FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH: AN INSTRUMENTAL VARIABLES APPROACH

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ABSTRACT

The objective of this article is to evaluate the effect of financial development on economic growth in the six countries of the Economic and Monetary Community of Central African States (EMCCAS) sub-region, during the period 2000-2020. To achieve our objective, we used the method of instrumental variables which are robust to autocorrelation, heteroscedasticity of errors and a possible problem of endogeneity. In addition, we used the Three Stages Least Squares method to test the robustness of our results. The results of the estimates revealed that there is an inverse relationship between financial intermediation and economic growth on the one hand and on the other hand, that there is a non-linear U-shaped relationship between the two variables. Therefore, the governments of the countries of the EMCCAS zone must implement policies aimed at supporting the guarantees of SMEs (small and medium-sized enterprises) in their credit granting processes with banks or financial institutions.

Contribution/Originality: This study contributes to existing literature by evaluating the effect of financial development on economic growth in the six countries of the Economic and Monetary Community of Central African States sub-region.

How to cite: Fidoline Ngo Nonga --- Ngo Yonga Debora Blanche --- Ekani Evrad Arnaud (2022) Financial Development and Economic Growth: An Instrumental Variables Approach. *Asian Journal of Empirical Research*, 12(3), 95-103. 10.55493/5004.v12i3.4608

1. INTRODUCTION

A modern economy without a financial sector is almost unthinkable, as this sector provides financial intermediation and functional payments in the economy. Also, financial intermediation would refer to a process of adjustment of financing needs and capacities through the intervention of a specific agent called a financial intermediary (Nasica, 2012). The financial sector also helps to channel funds by providing financial services and ensuring the optimal use of financial resources. Therefore, a healthy financial sector is an essential prerequisite for a prosperous economy (Raza, Farhan, & Akram, 2011).

From this fact, financial development can be understood as a multidimensional process by which the financial system gains in terms of accessibility, effectiveness, efficiency, stability, institutional quality, diversity and is open to international capital flows (Mohamedi, 2018). A definition close to the previous one is proposed by Kpodar (2006) who considers that a financial system develops when it occurs: an increase in the population's access to financial services, an accumulation of financial assets, an increase in the range of financial instruments, an increase in the diversity of financial institutions and finally an improvement in efficiency and competition in the financial sector.

However, since the 1980s, the Economic and Monetary Community of Central African States (EMCCAS) has achieved substantial financial development characterized by growth in the population's access to financial services, an accumulation of financial assets, an increase in the range of financial instruments, an increase in the diversity of financial institutions, an improvement in efficiency, competition in the financial sector, and an increase in innovative financial services based on telephony mobile (MLachila, 2016).

According to the Bank of Central African States report of December 31, 2019, twenty-one (21) banks were authorized to carry out the activity of issuing electronic money and sixty-eight thousand two hundred and twenty (68,220) service points at across EMCCAS compared to fifty-three thousand three hundred and three (53,303) points at the end of 2018.The number of payment accounts associated with electronic money instruments (carriers) has grown considerably, from seventeen point eight (17.8) million subscribers at the end of 2018 to twenty-four point seven (24.7) million twelve months later. Finally, with the inclusion of new payment systems and services in the monitoring system, special emphasis has been placed on the financial and human resources in order to carry out the mission assigned to the monitoring function, on the one hand, and to circumscribe all the risks inherent in the operation of said systems and payment services on the other hand. In 2019, the electronic money activity recorded eight hundred eighteen million nine hundred forty one thousand seven hundred seven (818,941,707 CFA) transactions for an amount of eleven thousand three hundred and thirty five billion (11,335,000,000 CFA) , against five hundred seventy-two million three hundred sixty-two thousand six hundred thirty-five (572,362,635) transactions for a value of eight thousand two hundred and ninety-six billion (8,296,000,000) XAF for the whole year 2018. Mobile Money accounted for 96% of this value.

It should be noted that, in the countries of the Economic and Monetary Community of Central African States (EMCCAS), the banking sector dominates the financial sector given the volume of transactions it carries out (Omankhanlen, 2012). Thus, as of December 31, 2019, the Sub-region had 51 banks and 9 financial institutions in operation, distributed as follows: in Cameroon (15 banks and 7 financial institutions), in the Central African Republic (4 banks), in Congo (11 banks) , in Gabon (7 banks and 2 financial establishments), in Equatorial Guinea (5 banks) and in Chad (9 banks). Alongside this banking sector, microfinance has also experienced rapid growth through the provision of financial services to very low-income clients (loans, deposits, funds transfer, insurance etc.). This rapid growth of microfinance in Africa from 2000 to 2013 shows that total assets increased by 427%, number of borrowers by 204% and loans by 504% (Yousuf & Masih, 2016).

Despite the evolution of microfinance in the countries of the EMCCAS sub-region, it has been dominated by mobile telephony, which has grown in the countries of this sub-region. Thus, according to the AWGOMT, (Association World Group of the Operators of Mobile Telephony). The penetration of the use of mobile money has been particularly strong in Gabon (43% of the population over 15 years old had an account in 2017) but remains more discreet in the other countries of the region, i.e. 16% of the population adult in the Democratic Republic of Congo in 2017, 15% in Cameroon and Chad, and 6% in Congo (European Investment Bank Financial Report, 2017). The fact is that this development of innovative financial services in the EMCCAS sub-region leads to strong economic growth.

Thus, for nearly two and a half centuries, economic growth has occupied the thinking of economists. (Smith, 1776) breaks new ground in a series of studies on the causes of the wealth of nations. From a conceptual point of view, economic growth designates the sustained increase over one or more long periods of a dimension indicator, in particular the real Gross Domestic Product. Perroux (1961); Mohamedi (2018); Weil (2013), in turn, define economic growth as an increase in the quantity of goods and services produced each year in an economy.

Economic growth is therefore one of the most fascinating phenomena in economics, because it makes it possible to understand the process of enrichment of countries and the disparities in the standard of living between countries (Nshue, 2012; Randiki, 2016). Based on this fact, it should be noted that in the countries of the EMCCAS sub-region, the level of wealth created has increased considerably since the beginning of the period of financial reforms. Thus, World Bank statistics show that real Gross Domestic Product per capita stands at nearly $4,489 in the EMCCAS sub-region compared to $4,137 in Southern African Development Community (SADC). It is $800 in the WAEMU zone and $726 in the EAC. At the regional level, the level of income differs from one country to another. In the EMCCAS for example, the real GDP per capita varies between $325.7 in Central African Republic and $12,028.6 in Equatorial Guinea, passing through $1,357.1 in Cameroon.

While the trajectory of real GDP is well known, that of economic growth is erratic. The economic growth rates of the sub-region, even if they are low and sometimes negative, evolve in sawtooth with a downward trend. Also, the growth rate of real GDP in the CEMAC sub-region would have gone from -2.3% in 1993 to 4.1% in 2001 and from 3.3% in 2015 to -1.2% in 2016 (World Bank, 2018). However, due to the deterioration of its economic growth in recent years, CEMAC is currently one of the developing regions with the lowest growth rates. World Bank statistics (World Bank, 2018) show that, on average, the growth rate of real GDP per capita is -3.7% in EMCCAS countries, compared to 1.1% in LDCs of Sub-Saharan Africa (SSA) over the period 2010-2016. This rate is lower than that of the other regions of Africa which respectively record rates of 2.1% in the Southern African Development Community, 4.6% in the East African Community (EAC) and 5.8% in the West African Economic and Monetary Union (WAEMU).

The role of financial development in economic growth has been debated in the literature for many decades. Schumpeter (1911) stresses the importance of the services provided by the financial sector. He argues that banks and financial markets are very effective in mobilizing savings and facilitating transactions and that these services lead to economic growth. Goldsmith (1969) argues that financial development influences economic growth through the channel of capital accumulation. Thus, financial development provides the necessary funds for investment and facilitates the transfer of technology, which accelerates growth. These authors also find a strong link between financial deepening and production, but do not provide a general theoretical framework for this. This is how Mc-Kinnon (1973) and Shaw

(1973) introduced a theoretical model to try to explain the influences of financial liberalization on growth. They suggested in this model that financial development increases the quantity of savings on the one hand and the quality of investments on the other. According to these two authors, liberalized financial development contributes to growth and financial liberalization limits the consequences that can result from financial decline.

The literature on the relationship between the size of financial intermediation and economic growth is abundant and old. According to the studies of Bagehot (1873) and Schumpeter (1912), finance is one of the powerful levers of economic growth. Also, for the first author, the rapid development of Great Britain would be explained by the superiority of its financial market which would mobilize savings in order to finance long-term investments. For the second, bank loans are essential for economic growth and the banker must stimulate innovation (destruction-creative process) by financing entrepreneurs with the best chance of succeeding in their projects.

The preceding statements are not unanimous with those of authors such as Robinson (1952) and Lucas Jr (1988), then Levine. (2003) who in turn believe that the size of financial intermediation has no effect on economic Growth. Indeed, neoclassical theory postulates that "money is only a veil" and therefore cannot influence real activity. For proponents of this approach, financial intermediation may well follow economic growth (Levine & Zervos, 1998), and the two may influence each other at the same time. With the arrival of endogenous growth theories, the finance and growth relationship will find a real theoretical conception and return to center stage. In this wake, financial development influences economic growth by acting on three factors in particular: the productivity of capital, the efficiency of financial systems and the savings rate. Pagano (1993); Berthélemy and Varoudakis (1994) are the authors of the pioneering models of this growth theory.

Other studies show that financial development is favorable to economic growth only in the early stages of development (Law & Singh, 2014) and that financial development can harm economic growth in emerging and developed countries (Cournede & Denk, 2015). These authors confirm the existence of threshold effects between financial development and growth and arrive at two main results: (i) the level of financial development can be a potential source of the non-linearity between financial development and economic growth (Cecchetti & Kharroubi, 2015; Rioja & Valev, 2004); (ii) the level of macroeconomic indicators can also lead to non-linearity (Kpodar, 2007). This divergence of effects demonstrates the multitude of problems associated with assessing the relationship between financial development and economic growth.

On the strength of these controversies and taking into account the contextual facts raised above, this study questions the leverage effect that financial development can have on the dynamics of the real sector of the economies of the EMCCAS sub-region. The objective of this work is to analyze the impact of financial development on the dynamics of economic growth in the countries of the EMCCAS sub-region.

Besides the introduction, the rest of this work is organized into three other sections. The methodology is the subject of section two. Section three is devoted to the presentation of the results while section 4 concludes.

2. METHODOLOGY

2.1. Data

To assess the first hypothesis of our study, we use secondary data from two (02) World Bank databases, namely: the 2021 Global Financial Development (GFD) and the 2021 World Development Indicators. These databases provide information on a set of data from six (06) countries in the EMCCAS sub-region covering the period from 2000–2020. These are Cameroon, Gabon, Central African Republic, Chad, Equatorial Guinea and Congo.

2.2. Model Specification

The econometric model to be estimated in this work stems from the theoretical model developed by Eggoh and Villieu (2013). This is a growth model in which technical progress is endogenized by the development of financial intermediation services. One of the main results of this model is that the development of financial intermediation services has a positive effect on the growth rate at the low equilibrium level, against a negative effect at the high equilibrium level. In other words, the development of this sector would generate an increase in the rate of economic growth in the financially underdeveloped countries while it would reduce it in the financially developed countries. This result, which reflects a non-linear relationship between economic growth and the development of banking intermediation services, can be approximated by a quadratic relationship. The resulting regression equation takes the following form::

$$TC_{it} = \mu_i + \alpha_1 DSIF_{it} + \alpha_2 DSIF_{it}^2 + \alpha_3 X_{it} + \delta_t + \varepsilon_{it} \qquad (1)$$

Where TC_{it} is the economic growth indicator of country i at date t; μ_i represents individual fixed effects (country-specific effects) ; δ_t represents specific temporal effects ; $DSIF_{it}$ is the financial intermediation services development indicator of country i at date t ; X_{it} is a vector of control variable; α_j are the coefficients to be estimated ; ε_{it} represents the error term, which is independent and identically distributed ; $i = 1, 2, 3, …6;$ t = 1, 2, 3,…..,21.

In Equation 1, the variable $DSIF_{it}^2$ allows to take into account the non-linearity in the growth equation. This is the non-linearity conditioned by the level of development of the financial system.

The economic growth indicator is measured here by the growth rate of real Gross Domestic Product and calculated on the basis of GDP in constant 2010 dollars. The choice of this variable is due to the fact that it makes it possible to capture the level of real growth, because it is deflated from price levels. As for the size of financial intermediation, it is approximated here by the credit granted to the private sector and the domestic credit provided by the financial sector. Bank credit to the private sector is the main indicator of financial development used in the literature because it directly measures the size of financial intermediation. Thus, a large proportion of private credit in GDP indicates intense

activity (financial development) of financial intermediaries (Alimi, 2015). As for Domestic credit provided by financial sector, it is an aggregate indicator of the amount of financial intermediation activity towards other financial institutions (Diandy, 2018).

Thus doing, the sequential form of the model is written:

$$TC_{it} = \alpha_0 + \alpha_1 CIFS_{it} + \alpha_2 CIFS_{it}^2 + \alpha_3 X_{it} + \delta_t + \mu_i + \varepsilon_{it} \qquad (2)$$

$$TC_{it} = \alpha_0 + \alpha_1 CBSP_{it} + \alpha_2 CBSP_{it}^2 + \alpha_3 X_{it} + \delta_t + \mu_i + \varepsilon_{it} \qquad (3)$$

Equation 2 presents the econometric model whose explanatory variable of interest is domestic credit provide by the financial sector, while bank credit to the private sector constitutes the variable of interest in Equation 3.

To regress this model, we consider some control variables highlighted in the literature as a factor of economic growth. These are the initial level of development, the level of investment, the level of government expenditure, the level of inflation calculated from the consumer price index, and the external debt.

The initial level of development indicator is approximated by Gross Domestic Product per capita (GDP). The level of investment (Inv) is assimilated to physical capital. The latter is captured by gross fixed capital formation. Inflation is approximated here by the consumer price index (CPI). Inflation is a structural factor whose rise can negatively affect economic growth through reduced investor incentives. Indeed, according to Jeanneney and Kpodar (2008), high inflation is a signal of great macroeconomic instability that generates information imperfections and uncertainties about the profitability of investments. External debt (exdebt) is measured as external debt as a percentage of GDP. According to classical theory, debt is a burden for future generations while in Keynesian theory, debt is a political instrument that allows the state to stabilize economic activity. According to Fosu (1999), external debt harms economic growth. Government expenditure (DepGouv) is apprehended by general public consumption expenditure. In more recent works, the authors (Fouopi, NSI, Mommon, & Epo, 2014) explain the lack of consensus among economists about the existence of a non-linear relationship between public spending and economic growth.

According to them, public spending stimulates growth up to a threshold beyond which any increase in such spending can actually harm growth.

2.3. Estimation Technique

The objective of this section is to describe the analytical methods used to analyze the effect of the size of financial intermediation on economic growth. To do this, we opted for the method of Instrumental Variables (VI).

Based on previous studies, some authors show that endogeneity is a serious problem in studies using econometrics (Aterido & Hall-Ward-Driemeier, 2010; Fisman & Svensson, 2007). The direction of causality is often not clear in the sense that the causal link may in some cases come from the informality variable (dependent variable) towards the explanatory variable (Batra, Daniel, & Andrew, 2004). The equations (of first stage and second stage) which are used to instrumentalize the endogenous variables are written in the following form:

$$GDP_{it} = \alpha_0 + \alpha_1 DSIF_{it}(endog) + \alpha_2 DSIF_{it}^2 + \alpha_3 DepGouv_{it} + \alpha_4 IPC_{it} + \alpha_5 exdebt_{it} + \alpha_6 INV_{it} + \alpha_7 GDPPH_{it} + \mu_i + \delta_t + \varepsilon_{it} \qquad (4)$$

$$DSIF_{it}(endog) = \alpha_0 + \alpha_1 Instruments_{it} + \alpha_3 DepGouv_{it} + \alpha_4 IPC_{it} + \alpha_5 exdebt_{it} + \alpha_6 INV_{it} + \alpha_7 GDPPH_{it} + \mu_i + \delta_t + \varepsilon_{it} \qquad (5)$$

Where $DSIF_{it}(endog)$ is the assumed endogenous variable, et Instruments$_{it}$ are the instruments including the assumed exogenous variables of the model.

For the instruments to be valid, two basic assumptions must be verified:

a) The instrumental variables that we use in this study must be correlated with the supposedly endogenous constraint variables. For this first condition, we carried out the instrument relevance test based on the statistics of Cragg and Donald (1993). Here, we use the criterion of Stock and Yogo (2005): for a single endogenous variable, the F statistic of the instrumentation equation must be at least equal to 10 for the instruments to be relevant.

b) The instruments must satisfy the condition of orthogonality: the instruments must not be correlated with the error. To test this hypothesis, we use the over-identification test based on Hansen's J statistic which follows a chi-square distribution. For probabilities greater than 5% or 10%, the Hansen statistic makes it possible to affirm that the estimated system of equations is over-identified, therefore the instruments are valid.

In the case of this study, the variable assumed to be endogenous is financial intermediation. Given the fact that the economic literature has not yet identified, to our knowledge, the instruments of financial intermediation, we have used the within transformation which consists in using the lagged explanatory variables as being instruments.

3. RESULTS

The presentation of the results of this part of the study is articulated around two points : the description of the variables and the presentation of the results of the regression model.

3.1. Descriptives Statistics

The paragraphs below are devoted to the presentation and description of the model's variables (descriptive statistics, correlation matrix, graph summarizing the evolution between financial intermediation and economic growth). Table 1 summarizes the variables of the model through a few indicators. This table shows that the average economic growth rate in the EMCCAS sub-region from 2000 to 2020 is 3.97%, This percentage is indicative of the fact that economic growth in the EMCCAS sub-region is stagnating and has not yet taken off with regard to its potential, such as natural resources. As for the domestic credit variable provided by financial sector, it has an average of 8.73%.

Similarly, the average bank credit to the private sector is 8.67%. These percentages sufficiently demonstrate that financial intermediation is still at an embryonic stage in the EMCCAS sub-region.

As for the correlation matrix, it is shown in Table 2. The analysis of this matrix reveals two main pieces of information. The first observation is that the correlation coefficient between the explanatory variables of the model is less than 87%, which demonstrates that our model does not suffer from the problem of multi-collinearity. The second main observation is that of the negative correlation between financial intermediation indicators and economic growth. This already presumes the hypothesis of an inverse effect between the two variables.

Table 1. Descriptive statistics.

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
GDP	126	3.978	9.541	-36.392	63.38
CISF	126	8.738	4.193	2.01	19.189
CIB	126	8.678	4.132	2.01	19.087
M2	126	26.192	12.063	7.649	66.268
DPCG	126	11.586	5.256	0.167	29.118
INFL	126	7.169	15.612	-29.547	70.191
EXDEBT	126	30.254	32.784	-33.118	165.97
FBCF	126	26.308	12.985	5.31	79.401
GDPPH	126	4020.449	5185.584	166.176	22942.609

Table 2. Correlation matrix.

Variables	GDP	CISF	CIB	M2	DPCG	INF	EXDEBT	FBCF	GDPPH
GDP	1.000								
CISF	-0.467	1.000							
CIB	-0.469	0.999	1.000						
M2	-0.404	0.737	0.739	1.000					
DPCG	-0.565	0.572	0.578	0.520	1.000				
INF	0.045	0.012	0.007	0.001		1.000			
EXDEBT	-0.016	-0.185	-0.181	-0.143	0.159	-0.048	1.000		
FBCF	0.271	-0.181	-0.179	0.146	-0.07	0.065	-0.141	1.000	
GDPPH	-0.022	0.010	0.016	-0.056	0.225	0.005	-0.265	0.145	1.000

Note: GDP : Gross Domestic Product, CISF: Domestic credit provided by the financial sector, CIB: Bank credit to the private sector, M2 : Money supply, DPCG: Government Expenditure, INF: Inflation, EXDEBT: External debt, FBCF: Investment, GDPPH: Gross Domestic Product Per Head.

3.2. Results Analysis

The results are presented in the various tables below. Tables 3 and 4 present the estimation of the effect of financial intermediation on economic growth using the technique of instrumental variables. Table 5 tests the robustness of the results obtained in Tables 3 and 4 using the money supply as an alternative measure of financial intermediation. Table 5 reproduces the results presented in Tables 3 and 4 using the Three Stages Least Squares (TSLQ) estimation method.

By performing the Hausman test on the financial intermediation variable (cisf), it appears that this explanatory variable is endogenous because the p-value of the fourteenth row of Table 3 is equal to zero. This allows us to reject the null hypothesis that the financial intermediation variable is exogenous.This result invalidates the previous basic results. To overcome this problem, we used the method of instrumental variables, the results of which are confined in Table 3.

The use of the instrumental variable technique to characterize the relationship between financial intermediation and economic growth is only valid under three main conditions : the absence of under-identification of the instruments, the relevance of the instruments, and the -identification of instruments. The results in Table 3 shows that the instruments are not under-identified with regard to the p-value (equal to zero) of the KPML(Kleipinder and Paf Maximun Likelihood) test which allows us to reject the null hypothesis of the under-identification of instruments. Similarly, the Cragg-Donal Statistics is greater than 10 for each column, which means that the instruments used are good or relevant and can validly replace the endogenous explanatory variable. In addition, the instrument over-identification test reveals for each column that the instruments are valid. This means that the instruments must not be correlated with the error term (the orthogonality condition is respected) with regard to the p-value of the Sargan test which is greater than 5% for all the columns.

Table 3 records the results of the analysis of the impact of financial intermediation on economic growth in the EMCCAS sub-region. The estimation of the effect of financial intermediation (measured by domestic credit provided by the financial sector) on economic growth by the method of instrumental variables robust to autocorrelation, heteroscedasticity of errors and a possible endogeneity problem shows that there is a negative and significant relationship between the two variables.

Table 3. Effect of domestic credit provided by the financial sector on economic growth using the instrumental variables method.

Variables	(1)	(2)	(3)	(4)	(5)
Cisf	–5.884***	–5.848***	–6.549***	–4.605***	–4.482***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cisf^2	0.290***	0.288***	0.331***	0.229***	0.230***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Dpcg	–0.938***	–0.937***	–1.042***	–1.011***	–1.153***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Infl		0.008	0.003	–0.005	–0.011
		(0.9)	(0.9)	(0.9)	(0.8)
Exdebt			0.037	0.034	0.052*
			(0.2)	(0.2)	(0.06)
Fbcf				0.042	0.037
				(0.5)	(0.5)
Gdpph					0.002*
					(0.09)
Cons	39.210***	39.060***	41.310***	32.560***	31.654***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Centered R^2	0.25	0.2538	0.2118	0.335	0.3569
KPML	0.00	0.00	0.00	0.00	0.00
Cragg-Donal	14.4	14.12	14.08	14.42	17.066
Sargan	0.18	0.16	0.19	0.45	0.08
DWH (Cisf)	0.00	0.00	0.00	0.00	0.01
Prob(F-stat)	0.00	0.00	0.00	0.00	0.00
Nb. Obs	120	120	120	120	120
Nb. Countries	6	6	6	6	6

Note: *** and * represent significance levels at 1% and 10% respectively. Values in parentheses represent probabilities.

According to this table, an increase in domestic credit provided, for example, by the private sector by 1% leads to a reduction in economic growth of 4.48% (column 5). This result is not compatible with the work of Pinar and Damar (2006) who instead found that financial intermediation promotes economic growth in Turkey. This result can be explained by the fact that financial intermediation captured by domestic credit provided by the financial sector or bank credit to the private sector each represents less than 9% of gross domestic product and therefore reflects the embryonic state of this last. Thus, the rate of access to credit by private sector actors is still low compared to the potential of the economies of the sub-region. This does not boost economic growth in the EMCCAS sub-region. On the other hand, the coefficient of the Cisf^2 variable is positive and significant. This means that there is a threshold of financial intermediation from which any increase of one unit of the latter boosts economic growth. Therefore, we can conclude that there is a U-shaped relationship between financial intermediation and economic growth. This non-linear relationship is corroborated by the theoretical work of Deidda and Fattouh (2001). This work stipulates that the effect of intermediation on economic growth is ambiguous when the level of development of the banking sector is low. Risk-averse agents prefer to bear transaction costs imposed by financial intermediaries rather than placing on the market. This choice results from the fact that banks reduce risk by diversifying assets. In this environment, the development of the banking sector weighs on economic growth relative to the market. On the other hand, for a high level of development of the banking sector, the effect on growth is always positive due to the relatively high level of income. This relationship is also not compatible with the work of Shen and Lee (2006), who found an inverted U-shaped function to describe the non-linearity of the relationship between finance and economic growth. Finally, this result is contradictory to that of Favara (2003), who found an inverted S-shaped function between financial intermediation and economic growth.

In addition to domestic credit provided by the financial sector, we also used bank credit to the private sector as a main indicator of financial intermediation. The analysis of the effect of bank credit to the private sector on economic growth gives results which are recorded in Table 4. The analysis shows that the results of this table are compatible with those of Table 3. That is to say that there is a U-shaped relationship between financial intermediation and economic growth on the one hand and on the other hand, the variables general government consumption expenditure, external debt, gross capital formation fixed and initial wealth all have a significant effect on economic growth, the first having a negative effect while the rest of the variables exerting a positive relationship (column 5).

Table 4. Effect of bank credit to the private sector on economic growth using the instrumental variables method.

Variables	(1)	(2)	(3)	(4)	(5)
Cib	–5.904***	–5.864***	–6.563***	–4.687***	–4.532***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cib2	0.295***	0.293***	0.337***	0.237***	0.235***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Dpcg	–0.964***	–0.963***	–1.073***	–1.033***	–1.173***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Infl		0.002	0.003	–0.005	–0.011
		(0.9)	(0.9)	(0.9)	(0.8)
Exdebt			0.037	0.0345	0.052*
			(0.1)	(0.1)	(0.06)
Fbcf				0.0393	0.035
				(0.5)	(0.6)
Gdpph					0.002*
					(0.09)
Cons	39.300***	41.38***	39.137***	32.973***	31.935***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Centered R^2	0.258	0.221	0.261	0.337	0.359
KPML	0.00	0.00	0.00	0.00	0.00
Cragg-Donal	15.07	14.72	14.79	14.75	17.56
Sargan	0.18	0.19	0.16	0.47	0.09
DWH (Cib)	0.00	0.00	0.00	0.00	0.01
Prob(F-stat)	0.00	0.00	0.00	0.00	0.00
Nb. Obs	120	120	120	120	120
Nb. Countries	6	6	6	6	6

Note: *** and * represent significance levels at 1% and 10% respectively. Values in parentheses represent probabilities.

To verify the robustness of our results, we used robustness tests. Which is the work of the paragraphs below.

3.3. Robustness Check

To test the sensitivity of our results, we used two methods: the first consists in using another alternative measure of financial intermediation which is the money supply and the second is dedicated to the use of an alternative estimation method. : the method of Three Stages Least Squares.

Using money supply as an alternative measure of financial intermediation in our growth model yields results that are confined to Table 5. The results in this table reveal that there is a U-shaped relationship between money monetary and economic growth. This result is compatible with those of Tables 3 and 4.

Table 5. Effect of money supply on economic growth by the method of instrumental variables.

Variables	(1)	(2)	(3)	(4)	(5)
M2	–1.674***	–1.734***	–1.761***	–1.437***	–1.415***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$M2^2$	0.021***	0.021***	0.022***	0.017***	0.017***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Dpcg	–0.514***	–0.487**	–0.570***	–0.605***	–0.639**
	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)
Infl		0.029	0.031	0.022	–0.020
		(0.5)	(0.5)	(0.6)	(0.6)
Exdebt			0.0487*	0.0447	0.484*
			(0.09)	(0.1)	(0.09)
Fbcf				0.0930	0.0893
				(0.1)	(0.2)
Gdpph					0.0005
					(0.7)
Cons	36.471***	36.895***	36.453***	30.110***	29.807***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Centered R^2	0.215	0.202	0.215	0.298	0.303
KPML	0.00	0.00	0.00	0.00	0.00
Cragg-Donal	17.99	16.75	16.636	11.825	11.41
Sargan	0.33	0.3718	0.34	0.574	0.454
DWH (M2)	0.00	0.00	0.00	0.00	0.01
Prob(F-stat)	0.00	0.00	0.00	0.00	0.00
Nb. Obs	120	120	120	120	120
Nb.Countries	6	6	6	6	6

Notes: *** ; ** and * represent significance levels at 1%, 5% and 10% respectively. Values in parentheses represent probabilities.

In addition, the use of the alternative method of estimation (triple least squares) gives results which are recorded in Table 6. The results found by the first method validate those which were found previously in Tables 3, 4 and 5.

Table 6. Effect of financial intermediation on economic growth through the method of Three Stages Least Squares (TSLS).

Variables	TSLS	
Cisf	-1.587**	
	(0.0 3)	
Cisf²	0.078*	
	(0.00)	
Cib		-1.625**
		(0.00)
Cib²		0.081*
		(0.06)
Dpcg	-1.071***	-1.077***
	(0.00)	(0.00)
Infl	-0.029	-0.029
	(0.4)	(0.4)
Exdebt	0.037	0.037
	(0.1)	(0.11)
Fbcf	0.121**	0.120**
	(0.02)	(0.03)
Gdpph	0.002	0.002
	(0.1)	(0.1)
Cons	17.919***	18.107***
	(0.00)	(0.00)
Nb. obs	126	126
R²	0.41	0.41
Prob (Chi2)	0.00	0.00

Notes: *** ; ** and * represent significance levels at 1%, 5% and 10% respectively. Values in parentheses represent probabilities.

4. CONCLUSION

The analysis of the effect of financial intermediation on economic growth in the EMCCAS sub-region through the methods of estimating instrumental variables and Three Stages Least Squares shows that there is an inverse relationship between the two variables of on the one hand and on the other hand, that there is a U-shaped relationship between the two variables for the period $2000 - 2020$. In addition, the use of the money supply variable as an alternative variable of financial intermediation (initially measured by domestic credit provided by the financial sector and bank credit to the private sector) gave results compatible with those using the starting indicators of financial intermediation. Therefore, the governments of the countries of the EMCCAS zone must implement policies aimed at supporting the guarantees of SMEs (small and medium-sized enterprises) in their credit granting processes with banks or financial institutions. Because greater access to credit would allow SMEs to carry out several projects that will have knock-on effects on employment, economic growth, tax revenues and many other sectors of the economy.Government support for access to the credit market by SMEs would allow the economy to reach a threshold of financial intermediation capable of boosting the economic growth of the economies of the region.

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