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Banking sector intermediation and economic growth: new evidence from CEMAC countries

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Abstract: An abundant body of literature explores the impact of finance on economic growth. However, only a few studies examine this link for developing economies. This paper investigates the banking intermediation-growth nexus with respect to the Central African Economic and Monetary Community (CEMAC). Making use of two panel estimation techniques, we exert the positive influence of banking sector intermediation on long-run growth over the studied period (1990–2016). Despite finding a negative association between financial development proxies and growth, our results suggest that the banking system in CEMAC still performs its main function of pooling and allocating financial resources. The latter is evidenced by the positive association between credit proxies (domestic credit to the private sector and bank credit to bank deposits) and growth/fixed capital formation.

Keywords: financial intermediation; financial development; banking sector; CEMAC; economic growth; panel estimation.

JEL codes: G21, O16, C33.

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1 Introduction

In the field of economics, several authors find that savings and fixed investment are the drivers of sustained growth (Ricardo and McCulloch, 200; Keynes, 1936). Nations' capacity to create and allocate financial resources to productive use has a strong effect on their wealth creation dynamics (Lewis, 1954; Otani and Villanueva, 1990; De Gregorio, 1992; Levine, 2005). While such purchasing power transfer is generally made through the financial system, commercial banks remain its main actors (Allen and Gale, 2000). It is then relevant to observe the influence of the banking sector intermediation on countries' long-term development, especially in the context of developing countries in which financial systems are often bank-based.

Schumpeter (1934) was among the first to highlight the significance of financial intermediation for achieving economic growth. Subsequently, a comprehensive amount of literature has investigated the intermediation-growth nexus. For instance, King and Levine (1993a, 1993b) asserted the importance of banking intermediation due to its impact on innovation and investments, which are the main drivers of sustainable growth. Nearly a decade later, Cojocaru et al. (2016) investigated the same nexus for the former communist countries of Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS). The analysis, based on 21 years of observations, found a positive association between financial sector efficiency and long-term economic growth. Moreover, Guru and Yadav (2019) examined the impacts of financial development on growth for Brazil, Russia, India, China and South Africa (BRICS). The study considered the period 1993–2014 and highlights the overall association between the components of the nexus. In the context of developing countries, where most of the financial system's assets are held by the banking sector, the intermediation activity supposes the deep influence of commercial banks. In the six countries of the Central African Economic and Monetary Community (CEMAC)¹, commercial banks are the main actors of the financial system, and their asset holdings are approximately 85% of the total financial sector. Due to the low development of both domestic and regional financial markets, 52 commercial banks are the dominant mediators between financing capacity agents and those needing to be financed. Hence, their activity, whether growth-oriented, efficient or not, affects the

savings-investment dynamic with a natural impact on countries' economic performance (Beck et al., 2000; Graff and Karmann, 2006).

From a structural perspective, commercial banks in CEMAC are aggregated around a central bank and specialised institutions whose role is to regulate the sector's activity. In parallel, CEMAC state members are provided with a regional financial market: the Stock Exchange of Central Africa (BVMAC), created June 27, 2003. BVMAC's mission is to expand investment in the community under the control of the Financial Market Supervisory Commission (COSUMAF). To date, BVMAC has only issued few securities to the public, a performance that reveals its fragile position in the regional financial industry.

In consideration of this background, our study investigates the impact of the banking sector's activity on economic sustainability in CEMAC. This study contributes to the existing knowledge in the field because it portrays the nature of the finance-growth relationship for a new sample of developing nations in Africa. To the best of our knowledge, previous studies tend to focus on advanced economies or broader samples. Analysing the finance-growth nexus for CEMAC provides a new array of findings that reflect countries' intrinsic characteristics on the one hand and their level of financial development on the other hand. Moreover, as capital markets in the region are characterised by low trading volumes and a small number of listed companies (Schiereck et al., 2018), CEMAC's financial system is bank-based by nature. Consequently, our sample is worth studying since our findings show the influence of bank-based systems on domestic investment and long-term economic growth.

The remainder of the paper is as follows. Section 2 introduces the CEMAC banking sector. Section 3 provides a summary of the existing literature on the intermediation-growth nexus. Section 4 presents the methodology in use for the analysis. Section 5 presents the empirical findings, and Section 6 concludes the paper.

2 Background of the study

2.1 Overview of CEMAC

CEMAC was created in 1994. The main objective of CEMAC is to ensure the long-term development of its state members. Additionally, CEMAC targets deeper economic integration among its members that share a single currency. As part of its agenda, this regional organisation seeks to facilitate the free movement of resources across its members while ensuring sound management of its currency: the CFA franc (XAF). To achieve the specified missions, CEMAC adopts specialised institutions. Among them:

- 1 the conference of heads of states, which defines the community's policy and global action
- 2 the Bank of Central African States (BEAC) in charge of monetary policy in the community
- 3 the Banking Commission of Central Africa (COBAC) or the supervisory body for the financial sector.

Countries of CEMAC export a wide range of natural resources. Crude oil accounts for 86% of CEMAC exports (International Monetary Fund, African Department, 2019;

International Bank for Reconstruction and Development, 2018). Given this situation, the region has been strongly affected by the fall in oil prices, and CEMAC countries are exploring options for diversification and reducing import dependency for food products.

Table 1 Summary statistics of the CEMAC economy in 2017

Country	Area (km ²) 2017	Population (millions) 2017	GDP growth		CPI 2017	Per capita GDP 2017
			2016	2017		
Cameroon	475,650	24,566	4.6	3.5	0.6	1,263
Central African Republic	622,984	4,596	4.5	4.3	4.1	400
Chad	1,284,000	15,017	-6.3	-3.0	-0.9	799
Republic of Congo	342,000	5,111	-2.8	-3.1	0.5	1,794
Gabon	267,668	1,262	2.1	0.5	0.7	11,948
Equatorial Guinea	28,051	2,065	-8.5	-4.9	2.7	7,584
<i>Total</i>	<i>3,020,353</i>	<i>52,616</i>	<i>-1</i>	<i>0.7</i>	<i>0.8</i>	<i>1,539</i>

Source: Data on World Bank and IMF data

The disturbances in oil prices observed between 2014 and 2016 resulted in drastic cuts in countries' budgets, current account deficits and exhaustion of foreign reserves. Five years later, the aftermath of the global economic crisis remains.

While the price of crude oil has significantly risen since 2016, CEMAC's oil production increased by 2.6% in 2018, and the real GDP growth rate in the community stood at 2.2% against 1.1% the previous year. According to IMF Country Report No. 19/383, CEMAC will witness an overall economic growth of 3.5% in 2020.

2.2 CEMAC banking sector

The banking sector of CEMAC is highly regulated. Financial intermediaries (commercial banks) are under the authority of several regulatory bodies. They include:

- 1 the Ministry of Finance of each member state
- 2 the BEAC, which oversees the region's monetary policy
- 3 the COBAC, which is the supervisory body for the banking sector.

Through the enactment of policies and standards, the latter is the guardian in the banking profession. It screens and supervises banking activity. As a result, any entry to this sector is subordinated to the approval of two main organs: the target country's Ministry of Finance and the COBAC. Currently, the CEMAC zone totals 52 commercial banks distributed disparately. Details of their ownership and equity are provided in Table 2.

With \$120 billion of registered capital in 2017, the CEMAC banking industry was at an early stage. With respect to countries' statistics, Gabon and Equatorial Guinea have the least concentration in the sector, while Cameroon, Chad and the Republic of Congo enjoy greater access to banking services. From a more general perspective, Cameroon and the Republic of Congo have attracted more than 50% of the total banks in the region. While this ratio is a light indicator to judge the soundness of the banking system, it reveals the existing trend in demand for financial services. It equally shows the disparities among countries' internal financial systems. In fact, over the past ten years, the number

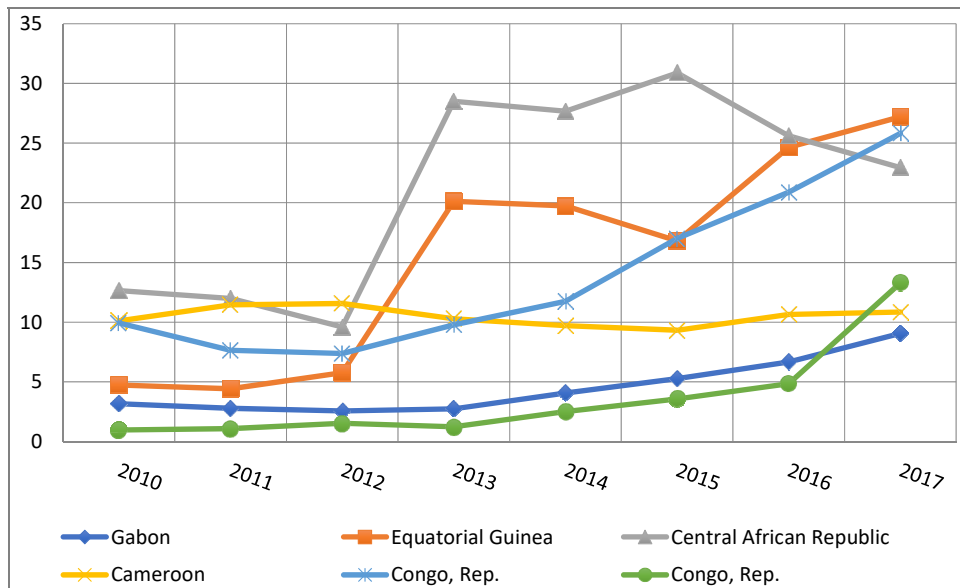
of bank branches has increased continuously, and the trend is steeper in the previously mentioned economies. In parallel, the oil crisis has severely impacted countries' business environments, which has resulted in bank failures in Gabon, for example. At another glance, Figure 1 shows the loan outstanding risks incurred by the banking sector. In 2017, non-performing loans amounted to \$284.2 million, compared with \$253.4 million in December 2016. These loans represented 17.1% of gross loans, compared with 14.9% 12 months earlier. Thus, the apparent quality of the portfolio deteriorated from December 2016 to 2017.

Table 2 The banking sector in CEMAC in 2017

Country	No. of banks	Registered capital (domestic currency in millions)	Principal shareholder
Cameroon	15	149,996.0	Cameroonian State Government
Central African Republic	4	35,627.0	Eco Bank Transnational Inc.
Chad	9	70,044.0	Chadian State Government
Republic of Congo	11	111,477.0	Congolese State Government
Equatorial Guinea	5	57,830.0	Eco Bank Transnational Incorporated
Gabon	8	176,528.4	BGFI Holdings Corporation
<i>Total</i>	52	601,502.4	

Source: BEAC statistics

Figure 1 Non-performing loans in CEMAC from 2010–2017 (% total loans) (see online version for colours)



Source: Author based on World Bank Economic indicators

3 Theoretical background

Agbada and Osuji (2013) defined financial intermediation as the process whereby financial service providers such as banks pull funds from the public as deposits and transform them into loanable funds. By Agbada and Osuji's (2013) definition, commercial banks across the globe belong to the category of financial intermediaries. Through their operations that broadly consist of accepting deposits and giving loans to make a profit, commercial banks deal with domestic savings, a component positively correlated with economic growth, as pointed out in several studies (Keynes, 1936; Solow, 1956; Alguacil et al., 2004).

The link between finance and economic growth has been the subject of models and theories since the 20th century. Several empirical works emphasised the role of the banking sector in pooling savings, allocating financial resources, reducing information costs, diversifying risks, and promoting investment and innovation (McKinnon, 1973; Greenwood and Jovanovic, 1990; King and Levine, 1993a; Jbili, 1997). Through the channels identified in the early literature, financial intermediation may induce countries' sustainable economic growth. Among the reputed studies in this field, Patrick (1966) stressed the existence of a positive causal relationship flowing from the banking sector to economic growth. It is the main argument of the 'supply-leading hypothesis' that posits the effect of a sound, developed banking system on sustainable development. While the direction of the causality between the two components is intensively explored in the literature, numerous scholars (De Gregorio and Guidotti, 1995; Levine, 1997; Xu, 2016; Seven and Yetkiner, 2016; Naghshpour and Sergi, 2018) concluded that there is a positive correlation between financial intermediation and long-term economic growth.

Levine (2005) provided a sound review of the finance-growth nexus. The author revealed five functions² through which the banking sector's intermediation affects countries' development. In addition, following Merton and Bodie (2004) and Levine (1997, 2005) related countries' economic growth to the overall efficiency of the financial sector. In fact, notwithstanding the size and structure of the financial system (bank-based vs. market-based), well-functioning institutions shall precede economic growth. This reasoning is widely supported, as several researchers make use of scale and efficiency proxies to investigate the finance-growth relationship.

Fink et al. (2005), for instance, showed the relevance of the banking sector through the capital allocation channel. While the study combines several financial markets and banking sector measurements, the authors established the overall impact of the financial sector on growth considering size-based measurements. Regarding the banking sector, the study found a positive correlation between bank credit and growth for the 11 transition economies subject to the analysis. More recently, Sahoo (2014) investigated the finance-growth nexus in India considering 30 years of observations. With the aim of stating which financial systems have the strongest effect on economic growth, the author combined selected banking and equity market indicators. The analysis, based on an autoregressive-distributed lag and a Granger causality test, revealed that financial deepening, denoting the overall size of the banking sectors, was positively correlated with growth. Banking sector intermediation was found to have the strongest influence on the Indian economy. Similar results were reported by Katenova et al. (2017). Their study investigated the causal relationship between financial depth and economic growth in Kazakhstan. Using principal component analysis (PCA) and the combination of variables representing financial development, efficiency and deepening, the results led to the

conclusion that GDP growth depends weakly on financial market performance and more strongly on the performance of the banking industry.

While a significant body of literature supports the finance-led growth hypothesis that suggests a positive and causal relationship between banking sector intermediation and economic growth, many scholars have found dissimilar results. As a recent opponent of the supply leading hypothesis, Mahlangu and Matsvai (2016) considered 13 SADC³ countries during the period 2005 to 2014. Using panel estimation techniques, the authors found a long-run positive relationship between economic growth and banking sector development proxied by money supply M2 and domestic credit to the private sector by banks. While these findings appear to support the supply leading hypothesis, the authors remained cautious about generalising their conclusions. In fact, the results collected subsequently from the Granger causality test provided evidence that the nature of the finance-growth nexus does vary among countries of different income groups. Moreover, through the analysis of 146 countries via panel regression techniques, Seven and Yetkiner (2016) scrutinised bank and stock market indicators during the period of 1991 to 2011. The authors differentiated between countries by income level, and the results suggest that banking sector development fosters economic growth for low and middle-income economies. On the other hand, in high-income economies, the authors concluded that there was a negative association between the two components. Similar findings were reported by Rioja and Valev (2004) for a sample of 74 economies. Using generalised method of moments (GMM) dynamic panel techniques, the authors found that financial development does affect growth through the capital accumulation channel. Nonetheless, the results display a strong influence of finance on growth in low-income countries, whereas mid and high-income countries' growth is insignificantly or slightly induced through productivity growth.

From another perspective, Ductor and Grechyna (2015) found a negative association between financial development and growth. The investigation was carried out using a sample of 101 countries over the period 1970 to 2010, and the authors attributed the negative correlation to the existing imbalance between private credit growth and the growth in real output across the sample.

Aware of the conflicting findings reported throughout the literature, this study investigates the banking sector intermediation–growth nexus for a new set of developing countries (CEMAC). Considering their relatively uniform economic and financial development, we posit the strong influence of the banking sector's intermediation on aggregate investment and economic growth through the capital allocation channel. Following McKinnon (1973), King and Levine (1993a), Rioja and Valev (2004), Fink et al. (2005), Beck et al. (2008), Yu and Gan (2010), Seven and Yetkiner (2016) and Mahlangu and Matsvai (2016), we state the following hypotheses:

- H1 Banking sector intermediation and GDP growth are positively related in CEMAC countries.
- H2 There is a significant positive relationship between banking sector intermediation and gross fixed capital formation.

4 Variables and methodology

4.1 Variables

The analysis considers six CEMAC economies during the period of 1990–2016. The financial and macroeconomic data were taken from the IMF International Financial Statistics and the World Bank development indicators database. In consideration of the existing literature, the study utilises the following indicators.

Domestic credit to the private sector (as a percentage of GDP) indicates the total financial resources provided to the private sector by financial corporations. As a broad measure of the credit allocation dynamic within financial intermediaries, higher ratios denote that a greater amount of resources is directed to the private sector, which results in capital accumulation and productivity growth. On that basis, Abubakar and Gani (2013) and Demetriades and Law (2006) considered domestic credit to the private sector as part of their studies. In addition, other studies have observed the impact of public sector lending on growth. *Domestic credit to the public sector (as a percentage of GDP)* is, for instance, used by Al-Zubi et al. (2006) to describe the public sector weight in economic activities. For the 11 Arab economies subject to their investigation, Al-Zubi et al. (2006) found a positive relationship between the variable of interest and economic growth, a rather unusual conclusion that shows the banking sector's orientation in reallocating resources.

The ratio of liquid liabilities to GDP is a measurement of the financial sector's depth. This variable captures the financial sector size relative to the economy. Abubakar and Gani (2013), for instance, took advantage of this indicator to investigate the impact of banking sector development on economic growth in Nigeria. It was also used by Seven and Yetkiner (2016) and earlier by Zang and Kim (2007) to examine the causality between economic growth and financial development for 74 economies. In the latter study, a panel data analysis was performed to estimate the relationship, and the indicator was used to infer a causal link between economic growth and financial development in the 74 countries subject to the analysis.

Interest rate spread is used in the literature as a proxy for banking sector efficiency. This variable portrays the transaction costs that arise from the banking sector's intermediation. The gap between lending and saving rates denotes the real state of the economy: the higher the gap, the higher the cost of intermediation, which results in less borrowing from the economic agents, a pattern which in turn affects the investment process. Koivu (2002), for instance, considered this measurement along with the ratio of liquid liabilities to GDP to examine the relationship between financial sector expansion and economic growth in eight transition economies. In that research, interest rate spread was used as an exogenous variable, and the author found a strong, negative correlation with economic growth throughout the sample. This finding is in line with the theory, which suggests that economic growth will quicken when transaction costs decrease and a larger share of savings is channelled into investments. Additional studies that included this indicator are Abubakar and Gani (2013), Alpha et al. (2016) and Cojocararu et al. (2016).

Table 3 Summary of variables

<i>Variable</i>	<i>Symbol</i>	<i>Measurement</i>	<i>Source</i>
GDP growth (annual %)	<i>GDPG</i>	Annual growth rate of GDP at market prices based on constant local currency	World Bank
GDP per capita growth (%)	<i>GDP/PC</i>	Growth rate of GDP = $[GDPN - GDPN - 1] / GDPN - 1 \times 100$ Annual growth rate of GDP per capita based on constant local currency	World Bank
Gross capital formation	<i>FCAP</i>	Growth rate of GDP per capita = growth rate of GDP / mid-year population Net investment in capital	World Bank
Domestic credit to private sector (% of GDP)	<i>DCPRIV</i>	Financial resources provided to the private sector by financial corporations	IMF International Financial Statistics and World Bank
Domestic credit to government sector (% of GDP)	<i>DCSOE</i>	Financial resources provided to the public sector by financial corporations	IMF International Financial Statistics and World Bank
Liquid liabilities to GDP	<i>LLGDP</i>	M3 broad money / GDP	World Bank
Interest rate spread	<i>SPREAD</i>	Bank lending interest rate – deposit interest rate	World Bank
Bank credit to bank deposits (%)	<i>BCREDIT</i>	Total bank credits / total bank deposits	World Bank
Deposit money banks assets to GDP (%)	<i>DEFO</i>	Claims on domestic real non-financial sector by deposit money banks as a share of GDP	IMF International Financial Statistics
Labour force	<i>LBR</i>	Average workforce in the country per year	World Bank
Inflation (annual %)	<i>INF</i>	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals	IMF International Financial Statistics

DEPO or deposit money banks assets to GDP (%) represents the real non-financial sector total claims held by the depository institutions. This variable denotes the actual weight of the intermediation directed to the real sector (including government, public enterprises and the private sector). Among the studies that adopt this indicator are Beck et al. (2000) and Beck and Demirgüç-Kunt (2009).

In addition to the depth, credit allocation and efficiency measurements, our investigation adopts additional variables selected in consideration of the previous literature: Abubakar and Gani (2013), Mercan and Göçer (2013) and Afonso et al. (2003). As dependent variables, the analysis individually uses GDP growth, growth in GDP per capita and gross fixed capital formation. In parallel, control variables are added to the investigation to capture some relevant factors that affect the intermediation-growth nexus. These variables include the inflation and lag value of GDP, inflation and unemployment. An exhaustive list of the variables is provided in Table 3.

4.2 Methodology

The study uses the generalised least squares (GLS) method and estimates the adjustment line considering the uncertainty associated with variables, heteroskedasticity and correlations. This method serves as support to investigate the relationship between financial intermediation and economic growth (and gross fixed capital formation respectively). Considering the selected indicators, an estimation of the β coefficients is held through models (1) to (3).

The study also uses the method of moments (GMM), which is an intuitive estimation tool from early statistics. It involves estimating the sought parameters by the equalisation of some theoretical times with their empirical counterparts. Equalisation is justified by the law of large numbers, which means that you can approach an expectation by a sample mean. The model is expressed in terms of the expected value of a function combining endogenous variables (Y) and exogenous variables (X) with unknown parameters. The expectation is zero for the true value of the parameters, as stated in the following formula:

$$E[h(Y, X, \beta_0)] = 0$$

where h is a vector function of dimension H and β_0 is a vector of k size parameters, with the assumption $H \geq k$. The principle of the method is to select a value β to make the sample mean as close as possible to zero.

$$\frac{1}{T} \sum_{t=1}^T h(Y_t, X_t, \beta)$$

Relying on this commonly used approach in the modern growth literature, the GMM dynamic panel analysis developed by Blundell and Bond (1998) is used. The GMM estimation for panel data estimates the β coefficients for the following model:

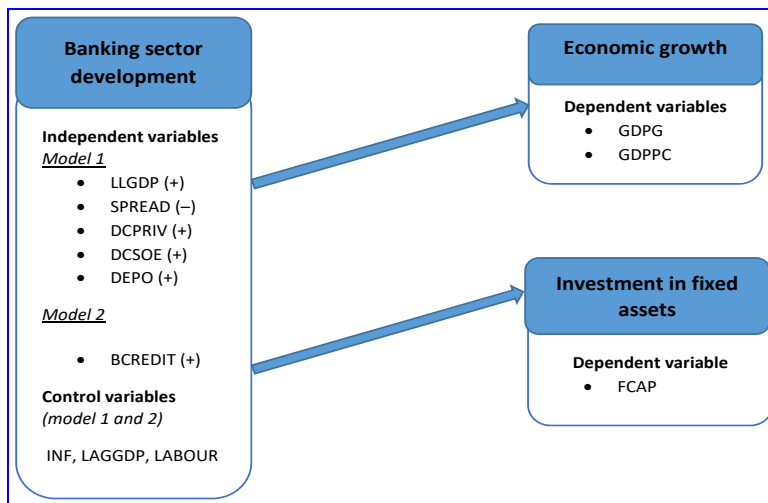
$$\begin{aligned} GDPG = & \alpha + \beta_1 LLGDP + \beta_2 Spread + \beta_3 DCPRIV + \beta_4 DCSOE + \beta_5 DEPO \\ & + \beta_6 INF + \beta_7 LAGGDP + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} GDPPC = & \alpha + \beta_1 LLGDP + \beta_2 Spread + \beta_3 DCPRIV + \beta_4 DCSOE + \beta_5 DEPO \\ & + \beta_6 INF + \beta_7 LAGGDP + \varepsilon \end{aligned} \quad (2)$$

$$FCAP = \alpha + \beta_1 BCREDIT + \beta_2 INF + \beta_3 LABOUR + \beta_4 LAGGDP + \varepsilon \tag{3}$$

With respect to the variables and methodology introduced hitherto, the investigation can be depicted by the conceptual framework presented in Figure 2. Hypotheses 1 and 2 are tested following two models and three different dependent variables (*GDPG*, *GDPPC* and *FCAP*).

Figure 2 Conceptual framework (see online version for colours)



5 Empirical results

5.1 Correlation matrix and other tests

Descriptive statistics are provided in Table 4. To detect multicollinearity among the variables, Pearson correlation analysis was conducted as a prerequisite. The highest correlation in Table 5 (positive correlation between *GDPG* and *GDPPC*) can be ignored since we do not consider both variables simultaneously in the regression. *GDPG* and *GDPPC* are in fact two dependent variables to be used interchangeably throughout the analysis. In consideration of the remaining coefficients of Table 5, no value is greater than 0.7. Therefore, the independent variables do not appear to be substitutes or highly correlated.

In the preliminary analysis exhibited in Table 5, six variables out of the nine used for equations (1) and (2) were significant. When taken individually, they show that banking intermediation exerts a negative effect on economic growth proxied by *GDPG* and *GDPPC*. Furthermore, with respect to equation (3), the indicator of intermediation (*BCREDIT*) was found to be positive but non-significant. In contrast, *LABR*, a control variable used in this model, was significantly and negatively associated with *FCAP*.

After this preliminary step and to check the unit root, the study used the Levin, Lin, and Chu and Im-Pesaran-Shin (IPS) tests. The unit root results are provided in Table 6. While the two approaches yield similar results, the null hypothesis can be rejected: all the variables are stationary at their first difference.

Table 4 Descriptive statistics

	<i>Mean</i>	<i>Median</i>	<i>Maximum</i>	<i>Minimum</i>	<i>Std. dev.</i>	<i>Jarque-Bera</i>	<i>Observations</i>
<i>GDPG</i>	5.7341	3.9127	149.973	-36.7	15.5037	15,928.21	162
<i>GDPPC</i>	2.6614	1.2908	140.5012	-36.8299	14.708	16,809.39	162
<i>FCAP</i>	32.1054	22.7058	219.069	4.6222	34.7722	1,288.433	162
<i>LLGDP</i>	15.4866	15.418	46.9552	4.6	5.9712	153.7082	159
<i>DCPRIV</i>	8.4684	7.3699	38.2327	2.0972	5.3567	385.335	162
<i>DCSOE</i>	3.3013	2.4338	13.05	0.0573	2.9508	99.4547	162
<i>BCREDIT</i>	91.7695	84.6796	397.115	22.2002	48.17	2,465.221	159
<i>SPREAD</i>	12.6035	12.2992	17	5.5625	2.5682	4.2939	162
<i>DEPO</i>	10.4365	10.1492	31.6791	1.9303	6.1085	43.5056	159
<i>LABR</i>	66.7921	70.454	82.745	45.261	10.7588	13.3013	162
<i>INF</i>	4.3397	2.9144	42.4397	-11.6861	8.3587	597.665	158
<i>LAGGDP</i>	0.0108	0.3835	83.393	-126.1985	16.3766	4,588.224	156

Notes: The sample consists of data from six countries in CEMAC for the period of 1990–2016. The detailed definitions of the variables are reported in Table 3.

In parallel, we performed a Kao panel residual cointegration test, and the results suggest the possibility of long-term cointegration between the variables. The test results showed the existence of a long-run association between economic determinants at the 1% significance level (t-statistic -5.49828). Furthermore, in consideration of the nature of the data, we then determined which of the fixed or random effects was suitable for the analysis. Based on the Hausman test result ($p\text{-value} = 0.0165 < 0.05$), we rejected the null hypothesis of no correlation between the errors and the regressor. We hence conducted the remainder of our analysis using the fixed effect.

5.2 Estimation results

Table 7 presents the results of the GLS and GMM estimations. Tests were performed to investigate the effect of the banking sector's intermediation on economic growth and aggregate investment. The study considers three dependent variables (*GDPG*, *GDPPC*, *FCAP*) and three models [equations (1) to (3)]; however, the findings of model (1) and model (2) suggest the same interpretation, so the results of model (2) are omitted for the sake of repetition.

Model (1) explains GDP growth as a function of the size, cost and claims of the banking sector on CEMAC economies. The variables were tested following two estimation techniques (GMM and GLS), and the results are provided in Panel A of Table 7.

Table 5 Correlation matrix

Probability	GDPG	GDPPC	FCAP	LLGDP	DCPRIV	DCSOE	BCREDIT	SPREAD	DEPO	LABOUR	INF	LAGGDP
<i>GDPG</i>	1											
<i>GDPPC</i>	0.9987***	1										
<i>FCAP</i>	0.6274***	0.6137***	1									
<i>LLGDP</i>	-0.3700***	-0.3476***	-0.3733***	1								
<i>DCPRIV</i>	-0.2029**	-0.1907**	-0.0361	0.5168***	1							
<i>DCSOE</i>	-0.1551*	-0.1402*	-0.2200***	0.3347***	0.4974***	1						
<i>BCREDIT</i>	-0.0120	-0.0016	0.0509	-0.1300	0.4554***	0.1484*	1					
<i>SPREAD</i>	0.2084**	0.2120***	0.1892**	-0.1342	-0.1556*	-0.1213	-0.0689	1				
<i>DEPO</i>	-0.2890***	-0.2727***	-0.1801**	0.5089***	0.8789***	0.5725***	0.4456***	-0.1966**	1			
<i>LABR</i>	-0.1248	-0.1137	-0.2786***	0.1155	-0.1173	0.1068	0.0729	-0.0132	-0.1060	1		
<i>INF</i>	0.0475	0.0519	0.1105	-0.0276	-0.1687**	-0.0528	-0.1002	-0.1827**	-0.1248	0.0533	1	
<i>LAGGDP</i>	0.5198***	0.5306***	0.0000	-0.0233	0.0165	0.0443	0.0623	0.0084	-0.0005	0.0106	0.0880	1

Notes: This table shows the Pearson correlation matrix values. The sample consists of data from six countries in CEMAC for the period of 1990–2016. The detailed definitions of the variables are reported in Table 3. ***, **, * and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 6 Unit root test results

Variable	<i>Levin, Lin and Chu test</i>		<i>Im, Pesaran and Shin W-stat</i>	
	Level	First difference	Level	First difference
<i>GDPG</i>	-5.0179***	-8.7842***	-3.2101***	-8.7160***
<i>GDPPC</i>	-5.0570***	-8.8324***	-3.5099***	-8.7843***
<i>FCAP</i>	-1.8701**	-6.8971***	-1.7965**	-6.7619***
<i>LLGDP</i>	0.5468	-6.5326***	2.8080	-6.2387***
<i>DCPRIV</i>	-13.1811***	-11.1081***	-8.6975***	-9.3008***
<i>DCSOE</i>	3.0070	-4.0321***	3.4570	-5.9785***
<i>BCREDIT</i>	-7.6653***	-6.0883***	-6.6489***	-6.8322***
<i>SPREAD</i>	-0.6736	-4.3197***	0.7020	-3.2143***
<i>DEPO</i>	-3.9502***	-5.7237***	-0.5512	-5.2937***
<i>LBR</i>	-1.2164	-3.2474***	1.1397	-3.3553***
<i>INF</i>	-5.7223***	-8.4590***	-4.5698***	-8.4865***
<i>LAGGDP</i>	-10.4705***	-10.8989***	-10.1441***	-14.7004***

Notes: The Levin, Lin and Chu test and Im, Pesaran and Shin W-statistic values are recorded in Table 6. The sample consists of data from six countries in CEMAC for the period of 1990–2016. The detailed definitions of the variables are reported in Table 3. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.

Table 7 GMM and fixed effect results

	<i>A</i>		<i>B</i>	
	<i>Growth function</i>		<i>Investment function</i>	
	<i>Panel GMM</i>	<i>Fixed effect</i>	<i>Panel GMM</i>	<i>Fixed effect</i>
<i>LLGDP</i>	-0.6175***	-0.5312**	-	-
<i>SPREAD</i>	0.7582	70.0096	-	-
<i>DCPRIV</i>	0.8427*	1.0356*	-	-
<i>DCSOE</i>	0.2690	0.2194	-	-
<i>DEPO</i>	-0.8319*	-1.1686**	-	-
<i>BCREDIT</i>	-	-	0.0977**	0.0826*
<i>INF</i>	0.1617	0.1705	0.6679***	0.9155**
<i>LABOUR</i>	-	-	-0.6892***	-0.6678***
<i>LAGGDP</i>	0.3374***	0.3813***	1.3522***	1.4646***
<i>C</i>	4.0074	7.8901	58.4912***	56.6214***
Adj. R ²	0.2947	0.2727	0.4541	0.4241
F-statistic	8.5363***	2.8030***	32.1878***	4.8089***
Durbin-Watson stat	2.0451	2.0908	2.1617	2.1916

Notes: The variables are considered at their first difference. Their detailed definitions are reported in Table 3. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Here, heteroskedasticity-consistent OLS statistics are reported. There was no autocorrelation or multicollinearity problem among the variables.

With respect to Table 7 Panel A, liquid liability to GDP (*LLGDP*) had the strongest effect in the model: it was the most significant variable of all the financial indicators used in the analysis. Standing for financial depth, the obtained factor shows that the actual expansion of the banking sector negatively affects CEMAC countries' economic performance. While a positive sign was initially expected, the present results raise some concerns on the actual efficiency in the studied banks. In fact, where the banking sector duly performs the functions stated by Levine (2005), a positive correlation would be expected between financial depth and GDP growth. Alongside financial depth, the variable *DEPO*, which is another size indicator, was found to be significant with an unusual negative coefficient. This finding suggests an inverse relationship between the overall weight of the banking sector and economic growth. While previous authors have asserted that *DEPO* typically increases at the same rate as a country's economic development (Beck and Demirgüç-Kunt, 2009), these results suggest an untapped potential that may relate to the excess liquidity observed in CEMAC banks.

At another glance, *DCPRIV* in Table 7 Panel A exerted a positive influence on *GDPG* and *GDPPC*. With a coefficient significant at 10% for the two tests conducted, the findings are in line with economic theory and suggest that financing the private sector enhances both companies' productivity and countries' sustainable growth. Similarly, *DCSOE*, which accounts for the resources channelled by banks to the public sector, exhibited a positive association with growth. Even though the latter indicator has failed to pass the t-test for significance, these results provide additional evidence for the effect of bank intermediation on economic growth. In fact, by facilitating trade, pooling savings, allocating resources and controlling the risks associated with investments, banks play a distinct part in the process of value creation (Levine, 2005). Among the remaining banking sector indicators, *SPREAD*, a proxy for banking sector efficiency, was found to be non-significant. However, the positive sign observed in its coefficient shows that higher interest margins between lending and deposits are positively associated with growth; it denotes potential gaps during the intermediation activity. In fact, with respect to previous studies, low intermediation costs allow banks to pool and allocate more financial resources to the real sector. Conversely, high intermediation costs deter borrowing and reduce the volume of resources to be affected by consumption and investment. This is the present case in the CEMAC area, where the real sector is unable to fully enjoy the benefits of intermediation.

From a broader perspective, while the indicators that depict the overall size, development and cost of banking sector intermediation are inversely associated with economic growth, CEMAC banks promote economic expansion in the region. In fact, with regard to the results purported in Table 7 Panel A, financial intermediation enhances economic growth via the banks' resource allocation function. The latter is captured in the analysis by the variables *DCPRIV* and *DCSOE*, which were positively correlated with GDP growth. As *DCSOE* was found to be positive and insignificant, the sign and the 10% significance obtained for *DCPRIV* provide some evidence that loans oriented to the private sector are decisive in supporting the wealth creation process. Hence, with respect to the coefficients of Panel A in Table 7, we are able to accept Hypothesis 1, which posits the positive influence of banking sector intermediation on GDP.

For robustness check and in order to observe the incidence of banks intermediation via the credit allocation channel, this study considers equation (3). It provides insight on the influence of banks activities on gross capital formation in CEMAC. The data are analysed following both panel GMM and a panel OLS fixed effect approach. Table 7

Panel B presents the outcome of equation (3) based on Hypothesis 2. The estimation results reveal the positive influence of *BCREDIT* on *FCAP*, which stresses the importance of bank credit in stimulating investment and enhancing the productivity of the real sector. These results provide support for the banking sector's functions documented by previous works. As such, we accept the second hypothesis formulated in Section 3.

6 Conclusions

The CEMAC has undergone a persistent crisis that has naturally impacted its financial sector. Provided currently with stronger institutions and greater know-how, one would expect a strong development of the banking industry as well as a proportionate effect on economic growth. While there is no real consensus on the link between finance and growth throughout the literature (Patrick, 1966; Levine, 1997; De Gregorio and Guidotti, 1995; Koivu, 2002), this study provides new evidence from a set of developing countries where financial services are still at an early stage. Aimed at investigating the relationship between banking sector intermediation, economic growth and gross capital formation, this study formulates two hypotheses tested in accordance with the GMM and the GLS method. With respect to the results summarised in Section 5, the financial intermediation performed by CEMAC banks has a positive influence on investment and long-run economic growth. The findings support the supply leading hypothesis and suggest that real investment and economic growth can be enhanced through an efficient allocation of financial resources to the private sector. As such, commercial banks in CEMAC should support regional businesses while adopting effective mechanisms aiming at reducing their exposure to non-performing loans. Such a configuration would result in a conducive allocation of financial resources while encouraging real investment and economic sustainability. The size indicators used in this study (*LLGDP* and *DEPO*) revealed potential efficiency concerns in the financial intermediation of CEMAC, so it is recommended that the central bank establish financial reforms to promote greater productivity in banks. The latter would, for instance, address the strong concentration observed in some countries while tackling down the challenges that currently prevent the region from benefiting fully from an expansion of the financial sector. Additional research could be conducted on the actual influence of banking sector productivity in CEMAC. In fact, Levine (2005) stated the importance of efficiency in banks to induce long-term growth.

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Notes

- 1 The CEMAC is made up of six states: Gabon, Cameroon, the Central African Republic (CAR), Chad, the Republic of the Congo and Equatorial Guinea. Established to promote cooperation and exchange among its members.
- 2
 - a Assessing investment opportunities
 - b exercising corporate control
 - c enabling risk mitigation or diversification
 - d pooling and reallocating financial resources
 - e easing the exchange of merchandises and services.
- 3 Southern African Development Community.