

Full Length Research Paper

The determinants of interest rate spread: Empirical evidence from the Central African economic and monetary community

Achille Dargaud Fofack

Cyprus International University Turkey.

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In spite of the reforms undertaken during the 1980s and 1990s in favour of financial deepening, the spread between the lending rate and the deposit rate is still high in the member countries of the Central African Economic and Monetary Community (CAEMC). Thus, the aim of this study is to investigate the determinants of banking spread in those countries. In that vein, the study employs two-step regression proposed by Ho and Saunders using country-level data from 2000 to 2010. On one hand, the study controlled for capital inflows and natural resources endowment. On the other hand, the study took into consideration the legal and institutional framework of the sample countries and the excess liquidity prevailing in their banking systems. The results revealed that among bank-specific characteristics, bank asset, doubtful loan, and the volume of credit significantly determine the observed spread. As for macroeconomic characteristics, oil rents, foreign direct investment (FDI) inflows, and real gross domestic product (GDP) growth significantly affect banking spread. Meanwhile, political stability, corruption, government effectiveness, regulatory quality, and bank concentration in the deposit market are the significant institutional determinants of the interest rate spread in CAEMC countries.

Key words: Panel Data, Commercial Banks, Financial Intermediary, Central Africa.

INTRODUCTION

The difference (spread) between the interest rate that banks charge on loans and the interest rate they pay on deposit is a key financial variable because it indicates the level of efficiency in financial intermediation (Demirgüç-kunt and Huizinga, 1998). Thus, a high interest rate spread like the one prevailing in the member countries of

the Central African Economic and Monetary Community (CAEMC)ⁱ discourages saving through low deposit rates, and rations credit through high lending rate. In that vein, high interest rate spread could adversely affect economic growth, especially in environments where banks are the principal, if not the sole source of external finance.

E-mail: adfofack@yahoo.fr.

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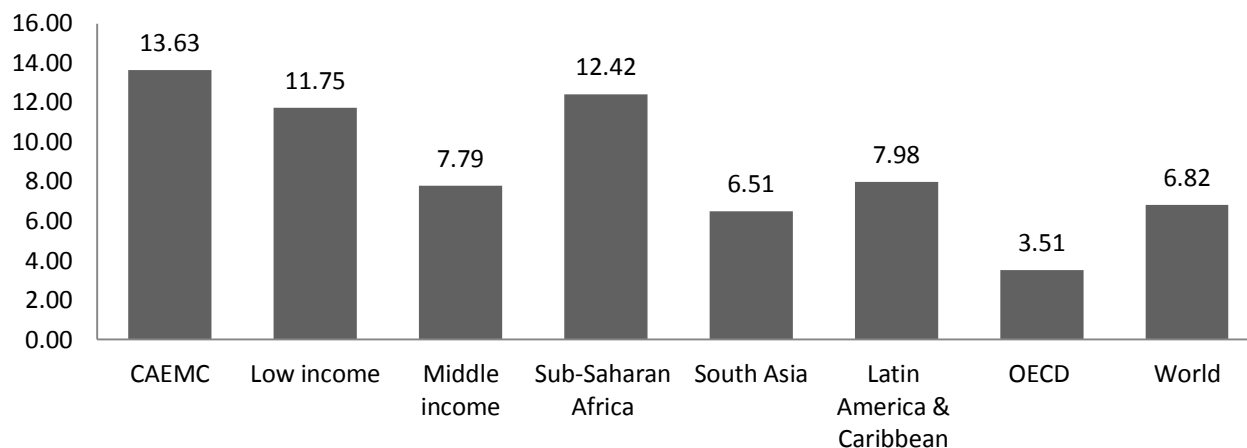


Figure 1. International comparison of banking spread (average for 2000-2006) (Source: Own elaboration based on data from World Development Indicators 2015).

Under the authority of multilateral institutions (IMF and World Bank), the member countries of CAEMC undertook reforms in favour of financial deepening during the late 1980s and the 1990s. As the result of those financial reforms, interest rate spread was supposed to converge over time, toward international standards. However, it is not the case. Indeed, banking spread is still high in the sub-region and does not really show a downward trend over time (Figure 1).

In order to address that issue, the study aims to investigate the determinants of the interest rate spread in those countries. For that purpose, the study employs the two-step regression proposed by Ho and Saunders (1981) using country-level data from 2000 to 2010. This is the first study on the determinants of banking spread to focus on CAEMC countries. The study also contributes to the existing literature by taking into consideration capital inflows, natural resources endowment, the legal and institutional framework of CAEMC countries, as well as, the excess liquidity prevailing in their banking systems.

Descriptive evidence

As revealed by Singh et al. (2009), Central African Economic and Monetary Community (CEMAC) countries implemented many reforms in favour of financial deepening during the 1980s and 1990s. Those reforms were built upon the theoretical wisdom advocated by McKinnon (1973) and Shaw (1973) according to which the efficiency and the flexibility of the financial sector would sustain economic growth. Thus, those reforms liberalized interest rates, abolished selective credit allocations, restructured and/or privatized banks, reinforced banking supervision, and implemented indirect monetary policy instruments.

Those financial reforms led to the creation of a single banking supervisor for the entire community named, the

Banking Commission of Central Africa (COBAC) in 1992, and to the creation of the money market in July 1994. Nevertheless, the general feeling more than two decades later, is that the effects of those reforms are quite mitigated if not disappointing. In that vein, Avom and Eyeffa (2007) noticed that the reforms undertaken by CAEMC countries led to 3 paradoxes.

First, banks operating in those countries suffer from excess liquidity while rationing credit to the private sector. For instance, 40 out of the 43 banks in the sub-region had a liquidity ratio exceeding 100% in 2009 and in 2010 (COBAC, 2010). Furthermore, excess reserves represented 200% of required reserves in 2013 (FMI, 2014). Besides, the 2010 World Bank data revealed that credit to private sector as a percentage of gross domestic product (GDP) was equal to 12.53% in Cameroon, 8.95% in the Central African Republic, 4.2% in Chad, 6.5% in Congo, 9.3% in Equatorial Guinea, and 8.1% in Gabon. These figures are ridiculous compared to the average of 56.64% in Sub-Saharan Africa (developing countries only) and 72.15% in low and middle-income countries around the world.

The second paradox is that the banking sector is highly concentrated in CAEMC countries as shown in Figure 2 while there is a rapid development of microfinance. The prevailing concentration is the result of passed restructurings that reduced the number of banks through mergers, acquisitions, and shutdowns. While the prohibitive prices (low deposit rate and high lending rate), and other conditions required by banks led to the financial exclusion of a vast portion of the population and boosted the development of microfinance as an alternative for those financially excluded people.

Finally, Avom and Eyeffa (2007) noticed that there is a paradox between the internationalization of banks and the absence of financial innovation in CAEMC countries. Indeed, most of the banks in Central African sub-region are foreign banks or foreign-owned banks. They operate

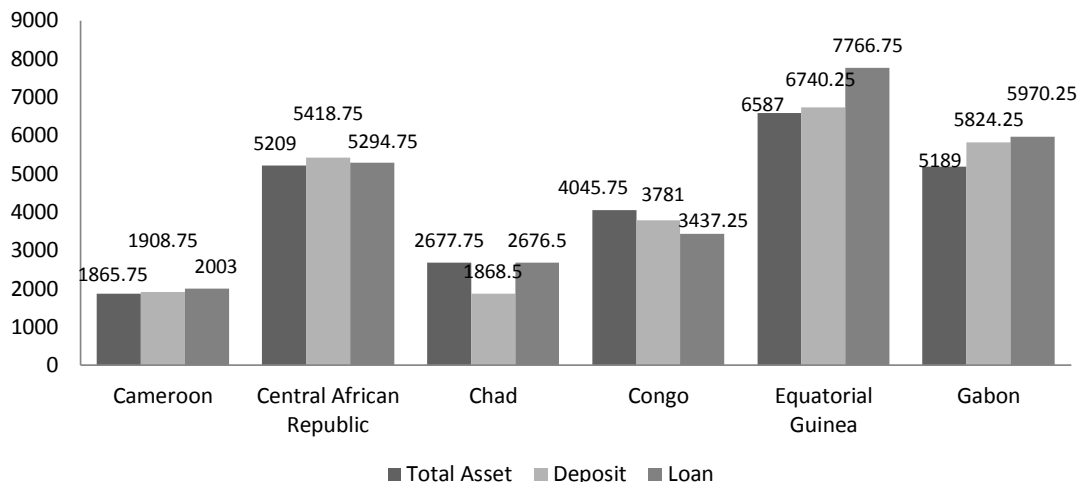


Figure 2. Concentration of the banking industry in CAEMC countries (average HHI for the period 2005-2010)
¹ (Source: Own elaboration based on data from COBAC).



Figure 3. Evolution of banking spread in CAEMC countries from 2000 to 2010 (Source: Own elaboration based on data from COBAC).

¹ The Herfindahl-Hirschman Index (HHI) is the sum of the squared market shares of all the competing banks. $HHI = \sum_{i=1}^n M_i^2$
 HHI < 1,000 indicates low concentration; $1,000 \leq HHI < 1,800$ indicates average concentration; and $HHI > 1,800$ indicates high concentration.

in many countries and carry out international transactions but basic financial products/services like ATM cards, internet banking, and the likes are still considered luxury goods in the sub-region.

Besides those paradoxes, Singh et al. (2009) noticed a gap in financial development between CAEMC countries and other Sub-Saharan African countries. One of the indicators they used to underline this gap is the ratio credit/GDP but it can also be done using banking spread. As revealed in Figure 1, the average banking spread is higher in CAEMC countries compared to various groups of countries (low-income, middle-income, OECD, etc.), even those with similar level of development.

Moreover, Figure 3 shows that excluding Cameroon, banking spread is not really decreasing over time in CAEMC countries. This situation is alarming because after the financial reforms and banking restructurings undertaken in the 1980s and 1990s, interest margins were supposed to converge over time, toward international standards. On the one hand, the high interest margins observed in Central African countries is associated with low interest rate on deposits (3.25% a year on average in 2010) that leads to low domestic savings. Thus, if not for security purposes, many people would have preferred to invest their savings in a Rotating Savings and Credit Association (ROSCA) where it yields more or to hoard it up. On the other hand, high spread is associated with high interest rate on credits and leads to both credit rationing and adverse selection of potential borrowers. The situation is serious in Central African countries because banks constitute the major if not the sole source of external finance for most of the economic agents.

Finally, Singh et al. (2009) argued that the gap in financial development between CAEMC countries and other Sub-Saharan African countries could be explained by the differences in their institutional framework. They highlighted the importance of institutions because they believed that liberalization and macroeconomic stability are required but not sufficient conditions for financial development.

As to institutional soundness, CAEMC countries are characterized by inefficient judicial systems with lengthy proceedings, weak contract enforcement, and weak protection of property rights. Furthermore, the sub-region is associated with poor governance, high corruption and political instability. As a result, Central African countries are usually ranked among the worst in the world when it comes to institutional quality.

LITERATURE REVIEW

Theoretically, studies that aimed to explain how banks set their interest rates and their interest margins can be traced back to the influential articles of Klein (1971) and Monti (1972). These researchers proposed a micro-

economic model of the banking firm that aims to explain how the equilibrium scale of the bank, the composition of its asset and liability portfolios, and the interest rates it applies on loans and deposits are determined endogenously. They modelled each side of the bank's balance sheet separately and justified the existence of interest margin by the addition of the monopoly power of the bank, the marginal cost of deposits, and the marginal cost of loans.

Knowing that a bank can use its margin on loans (or deposits) to cross-subsidise its interest rate on deposits (or loans), Ho and Saunders (1981) considered the two-sided nature of bank's interest rate setting and made a seminal contribution in the explanation of banking spread. Ho and Saunders (1981) modelled the bank as a risk-averse dealer in the credit market acting as a middleman between depositors and borrowers. The stochastic and asynchronous nature of deposit supplies and loan demands exposes the bank to interest rate risk. Therefore, the bank requires a positive interest margin similar to the bid-ask spread of a security dealer. Ho and Saunders (1981) justified the existence of interest margins by the presence of transaction uncertainty and named the margin due to that uncertainty the "pure spread". Their dealership model revealed that the pure spread depends on four factors, namely: the degree of bank management risk aversion, the market structure of the industry, the average size of bank activities, and the volatility of interest rates.

The dealership model was extended by many researchers and some of the assumptions made by Ho and Saunders (1981) were relaxed to take into consideration various types of loans (Allen, 1988), the money market interest rate (McShane and Sharpe, 1985), default risk, interest rate risk and their interaction (Angbazo, 1997), operating costs (Maudos and Fernandez de Guevara, 2004), non-traditional activities (Carbó and Rodriguez, 2007), etc. All together with the original dealership model, these new models constitute the bedrock on which many empirical studies were built. Those empirical studies revealed a multitude of factors covering the macro and microeconomic determinants of banking spread in different environments. Those factors can generally be classified into four non-exhaustive groups referring to bank-specific characteristics, the market structure of the banking industry, the macroeconomic environment, and the legal and institutional framework in which banks operate.

Bank-specific characteristics

At the level of individual banks, a key factor to consider in the determination of interest margin is risk. Indeed, banks are exposed to a wide range of risks (interest rate risk, default risk, foreign exchange risk, legal risk, etc.) inherent in their activities. They hedge their exposure to those risks

by widening their interest margins. In that vein, Afanasieff *et al.* (2002) analysed data from 142 commercial banks and found that a rise in risk premium led to higher spread in Brazil during the period spanning from 1997 to 2000. While Angbazo (1997) revealed that the most important risks in the setting of interest margins are default risk and interest rate risk.

Costs (overhead costs, operating costs, etc.) are among other important micro characteristics affecting interest rate spread. They represent a loss profit that banks deal with by increasing their interest margins. Beck and Hesse (2006), Barajas *et al.* (1999), and Demirgüç-kunt and Huizinga (1998) found evidence that higher operating costs led to higher spreads in Uganda, in Colombia and in a sample of 7,900 commercial banks from 80 countries respectively. Implicit costs like reserve (or capital) requirements are also associated with higher interest margins. Indeed, the opportunity cost of holding reserves that do not earn at all or do not earn enough interest is usually channeled by banks to their clients through lower interest rates on deposits or higher interest rates on loans. Chirwa and Mlachila (2004) and Brock and Rojas (2000) found evidence supporting the positive correlation between reserve requirements and banking spread in Malawi and Latin America respectively.

Another factor to consider in the explanation of interest margins is the size of the bank since larger banks are associated with narrower interest margins when returns to scale are increasing (Demirgüç-kunt *et al.*, 2003). The size of a bank's transactions and especially the size of its non-traditional activities also affect its interest margins. Banks usually cross-subsidize their traditional activities (savings and lending) with the revenues they earn from their non-core or fee-based activities (Carbo and Rodriguez, 2007). So, Demirgüç-kunt *et al.* (2003) studied a sample of 1,400 banks from 72 countries during the period from 1995-1999 and revealed that regulations restricting banks from underwriting securities, investing in real estate, owning non-financial firms or engaging in insurance led to higher interest margins in the banking industry.

Industry-specific characteristics

The structure of a banking sector in terms of size, competition, concentration, contestability, number of banks, banks' ownership, and bank regulation affects the interest margins of all the banks operating in that industry. Thus, Crowley (2007) argued that in a free-market economy, interest rate spread should be negatively correlated to factors affecting the overall level of competition since less competition gives more market power to banks and leads to wider spreads. As to Demirgüç-kunt *et al.* (2003), they found evidence of a positive correlation between concentration and interest margin. Because of the empirical ambiguity surrounding the relationship between concentration and competition,

Maudos and Fernandez de Guevara (2004) recommended to use a direct measurement of market power (like the Lerner index) instead of a structural measurement of competition (like concentration).

Claessens and Laeven (2004) instead opted for contestability since the competitive pressure coming from the free-entry and free-exit conditions would reduce the market power of the existing banks and therefore lead to lower interest margins. Levine (2003) added that when the competitive pressure is coming from foreign banks, the contestability of a banking sector becomes much more important in the determination of interest margins. Working with a sample of 1,165 banks from 47 countries, he found that restricting foreign bank entry positively and significantly increased banking spread. Meanwhile restricting domestic bank entry or foreign bank ownership did not significantly affect interest margin.

Detragiache *et al.* (2006) studied the role of foreign banks in poor countries. They revealed that these well-capitalized banks come with advanced technology, better management, and increase the competition in the banking industry. With all these characteristics put together, one could have inferred that foreign banks would lead to lower interest margins as Gelos (2006) found in 14 Latin American countries. But surprisingly, Detragiache *et al.* (2006) found that the presence of foreign banks was associated with less access to credit in poor countries, while this adverse effect disappeared in developed countries. Furthermore, Demirgüç-kunt and Huizinga (1998) found evidence that foreign banks had higher spread in developing countries while the opposite was true in developed countries.

The degree of state involvement in the banking industry is also cited as one of the determinants of interest margin. Demirgüç-kunt *et al.* (2003) and Crowley (2007) found evidence that state ownership of banks was positively associated with banking spread. This is due to the fact that state-owned banks are incited to grant cheap credits to some particular persons, companies, or economic sectors. They then have to apply higher lending rates on other credits in order to cover the loss profits coming from those cheap credits.

Macroeconomic environment

At the aggregate level of a country, factors like the level of financial development, inflation, economic growth, the volatility of interest rate or exchange rate, trade or budget deficit, or the overall uncertainty surrounding macroeconomic performances have an impact on banking spread. Among those macroeconomic characteristics, inflation is the most cited determinant of interest margin, especially in developing countries. Indeed, inflation was found to be positively correlated to banking spread in Malawi (Chirwa and Mlachila, 2004), in Indonesia (Raharjo *et al.*, 2014), in a panel of 18 English-speaking African countries (Crowley, 2007), and in a panel of

1,400 banks from 72 countries (Demirgüç-kunt et al., 2003). The reason of this positive effect of inflation on interest margin is that it creates a monetary depreciation that allows borrowers to reimburse in real terms, less than what banks lent to them. Therefore, banks cover this loss profit by increasing their lending rate and widening their interest margin. This is particularly true in developing countries because they suffer from higher and more volatile inflation compared to developed countries.

Another macro factor determining banking spread is economic growth. Indeed, the growth of output improves the creditworthiness of economic agents and reduces their default risk (Gelos, 2006). It also increases the resources that banks can lend because they receive more deposits (Khan and Khan, 2010). Banks react to these favourable conditions by lowering their interest margins. One should also notice that banking spread affects economic growth in return by its effect on saving and mostly on investment (Kiptui, 2014). The negative correlation between banking spread and economic growth has been supported empirically by Demirgüç-kunt et al. (2003) and Afanasieff et al. (2002). Finally, one should notice after Ndung'u and Ngugi (2000) and Gelos (2006) that macroeconomic instability –the volatility of interest rate, exchange rate, growth rate, trade deficit, budget deficit, etc. – is positively associated with interest margin because it increases the various risks faced by banks. Another group of factors increases the risks faced by banks and leads to higher banking spreads. This group of factors is gaining interest in the scientific community and especially in developing countries where its adverse effects are much more serious. This last group of factors refers to the legal and institutional framework in which banks operate.

Institutional framework

Banks do not usually have much information about the daily transactions they carry out for their clients as the latter do. Therefore, they require collaterals in an attempt to overcome the resulting adverse selection and moral hazard described by Stiglitz and Weiss (1981). So, the legal risk surrounding collateral repossession in cases of default shapes financial contracts (Galindo, 2001) and should affect banking spread as a result. Using a sample of 129 countries, Djankov et al. (2005) found evidence that in economies where the legal framework and the judicial institutions in charge of contracts enforcement and creditor rights protection worked efficiently, there was more credit to private sector. Suggesting that in such environments, banks reduce their lending rates and narrow their margins due to less legal risk. The researchers added that the beneficial effect on credit is also felt in economies where there are institutions collecting and disseminating information about lenders because they reduce the information asymmetry between

banks and their clients.

The quality of a country's governance also affects the interest margins of the banks operating in that country. Thus, Demirgüç-kunt and Huizinga (1998) revealed that banks reduce their risk premium and their interest margin in countries with less corruption. Furthermore, as revealed by La Porta et al. (2008), the historical origin of a country's legal framework shapes the way its institutions function as well as its economic outcomes.

Following the legal origin theory, La Porta et al. (2008) revealed that French legal origin (civil law) and English legal origin (common law) are the most distinct philosophies of law and regulation. They added that compared to common law, civil law is associated with less investor (or creditor) protection, more regulation, more state involvement in economic activities, and less independent judicial systems. As a result, civil law leads to less financial development, more corruption, weak contracts enforcement, and weak protection of property rights. All these factors put together should incite banks to widen their interest margins and ration credit. Using a sample of 4,000 firms from 38 countries, Beck et al. (2004) found evidence that the correlation between legal tradition and firm's access to external finance was statistically and economically significant.

Beside those four groups of factors identified by the literature, there may be other country-specific factors affecting banking spread. This may be the case of natural resources endowment in CAEMC countries.

METHODOLOGY

The methodology used in this study is the two-step regression proposed by Ho and Saunders (1981) to empirically assess the determinants of banking spread. This methodology allows the study to assess the micro and macroeconomic determinants of interest rate spread; it also allows estimating the pure spread prevailing in CAEMC countries. Before presenting the two-step approach, it is necessary to go back to its theoretical foundations. As revealed by Afanasieff et al. (2002), the theoretical model formulated by Ho and Saunders (1981) was adapted from a model of bid-ask prices of security dealers. Thus, the authors modeled banks as risk-averse dealers in credit market acting as middlemen between depositors and borrowers. Playing the middlemen's role, banks require a positive interest margin similar to the bid-ask spread of a security dealer because the stochastic and asynchronous nature of deposit supplies and loan demands exposes them to interest rate risk. The one-period decision model proposed by Ho and Saunders (1981) assumed that it is costly for banks to process deposits and credits. It also assumed that banks maximize the expected utility of their end-of-period wealth. Therefore, the optimal interest margin was given by the following equation:

$$s = a + b = \frac{\alpha}{\beta} + \frac{1}{2} R \sigma_l^2 Q \quad (1)$$

Where a and b represent the fees charged on deposit and loan respectively. α is the intercept and β the slope of the symmetric deposit and loan arrival functions. The dealership model proposed by Ho and Saunders (1981) revealed that the optimal spread

depends on four factors: the degree of bank management risk aversion (R), the market structure of the industry or the risk-neutral spread ($\frac{\alpha}{\beta}$), the average size of bank activities (Q), and the volatility of interest rates (σ_I^2).

From their theoretical model, Ho and Saunders (1981) proposed a two-step regression to empirically assess the determinants of banking spread. The first regression is run with banking spread as the dependant variable while a vector of bank-specific characteristics and a vector of time dummies are used as the independent variables. The constant term of the first regression and the coefficients of the dummy variables generate a new variable (the pure spread). The second regression is then run with the pure spread as the dependant variable while a vector of macroeconomic variables is used as the independent variables.

The two-step approach has been used by many researchers (Brock and Rojas-Suarez, 2000; Afanasieff et al., 2002) to underline the determinants of banking spread in different environments. This study also borrowed that methodology in order to assess the micro as well as the macro determinants of banking spread in CAEMC countries. Thus, the following equation was used in the first step of the methodology:

$$S_{it} = \omega + T\varphi + B_{it}\theta + \varepsilon_{it} \quad (2)$$

Where i and t denote country and time indices respectively, S is the interest margin, T is a vector of time dummy variables taking the value 1 in the corresponding year and 0 elsewhere, B is a vector bank-specific characteristics, ε is the error term, and ω , φ , and θ are parameters to be estimated. The vector of bank-specific characteristics was made of the following variables: asset, doubtful loan, deposit, credit, and capital. Details about the definition and the calculation of all variables are reported in the appendix. The following equation allowed to calculate the pure spread observed in each country:

$$PS_{it} = \omega + \varphi_t + \delta_i \quad (3)$$

Where i and t denote country and time indices respectively, PS is the pure spread, ω is the constant term of the first regression, φ is the coefficient of year t dummy variable, and δ is the individual effect of each country. As to the second step of the methodology, the study first evaluated the macroeconomic determinants of interest margins in CAEMC countries using the following equation:

$$PS_{it} = \alpha + M_{it}\beta + \mu_{it} \quad (4)$$

When i and t denote country and time indices respectively, PS is the pure spread, M is a vector of macroeconomic variables, μ is the error term, and α , and β are parameters to be estimated. The vector of macroeconomic variables was made of the following variables: real GDP growth rate, inflation rate, FDI inflows, and oil rents. The last two variables aimed to control for capital inflows and natural resources endowment in Central African countries.

Still in the second step of the methodology, the study evaluated the institutional determinants of banking spread in Central Africa. This evaluation was done because many researchers (Beck et al., 2004; Djankov et al., 2005; La Porta et al., 2008) pointed out the impact of the institutional framework on economic outcome. Furthermore, Singh et al. (2009) argued that institutional factors may explain the differences in financial deepening between CAEMC countries and other Sub-Saharan African countries. Thus, the following equation was used:

$$PS_{it} = \gamma + I_{it}\rho + \epsilon_{it} \quad (5)$$

Where i and t denote country and time indices respectively, PS is the pure spread, I is a vector of institutional variables, ϵ is the error term, and γ , and ρ are parameters to be estimated. The vector of institutional variables was made of the following variables: political stability, rule of law, control of corruption, regulatory quality, government effectiveness, and voice and accountability. Because the study viewed the structural excess liquidity prevailing in CAEMC banking systems as an institutional problem, the Herfindahl-Hirschman Index on deposit was added in this step of the methodology to take into consideration that institutional problem.

The dataset of the present study was made of 66 annual observations covering the six countries of the CAEMC (Cameroon, the Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon), during the period spanning from 2000 to 2010. These data were collected from the Banking Commission of Central Africa (COBAC), the Central Bank of Central African States (BEAC), and the World Bank (World Development Indicators 2015 and Worldwide Governance Indicators 2013).

Estimation results

Hausman test revealed that the random effects model is the most suitable for the first step of the methodology. The results revealed that asset, doubtful loan, and credit, were the significant bank-specific factors determining interest rate spread in CAEMC countries. They also revealed that the estimated coefficients were of the expected signs and the model was globally significant. Furthermore, the results revealed that banking spread decreased significantly during the years 2004, 2005, 2008, 2009 and 2010; while the time dummy variables were not globally significant.

On one hand, interest rate spread was found to be lower in countries where banks have more assets or high bank asset/GDP. This may be because those banks can benefit from economies of scale and reduce their unit costs. On the other hand, interest margins were found to be positively associated with doubtful loans. This positive correlation may be due to the fact that doubtful loans convey information about the uncertainty surrounding credit activities. Thus, an increase in doubtful loans may signal an increase in the overall uncertainty level and may threaten the reimbursement of credits. Banks may then react to this threat by charging a risk premium on their lending rate and widen their interest margin.

As to the volume of credit and deposit, there are found to be negatively associated with banking spread because a bank specialized in one or both of those activities may be able to benefit from economies of scale and reduce its unit costs. Moreover, credit had the highest coefficient (in absolute terms) among all bank-specific variables, may be because it is an interest-generating activity. Table 1 also revealed that capital is positively associated with interest margin in CAEMC countries. This may be due to the fact that banks face a loss profit trying to respect or to exceed their capital requirements. Thus, they channel the loss profit to their clients through wider interest margins.

The results obtained from the first estimation and equation (3), allowed to compute the pure spread or the

Table 1. Bank-specific determinants of interest rate spread in CAEMC countries.

Dependant variable: Spread	Coefficients	Standard errors
Asset	-0.0916**	0.0391
Doubtful loan	0.0707**	0.0317
Credit	-0.892***	0.206
Deposit	-0.0219	0.047
Capital	0.176	0.133
Cons	17.707***	4.222
Time dummies significance	$\chi^2 (10) = 12.25$	Prob > $\chi^2 = 0.2685$
R-Squared	0.552	
Wald $\chi^2 (15)$	61.67	Prob > $\chi^2 = 0.001$
Number of observations	66	
Hausman test	$\chi^2 (15) = 2.52$	Prob > $\chi^2 = 0.999$
Modified Wald test for group wise heteroscedasticity	$\bar{\chi}^2 (6) = 1.02$	Prob > $\bar{\chi}^2 = 0.985$
Wooldridge test for autocorrelation in panel data	$F(1,5) = 0.594$	Prob > F = 0.475

Notes: * denotes significance at 10% confidence level, ** denotes significance at 5% confidence level, and *** denotes significance at 1% confidence level.

fraction of spread that is not explained by bank-specific characteristics. In that vein, the study found that the correlation coefficient between spread and pure spread was equal to 0.72 and it was significant at 5% confidence level. Moreover, a comparison of spread and pure spread (Figure 4) revealed that the latter is generally superior to the former in Central African countries. This finding is consistent with what Afanasieff et al. (2002) found in the case of Brazil, and it suggests that macro factors do explain banking spread in Central African countries better than micro factors. Therefore, the comparison between spread and pure spread justifies the second step of this methodology.

The Central African Republic was not included in the second step of the methodology because of data availability on oil rents while the same series started in 2003 for Chad. Hausman test could not help choosing between the random and the fixed effects model, while the individual effects were not significant in both models. Besides, the study faced serial correlation and heteroscedasticity. Therefore, an AR (1) term was added and a pooled regression with correlated panels corrected standard errors was run. Estimation results are shown in Table 2.

The results revealed that oil rents, FDI net inflows, and real GDP growth were the significant macroeconomic factors determining interest rate spread in CAEMC countries. Moreover, Table 2 revealed that interest margin is counter-cyclical. It rises during economic recession and falls during expansion. This may be due to the fact that the creditworthiness of economic agents increases during expansion and decreases during recession. Thus, banks

may narrow and widen their interest margins accordingly. Furthermore, inflation was found to be positively associated with banking spread although the correlation was not significant. This positive relationship was expected because inflation creates a monetary depreciation that reduces the real value of loan reimbursements and may lead to higher spreads.

As to FDI inflows, they were found to be positively and significantly correlated with interest margins. This finding reveals that FDI inflows may cream-skim and reduce the available investment opportunities. Therefore, domestic investors may be left with riskier opportunities that banks finance at higher lending rates. Concerning the significant positive correlation between oil rents and banking spread, it could be explained by the fact that the oil industry is among the biggest borrowers in CAEMC countries. The industry may need less credit when oil rents increase and may lead banks to widen their margins in order to cover their corresponding loss profit. The opposite may be true when oil rents decrease.

Still in the second step of the methodology, the study followed the intuition of Singh et al. (2009) that institutional factors may explain the differences in financial deepening between CAEMC countries and other Sub-Saharan African countries. Thus, it evaluated the institutional determinants of banking spread. Moreover, because the structural excess liquidity prevailing in CAEMC banking systems was viewed as an institutional problem, the Herfindahl-Hirschman Index on deposit was added in this step of the methodology to take into consideration that institutional problem.

Two different models were run because multicollinearity

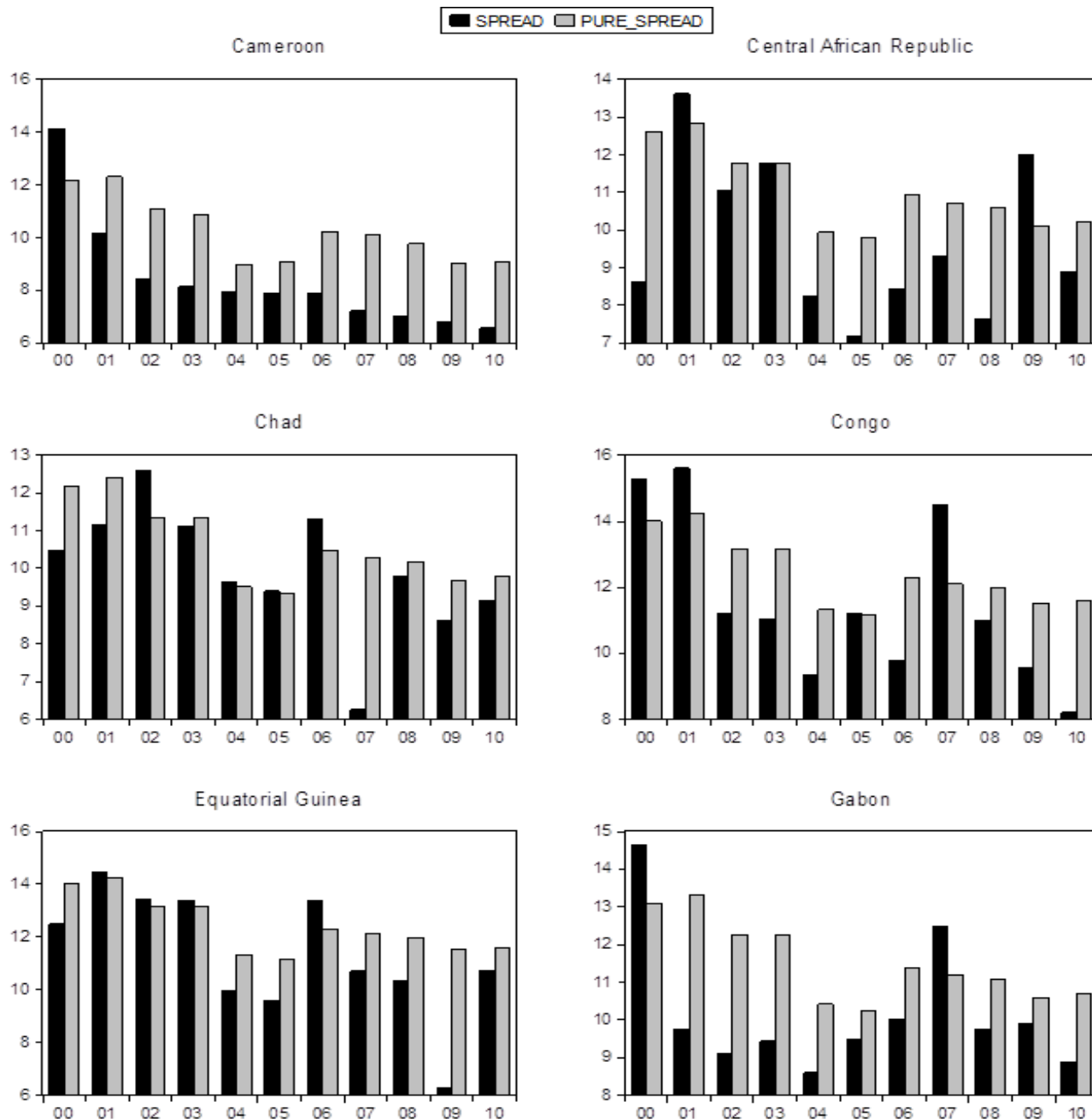


Figure 4. Comparison between spread and pure spread in Central African countries (Source: Own elaboration based on data from COBAC and estimation results (Table 1)).

prevented the study to put all the variables into the same model. The individual effects were not significant and problems occurred with heteroscedasticity. So, the study ran a pooled regression with correlated panels corrected standard errors in both cases and added an AR (1) term in the first model because of serial correlation. All the six CAEMC countries were included in the sample but data on institutions were just available for the period 2002-2010. Furthermore, data on bank concentration started in

2005. So the model was run with 36 observations and Table 3 presents the results.

Those results revealed that political stability, corruption, government effectiveness, and bank concentration in the deposit market were the significant determinants of interest margins in CAEMC countries. Political stability was found to be positively and significantly associated with banking spread. This may be because; following the definition of the variable, political stability reflects the

Table 2. Macroeconomic determinants of interest rate spread in CAEMC countries.

Dependant variable: Pure spread	Coefficients	Panel-corrected standard errors
Oil rent	0.024***	0.007
FDI inflow	0.029***	0.011
Inflation	0.011	0.037
Real GDP	-0.018*	0.011
Cons	10.209***	0.604
R-Squared	0.84	-
Number of observations	52	-
Wald χ^2 (4)	38.24	Prob > χ^2 = 0.001

Notes: * denotes significance at 10% confidence level, ** denotes significance at 5% confidence level, and *** denotes significance at 1% confidence level.

Table 3. Institutional determinants of interest rate spread in CAEMC countries (First model).

Dependant variable: Pure spread	Coefficients	Panel-corrected standard errors
Political stability	0.704***	0.208
Corruption	0.974*	0.554
Rule of Law	-0.867	0.983
Government Effectiveness	-1.177*	0.626
HHI_Deposit	1.999***	0.557
Cons	2.966	1.968
R-Squared	0.53	-
Number of observations	36	-
Wald χ^2 (5)	127.97	χ^2 = 0.001

Notes: * denotes significance at 10% confidence level, ** denotes significance at 5% confidence level, and *** denotes significance at 1% confidence level.

likelihood of a bad event. Therefore, it may increase the institutional risk faced by banks and lead them to widen their interest margins accordingly.

As to corruption, it may weaken creditor rights as well as the legal protection of collaterals. That may explain why it was found to be positively correlated to banking spread although the correlation was not significant. Government effectiveness on the other hand, was found to be negatively correlated with interest margin because sound government policies may create a low-risk environment in which banks can easily carry out their activities. Therefore, those banks would narrow their interest margins as a result of the safer environment they perceive.

Rule of law may also be associated with a safer environment since it was found to have a negative correlation with banking spread. Indeed, an environment in which agents abide by the rules may lead to property and creditor rights securitization, as well as contract enforcements. *Ceteris paribus*, these virtues would reduce the overall legal risk and lead to narrower interest margins. Finally, bank concentration in the deposit market

was found to be positively associated with interest margins. This variable was added in this stage to control for the structural excess liquidity prevailing in CAEMC banking systems because the issue was viewed as an institutional problem. In the first step of the methodology, deposits were found to be negatively correlated with spread despite the fact that the sample banking systems are suffering from excess liquidity. Meanwhile in this step, bank concentration as high as it is in CAEMC countries is positively correlated to it. These findings suggest that compared to other banks, the few banks controlling most of the deposit market may suffer more from excess liquidity and therefore use their market power to reduce the interest rate they pay on deposit. *Ceteris paribus*, the lower interest rate they pay on deposit will lead to higher interest margins.

Taking into consideration the other institutional variables, a second model was run and the results reported in Table 4. The results revealed that the estimated coefficients are of the expected signs and the model is globally significant. Moreover, they revealed that political stability, regulatory quality, and bank concentration

Table 4. Institutional determinants of interest rate spread in CAEMC countries (second model).

Dependant variable: Pure spread	Coefficients	Panel-corrected standard errors
Political Stability	0.473***	0.1567
Voice and Accountability	-0.322	0.433
Regulatory Quality	-1.854***	0.568
HHI_Deposit	1.872***	0.396
Cons	3.519***	1.337
R-Squared	0.61	-
Number of observations	36	-
Wald χ^2 (4)	768.23	Prob > χ^2 = 0.001
Wooldridge test for autocorrelation in panel data	F(1,5) = 1.989	Prob > F = 0.217

Notes: * denotes significance at 10% confidence level, ** denotes significance at 5% confidence level, and *** denotes significance at 1% confidence level.

in the deposit market are the significant determinants of interest margins in CAEMC countries.

Moreover, bank concentration in the deposit market and political stability maintained their positive signs and their level of significance. As to voice and accountability, and regulatory quality, there were found to be negatively associated with banking spread. Regulatory quality was even significant at 1% confidence level. These two variables may lead to narrower interest margins because following their definition they are associated with safer environments for economic activities.

CONCLUSION AND RECOMMENDATIONS

The present study revealed that, bank asset, doubtful loan, and the volume of credit were among bank-specific characteristics, the significant determinants interest rate spread in CAEMC countries during the period spanning from 2000 to 2010. On the other hand, oil rents, FDI inflows, and real GDP growth were the significant macro-economic determinants; meanwhile, political stability, corruption, government effectiveness, regulatory quality, and bank concentration in the deposit market were the significant institutional determinants. Besides, the results revealed that in Central African countries, macro factors do explain banking spread better than micro factors. Therefore, the policy recommendations will focus on macro factors in general and the institutional framework in particular.

First, the member states of the CAEMC should indeed strengthen their institutional framework. In that vein, they could take a bold step toward democracy by implementing independent electoral boards, transparent electoral codes, full biometric elections, as well as the opposition statute. Furthermore, policy makers in CAEMC countries should abide by the law and stop anti-democratic practices such as the recurrent constitutional changes carried out by the reigning presidents in order to get rid of the articles

limiting their term in office. *In fine*, the walk toward democracy would have a positive impact on voice and accountability within CAEMC countries and would ultimately improve the effectiveness of their governments, their political stability, as well as the effectiveness of their fight against corruption. *Ceteris paribus*, these improvements would lead to narrower banking spread.

Second, given that CAEMC economies rely heavily on natural resources (oil, ore, and forest), they should comply with the Extractive Industries Transparency Initiative (EITI) in order to reinforce the institutions dealing with those corruption-sensitive industries. But, up to March 2016, Cameroon, Chad, and Congo were the only countries that have fulfilled all EITI requirements; while the Central African Republic was temporarily suspended in April 10, 2013 because of political turmoil. As to Equatorial Guinea and Gabon, they have lost their status as EITI candidates because they could not fulfill all the requirements on time. The fulfilment of EITI requirements could bring transparency, accountability, and effectiveness in the management of those industries usually described as corruption nests. Such a commitment could improve the living standards and the creditworthiness of CAEMC citizens, and incite banks to reduce their interest margins.

Third, policy makers in CAEMC countries should improve their legal and judiciary systems. Magistrates should be independent, property and creditor rights secured, contracts reinforced, and legal procedures shortened. Such measures could facilitate the repossession of collaterals, reduce doubtful loans, and lead to narrower interest margins. Fourth, because common law institutional framework has been proved to be better for economic activities (Beck et al., 2004; La Porta et al., 2008), a country like Cameroon that was colonized by both France and Great Britain and that has a hybrid institutional framework although dominated by civil law could implement an institutional shift from its civil law-dominated framework to common law framework.

This institutional shift could lead to narrower interest rate spreads and higher growth rates more compatible with the ambition of becoming an emerging country.

Finally, the institutional reforms proposed earlier coupled with a sound regulation of economic activities could reduce the overall macro-risk perceived by banks and lead to lower interest margins. Moreover, these reforms could limit the positive impact of oil rents and FDI inflows on banking margin as well as the corresponding crowding out effect they may have on domestic investment. Furthermore, a sound institutional framework, associated with the low inflation and the moderate to high economic growth characterizing CAEMC countries could incite banks to grant more credits and therefore solve the structural excess liquidity problem they face.

Conflict of interests

The author has not declared any conflict of interests.

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Appendix. Description of the variables.

Variable	Description
Spread	Annual difference between the average lending rate and the average deposit rate (Source: COBAC)
Asset	Ratio bank total asset/GDP in percentage (Source: COBAC)
Doubtful loan	Ratio provision for doubtful loan/loan in percentage (Source: COBAC)
Credit	Ratio loan/total asset in percentage (Source: COBAC)
Deposit	Ratio deposit/total asset in percentage (Source: COBAC)
Capital	Ratio registered capital/total asset in percentage (Source: COBAC)
Pure spread	Fraction of spread that is not explained by bank-specific characteristics (Source: Own calculation)
Oil rent	Ratio oil rents/GDP in percentage. While oil rents are the difference between the value of crude oil production at world price and total cost of production (Source: WDI 2015)
FDI inflow	Ratio foreign direct investment net inflows/GDP in percentage (Source: WDI 2015)
Inflation	Annual percentage inflation (Source: BEAC)
Real GDP	Annual GDP growth rate in percentage (Source: BEAC)
Political	“Reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism” (Source: WGI 2013)
Corruption	“Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as “capture” of the state by elites and private interests” (Source: WGI 2013)
Rule	“Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (Source: WGI 2013)
Government	“Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies” (Source: WGI 2013)
Voice	“Reflects perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media” (Source: WGI 2013)
Regulatory	“Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development” (Source: WGI 2013)
HHI_deposit	Log Herfindahl-Hirschman Index on deposit (Source: COBAC)

ⁱ The Central African Economic and Monetary Community (CAEMC) is monetary union made of Cameroon, the Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon. These countries are under the authority of the same central bank (BEAC) as well as the same banking supervisor (COBAC). They share a common currency (CFA Franc) that was pegged to French Franc (1 French franc = 100 CFA franc) up till 1998. Since January 1999, the CFA Franc is now pegged to the euro (1 euro = 655.957 CFA Francs).