What Influences Banks' Lending in Sub-Saharan Africa?

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1. Introduction

Banks play a key role in financing economic activities in a country. By its very nature, banking is an attempt to manage multiple, and seemingly opposing, needs. Banks accept deposits, by assuring savers that their deposits are liquid and secured. They provide liquidity on demand to depositors and extend credit as well as liquidity to borrowers through lines of credit (Kashyap et al., 1999). Due to these fundamental roles, banks have always been concerned with both solvency and liquidity risk. Hence, banks actively evaluate and take risks on a daily basis as part of their core business processes. To assess and manage risks, and extend credit, banks must have effective ways to determine the appropriate amount of capital that is necessary to absorb unexpected losses arising from their market, credit and operational risk exposures.

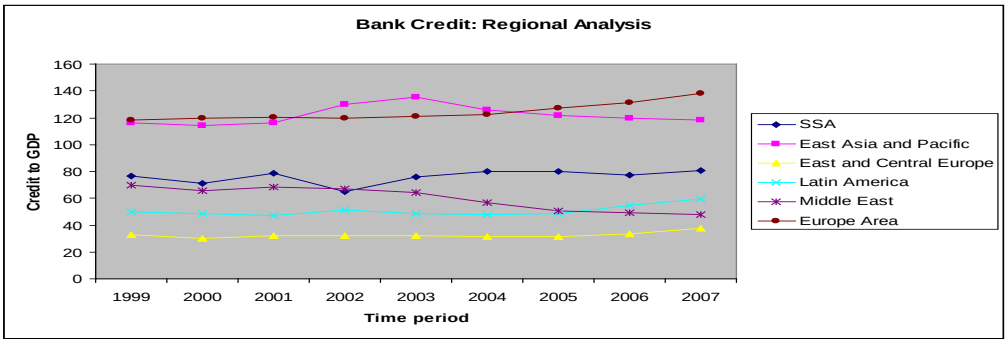
The issue in determining the appropriate level of bank capital depends on how a bank is governed and regulated. Banks participate in, and influence, the governance of firms through the extension of credit. The credit relation arises because banks, in their role as delegated monitors, operate beyond passive lenders. They involve themselves in shaping the operations of borrowers through screening, monitoring and enforcement of loan repayment thus involving themselves in forms of corporate governance. More importantly, the governance of banks also influences their lending behaviour. Good corporate governance of banks also matters because their services require the public to have confidence in the system. Since banks offer liquid deposits backed, in part, by illiquid loans with limited markets, this confidence depends to a large degree on the quality of the banks' investment choices, including their loan decisions.

Studies have, however, shown that bank lending is, not only constrained by the level of capital, risk or its governance, but also that the lending decision of banks is directly hampered by monetary policy actions, macroeconomic uncertainty, legal and financial structure as well as regulatory environments (Cecchetti, 1999; Ehrmann et al., 2003; Balazs, et al., 2006; Pruteanu-Podpiera, 2007; Baum et al., 2009; Quagliariello, 2009). Thus, the supply of bank loans depends on banks' financial positions (Balazs et al., 2006), the country's financial structure (Hainz, 2003), the monetary policy (Pruteanu-Podpiera, 2007), the macroeconomic environment (Sacerdoti, 2005; Baum et al., 2009), and regulatory framework (Cotarelli et al., 2003).

The recent trend in financial intermediation suggests less impressive performance of banks in the supply of loans to the private sector in sub-Saharan Africa (SSA). Figure 1 depicts the development of private sector credit relative to GDP of SSA banks, which has been increasing steadily. However, the performance of banks in Africa is below that of Continental Europe and Asia East and Pacific. What accounts for such performances of

banks in SSA? What are the credit delivery constraints in SSA? Are they microeconomic issues? Are they monetary policy related constraints? Or are they issues bordering on macroeconomic environments? This study first discusses credit delivery constraints in SSA, providing some stylized facts then clearly states the objective of the study. This is followed by a review of relevant literature in the subject area for which framework, data analysis and methodology have been developed. The final chapter presents the summary of findings, and the conclusion and policy recommendations emanating from the research.

Figure 1: Total bank credit to private sector as a share of GDP



Note: Data is aggregated averaging across regions and are obtained from World Bank Development Indicators 2009.

Credit delivery constraints in SSA

The main characteristic of sub-Saharan Africa (SSA) is that the stock of bank credit to the private sector remains very low. Table 1 shows that, with the exception of South Africa and Mauritius, which seem to have well-developed financial infrastructure and whose private sector lending is more than 80% of GDP, private lending was 17% of GDP during the period 2004-2007.

There are a numbers of factors that could explain the current position of bank lending in SSA, vis-à-vis the liquidity and the broad money supply. Poor bank credit, according to the 2006 IMF report is, in itself, a function of widespread poverty. A high share of the population is engaged in subsistence agriculture. Certainly, the large concentration of populations on subsistence production limits the financial resources available for intermediation. Demirguc-Kunt et al. (2004) argue that, in low-income countries, private sector correlates positively with GDP per capita income and negatively with the size of the agriculture sub-sector. The low performance of SSA banks in the area of credit has occurred in the area of high liquid reserves, broad money ratio (excess liquidity) and extreme risk aversion in the banking system (IMF, 2006). In addition to excess liquidity and the high ratio of non-performing loans in the SSA banking system, the debt position of SSA countries has also accounted for the poor performance in bank credit extension (Nissanke and Aryeetey, 2006; Christensen, 2004; Collier and Guning, 1999; Nissanke and Aryeetey, 1998).

The issue of non-performing loans could largely be due to the limited capacity of banks in SSA to monitor and efficiently assess the risk of their loan clients. Nissanke and Aryeetey (2006) added that SSA banks predominantly extend credit to large-scale formal real sector activities, the bulk of which are owned by the state. These organizations are characterized by inefficiencies which have resulted in low return and poor financial performance. A corollary to the non-performing loans is the issue of enforcement of contracts in SSA. Mcdonald and Schumacher (2007) emphasize that, banks will be willing to extend more credit if, in the event of default, they could enforce contracts by ensuring repayment or seizing of collateral.

Table 1: Credit indicators of SSA banks

	Ratio of bank liquid assets to total assets			Ratio of M2 To GDP			Bank credit to private Sector as a % of GDP		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Angola	25.2	14.4	16.5	11.9	13.9	15.6	5.1	7.4	10.5
Benin	15.7	11.9	14.9	25.1	28.2	30.7	16.2	16.8	19.6
Botswana	5.6	8.7	8.9	26.0	30.5	37.6	19.0	18.3	19.9
Burkina Faso	7.6	8.9	11.4	19.9	19.4	21.3	16.4	17.0	16.8
Burundi	12.3	12.3	9.2	29.3	33.6	34.9	20.4	21.9	21.0
Cameroon	28.7	38.5	46.3	16.9	17.0	18.1	9.5	9.2	9.3
Côte d'Ivoire	9.0	9.6	8.2	23.3	24.1	27.0	13.6	14.1	16.0
Eritrea	18.1	19.2	20.8	115.3	113.9	115.8	27.6	26.0	20.7
Ethiopia	36.9	19.8	24.1	40.7	39.2	25.3	19.0	20.6	18.7
Gabon	20.0	26.6	15.8	16.4	18.2	18.2	8.3	9.3	12.0
Gambia, The	20.7	16.8	16.7	43.9	48.8	50.1	12.8	15.4	15.8
Ghana	9.4	10.4	..	27.6	29.2	..	15.4	17.7	23.8
Guinea-Bissau	107.7	23.7	33.2	30.3	33.6	36.3	1.1	2.0	3.2
Kenya	7.5	7.4	8.3	37.1	36.9	39.1	26.3	26.3	27.2
Lesotho	10.2	5.3	4.6	27.4	30.1	33.7	9.3	9.4	10.7
Liberia	32.1	34.5	30.8	18.4	21.1	23.1	..	..	..
Madagascar	20.1	19.5	24.0	19.9	19.5	20.5	9.9	10.1	10.2
Malawi	22.5	9.8	8.4	14.9	13.6	14.9	5.4	6.4	7.3
Mauritius	2.2	1.8	1.9	99.3	100.5	101.3	75.3	74.2	77.7
Mozambique	14.0	14.6	13.1	25.2	26.5	28.9	11.8	13.3	13.5
Namibia	2.5	2.2	2.3	41.9	44.8	49.8	51.8	50.8	49.9
Nigeria	16.6	10.9	7.7	16.1	16.5	22.6	13.2	13.2	25.3
Senegal	13.6	11.2	13.8	32.5	34.0	34.7	22.5	22.6	22.7
Sierra Leone	10.9	6.3	7.7	18.2	19.0	19.7	4.3	4.4	5.3
South Africa	2.8	2.7	2.7	55.8	59.5	62.7	68.8	76.6	81.9
Swaziland	4.9	6.4	7.0	20.7	21.6	23.6	21.6	23.5	24.9
Tanzania	12.1	11.4	13.9	23.2	26.5	28.3	10.2	12.7	14.9
Togo	8.1	10.6	7.0	27.9	30.1	34.8	17.5	16.8	21.3
Uganda	14.2	11.2	11.8	17.9	18.5	19.2	8.6	10.1	10.2
Zambia	25.3	27.8	21.2	17.3	17.9	20.6	7.7	9.7	11.8

Note: Liquidity is a ratio of total bank liquidity as a percentage of total banking assets; the ratio of M2 to GDP measures broad money as a proportion of GDP; bank credit to private sector is the total credit to private sector as a percentage of GDP. These data are obtained from World Bank development indicators, June 2009.
------ Information not yet available

On the issue of SSA financial system, Nissanke and Aryeetey (1998), suggest that the decades of prolonged financial repression could be a factor of low bank lending. They argue that economic growth in African countries was retarded because the size of the financial system was reduced by the distortions of financial prices, control over credit allocation, interest rate ceilings, and fixed exchange rates. The pressure of government domestic financing practices has also led to crowding out of the credit to the private sector.

Table 2 shows that, with the exception of Botswana and Ethiopia, total debt stock of SSA has been increasing and this has been confirmed by a study in SSA. Christensen (2004) conducted a study in 27 SSA countries over the period 1980-2000 and found evidence to suggest that government domestic securitized debt crowded out credit to the private sector. He concludes that an expansion of domestic debt of 1% relative to broad money is associated, on average, with a decline of the ratio of private sector lending to broad money of 0.15%.

Table 2: Debt stock to GNI and broad money growth

	Debt stock to GNI			Broad money growth		
	2005	**2006**	**2007**	**2005**	**2006**	**2007**
Angola	47.54	26.18	26.19	60.54	57.34	38.55
Benin	43.13	17.54	15.78	26.26	14.50	19.63
Botswana	4.87	3.99	3.45	10.65	67.43	31.17
Burkina Faso	37.02	19.51	21.74	-4.81	10.97	23.84
Burundi	170.29	162.28	154.60	24.27	22.96	13.76
Cameroon	45.62	19.00	15.34	4.90	10.26	14.87
Côte d'Ivoire	76.43	77.30	73.63	7.69	10.26	23.61
Eritrea	63.85	62.84	64.07	10.67	5.76	12.11
Ethiopia	51.02	15.08	13.57	18.59	19.99	-46.82
Gabon	49.90	50.81	56.18	27.54	16.35	6.94
Gambia, The	159.96	157.59	122.86	13.13	26.24	6.66
Ghana	64.02	25.40	29.85	9.35	42.82	..
Kenya	34.26	29.02	30.29	9.88	17.00	20.41
Lesotho	38.28	34.80	33.71	9.14	35.31	16.35
Madagascar	69.88	26.74	22.68	2.25	26.44	20.92
Malawi	113.14	27.91	24.58	16.25	16.42	36.59
Mali	63.31	29.86	30.62	9.80	5.99	13.72
Mauritius	49.72	41.16	62.05	7.51	10.06	15.43
Mozambique	73.95	47.52	44.02	24.28	21.39	26.25
Nigeria	22.31	5.76	6.03	22.60	36.35	64.24
Senegal	45.30	21.00	23.36	8.16	12.48	13.05
Seychelles	98.19	148.72	190.78	1.65	3.03	-7.97
Sierra Leone	134.13	95.85	21.38	31.29	21.45	22.65
South Africa	13.10	14.12	15.82	19.90	21.19	20.15
Swaziland	15.96	15.01	13.30	9.72	25.08	21.47
Tanzania	55.68	30.08	31.39	34.78	21.50	20.51
Togo	80.99	81.99	80.13	2.25	22.61	16.77
Uganda	49.24	13.02	13.95	17.18	16.92	21.97
Zambia	80.19	23.50	27.94	3.16	44.18	25.27

Note: Debt stock to GNI is the total debt of a country as a percentage of GNI. Broad money growth is the annual growth rate of broad money supply. . These data are obtained from World Bank development indicators, June 2009.

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To enhance credit delivery, and to foster a credit culture in SSA, Sacerdoti (2005) suggests, among other things: efficient accounting standards, availability, and quality, of collateral, credit information, and credit recovery. Questions raised with regards to low credit delivery in SSA are whether the situation is due to bank-specific conditions, a fragmented financial system, the subject of monetary policy, the macroeconomic environment or related to regulatory frameworks. The study responds to these questions by examining the broad determinants of credit delivery in SSA. This is because it is only when the banks' lending determinants are identified that the necessary policy actions can be put in place to reduce the constraints related to the credit supply.

Objectives of the study

The study aims at examining the determinants of bank lending. It focuses on whether bank lending in SSA is influenced by bank-specific characteristics, the monetary policy stance, macroeconomic variables, and legal and financial structure. The study, in particular, empirically investigates and analyses the key determinants of bank lending in SSA.

2. Literature review

In the literature, the supply of bank loans is usually expressed as a function of internal and external determinants. The internal determinants are termed micro or bank-specific determinants of bank lending, while the external determinants are variables that are not related to bank management but reflect the monetary, economic and legal environment that affect the operation and performance of financial institutions. According to Athanasoglou et al. (2008), the number of explanatory variables that have been proposed for both categories depends on the nature and purpose of each study.

Bank-level environment

Studies dealing with internal determinants employ variables such as size, liquidity, capital, and management efficiency. Bank size is introduced to account for existing economies or diseconomies of scale in the market. Smirlock (1985) finds a positive relationship between size and bank performance; suggesting that, the bigger the bank, the higher the supply of loan. Demirguc-Kunt and Huizinga (2000 on their part, argue that the extent to which various financial, legal and other factors affect banks' performance is closely related to size. Bikker and Hu (2002) and Goddard et al. (2004) link bank size to capital and hence performance. Thus, the size of bank and the capitalization level of banks define the banks' health and level of economies of scale. However, Ehrmann et al. (2003) find no relationship between capitalization level of European banks and supply of loan. Instead, liquidity, to an extent, allows the bank to draw on it instead of going to the market. According to Kashyap and Stein (2000) and Pruteanu-Podpiera (2007), liquidity reduces the increase in the marginal cost of funds after a monetary tightening. In SSA, however, excess liquidity has been suggested as a factor that inhibits bank lending. High levels of reserve requirements on deposits in developing countries have also been cited as an instrument of financial repression (Chamley and Honohan, 1990). Thus, bank-specific factors will determine credit availability. Balazs et al. (2006) argue that, changes in banks' financial position affect the availability of credit supply in developing countries. High non-performing loans on the balance sheet of SSA banks could explain the weak credit delivery that exists in most African countries. In this study, broad measures of bank stability are used as a determinant of bank lending in SSA.

Macroeconomic environment

A banks' balance sheet position is not the only factor that influences the supply of bank loans. Studies suggest that the stance of monetary policy reflected in the level of interest

rate affects the supply of bank loans. According to Hofmann (2004), the supply of bank loans may arise from the effect of monetary policy on the creditworthiness of firms (balance sheet channel) and of households (interest rate channel) via its effect on their financial positions, or from a drain of reserves and, consequently, loanable funds from the banking sector (bank lending channel) following changes in the stance of monetary policy operated through open market sales by the central bank. However, there is no conclusive position on the effect of monetary policy on bank lending. Bernanke and Gertler (1995) refer to this as 'a black box'. Some empirical studies find no evidence of a significant influence in bank lending with changes in monetary stance, whilst others find a significant relationship. For example, Gertler and Gilchrist (1993) conducted a study which specifically looked at how banks' business lending responds to policy tightening. Their study reveals that business lending does not decline when policy is tightened. In contrast to Gertler and Gilchrist's (1993) findings, (Kashyap and Stein (1995), Ehrmann et al. (2003) and Pruteanu-Podpiera (2007) find evidence that the supply of bank loans may respond to a tightening of monetary policy.

In addition to the monetary policy stance and bank balance sheet position, there is evidence supporting the hypothesis that macroeconomic conditions affect the performance of the banking system and this affects financial intermediation (Quagliariello, 2007; Baum et al., 2005; Al-Haschimi, 2007; Beck and Hesse, 2006; Chirwa and Mlachila, 2004). Using panel data, Quagliariello (2007) found that during economic booms, banks tend to expand their lending activity, often relaxing their selection criteria resulting in an increase in bad loans. Hoggarth et al. (2005) provides a link between the state of the UK business cycle and the banks' supply of loans. On their part, Baum et al. (2005) use a sample of US bank and portfolio models and find that, as macroeconomic uncertainty increases, the cross-bank dispersion of the share of risky loans to total assets diminishes since the uncertainty hinders bank ability to foresee investment opportunities. Thus, the uncertainty pushes banks to rebalance the composition of their assets in line with the new signals revealed by credit markets. This adversely affects the allocation of financial resources. Garcia and Calmes (2005) use a similar approach on Canadian banks and confirm that there is a negative relationship between macroeconomic uncertainty and the cross-bank variance dispersion of the loan-to-asset ratio. Quagliariello's (2009) interpretation of Baum et al. (2005) and Garcia and Calmes' (2005) findings is that, macroeconomic uncertainty fosters herding behaviour and this leads banks to behave more homogeneously than during a stable period. However, macroeconomic uncertainty has a limited effect on SSA banks' performance in relation to their credit delivery (Al-Haschimi, 2007). This evidence is consistent with the results of other country-specific studies in SSA.[1] In SSA, it is the governments' fiscal deficit and the level of public debt that explain the level of financial intermediation. Christensen (2004), regressing private sector lending on domestic government debt reveals evidence of some crowding out. Though monetary policy stance and macroeconomic uncertainty influence the supply of credit to the private sector, the regulatory environment plays a role in determining bank lending. Cottarelli et al. (2003) show the effect of the institutional and regulatory environment as well as economic policy impact on private sector credit growth. They use variables that capture the level of financial liberalization, the quality of implementation of accounting standards, entry restrictions and the evolution of public sector debt. For

this study, entry restrictions, entry requirement, supervisory power, and initial capital requirements are employed as contestability variables.

Bank market structure

Studies have revealed that several features of national banking structures are important for the response of bank lending to a monetary policy action, and for the assessment of the macroeconomic importance of such response. Campello (2002) examines the role of internal capital markets in influencing the investment allocation process of conglomerate banks. The results suggest that, frictions between conglomerate headquarters and external capital markets are at the root of investment inefficiencies generated by internal capital markets. Brissimis and Magginas (2005), on their part, find mixed results. In the US and UK, where financial systems are market-based, the market structure has no significant impact on determining supply of bank loans to private sector. On the one hand, their results suggest that the financial structure significantly influences the supply of bank loans in Japan and other three other European countries - Germany, France and Italy. Cecchetti (1999) also finds that the strength and the magnitude of the supply of bank loans depend, not only on the size and the concentration of the banking system, but also on the legal structure as well. Cihak and Podpiera (2005), on their part, examine the behaviour of Eastern Africa countries' banks and concluded that, despite a number of financial sector reforms to enhance bank credit, a great deal still remain to be done to further strengthen the environment for the development and efficient function of the financial system in SSA. Thus, the current financial systems do not support bank lending in SSA. A corollary to the above is the type of branch network in SSA, which studies (Beck et al., 2005) have shown to affect credit delivery. Branch networks are generally small and concentrated in Africa. This, they concluded, makes physical access to financial services very difficult. The average branch network density in SSA is only six branches per 1000 square kilometres, compared with 34 for non–SSA countries (IMF, 2005). Clearly, the type of banking structure determines the supply of bank loans.

3. Data and methodology

The bank credit delivery model

The analysis of the determinants of bank credit delivery in SSA considers bank portfolio behaviour using data measured over a period of time as well as across many banks in a number of countries. This study uses the panel data regression model and the analysis are conducted using data over an eight-year period, 2000-2007, covering 264 banks from 24 SSA countries. The model specification followed that of Baum et al. (2009), Balazs et al. (2006) and Cottarelli et al. (2003). The relationship between bank financial position, monetary and macroeconomic shocks, on one hand, and bank credit delivery, on the other hand, can be intuitively explained as follows: during stable periods, banks take advantage of the perceived investment opportunity and respond more accurately to loan demand, having identified and assessed their balance sheet position and regulatory environment. Conversely, during the period of uncertainty, where the returns to bank lending are difficult to predict because the environment provides no prospect to identify profitable and viable lending opportunities, bank lending reduces. The study considers the relationship where credit delivery is a function of monetary policy stance, economic activities, bank market structure, regulatory initiative and bank-specific characteristics. Following Adams and Amel (2005), the study employs the dollar amount of bank loan to private sector in period as the dependent variable as:

$$Credit_{ic,t} = \alpha_1 Credit_{ic,t\text{-}1} + \sum_j \alpha_j X^{j}_{ic,t} + \sum_m \alpha_m X^{m}_{c,t} + \varepsilon_{i,t} \quad (1)$$

Where $Credit_{ic,t}$ is the dollar amount of bank *i* credit to private sector of country *c* in period *t*; $Credit_{ic,t\text{-}1}$ is the observation of the same bank from the same country in the previous year; the variables $X^{j}_{ic,t}$ and $X^{m}_{c,t}$ denote bank-specific characteristics, respective countries' specific macroeconomic environments, market structure and regulatory initiatives; are the parameter vectors; and is ε_{it} the disturbance term. Equation 1 recognizes that the credit delivery equation captures the impact of adjustment in derived demand in a dynamic panel format. The estimation, therefore, takes into consideration a lagged dependent variable among the explanatory variables. The advantage of this approach, according to Baum et al. (2009), is that behaviour of bank lending can be directly related

to a measure of bank-specific characteristics, bank market structure, regulatory initiatives and monetary, and macroeconomic shocks.

Explanatory variables

Our estimation for bank credit to the private sector relies on explanatory variables used in the previous studies (see Table 3). However, I extended the previous studies to include the impact of bank-specific, market structure, contestability, monetary, and general level of economic development variables on bank lending. The main explanatory variables are measured and described as follows:

Table 3: Overview of studies on determinants of credit delivery

Author(s)	Dependent variable	Explanatory variables
Hofmann (2004)	Credit to private sector as a %age of GDP	GDP growth, real interest rates, property prices, inflation rates
Cottarelli et al. (2003)	Credit to private sector as a %age of GDP	Financial liberalization index, accounting standard, entry restriction, legal system, public debt
Boissay et al. (2006)	Credit to private sector as a %age of GDP	GDP per capita, real interest rate, quadratic trend
Kiss et al. (2006)	Credit to private sector as a %age of GDP	GDP per capita, real interest rate, inflation rates
	Credit to private sector as a %age of GDP	GDP per capita in purchasing power standard (PPS), inflation rates, short-term and long-term nominal rates, inflation, housing prices, liberalization index
Quagliariello (2009)	Dispersion of bank loan-to-asset ratio	Industrial production index, consumer price index

Source: Balazs et al. (2006) and author's extension.

Bank-specific variables

Studies on bank lending behaviour have noted that, bank-specific variables have a capacity to explain the behaviour of credit delivery (Kishan and Opiela, 2000; Kashyap and Stein, 2000; Gaiotti and Secchi, 2006). More specifically, the size of the bank, the efficiency of the management, bank liquidity, bank capitalization level, and bank growth are the bank-specific variables used in our discussion on bank lending behaviour in SSA. Bank size is measured as a logarithm of total assets, where the total bank assets are the sum of current assets and non-current bank assets.[2] On management efficiency, a bank with efficient and productive management and labour force, ceteris paribus, enjoys higher margin and consequently, higher supply of bank loans (Gaiotti and Secchi, 2006). Management efficiency is measured as the earning assets divided by total assets. Liquidity of the bank is included to control for the reserve position of the bank. Liquidity is constructed as total cash plus bank total short-term investments divided by total assets. For this study,

excess liquidity is used as it reflects the shallowness of the financial market as well as the inefficiency of banking operations shown in high intermediation and transactions costs. Excess liquidity is calculated as the difference between banks liquidity ratio and bank reserve ratio requirement. The bank growth is controlled for the possibility of its effect on bank lending. Bank growth is measured as a first difference of total assets divided by previous total assets. Capital ratio is included because the introduction of the Basel Accord in 1988 has made banks increasingly focused on managing their capital base as buffer against default. Bank capitalization is measured as the ratio of equity capital to total assets.

Market structure variables

Concentration, bank density and the Lerner index are used as bank market measures. Bank concentration is measured as a fraction of a country's total banking assets held by three banks; the logarithm of the number of banks per million inhabitants in a particular country, as a proxy for the density of banks; and the Lerner index as a measure of bank market power. The Lerner index provides a direct measure of the degree of market power as it represents the mark-up of price over marginal cost. It is the only measure of competition, according to Berger et al. (2009), calculated at the bank-level as $Lerner_{it} = (Price_{it}\text{-}MC_{it})/Price_{it}$. Here, the $Price_{it}$ is the price of the total assets calculated as a ratio of total income to total assets. MC_{it} is the marginal cost of producing an additional unit of output and it is derived from the translog cost function.

Bank stability

The performance of a bank depends on the viability and the stability of the bank (Allen and Gale, 2004). Different risk exposure indicators are used as a proxy for bank stability: the Z-score is used as a measure of overall bank risk, the risk adjusted profit as a measure of performance, the volume of non-performing loans to total gross loans to measure the bank loan portfolio risk. The Z-score is measured as return on asset plus the capital ratio and the resultant figure is divided by the standard deviations of return on assets as:

$$Z\text{-}score = \frac{ROA + E/TA}{\sigma ROA} \tag{2}$$

There are two alternative measures of bank risk that affect credit delivery to private sector. The first of these, the Sharpe ratio, is also considered. This ratio is defined as the mean of return on equity (calculated as post-tax profits relative to equity) divided by the standard deviation of the return on equity. The Sharpe ratio, therefore, measures the risk-adjusted rate of return and it is calculated only if the bank data for at least four years are available (Demirguc-Kunt and Huizinga, 2010). The Sharpe ratio is calculated as:

$$Sharperatio = \frac{ROE}{\sigma_{ROE}} \tag{3}$$

The second alternative measure of bank risk is the volume of non-performing loans to total gross loans to measure the bank loan portfolio risk. The ratio of non-performing loans to total gross loans is used as a proxy for loan portfolio risk. It is calculated as non-performing loans to total loans. A higher value indicates a more risky loan portfolio.

Regulatory/contestability variables

Activity restrictions, entry into banking requirements, initial capital requirement, and bank supervision power are used as contestability (regulatory) variables. These variables have been found to explain credit delivery in Eastern Europe (Cottarelli et al., 2003). Activity restrictions measure the degree to which national authorities allow banks to engage in activities that generate non-interest income. It indicates the limits imposed on commercial banks to participate in securities markets, insurance and real estate activities. The measure varies from four to 16, with higher scores indicating more restrictions. The entry requirement indicates the severity (range from 0 to 8) of entry regime with higher values indicating more restrictiveness.[3] Capital index measures overall capital stringency. It ranges from 0 to 9, with a higher value indicating greater stringency. The official supervisory power describes whether the supervisory authorities have the power to take specific actions to prevent and correct problems and it ranges from 0 to 16, with the higher score indicating more supervisory power.

General level of development

The study also suggests controls for general economic development, macroeconomic and monetary stability and institutional framework as these are likely to affect banking system performance. GDP growth is used to control cyclical output effect which, it assumes, has a positive influence on bank lending. However, when the GDP growth slows down, particularly during recessions, credit quality deteriorates, and default increases thus, reducing subsequent bank lending (Flamini et al., 2009). As a result, GDP per capita is employed to control different levels of economic development in each country and year. GDP/GDP per capita growth is measured as the annual rate of growth of GDP/GDP per capita, and inflation is measured as the annual growth rate of the CPI index. While the GDP/GDP per capita growth captures the possible effect of the business cycle and the level of economic development, the banking system is less likely to supply loans when it is subject to high inflation, in that, prices of financial services such as interest rates become less informative. On monetary policy stance, empirical literature on bank lending has ample evidence on the link between monetary policy and lending. Indeed, there is no conclusive stand on the effect of monetary policy on bank lending (Bernanke and Gertler, 1995; Kashyap and Stein, 1995; Gertler and Gilchrist, 1993). The literature is still not conclusive on the best indicator of monetary policy stance. In this study, the respective countries' interest rates are used as a measure of monetary policy indicator.

The study incorporates the stock market capitalization, banking freedom and financial reform index. The size of the country's stock market capitalization to GDP is used as a proxy for contribution from non-bank financial institutions. The banking freedom provides the overall measures of the openness of the banking sector and the extent to

which banks are free to operate their businesses. The measure describes the country's financial climate and assigns an overall score of between 0% and 100%, with a higher percentage score signifying more freedom. For financial reforms index, information from the database of (Abiad et al., 2010), which covers 91 countries from 1973 to 2006, are used. The index is multi-faceted and graded measure can be used to empirically investigate the effect of reforms on financial sector outcomes such as increased financial intermediation.

Data sources

The study employs both micro-firm level and macro-country level data. Bank-level data is taken from BankScope database maintained by Fitch/IBCA/Bureau Van Dijk. Series are yearly, covering a sample of 264 banks across 24 sub-Saharan African countries during the eight-year period, 2000–2007. As the study focuses on bank intermediation, unconsolidated balance sheet data, whenever possible, are opted for even though in some cases the study have to depend on consolidated statement because of data unavailability. The sample includes all commercial banks, cooperative banks, development banks, savings banks, real estate and mortgage banks for which annual data is available for some period or the years during the period 2000–2007. To ensure that banks that are important players in the deposit and/or loan markets are not omitted, medium- and long-term credit banks and specialized government institutions are included as they remain important in SSA countries. The use of BankScope has an advantage since the accounting information on banks are standardized. This is after necessary adjustments are made for differences in accounting and reporting standards across countries. Macro data are obtained from the World Development Indicator of the World Bank and International Financial Statistics database of the International Monetary Fund and the respective central banks. The series includes GDP/GDP per capita growth, inflation, exchange rates, average policy interest rates, the Treasury Bill rate, interbank rate, and money market rate. Activity restrictions, entry into banking requirements, capital stringency and supervisory power variables are obtained from Barth et al. (2004), while banking freedom data are taken from Heritage foundation. Financial reform index are taken from Abiad et al. (2010). Appendix V provides summary and the sources of various variables used in the study.

4. Empirical results

Summary statistics

Descriptive statistics are presented in tables 4, 5 and 6. Table 4 provides bank-specific variables averaged for the period 2000-2007; Table 5 provides summary statistic for bank market structure and contestability; while Table 6 deals with the measures of banking stability. The summary statistics of the entire sample are also presented in Appendix I. This shows the mean, standard deviation, the minimum and the maximum values, as well as the total observation.

Table 4: Bank-specific variables: Averages for the period 2000–2007

	Loan to assets	Bank size	Liquidity	Mgt efficiency	Bank growth	Capital ratio
Benin	0.5583	252.3278	0.1421	0.8033	0.1005	0.0929
Burkina Faso	0.6028	206.3341	0.1698	0.8578	0.1383	0.0883
Cameroon	0.5115	475.4163	0.2453	0.8676	0.1484	0.0752
Cote d'Ivoire	0.6247	412.0526	0.1439	0.8328	0.0935	0.0918
Ghana	0.4035	154.9792	0.4989	0.8327	0.3829	0.1189
Nigeria	0.3580	1554.3790	0.6178	0.8381	0.3672	0.1546
Senegal	0.5657	344.8411	0.1411	0.8772	0.1499	0.0946
Sierra Leone	0.2519	32.8857	0.1788	0.8137	0.1958	0.1943
Togo	0.5788	121.1300	0.3420	0.7588	0.1325	0.1779
Kenya	0.5628	223.7234	0.4662	0.8460	0.1673	0.1861
Uganda	0.4255	133.9829	0.4590	0.8788	0.2288	0.1393
Tanzania	0.3845	186.9849	0.5074	0.8738	0.2579	0.1317
Ethiopia	0.5918	526.0118	0.3142	0.8850	0.2593	0.1163
Angola	0.2400	653.6827	0.3458	0.7729	0.4372	0.1281
Botswana	0.5493	409.5558	0.3298	0.9289	0.2139	0.1930
Malawi	0.3377	62.0842	0.3563	0.7800	0.2741	0.1335
Madagascar	0.4641	151.2108	0.2871	0.7310	0.1660	0.1085
Mauritius	0.5827	790.8535	0.1932	0.8914	0.1350	0.1826
Mozambique	0.4091	223.9475	0.3466	0.7420	0.2525	0.1549
Namibia	0.7318	520.1613	0.1721	0.9373	0.1766	0.3107
South Africa	0.6567	8104.8160	0.2842	0.9272	0.1588	0.1779
Swaziland	0.7047	137.9059	0.2204	0.8883	0.1281	0.1436
Zambia	0.2849	129.9619	0.5363	0.8137	0.2569	0.1784
Zimbabwe	0.4036	1358.3580	-0.0879	0.7414	0.2025	0.1628

Bank equity represents average capitalization of respective countries' banks; loan to assets indicate portfolio mix; the bank size is the average total assets, management efficiency and bank growth. The mean values of the selected banks over the period 2000-2007 are in percentage terms except for bank size which is in millions of US dollars.

Table 4 shows that, on the average, 73.18% of Namibian banks' assets in the sample are loans extended to customers. This is the highest in the sample. The least is the Angolan banks, whose average loan portfolio is 24%. The overall average is 49.10%, indicating that more than 50% of the selected African banks' assets are outside loans. South African (SA) banks are the largest banks in terms of size. The average bank size of the SA banks is more than 8,104 million US Dollars. On management efficiency, Botswana banks' management are most efficient with the most growing banks located in Angola. However, Namibian banks are the most capitalized with a percentage of 31.07, the highest capitalization level among the sample, while Nigerian banks are the banks with excess liquidity.

Table 5: Financial structure and contestability

	Financial Structure			Contestability		
	C3 (%)	Bank density	Market power	Activity restriction	Entry require-ment	Capital string-ent
Benin	0.8429	0.0000	0.16597	10.500	8.000	7.000
Burkina Faso	0.6662	0.0000	0.04301	10.500	8.000	7.000
Cameroon	0.6369	0.5272	0.54417	9.500	8.000	3.000
Côte d'Ivoire	0.6266	0.0000	0.78942	10.500	8.000	7.000
Ghana	0.5885	1.4583	0.25226	10.500	8.000	6.000
Nigeria	0.4584	0.4730	0.32018	12.000	8.000	5.000
Senegal	0.6263	0.0000	0.35988	10.500	8.000	7.000
Sierra Leone	0.8718	0.0000	0.06861	10.000	8.000	…..
Togo	0.9427	0.2690	0.91797	6.000	8.000	7.000
Kenya	0.3370	1.5363	0.21031	11.000	7.500	7.000
Uganda	0.5369	0.0000	0.36347	12.000	8.000	5.000
Tanzania	0.4593	0.0000	0.30627	9.000	8.000	3.000
Ethiopia	0.8627	0.0003	0.42468	15.000	5.000	2.000
Angola	0.7151	0.5905	0.07575	12.500	8.000	3.000
Botswana	0.7242	7.5766	0.20806	10.000	8.000	6.000
Malawi	0.6116	0.0006	0.31535	13.000	8.000	5.000
Madagascar	0.7712	0.0000	0.30246	11.000	7.000	7.000
Mauritius	0.5036	13.8419	0.21698	11.000	7.500	5.000
Mozambique	0.7344	0.0008	-0.08541	11.000	8.000	4.000
Namibia	0.4142	7.3006	0.46569	11.250	8.000	2.000
South Africa	0.2698	1.7088	-0.03238	9.000	8.000	7.000
Swaziland	0.6727	6.1758	0.19379	14.000	7.000	4.000
Zambia	0.6275	1.7817	0.33030	…	…..	…..
Zimbabwe	0.3834	0.0001	0.26762	10.000	8.000	6.000

CR (3) % is three bank concentration ratio; bank density is the number of banks per million population; activity restriction is the degree to which national authorities allow banks to engage in activities that generate non-interest income; entry requirements are the specific legal submissions required to obtained a licence to operate as a bank; and the capital stringency is the explicit regulatory requirement on the amount of capital that a bank must have relative to various guidelines.

------ Information not yet available

Regarding financial structure and contestable variables, Table 5 shows that least concentrated banking systems are located in SA and the largest number of banks per million of population is in Mauritius, i.e., Mauritius has the highest bank density. Togolese

banks are the banks with the highest market power. Activity restrictions are severe among the Ethiopia banks. This means that banks in Ethiopia can not freely engage in non-banking activities such as securities markets, insurance and real estate. In addition to that, Ethiopia scores least with regard to entry requirement. It is, therefore, easy to establish banking activities in Ethiopia. On the issue of initial capital requirement, SA banks seem to have the most capital stringency requirements.

Table 6: Measure of bank stability

	Z-score	Sharpe ratio	Bad loan
Benin	10.08392	0.79597	0.12688
Burkina Faso	12.66114	2.30429	0.11106
Cameroon	14.98758	2.57901	0.11919
Côte d'Ivoire	8.34316	0.58859	0.08294
Ghana	11.75616	3.28749	0.11333
Nigeria	14.80174	1.95349	0.13765
Senegal	22.37535	3.74055	0.05615
Sierra Leone	7.72912	2.01718	0.31804
Togo	17.38936	2.11418	0.31642
Kenya	22.14288	2.43361	0.18155
Uganda	11.84336	2.35885	0.04331
Tanzania	13.70788	1.60701	0.10501
Ethiopia	12.36937	2.45812	0.13413
Angola	7.20847	0.69648	0.07227
Botswana	15.83030	4.42543	0.03671
Malawi	9.58383	2.56210	0.10396
Madagascar	9.24150	2.88216	0.07469
Mauritius	27.79948	3.27104	0.01931
Mozambique	12.67306	2.29813	0.07849
Namibia	18.41460	5.16238	0.06514
South Africa	15.13181	2.40621	0.12682
Swaziland	29.29393	3.16957	0.04153
Zambia	8.29063	0.40917	0.06997
Zimbabwe	3.21637	0.96761	0.09281

Z-score, RARA, RARE, non-performing loans and capital ratio are measures of bank's stability. The Z-score is used as a measure of overall bank risk; the risk adjusted profit as a measure of performance; the volume of non-performing loans to total gross loans to measure the bank loan portfolio risk; the equity capital to asset ratio to account for the bank's capitalization level.

On the measure of banking stability, Table 6 shows that Swaziland banks are the most stable and the least stable are the Zimbabwean banks with a Z-score of 3.21637 (SSA average is 14.03646). Namibian banks are the most profitable with a Sharpe ratio of 5.16238. Sierra Leonean banks have the highest non-performing loans, almost 32%, compared with the overall average of 10.94%.

Pair-wise correlation coefficients are used in this study as a first step to test the relationship between the key variables. The results are presented in appendixes II and III. The correlation coefficient between bank size and excess liquidity is negative and statistically significant indicating that smaller banks in Africa have excess liquidity. The reverse holds with efficiency as the bank size is positively correlated with efficient managed banks. On the correlation between Z-score and the size of the bank, one notes that stable banks increase their share of the market as the correlation coefficient is positive.

Next is the pair-wise correlation coefficient between C3 (%), a measure of concentration and the selected regulatory and contestability variables. Whereas concentration has a positive relationship with monetary policy, GDP growth, and inflation, it has a negative and statistically significant relationship with banking freedom, regulatory capital, and financial reforms. These results show that improving competitive environment strengthens regulatory capital, improves banking freedom as well as enhances financial reforms. These activities take place while monetary policy is tightened and economic growth falls.

Regression results

Cross-country determinants of bank loan to private sector

The specification in (1) relates the observed variation in the supply of bank loans to the private sector to its lag, a monetary policy indicator, and several control variables to account for the general economic environment. The specification of the model is based on data for 24 SSA countries for the period 2000-2007, and a random effects General Least Square estimation procedure. The random effect estimator is preferred given the interest of examining the effect of a number of time-invariant variables. In addition, a Hausman specification test could not reject the hypothesis of no correlation between the errors and the regressor. The regressions results are presented in columns using: bank-specific variable, bank market structure, bank stability and contestability that include regulatory initiative variables - activity restrictions, entry into banking requirements, capital stringent and supervisory power. Banking structure variables are concentration, density of banks and market power. The column labelled bank stability includes the Z-score, ratio of non-performing loans to total loans and Sharpe ratio (risk adjusted return on equity). All the regressions include monetary policy indicator and two macroeconomic variables to control differences in monetary policy stance, and macroeconomic shocks, and the respective countries' level of economic development. The results are reported in Appendix IV.

The entire countries' bank-specific variables sample statistically impact bank lending behaviour. The results show that, credit delivery to the private sector in SSA is influenced by the size of the bank, the liquidity position of such bank, the growth level, as well as the efficiency of the management of the banks. The coefficient of bank size, its growth variable and efficiency, is positive, demonstrating that, in SSA, it is bigger and most growing banks which provide credit to the private sector. The result shows that, ceteris paribus, one per cent growth of bank will increase credit to private sector by more than 35%. Also, the coefficient of the efficiency variable is positive suggesting that, in SSA, the most efficient banks support the private sector with loans. The relationship between bank credit and liquidity is negative and statistically significant. Bank liquidity is not a barrier for extending loans to those who demand bank loans. A possible explanation for this is that, banks in SSA, especially the most liquid ones, tend to use their liquid position for activities other than supply of loans. The lagged dependent variable positively influences credit delivery to the private sector. The current year banks' support to private sector is influenced by the previous year's results. Thus, the magnitude and significance of the coefficient on the lagged bank credit in our equations confirms the dynamic nature of the model.

With regards to bank market structure variables, we find evidence that supports the fact that the banking system structure does not necessarily explain bank lending behaviour in SSA. The only variable that influences credit supply is the concentration. The parameter of the concentration is negative and statistically significant, indicating a strong relationship between bank lending and concentration in SSA. The negative relationship shows that in the country where banks are most concentrated, the supply of loan is less. Contrary to this, we find that bank market power has a positive sign though insignificant, meaning that the bank with relative market power increases bank loan to the private sector. This finding, therefore, suggests that the bank's market power has no significant impact on bank lending behaviour in SSA.

On the issue of bank solvency, there is some evidence that the level of bank stability, risk adjusted profit, and non-performing loan ratio influence the supply of loans in SSA banks. That notwithstanding, the relationship between bank lending and the Z-score is insignificant: the positive coefficient indicates that a stable bank supplies more loans. Studies have shown that high non-performing loans on the balance sheet of banks hinder credit delivery. As expected, the coefficient of non-performing loans to total loan ratio is negative, meaning that SSA banks with high non-performing loans relative to their total loan portfolio will supply fewer loans.

Furthermore, the results show that activity restrictions, entry requirement, capital stringency and bank supervisory power, to a very large extent, explain the cross-country variations in bank lending. Activity restriction, entry requirement and supervisory power have positive relationship with the supply of loans. Severe entry requirements, effective supervisory power and allowing banks to concentrate on their core business of banking promote supply of banks loans in SSA. The positive coefficient of entry requirement shows that a country with rigid entry requirements provide an avenue for quality of new entrants, leading to less financial crisis and more credit delivery. More stringent initial capital requirement hinder credit delivery to private sector. The supervisory power has an insignificant positive relationship with bank lending in SSA. These findings show that, regulatory initiative, which restricts banking activities, imposes severe entry requirements and requires high regulatory capital influences on banks' decision to supply loans in SSA.

The policy–induced domestic interest rate is negative only in column 1. The effect of monetary policy shocks (as the coefficient indicates) on bank lending among banks in SSA shows that monetary policy reduces supply of bank credit in SSA, especially when the bank-specific variables are controlled. For example, on average, one per cent increase of policy-induced interest rate reduces bank credit to private sector by at least 3.5%. This finding suggests that, increasing policy interest rates reduces bank lending. The result is consistent with monetary policy theory and confirms existing empirical research that shows that bank lending increases when monetary policy stance is relaxed. Surprisingly, the monetary policy stance is positive in column 3 (where bank stability variables are controlled), meaning that bank lending increases when monetary policy is tightened. With respect to the influence of macroeconomic factors on each bank's lending, the study reveals that an increase in GDP growth increases bank lending in SSA. These findings are consistent with Quagliariello (2009) result that, in Italy, during economic booms, banks tend to expand their lending activity, often relaxing their selection criteria

resulting in an increase bank lending. Inflation does not seem to influence supply of bank loans. Inflation only impacts on bank lending when market structure variables are used as explanatory variables. The non-impact of inflation and insignificance of GDP growth in columns 2 and 3 on supply of loan is consistent with studies on SSA. For example, Al-Haschimi (2007) find that, macroeconomic environment has only limited effect on SSA banks' margins, and for that matter supply of loan; Beck and Hesse (2006) and Chirwa and Mlachila (2004) find similar results for Uganda and Malawi, respectively.

Benchmark estimation results

The term 'preferred model' is meant to reveal the impact of banking freedom and financial reforms on bank credit to private sector. Here, Equation 1 is estimated emphasizing how banking freedom and financial reforms in addition to some bank-specific, market structure and macroeconomic variable influenced banks' supply of loans. The results are presented in three columns. Column 1 is the benchmark model. In column 2, banking freedom and financial reform index are included. The objective is to find out whether a country that has reformed its financial sector and allows banks to operate freely influences credit. In column 3, South Africa is excluded from the estimation. The results are presented in Table 7.

Table 7: Determinants of bank credit delivery in SSA: Benchmark model

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Bank credit to private sector$_{t-1}$	0.4643***	0.4509***	0.4576***
	(0.0261)	(0.0290)	(0.0295)
Bank size	0.5264***	0.5347***	0.5314***
	(0.0268)	(0.0295)	(0.0298)
Excess liquidity	-0.6399***	-0.6512***	-0.6887***
	(0.0451)	(0.0516)	(0.0537)
Efficiency	0.3499**	0.2881**	0.3433***
	(0.1039)	(0.1166)	(0.1199)
Bank growth	0.2178***	0.2257***	0.1836***
	(0.0357)	(0.0380)	(0.0384)
Concentration	-0.3083***	-0.0505	0.0386
	(0.0625)	(0.1022)	(0.1053)
Bank density	-0.0075**	0.1021***	0.1596**
	(0.0035)	(0.0237)	(0.0282)
Z-score	0.0342**	0.0349***	0.0318**
	(0.0113)	(0.0115)	(0.0128)
Bank bad loan ratio	-0.0071	-0.0031	-0.1014
	(0.0839)	(0.0857)	(0.0905)

continued next page

Table 7 Continued

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Bank capitalization	-0.2780***	-0.2867**	-0.1617
	(0.1044)	(0.1260)	(0.1483)
Activity restriction	0.0079	0.0115	0.0208***
	(0.0053)	(0.0073)	(0.0076)
Entry restriction	-0.0540***	-0.0359*	-0.0436**
	(0.0170)	(0.0191)	(0.0192)
Regulatory capital requirements	0.0289***	0.0073	-0.0045
	(0.0079)	(0.0100)	(0.0103)
Banking freedom		0.0002	0.0008
		(0.0008)	(0.0008)
Financial reforms		0.0150**	0.0244***
		(0.0070)	(0.0078)
Monetary policy indicator	-0.0021***	-0.0046**	-0.0027
	(0.0008)	(0.0019)	(0.0019)
GDP growth	0.0040**	0.0094***	0.0071**
	(0.0018)	(0.0030)	(0.0030)
Inflation	-0.0014*	-0.0010	-0.0029*
	(0.0008)	(0.0015)	(0.0015)
Diagnostics tests			
Number of observations	636	519	476
R^2	0.9879	0.9901	0.9865
Wald chi^2	30367.75	31423	21618.77
p-value	0.0000	0.0000	0.0000

The estimation is based on data for 24 SSA countries using random effects GLS estimators. The dependent variable is bank credit to private sector. Constant term included but not reported. Standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. All regression includes monetary policy stance and two macroeconomic variables.

As reported in Appendix I, credit delivery in SSA is, to some extent, influenced by some bank-specific, market structure, bank stability and contestability variables. The results in Table 7, column 1 is similar to the results in Appendix I except the Z-score and the bank capitalization. The coefficient of bank capitalization is negative indicating that credit delivery is decreased in a country in SSA where banks' capitalization level has decreased. The results demonstrate that in SSA capitalization level is probably used for stability purposes and not that of credit. Furthermore, (in column 2) I incorporated in the equation banking freedom and financial reforms index. Even though the coefficient of banking freedom index is insignificant, the financial reform index and the banking density are positive and statistically significant, meaning that bank credit delivery in SSA is enhanced in a country where the financial sector has been reformed and where banks are allowed to operate freely. Again, the results suggest that the number of banks per country's population alone does not necessarily increase credit delivery unless the financial sector is reformed and that the banks are free to conduct their activities.

In column 2, when the financial reforms index is added to the estimation, the outcome shows that more credit is supplied by banks to the private sector in a country that has reformed its financial system. These findings suggest that a country with high bank density, operating its banking activities freely and openly and which has liberalized its financial systems, banks loans are increased even when monetary policy stance is tightened. The consistency of this result is tested by excluding South African data. The results provided in column 3 are relatively the same in terms of the sign and the magnitude of that of the results in column 2. Thus, the inclusion of the South African data in the estimation process does not necessarily bias the findings.

Determinants of bank credit in SSA: Bank types versus level of income

This subsection provides further implication on how bank types and the income level affect bank credit delivery to the private sector in SSA. To achieve this, we include bank type (a dummy variable denoting either commercial or development bank) and the income level (a dummy variable representing either low or middle income countries) to Equation 1. The results are presented in Table 8 and in columns: column 1 for commercial banks; column 2 for development banks; and column 3 representing low income countries in SSA.

The results are similar to those of the findings presented in Table 7. The coefficient of commercial banks is negative and statistically significant, meaning that commercial banks in SSA do not provide credit to the private sector. The possible explanation of this result is that banks in Africa, especially the commercial banks prefer trading in commercial and government securities than extending credit to the private sector. Contrary to the result of the commercial banks, the majority of the bank loans in Africa are provided by the development banks. On the level of development, the result show that banks, in the low income economies in SSA supply very little in terms of loans to the private sector. However, those operating in middle income countries in Africa extend more credit to the private sector. The results, therefore, suggest that, as the level of a country's income improves, banks take advantage of the perceived investment opportunities and respond decisively to the loan demand.

Table 8: Determinants of bank credit in SSA: Bank types versus level of development

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Bank credit to private sectort-1	0.4490***	0.4393***	0.4395***
	(0.0290)	(0.0290)	(0.0292)
Bank size	0.5362***	0.5455***	0.5357***
	(0.0294)	(0.0293)	(0.0293)
Excess liquidity	-0.6533***	-0.6645***	-0.6586***
	(0.0515)	(0.0512)	(0.0514)

continued next page

Table 8 Continued

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Efficiency	0.2526**	0.2970**	0.2803**
	(0.1172)	(0.1155)	(0.1162)
Bank growth	0.2253***	0.2261***	0.2163***
	(0.0379)	(0.0376)	(0.0380)
Concentration	-0.0526	-0.0261	-0.0737
	(0.1019)	(0.1013)	(0.1023)
Bank density	0.0969***	0.1064***	0.0971***
	(0.0238)	(0.0236)	(0.0237)
Z-score	0.0339***	0.0351***	0.0410***
	(0.0115)	(0.0114)	(0.0118)
Bank bad loan ratio	-0.0246	-0.0213	0.0037
	(0.0858)	(0.0849)	(0.0854)
Bank capitalization	-0.3214**	-0.2848**	-0.3621***
	(0.1262)	(0.1243)	(0.1296)
Activity restriction	0.0132*	0.0125*	0.0104
	(0.0074)	(0.0073)	(0.0073)
Entry restriction	-0.0402**	-0.0375**	-0.0426**
	(0.0192)	(0.0189)	(0.0193)
Regulatory capital requirements	0.0071	0.0061	0.0119
	(0.0100)	(0.0099)	(0.0102)
Banking freedom	0.0002	0.0001	0.0006
	(0.0008)	(0.0008)	(0.0008)
Financial reforms	0.0167**	0.0176**	0.0097
	(0.0070)	0.0070	(0.0074)
Commercial banks	-0.0667**		
	(0.0292)		
Development bank		0.1787***	
		(0.0505)	
Less developing countries			-0.0745**
			(0.0316)
Middle income countries			
Monetary policy indicator	-0.0049**	-0.0046**	-0.0049**
	(0.0019)	(0.0019)	(0.0019)
GDP growth	0.0095***	0.0097***	0.0105***
	(0.0030)	(0.0030)	(0.0030)
Inflation	-0.0012	-0.0010	-0.0008
	(0.0015)	(0.0015)	(0.0015)

continued next page

Table 8 Continued

Dependent variable: Bank credit to private sector			
	(1)	(2)	(3)
Diagnostics tests			
Number of observations	581	518	519
R^2	0.9903	0.9904	9902
Wald $Chic^2$	31818	32296.05	31582.48
P-value	0.0000	0.0000	0.0000
Hausman (Chi^2)	543.61	479.53	955.23
P-value	0.0000	0.0000	0.0000

The estimation is based on data for 24 SSA countries using random effects GLS estimators. The dependent variable is bank credit to the private sector. The constant term is included but not reported. Standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. All regression includes monetary policy stance, regulatory and macroeconomic variables.

Determinants of bank credit in SSA: Regional analysis

Several variations are made to Equation 1 with the aim of testing its robustness. First, is the grouping of SSA's banks into three zones; and the second variation is to employ system General Method of Moments (GMM) estimators. SSA countries are categorized into three zones: Economic Community of West African States (ECOWAS), the East African Community (EAC) and the Southern African Development Community (SADC).[4] This is conducted in order to examine whether there is a regional difference of banks' loans to private sector.

One immediate problem in applying Ordinary Least Squares (OLS) in estimating Equation 1 is that $Credit_{it,c\text{-}1}$ is correlated with fixed effects in the error term, which gives rise to 'dynamic panel bias'. Moreover, there is evidence to suggest that OLS produces bias when an attempt is made to control for unobserved heterogeneity and simultaneity. Therefore, the estimation strategy that is used to deal with possible endogeneity issues in Equation 8 is based on the methodology proposed by Blundell and Bond (1998) and Alvarez and Arellano (2003) in estimating systems of equations in both first difference and levels. As pointed in Roodman (2009), the system GMM estimator combines the standard set equations in first-difference with a suitable lagged level as instruments, and an additional set of equations in levels with suitably lagged first differences as instruments. Generally, linear difference and system GMM estimators have one–and–two step variants. I use two-step System GMM, Windmeijer (2005) correct standard error, small-sample adjustments, and orthogonal deviation. The two-step variant uses residuals from the one-step estimates and is asymptotically more efficient than the one-step.[5]

Regional analysis using bank-specific variables

Table 9 shows that bank size influences bank credit delivery. The coefficient is positive indicating that the bigger the bank, the higher it is in the position to supply loans. Banks with excess liquidity within ECOWAS and EAC supply loans to the private sector. Management efficiency only significantly influences credit delivery in countries within SADC. This means that more loans are therefore extended to private sector in SADC where management are most efficient.

Table 9: Regional analysis of bank lending determinant using bank-specific variables

Dependent variable: Bank Loan	ECOWAS	EAC	SADC	ALL
Ln Loan$_{t-1}$	0.59816***	0.63142***	0.67162***	0.72838***
	(0.06810)	(0.07513)	(0.16246)	(0.07025)
Bank Size	0.43100***	0.32908***	0.3212*	0.27340***
	(0.07569)	(0.08122)	(0.17117)	(0.07399)
Excess Liquidity	-0.49612**	-0.34720*	-0.58039	-0.49437***
	(0.21313)	(0.19318)	(0.37913)	(0.17397)
Management Efficient	0.7315814	0.2544774	1.5509***	0.85714***
	(0.51065)	(0.24812)	(0.52740)	(0.28847)
Bank growth	0.38946***	0.1651815	0.52565*	0.58062***
	(0.12085)	(0.19481)	(0.26338)	(0.17388)
Capitalization	-1.17558**	-0.40789*	0.155859	-0.02239
	(0.57627)	(0.24382)	(0.28698)	(0.29448)
Monetary policy	0.0591361	-0.02373*	-0.01582	-0.03695**
	(0.07112)	(0.01257)	(0.04994)	(0.01893)
Log GDP per capita	0.0333356	-0.0603493	-0.00176	-0.02568*
	(0.02031)	(0.03713)	(0.02196)	(0.01372)
Log Inflation	0.02009	0.03641	0.085	0.06960***
	(0.02639)	(0.04407)	(0.08167)	(0.01894)
Constant	-0.94451**	0.12103	-1.5393	-0.77676
	(0.40009)	(0.35014)	(0.56066)	(0.36981)
Diagnostics tests				
Number of observations	326	243	367	936
Number of instruments	135	114	138	85
Wald test	10221	6506.11	8957.15	3978.03
P-value	0.0000	0.0000	0.0000	0.0000
Hansen	59.82	40.64	71.39	74.30
P-value	1.000	1.000	1.000	0.371
AB2	-0.21	0.26	1.49	-1.37
P-value	0.835	0.792	0.136	0.172

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

Regional analysis using market structure variables

With regards to bank market structure variables, presented in Table 10, it reveals that the parameter of the concentration is negative and statistically significant only for banks in ECOWAS region.

Table 10: Regional analysis of bank lending determinant using bank market structure variables

Dependent variable: Bank Loan				
	ECOWAS	**EAC**	**SADC**	**ALL**
Bank loan to private sector$_{t-1}$	0.97053***	0.83486***	0.93957***	0.96944***
	(0.03669)	(0.09975)	(0.02623)	(0.01823)
Concentration	-0.56467**	-0.5912843	-0.29378	0.18319*
	(0.26748)	(0.40384)	(0.18807)	(0.10717)
Bank density	0.0668974	-0.12949*	0.01034	-0.00751**
	(0.04779)	(0.06865)	(0.00791)	(0.00365)
Bank market power	-0.2885***	-0.0501179	-0.22562***	0.0849388
	(0.10820)	(0.33244)	(0.07312)	(0.14916)
Monetary policy	-0.0256618	-0.10406**	0.0471692	-0.0111472
	(0.08056)	(0.04625)	(0.04565)	(0.01463)
Log GDP growth	0.0410424	0.0504968	0.09808*	0.0526924
	(0.03202)	(0.05045)	(0.05550)	(0.03295)
Log Inflation	0.0283433	0.0339351	0.19412***	0.07454***
	(0.02332)	(0.11955)	(0.07117)	(0.02395)
Constant	0.90945	1.2893	0.00977	0.10699
	(0.46387)	(0.5376)	(0.19686)	(0.12987)
Diagnostics tests				
Number of observations	448	343	425	1112
Number of instruments	85	63	91	111
Wald test	3978.03	2345.56	2599	5767.12
P-value	0.0000	0.000	0.000	0.000
Hansen	74.30	52.35	77.59	119.58
P-value	0.371	0.345	0.460	0.060
AB2	-1.37	-0.44	1.51	1.17
P-value	0.172	0.661	0.132	0.243

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

This indicates a strong relationship between bank lending and concentration in ECOWAS. The negative relationship shows that, in ECOWAS, where banks are most concentrated, the supply of loan is less. While concentration is only significant in ECOWAS, bank density is also negatively related to credit delivery only with banks in East African countries. This finding suggests that there are more banks relative to the population in EAC, and this enables banks to invest less in the private sector. With regards to the degree of market power of a bank in the domestic markets, the study reveals that the greater the share a bank possessed, in ECOWAS and SADC countries, the lesser the bank is in a position to supply loans. This finding suggests that the banks' market power matters in bank lending behaviour in SSA, except banks in EAC.

Regional analysis using bank stability variables

Bank solvency matters in credit delivery in SSA. There is evidence to suggest that the level of bank stability and risk adjusted return on equity affect private loans only for banks in ECOWAS. It, therefore, means that bank stability (in terms of higher Z-score and higher profitability) has an influence on bank credit in EAC and SADC. As expected, the coefficient of non-performing loans to total loan ratio is negative, meaning that all banks in SSA with high non-performing loans relative to their total loan portfolio will supply fewer loans (Table 11).

Table 11: Regional analysis of bank lending determinant using bank stability variables

Dependent variable: Bank Loan				
	ECOWAS	**EAC**	**SADC**	**ALL**
Bank loan to private sector$_{t-1}$	0.95548***	0.94272***	0.97014***	0.97363***
	(0.03995)	(0.04879)	(0.01468)	(0.03461)
Z-Score	0.14050**	0.0963848	-0.0211661	0.12096**
	(0.06681)	(0.06906)	(0.07261)	(0.06170)
Shape ratio	-0.15860***	-0.0629262	-0.0238231	-0.1688***
	(0.03925)	(0.04156)	(0.04304)	(0.04805)
Bank Bad Loans	-1.21452*	-0.75771**	-0.967891*	-0.8972***
	(0.70740)	(0.34453)	(0.54475)	(0.31843)
Monetary policy	0.214091**	-0.04896***	0.1438128	-0.0024781
	(0.09758)	(0.01520)	(0.09552)	(0.03805)
Log GDP per capita	0.0277168	0.0083949	-0.0077643	0.0165674
	(0.04366)	(0.03462)	(0.03011)	(0.02908)
Lon Inflation	-0.0357185	0.0000319	0.0858138	0.0503972
	(0.04930)	(0.06158)	(0.12178)	(0.04555)
Constant	0.09168	0.46192	0.02805	0.21152
	(0.26450)	(0.29639)	(0.2442)	(0.2617)

continued next page

Table 11 Continued

Dependent variable: Bank Loan				
	ECOWAS	**EAC**	**SADC**	**ALL**
Diagnostics tests				
Number of observations	196	177	158	531
Number of instruments	81	65	83	83
Wald test	3236.04	2056.13	8095.44	3020.71
P-value	0.0000	0.0000	0.0000	0.0000
Hansen	38.00	34.11	35.19	78.05
P-value	0.998	0.974	1.000	0.213
AB2	0.71	1.03	1.13	1.52
P-value	0.481	0.301	0.258	0.129

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1% 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

Regional analysis using contestability variables

We find that, activity restrictions, entry requirements and capital stringency, to a large extent, can explain the cross-regional variations in bank lending. Supply of bank loan is hindered in ECOWAS, where banks are not allowed to freely operate in non-banking activities (securities, insurance and real estate activities). Diversification into non-interest generating activities increases credit to the private sector, especially for banks operating in the ECOWAS region. The opposite is true of banks in EAC and SADC where more loans are extended when banks are allowed only to concentrate on their core banking activities. It should, however, be noted that the relationship between bank activity restriction and bank lending is insignificant in SADC. Entry requirements has a positive relationship with the supply of loans in SADC. This means that severe entry requirements promote the supply of bank loans in SADC. The positive coefficient of entry requirement shows that the rigid entry requirements in SADC provide an avenue for quality new entrants, leading to less financial crisis and more credit delivery. The coefficient of supervisory power has a significant and positive relationship with bank lending in ECOWAS and EAC and insignificant, but equally positive relationship, with bank lending in SADC. These findings show that regulatory initiative, which restricts banking activities, imposes severe entry requirements, requires high regulatory capital and provides efficient supervisory services, influence only banks in ECOWAS to supply loans (Table 12).

Table 12: Regional analysis of bank lending determinant using contestability variables

Dependent variable: Bank Loan to private sector				
	ECOWAS	**EAC**	**SADC**	**ALL**
Bank loan to private sector$_{t-1}$	0.92829***	0.98505***	0.88798***	0.9644***
	(0.06145)	(0.01581)	(0.05150)	(0.08344)
Activity restriction	-0.98985***	8.2110**	0.1512489	0.196402
	(0.39698)	(3.9977)	(0.32486)	(0.23951)
Capital requirement	0.126596**	-3.5552**	-0.0773074	-0.93065**
	(0.06081)	(1.6336)	(0.10607)	(0.38136)
Banking supervision	1.36235***	21.44193**	0.1436672	0.7104136
	(0.52688)	(9.8260)	(0.22918)	(0.60967)
Entry restriction		-23.5227**	2.6949***	1.40275***
		(11.0488)	(0.84466)	(0.44339)
Monetary policy	-0.13086	-0.08079***	0.0029186	-0.0671***
	(0.19826)	(0.02441)	(0.06780)	(0.02312)
Log GDP per capita	-0.01571	0.0537047	-0.0350052	-0.06298**
	(0.02929)	(0.133267)	(0.02649)	(0.02987)
Log Inflation	-0.03191	0.0297355	0.1209398	0.06745*
	(0.02292)	(0.08179)	(0.08770)	(0.03702)
Constant	-0.04981	22.7535*	-5.6182	-3.42473
	(0.79071)	(10.9067)	(2.3804)	(2.0380)
Diagnostics tests				
Number of observations	357	253	342	1015
Number of instruments	29	29	46	50
Wald test	3498.53	13793.11	944.13	1124.02
P-value	0.0000	0.0000	0.0000	0.0000
Hansen	15.66	20.19	35.17	42.46
P-value	0.405	0.165	0.277	0.181
AB2	-0.79	0.53	0.59	0.15
P-value	0.429	0.594	552	0.880

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

5. Conclusion

This study contributes to the empirical literature on bank lending behaviour in SSA. Broad determinants of the supply of bank loans are analysed. Micro-bank/firm level and macro-country level data of 264 banks across 24 sub-Sahara African countries are used. Activity restrictions and other regulatory variables are sourced from Barth et al. (2004), while liberalization index and banking freedom data are taken from Abiad et al. (2010) and The Heritage Foundation (2010), respectively. The analyses are presented in three subsections. The first subsection examines cross-country determinants of bank lending; the second subsection includes financial reform and banking freedom index into the main equation as 'the benckmark model'; and the last subsection examines the regional determinants of bank credit.

The entire countries' bank-specific variables sample statistically influence bank credit to private sector. Credit delivery to private sector in SSA is influenced by the size of the bank, the liquidity position of such bank, the growth level as well as the efficiency of the management of the banks. The coefficient of bank size, its growth variable and efficiency are positive, demonstrating that, in SSA, bigger and most growing banks provide credit to the private sector. We also find that banking entry requirements, supervisory power and capital stringency, to a large extent, explain the cross-country variations in bank lending. Supply of bank loans is not hindered in a country where banks are not allowed to freely operate in non-banking activities. Thus, these findings show that regulatory initiative, which imposes severe entry requirements, provides effective supervisory power, and requires high regulatory capital requirements, influences banks' decisions to supply loans in SSA. The direction and the level of impact depend on the region in which the bank operates. Furthermore, the lagged dependent variable positively influences credit delivery to the private sector, suggesting that, in SSA, the current year banks' finance to private sector is influenced by the previous year's results.

There is some evidence to support the fact that banking system structure explains bank lending behaviour only when the financial sector is reformed and the banks are allowed to operate freely. The parameter of the concentration is negative, and statistically significant, indicating that there is a relationship between bank lending and concentration in SSA. The study shows that in countries where banks are most concentrated, the supply of loan is less. However, I also find evidence to support the fact that bank density increases supply of loans. On the issue of bank solvency, there is also no evidence that the level of bank stability and risk adjusted profit influence the supply of loans in SSA banks. The study, however, reveals that, in a country where the ratio of banks' non-performing loans to total loan is high, bank lending decreases though the coefficient is

not significant. The estimation results reveal that monetary policy significantly influences bank lending in SSA. The negative relationship suggests that, increasing policy-induced interest rates reduces bank lending. The result is consistent with monetary policy theory and confirms existing empirical research that shows that bank lending increases when monetary policy stance is relaxed. Also, the level of economic activity does affect bank lending especially in an environment where the financial sector has been reformed and that bank density is high.

On how bank types and income levels affect bank credit delivery to private sector in SSA, the results show that banks in the low income economies in SSA supply very little loans to the private sector but those operating in middle income countries in Africa extend more credit to the private sector. The results, therefore, suggest that as the level of a country's income improves, banks take advantage of the perceived investment opportunities and respond decisively to the loan demand.

With regard to the regional analyses, the study sets out to identify whether there are regional differences of bank credit delivery in SSA using bank-specific, bank market structure, bank stability and contestability variables. The results show that, management efficiency only significantly influences credit delivery in countries within SADC, meaning that more loans are, therefore, extended to private sector in SADC where management are most efficient. While concentration is only significant in ECOWAS, bank density impacts negatively to credit delivery of banks in Eastern African countries. This finding suggests that there are more banks relative to the population in EAC and this, according to the results, enables banks to invest less in the private sector. With regards to the degree of market power of a bank, the study reveals that the more the share a bank possesses, in ECOWAS and SADC countries, the lesser the banks are in the position to supply loans. This finding suggests that the bank's market power matters in bank lending behaviour in SSA, except banks in EAC. There is evidence to suggest that the level of bank stability and risk adjusted return on equity affect private loans only of banks in ECOWAS. Furthermore, the findings of the study show that, activity restrictions, entry requirement and capital stringency, to a large extent, can explain the cross-regional variations in bank lending. Supply of bank loan is hindered in ECOWAS, where banks are not allowed to freely operate in non-banking activities. These findings clearly demonstrate that there are different determinants of bank credit delivery across the various regions (ECOWAS, EAC and SADC) in SSA. It is, therefore, recommended that the policy makers adopt multi-faceted region-specific approaches in dealing with credit constraints facing the private sector.

6. Public policy implications

This study makes several contributions to the growing body of literature of lending behaviour of banks in Africa. Even though the study focuses on Africa, given the link between finance and the real economy, the benefits of conducting this research in Africa has a chance of making an impact beyond these economies. Bekaert and Harvey (2002) put this in context as "the benefits and the subsequent impact of research on emerging economies on economic growth cannot be merely measured in absolute dollar terms, but in the number of people that are elevated from a desperate subsistence level to a more adequate standard of living".

The findings of this study give rise to three very important public policy considerations. First of all, policies that improve bank-specific condition such as the bank growth, size, and efficiency of the management should be pursued by the management of the banks. For example, banks in Africa should be encouraged to consolidate their operations or merge their activities. Therefore, supervisory, regulatory and competition authorities should coordinate to put in place a mechanism that allows banks to have a considerable amount of market power that is robust and consistent with any competition policy. Secondly, given the positive role of the relationship between financial reform and bank lending, SSA countries must liberalize their financial sector in the area of credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets, prudential regulations and supervision of the banking sector and restrictions on the capital accounts. These reforms are needed as the number of banks per population will not improve the access of financial services, unless the entire financial sector is reformed and that banks are allowed to conduct their operations freely. Finally, given the fact that development banks finance economic activities, compared with the other forms, policy makers should introduce guidelines and incentives that enables investors to establish development banks.

Notes

1. See, for example, Chirwa and Mlachila (2004) for Malawi and Beck and Hesse (2006) for Uganda.

2. As total assets are in domestic currency, they are not easily comparable across countries. In order to make a cross-country comparison still feasible, we convert individual banks assets denominated in local currencies to US dollar.

3. Moreover, the higher score also indicates the quality of new entrants and is therefore less likely to experience banking system crises and thus enhancing bank lending.

4. Countries included in the analysis for ECOWAS are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo; those of the EAC included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia; while Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe are included for SADC.

5. The following diagnostic tests are made: (1) The instruments count, (2) The Hansen test for over-identification restriction for which the null hypothesis is that instruments are exogenous, (3) The Arellano-Bond tests for first and second order serial correlation in the residuals for which the null hypothesis is that there is no serial correlation, and (4) The F-test for joint significance of instruments.

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Appendix

Appendix I: Summary descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Bank size	1724	961.3510	4562.0520	0.1000	68368.2000
Excess liquidity	1688	0.3598	0.2418	-0.5333	0.9691
Management efficiency	1722	0.8437	0.1074	0.0688	0.9969
Bank growth	1354	0.2280	0.2415	-0.9671	0.9981
Bank capitalization	1708	0.1494	0.1249	-0.0749	0.9968
Concentration	2109	0.5439	0.1860	0.2199	0.9775
Bank density	2103	1.7517	3.2880	0.0000	18.8091
Market power	1681	0.2659	0.4542	-5.3705	3.5417
Z-score	1721	14.5977	16.0703	-11.6649	171.9246
Sharpe ratio	1682	2.3135	2.5121	-4.8188	18.7619
Bank bad loan	901	0.1162	0.1213	0.0001	0.8657
Activity restriction	2016	10.8691	1.8815	1.0000	15.0000
Entry requirement	2016	7.7639	0.6284	5.0000	8.0000
Capital requirement	1976	5.3927	1.6213	2.0000	7.0000
Supervisory power	1976	11.7166	2.6473	5.0000	15.0000
Banking freedom	2112	48.3144	15.1288	10.0000	70.0000
Financial reform index	1512	14.6564	2.7114	6.0000	18.2500

Appendix II: Correlations between bank-specific variables

	Bank size	Liquidity	Mgt efficiency	Bank growth	Z-score	Bad loans	Capital ratio
Bank size	1						
Excess liquidity	-0.1071*	1					
Efficiency	0.1688*	0.0333	1				
Bank growth	0.0431	0.2086*	-0.0553*	1			
Z-score	0.1039*	0.1193*	0.2197*	-0.0426	1		
Bad loans	-0.1626*	0.0699*	-0.1571*	-0.187*	-0.182*	1	
Capital ratio	-0.2240*	-0.0221	-0.0807*	-0.084*	0.1689*	0.1804*	1

NB: Significant level at 5%

Appendix III: Correlations between country-level variables

	C3 (%)	Liquidity	Activity	Entry	Regulatory capital	Banking freedom	Financial reforms	Monetary policy	GDP growth	Inflation
C 3 (%)	1									
Bank density	-0.1152*	1								
Activity	0.1710*	0.0197	1							
Entry	-0.2463*	-0.0916*	-0.335*	1						
Reg. capital	-0.2847*	-0.0726*	-0.292*	0.2413*	1					
Banking freedom	-0.1557*	0.3869*	-0.188*	0.1077*	0.1454*	1				
Financial reforms	-0.5951*	0.1407*	-0.310*	0.5007*	0.2308*	0.2853*	1			
M. policy	0.0615*	-0.1505*	0.1524*	0.1532*	-0.1497*	-0.219*	-0.106*	1		
GDP growth	0.2089*	-0.0385	0.2559*	0.003	-0.2175*	-0.0419	0.0954*	-0.0091	1	
Inflation	0.0475*	-0.0801*	0.1519*	0.0764*	0.0076	-0.212*	-0.190*	0.5582*	-0.067*	1

NB: Significant level at 5%

Appendix IV: Cross-country determinants of bank lending

Dependent variable: Bank credit to private sector

	Bank Specific	Market Structure	Stability	Contestability
Bank credit to private sector-1	0.6300*** (0.0176)	0.9063*** (0.0089)	0.9793*** (0.0079)	0.9176*** (0.0086)
Bank size	0.3641*** (0.0195)			
Excess liquidity	-0.565*** (0.0437)			
Efficiency	0.5704*** (0.0899)			
Bank growth	0.3508*** (0.0346)			
Concentration		-0.1591* (0.0859)		
Bank density		-0.0033 (0.0047)		
Bank market power		0.0347 (0.0443)		
Z-score			0.0256 (0.019)	
Sharpe ratio			-0.050*** (0.0144)	
Bank bad loan ratio			-0.607*** (0.1154)	
Activity restriction				0.0961* (0.0571)
Entry restriction				0.4157** (0.1893)
Regulatory capital requirements				-0.1327** (0.0512)
Supervision power				0.0300 (0.0624)
Monetary policy indicator	-0.0352** (0.0141)	-0.0180 (0.0230)	0.0673*** (0.0203)	-0.0018 (0.0222)
GDP growth	0.0209* (0.0123)	0.0389* (0.0206)	0.0253 (0.0197)	0.0249 (0.0186)
Inflation	-0.0001 (0.0007)	0.0017 (0.0015)	0.0005 (0.0013)	0.0005 (0.0013)

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Appendix IV Continued

Dependent variable: Bank credit to private sector				
	Bank Specific	**Market Structure**	**Stability**	**Contestability**
Diagnostics tests				
Number of observations	1189	1221	648	1174
R2	0.9803	0.9533	0.9707	0.9789
Wald chi2	33698.88	13190.54	16652.61	1225.74
p-value	0.0000	0.0000	0.0000	0.0000
Hausman (chi2)	680.35	275.73	83.18	125.61
P-value	0.0000	0.0000	0.0000	0.0000

The estimation is based on data for 24 SSA countries using random effects GLS estimators. The dependent variable is bank credit to private sector. Constant term included but not reported. Standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, depending on the categories (bank-specific, structure and contestability) of independent variables. All regression includes monetary policy stance and two macroeconomic variables.

Appendix V: Summary definition of variables

Variable name	Description	Source
Bank-specific		
Bank size	Bank size is measured as a logarithm of assets	BankScope
Bank capitalization	Ratio of equity capital to total assets. A higher bank capitalization indicates lower bank risk	BankScope; Author's calc.
Loan to assets	Total bank loans to total assets	BankScope
Bank growth	It is calculated as the difference between the previous total assets and the current value and the result is divided by the previous value	BankScope
6 ptLiquidity	Is constructed as total cash plus bank total short-term investments divided by total assets	BankScope; Author's cal.
Market structure		
Concentration	Three-bank concentration ratio of total assets, a measure of banking system concentration	BankScope; Author's cal.
Density of banks	The ratio of the number of banks in the country and the total population of the country	BankScope; Author's cal.
Market power	Measures market power using Lerner index	Author's cal.
Contestability		
Activity restrictions	Degree to which national authorities allow banks to engage in activities that generate non-interest income. The measure varies from 4 to 16 with higher scores indicates more restrictions	Barth et al. (2004)
Entry requirement	The entry requirement indicates the severity (range from 0 to 8) of entry regime, with higher value indicating more restrictiveness	Barth et al. (2004)

continued next page

Appendix V Continued

Variable name	Description	Source
Contestability		
Capital index	Capital index measures overall capital stringency. It ranges from 0 to 9, with higher value indicating greater stringency	Barth et al. (2004)
Monetary policy	Short-term interest rate	IMF of IFS
Economic development		
GDP /GDP per capita growth	Uses GDP growth measured as the annual rate of growth of GDP	World Bank Dev. Indicators
Inflation	Inflation is measured as the annual growth rate of the CPI index	World Bank Dev. indicators
Banking Stability		
Sharpe ratio	Sharpe ratio measures risk-adjusted return on equity (ROE) and it is calculated as ROE divided by standard deviation of ROE	BankScope; Authors' cal.
Z-index	The Z-index measures the number of standard deviations that a bank's profit must fall to drive it into insolvency. The index potentially measures the accounting distant to default for a given institution	BankScope; authors' calculation
Non-performing loan	Ratio of banks' non-performing loans to gross total loans. A higher value indicates a riskier loan portfolio	BankScope; Authors' cal.
Depending variable		
Bank loan to private sector	Log of dollar amount of credit to private sector	BankScope, Author's cal.

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1. Introduction

Banks play a key role in financing economic activities in a country. By its very nature, banking is an attempt to manage multiple, and seemingly opposing, needs. Banks accept deposits, by assuring savers that their deposits are liquid and secured. They provide liquidity on demand to depositors and extend credit as well as liquidity to borrowers through lines of credit (Kashyap et al., 1999). Due to these fundamental roles, banks have always been concerned with both solvency and liquidity risk. Hence, banks actively evaluate and take risks on a daily basis as part of their core business processes. To assess and manage risks, and extend credit, banks must have effective ways to determine the appropriate amount of capital that is necessary to absorb unexpected losses arising from their market, credit and operational risk exposures.

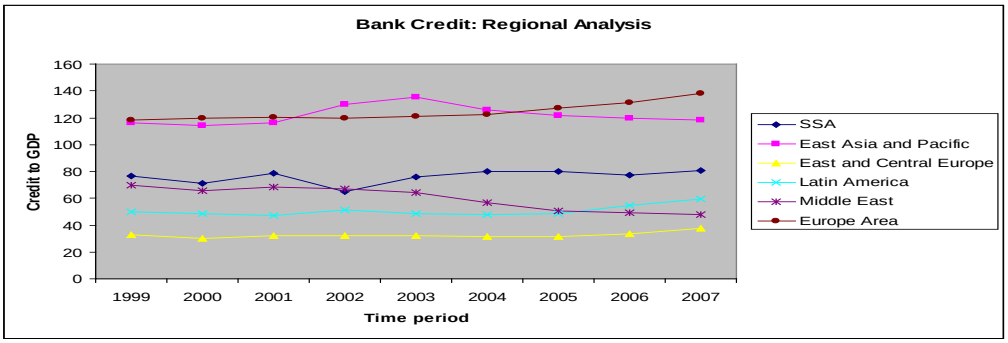
The issue in determining the appropriate level of bank capital depends on how a bank is governed and regulated. Banks participate in, and influence, the governance of firms through the extension of credit. The credit relation arises because banks, in their role as delegated monitors, operate beyond passive lenders. They involve themselves in shaping the operations of borrowers through screening, monitoring and enforcement of loan repayment thus involving themselves in forms of corporate governance. More importantly, the governance of banks also influences their lending behaviour. Good corporate governance of banks also matters because their services require the public to have confidence in the system. Since banks offer liquid deposits backed, in part, by illiquid loans with limited markets, this confidence depends to a large degree on the quality of the banks' investment choices, including their loan decisions.

Studies have, however, shown that bank lending is, not only constrained by the level of capital, risk or its governance, but also that the lending decision of banks is directly hampered by monetary policy actions, macroeconomic uncertainty, legal and financial structure as well as regulatory environments (Cecchetti, 1999; Ehrmann et al., 2003; Balazs, et al., 2006; Pruteanu-Podpiera, 2007; Baum et al., 2009; Quagliariello, 2009). Thus, the supply of bank loans depends on banks' financial positions (Balazs et al., 2006), the country's financial structure (Hainz, 2003), the monetary policy (Pruteanu-Podpiera, 2007), the macroeconomic environment (Sacerdoti, 2005; Baum et al., 2009), and regulatory framework (Cotarelli et al., 2003).

The recent trend in financial intermediation suggests less impressive performance of banks in the supply of loans to the private sector in sub-Saharan Africa (SSA). Figure 1 depicts the development of private sector credit relative to GDP of SSA banks, which has been increasing steadily. However, the performance of banks in Africa is below that of Continental Europe and Asia East and Pacific. What accounts for such performances of

banks in SSA? What are the credit delivery constraints in SSA? Are they microeconomic issues? Are they monetary policy related constraints? Or are they issues bordering on macroeconomic environments? This study first discusses credit delivery constraints in SSA, providing some stylized facts then clearly states the objective of the study. This is followed by a review of relevant literature in the subject area for which framework, data analysis and methodology have been developed. The final chapter presents the summary of findings, and the conclusion and policy recommendations emanating from the research.

Figure 1: Total bank credit to private sector as a share of GDP



Note: Data is aggregated averaging across regions and are obtained from World Bank Development Indicators 2009.

Credit delivery constraints in SSA

The main characteristic of sub-Saharan Africa (SSA) is that the stock of bank credit to the private sector remains very low. Table 1 shows that, with the exception of South Africa and Mauritius, which seem to have well-developed financial infrastructure and whose private sector lending is more than 80% of GDP, private lending was 17% of GDP during the period 2004-2007.

There are a numbers of factors that could explain the current position of bank lending in SSA, vis-à-vis the liquidity and the broad money supply. Poor bank credit, according to the 2006 IMF report is, in itself, a function of widespread poverty. A high share of the population is engaged in subsistence agriculture. Certainly, the large concentration of populations on subsistence production limits the financial resources available for intermediation. Demirguc-Kunt et al. (2004) argue that, in low-income countries, private sector correlates positively with GDP per capita income and negatively with the size of the agriculture sub-sector. The low performance of SSA banks in the area of credit has occurred in the area of high liquid reserves, broad money ratio (excess liquidity) and extreme risk aversion in the banking system (IMF, 2006). In addition to excess liquidity and the high ratio of non-performing loans in the SSA banking system, the debt position of SSA countries has also accounted for the poor performance in bank credit extension (Nissanke and Aryeetey, 2006; Christensen, 2004; Collier and Guning, 1999; Nissanke and Aryeetey, 1998).

The issue of non-performing loans could largely be due to the limited capacity of banks in SSA to monitor and efficiently assess the risk of their loan clients. Nissanke and Aryeetey (2006) added that SSA banks predominantly extend credit to large-scale formal real sector activities, the bulk of which are owned by the state. These organizations are characterized by inefficiencies which have resulted in low return and poor financial performance. A corollary to the non-performing loans is the issue of enforcement of contracts in SSA. Mcdonald and Schumacher (2007) emphasize that, banks will be willing to extend more credit if, in the event of default, they could enforce contracts by ensuring repayment or seizing of collateral.

Table 1: Credit indicators of SSA banks

	Ratio of bank liquid assets to total assets			Ratio of M2 To GDP			Bank credit to private Sector as a % of GDP		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Angola	25.2	14.4	16.5	11.9	13.9	15.6	5.1	7.4	10.5
Benin	15.7	11.9	14.9	25.1	28.2	30.7	16.2	16.8	19.6
Botswana	5.6	8.7	8.9	26.0	30.5	37.6	19.0	18.3	19.9
Burkina Faso	7.6	8.9	11.4	19.9	19.4	21.3	16.4	17.0	16.8
Burundi	12.3	12.3	9.2	29.3	33.6	34.9	20.4	21.9	21.0
Cameroon	28.7	38.5	46.3	16.9	17.0	18.1	9.5	9.2	9.3
Côte d'Ivoire	9.0	9.6	8.2	23.3	24.1	27.0	13.6	14.1	16.0
Eritrea	18.1	19.2	20.8	115.3	113.9	115.8	27.6	26.0	20.7
Ethiopia	36.9	19.8	24.1	40.7	39.2	25.3	19.0	20.6	18.7
Gabon	20.0	26.6	15.8	16.4	18.2	18.2	8.3	9.3	12.0
Gambia, The	20.7	16.8	16.7	43.9	48.8	50.1	12.8	15.4	15.8
Ghana	9.4	10.4	..	27.6	29.2	..	15.4	17.7	23.8
Guinea-Bissau	107.7	23.7	33.2	30.3	33.6	36.3	1.1	2.0	3.2
Kenya	7.5	7.4	8.3	37.1	36.9	39.1	26.3	26.3	27.2
Lesotho	10.2	5.3	4.6	27.4	30.1	33.7	9.3	9.4	10.7
Liberia	32.1	34.5	30.8	18.4	21.1	23.1	..	..	..
Madagascar	20.1	19.5	24.0	19.9	19.5	20.5	9.9	10.1	10.2
Malawi	22.5	9.8	8.4	14.9	13.6	14.9	5.4	6.4	7.3
Mauritius	2.2	1.8	1.9	99.3	100.5	101.3	75.3	74.2	77.7
Mozambique	14.0	14.6	13.1	25.2	26.5	28.9	11.8	13.3	13.5
Namibia	2.5	2.2	2.3	41.9	44.8	49.8	51.8	50.8	49.9
Nigeria	16.6	10.9	7.7	16.1	16.5	22.6	13.2	13.2	25.3
Senegal	13.6	11.2	13.8	32.5	34.0	34.7	22.5	22.6	22.7
Sierra Leone	10.9	6.3	7.7	18.2	19.0	19.7	4.3	4.4	5.3
South Africa	2.8	2.7	2.7	55.8	59.5	62.7	68.8	76.6	81.9
Swaziland	4.9	6.4	7.0	20.7	21.6	23.6	21.6	23.5	24.9
Tanzania	12.1	11.4	13.9	23.2	26.5	28.3	10.2	12.7	14.9
Togo	8.1	10.6	7.0	27.9	30.1	34.8	17.5	16.8	21.3
Uganda	14.2	11.2	11.8	17.9	18.5	19.2	8.6	10.1	10.2
Zambia	25.3	27.8	21.2	17.3	17.9	20.6	7.7	9.7	11.8

Note: Liquidity is a ratio of total bank liquidity as a percentage of total banking assets; the ratio of M2 to GDP measures broad money as a proportion of GDP; bank credit to private sector is the total credit to private sector as a percentage of GDP. These data are obtained from World Bank development indicators, June 2009.
------ Information not yet available

On the issue of SSA financial system, Nissanke and Aryeetey (1998), suggest that the decades of prolonged financial repression could be a factor of low bank lending. They argue that economic growth in African countries was retarded because the size of the financial system was reduced by the distortions of financial prices, control over credit allocation, interest rate ceilings, and fixed exchange rates. The pressure of government domestic financing practices has also led to crowding out of the credit to the private sector.

Table 2 shows that, with the exception of Botswana and Ethiopia, total debt stock of SSA has been increasing and this has been confirmed by a study in SSA. Christensen (2004) conducted a study in 27 SSA countries over the period 1980-2000 and found evidence to suggest that government domestic securitized debt crowded out credit to the private sector. He concludes that an expansion of domestic debt of 1% relative to broad money is associated, on average, with a decline of the ratio of private sector lending to broad money of 0.15%.

Table 2: Debt stock to GNI and broad money growth

	Debt stock to GNI			Broad money growth		
	2005	**2006**	**2007**	**2005**	**2006**	**2007**
Angola	47.54	26.18	26.19	60.54	57.34	38.55
Benin	43.13	17.54	15.78	26.26	14.50	19.63
Botswana	4.87	3.99	3.45	10.65	67.43	31.17
Burkina Faso	37.02	19.51	21.74	-4.81	10.97	23.84
Burundi	170.29	162.28	154.60	24.27	22.96	13.76
Cameroon	45.62	19.00	15.34	4.90	10.26	14.87
Côte d'Ivoire	76.43	77.30	73.63	7.69	10.26	23.61
Eritrea	63.85	62.84	64.07	10.67	5.76	12.11
Ethiopia	51.02	15.08	13.57	18.59	19.99	-46.82
Gabon	49.90	50.81	56.18	27.54	16.35	6.94
Gambia, The	159.96	157.59	122.86	13.13	26.24	6.66
Ghana	64.02	25.40	29.85	9.35	42.82	..
Kenya	34.26	29.02	30.29	9.88	17.00	20.41
Lesotho	38.28	34.80	33.71	9.14	35.31	16.35
Madagascar	69.88	26.74	22.68	2.25	26.44	20.92
Malawi	113.14	27.91	24.58	16.25	16.42	36.59
Mali	63.31	29.86	30.62	9.80	5.99	13.72
Mauritius	49.72	41.16	62.05	7.51	10.06	15.43
Mozambique	73.95	47.52	44.02	24.28	21.39	26.25
Nigeria	22.31	5.76	6.03	22.60	36.35	64.24
Senegal	45.30	21.00	23.36	8.16	12.48	13.05
Seychelles	98.19	148.72	190.78	1.65	3.03	-7.97
Sierra Leone	134.13	95.85	21.38	31.29	21.45	22.65
South Africa	13.10	14.12	15.82	19.90	21.19	20.15
Swaziland	15.96	15.01	13.30	9.72	25.08	21.47
Tanzania	55.68	30.08	31.39	34.78	21.50	20.51
Togo	80.99	81.99	80.13	2.25	22.61	16.77
Uganda	49.24	13.02	13.95	17.18	16.92	21.97
Zambia	80.19	23.50	27.94	3.16	44.18	25.27

Note: Debt stock to GNI is the total debt of a country as a percentage of GNI. Broad money growth is the annual growth rate of broad money supply. . These data are obtained from World Bank development indicators, June 2009.

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To enhance credit delivery, and to foster a credit culture in SSA, Sacerdoti (2005) suggests, among other things: efficient accounting standards, availability, and quality, of collateral, credit information, and credit recovery. Questions raised with regards to low credit delivery in SSA are whether the situation is due to bank-specific conditions, a fragmented financial system, the subject of monetary policy, the macroeconomic environment or related to regulatory frameworks. The study responds to these questions by examining the broad determinants of credit delivery in SSA. This is because it is only when the banks' lending determinants are identified that the necessary policy actions can be put in place to reduce the constraints related to the credit supply.

Objectives of the study

The study aims at examining the determinants of bank lending. It focuses on whether bank lending in SSA is influenced by bank-specific characteristics, the monetary policy stance, macroeconomic variables, and legal and financial structure. The study, in particular, empirically investigates and analyses the key determinants of bank lending in SSA.

2. Literature review

In the literature, the supply of bank loans is usually expressed as a function of internal and external determinants. The internal determinants are termed micro or bank-specific determinants of bank lending, while the external determinants are variables that are not related to bank management but reflect the monetary, economic and legal environment that affect the operation and performance of financial institutions. According to Athanasoglou et al. (2008), the number of explanatory variables that have been proposed for both categories depends on the nature and purpose of each study.

Bank-level environment

Studies dealing with internal determinants employ variables such as size, liquidity, capital, and management efficiency. Bank size is introduced to account for existing economies or diseconomies of scale in the market. Smirlock (1985) finds a positive relationship between size and bank performance; suggesting that, the bigger the bank, the higher the supply of loan. Demirguc-Kunt and Huizinga (2000 on their part, argue that the extent to which various financial, legal and other factors affect banks' performance is closely related to size. Bikker and Hu (2002) and Goddard et al. (2004) link bank size to capital and hence performance. Thus, the size of bank and the capitalization level of banks define the banks' health and level of economies of scale. However, Ehrmann et al. (2003) find no relationship between capitalization level of European banks and supply of loan. Instead, liquidity, to an extent, allows the bank to draw on it instead of going to the market. According to Kashyap and Stein (2000) and Pruteanu-Podpiera (2007), liquidity reduces the increase in the marginal cost of funds after a monetary tightening. In SSA, however, excess liquidity has been suggested as a factor that inhibits bank lending. High levels of reserve requirements on deposits in developing countries have also been cited as an instrument of financial repression (Chamley and Honohan, 1990). Thus, bank-specific factors will determine credit availability. Balazs et al. (2006) argue that, changes in banks' financial position affect the availability of credit supply in developing countries. High non-performing loans on the balance sheet of SSA banks could explain the weak credit delivery that exists in most African countries. In this study, broad measures of bank stability are used as a determinant of bank lending in SSA.

Macroeconomic environment

A banks' balance sheet position is not the only factor that influences the supply of bank loans. Studies suggest that the stance of monetary policy reflected in the level of interest

rate affects the supply of bank loans. According to Hofmann (2004), the supply of bank loans may arise from the effect of monetary policy on the creditworthiness of firms (balance sheet channel) and of households (interest rate channel) via its effect on their financial positions, or from a drain of reserves and, consequently, loanable funds from the banking sector (bank lending channel) following changes in the stance of monetary policy operated through open market sales by the central bank. However, there is no conclusive position on the effect of monetary policy on bank lending. Bernanke and Gertler (1995) refer to this as 'a black box'. Some empirical studies find no evidence of a significant influence in bank lending with changes in monetary stance, whilst others find a significant relationship. For example, Gertler and Gilchrist (1993) conducted a study which specifically looked at how banks' business lending responds to policy tightening. Their study reveals that business lending does not decline when policy is tightened. In contrast to Gertler and Gilchrist's (1993) findings, (Kashyap and Stein (1995), Ehrmann et al. (2003) and Pruteanu-Podpiera (2007) find evidence that the supply of bank loans may respond to a tightening of monetary policy.

In addition to the monetary policy stance and bank balance sheet position, there is evidence supporting the hypothesis that macroeconomic conditions affect the performance of the banking system and this affects financial intermediation (Quagliariello, 2007; Baum et al., 2005; Al-Haschimi, 2007; Beck and Hesse, 2006; Chirwa and Mlachila, 2004). Using panel data, Quagliariello (2007) found that during economic booms, banks tend to expand their lending activity, often relaxing their selection criteria resulting in an increase in bad loans. Hoggarth et al. (2005) provides a link between the state of the UK business cycle and the banks' supply of loans. On their part, Baum et al. (2005) use a sample of US bank and portfolio models and find that, as macroeconomic uncertainty increases, the cross-bank dispersion of the share of risky loans to total assets diminishes since the uncertainty hinders bank ability to foresee investment opportunities. Thus, the uncertainty pushes banks to rebalance the composition of their assets in line with the new signals revealed by credit markets. This adversely affects the allocation of financial resources. Garcia and Calmes (2005) use a similar approach on Canadian banks and confirm that there is a negative relationship between macroeconomic uncertainty and the cross-bank variance dispersion of the loan-to-asset ratio. Quagliariello's (2009) interpretation of Baum et al. (2005) and Garcia and Calmes' (2005) findings is that, macroeconomic uncertainty fosters herding behaviour and this leads banks to behave more homogeneously than during a stable period. However, macroeconomic uncertainty has a limited effect on SSA banks' performance in relation to their credit delivery (Al-Haschimi, 2007). This evidence is consistent with the results of other country-specific studies in SSA.[1] In SSA, it is the governments' fiscal deficit and the level of public debt that explain the level of financial intermediation. Christensen (2004), regressing private sector lending on domestic government debt reveals evidence of some crowding out. Though monetary policy stance and macroeconomic uncertainty influence the supply of credit to the private sector, the regulatory environment plays a role in determining bank lending. Cottarelli et al. (2003) show the effect of the institutional and regulatory environment as well as economic policy impact on private sector credit growth. They use variables that capture the level of financial liberalization, the quality of implementation of accounting standards, entry restrictions and the evolution of public sector debt. For

this study, entry restrictions, entry requirement, supervisory power, and initial capital requirements are employed as contestability variables.

Bank market structure

Studies have revealed that several features of national banking structures are important for the response of bank lending to a monetary policy action, and for the assessment of the macroeconomic importance of such response. Campello (2002) examines the role of internal capital markets in influencing the investment allocation process of conglomerate banks. The results suggest that, frictions between conglomerate headquarters and external capital markets are at the root of investment inefficiencies generated by internal capital markets. Brissimis and Magginas (2005), on their part, find mixed results. In the US and UK, where financial systems are market-based, the market structure has no significant impact on determining supply of bank loans to private sector. On the one hand, their results suggest that the financial structure significantly influences the supply of bank loans in Japan and other three other European countries - Germany, France and Italy. Cecchetti (1999) also finds that the strength and the magnitude of the supply of bank loans depend, not only on the size and the concentration of the banking system, but also on the legal structure as well. Cihak and Podpiera (2005), on their part, examine the behaviour of Eastern Africa countries' banks and concluded that, despite a number of financial sector reforms to enhance bank credit, a great deal still remain to be done to further strengthen the environment for the development and efficient function of the financial system in SSA. Thus, the current financial systems do not support bank lending in SSA. A corollary to the above is the type of branch network in SSA, which studies (Beck et al., 2005) have shown to affect credit delivery. Branch networks are generally small and concentrated in Africa. This, they concluded, makes physical access to financial services very difficult. The average branch network density in SSA is only six branches per 1000 square kilometres, compared with 34 for non–SSA countries (IMF, 2005). Clearly, the type of banking structure determines the supply of bank loans.

3. Data and methodology

The bank credit delivery model

The analysis of the determinants of bank credit delivery in SSA considers bank portfolio behaviour using data measured over a period of time as well as across many banks in a number of countries. This study uses the panel data regression model and the analysis are conducted using data over an eight-year period, 2000-2007, covering 264 banks from 24 SSA countries. The model specification followed that of Baum et al. (2009), Balazs et al. (2006) and Cottarelli et al. (2003). The relationship between bank financial position, monetary and macroeconomic shocks, on one hand, and bank credit delivery, on the other hand, can be intuitively explained as follows: during stable periods, banks take advantage of the perceived investment opportunity and respond more accurately to loan demand, having identified and assessed their balance sheet position and regulatory environment. Conversely, during the period of uncertainty, where the returns to bank lending are difficult to predict because the environment provides no prospect to identify profitable and viable lending opportunities, bank lending reduces. The study considers the relationship where credit delivery is a function of monetary policy stance, economic activities, bank market structure, regulatory initiative and bank-specific characteristics. Following Adams and Amel (2005), the study employs the dollar amount of bank loan to private sector in period as the dependent variable as:

$$Credit_{ic,t} = \alpha_1 Credit_{ic,t\text{-}1} + \sum_j \alpha_j X^{j}_{ic,t} + \sum_m \alpha_m X^{m}_{c,t} + \varepsilon_{i,t} \quad (1)$$

Where $Credit_{ic,t}$ is the dollar amount of bank *i* credit to private sector of country *c* in period *t*; $Credit_{ic,t\text{-}1}$ is the observation of the same bank from the same country in the previous year; the variables $X^{j}_{ic,t}$ and $X^{m}_{c,t}$ denote bank-specific characteristics, respective countries' specific macroeconomic environments, market structure and regulatory initiatives; are the parameter vectors; and is ε_{it} the disturbance term. Equation 1 recognizes that the credit delivery equation captures the impact of adjustment in derived demand in a dynamic panel format. The estimation, therefore, takes into consideration a lagged dependent variable among the explanatory variables. The advantage of this approach, according to Baum et al. (2009), is that behaviour of bank lending can be directly related

to a measure of bank-specific characteristics, bank market structure, regulatory initiatives and monetary, and macroeconomic shocks.

Explanatory variables

Our estimation for bank credit to the private sector relies on explanatory variables used in the previous studies (see Table 3). However, I extended the previous studies to include the impact of bank-specific, market structure, contestability, monetary, and general level of economic development variables on bank lending. The main explanatory variables are measured and described as follows:

Table 3: Overview of studies on determinants of credit delivery

Author(s)	Dependent variable	Explanatory variables
Hofmann (2004)	Credit to private sector as a %age of GDP	GDP growth, real interest rates, property prices, inflation rates
Cottarelli et al. (2003)	Credit to private sector as a %age of GDP	Financial liberalization index, accounting standard, entry restriction, legal system, public debt
Boissay et al. (2006)	Credit to private sector as a %age of GDP	GDP per capita, real interest rate, quadratic trend
Kiss et al. (2006)	Credit to private sector as a %age of GDP	GDP per capita, real interest rate, inflation rates
	Credit to private sector as a %age of GDP	GDP per capita in purchasing power standard (PPS), inflation rates, short-term and long-term nominal rates, inflation, housing prices, liberalization index
Quagliariello (2009)	Dispersion of bank loan-to-asset ratio	Industrial production index, consumer price index

Source: Balazs et al. (2006) and author's extension.

Bank-specific variables

Studies on bank lending behaviour have noted that, bank-specific variables have a capacity to explain the behaviour of credit delivery (Kishan and Opiela, 2000; Kashyap and Stein, 2000; Gaiotti and Secchi, 2006). More specifically, the size of the bank, the efficiency of the management, bank liquidity, bank capitalization level, and bank growth are the bank-specific variables used in our discussion on bank lending behaviour in SSA. Bank size is measured as a logarithm of total assets, where the total bank assets are the sum of current assets and non-current bank assets.[2] On management efficiency, a bank with efficient and productive management and labour force, ceteris paribus, enjoys higher margin and consequently, higher supply of bank loans (Gaiotti and Secchi, 2006). Management efficiency is measured as the earning assets divided by total assets. Liquidity of the bank is included to control for the reserve position of the bank. Liquidity is constructed as total cash plus bank total short-term investments divided by total assets. For this study,

excess liquidity is used as it reflects the shallowness of the financial market as well as the inefficiency of banking operations shown in high intermediation and transactions costs. Excess liquidity is calculated as the difference between banks liquidity ratio and bank reserve ratio requirement. The bank growth is controlled for the possibility of its effect on bank lending. Bank growth is measured as a first difference of total assets divided by previous total assets. Capital ratio is included because the introduction of the Basel Accord in 1988 has made banks increasingly focused on managing their capital base as buffer against default. Bank capitalization is measured as the ratio of equity capital to total assets.

Market structure variables

Concentration, bank density and the Lerner index are used as bank market measures. Bank concentration is measured as a fraction of a country's total banking assets held by three banks; the logarithm of the number of banks per million inhabitants in a particular country, as a proxy for the density of banks; and the Lerner index as a measure of bank market power. The Lerner index provides a direct measure of the degree of market power as it represents the mark-up of price over marginal cost. It is the only measure of competition, according to Berger et al. (2009), calculated at the bank-level as $Lerner_{it} = (Price_{it}\text{-}MC_{it})/Price_{it}$. Here, the $Price_{it}$ is the price of the total assets calculated as a ratio of total income to total assets. MC_{it} is the marginal cost of producing an additional unit of output and it is derived from the translog cost function.

Bank stability

The performance of a bank depends on the viability and the stability of the bank (Allen and Gale, 2004). Different risk exposure indicators are used as a proxy for bank stability: the Z-score is used as a measure of overall bank risk, the risk adjusted profit as a measure of performance, the volume of non-performing loans to total gross loans to measure the bank loan portfolio risk. The Z-score is measured as return on asset plus the capital ratio and the resultant figure is divided by the standard deviations of return on assets as:

$$Z\text{-}score = \frac{ROA + E/TA}{\sigma ROA} \tag{2}$$

There are two alternative measures of bank risk that affect credit delivery to private sector. The first of these, the Sharpe ratio, is also considered. This ratio is defined as the mean of return on equity (calculated as post-tax profits relative to equity) divided by the standard deviation of the return on equity. The Sharpe ratio, therefore, measures the risk-adjusted rate of return and it is calculated only if the bank data for at least four years are available (Demirguc-Kunt and Huizinga, 2010). The Sharpe ratio is calculated as:

$$Sharperatio = \frac{ROE}{\sigma_{ROE}} \tag{3}$$

The second alternative measure of bank risk is the volume of non-performing loans to total gross loans to measure the bank loan portfolio risk. The ratio of non-performing loans to total gross loans is used as a proxy for loan portfolio risk. It is calculated as non-performing loans to total loans. A higher value indicates a more risky loan portfolio.

Regulatory/contestability variables

Activity restrictions, entry into banking requirements, initial capital requirement, and bank supervision power are used as contestability (regulatory) variables. These variables have been found to explain credit delivery in Eastern Europe (Cottarelli et al., 2003). Activity restrictions measure the degree to which national authorities allow banks to engage in activities that generate non-interest income. It indicates the limits imposed on commercial banks to participate in securities markets, insurance and real estate activities. The measure varies from four to 16, with higher scores indicating more restrictions. The entry requirement indicates the severity (range from 0 to 8) of entry regime with higher values indicating more restrictiveness.[3] Capital index measures overall capital stringency. It ranges from 0 to 9, with a higher value indicating greater stringency. The official supervisory power describes whether the supervisory authorities have the power to take specific actions to prevent and correct problems and it ranges from 0 to 16, with the higher score indicating more supervisory power.

General level of development

The study also suggests controls for general economic development, macroeconomic and monetary stability and institutional framework as these are likely to affect banking system performance. GDP growth is used to control cyclical output effect which, it assumes, has a positive influence on bank lending. However, when the GDP growth slows down, particularly during recessions, credit quality deteriorates, and default increases thus, reducing subsequent bank lending (Flamini et al., 2009). As a result, GDP per capita is employed to control different levels of economic development in each country and year. GDP/GDP per capita growth is measured as the annual rate of growth of GDP/GDP per capita, and inflation is measured as the annual growth rate of the CPI index. While the GDP/GDP per capita growth captures the possible effect of the business cycle and the level of economic development, the banking system is less likely to supply loans when it is subject to high inflation, in that, prices of financial services such as interest rates become less informative. On monetary policy stance, empirical literature on bank lending has ample evidence on the link between monetary policy and lending. Indeed, there is no conclusive stand on the effect of monetary policy on bank lending (Bernanke and Gertler, 1995; Kashyap and Stein, 1995; Gertler and Gilchrist, 1993). The literature is still not conclusive on the best indicator of monetary policy stance. In this study, the respective countries' interest rates are used as a measure of monetary policy indicator.

The study incorporates the stock market capitalization, banking freedom and financial reform index. The size of the country's stock market capitalization to GDP is used as a proxy for contribution from non-bank financial institutions. The banking freedom provides the overall measures of the openness of the banking sector and the extent to

which banks are free to operate their businesses. The measure describes the country's financial climate and assigns an overall score of between 0% and 100%, with a higher percentage score signifying more freedom. For financial reforms index, information from the database of (Abiad et al., 2010), which covers 91 countries from 1973 to 2006, are used. The index is multi-faceted and graded measure can be used to empirically investigate the effect of reforms on financial sector outcomes such as increased financial intermediation.

Data sources

The study employs both micro-firm level and macro-country level data. Bank-level data is taken from BankScope database maintained by Fitch/IBCA/Bureau Van Dijk. Series are yearly, covering a sample of 264 banks across 24 sub-Saharan African countries during the eight-year period, 2000–2007. As the study focuses on bank intermediation, unconsolidated balance sheet data, whenever possible, are opted for even though in some cases the study have to depend on consolidated statement because of data unavailability. The sample includes all commercial banks, cooperative banks, development banks, savings banks, real estate and mortgage banks for which annual data is available for some period or the years during the period 2000–2007. To ensure that banks that are important players in the deposit and/or loan markets are not omitted, medium- and long-term credit banks and specialized government institutions are included as they remain important in SSA countries. The use of BankScope has an advantage since the accounting information on banks are standardized. This is after necessary adjustments are made for differences in accounting and reporting standards across countries. Macro data are obtained from the World Development Indicator of the World Bank and International Financial Statistics database of the International Monetary Fund and the respective central banks. The series includes GDP/GDP per capita growth, inflation, exchange rates, average policy interest rates, the Treasury Bill rate, interbank rate, and money market rate. Activity restrictions, entry into banking requirements, capital stringency and supervisory power variables are obtained from Barth et al. (2004), while banking freedom data are taken from Heritage foundation. Financial reform index are taken from Abiad et al. (2010). Appendix V provides summary and the sources of various variables used in the study.

4. Empirical results

Summary statistics

Descriptive statistics are presented in tables 4, 5 and 6. Table 4 provides bank-specific variables averaged for the period 2000-2007; Table 5 provides summary statistic for bank market structure and contestability; while Table 6 deals with the measures of banking stability. The summary statistics of the entire sample are also presented in Appendix I. This shows the mean, standard deviation, the minimum and the maximum values, as well as the total observation.

Table 4: Bank-specific variables: Averages for the period 2000–2007

	Loan to assets	Bank size	Liquidity	Mgt efficiency	Bank growth	Capital ratio
Benin	0.5583	252.3278	0.1421	0.8033	0.1005	0.0929
Burkina Faso	0.6028	206.3341	0.1698	0.8578	0.1383	0.0883
Cameroon	0.5115	475.4163	0.2453	0.8676	0.1484	0.0752
Cote d'Ivoire	0.6247	412.0526	0.1439	0.8328	0.0935	0.0918
Ghana	0.4035	154.9792	0.4989	0.8327	0.3829	0.1189
Nigeria	0.3580	1554.3790	0.6178	0.8381	0.3672	0.1546
Senegal	0.5657	344.8411	0.1411	0.8772	0.1499	0.0946
Sierra Leone	0.2519	32.8857	0.1788	0.8137	0.1958	0.1943
Togo	0.5788	121.1300	0.3420	0.7588	0.1325	0.1779
Kenya	0.5628	223.7234	0.4662	0.8460	0.1673	0.1861
Uganda	0.4255	133.9829	0.4590	0.8788	0.2288	0.1393
Tanzania	0.3845	186.9849	0.5074	0.8738	0.2579	0.1317
Ethiopia	0.5918	526.0118	0.3142	0.8850	0.2593	0.1163
Angola	0.2400	653.6827	0.3458	0.7729	0.4372	0.1281
Botswana	0.5493	409.5558	0.3298	0.9289	0.2139	0.1930
Malawi	0.3377	62.0842	0.3563	0.7800	0.2741	0.1335
Madagascar	0.4641	151.2108	0.2871	0.7310	0.1660	0.1085
Mauritius	0.5827	790.8535	0.1932	0.8914	0.1350	0.1826
Mozambique	0.4091	223.9475	0.3466	0.7420	0.2525	0.1549
Namibia	0.7318	520.1613	0.1721	0.9373	0.1766	0.3107
South Africa	0.6567	8104.8160	0.2842	0.9272	0.1588	0.1779
Swaziland	0.7047	137.9059	0.2204	0.8883	0.1281	0.1436
Zambia	0.2849	129.9619	0.5363	0.8137	0.2569	0.1784
Zimbabwe	0.4036	1358.3580	-0.0879	0.7414	0.2025	0.1628

Bank equity represents average capitalization of respective countries' banks; loan to assets indicate portfolio mix; the bank size is the average total assets, management efficiency and bank growth. The mean values of the selected banks over the period 2000-2007 are in percentage terms except for bank size which is in millions of US dollars.

Table 4 shows that, on the average, 73.18% of Namibian banks' assets in the sample are loans extended to customers. This is the highest in the sample. The least is the Angolan banks, whose average loan portfolio is 24%. The overall average is 49.10%, indicating that more than 50% of the selected African banks' assets are outside loans. South African (SA) banks are the largest banks in terms of size. The average bank size of the SA banks is more than 8,104 million US Dollars. On management efficiency, Botswana banks' management are most efficient with the most growing banks located in Angola. However, Namibian banks are the most capitalized with a percentage of 31.07, the highest capitalization level among the sample, while Nigerian banks are the banks with excess liquidity.

Table 5: Financial structure and contestability

	Financial Structure			Contestability		
	C3 (%)	Bank density	Market power	Activity restriction	Entry require-ment	Capital string-ent
Benin	0.8429	0.0000	0.16597	10.500	8.000	7.000
Burkina Faso	0.6662	0.0000	0.04301	10.500	8.000	7.000
Cameroon	0.6369	0.5272	0.54417	9.500	8.000	3.000
Côte d'Ivoire	0.6266	0.0000	0.78942	10.500	8.000	7.000
Ghana	0.5885	1.4583	0.25226	10.500	8.000	6.000
Nigeria	0.4584	0.4730	0.32018	12.000	8.000	5.000
Senegal	0.6263	0.0000	0.35988	10.500	8.000	7.000
Sierra Leone	0.8718	0.0000	0.06861	10.000	8.000	…..
Togo	0.9427	0.2690	0.91797	6.000	8.000	7.000
Kenya	0.3370	1.5363	0.21031	11.000	7.500	7.000
Uganda	0.5369	0.0000	0.36347	12.000	8.000	5.000
Tanzania	0.4593	0.0000	0.30627	9.000	8.000	3.000
Ethiopia	0.8627	0.0003	0.42468	15.000	5.000	2.000
Angola	0.7151	0.5905	0.07575	12.500	8.000	3.000
Botswana	0.7242	7.5766	0.20806	10.000	8.000	6.000
Malawi	0.6116	0.0006	0.31535	13.000	8.000	5.000
Madagascar	0.7712	0.0000	0.30246	11.000	7.000	7.000
Mauritius	0.5036	13.8419	0.21698	11.000	7.500	5.000
Mozambique	0.7344	0.0008	-0.08541	11.000	8.000	4.000
Namibia	0.4142	7.3006	0.46569	11.250	8.000	2.000
South Africa	0.2698	1.7088	-0.03238	9.000	8.000	7.000
Swaziland	0.6727	6.1758	0.19379	14.000	7.000	4.000
Zambia	0.6275	1.7817	0.33030	…	…..	…..
Zimbabwe	0.3834	0.0001	0.26762	10.000	8.000	6.000

CR (3) % is three bank concentration ratio; bank density is the number of banks per million population; activity restriction is the degree to which national authorities allow banks to engage in activities that generate non-interest income; entry requirements are the specific legal submissions required to obtained a licence to operate as a bank; and the capital stringency is the explicit regulatory requirement on the amount of capital that a bank must have relative to various guidelines.

------ Information not yet available

Regarding financial structure and contestable variables, Table 5 shows that least concentrated banking systems are located in SA and the largest number of banks per million of population is in Mauritius, i.e., Mauritius has the highest bank density. Togolese

banks are the banks with the highest market power. Activity restrictions are severe among the Ethiopia banks. This means that banks in Ethiopia can not freely engage in non-banking activities such as securities markets, insurance and real estate. In addition to that, Ethiopia scores least with regard to entry requirement. It is, therefore, easy to establish banking activities in Ethiopia. On the issue of initial capital requirement, SA banks seem to have the most capital stringency requirements.

Table 6: Measure of bank stability

	Z-score	Sharpe ratio	Bad loan
Benin	10.08392	0.79597	0.12688
Burkina Faso	12.66114	2.30429	0.11106
Cameroon	14.98758	2.57901	0.11919
Côte d'Ivoire	8.34316	0.58859	0.08294
Ghana	11.75616	3.28749	0.11333
Nigeria	14.80174	1.95349	0.13765
Senegal	22.37535	3.74055	0.05615
Sierra Leone	7.72912	2.01718	0.31804
Togo	17.38936	2.11418	0.31642
Kenya	22.14288	2.43361	0.18155
Uganda	11.84336	2.35885	0.04331
Tanzania	13.70788	1.60701	0.10501
Ethiopia	12.36937	2.45812	0.13413
Angola	7.20847	0.69648	0.07227
Botswana	15.83030	4.42543	0.03671
Malawi	9.58383	2.56210	0.10396
Madagascar	9.24150	2.88216	0.07469
Mauritius	27.79948	3.27104	0.01931
Mozambique	12.67306	2.29813	0.07849
Namibia	18.41460	5.16238	0.06514
South Africa	15.13181	2.40621	0.12682
Swaziland	29.29393	3.16957	0.04153
Zambia	8.29063	0.40917	0.06997
Zimbabwe	3.21637	0.96761	0.09281

Z-score, RARA, RARE, non-performing loans and capital ratio are measures of bank's stability. The Z-score is used as a measure of overall bank risk; the risk adjusted profit as a measure of performance; the volume of non-performing loans to total gross loans to measure the bank loan portfolio risk; the equity capital to asset ratio to account for the bank's capitalization level.

On the measure of banking stability, Table 6 shows that Swaziland banks are the most stable and the least stable are the Zimbabwean banks with a Z-score of 3.21637 (SSA average is 14.03646). Namibian banks are the most profitable with a Sharpe ratio of 5.16238. Sierra Leonean banks have the highest non-performing loans, almost 32%, compared with the overall average of 10.94%.

Pair-wise correlation coefficients are used in this study as a first step to test the relationship between the key variables. The results are presented in appendixes II and III. The correlation coefficient between bank size and excess liquidity is negative and statistically significant indicating that smaller banks in Africa have excess liquidity. The reverse holds with efficiency as the bank size is positively correlated with efficient managed banks. On the correlation between Z-score and the size of the bank, one notes that stable banks increase their share of the market as the correlation coefficient is positive.

Next is the pair-wise correlation coefficient between C3 (%), a measure of concentration and the selected regulatory and contestability variables. Whereas concentration has a positive relationship with monetary policy, GDP growth, and inflation, it has a negative and statistically significant relationship with banking freedom, regulatory capital, and financial reforms. These results show that improving competitive environment strengthens regulatory capital, improves banking freedom as well as enhances financial reforms. These activities take place while monetary policy is tightened and economic growth falls.

Regression results

Cross-country determinants of bank loan to private sector

The specification in (1) relates the observed variation in the supply of bank loans to the private sector to its lag, a monetary policy indicator, and several control variables to account for the general economic environment. The specification of the model is based on data for 24 SSA countries for the period 2000-2007, and a random effects General Least Square estimation procedure. The random effect estimator is preferred given the interest of examining the effect of a number of time-invariant variables. In addition, a Hausman specification test could not reject the hypothesis of no correlation between the errors and the regressor. The regressions results are presented in columns using: bank-specific variable, bank market structure, bank stability and contestability that include regulatory initiative variables - activity restrictions, entry into banking requirements, capital stringent and supervisory power. Banking structure variables are concentration, density of banks and market power. The column labelled bank stability includes the Z-score, ratio of non-performing loans to total loans and Sharpe ratio (risk adjusted return on equity). All the regressions include monetary policy indicator and two macroeconomic variables to control differences in monetary policy stance, and macroeconomic shocks, and the respective countries' level of economic development. The results are reported in Appendix IV.

The entire countries' bank-specific variables sample statistically impact bank lending behaviour. The results show that, credit delivery to the private sector in SSA is influenced by the size of the bank, the liquidity position of such bank, the growth level, as well as the efficiency of the management of the banks. The coefficient of bank size, its growth variable and efficiency, is positive, demonstrating that, in SSA, it is bigger and most growing banks which provide credit to the private sector. The result shows that, ceteris paribus, one per cent growth of bank will increase credit to private sector by more than 35%. Also, the coefficient of the efficiency variable is positive suggesting that, in SSA, the most efficient banks support the private sector with loans. The relationship between bank credit and liquidity is negative and statistically significant. Bank liquidity is not a barrier for extending loans to those who demand bank loans. A possible explanation for this is that, banks in SSA, especially the most liquid ones, tend to use their liquid position for activities other than supply of loans. The lagged dependent variable positively influences credit delivery to the private sector. The current year banks' support to private sector is influenced by the previous year's results. Thus, the magnitude and significance of the coefficient on the lagged bank credit in our equations confirms the dynamic nature of the model.

With regards to bank market structure variables, we find evidence that supports the fact that the banking system structure does not necessarily explain bank lending behaviour in SSA. The only variable that influences credit supply is the concentration. The parameter of the concentration is negative and statistically significant, indicating a strong relationship between bank lending and concentration in SSA. The negative relationship shows that in the country where banks are most concentrated, the supply of loan is less. Contrary to this, we find that bank market power has a positive sign though insignificant, meaning that the bank with relative market power increases bank loan to the private sector. This finding, therefore, suggests that the bank's market power has no significant impact on bank lending behaviour in SSA.

On the issue of bank solvency, there is some evidence that the level of bank stability, risk adjusted profit, and non-performing loan ratio influence the supply of loans in SSA banks. That notwithstanding, the relationship between bank lending and the Z-score is insignificant: the positive coefficient indicates that a stable bank supplies more loans. Studies have shown that high non-performing loans on the balance sheet of banks hinder credit delivery. As expected, the coefficient of non-performing loans to total loan ratio is negative, meaning that SSA banks with high non-performing loans relative to their total loan portfolio will supply fewer loans.

Furthermore, the results show that activity restrictions, entry requirement, capital stringency and bank supervisory power, to a very large extent, explain the cross-country variations in bank lending. Activity restriction, entry requirement and supervisory power have positive relationship with the supply of loans. Severe entry requirements, effective supervisory power and allowing banks to concentrate on their core business of banking promote supply of banks loans in SSA. The positive coefficient of entry requirement shows that a country with rigid entry requirements provide an avenue for quality of new entrants, leading to less financial crisis and more credit delivery. More stringent initial capital requirement hinder credit delivery to private sector. The supervisory power has an insignificant positive relationship with bank lending in SSA. These findings show that, regulatory initiative, which restricts banking activities, imposes severe entry requirements and requires high regulatory capital influences on banks' decision to supply loans in SSA.

The policy–induced domestic interest rate is negative only in column 1. The effect of monetary policy shocks (as the coefficient indicates) on bank lending among banks in SSA shows that monetary policy reduces supply of bank credit in SSA, especially when the bank-specific variables are controlled. For example, on average, one per cent increase of policy-induced interest rate reduces bank credit to private sector by at least 3.5%. This finding suggests that, increasing policy interest rates reduces bank lending. The result is consistent with monetary policy theory and confirms existing empirical research that shows that bank lending increases when monetary policy stance is relaxed. Surprisingly, the monetary policy stance is positive in column 3 (where bank stability variables are controlled), meaning that bank lending increases when monetary policy is tightened. With respect to the influence of macroeconomic factors on each bank's lending, the study reveals that an increase in GDP growth increases bank lending in SSA. These findings are consistent with Quagliariello (2009) result that, in Italy, during economic booms, banks tend to expand their lending activity, often relaxing their selection criteria

resulting in an increase bank lending. Inflation does not seem to influence supply of bank loans. Inflation only impacts on bank lending when market structure variables are used as explanatory variables. The non-impact of inflation and insignificance of GDP growth in columns 2 and 3 on supply of loan is consistent with studies on SSA. For example, Al-Haschimi (2007) find that, macroeconomic environment has only limited effect on SSA banks' margins, and for that matter supply of loan; Beck and Hesse (2006) and Chirwa and Mlachila (2004) find similar results for Uganda and Malawi, respectively.

Benchmark estimation results

The term 'preferred model' is meant to reveal the impact of banking freedom and financial reforms on bank credit to private sector. Here, Equation 1 is estimated emphasizing how banking freedom and financial reforms in addition to some bank-specific, market structure and macroeconomic variable influenced banks' supply of loans. The results are presented in three columns. Column 1 is the benchmark model. In column 2, banking freedom and financial reform index are included. The objective is to find out whether a country that has reformed its financial sector and allows banks to operate freely influences credit. In column 3, South Africa is excluded from the estimation. The results are presented in Table 7.

Table 7: Determinants of bank credit delivery in SSA: Benchmark model

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Bank credit to private sector$_{t-1}$	0.4643***	0.4509***	0.4576***
	(0.0261)	(0.0290)	(0.0295)
Bank size	0.5264***	0.5347***	0.5314***
	(0.0268)	(0.0295)	(0.0298)
Excess liquidity	-0.6399***	-0.6512***	-0.6887***
	(0.0451)	(0.0516)	(0.0537)
Efficiency	0.3499**	0.2881**	0.3433***
	(0.1039)	(0.1166)	(0.1199)
Bank growth	0.2178***	0.2257***	0.1836***
	(0.0357)	(0.0380)	(0.0384)
Concentration	-0.3083***	-0.0505	0.0386
	(0.0625)	(0.1022)	(0.1053)
Bank density	-0.0075**	0.1021***	0.1596**
	(0.0035)	(0.0237)	(0.0282)
Z-score	0.0342**	0.0349***	0.0318**
	(0.0113)	(0.0115)	(0.0128)
Bank bad loan ratio	-0.0071	-0.0031	-0.1014
	(0.0839)	(0.0857)	(0.0905)

continued next page

Table 7 Continued

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Bank capitalization	-0.2780***	-0.2867**	-0.1617
	(0.1044)	(0.1260)	(0.1483)
Activity restriction	0.0079	0.0115	0.0208***
	(0.0053)	(0.0073)	(0.0076)
Entry restriction	-0.0540***	-0.0359*	-0.0436**
	(0.0170)	(0.0191)	(0.0192)
Regulatory capital requirements	0.0289***	0.0073	-0.0045
	(0.0079)	(0.0100)	(0.0103)
Banking freedom		0.0002	0.0008
		(0.0008)	(0.0008)
Financial reforms		0.0150**	0.0244***
		(0.0070)	(0.0078)
Monetary policy indicator	-0.0021***	-0.0046**	-0.0027
	(0.0008)	(0.0019)	(0.0019)
GDP growth	0.0040**	0.0094***	0.0071**
	(0.0018)	(0.0030)	(0.0030)
Inflation	-0.0014*	-0.0010	-0.0029*
	(0.0008)	(0.0015)	(0.0015)
Diagnostics tests			
Number of observations	636	519	476
R^2	0.9879	0.9901	0.9865
Wald chi^2	30367.75	31423	21618.77
p-value	0.0000	0.0000	0.0000

The estimation is based on data for 24 SSA countries using random effects GLS estimators. The dependent variable is bank credit to private sector. Constant term included but not reported. Standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. All regression includes monetary policy stance and two macroeconomic variables.

As reported in Appendix I, credit delivery in SSA is, to some extent, influenced by some bank-specific, market structure, bank stability and contestability variables. The results in Table 7, column 1 is similar to the results in Appendix I except the Z-score and the bank capitalization. The coefficient of bank capitalization is negative indicating that credit delivery is decreased in a country in SSA where banks' capitalization level has decreased. The results demonstrate that in SSA capitalization level is probably used for stability purposes and not that of credit. Furthermore, (in column 2) I incorporated in the equation banking freedom and financial reforms index. Even though the coefficient of banking freedom index is insignificant, the financial reform index and the banking density are positive and statistically significant, meaning that bank credit delivery in SSA is enhanced in a country where the financial sector has been reformed and where banks are allowed to operate freely. Again, the results suggest that the number of banks per country's population alone does not necessarily increase credit delivery unless the financial sector is reformed and that the banks are free to conduct their activities.

In column 2, when the financial reforms index is added to the estimation, the outcome shows that more credit is supplied by banks to the private sector in a country that has reformed its financial system. These findings suggest that a country with high bank density, operating its banking activities freely and openly and which has liberalized its financial systems, banks loans are increased even when monetary policy stance is tightened. The consistency of this result is tested by excluding South African data. The results provided in column 3 are relatively the same in terms of the sign and the magnitude of that of the results in column 2. Thus, the inclusion of the South African data in the estimation process does not necessarily bias the findings.

Determinants of bank credit in SSA: Bank types versus level of income

This subsection provides further implication on how bank types and the income level affect bank credit delivery to the private sector in SSA. To achieve this, we include bank type (a dummy variable denoting either commercial or development bank) and the income level (a dummy variable representing either low or middle income countries) to Equation 1. The results are presented in Table 8 and in columns: column 1 for commercial banks; column 2 for development banks; and column 3 representing low income countries in SSA.

The results are similar to those of the findings presented in Table 7. The coefficient of commercial banks is negative and statistically significant, meaning that commercial banks in SSA do not provide credit to the private sector. The possible explanation of this result is that banks in Africa, especially the commercial banks prefer trading in commercial and government securities than extending credit to the private sector. Contrary to the result of the commercial banks, the majority of the bank loans in Africa are provided by the development banks. On the level of development, the result show that banks, in the low income economies in SSA supply very little in terms of loans to the private sector. However, those operating in middle income countries in Africa extend more credit to the private sector. The results, therefore, suggest that, as the level of a country's income improves, banks take advantage of the perceived investment opportunities and respond decisively to the loan demand.

Table 8: Determinants of bank credit in SSA: Bank types versus level of development

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Bank credit to private sectort-1	0.4490***	0.4393***	0.4395***
	(0.0290)	(0.0290)	(0.0292)
Bank size	0.5362***	0.5455***	0.5357***
	(0.0294)	(0.0293)	(0.0293)
Excess liquidity	-0.6533***	-0.6645***	-0.6586***
	(0.0515)	(0.0512)	(0.0514)

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Table 8 Continued

Dependent variable: Bank credit to private sector			
	(1)	**(2)**	**(3)**
Efficiency	0.2526**	0.2970**	0.2803**
	(0.1172)	(0.1155)	(0.1162)
Bank growth	0.2253***	0.2261***	0.2163***
	(0.0379)	(0.0376)	(0.0380)
Concentration	-0.0526	-0.0261	-0.0737
	(0.1019)	(0.1013)	(0.1023)
Bank density	0.0969***	0.1064***	0.0971***
	(0.0238)	(0.0236)	(0.0237)
Z-score	0.0339***	0.0351***	0.0410***
	(0.0115)	(0.0114)	(0.0118)
Bank bad loan ratio	-0.0246	-0.0213	0.0037
	(0.0858)	(0.0849)	(0.0854)
Bank capitalization	-0.3214**	-0.2848**	-0.3621***
	(0.1262)	(0.1243)	(0.1296)
Activity restriction	0.0132*	0.0125*	0.0104
	(0.0074)	(0.0073)	(0.0073)
Entry restriction	-0.0402**	-0.0375**	-0.0426**
	(0.0192)	(0.0189)	(0.0193)
Regulatory capital requirements	0.0071	0.0061	0.0119
	(0.0100)	(0.0099)	(0.0102)
Banking freedom	0.0002	0.0001	0.0006
	(0.0008)	(0.0008)	(0.0008)
Financial reforms	0.0167**	0.0176**	0.0097
	(0.0070)	0.0070	(0.0074)
Commercial banks	-0.0667**		
	(0.0292)		
Development bank		0.1787***	
		(0.0505)	
Less developing countries			-0.0745**
			(0.0316)
Middle income countries			
Monetary policy indicator	-0.0049**	-0.0046**	-0.0049**
	(0.0019)	(0.0019)	(0.0019)
GDP growth	0.0095***	0.0097***	0.0105***
	(0.0030)	(0.0030)	(0.0030)
Inflation	-0.0012	-0.0010	-0.0008
	(0.0015)	(0.0015)	(0.0015)

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Table 8 Continued

Dependent variable: Bank credit to private sector			
	(1)	(2)	(3)
Diagnostics tests			
Number of observations	581	518	519
R^2	0.9903	0.9904	9902
Wald $Chic^2$	31818	32296.05	31582.48
P-value	0.0000	0.0000	0.0000
Hausman (Chi^2)	543.61	479.53	955.23
P-value	0.0000	0.0000	0.0000

The estimation is based on data for 24 SSA countries using random effects GLS estimators. The dependent variable is bank credit to the private sector. The constant term is included but not reported. Standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. All regression includes monetary policy stance, regulatory and macroeconomic variables.

Determinants of bank credit in SSA: Regional analysis

Several variations are made to Equation 1 with the aim of testing its robustness. First, is the grouping of SSA's banks into three zones; and the second variation is to employ system General Method of Moments (GMM) estimators. SSA countries are categorized into three zones: Economic Community of West African States (ECOWAS), the East African Community (EAC) and the Southern African Development Community (SADC).[4] This is conducted in order to examine whether there is a regional difference of banks' loans to private sector.

One immediate problem in applying Ordinary Least Squares (OLS) in estimating Equation 1 is that $Credit_{it,c\text{-}1}$ is correlated with fixed effects in the error term, which gives rise to 'dynamic panel bias'. Moreover, there is evidence to suggest that OLS produces bias when an attempt is made to control for unobserved heterogeneity and simultaneity. Therefore, the estimation strategy that is used to deal with possible endogeneity issues in Equation 8 is based on the methodology proposed by Blundell and Bond (1998) and Alvarez and Arellano (2003) in estimating systems of equations in both first difference and levels. As pointed in Roodman (2009), the system GMM estimator combines the standard set equations in first-difference with a suitable lagged level as instruments, and an additional set of equations in levels with suitably lagged first differences as instruments. Generally, linear difference and system GMM estimators have one–and–two step variants. I use two-step System GMM, Windmeijer (2005) correct standard error, small-sample adjustments, and orthogonal deviation. The two-step variant uses residuals from the one-step estimates and is asymptotically more efficient than the one-step.[5]

Regional analysis using bank-specific variables

Table 9 shows that bank size influences bank credit delivery. The coefficient is positive indicating that the bigger the bank, the higher it is in the position to supply loans. Banks with excess liquidity within ECOWAS and EAC supply loans to the private sector. Management efficiency only significantly influences credit delivery in countries within SADC. This means that more loans are therefore extended to private sector in SADC where management are most efficient.

Table 9: Regional analysis of bank lending determinant using bank-specific variables

Dependent variable: Bank Loan	ECOWAS	EAC	SADC	ALL
Ln Loan$_{t-1}$	0.59816***	0.63142***	0.67162***	0.72838***
	(0.06810)	(0.07513)	(0.16246)	(0.07025)
Bank Size	0.43100***	0.32908***	0.3212*	0.27340***
	(0.07569)	(0.08122)	(0.17117)	(0.07399)
Excess Liquidity	-0.49612**	-0.34720*	-0.58039	-0.49437***
	(0.21313)	(0.19318)	(0.37913)	(0.17397)
Management Efficient	0.7315814	0.2544774	1.5509***	0.85714***
	(0.51065)	(0.24812)	(0.52740)	(0.28847)
Bank growth	0.38946***	0.1651815	0.52565*	0.58062***
	(0.12085)	(0.19481)	(0.26338)	(0.17388)
Capitalization	-1.17558**	-0.40789*	0.155859	-0.02239
	(0.57627)	(0.24382)	(0.28698)	(0.29448)
Monetary policy	0.0591361	-0.02373*	-0.01582	-0.03695**
	(0.07112)	(0.01257)	(0.04994)	(0.01893)
Log GDP per capita	0.0333356	-0.0603493	-0.00176	-0.02568*
	(0.02031)	(0.03713)	(0.02196)	(0.01372)
Log Inflation	0.02009	0.03641	0.085	0.06960***
	(0.02639)	(0.04407)	(0.08167)	(0.01894)
Constant	-0.94451**	0.12103	-1.5393	-0.77676
	(0.40009)	(0.35014)	(0.56066)	(0.36981)
Diagnostics tests				
Number of observations	326	243	367	936
Number of instruments	135	114	138	85
Wald test	10221	6506.11	8957.15	3978.03
P-value	0.0000	0.0000	0.0000	0.0000
Hansen	59.82	40.64	71.39	74.30
P-value	1.000	1.000	1.000	0.371
AB2	-0.21	0.26	1.49	-1.37
P-value	0.835	0.792	0.136	0.172

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

Regional analysis using market structure variables

With regards to bank market structure variables, presented in Table 10, it reveals that the parameter of the concentration is negative and statistically significant only for banks in ECOWAS region.

Table 10: Regional analysis of bank lending determinant using bank market structure variables

Dependent variable: Bank Loan				
	ECOWAS	**EAC**	**SADC**	**ALL**
Bank loan to private sector$_{t-1}$	0.97053***	0.83486***	0.93957***	0.96944***
	(0.03669)	(0.09975)	(0.02623)	(0.01823)
Concentration	-0.56467**	-0.5912843	-0.29378	0.18319*
	(0.26748)	(0.40384)	(0.18807)	(0.10717)
Bank density	0.0668974	-0.12949*	0.01034	-0.00751**
	(0.04779)	(0.06865)	(0.00791)	(0.00365)
Bank market power	-0.2885***	-0.0501179	-0.22562***	0.0849388
	(0.10820)	(0.33244)	(0.07312)	(0.14916)
Monetary policy	-0.0256618	-0.10406**	0.0471692	-0.0111472
	(0.08056)	(0.04625)	(0.04565)	(0.01463)
Log GDP growth	0.0410424	0.0504968	0.09808*	0.0526924
	(0.03202)	(0.05045)	(0.05550)	(0.03295)
Log Inflation	0.0283433	0.0339351	0.19412***	0.07454***
	(0.02332)	(0.11955)	(0.07117)	(0.02395)
Constant	0.90945	1.2893	0.00977	0.10699
	(0.46387)	(0.5376)	(0.19686)	(0.12987)
Diagnostics tests				
Number of observations	448	343	425	1112
Number of instruments	85	63	91	111
Wald test	3978.03	2345.56	2599	5767.12
P-value	0.0000	0.000	0.000	0.000
Hansen	74.30	52.35	77.59	119.58
P-value	0.371	0.345	0.460	0.060
AB2	-1.37	-0.44	1.51	1.17
P-value	0.172	0.661	0.132	0.243

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

This indicates a strong relationship between bank lending and concentration in ECOWAS. The negative relationship shows that, in ECOWAS, where banks are most concentrated, the supply of loan is less. While concentration is only significant in ECOWAS, bank density is also negatively related to credit delivery only with banks in East African countries. This finding suggests that there are more banks relative to the population in EAC, and this enables banks to invest less in the private sector. With regards to the degree of market power of a bank in the domestic markets, the study reveals that the greater the share a bank possessed, in ECOWAS and SADC countries, the lesser the bank is in a position to supply loans. This finding suggests that the banks' market power matters in bank lending behaviour in SSA, except banks in EAC.

Regional analysis using bank stability variables

Bank solvency matters in credit delivery in SSA. There is evidence to suggest that the level of bank stability and risk adjusted return on equity affect private loans only for banks in ECOWAS. It, therefore, means that bank stability (in terms of higher Z-score and higher profitability) has an influence on bank credit in EAC and SADC. As expected, the coefficient of non-performing loans to total loan ratio is negative, meaning that all banks in SSA with high non-performing loans relative to their total loan portfolio will supply fewer loans (Table 11).

Table 11: Regional analysis of bank lending determinant using bank stability variables

Dependent variable: Bank Loan				
	ECOWAS	**EAC**	**SADC**	**ALL**
Bank loan to private sector$_{t-1}$	0.95548***	0.94272***	0.97014***	0.97363***
	(0.03995)	(0.04879)	(0.01468)	(0.03461)
Z-Score	0.14050**	0.0963848	-0.0211661	0.12096**
	(0.06681)	(0.06906)	(0.07261)	(0.06170)
Shape ratio	-0.15860***	-0.0629262	-0.0238231	-0.1688***
	(0.03925)	(0.04156)	(0.04304)	(0.04805)
Bank Bad Loans	-1.21452*	-0.75771**	-0.967891*	-0.8972***
	(0.70740)	(0.34453)	(0.54475)	(0.31843)
Monetary policy	0.214091**	-0.04896***	0.1438128	-0.0024781
	(0.09758)	(0.01520)	(0.09552)	(0.03805)
Log GDP per capita	0.0277168	0.0083949	-0.0077643	0.0165674
	(0.04366)	(0.03462)	(0.03011)	(0.02908)
Lon Inflation	-0.0357185	0.0000319	0.0858138	0.0503972
	(0.04930)	(0.06158)	(0.12178)	(0.04555)
Constant	0.09168	0.46192	0.02805	0.21152
	(0.26450)	(0.29639)	(0.2442)	(0.2617)

continued next page

Table 11 Continued

Dependent variable: Bank Loan				
	ECOWAS	**EAC**	**SADC**	**ALL**
Diagnostics tests				
Number of observations	196	177	158	531
Number of instruments	81	65	83	83
Wald test	3236.04	2056.13	8095.44	3020.71
P-value	0.0000	0.0000	0.0000	0.0000
Hansen	38.00	34.11	35.19	78.05
P-value	0.998	0.974	1.000	0.213
AB2	0.71	1.03	1.13	1.52
P-value	0.481	0.301	0.258	0.129

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1% 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

Regional analysis using contestability variables

We find that, activity restrictions, entry requirements and capital stringency, to a large extent, can explain the cross-regional variations in bank lending. Supply of bank loan is hindered in ECOWAS, where banks are not allowed to freely operate in non-banking activities (securities, insurance and real estate activities). Diversification into non-interest generating activities increases credit to the private sector, especially for banks operating in the ECOWAS region. The opposite is true of banks in EAC and SADC where more loans are extended when banks are allowed only to concentrate on their core banking activities. It should, however, be noted that the relationship between bank activity restriction and bank lending is insignificant in SADC. Entry requirements has a positive relationship with the supply of loans in SADC. This means that severe entry requirements promote the supply of bank loans in SADC. The positive coefficient of entry requirement shows that the rigid entry requirements in SADC provide an avenue for quality new entrants, leading to less financial crisis and more credit delivery. The coefficient of supervisory power has a significant and positive relationship with bank lending in ECOWAS and EAC and insignificant, but equally positive relationship, with bank lending in SADC. These findings show that regulatory initiative, which restricts banking activities, imposes severe entry requirements, requires high regulatory capital and provides efficient supervisory services, influence only banks in ECOWAS to supply loans (Table 12).

Table 12: Regional analysis of bank lending determinant using contestability variables

Dependent variable: Bank Loan to private sector				
	ECOWAS	**EAC**	**SADC**	**ALL**
Bank loan to private sector$_{t-1}$	0.92829***	0.98505***	0.88798***	0.9644***
	(0.06145)	(0.01581)	(0.05150)	(0.08344)
Activity restriction	-0.98985***	8.2110**	0.1512489	0.196402
	(0.39698)	(3.9977)	(0.32486)	(0.23951)
Capital requirement	0.126596**	-3.5552**	-0.0773074	-0.93065**
	(0.06081)	(1.6336)	(0.10607)	(0.38136)
Banking supervision	1.36235***	21.44193**	0.1436672	0.7104136
	(0.52688)	(9.8260)	(0.22918)	(0.60967)
Entry restriction		-23.5227**	2.6949***	1.40275***
		(11.0488)	(0.84466)	(0.44339)
Monetary policy	-0.13086	-0.08079***	0.0029186	-0.0671***
	(0.19826)	(0.02441)	(0.06780)	(0.02312)
Log GDP per capita	-0.01571	0.0537047	-0.0350052	-0.06298**
	(0.02929)	(0.133267)	(0.02649)	(0.02987)
Log Inflation	-0.03191	0.0297355	0.1209398	0.06745*
	(0.02292)	(0.08179)	(0.08770)	(0.03702)
Constant	-0.04981	22.7535*	-5.6182	-3.42473
	(0.79071)	(10.9067)	(2.3804)	(2.0380)
Diagnostics tests				
Number of observations	357	253	342	1015
Number of instruments	29	29	46	50
Wald test	3498.53	13793.11	944.13	1124.02
P-value	0.0000	0.0000	0.0000	0.0000
Hansen	15.66	20.19	35.17	42.46
P-value	0.405	0.165	0.277	0.181
AB2	-0.79	0.53	0.59	0.15
P-value	0.429	0.594	552	0.880

Two-step System GMM, Windmeijer-correct standard error, small-sample adjustments, and orthogonal deviation. The dependent variable is bank loan. Robust standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, basing on the regional groupings. ECOWAS is Economic Community of West African States, and countries included for the analysis are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo. The EAC is Eastern Africa Community, and countries included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia. The SADC refers to the Southern Africa Development Community, and is made up of Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe. All regression includes monetary policy stance and two macroeconomic variables. The following diagnostic tests are conducted: (1) the instruments counts; (2) the Hansen test for over identification restriction (which the null hypothesis is that instruments are exogenous); (3) the Arellano-Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and (4) the Wald test for joint significant of parameters.

5. Conclusion

This study contributes to the empirical literature on bank lending behaviour in SSA. Broad determinants of the supply of bank loans are analysed. Micro-bank/firm level and macro-country level data of 264 banks across 24 sub-Sahara African countries are used. Activity restrictions and other regulatory variables are sourced from Barth et al. (2004), while liberalization index and banking freedom data are taken from Abiad et al. (2010) and The Heritage Foundation (2010), respectively. The analyses are presented in three subsections. The first subsection examines cross-country determinants of bank lending; the second subsection includes financial reform and banking freedom index into the main equation as 'the benckmark model'; and the last subsection examines the regional determinants of bank credit.

The entire countries' bank-specific variables sample statistically influence bank credit to private sector. Credit delivery to private sector in SSA is influenced by the size of the bank, the liquidity position of such bank, the growth level as well as the efficiency of the management of the banks. The coefficient of bank size, its growth variable and efficiency are positive, demonstrating that, in SSA, bigger and most growing banks provide credit to the private sector. We also find that banking entry requirements, supervisory power and capital stringency, to a large extent, explain the cross-country variations in bank lending. Supply of bank loans is not hindered in a country where banks are not allowed to freely operate in non-banking activities. Thus, these findings show that regulatory initiative, which imposes severe entry requirements, provides effective supervisory power, and requires high regulatory capital requirements, influences banks' decisions to supply loans in SSA. The direction and the level of impact depend on the region in which the bank operates. Furthermore, the lagged dependent variable positively influences credit delivery to the private sector, suggesting that, in SSA, the current year banks' finance to private sector is influenced by the previous year's results.

There is some evidence to support the fact that banking system structure explains bank lending behaviour only when the financial sector is reformed and the banks are allowed to operate freely. The parameter of the concentration is negative, and statistically significant, indicating that there is a relationship between bank lending and concentration in SSA. The study shows that in countries where banks are most concentrated, the supply of loan is less. However, I also find evidence to support the fact that bank density increases supply of loans. On the issue of bank solvency, there is also no evidence that the level of bank stability and risk adjusted profit influence the supply of loans in SSA banks. The study, however, reveals that, in a country where the ratio of banks' non-performing loans to total loan is high, bank lending decreases though the coefficient is

not significant. The estimation results reveal that monetary policy significantly influences bank lending in SSA. The negative relationship suggests that, increasing policy-induced interest rates reduces bank lending. The result is consistent with monetary policy theory and confirms existing empirical research that shows that bank lending increases when monetary policy stance is relaxed. Also, the level of economic activity does affect bank lending especially in an environment where the financial sector has been reformed and that bank density is high.

On how bank types and income levels affect bank credit delivery to private sector in SSA, the results show that banks in the low income economies in SSA supply very little loans to the private sector but those operating in middle income countries in Africa extend more credit to the private sector. The results, therefore, suggest that as the level of a country's income improves, banks take advantage of the perceived investment opportunities and respond decisively to the loan demand.

With regard to the regional analyses, the study sets out to identify whether there are regional differences of bank credit delivery in SSA using bank-specific, bank market structure, bank stability and contestability variables. The results show that, management efficiency only significantly influences credit delivery in countries within SADC, meaning that more loans are, therefore, extended to private sector in SADC where management are most efficient. While concentration is only significant in ECOWAS, bank density impacts negatively to credit delivery of banks in Eastern African countries. This finding suggests that there are more banks relative to the population in EAC and this, according to the results, enables banks to invest less in the private sector. With regards to the degree of market power of a bank, the study reveals that the more the share a bank possesses, in ECOWAS and SADC countries, the lesser the banks are in the position to supply loans. This finding suggests that the bank's market power matters in bank lending behaviour in SSA, except banks in EAC. There is evidence to suggest that the level of bank stability and risk adjusted return on equity affect private loans only of banks in ECOWAS. Furthermore, the findings of the study show that, activity restrictions, entry requirement and capital stringency, to a large extent, can explain the cross-regional variations in bank lending. Supply of bank loan is hindered in ECOWAS, where banks are not allowed to freely operate in non-banking activities. These findings clearly demonstrate that there are different determinants of bank credit delivery across the various regions (ECOWAS, EAC and SADC) in SSA. It is, therefore, recommended that the policy makers adopt multi-faceted region-specific approaches in dealing with credit constraints facing the private sector.

6. Public policy implications

This study makes several contributions to the growing body of literature of lending behaviour of banks in Africa. Even though the study focuses on Africa, given the link between finance and the real economy, the benefits of conducting this research in Africa has a chance of making an impact beyond these economies. Bekaert and Harvey (2002) put this in context as "the benefits and the subsequent impact of research on emerging economies on economic growth cannot be merely measured in absolute dollar terms, but in the number of people that are elevated from a desperate subsistence level to a more adequate standard of living".

The findings of this study give rise to three very important public policy considerations. First of all, policies that improve bank-specific condition such as the bank growth, size, and efficiency of the management should be pursued by the management of the banks. For example, banks in Africa should be encouraged to consolidate their operations or merge their activities. Therefore, supervisory, regulatory and competition authorities should coordinate to put in place a mechanism that allows banks to have a considerable amount of market power that is robust and consistent with any competition policy. Secondly, given the positive role of the relationship between financial reform and bank lending, SSA countries must liberalize their financial sector in the area of credit controls and reserve requirements, interest rate controls, entry barriers, state ownership, policies on securities markets, prudential regulations and supervision of the banking sector and restrictions on the capital accounts. These reforms are needed as the number of banks per population will not improve the access of financial services, unless the entire financial sector is reformed and that banks are allowed to conduct their operations freely. Finally, given the fact that development banks finance economic activities, compared with the other forms, policy makers should introduce guidelines and incentives that enables investors to establish development banks.

Notes

1. See, for example, Chirwa and Mlachila (2004) for Malawi and Beck and Hesse (2006) for Uganda.

2. As total assets are in domestic currency, they are not easily comparable across countries. In order to make a cross-country comparison still feasible, we convert individual banks assets denominated in local currencies to US dollar.

3. Moreover, the higher score also indicates the quality of new entrants and is therefore less likely to experience banking system crises and thus enhancing bank lending.

4. Countries included in the analysis for ECOWAS are Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Nigeria, Senegal, Sierra Leone and Togo; those of the EAC included for the analysis are Kenya, Uganda, Tanzania, and Ethiopia; while Angola, Botswana, Malawi, Madagascar, Mauritius, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe are included for SADC.

5. The following diagnostic tests are made: (1) The instruments count, (2) The Hansen test for over-identification restriction for which the null hypothesis is that instruments are exogenous, (3) The Arellano-Bond tests for first and second order serial correlation in the residuals for which the null hypothesis is that there is no serial correlation, and (4) The F-test for joint significance of instruments.

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Appendix

Appendix I: Summary descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Bank size	1724	961.3510	4562.0520	0.1000	68368.2000
Excess liquidity	1688	0.3598	0.2418	-0.5333	0.9691
Management efficiency	1722	0.8437	0.1074	0.0688	0.9969
Bank growth	1354	0.2280	0.2415	-0.9671	0.9981
Bank capitalization	1708	0.1494	0.1249	-0.0749	0.9968
Concentration	2109	0.5439	0.1860	0.2199	0.9775
Bank density	2103	1.7517	3.2880	0.0000	18.8091
Market power	1681	0.2659	0.4542	-5.3705	3.5417
Z-score	1721	14.5977	16.0703	-11.6649	171.9246
Sharpe ratio	1682	2.3135	2.5121	-4.8188	18.7619
Bank bad loan	901	0.1162	0.1213	0.0001	0.8657
Activity restriction	2016	10.8691	1.8815	1.0000	15.0000
Entry requirement	2016	7.7639	0.6284	5.0000	8.0000
Capital requirement	1976	5.3927	1.6213	2.0000	7.0000
Supervisory power	1976	11.7166	2.6473	5.0000	15.0000
Banking freedom	2112	48.3144	15.1288	10.0000	70.0000
Financial reform index	1512	14.6564	2.7114	6.0000	18.2500

Appendix II: Correlations between bank-specific variables

	Bank size	Liquidity	Mgt efficiency	Bank growth	Z-score	Bad loans	Capital ratio
Bank size	1						
Excess liquidity	-0.1071*	1					
Efficiency	0.1688*	0.0333	1				
Bank growth	0.0431	0.2086*	-0.0553*	1			
Z-score	0.1039*	0.1193*	0.2197*	-0.0426	1		
Bad loans	-0.1626*	0.0699*	-0.1571*	-0.187*	-0.182*	1	
Capital ratio	-0.2240*	-0.0221	-0.0807*	-0.084*	0.1689*	0.1804*	1

NB: Significant level at 5%

Appendix III: Correlations between country-level variables

	C3 (%)	Liquidity	Activity	Entry	Regulatory capital	Banking freedom	Financial reforms	Monetary policy	GDP growth	Inflation
C 3 (%)	1									
Bank density	-0.1152*	1								
Activity	0.1710*	0.0197	1							
Entry	-0.2463*	-0.0916*	-0.335*	1						
Reg. capital	-0.2847*	-0.0726*	-0.292*	0.2413*	1					
Banking freedom	-0.1557*	0.3869*	-0.188*	0.1077*	0.1454*	1				
Financial reforms	-0.5951*	0.1407*	-0.310*	0.5007*	0.2308*	0.2853*	1			
M. policy	0.0615*	-0.1505*	0.1524*	0.1532*	-0.1497*	-0.219*	-0.106*	1		
GDP growth	0.2089*	-0.0385	0.2559*	0.003	-0.2175*	-0.0419	0.0954*	-0.0091	1	
Inflation	0.0475*	-0.0801*	0.1519*	0.0764*	0.0076	-0.212*	-0.190*	0.5582*	-0.067*	1

NB: Significant level at 5%

Appendix IV: Cross-country determinants of bank lending

Dependent variable: Bank credit to private sector

	Bank Specific	Market Structure	Stability	Contestability
Bank credit to private sector-1	0.6300*** (0.0176)	0.9063*** (0.0089)	0.9793*** (0.0079)	0.9176*** (0.0086)
Bank size	0.3641*** (0.0195)			
Excess liquidity	-0.565*** (0.0437)			
Efficiency	0.5704*** (0.0899)			
Bank growth	0.3508*** (0.0346)			
Concentration		-0.1591* (0.0859)		
Bank density		-0.0033 (0.0047)		
Bank market power		0.0347 (0.0443)		
Z-score			0.0256 (0.019)	
Sharpe ratio			-0.050*** (0.0144)	
Bank bad loan ratio			-0.607*** (0.1154)	
Activity restriction				0.0961* (0.0571)
Entry restriction				0.4157** (0.1893)
Regulatory capital requirements				-0.1327** (0.0512)
Supervision power				0.0300 (0.0624)
Monetary policy indicator	-0.0352** (0.0141)	-0.0180 (0.0230)	0.0673*** (0.0203)	-0.0018 (0.0222)
GDP growth	0.0209* (0.0123)	0.0389* (0.0206)	0.0253 (0.0197)	0.0249 (0.0186)
Inflation	-0.0001 (0.0007)	0.0017 (0.0015)	0.0005 (0.0013)	0.0005 (0.0013)

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Appendix IV Continued

Dependent variable: Bank credit to private sector				
	Bank Specific	**Market Structure**	**Stability**	**Contestability**
Diagnostics tests				
Number of observations	1189	1221	648	1174
R2	0.9803	0.9533	0.9707	0.9789
Wald chi2	33698.88	13190.54	16652.61	1225.74
p-value	0.0000	0.0000	0.0000	0.0000
Hausman (chi2)	680.35	275.73	83.18	125.61
P-value	0.0000	0.0000	0.0000	0.0000

The estimation is based on data for 24 SSA countries using random effects GLS estimators. The dependent variable is bank credit to private sector. Constant term included but not reported. Standard errors are reported in parentheses. ***, **, and * indicates statistical significance at the 1%, 5% and 10% level, respectively. The results are presented in columns, depending on the categories (bank-specific, structure and contestability) of independent variables. All regression includes monetary policy stance and two macroeconomic variables.

Appendix V: Summary definition of variables

Variable name	Description	Source
Bank-specific		
Bank size	Bank size is measured as a logarithm of assets	BankScope
Bank capitalization	Ratio of equity capital to total assets. A higher bank capitalization indicates lower bank risk	BankScope; Author's calc.
Loan to assets	Total bank loans to total assets	BankScope
Bank growth	It is calculated as the difference between the previous total assets and the current value and the result is divided by the previous value	BankScope
6 ptLiquidity	Is constructed as total cash plus bank total short-term investments divided by total assets	BankScope; Author's cal.
Market structure		
Concentration	Three-bank concentration ratio of total assets, a measure of banking system concentration	BankScope; Author's cal.
Density of banks	The ratio of the number of banks in the country and the total population of the country	BankScope; Author's cal.
Market power	Measures market power using Lerner index	Author's cal.
Contestability		
Activity restrictions	Degree to which national authorities allow banks to engage in activities that generate non-interest income. The measure varies from 4 to 16 with higher scores indicates more restrictions	Barth et al. (2004)
Entry requirement	The entry requirement indicates the severity (range from 0 to 8) of entry regime, with higher value indicating more restrictiveness	Barth et al. (2004)

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Appendix V Continued

Variable name	Description	Source
Contestability		
Capital index	Capital index measures overall capital stringency. It ranges from 0 to 9, with higher value indicating greater stringency	Barth et al. (2004)
Monetary policy	Short-term interest rate	IMF of IFS
Economic development		
GDP /GDP per capita growth	Uses GDP growth measured as the annual rate of growth of GDP	World Bank Dev. Indicators
Inflation	Inflation is measured as the annual growth rate of the CPI index	World Bank Dev. indicators
Banking Stability		
Sharpe ratio	Sharpe ratio measures risk-adjusted return on equity (ROE) and it is calculated as ROE divided by standard deviation of ROE	BankScope; Authors' cal.
Z-index	The Z-index measures the number of standard deviations that a bank's profit must fall to drive it into insolvency. The index potentially measures the accounting distant to default for a given institution	BankScope; authors' calculation
Non-performing loan	Ratio of banks' non-performing loans to gross total loans. A higher value indicates a riskier loan portfolio	BankScope; Authors' cal.
Depending variable		
Bank loan to private sector	Log of dollar amount of credit to private sector	BankScope, Author's cal.

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Abstract

Banking literature, especially those on the developing economies, has not emphasized the link between macroeconomic activities, monetary policy, bank market structure, bank specific condition, and the supply of bank loans. This study employs dynamic panel data techniques to investigate the broad determinants of lending behaviour of 264 banks across 24 sub-Saharan Africa (SSA) countries. The results show that the market structure of banks influences credit delivery in SSA in an environment where the financial sector is reformed and banks are allowed to operate freely. More so, there is evidence to suggest a link between bank credit and the financial strength of the banks. The study further reveals that, regulatory initiative, which restricts banking activities, imposes severe entry requirements and requires high regulatory capital, and influences banks' decisions to supply loans.

JEL classifications: *E52, G21, G28, N27*
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