
Access to Inclusive Financial Services in Gabon

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Abstract

The objective of this article is to highlight, based on an empirical model, the impact of inclusive financial services as a means of improving individual well-being and integration into economic and social activity in Gabon. The results estimated by Fully Modified Ordinary Least Squares (FMOLS) reveal that economic growth has a negative effect on the provision of inclusive financial services, but this correlation is only significant in the short term. Inflation and public spending have a negative effect, in both the short and long term, on financial inclusion, while bank credit granted to the private sector and households has a positive influence in both periods. At several levels of robustness control, through the estimation of DOLS and ARDL models to accurately capture the influence of the determinants of the supply of inclusive financial services in Gabon, we observe that the DOLS and ARDL results are consistent with the baseline results. These results imply that financial development undeniably contributes to accelerating growth and lifting vulnerable economic agents out of poverty traps. The relevant institutions and/or authorities must ensure the stability of the financial system and the dynamics of inclusion, given that the correlation between financial intermediation and people's well-being depends on their level of financial inclusion.

Keywords: Inclusive financial services, microcredit, Gabonese economy, public development policies, poverty, FMOLS.

1. Introduction

The search for relevant solutions that contribute to reducing the vulnerabilities of households in transition countries in the face of social risks and economic shocks in a financialized environment (Reardon et al., 2001; Barrett et al., 2001; De Olloqui et al., 2015; Gabbas et al., 2017) remains fundamentally about establishing public development policies focused on market inclusion as a key investment for healthy and sustainable economic growth (Morvant-Roux et al., 2010; Sarma and Pais, 2011; IMF, 2015; Langevin, 2016; World Bank, 2021).

Indeed, promoting market inclusion as a development lever in an international context highlights a paradox in Gabon. According to data from UNDP and BEAC (UNDP, 2023; BEAC, 2023) on the Human Development Index (HDI), the Gabonese economy ranks 123rd out of 193 countries, and despite the low level of financial literacy among the population, the expanded banking rate exceeds 35%, with overall financial inclusion increasing to 45%. Indeed, as an upper-middle-income country with a dynamic banking sector, a large portion of the Gabonese population remains excluded from formal financial services. Furthermore, the development of mobile money and microfinance opens up opportunities, while access to inclusive financial services is still limited by socio-economic, geographical, and institutional constraints (BEAC, 2023). Understanding the main catalysts for access to inclusive financial services in Gabon is essential for strengthening public development policies and promoting healthy, more equitable growth for low-income populations and small and medium-sized enterprises, particularly through the promotion of the national financial inclusion strategy (BEAC, 2019, 2023).

The concept of inclusive finance¹ is generally defined as permanent equitable access for populations to a diverse range of appropriate financial products and services at affordable costs, used effectively, efficiently and efficiently. It is based on the complementarity of different financial inclusion mechanisms with the ultimate goal of increasing access to financial services² (Demirguç-Kunt and Levine, 2008; Demirguç-Kunt and al., 2012; World Bank, 2014; Zins and Weill, 2016; Barajas and al., 2017). This concept, which is well established in economic literature, is generally adopted as a strategy for the economic and social inclusion of people living in multidimensional poverty (World Bank, 2014; Duflo and Banerjee, 2019; Mbaye, 2023).

In this regard, two concerns regarding access to inclusive financial services arise: one that analyzes the effects of financial inclusion on activity, on the one hand, and one that discusses the role of the state in supporting people vulnerable to social risks, on the other hand. The first problem, which is much more contentious, highlights two main effects: microeconomic effects, on the one hand, and macroeconomic effects, on the other hand (Cull et al., 2014; Barajas, 2015; Barajas et al., 2017). As for the microeconomic effects, access to microcredit is beneficial for households and businesses because it allows the most disadvantaged to diversify their income, smooth their consumption, build, accumulate financial assets, and increase their economic opportunities through better access to credit and other types of financing through a better allocation of capital (Beck and De la Torre, 2004; Boyé et al., 2006; Ashcroft, 2008; Sahay et al., 2015a; Allen et al., 2016; Ogunleye, 2017; Barajas et al., 2017).

¹ Inclusive finance therefore refers to permanent, equitable access for populations to a diverse range of appropriate financial products and services at affordable costs, used effectively, efficiently and efficiently. It is based on the complementarity of various financial inclusion mechanisms, the most recent of which is mobile banking¹ (Demirguç-Kunt and Levine, 2008; Demirguç-Kunt et al., 2012; Zins and Weill, 2016; Barajas et al., 2017).

² These include deposits, loans and insurance, with the aim of substantially reducing poverty, both directly and indirectly through improved economic growth

Regarding macroeconomic effects, access to inclusive financial services contributes to a culture of savings, the deepening of the financial system, the reduction of the size of the informal sector, and the increase in the impact of monetary and financial variables on the real sector (Toolsema and Schoonbeek, 1999; Peria et al., 2012). Indeed, by offering households, once included in the financial system, the opportunity to transform their savings and hoarding into bank deposits, financial inclusion is a tool for improving the effectiveness of monetary policies, financial stability, growth financing, and thus development, as it facilitates the integration of small savers into formal bank deposits (Geda et al., 2006; Beck et al., 2007; Aglietta, 2008; Han and Melecky, 2013; Mehrotra and Yetman, 2014).

The second issue, on the other hand, concerns the new consensus given to market logics considering the possibility of a more direct presence of the State in certain economic sectors that include a social component (Campbell, 1997; Lévesque, 2003; Johnson and Arnold, 2012; Ehrbech, 2012; Demirgüç-Kunt et al., 2015; Moya, 2017). Pessimists (World Bank, 1989; Duflos and Imboden, 2004; Balkenhol and Guérin, 2002; Boyer, 2004) and optimists (World Bank, 1997; Campbell, 1997; Guérin, 2002; Lévesque, 2003; CGAP, 2012; Morvant-Roux and Fouillet, 2015) fuel the debate. Regarding the pessimists, they are wary of public intervention in the inclusive finance market because, on the one hand, encouraging the unemployed and other marginalized individuals to engage in entrepreneurial activities can amplify underemployment (Balkenhol and Guérin, 2002), and on the other hand, subsidizing business creation, even for the unemployed, can cause market distortion detrimental to economic activity (Boyer, 2004).

Conversely, according to the optimists, a State presence is relevant as it allows expanding the share of the population covered and reducing debt costs that burden the most vulnerable groups (Morvant-Roux et al., 2010). In this sense, public financial inclusion policies can be interpreted as contributing to a process of extending the legitimacy of the State in areas or toward populations that are marginalized and poorly controlled. Indeed, by significantly reducing transaction costs and promoting access for the largest number of people to financial services, financial innovation gives rise to new private business models that contribute to the realization of other development priorities. Furthermore, due to the significant savings that their use makes possible, many governments choose to use electronic means to make these payments, as this allows them to better target beneficiaries and reduce transaction costs. Thus, financial inclusion policies constitute an important factor in poverty reduction, a key pillar of economic policy, and an end in itself of financial policy (Allen, Demirgüç-Kunt, Klapper, and Periac, 2016; Alkire et al., 2017; Zhang and Posso, 2019; Ozili, 2020).

This reflection, which is based on the Gabonese economy, a member of the Economic and Monetary Community of Central Africa (CEMAC), aims to analyze the effect of economic growth on the supply of inclusive financial services. Indeed, since money is effectively the only financing lever, and due to political, health, and economic uncertainties, the Gabonese economy appears very vulnerable, and the fear of a liquidity trap (Nkoulou Nkoulou, 2021) justifies this study, notably because of the fact that : 1) currently including several first- and second-category microfinance institutions, licensed MFIs in Gabon are increasingly tending to expand into rural

areas (Obiang Obiang, 2022) ; 2) similar to other CEMAC member countries, the Gabonese economy is characterized by dual financial intermediation due to banking institutions on one hand, and microfinance institutions on the other, the latter gradually becoming essential channels not only for combating poverty but also for achieving sound, sustainable, and inclusive financial inclusion.

As a result, in light of the paradox of market inclusion in Gabon coupled with the aforementioned theoretical foundations, we hypothesize that the sub-optimality related to macroeconomic shocks in the supply of inclusive financial services in Gabon negatively affects economic growth. This article is structured around the following sections. The literature review is presented in Section 2. The empirical analysis of the effect of economic growth on the supply of inclusive financial services is presented in Section 3. Section 4 presents and interprets the results. Section 5 is devoted to the conclusion and recommendations.

2. Literature Review

The question of access to inclusive financial service offerings has generated much debate regarding the impact of financial inclusion on economic growth, financial development, and social and economic inclusion (Savall et al., 2015). This is particularly justified because, due to its potential to reduce poverty, the inclusive finance market acts as a catalyst for economic growth in developing countries, as it allows for increased access to basic financial services and higher levels of investment at lower costs, in a safer manner, and accessible to excluded individuals, through two main channels, namely the mobilization of savings and credit (Kikulwe, Fischer, and Qaim, 2014; Allen et al., 2016; Alkire et al., 2017; Ogunleye, 2017; Ozili, 2020; Vo, Nguyen, and Van, 2021).

Empirically, it appears that financial services have a positive impact on the activity of individual businesses, household consumption, and welfare (Bauchet et al., 2011). The effects vary depending on the type of financial product, specifically credit, savings, insurance, and money transfers via mobile money. Studies focused on credit yield mixed results regarding the impact of microcredit on household welfare in the short term, particularly in terms of increasing consumption or income for poor families (Banerjee, Duflo, Glennerster, and Kinnan, 2010 and 2013; Crépon, Devoto, Duflo, and Parienté, 2011; Karlan and Zinman, 2011; Angelucci, Karlan, and Zinman, 2013). Banerjee, Duflo, Glennerster, and Kinnan (2013), following a study conducted in Hyderabad, found that access to the first microloan resulted in no subsequent improvement in long-term welfare. However, in Mongolia, the study by Attanasio et al., (2011) concluded that group loans had a strong impact on food consumption, resulting in more and higher-quality food. Karlan and Zinman (2010) concluded that borrowers experienced greater welfare but were more exposed to stress in a study conducted in South Africa, which investigated the expansion of access to consumer credit. Angelucci, Karlan, and Zinman (2013), following a study of Banco Compartamos borrowers in Mexico, generally present a positive picture of the average impact on welfare from better access to credit. Attanasio et al., (2011), Augsburg, de Haas, Harmgart, and Meghir (2012), concluded that microcredit stimulates business creation and provides entrepreneurs with investment opportunities to start or develop activities of existing

microenterprises in Mongolia and Bosnia. Positive effects have been demonstrated on the turnover of existing businesses in India, the Philippines, and Mongolia, the size of enterprises in Mexico, as well as the extent of agricultural activities and livestock diversification in Morocco. Additionally, access to microcredit has strengthened the ability of microentrepreneurs to cope with risks, particularly in the Philippines and Mexico. Studies focused on the impact of savings all yield positive results. In Kenya, Dupas and Robinson (2013a) found that access to a new locked savings service allows market women to mitigate the consequences of health shocks and increase investment in food expenditures. Another study in Kenya on the impact of simple and informal health savings products concluded that health savings increased, along with very high uptake rates (Dupas and Robinson, 2013b). This study highlights the important role of health savings and preventive investments in reducing the vulnerability of poor families to health shocks. Brune, Giné, Goldberg, and Yang (2013) show positive effects of locked savings on business investment as well as increased spending and agricultural production in Malawi.

According to Ashraf, Karlan, and Yin (2010), access to locked savings accounts has a positive impact on women's empowerment in the Philippines. However, recent studies conducted in India and Ghana on insurance concluded a strong positive impact on farmers, as the prospect of better yields encourages them to switch from subsistence crops to riskier but more profitable crops (Cole et al., 2013; Karlan, Osei-Akoto, Osei, and Udry, 2014). In Kenya, Janzen and Carter (2013) found that this type of insurance is an effective protection against the effects of natural disasters; for instance, when faced with extreme drought, farmers had to sell fewer assets, skipped fewer meals, and were less dependent on food aid or other forms of assistance. Vulnerability to risk and the lack of instruments to effectively cope with external shocks prevent the poor from improving their situation. They suggest that microinsurance can serve as a valuable risk mitigation mechanism. Nevertheless, even when insurance is offered for free, demand and subscription rates are extremely low. Key obstacles, particularly lack of trust and liquidity constraints, must be overcome for microinsurance to fully benefit the poor (Matul, Dalal, De Bock, and Gelade, 2013).

Jack and Suri (2014) examined, using non-experimental panel data, the impact of reduced transaction costs via mobile phones on risk sharing in Kenya. The results show that users of the M-PESA service are able to cope with the effects of severe shocks (serious illness, job loss, livestock losses, poor harvests, or bankruptcy) without reducing household consumption, thereby strengthening risk sharing among friends and family. The analysis by Kim et al. (2017) on a sample of 55 countries from the Organisation of Islamic Cooperation (OIC) during the period 1990-2013 revealed a positive correlation between financial inclusion and economic growth. The results also concluded that a high level of financial inclusion is a key element in stimulating growth. Furthermore, Kim's study (2004-2011) on European Union and OECD countries also confirmed the positive impact of financial inclusion on growth. Additionally, Harley et al. (2017) determined that bank branches play an important role in economic growth and poverty reduction in developing countries.

According to the 2012 report of the International Monetary Fund (IMF), exclusion from the formal financial sector and a lack of banking products can lead to poverty among the most vulnerable populations. Financial inclusion can increase individuals' incomes, reduce poverty, and stimulate job creation (Pearce, 2011; Park and Mercado, 2015). Access to formal financial services such as savings accounts, credit, insurance, and payment services can improve the lives of people and businesses by allowing them to take advantage of business opportunities, invest in education, save for retirement, and protect themselves against risks (Demirgüç-Kunt et al., 2008). According to the World Bank (2018), financial inclusion plays an important role in reducing poverty and economic development. It enables low-income individuals to meet their needs through the formal financial system, diversify their sources of income, and develop a strong savings culture (Sarma, 2008). The study by Abor et al. (2018), through a survey of a large sample of households in Ghana, revealed that financial inclusion can significantly reduce the likelihood of poverty and increase per capita consumption. A recent study by Sethi and Acharyaa (2018) across 31 countries reached the same conclusions. Abor et al. (2018) examined the effect of financial inclusion on inclusive growth in Ghana using a survey of a large sample of households. They found that financial inclusion significantly reduces the chances of a household falling into poverty and increases household per capita consumption. Cabeza-Garcia et al. (2019) studied the impact of women's financial inclusion on inclusive economic development and found that increasing women's financial inclusion positively affects inclusive growth.

In view of the extensive literature, within the framework of this study, the specifications we use to verify the catalytic effect of access to inclusive financial services on economic growth and to model the financial inclusion index on the growth rate and control variables are based on Sarma's (2008, 2015) methodology. This index has the advantage of highlighting an empirical relationship between the level of development and market inclusion by taking into account the accessibility, availability, and usage of financial services. In measuring the effects of control variables on financial inclusion, we draw inspiration from the methodology based on the Fully Modified Ordinary Least Squares (FMOLS) error-correction method. Although the specifications of the aforementioned authors differ from ours in terms of variable choices, there is some similarity in the form adopted.

3. Methodology

This methodology focuses on analyzing the effect of economic growth on the provision of inclusive financial services in Gabon. The theoretical analysis leads to estimating an equation in which we regress the financial inclusion index on the real GDP growth rate and other control variables using FMOLS (Phillips and Moon, 1999).

3.1. The Model

Consider the following basic model:

$$If_t = \alpha_0 + \alpha_1 Pib_t + \beta X_t + \varepsilon_t \quad (1)$$

If represents the explained variable denoting financial inclusion.

Where : *Pib* is the variable of interest measured by the real GDP growth rate ; X is the matrix of control variables ; α and β are the parameters to be estimated; ε is the innovation term (errors) and the year t. Specified for estimation purposes, model (1) is modified to incorporate all control variables, expanding the model with the domestic credit variable, and takes the following linear form:

$$If_t = \alpha_0 + \alpha_1 Pib_t + \alpha_2 Inf_t + \alpha_3 Inv_t + \alpha_4 Com_t + \alpha_5 Dep_t + \alpha_6 Cred_t + \varepsilon_t \quad (2)$$

Where, the control variables : *Inf* represents the inflation rate, which indicates the change in the consumer price index, *Inv* refers to investment measured by gross fixed capital formation (% GDP), *Com* represents trade (exchange) measured by the weight of exports and imports of goods (% GDP), *Dep* refers to public expenditure measured by final consumption expenditure of general government (% GDP), *Cred* represents domestic credit granted to the private sector by banks (% GDP). The empirical measurement of the financial inclusion index is carried out by calculating the index according to the methodology of Sarma (2008, 2015), which determines a financial inclusion index based on the following three (3) dimensions: accessibility³ , availability⁴ and usage⁵ . The first step is to calculate the sub-indices according to the dimensions mentioned.

These sub-indices take the following form :

$$d_i = \omega_i \times \frac{A_i - Min_i}{Max_i - Min_i} \quad (3)$$

With: d_i , the sub-index linked to each of the dimensions of financial inclusion, $i = \{1, 2 \text{ et } 3\}$ et $0 \leq d_i \leq 1$; A_i , the current value of variable i ; Max_i , the maximum value of variable i ; Min_i , the minimum value of variable i . Since several variables can be used to calculate a dimension, the dimension index is obtained by taking the geometric mean of the indices of these variables. These three dimensions then provide a three-dimensional Cartesian space (J_i, S_i, C_i) . J_i refers to the index of the financial sector's accessibility or penetration; S_i refers to the index of availability; and C_i refers to the index of usage. However, by introducing the number of ATMs per 100,000 adults, Sarma et al. (2011) recommend that for the "use" dimension, a weight ($\omega(i)$) of 1/3 and 2/3 ($0 \leq \omega(i) \leq 1$) should be assigned to ATMs, particularly for commercial branches. The financial inclusion index is then calculated by the normalised inverse of the Euclidean distance between the ideal situation in Cartesian space (J_i, S_i, C_i) , i.e. (1,1,1), and the least ideal situation, i.e. (0,0,0). Under these conditions, if the index is very close to unity, financial inclusion is strong, and if the index is very close to zero, financial inclusion is weak. The second step then focuses on determining the financial inclusion index according to the following formula:

³ This is a set of indicators that can be used to assess access to financial services in an economy, including, but not limited to, the number of deposit accounts at commercial banks per 1,000 adults and the number of credit accounts at commercial banks per 1,000 adults.

⁴ Refers to the number of branches of financial institutions. Examples include the number of commercial bank branches per 100,000 adults, the number of microfinance institution branches per 100,000 adults, and the number of ATMs per 100,000 adults.

⁵ This dimension of financial inclusion is a measure of the population's demand for financial services. The FAS database contains the volume of credit as a percentage of gross domestic product (GDP) and the volume of deposits as a percentage of GDP.

$$If_i = 1 - \sqrt{\frac{(1 - J_i)^2 + (1 - S_i)^2 + (1 - C_i)^2}{3}} \quad (4)$$

Where: If is the financial inclusion index, $0 \leq If \leq 1$. In short, the index is average if $0.3 \leq If \leq 0.5$, high if $0.5 \leq If \leq 1$, and low if $0 \leq If \leq 0.3$; $0 \leq J_i, S_i, C_i \leq 1$. The If index is determined on the basis of the three (3) dimensions mentioned above, namely accessibility, availability and utilisation, in accordance with the literature (Sarma, 2008; Ngono, 2020). By hypothesis, when examining the impact of long-term endogeneity biases on the estimates of model (2) using the Ordinary Least Squares (OLS) method of the parameters of a cointegration relationship, we use a model based on the Fully Modified Ordinary Least Squares (FMOLS) error correction method.

3.2. Data

Taking Gabon as the study framework, the entire dataset of explanatory variables (interest and control) of the model comes from the World Bank database (2023). The data used to construct the financial inclusion index come from two sources: the Central African States Bank (BEAC) database (2023) and the Financial Access Survey (2023). The study period spans from 2007 to 2023 due to difficulties in accessing the total population banked rate and the absence of data over a longer period. Due to a short observation period and to address the degrees of freedom problem, the data were quarterly from the first quarter of 2007 to the fourth quarter of 2023 using Denton's (1971) method. Focused on the least squares method, Denton et al.'s (1971), or Denton's proportional method, is a econometric quarterly disaggregation technique that adjusts low-frequency annual data series to match high-frequency quarterly data while respecting the constraint of final annual aggregates. This method adjusts the preliminary distribution so that it perfectly fits the final annual data, aiming to make the resulting quarterly series as smooth and regular as possible by minimizing deviations between successive quarterly values and the mean ratios of the annual indicator. Additionally, Gabon being a country sensitive to economic shocks, this period is considered very strategic as it covers equally the periods before and after the 2008-2009 global financial crises, the oil price shock of 2013-2014, the impact of the Covid-19 pandemic from 2019-2021, and the shocks related to the economic consequences of the Russo-Ukrainian conflict on global activity.

3.3. Analysis Method

a. Endogeneity Test

One of the assumptions of the Ordinary Least Squares (OLS) method is that the explanatory variables should not be correlated with the model's error term. Endogeneity means that the explanatory variable is correlated with the error term, which can lead to bias in the estimates of the model's regression coefficients. Considering this impact, the Modified or Fully Modified Ordinary Least Squares method may be preferred to correct for this bias. To this end, we first apply the Hausman endogeneity test in its Nakamura (1981) version to test for the existence of simultaneity bias related to the lack of orthogonality between these different explanatory variables and the residual obtained by the OLS method. The endogeneity test is carried out using

the Two-Stage Least Squares (2SLS) method in comparison to the OLS estimates, as confirmed by the Hausman test.

b. Unit Root Test of Time Series

Empirical work often begins with an analysis of the stationarity of the considered time series using various unit root tests. In a multivariate context, studies often aim to highlight long-term equilibrium relationship between the variables through the application of cointegration tests. In the context of this study, we use the Augmented Dickey-Fuller (ADF) test on all our variables to see if they are stationary. The interest of the Augmented Dickey-Fuller (1981) test compared to the Simple Dickey-Fuller (1979) test (which requires the error term to be white noise) lies in the fact that it allows the test to be conducted without requiring the error term to be white noise and it allows for accounting for potential autocorrelation in the residuals of the models used. The Augmented Dickey-Fuller test is based on three models, which are :

$$\text{Modèle1: } \Delta y_t = \rho y_{t-1} + \sum_{j=2}^p \phi_j \Delta y_{t-j+1} + \varepsilon_t$$

$$\text{Modèle2: } \Delta y_t = \rho x_{t-1} + \sum_{j=2}^p \phi_j \Delta x_{t-j+1} + c + \varepsilon_t \text{ avec } \varepsilon_t \sim iid(0, \sigma^2)$$

$$\text{Modèle3: } \Delta y_t = \rho x_{t-1} + \sum_{j=2}^p \phi_j \Delta x_{t-j+1} + c + bt + \varepsilon_t$$

All three models aim to test the hypothesis of the presence of a unit root, which is the following null hypothesis: $H_0: \rho = 0$. However, we not only want to test for the presence of a unit root, but also to distinguish whether a series is non-stationary if it is a DS (Difference Stationary) process or a TS (Trend Stationary) process, in order to apply an appropriate stationarization method when necessary. To accept or reject the null hypothesis H_0 , we compare the p-value of the test against a risk of error α equal to 1%, 5%, or 10%. When the p-value is higher than the set risk of error, the null hypothesis H_0 of the presence of a unit root is accepted, meaning that the variable considered is not stationary. Otherwise, the variable is stationary. We also use the Phillips-Perron (PP) test (1988), which is a non-parametric adaptation of the Dickey-Fuller test.

c. Cointegration test

In this section, we perform Johansen's cointegration test to examine the existence of cointegration between the corresponding variables. However, before performing Johansen's cointegration test, it is very important to determine the optimal number of lags to consider. To do this, we use the FPE (Final Prediction Error), AIC (Aikake information criterion), SC (Schwarz information criterion) and HQ (Hannan-Quinn information criterion) criteria are used. To perform the cointegration test, we can use either the trace test or the maximum eigenvalue test.

The hypotheses for these tests are as follows: " H_0 : there are at most r cointegration vectors vs H_1 : there are at least r cointegration vectors". That is, we accept $H(0)$ when the test statistic is less than the critical value at the significance level of α % (frequently used 5%). However, we reject it in the opposite case. This test is applied sequentially from $r=0$ to $r=k-1$, where k represents the number of endogenous variables integrated into the model. Other cointegration tests are also used, including the Hansen test (1992), which analyses parameter stability, the Park test (1992) and the Engle-Granger test (1987).

d. Technique for estimating cointegrated models

After confirming the presence of cointegration of the explanatory variables, we use the fully modified ordinary least squares (FMOLS) method and the dynamic ordinary least squares (DOLS) method developed by Pedroni (2001 and 2004) and Kao and Chiang (2000). These methods indicate the long-term effect of the independent variables. According to several studies (Sadorsky, 2011, Hu et al., 2018 and Yao et al., 2019), FMOLS is a non-parametric method that corrects for autocorrelation and heteroscedasticity by eliminating the correlation between the explanatory variables and the error term, while DOLS is a parametric method that eliminates autocorrelation between the explanatory variables and the error terms by adding lag terms to the explanatory variables. In addition to FMOLS, Rahman et Velayutham (2020) adopt DOLS as an additional method to verify the robustness of the results.

These two methods are suited to asymptotically biased distributions and can avoid problems of endogeneity, serial correlation and simultaneity. For robustness, as a second level of verification, we also estimate the parameters using the ARDL (Auto Regression Distribution Lag) approach, which allows us to preserve short- and long-term dynamics.

3.1. Data

With regard to descriptive statistics (Table 1), the coefficient of variation indicates that financial inclusion in Gabon is less volatile ($0.23 < 0.30$), in other words, the inclusive finance market in Gabon is homogeneous, with an estimated average penetration rate of 44%. The average of this variable is appreciable during the period 2007-2023, as $0.3 < If = 0.44 < 0.5$ (Sarma, 2008; Ngono, 2020). In general, we observe that all p-values associated with the Jarque-Berra normality test are higher than the 5% error risk. This shows that all variables follow a normal distribution, which is not the case for the investment variable (*Inv*). Indeed, the non-normality of investment can be explained by the fact that, since 2014, Gabon has been facing a slowdown in growth and severe cash flow constraints. A major budgetary adjustment has been implemented, reducing the room for manoeuvre to launch new investments. To this end, this constrained environment, in which the volume of investment expenditure is necessarily limited, requires that the optimal impact of investment expenditure be achieved in terms of infrastructure coverage and quality. This objective is all the more pressing given that public investment serves as an adjustment variable in periods of slow growth (IMF, 2020). Table 1 also shows that the standard deviations of these variables are not zero. This indicates that these variables experienced

variability (movements) during the period 2007-2023. We can clearly see this in Figure 1 below for the case of financial inclusion and real GDP growth.

Table 1. Descriptive statistics

	<i>Mean</i>	<i>Standard deviation</i>	<i>CV</i>	-----Joint test-----	
				<i>Adj chi2(2)</i>	<i>Prob>chi2</i>
<i>If</i>	00.44	0.10	0.23	01.78**	0.4110
<i>GDP</i>	02.76	03.03	1.09	0.62**	0.7332
<i>Inf</i>	02.62	01.70	0.65	01.74**	0.4197
<i>Inv</i>	10.94	22.35	2.04	13.	0.0009
<i>Com</i>	65.97	08.95	0.14	02.63**	0.2680
<i>Dep</i>	13.23	01.62	0.12	00.64**	0.7270
<i>Cred</i>	11.97	02.15	0.18	02.83**	0.2428

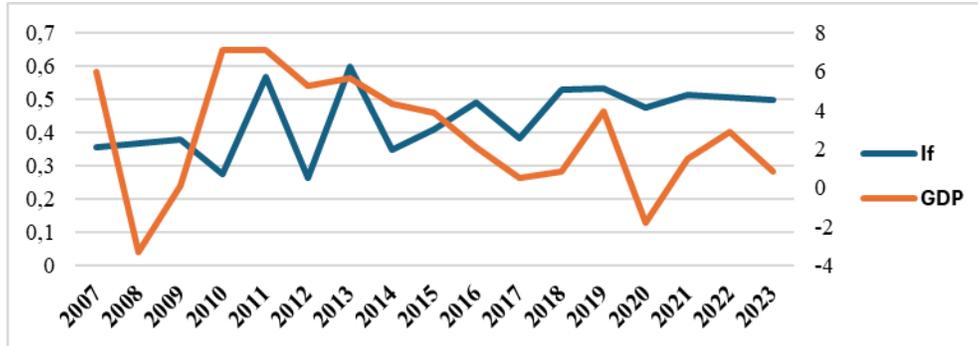
Obs = 68. CV: Coefficient of variation, if CV < 0.3 low volatility, if CV > 0.3 high volatility

Joint test: Jarque-Bera normality test, normality hypothesis if Prob(chi2) > 0.05**

Source: Authors

Graph 1 shows the evolution of economic growth and financial inclusion in Gabon between 2007 and 2023 and highlights two observations. Firstly, we observe a trend towards increased financial inclusion, but this is modest and fluctuates between 0.3 and 0.6. These results reinforce the conclusions of Obiang Obiang (2022), who measures and analyses the determinants of financial inclusion in Gabon. The author finds that financial inclusion remains relatively low, never exceeding 0.6 (very slightly above 0.5). However, after 2012, financial inclusion improved relatively, as the index shows values above 0.3. Only the years 2011, 2013, 2016, 2018 to 2023 show values above 0.5. This situation could be the result of increasingly high levels of economic growth and development and, above all, the boom in the financial market in Gabon. The sector has developed relatively over time, covering most areas (urban and rural) throughout the country. The main implication of this deployment is the development of access to financial services for these remote populations, further reducing financial exclusion. Secondly, Figure 1 below shows the comparative evolution between financial inclusion and economic growth. Analysis of this graph shows that the trends in the indicators illustrate a funnel after each crossover, which seems to reflect an inverse relationship between growth and the financial inclusion index. This hypothesis will therefore be confirmed or refuted on the basis of regressions, given that the empirical work of our predecessors is mixed: for some, there is a positive correlation between financial inclusion and economic growth (Evans, 2015; Obiang Obiang, 2022; Chuc and al., 2021), while others find a negative correlation (Kostov and al., 2015; Abesselo and Timbi, 2019; Tchouassi and al., 2022).

Figure 1. Dynamics of financial inclusion and economic growth



Source: Authors

Looking at Table 2, Karl Pearson's correlation matrix analysis (1932) indicates that only one regressor (*Cred*) has a significant association at the 5% threshold with the financial inclusion index. Interestingly, from a theoretical point of view, there is a negative correlation between financial inclusion and economic growth. However, if we bear in mind the properties of time series data, these correlations are not threatening in terms of multicollinearity. The variance inflation factor (*VIF*) values for all variables are less than five (5), indicating that there is no multicollinearity problem. Overall, the analysis of these various statistics suggests that the estimated parameters would be unbiased, consistent and efficient.

Table 2. Pearson correlation matrix

	<i>If</i>	<i>GDP</i>	<i>Inf</i>	<i>Inv</i>	<i>Com</i>	<i>Dep</i>	<i>Cred</i>
<i>If</i>	1						
<i>GDP</i>	-0.06 (0.816)	1					
<i>Inf</i>	-0.22 (0.383)	-0.25 (0.322)	1				
<i>Inv</i>	0.15 (0.566)	0.17 (0.495)	0.38 (0.127)	1			
<i>Com</i>	-0.34 (0.177)	0.33 (0.190)	0.10 (0.697)	0.14 (0.582)	1		
<i>Dep</i>	-0.406 (0.105)	0.13 (0.612)	-0.31 (0.222)	-0.52** (0.032)	0.21 (0.435)	1	
<i>Cred</i>	0.49 (0.042)	0.001 (0.996)	-0.22 (0.397)	-0.12 (0.650)	-0.48* (0.052)	0.03 (0.894)	1
<i>VIF</i>		1.40	1.42	1.77	1.68	1.63	1.39

(.) = *P*-value significant at the threshold of: <1%***, <5%** , <10%***

Source: Authors

4. Empirical results

4.1. Endogeneity analysis and parameter diagnosis

We observe that the calculated p-values for the explanatory variables trade (*Com*) and domestic credit (*Cred*) are less than 10% (Table 3), and the Hausman test indicates that there is a problem of endogeneity for the variables considered. In conclusion, this impact of long-term endogeneity biases on the estimates of model (2), using OLS of the parameters of a cointegration relationship, allows us to converge towards a model based on the Fully Modified Least Squares (FMOLS) method. Analysis of Table 3 reveals significant autocorrelation of errors at the 1% threshold according to the Durbin-Watson test and the Breush-Godfrey LM test.

Table 3. Endogeneity test and OLS parameter diagnosis

(1) Hausman endogeneity test						
Equation	<i>Eq1</i>	<i>Eq2</i>	<i>Eq3</i>	<i>Eq4</i>	<i>Eq5</i>	<i>Eq6</i>
Endogenous variable	<i>GDP</i>	<i>Inf</i>	<i>Inv</i>	<i>Com</i>	<i>Dep</i>	<i>Cred</i>
<i>Chi2</i> (2)	1.58 (0.4533)	0.56 (0.7558)	0.30 (0.8593)	5.36* (0.0686)	0.44 (0.8029)	7.66* (0.0536)
				Chi2	P-value	
(2) Diagnosis of coefficients						
<i>Wald test</i>				01.75	0.2078	
(3) Residual diagnosis						
<i>Jarque-Bera normality test</i>				10.	0.0054	
<i>test Breush-Pagan/Cook-Wisberg</i>				0.	0.4548	
<i>Arch test (heteroscedasticity)</i>				7.611***	0.0058	
<i>Breush-Godfrey LM test (autocorrelation)</i>				12.35	0.0004	
<i>Durbin Watson test (autocorrelation)</i>				23.93	0.0000	
(4) Stability diagnosis						
<i>Ramsey reset test</i>				01.28	0.3544	

(.) = P-value significant at the threshold of: <1%***, <5%**, <10%***

Source: Authors

We observe that the chi-square value associated with the Breush-Pagan/Cook_wisberg test⁶ is low, indicating that heteroscedasticity is probably not an issue, as the p-value = 0.4548 indicates insignificance, which indicates that the errors have constant variance (the data suffer from homoscedasticity). However, the high Arch chi-square value would indicate that heteroscedasticity is present at the 1% significance level (p-value = 0.0058). We therefore conclude that the homoscedasticity hypothesis is rejected, meaning that there is an Arch effect, which contradicts the previous results. As a result, we cannot conclude whether the estimates

⁶ In linear regression, the error term is assumed to be constant and homoscedastic from one observation to another. Violation of this assumption is pernicious. The standard error estimates for the regression coefficients are biased, and the direction of the bias is not known a priori, which can inflate or deflate the t-tests. The Breusch-Pagan/Cook-Weisberg test is used to test for heteroscedasticity in this study, as shown in Table 3. A large chi-square would indicate that heteroscedasticity is present.

obtained by OLS are optimal or not. This uncertainty once again motivates convergence towards FMOLS. Furthermore, the errors do not follow a normal distribution in the Jarque-Bera sense, as the associated probability is less than 5%. The Wald test indicates that none of the parameters are significant. However, according to Ramsey's Reset test, with a p-value of 0.3544 (> 5%), the model is well specified.

4.2. Analysis of the stationarity of variables

The Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests for unit roots were calculated. The results in Table 4 indicate that some variables are stationary in level, while others are stationary in first difference. Since, in the sample, the series do not have the same order of integration, cointegration tests are used below to test whether there is a long-term relationship between the series.

Table 4. Unit root tests

	ADF		PP		Stationarity
	Level	Difference 1 st	Level	Difference 1 st	
<i>If</i>	-5.224*** (0.000)		- 5.041*** (0.000)		<i>I(0)</i>
<i>GDP</i>	-3.088** (0.027)		-3.160** (0.022)		<i>I(0)</i>
<i>Inf</i>	-4.113*** (0.001)		- 4.241*** (0.001)		<i>I(0)</i>
<i>Inv</i>	-3.940*** (0.002)		- 3.967*** (0.002)		<i>I(0)</i>
<i>Com</i>	-1.971 (0.299)	-6.618*** (0.000)	-1.949 (0.309)	-6.355*** (0.000)	<i>I(1)</i>
<i>Dep</i>	-2.554 (0.103)	-4.519*** (0.000)	-2.517 (0.111)	-4.717*** (0.000)	<i>I(1)</i>
<i>Cred</i>	-1.782 (0.389)	-4.317*** (0.000)	-1.773 (0.394)	-4.327*** (0.000)	<i>I(1)</i>

(.) = P-value significant at the threshold of: $\leq 1\%^{***}$, $\leq 5\%^{**}$, $\leq 10\%^{***}$

Source: Authors

4.3. Time series cointegration tests

Before performing Johansen's cointegration test and other cointegration tests, it is very important to determine the optimal lag number. To do this, the FPE (Final Prediction Error), AIC (Aikake Information Criterion), SC (Schwarz Information Criterion) and HQ (Hannan-Quinn Information Criterion) criteria are used.

According to the results in Table 5 below, all the criteria considered recommend that we keep the optimal number equal to 1.

Table 5. Optimal lag number

<i>Lag</i>	<i>LogL</i>	<i>LR</i>	<i>FPE</i>	<i>AIC</i>	<i>SC</i>	<i>HQ</i>
0	-798,752	NA	203,288	25,179	25,416	25,272
1	-691,121	188,353	32,839	23,347	25,237	24,092
2	-684,646	9,9146	130,772	24,676	28,218	26,072

* indicates lag order selected by the criterion

Source: Authors

According to the results of Johansen's cointegration test in Table 6 below, the Trace test indicates the existence of seven (7) cointegrations, and the Max-eigenvalue test indicates that there are two (2) cointegrations between the corresponding variables. For ease of interpretation, we will consider a single cointegration in the FMOLS model estimation. Examining the Hansen test, the *Lc* statistic confirms the existence of a cointegration relationship but with unstable parameters. That is, a cointegration relationship in which the coefficients of the cointegration equation (model 5) are allowed to depend on time. These results show that there is likely to be a structural break at specific periods, which seems to substantially explain the fluctuations observed in the inclusive finance market in Gabon (Figure 1). These results are consistent with Park's cointegration test with a low significance level of 10%. Observing also the significant p-values of Engle-Granger, the alternative hypothesis of cointegration cannot be rejected, so equation 5 describing the long-term relationship between the variable can be estimated. As all of the above tests prove that there is cointegration between our variables, we can suspect the existence of a long-term relationship between the variables. Consequently, we can use FMOLS to study the influence of the variables *GDP*, *Inf*, *Inv*, *Com*, *Dep*, and *Cred* on the variable *If*.

Table 6. Cointegration tests

(1) Johansen (1991) cointegration test				
<i>Unrestricted Cointegration Rank Test (Trace)</i>				
<i>Hypothesised</i>		<i>Trace</i>	<i>0.05</i>	
<i>No. of CE(s)</i>	<i>Eigenvalue</i>	<i>Statistic</i>	<i>Critical Value</i>	<i>Prob.</i>
<i>None *</i>	<i>0.551</i>	<i>164.76</i>	<i>125.61</i>	<i>0.0000</i>
<i>At most 1</i>	<i>0.410</i>	<i>113.38</i>	<i>95.753</i>	<i>0.0018</i>
<i>At most 2 *</i>	<i>0.271</i>	<i>79.588</i>	<i>69.818</i>	<i>0.0068</i>
<i>At most 3 *</i>	<i>0.264</i>	<i>59.301</i>	<i>47.856</i>	<i>0.0030</i>
<i>At most 4 *</i>	<i>0.250</i>	<i>39.620</i>	<i>29.797</i>	<i>0.0027</i>
<i>At most 5 *</i>	<i>0.176</i>	<i>21,207</i>	<i>15.494</i>	<i>0.0062</i>
<i>At most 6 *</i>	<i>0.127</i>	<i>8.7526</i>	<i>3.8414</i>	<i>0.0031</i>
<i>Unrestricted Cointegration Rank Test (Maximum Eigenvalue)</i>				
<i>Hypothesised</i>		<i>Max-Eigen</i>	<i>0.05</i>	
<i>No. of CE(s)</i>	<i>Eigenvalue</i>	<i>Statistic</i>	<i>Critical Value</i>	<i>Prob.</i>
<i>None *</i>	<i>0.551</i>	<i>51.382</i>	<i>46.231</i>	<i>0.0129</i>
<i>At most 1</i>	<i>0.410</i>	<i>33.796</i>	<i>40.077</i>	<i>0.2148</i>
<i>At most 2</i>	<i>0.271</i>	<i>20.287</i>	<i>33.876</i>	<i>0.7365</i>
<i>At most 3</i>	<i>0.264</i>	<i>19,681</i>	<i>27.584</i>	<i>0.3636</i>
<i>At most 4</i>	<i>0.250</i>	<i>18,412</i>	<i>21.131</i>	<i>0.1152</i>
<i>At most 5</i>	<i>0.176</i>	<i>12.455</i>	<i>14.264</i>	<i>0.0947</i>
<i>At most 6 *</i>	<i>0.127</i>	<i>8.7526</i>	<i>3.8414</i>	<i>0.0031</i>

Trace test indicates 7 cointegrating equations at the 0.05 level
 Max-eigenvalue test indicates 1 cointegrating equation(s) at the 0.05 level
 * denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis (1999) p-values

(2) Hansen (1992) cointegration test				
	<i>Stochastic</i>	<i>Deterministic</i>	<i>Excluded</i>	
<i>Lc statistic</i>	<i>Trends (m)</i>	<i>Trends (k)</i>	<i>Trends (p2)</i>	<i>Prob.*</i>
<i>2.465</i>	<i>6</i>	<i>0</i>	<i>0</i>	<i>< 0.01</i>

(3) Park's cointegration test (1992)			
	<i>Value</i>	<i>df</i>	<i>Probability</i>
<i>Chi-square</i>	<i>4.697</i>	<i>2</i>	<i>0.095</i>

(4) Engle-Granger cointegration test		
	<i>Value</i>	<i>Prob.*</i>
<i>Engle-Granger tau statistic</i>	<i>-6.508</i>	<i>0.043</i>
<i>Engle-Granger z-statistic</i>	<i>-23.03</i>	<i>0.000</i>

Source: Authors

4.4. Model estimation

To estimate equation (5), we use a model based on the error-corrected FMOLS method. This procedure allows us to highlight both short-term and long-term coefficients in order to analyse the determinants of access to inclusive financial services in Gabon from the perspective of these two periods. Statistically, the estimation results summarised in Table 5 are acceptable in terms of quality, as the coefficient of determination is greater than 50%. We can say that 52.03% of the fluctuations in the financial inclusion variable (*If*) in Gabon are explained by economic growth, inflation, investment, trade, public expenditure and domestic credit. This indicates that the coefficients are clearly robust, allowing us to say that the model is short-term, with a significant empirical correlation coefficient of around 72.13%⁷.

Table 7. Estimation of the equation using the FMOLS method

<i>Variables</i>	<i>Coefficients</i>
Short term	
$\Delta(GDP)$	-0.008* (0.0512)
$\Delta(Inf)$	-0.029*** (0.0002)
$\Delta(Inv)$	-8.4E-05 (0.8947)
$\Delta(\Delta Com)$	-0.001 (0.4091)
$\Delta(\Delta Dep)$	-0.039*** (0.0003)
$\Delta(\Delta Cred)$	0.046*** (0.0000)
Recall strength	
Ec	-0.137* (0.0726)
Long term	
$GDP(-1)$	-0.004 (0.1212)
$Inf(-1)$	-0.005 (0.3511)
$Inv(-1)$	3.4E-05 (0.9346)
$\Delta Com(-1)$	-0.001 (0.5827)
$\Delta Dep(-1)$	-0.039*** (0.0038)

⁷ $r = \sqrt{0,5203} = 72,13\%$; $t_c = 0,7213 / \sqrt{((1 - 0,5203)/52)} = 7,51 > t_{5\%} = 1,96$

$\Delta Cred(-1)$	0.048*** (0.0005)
C	0.083 (0.0496)
<i>R-squared</i>	52.03
<i>Adjusted R-squared</i>	39.80
<i>Wald test system</i>	13.03 (0.0000)
<i>Observations</i>	66

(.) = *P-value significant at the threshold of: < 1%***, < 5%** , < 10%****

Source: Authors

Table 7 shows the results of the Wald coefficient diagnostic test, also known as the short-term causality test. The purpose of this test is to determine the joint influence of macroeconomic indicators (*GDP, Inflation, Investment, Trade, Debt, Credit*) on the supply of inclusive financial services in the short term. Thus, according to Table 7, Wald's chi-square is significant at the 1% threshold, indicating that macroeconomic indicators jointly influence financial inclusion in Gabon in the short term. Furthermore, the recall strength, which represents the error correction coefficient ($Ec = -0.137$), is negative, less than one and significant (p-value = 0.0726 < 10%). Thus, shocks to the financial inclusion variable in Gabon are corrected by 13.7% through feedback effects. In other words, short-term imbalances are corrected in the long term. In short, the model proves its empirical validity.

The analysis in Table 7 leads us to analyse the determinants that may or may not influence the supply of inclusive financial services in the short and long term. In short, we observe that there is a negative relationship between financial inclusion and economic growth in both periods, but this correlation is only significant in the short term. These results validate our impressions based on the analysis of Figure 1 and the theoretical foundations that estimated the negative impact of growth on the inclusive finance market (Kostov and al., 2015; Abesselo and Timbi, 2019; Tchouassi and al., 2022). This demonstrates that, in the short term, economic growth is an essential adjustment factor for development, but this adjustment does not favour the inclusive finance market in Gabon when economic growth is generally sustained in Gabon, since if it increases by 10%, inclusive finance decreases by 0.08% and 0.04% in the short and long term, respectively. Given that Gabon is an atypical country, as Mbaye (2023) points out, we believe that this is why it is important to consider uncertainty in all respects when analysing the quality of Gabon's economic growth in the face of the acute poverty that remains a pressing issue.

Furthermore, the results indicate the negative effect of inflation on financial inclusion in both periods, and this effect is significant in the short term at the 1% threshold. Our results converge with the conclusions of Moulouade and Jamil (2021), who analyse financial inclusion and macroeconomic stability in the MENA region and observe that inflation has a negative influence on inclusion. Our results imply that the negative impact of financial inclusion on price stability

highlights the need for Gabon to pursue economic policies aimed at stabilising prices, such as inflation targeting.

Analysis of Table 7 reveals that investment and trade have no significant influence on financial inclusion in either the short or long term. From a theoretical perspective, trade in Gabon does not promote financial inclusion. Thus, increased trade openness leads to a decrease in financial inclusion in Gabon. This result is contrary to the expected sign and to economic theory. The negative sign of our result can be explained by the low diversification of the Gabonese economy, which mainly exports raw materials, and the absence of manufacturing industries. This negative sign can also be explained by the fact that trade can be detrimental to small countries far from the global technological frontier (Aghion and al., 2005). From a theoretical point of view, the negative short-term investment rate in our study is contrary to economic theory. Therefore, the degree of short-term economic response to investment is low in Gabon. This can also be explained by the low level of diversification and participation of the financial sector in the Gabonese economy and by the predominance of short-term credit. This negative sign can also be interpreted as a misallocation of investment towards less productive activities. According to Levine and al., (2000), a better distribution of economic resources stimulates productive investment and, in turn, economic growth. However, in the long term, the sign of investment is positive. Our results show that public spending does not affect the inclusive finance market in Gabon in either period. The implication is that an increase in public spending leads to a decline in financial inclusion in Gabon.

In light of the above results, we use the CUSUM test based on forecast error dynamics to analyse the stability of the model. This test detects structural instabilities in regression equations over time, i.e. it studies the stability of the model. In fact, the general idea behind this test is to study the evolution over time of the normalised forecast error; and we call this sequence of forecast errors calculated at $t-1$ for t the recursive residual. The CUSUM (Cumulative Sum) will therefore be based on the cumulative sum of the recursive residuals. As the short-term model is dynamic, it only applies to the long-term model. If the curve does not cross the corridor (dotted line), then the model is stable ; however, it is unstable when the curve crosses the corridor. According to graph 2 above, we observe that the blue line lies between the two red lines, indicating that our long-term error correction model (FMOLS) is stable and free of structural changes (Cusum test).

Graph 2. Cusum stability test



Source: Authors

4.5. Robustness analysis

In order to establish the robustness of estimates of the short-term and long-term elasticity of financial inclusion in Gabon, we use the error correction model derived from the ARDL model and the DOLS procedure suggested by Saikkonen (1992) and Stock and Watson (1993). Table 8 presents the results of the two different estimators. We have confirmation of the existence of a cointegration relationship between the variables, as the coefficients of the error correction term (Ec) for both estimates are negative and statistically significant at the 10% (DOLS) and 5% (ARDL) thresholds. Indeed, the coefficient estimated by DOLS is 0.197, which implies that any deviation of financial inclusion from its equilibrium level is corrected by 19.7% in the following period. According to the ARDL procedure, this equilibrium level is corrected by 21.8% in the following period. The sensitivities linked to fluctuations in the inclusive finance market in Gabon, relatively explained by the degrees of determination coefficients ($R^{(2)}= 53.42\%$ for DOLS, $R^{(2)}= 53.78\%$ for ARDL), are consistent with the basic specifications at a 1.75% loan deviation. Both models are globally significant at the 1% threshold according to the Wald system test. In both cases, robustness relative to the baseline model (FMOLS) proves the validity of a cointegration relationship.

When estimating the FMOLS model, robustness checks using DOLS and ARDL estimates (Table 8) also enabled us to accurately capture the influence that the model's explanatory variables have on the inclusive finance market in Gabon. Our results show interesting similarities in both estimates. Indeed, we continue to find that our main variables of interest are highly significant and unchanged in sign compared to the results in Table 7. Strikingly, even the magnitude of the estimated coefficients varies very little from the baseline specifications, which is consistent with the relatively weak correlations between our various determinants of the financial inclusion index in Gabon. Overall, the rationale for this robustness check is the same as before. These results suggest that a considerable fraction of the fluctuations in the inclusive finance market can be adequately explained in the long term by public expenditure and domestic credit, and in the short term by economic growth, inflation, public expenditure and domestic credit. The results from the parameter estimates for these variables remain fairly consistent with those described above. One important finding is that there is short-term persistence in financial inclusion, as the coefficient associated with the lag in financial inclusion (0.080) is positive. However, this persistence is not significant. It appears that this persistence of financial inclusion over time is due not only to the persistence of acute poverty, but also to the weakness of social-oriented economic policies aimed at lifting the poor out of the abyss of exclusion, the⁸ poverty trap and marginalisation in the context of Gabon. Consequently, all of these results lead us to conclude that our findings are robust at several levels of control.

⁸ Spatial poverty traps are defined as areas with high concentrations of poor populations that are unable to experience episodes of growth strong and sustained enough to lift them out of poverty (De Vreyer, 2003).

Table 8. Estimates of cointegration relationships

<i>Variables</i>	<i>DOLS</i>	<i>ARDL</i>
Short term		
		0.080
$\Delta(I_f(-1))$		(0.5311)
$\Delta(GDP)$	-0.008	-0.008
	(0.0955)	(0.0942)
$\Delta(Inf)$	-0.026***	-0.025***
	(0.0077)	(0.0055)
$\Delta(Inv)$	-6.9E-05	-6.3E-05
	(0.9342)	(0.9344)
$\Delta(\Delta Com)$	-0.002	-0.002
	(0.3922)	(0.3510)
$\Delta(\Delta Dep)$	-0.039***	-0.039***
	(0.0036)	(0.0020)
$\Delta(\Delta Cred)$	0.047***	0.046***
	(0.0003)	(0.0001)
Restoring force		
<i>Ec</i>	-0.197*	-0.218
	(0.0502)	(0.0279)
Long term		
<i>GDP(-1)</i>	-0.003	-0.003
	(0.4099)	(0.3912)
<i>Inf(-1)</i>	-0.007	-0.006
	(0.3505)	(0.3399)
<i>Inv(-1)</i>	0.0002	0.0002
	(0.6911)	(0.6267)
<i>ΔCom(-1)</i>	-0.002	-0.002
	(0.4882)	(0.4796)
<i>ΔDep(-1)</i>	-0.042**	-0.039
	(0.0181)	(0.0230)
<i>ΔCred(-1)</i>	0.052***	0.047***
	(0.0037)	(0.0080)
<i>C</i>	0.108	0.116**
	(0.0514)	(0.0285)
<i>R-squared</i>	53.42	53.78
<i>Adjusted R-squared</i>	41.78	41.09%
<i>F-statistic</i>		4.239
<i>Prob(F-statistic)</i>		0.0000
<i>Wald test System</i>	15.044***	13.113***
	(0.0000)	(0.0000)
<i>Observations</i>	66	66

(.) = P-value significant at the threshold of: < 1%***, < 5%** , < 10%***

Source: Authors

4.6. Analysis of the Main Results

The estimation results mainly indicate that, in both the short and long term, credit granted to the private sector and households is significant and positively impacts the inclusive finance market, albeit with relatively small weights. From a microeconomic perspective, given a weakly developed financial system, financing Gabon's economy constitutes a dual challenge for both the State and the private sector: it promotes savings and capital accumulation on one hand, and allows for optimal allocation of capital on the other. Financial development contributes to accelerating growth and reducing poverty. Moreover, financial inclusion is of crucial importance for the Bank of Central African States for at least two reasons. On one hand, financial inclusion affects long-term growth and poverty reduction. On the other hand, strong financial inclusion enhances monetary policy (Demirgüç-Kunt and Levine, 2004; Geda et al., 2006; Beck et al., 2007; Honohan, 2008). In this sense, by encouraging savings, investment, and productivity, market inclusion stimulates economic activity (Demirgüç-Kunt and Klapper, 2013; Dabla-Norris et al., 2015) by broadening the deposit base available to banks, primarily favoring financial stability (Han and Melecky, 2013), which is also conducive to economic growth. From a macroeconomic perspective, financial accessibility for low-income Gabonese households would help balance opportunities and reduce inequality and poverty within the population (World Bank, 2008).

Indeed, despite the generally low level of financial literacy among the populations of CEMAC in general and Gabon in particular, the rate of financial inclusion is overall increasing, with an expanded banking rate of 35%. Furthermore, the predominance of informal credit and savings services compared to formal services highlights a mismatch between the needs of the population and the supply of formal inclusive financial services, resulting in a penetration rate of less than 10% for formal credit (Global Findex, 2021). Moreover, microcredit remains an essential tool for improving financial inclusion because, when properly managed, it promotes banking inclusion for vulnerable populations to the extent that it provides financing opportunities to borrowers who would not have access to traditional credit to successfully carry out social or professional integration projects (World Bank, 2014).

Additionally, strict compliance with the new CEMAC regulation (COBAC, 2018) provides a regulatory framework for Gabon that could benefit its development and financial inclusion by allowing a greater number of supervised actors to offer financial products and services, facilitating the introduction of a new category of financial institutions authorized to provide payment services without being attached to a bank. This implies that the supply of bank credit constitutes the main catalyst for funding the Gabonese economy through the expansion of mobile money and financial interoperability, enabling financially included individuals to access the full range of financial services and all CEMAC banking networks, on the one hand, while also increasing the usage rate of financial services by youth, women, and SMEs by linking mobile money payment accounts with financial accounts for effective market inclusion, on the other hand. An increase in credit supply leads to higher economic activity. This is explained by the fact

that Gabon's financial and banking system is increasingly developing, despite the challenges posed by information asymmetry risks and macroeconomic shocks.

An inclusive financial sector is essential to reduce the vulnerability of low-income Gabonese households and to encourage the growth of small and medium-sized enterprises through better allocation of capital. These two dynamics, combined, help promote economic growth by contributing to a reduction in unemployment, which is considered a challenge for the Gabonese economy. The correlation between financial intermediation and individual well-being depends on the level of financial inclusion of these individuals (Saab, 2018).

5. Conclusion

The purpose of this research was to analyse the effects of economic growth on the inclusive finance market in Gabon over the period 2007-2023. To do this, models based on dynamic ordinary least squares (DOLS) and fully modified ordinary least squares (FMOLS) with error correction were used. Through these models, we were able to show that economic growth has a negative effect on the inclusive finance market in the short and long term. In the short and long term, credit granted to the private sector and households is significant and positively influences access to inclusive financial services with relatively low weights. The results confirm that financial development undeniably contributes to accelerating growth and lifting vulnerable economic agents out of poverty traps. An inclusive financial sector is essential to reducing the vulnerability of low-income households and encouraging the growth of small and medium-sized enterprises through better capital allocation. At the same time, the relevant institutions and/or authorities must ensure the stability of the financial system and the momentum of inclusion, and it is therefore imperative to establish a regulatory framework and a method of public expenditure governance that supports this sector. Ultimately, the Gabonese authorities in particular and the CEMAC in general must strengthen financial services and reduce barriers to access in order to enable poor people to access the financial system.

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7. Appendices

Appendix 1 : Methodology for calculating the composite financial inclusion index

This is based on the work of Sarma (2008) and comprises three stages.

a) Selection of financial inclusion dimensions

Three groups were selected:

- D1⁹ : Banking penetration: number of bank accounts per individual and number of bank accounts opened by the total population ;
- D2: Availability of banking services: number of bank branches per 1,000 adults. ATMs (per 100,000 adults), commercial bank branches (per 100,000 adults) according to the World Bank ;
- D3: Use of financial services: outstanding commercial bank loans (% of GDP), outstanding commercial bank deposits (% of GDP). Commercial bank depositors (% of GDP), commercial bank borrowers (per 100,000 adults) according to the World Bank.

b) Calculation of the index for each dimension

$$d_i = \omega_i * \frac{A_i - m_i}{M_i - m_i} \quad (1)$$

Where ω_i is the weight attached to dimension i , $0 \leq \omega_i \leq 1$;

A_i = current value of dimension i ;

m_i = the minimum value of dimension i ;

M_i = the maximum value of dimension i ;

d_i = the dimension of financial inclusion.

⁹ Given the difficulties in accessing the banking penetration rate of the total population for all six countries that make up the CEMAC zone, this dimension will not be taken into account in the calculation of the If.

c) Calculation of the index

Considering the dimension n of financial inclusion, country i would be represented by the point $D_i = (d_1, d_2, d_3, \dots, d_n)$ in the Cartesian dimensional space.

$$If = 1 - \sqrt{\frac{(1-d_1)^2 + (1-d_2)^2 + \dots + (1-d_n)^2}{n}} \tag{2}$$

Taking into account the three dimensions, P_i (penetration), a_i (availability) and u_i (usage), the formula for calculating the financial inclusion index becomes:

$$If = 1 - 0. \sqrt{\frac{(1-p_i)^2 + (1-a_i)^2 + (1-u_i)^2}{3}} \tag{3}$$

- If $0.3 \leq If < 0.5$, the index is average;
- If $0.5 \leq If \leq 1$, the financial inclusion index is high;
- If $0 \leq If < 0.3$, the financial inclusion index is low.

Appendix 2: Error correction model

The empirical modelling of equation (2) can then be written in the form of an error correction specification as follows:

$$\Delta(If)_t = \mu + \theta_1 \Delta(Pib)_t + \theta_2 \Delta(Inf)_t + \theta_3 \Delta(Inv)_t + \theta_4 \Delta(Com)_t + \theta_5 \Delta(Dep)_t + \theta_6 \Delta(Cred)_t + \delta If_{t-1} + \gamma_1 Pib_{t-1} + \gamma_2 Inf_{t-1} + \gamma_3 Inv_{t-1} + \gamma_4 Com_{t-1} + \gamma_5 Dep_{t-1} + \gamma_6 Cred_{t-1} + \varepsilon_t \tag{5}$$

Where:

Δ , the short-period operator; $\theta_i, i = 1 \dots 6$, denote the short-term coefficients ;

$\gamma_i, i = 1 \dots 6$, denote the long-term coefficients ;

μ and ε_t , denote the model constant and the error term, respectively; δ represents the restoring force.

Equation (5) is estimated using FMOLS-based time series in order to highlight both the short-term and long-term coefficients, and then to capture the determinants of the inclusive finance market in Gabon from the perspective of these two periods.

It should also be noted that FMOLS is a version that leads to estimators that are asymptotically distributed according to a reduced normal distribution (Phillips and Moon, 1999).