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Effects of Access to Bank Credit on Economic Growth: A Sector-by-sector Analysis of the Malian Economy

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Abstract

This work aims to verify the effect of access to bank credit on economic growth from an analysis by sector of the Malian economy during the period 1990-2021. Using ARDL (Auto Regressive Distributed Lag) modeling, the results show that access to bank credit has a negative short-term and positive long-term effect on economic growth in Mali. The results of the sector analysis show that bank credit granted to the private sector has a positive effect on the growth of the industrial and services sectors but shows a negative effect on the growth of the agricultural sector. Economic policy makers need to improve access to credit in the agricultural sector.

Keywords: Bank credit, ARDL, Economic growth, GDP, Mali.

1. Introduction

According to the World Bank, financial services can help stimulate development. They help individuals escape poverty by facilitating investment in health, education and business. Schumpeter (1911), in his theory of economic evolution, asserted that money and credit, through banking, occupy a central place in economic development. According to Schumpeter, investment in these sectors goes beyond mere technical investigations, independent of the world of production and distribution; it is at the heart of evolution, because without credit, no evolution is possible. Through diversified methodologies, several authors (Sekali, 2018; Abdillah, 2022) have analyzed the influence of bank credit granted to the private sector on economic growth and find that bank credit is a real driver for a country's economic dynamics. Although the conclusions of (Sekali 2018; Abdillah, 2022) are in favor of a positive effect of bank credit on economic growth, there are controversies in the debates on this subject. Indeed, some authors argue that bank credit could have adverse effects on economic growth. This is the case with Omar and Khalid (2022), Gérard and Tomo (2022) and Narindra (2022), who show in their study that bank credit granted to the private sector does not improve economic growth.

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Mali, a member of the UEMOA, has 14 banks in its banking sector, with an estimated bancarisation rate of 16.8% in 2021 (BCEAO, 2022). The reasons for this low rate are due to a number of factors, including low incomes, a lack of financial literacy and the population's high propensity to hoard, particularly in rural areas. A large-scale banked population will have greater access to bank loans and investments will increase, which in turn will have a greater impact on economic growth (Armand et al, 2016). In Mali, economic growth has been weak and highly unstable over a long period, both in terms of real GDP (1.8% in 2022 versus 3.1% in 2021, World Bank, 2023) and per capita income. This trend is partly linked to the macroeconomic policies implemented, which have had the effect of weakly transforming the structure of production and population poverty, particularly in rural areas (Estay and Thiam 2015). Togo, for example, is one of the WAEMU countries where the supply of bank credit increased the most in 2021. In fact, the ranking of WAEMU zone countries in terms of loans granted by commercial banks to their customers in 2021 places Togo in first place, with a rate of 32%, followed by Burkina Faso with 24%, Benin with 19% and Mali with 15.7% (Agence Ecofin, 2022). Despite the importance of its contribution to economic growth, agricultural production accounts for only a small proportion of the overall volume of credit to the private sector. The agricultural sector accounts for only 5.49% of the total volume of bank loans to the private sector. As for the trade sector, it benefits from the largest share of the overall volume of credit to the private sector with a proportion of 40.85%, followed by the industrial sector (manufacturing and extractive industries) with 16.1% (BCEAO, 2021).

Although Mali's banking sector has developed systematically in recent years, it still lacks depth, and access to banking services, particularly credit, is limited. Indeed, banks in Mali generally grant credit to a relatively limited range of companies. In the current context, marked by the beginnings of an improvement in bank credit indicators, it is necessary to revisit the relationship between access to bank credit and growth in Mali. This paper seeks to analyze the effects of access to bank credit on sectoral growth in Mali.

After this introduction, the remainder of this paper deals in the following sections with the analytical review, the method of analysis, the results and discussion, a conclusion and, finally, the bibliographical references.

2. Analytical review

Today, there is a large body of work analyzing the relationship between bank credit and economic growth, but authors have yet to agree on a consensual answer, and analyses focus very little on sectors of the economy. In this review, we focus not only on the link between bank credit and economic growth, but also on the links found between bank credit and sectors of the economy.

Very recently, Omar and Khalid (2022) empirically verify the relationship between financial development and economic growth in African economies, using panel data from 40 African countries (11 low-income and 29 middle-income) over the period 1980-2019. The results show that financial development, as measured by bank credit to GDP and the ratio of money supply in the sense of M3 to GDP, does not improve economic growth in African economies. These results do not corroborate those of Abdillah (2022), who investigates the effects of remittances on

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economic growth in the Comoros and the role of bank credit over a 35-year period from 1985 to 2019. The author uses an ARDL model for his analyses. The results show that credit has a positive and significant impact on economic growth in the Comoros. Gérard and Tomo (2022) study the effects of financial development institutional reforms in the Central African Economic and Monetary Community (CEMAC) on economic growth. Using the Generalized Moment Method on a cylindrical panel, they find that credit granted to the private sector does not contribute to economic growth.

Narindra (2022) examines the impact of financial inclusion via microfinance on economic growth over the period 1990 to 2020. His results show that the variable Credit granted by the banking sector to the private sector is significant and negatively impacts Madagascar's real GDP. A result contrary to Narinda (2022) was found by Sekali (2018) examining the relationship between financial development and economic growth in Morocco for the period 1980-2015. The latter had used the ARDL model and his results showed that the bank credit variable has a positive impact on Morocco's economic growth. The work of Jacques and Kabikissa (2021) is much more mixed. The authors analyze the effects of financial liberalization on economic growth in the Central African Economic and Monetary Community (CAEMC) over the period 1985-2018, using an ARDL model. They find that, in the long term, financial liberalization is significant and negatively affects economic growth, while banking development has a positive and significant effect on growth in the CEMAC zone in both the long and short term.

Selmi et al (2015) using a Tobit model, highlight the impact of farmers' access to bank credit on improving their technical efficiencies. The results of the study reveal that farmers who have benefited from agricultural credit are the most efficient compared with those who have no access to any form of financing in Tunisia. While the results of Selmi et al are in favor of a positive effect of bank credit on GDP, Sossou (2015) finds a negative link when looking at agricultural financing in Benin. The results of his research revealed that the needs of farms are not fully met because the credits granted are small, so it emerges from his study that income determines access to bank credit. Kendo's (2012) analysis, using a panel model, assesses the impact that the financial sector can have on agricultural productivity, and then the impact the latter can have on poverty. His study shows that the financial sector does not contribute to improving agricultural productivity in the 15 West African countries concerned, including Mali. For the author, however, the financial sector is an essential factor in the process of reducing poverty. Through a descriptive analysis of data from the French Development Agency (AFD), Fouquet (2014) supports the idea that the weakness of credit to agriculture is clearly a major obstacle to the growth of agricultural production in three countries studied; Mali, Tunisia and Senegal.

The study by Mokrani (2020) looks at the problem of lack of access to agricultural bank loans in Algeria. According to the author, the problem is linked to two types of cause: one concerning farmers and the other linked to banks. Most farmers, often the smallest, are unable to obtain loans because they have no deeds of ownership or use to present as collateral to the banks, or because they have no other collateral to offer as a mortgage. As for the banks, they are reluctant to finance the agricultural sector due to their unfamiliarity with the sector, the lack of information available about it and its very high risks, which means that they impose very high

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transaction rates that farmers cannot bear. The findings of Fouquet et al (2016) on agricultural credit in sub-Saharan Africa, the Maghreb and the Caribbean show that credit is an essential component of agricultural development.

Lo and Ramde (2019), using a VAR error correction model, investigate the relationship between financial sector development and industrialization in African Franc zone economies. According to their analysis, a shock to bank credit allocated to the private sector produces a negative short-term effect and a positive long-term effect on the manufacturing sector. Furthermore, Mokombi (2021), using a random-effects model on data from 2000 to 2017, examined the effects of bank credit on private-sector investment in CAEMC member countries. The results reveal that bank credit extended to private companies is a real driver of private sector investment. Furthermore, Cissokho (2020), using a random-effects panel model, shows that access to bank credit has a positive and significant effect on the productivity of manufacturing companies in Senegal. According to the author, manufacturing companies with access to bank financing are more productive than those without access to any form of financing. Woni 2020, using a random-effects model, looks at bank financing in WAEMU countries. The results show that bank financing of the private sector has a positive influence on the foreign trade of WAEMU member countries, in terms of both exports and imports. According to the author, the banking system plays a role in trade by promoting productive investment for both importers and exporters.

From this literature, we can see that access to credit is captured by different indicators. The authors use several methods of analysis, either for a single country or for a group of countries. The results suggest a positive or negative effect of bank credit on the economy as a whole. We note that the authors focus their analysis on agricultural production, private investment and poverty reduction. To the best of our knowledge, however, the authors do almost nothing to analyze access to credit in the economic sectors of a country or group of countries. This is what we are going to do in this research to help understand how access to credit affects the sectors of Mali's economy and overall economy.

3. Estimation method, data and results

This section covers model specification and variable identification.

3.1. Model and estimation method

- **Theoretical model**

Our theoretical model used to examine the effect of access to credit on sectors of the Malian economy has its origins in Aschauer (1989). His basic model is based on Solow's (1956) augmented model. It starts from the Cobb-Douglas model in the following form:

$$Y_t = AK_t^{\alpha} L_t^{\beta} G_t^{\chi}$$

with $0 \prec \alpha \prec 1$ $0 \prec \beta \prec 1$; $0 \prec \chi \prec 1$ et $\alpha + \beta + \chi = 1$ ou Y_t is the production, A is a scaling factor, L_t le facteur travail, K_t the labor factor (infrastructure not included), G_t infrastructure capital. In this model, returns to scale are constant. By linearizing the equation, we obtain the elasticities of the various factors. This model is relevant in our case because it allows us to consider stocks

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rather than flows, thus integrating access to credit, which is useful for the production sectors of the economy. Linearization gives us the following model:

$$\ln Y_t = \ln A + \alpha \ln K_t + \beta \ln L_t + \chi \ln G_t$$

In our analysis of the effects of access to credit on growth in the production sectors (primary, secondary and tertiary), we start from this theoretical model and replace the variable G (public spending) with our variable of interest: access to credit. This allows us to determine models for all three sectors in addition to the overall economy.

- **Empirical specification**

For the empirical specification, our research draws more on the model developed by Bathily et al (2021) in analyzing the effect of public spending on the performance of economic sectors in Mali. For our part, we have specified the main model in four models. This gives us the advantage of seeing the effect of bank credit on the agricultural sector, the secondary sector, the tertiary sector and the overall economy. The general formulation of the economic model is as follows for the 4 models with ARDL format:

$$\begin{aligned}\Delta LnGDP_t^K = {} & \alpha_0 + \sum_{i=1}^{p} \alpha_{1i}\, \Delta LnGDP_{t=1}^K + \sum_{i=1}^{q} \alpha_{2i}\, \Delta LnCa\_GDP_{t-1} \\ & + \sum_{i=1}^{l} \alpha_{3i}\, \Delta Lnmm\_GDP_{t-1} + \sum_{i=1}^{m} \alpha_{4i}\, \Delta LnGFCF_{t-1} \\ & + \sum_{i=1}^{n} \alpha_{5i}\, \Delta Lnstabpol_{t-1} + \sum_{i=1}^{r} \alpha_{6i}\, \Delta Lnmoderagri_{t-1} \\ & + \sum_{i=1}^{s} \alpha_{7i}\, \Delta Lnpluvio_{t-1} + \beta_1 LnGDP_{t-1}^K + \beta_2 Lnca\_GDP_{t-1} \\ & + \beta_3 Lnmm\_GDP_{t-1} + \beta_4 Lnfbcf_{t-1} + \beta_5 Lstabpol_{t-1} + \beta_6 Lnmoderagri_{t-1} \\ & + \beta_7 Lnrainf_{t-1} + \varepsilon_i\end{aligned}$$

K to distinguish the 4 models (K=1 to 4)

Model 1 for the agricultural sector (K = 1), GDP = agricultural GDP

Model 2 for the industrial sector (K = 2), GDP = industrial GDP

Model 3 for the service sector (K = 3), GDP = service GDP

Model 4 for the global economy (K = 4), GDP = global GDP

$\alpha_{1i}$to $\alpha_{7i}$are the coefficients capturing short-term effects; β_1 $to\beta_7$ are the coefficients capturing long-term effects; Δ is the first difference; α_0 is the constant; εi is the error term and t = year.

The ARDL model is used to model the long- and short-term dynamics of the variables. Since some variables are stationary and others have a unit root, the ARDL model is generally used to

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estimate the dynamic equation. The ARDL model (autoregressive model with staggered lags) proposed by Pesaran and Shin (1998) and Pesaran et al. (2001) makes it possible, on the one hand, to test long-term relationships using the "bounds test" on series that are not integrated of the same order and, on the other hand, to obtain better estimates on small sample sizes (Narayan and Smyth, 2005). The ARDL model makes it possible to deal simultaneously with long-term dynamics and short-term adjustments. The basic equation is formulated as follows:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta y_{t-1} + \sum_{i=0}^{q} \alpha_{2i} \Delta x_{t-1} + \beta_1 y_{t-1} + \beta_2 x_{t-1} + \varepsilon_i$$

Where: $y$is the variable to be explained; x is the vector of explanatory variables α_{1i}andα_{2i} are the short-term effects; β_1 and $\beta_2$are the long-term effects Δ is the first difference; α_0 is the constant; $\varepsilon_i$is the error term.

Schematically, ARDL estimation involves three stages. The first step consists in testing the existence of a long-run relationship by applying the "bounds tests" approach; in the second, estimating the error-correction models using the ordinary least squares (OLS) method; and in the third and final step, estimating the long-run relationship and short-run dynamics of the ARDL models using OLS. The ARDL approach is used because this procedure is considered by many economists as one of the new and relatively simple concepts, Pesaran et al (2001).

3.2. Variables and data source

The data used are time series extracted from the World Bank database covering the period 1990 to 2021.

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Table 1: Variables and data sources

Code	Variable definition	Sources	Measuring variables
GDP	Real gross domestic product	World Bank	Economic growth measured by real GDP
GDPAGRI	Gross domestic product of the agricultural sector	World Bank	Primary sector growth measured by agricultural GDP
GDPSEC	Gross Domestic Product of the industrial sector	World Bank	Growth in the secondary sector measured by industrial GDP
GDPSER	Gross domestic product of the service sector	World Bank	Service sector growth measured by GDP of services
CA_GDP	Bank credit to the private sector as a % of GDP	World Bank	Access to bank credit measured by bank credit granted to the private sector/GDP
STABPOL	Political stability	World Bank	Political stability measured by STABPO
GFCF	Gross fixed capital formation	World Bank	Investment measured by gross fixed capital formation
MM_GDP	Money supply as % of GDP	World Bank	Money supply measured by money supply/GDP
RAINF	Rainfall	World Bank	Rainfall variation in millimeters (mm)
MODERNAGRI	Agricultural modern	World Bank	Agricultural investment measured by agricultural modernization

Source: Authors

4. Results and discussion

4.1. Descriptive statistics of variables

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Table 2: Descriptive statistics for variables over the period 1990 - 2021

Variables	Minimum	Maximum	Average	Median	Standard deviation
LN Real gross domestic product	22.12787	23.55483	22.84218	22.88932	0.439507
LN Gross domestic product of the agricultural sector	20.45782	22.85858	21.55910	21.43558	0.787845
LN Gross Domestic Product of the industrial sector	20.31682	21.96603	21.28274	21.52283	0.532838
LN Gross domestic product of the service sector	21.13940	22.60047	21.81815	21.77959	0.468276
LN Bank credit to the private sector as a % of GDP	1.987874	3.273364	2.775934	2.714607	0.331976
Money supply as % of GDP	17.10000	36.40000	23.97813	23.05000	4.669443
LN Gross fixed capital formation	2.401805	3.187858	2.905767	2.957039	0.196052
Political stability	-2.726415	0.577491	-0.434217	0.235418	1.135388
Agricultural modern	1.141030	10.66408	4.037125	2.657178	2.736844
Rainfall	250.9900	391.6840	320.2961	323.4065	29.68208

Source: Authors

From the results in Table 2 above, we can generally see that the selected variables have low standard deviations. This shows that the majority of observations taken by the variables are less dispersed around their mean values. We can also see that the mean values are roughly equal to the median values. This shows that extreme values have little influence on the mean levels of the variables.

4.2. Variable stationarity

Table 3: Augmented Dickey-Fuller (ADF) stationarity test

Variables	In level	In difference 1st	Order of integration
LN Real gross domestic product	0.516924	-3.7584***	I(1)
LN Gross domestic product of the agricultural sector	0.871114	-4.1979***	I(1)
LN Gross Domestic Product of the industrial sector	-1.150763	-3.1906**	I(1)
LN Gross domestic product of the service sector	1.120086	-5.0898***	I(1)
LN Bank credit to the private sector as a % of GDP	-0.755280	-5.2851***	I(1)
Money supply as % of GDP	-0.299599	-4.1500***	I(1)
LN Gross fixed capital formation	-7.340341***		I(0)
Political stability	0.634419	-3.3202**	I(1)
Agricultural modern	-3.50241**		I(0)
Rainfall	-3.60847**		I(0)
Asymptomatic critical values			
1% level	-3.670170	-3.679322	
5% level	-2.963972	-2.967767	
10% level	-2.621007	-2.622989	

Source: Authors
NB: Conventional thresholds: 1% =***, 5% = **, 10% = *.

According to the unit root test (ADF), the results presented in the table above combine series integrated at level I (0) and at first difference I(1). None of the series studied is integrated of order 2. Given this arrangement, it is therefore possible to estimate an ARDL model.

4.3. Test de cointégration aux bornes

Le test de cointégration ou le Bounds test est le test d'existence de relation de long terme entre les variables. Le rejet de l'hypothèse nulle de la non-existence de cette relation sera appliqué lorsque le F-Statistic excède la valeur critique de la borne supérieure I (1) avec un seuil significatif de 5%.

Tableau 4: Test de cointégration aux bornes pour les quatre modèles

Estimated model	**F-stastic**	**Critical values à 5%**	
		I(0)	**I(1)**
Model 1 (agricultural sector)	7.599011	3.47	4.57
Model 2 (industrial sector)	15.40041	3.47	4.57
Model 3 (commercial sector)	8.900750	3.47	4.57
Model 4 (Global economy)	23.34901	3.47	4.57

Source: Authors

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According to this table, the Fisher statistics are above the critical upper bound values. There is therefore a cointegrating relationship between each model's GDP and its explanatory variables.

4.4. Short-term dynamics

Table 5: Estimation results for short-term ARDL models

Variables	**agricultural sector**	**industrial sector**	**commercial sector**	**Global economy**
D (**Political stability**)	//		0.045***	0.063***
LN D (**Bank credit to the private sector as a % of GDP**)	-0.456***	0.344***	0.085**	-0.069***
LN D (**Gross fixed capital formation**)	//	-0.298***	-0.099**	-0.068**
D (**Money supply as % of GDP**)	-0.027***	-0.016***	0.007**	0.005***
D(**Rainfall**)	0.002***	//	//	//
Agricultural modern	-0.083**	//	//	//
Cointegration equation (-1)*	-0.925***	-0.329***	-0.294***	-1.679***

Source: Authors

Significance level: ***= 1% ; **= 5% ; *=10%

After estimation, the results show that in the short term all the selected variables are significant. Rainfall has a positive and significant effect on agricultural sector growth, while bank credit to the private sector, money supply and agricultural modernization are negative and significant. In addition, bank credit to the private sector has a positive and significant effect on industrial GDP. Gross fixed capital formation and money supply, on the other hand, have a negative impact on industrial sector growth. On the other hand, bank credit to the private sector, political stability and money supply have a positive and significant impact on service sector GDP, while gross fixed capital formation has a negative effect on the service sector. As for the overall economy, the explanatory variables political stability and money supply are positive and significant, but bank credit to the private sector and gross fixed capital formation have a negative and significant effect on the overall economy.

In addition, the CointEq (-1) terms correspond to the one-period lagged residual from the equilibrium equation. Its estimated coefficients are negative and highly significant. This, while validating the error-correction representation, indicates the convergence of series trajectories towards the long-term target.

4.5. Long-term dynamics

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Table 6: Estimation results for long-term ARDL models

Variables	agricultural sector	industrial sector	commercial sector	Global economy
Political stability	//	-0.287677***	-0.021483	0.062207***
LN **Bank credit to the private sector as a % of GDP**	-1.448381***	1.046452***	1.055633**	0.109695***
LN **Gross fixed capital formation**	//	3.884871***	2.724641**	0.092923***
Money supply as % of GDP	0.019699	0.092861***	0.079089**	0.092923
Rainfall	0.015993**			
Agricultural modern	-0.016715			

Source: Authors

Significance level: ***= 1% ; **= 5% ; *=10%

- Commentary on long-term results for the agricultural sector

Long-term dynamic results in the agricultural sector show that bank credit granted to the private sector has a negative and significant effect at the 1% threshold on growth in the agricultural sector. This negative sign is not surprising in the Malian case. Indeed, farmers are the ones who benefit least from bank financing, as access to agricultural credit is very low in Mali due to the insufficient involvement of banks in financing agricultural investments. In fact, this lack of access to agricultural credit may be linked to the fact that most farmers, often the smallest, cannot benefit from loans due to their lack of deeds of ownership or enjoyment presented as a guarantee to banks, or because they do not possess other guarantees to offer as mortgages. On the other hand, banks are linked to this problem because they impose very high transaction rates that farmers cannot bear (Mokrani 2020). As shown in the table above, the performance of the agricultural sector remains dependent on rainfall conditions. Indeed, a 1% increase in rainfall leads to a 0.015993% increase in agricultural GDP, all else being equal. This result is in line with those of Sow et al (2020), who focus on the case of Senegal and show that good rainfall has a positive and significant impact on agricultural GDP.

- Commentary on long-term results for the industrial sec

Long-term results show that bank credit granted to the private sector has a positive and significant impact on industrial sector growth. This result supports that of Lo and Ramde (2019), who conduct a study on the relationship between financial sector development and industrialization in African Franc zone economies, and the results show that bank credit allocated to the private sector has a positive effect on the manufacturing sector. The results show that money supply and gross fixed capital formation play in favor of the industrial sector. This result is eagerly awaited, as investment helps to increase the capital stock and is known to be one of the essential means of generating a rise in productivity. However, political stability has a negative and significant effect on industrial sector growth, this result may be due to the fact that political

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and social demands turn into strikes and demonstrations that disrupt business activity and force entrepreneurs to move or even leave the country (Makrem and Faycel, 2018).

- Commentary on long-term results in the service sector

In the service sector, long-term results show that bank credit granted to the private sector increases growth in the service sector. Our results show that, in Mali, it is the service sector that benefits most from bank financing, since a one-point increase in bank credit to the private sector leads to a 1.055633 increase in service GDP. This positive effect of access to bank credit on services GDP confirms the World Bank's assertion that, the sector benefiting from the largest banking sector commitments in Mali is trade and services (World Bank, 2015). In addition, money supply and gross fixed capital formation produce positive and significant effects on services GDP.

- Commentary on long-term results for the global economy

At the level of the overall economy, the long-term results show that all the variables selected, namely bank credit granted to the private sector, gross fixed capital formation and political stability, have a positive and significant effect on real GDP growth, with the exception of the money supply, which has no significant effect on real GDP. In fact, the positive effect of bank credit on overall growth is much expected, since according to Schumpeter's theory of economic evolution (1911), credit and banking occupy a central place in economic theory, so without credit no evolution is possible, and conversely the credit necessary for evolution is not necessary for a static economy. Empirically, this result supports that of Sekali (2018), who uses an ARDL model to show that bank credit has a positive and significant impact on economic growth in Morocco. The positive effect of political stability is quite normal, as all countries, developed or developing, benefit from political stability, especially when the principles of democracy are respected and applied. This result supports the findings of Ondoa (2013), who uses a dynamic panel model to show that political stability has a positive influence on economic growth in Africa. As for gross capital formation, its positive sign is eagerly awaited. Investment helps companies to expand, creates jobs, stimulates economic growth and leads to innovation. This same sign was found by Okombi (2018), who through a VAR model shows that gross fixed capital formation plays a decisive role in the economic growth process in Congo.

4.6 Robustness test

The CUSUM test is based on the sum of residuals. It represents the curve of the cumulative sum of residuals together with 5% of the critical lines. Thus, the model parameters are unstable if the curve lies outside the critical zone between the two critical lines, and stable if the curve lies between the two critical lines. The same procedure is used to perform the CUSUM squared test, which is based on the sum of squared residuals.

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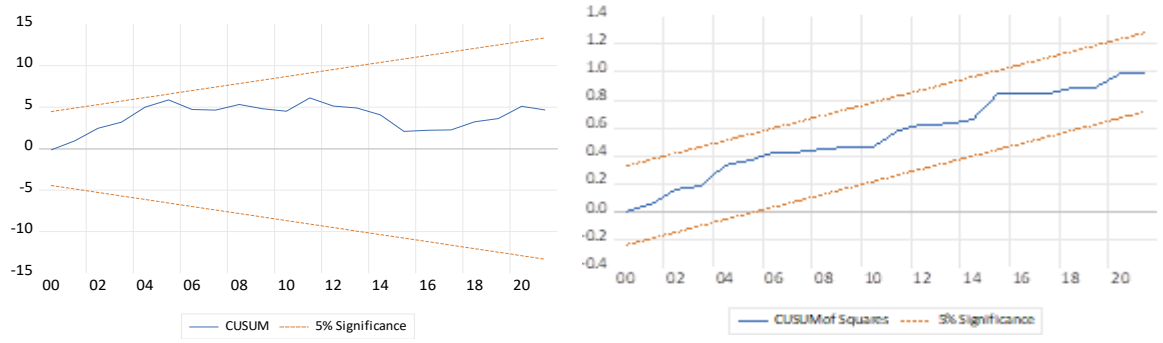
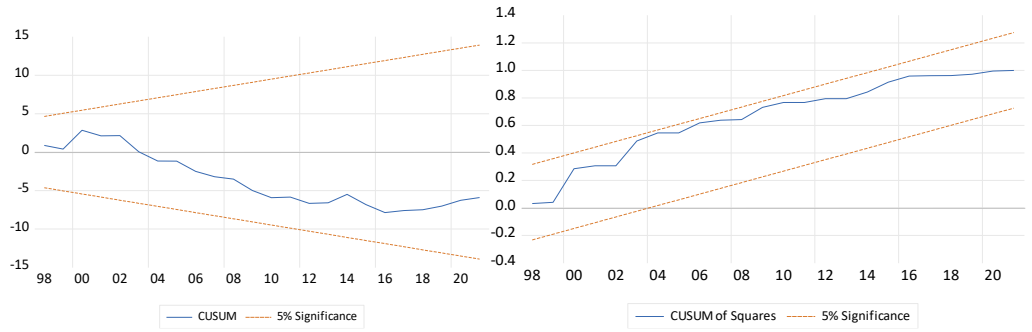
Figure 1: CUSUM and CUSUM squared tests for model 1 (agricultural sector)



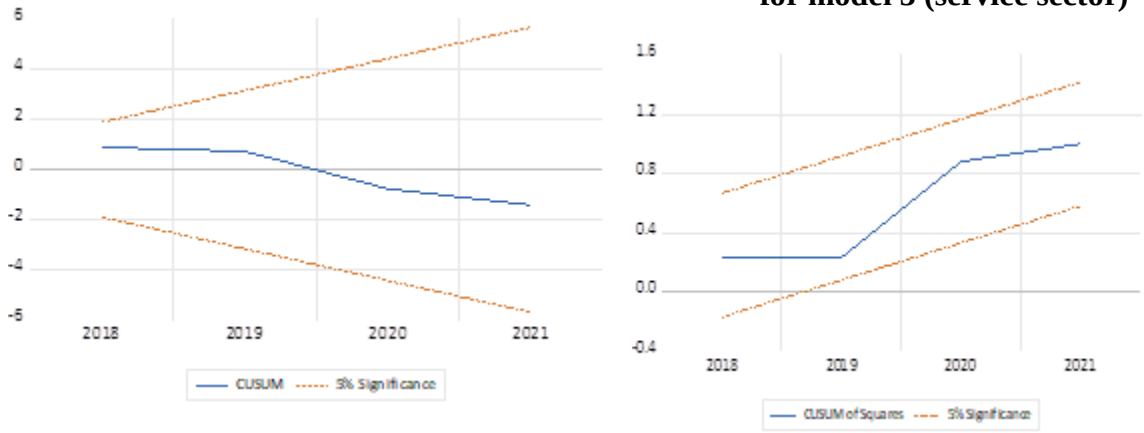
Source: authors

Figure 2: CUSUM and CUSUM squared test for model 2 (industrial sector)



Source: authors

Figure 3: CUSUM and CUSUM squared test for model 3 (service sector)



Source: authors

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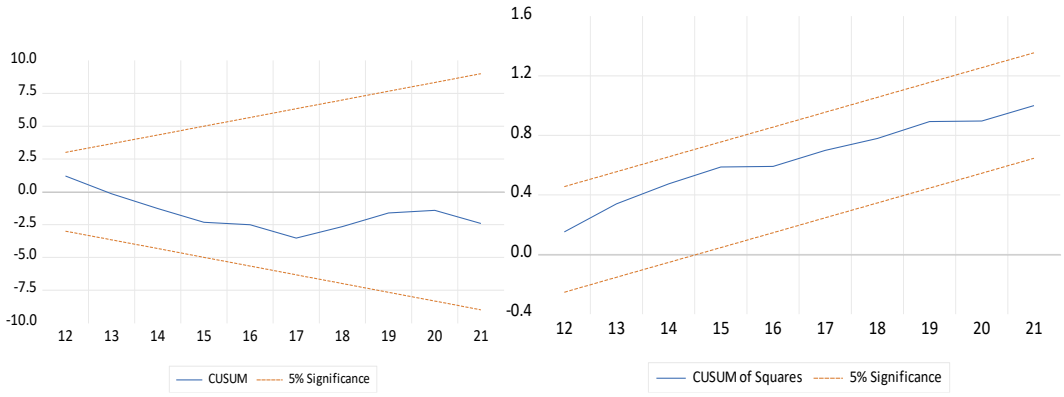
Figure 4: CUSUM and CUSUM squared test for model 4 (global economy)



Source: authors

Based on the graphs above, the CUSUM and CUSUM of Squares test results show that the estimated models are stable (as the curve does not leave the dotted corridor). So the coefficients are stable over time. In sum, the results of the various diagnostic tests have led to the validation of our models ARDL_1 (1,4,4,2,4), ARDL_2 (3,1,0,3,2), ARDL_3 (4,4,4,3,4) and ARDL_4 (1,3,3,3,3) respectively for the agricultural, industrial, service and overall economy sectors on a statistical level.

5. Conclusion

The aim of this research was to show the effect of access to bank credit on economic growth in Mali, while carrying out a sector-by-sector analysis of the Malian economy. To achieve this, we adopted a methodology based on the analysis of variables through the ARDL model over the period 1990 to 2021.

The literature review enabled us to establish that access to bank credit always has a positive effect on growth, but it can have a negative effect on growth if credit is not granted sufficiently.

The econometric results show that access to bank credit has a positive and significant effect on overall growth in Mali in the long term. This result is eagerly awaited, as it confirms Schumpeter's theory (1935) that access to credit enables the entrepreneur to access the means of production needed to carry out his project, and thus pushes the economic system towards new channels of evolution.

Specifically, access to bank credit has a negative and significant effect on short- and long-term growth in the agricultural sector. This result may be due to the fact that farmers find it difficult to access bank financing, because for banks, financing agricultural projects is very risky, since success in this sector depends on rainfall variation. Furthermore, bank credit granted to the private sector has a positive and significant effect in the short and long term on growth in the industrial and service sectors. It should be noted that, in Mali, it is the service sector that benefits

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most from bank financing. As for the industrial sector, although its link with access to bank credit is positive, only a restricted range of this sector has easy access to bank financing, namely the manufacturing industry, while the extractive industry suffers from the problem of bank financing.

The conclusions drawn from the analysis of the results of the model estimations enable us to verify our hypotheses:

- Access to bank credit has a positive effect on economic growth in Mali.
- Access to bank credit has a positive impact on growth in the agricultural sector: This hypothesis has not been verified, as bank credit does not improve growth in the agricultural sector.
- Access to bank credit has a positive impact on growth in the industrial sector.
- Access to bank credit promotes growth in the service sector

On the basis of these results, recommendations for economic policy can be formulated. According to our results, there is a negative link between bank financing and agricultural growth, despite the fact that the country's economy is heavily dominated by agriculture. We therefore recommend that policy-makers set up a banking development system through the geographical deployment of bank branches, particularly in rural areas, and also by improving the penetration of banking services such as access to financing by farmers. As the country's economy is strongly dominated by agriculture, an increase in financing could help to cover the enormous agropastoral potential.

Banking development must also be based on education in banking culture, particularly in rural areas. Products must be affordable, adapted and appropriate to the needs of very poor rural populations. Poverty reduction policies are also needed to increase the use of formal financial services, since one of the reasons for Mali's low rate of bank penetration is low income.

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