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The Development of Financial Inclusion in Central African Countries

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Abstract: The financial sector in Central Africa, despite recent progress, remains weakly inclusive and essentially dominated by banks. The need for access to bank financing for micro businesses and SMEs is such that the region still has a lot of potential to exploit in the years to come. Using data from Global Findex, we aim to understand the drivers of corporate financial inclusion (FI) in Central African countries. More precisely, using a Multivariate Probit (MVP) model, we examine the determinants of companies' FI indicators. Furthermore, considering the FI as a continuous phenomenon, we used the Instrumental Variable Probit (IVP) model to study the impact of determinants of the business climate on financial inclusion indicators (external audit, bank account and access to credit). In this regard, the integration of the local financial system with global financial markets will facilitate efforts to ensure financial inclusion in the region.

Keywords: Businesses, financial inclusion, Central Africa, Probit Multivatiate Model, Instrumental Variable Probit Model.

JEL Ranking: G21, O16

1. Introduction

Financial inclusion has occupied a major place on the development agenda of countries in their attempts to economically empower their populations (Park and Mercado 2018). According to Raichoudhury (2020), financial inclusion involves deliberate measures used to promote access and use of services provided by the financial sector. Broadly speaking, the extent to which financial services are designed to cover the excluded (low-income earners or vulnerable people) in an economy is called "financial inclusion" (Sinclair 2013).

African countries have made several efforts to improve in terms of financial inclusion. However, barriers exist, most actors in sub-Saharan Africa face difficulties in their attempt to access traditional financial services, leaving many households struggling with financial exclusion (Beck and Cull 2015). A key driver of financial inclusion in sub-Saharan Africa is that of mobile money operations where small and medium enterprises (SMEs), rural populations have been provided with the financial inclusion platform (Abor *et al.* 2018).

Chen and Divanbeigi (2019) posit that financial inclusion expands the boundaries of access to bank accounts and accelerates credit acquisition opportunities for individuals and entrepreneurs. An efficient financial system is also necessary to provide payment mechanisms, manage risks and facilitate transactions between economic units (Muralidharan *et al.* 2016). However, some authors believe that the benefits of financial inclusion are evident in economies with higher net domestic production and productivity, adding that weaker economies hardly benefit from the benefits of financial inclusion (Pitt 2014). Mian and Sufi (2014). Furthermore, they established that a sharp increase in financial inclusion can generate a financial crisis.

Nevertheless, financial inclusion has been found to increase the liquidity of entrepreneurs, thereby strengthening their operational capabilities and leading to job creation and poverty reduction (Bruhn and Love 2014). Providing a wide range of financial services and creating openings to access these services is imperative to promote business transactions and meet the expectations of vulnerable people, especially the poor and deprived (Célerier and Matray 2018; Davidovic *et al.* 2019).

Several decision-makers in sub-Saharan African countries have implemented financial reforms aimed at improving the level of financial inclusion in the region. Besides the Maya Declaration, other initiatives to promote financial inclusion in AfSS exist such as the financial education campaign, the National Financial Inclusion Strategy (NFIS) and the cashless systems policies of the respective central banks . Despite these efforts, priority must be given to vulnerable populations in the region so that they can easily access financial services (Adedokun and Aga 2021).

Some authors have studied the link between financial inclusion and businesses in the African context (Adusei, 2016; Munemo; 2018; Lakuma et al, 2019; Lorenz and Pommet, 2020). FI creates a business-friendly environment (Arcand et al., 2015; Sahay et al., 2015). Indeed, it paves the way for businesses to access financing, services and technologies that support businesses and make them less vulnerable to certainrisks.

FI also has several benefits for businesses. It allows them to increase their bank deposits, which makes them more robust in times of difficulty (Han and Melecky, 2013). Furthermore, greater FI can alsoproviding businesses with opportunities to build savings, make investments and access credit (Ellis et al, 2010).

This study aims to contribute to the lack of empirical studies on the drivers of financial inclusion in Central African countries. Some studies (Lorenz and Pommet, 2020; Kyung-ha Kim, 2020) attempted to understand the key factors

of companies' FI by using the main FI indicators one by one.Such studies could produce biased results as the multidimensional nature of financial inclusion is ignored.Furthermore, no study has attempted to consider, on the one hand, the correlation between FI indicators and, on the other hand, the existence of a continuum in FI indicators.Our study takes a unique approach and contributes in several ways to the literature on the determinants of financial inclusionconsidering, on the one hand, the correlation between the FI indicators and, on the other hand, the existence of a continuum in the FI phenomenon.

The rest of the document is organized as follows. Section 2 reviews the literature on the state of financial inclusion in Central African countries.Section 3 explains our data and analytical strategy. Section 4 presents the main estimates. Section 5 presents the discussion and conclusions.

2. The State of Financial Inclusion in Central African Countries

According to the systemic theory of financial inclusion, financial inclusion outcomes are achieved through the functioning of different existing subsystems (Ozili 2020).

These subsystems include the financial, economic and social systems. The desired outcome of financial inclusion could be significantly impacted by a significant change in a subsystem (a component of the system). The theory posits that the effectiveness of subsystems will determine the success or failure of a national financial inclusion strategy. In essence, systems theory recognizes the importance of existing economic, financial and social systems, and their interconnections, in driving financial inclusion.

The theory of financial literature explains that it is necessary to increase the financial knowledge of individuals through education to achieve the financial inclusion agenda. With improved financial literacy, individuals can avail themselves of additional products from the formal financial sector, such as investment products and mortgage loans. According to this theory, financial literacy is used as a national strategy to achieve financial inclusion. It provides a platform to educate the population on financial management and the benefits of using formal financial services.

Financial inclusion in Central African countries remains subject to improvement. The Central African Republic, Burundi, Chad, Congo and Gabon all have account ownership rates below not only 20% of the population aged over 15 but also the average for low-income countries..

Financial inclusion recorded a sharp increase in Central African countries (Chart 1) The Central African Republic, Chad, Cameroon and Gabon all saw

sustained growth in the number of bank and mobile accounts between 2020 and 2022 .

This development is in line with the development observed for other low-income sub-Saharan African countries and those with lower middle incomes. The lack of FINDEX data for Equatorial Guinea, however, suggests that the country is clearly lagging behind the rest of the region and, compared to countries in its income category (lower middle) in the area of financial inclusion.
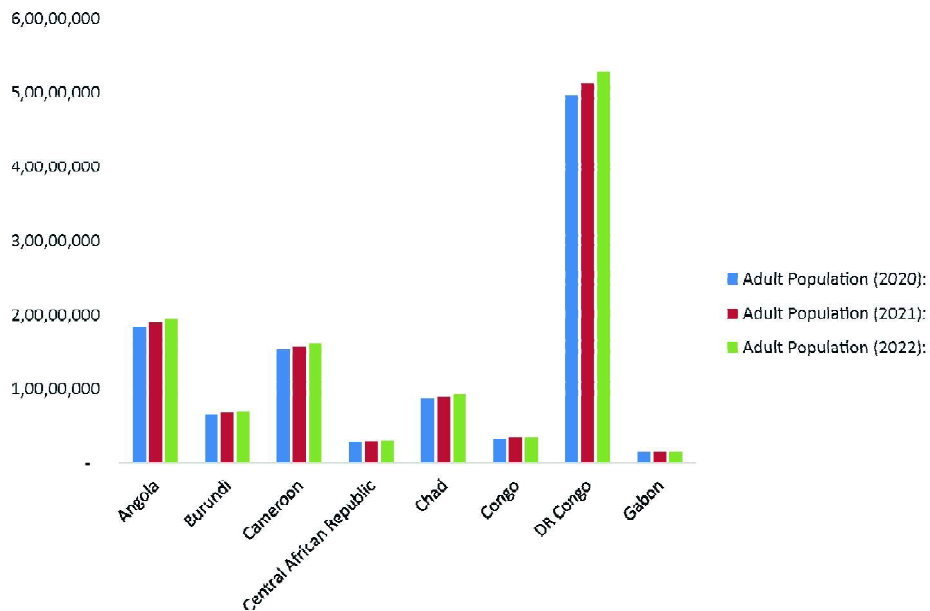
Graph 1: Evolution of the share of the adult population with an account in CEMAC (age 15+, 2022)

However, there is a considerable gap between the financial inclusion of Central African countries and those of Sub-Saharan Africa (Figure 2). In terms of financial inclusion, the sub-region still has a significant gap to make up compared to sub-Saharan Africa. In doing so, mobile banking makes a decisive contribution to banking provision in the region. The majority of accounts are mobile accounts in Chad and Gabon.

For its part, Cameroon stands out with a mobile banking rate close to the average for low-income countries, even if it is lower than the median for sub-Saharan African countries.

All this pushes the region's banks to reinvent themselves, especially thanks to the evolution of innovative technologies and the explosion of electronic wallets (Orange Money, MTN Mobile Money, etc.). For example, the Afriland First Bank
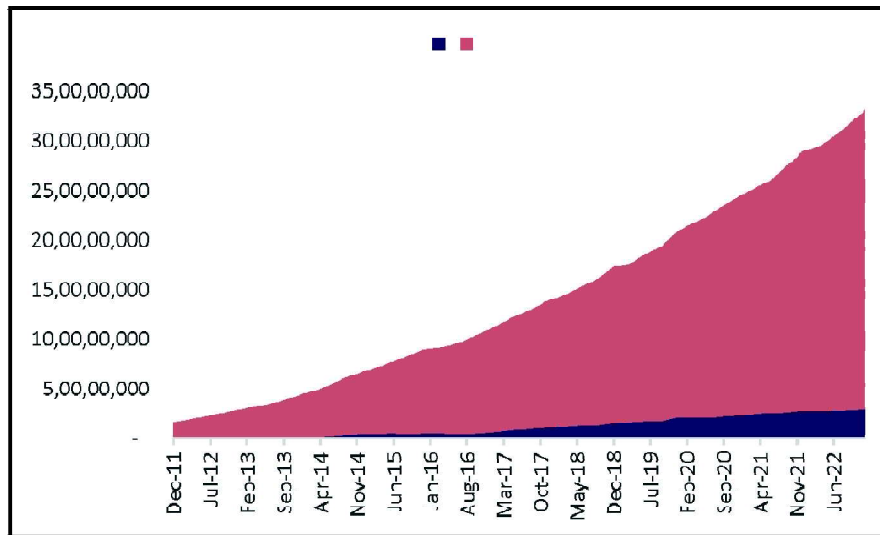
Figure 2: Active Financial Inclusion in Central Africa (2011-2022)

Group is banking on digital technology to better attract younger people. To this end, the Cameroonian bank has developed several innovative solutions, including a new generation card with a dynamic code, placed on the back of the bank card, making it possible to secure transactions, particularly those carried out on the Internet.

The need for access to bank financing for micro-enterprises and SMEs is pressing in almost all Central African countries. Moreover, decision-makers have continually strengthened institutions such as the National SME Agency and the creation of a Credit Guarantee Fund to sustainably support these structures.

3. Methodology and Data

3.1. Methodology

The multivariate probit model is recommended when the irrelevant alternatives are independent (Greene, 2003). This model is robust when the binary dependent variables are very closely linked and influenced by the same determinants (Castillo-Manzano, 2010).

FI is possible through an external audit, bank account or access to credit and choose an indicator generate dichotomous data. The data might also be correlated, for example, choose bank account could be positively or negatively related with access to credit. Dichotomous correlated data are popularly modeled using the Multivariate probit (Capellari and Jenkins, 2003). The Multivariate probit model is a simultaneous system of several M-dimension binary probits.

In our study, we have three different latent variables, y_1^*, y_2^*, y_3^* which are unobserved, but linearly depend on explanatory variables, X_j. Assuming the error structure of the system to be multivariate standard normal with $E(\varepsilon_i \mid x_1, x_2, x_3) = 0$, $var(\varepsilon_i \mid x_1, x_2, x_3) = 1$ and $E(\varepsilon_i.\varepsilon_j \mid x_1, x_2, x_3) = \rho_{ij}$ the actual observations relating to these latent variables are denoted by y_j and take on binary values thus:

$$y_{i1} = \begin{cases} 1 \ if \ \ external \ audit \\ 0 \ \ otherwise \end{cases}$$

$$y_{i2} = \begin{cases} 1 \ if \ \ bank \ account \\ 0 \ \ otherwise \end{cases}$$

$$y_{i3} = \begin{cases} 1 \ if \ \ access \ to \ credit \\ 0 \ \ otherwise \end{cases}$$

With general specification

$$Y_{im}^* = \begin{cases} \beta_m' X_{im} + \varepsilon_{im} = 1 & if \quad y_i \succ 0 \\ 0 & otherwise \end{cases} , \quad m = 1, 2, 3$$

Where

Y_{im}^* is unobserved variable representing the latent utility (or propensity) for alternative m.

X_{im} is a vector of characteristics which determines alternative choice m

β_m represents a vector of coefficients, and ε_m represents a vector of error terms that are normally distributed with zero mean and constant variance.

The variance-covariance matrix of the error term is given as follows:

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{pmatrix} \rightarrow N(0, \Sigma) \quad \text{With} \quad \Sigma = \begin{pmatrix} 1 & \rho_{12} & \rho_{13} \\ \rho_{12} & 1 & \rho_{22} \\ \rho_{13} & \rho_{23} & 1 \end{pmatrix}$$

The coefficients ρ_{ik} (with $j \neq k$) show the correlations among the latent utilities.

The marginal effects measure the variation of conditional expected value of one dependent variable Y_{im}, and all others Y_{sm} equal one. The marginal effects for the multivariate probit model is obtained using the following expression.

$$E[Y_1 \mid Y_2 = 1, Y_3 = 1] = \frac{\Pr ob(Y_1 = 1, Y_2 = 1, Y_3 = 1)}{\Pr ob(Y_2 = 1, Y_3 = 1)} = E_1$$

As instruments could not be identified for each FI dimension, we only estimate a probit model for each FI dimension. The estimation technique used is a one-stage instrumental variable (IV) probit model. Probit IV estimates are maximum likelihood (MLE) estimates of the generalized least squares estimator (Amemiya, 1978; Newey, 1987), where endogenous variables are treated as linear functions of their instruments and other variables exogenous.

The procedure makes it possible to predict results between 0 and 1, unlike the experience of the linear probability model with instrumental variables. This is adopted because the existence of a continuum in the IF phenomenon highlights the existence of many dimensions of IF. This leads us to consider the existence of more than one source of endogeneity affecting the FI. The sources of endogeneity can be attributed to the existence of power outages (per month), total annual sales and the number of years of formality as instruments in the IV probit model. To be valid, an instrument must satisfy the following two conditions: it must have a direct relationship with the endogenous variable, but not with the dependent variable (Cameron and Trivedi 2010). Our three instruments meet both conditions.

Formally, for a three endogenous regressors, the IV Probit model can be state as:

$$Y_i^* = A_i \alpha + B_i \beta + C_i \gamma + X_i \theta + u_i \tag{1}$$

We do not observe Y_i^* and
$$\begin{array}{l} Y_i = 1 \;\; if \;\; Y_i^* \geq 0 \\ Y_i = 0 \;\; if \;\; Y_i^* \prec 0 \end{array}$$

$$A_i = X_i \Pi_1 + Z_i \Pi_2 + \upsilon_i \tag{2}$$

$$B_i = X_i \Pi_1 + Z_i \Pi_2 + \upsilon_i \tag{3}$$

$$C_i = X_i \Pi_1 + Z_i \Pi_2 + \upsilon_i \qquad (4)$$

Where $i = 1,...,N$, A_i, B_i, C_i is a vector of endogenous variables, X_i is a vector of exogenous variables, Z_i is a vector of instruments that satisfy the requirements of instrumental exogeneity and relevance, α, β, γ and θ are vectors of structural parameters, equations (2), (3) and (4) is written in its reduced form, and Π_1 and Π_2 are matrices of reduced form parameters.

The model is jointly estimated using Maximum Likelihood Estimator (MLE) and is derived under the assumption that (u_1, υ_i) is independently and identically distributed (iid) multivariate normal for all observations.

3.2. Data

The study uses national data from eight Central African countries. Data is collected from the International Monetary Fund's Financial Access Survey, the World Bank's Global Financial Development Database and the KOF Swiss Economic Institute. The countries selected for the study include Angola, Cameroon, Gabon, Congo, DRC, Equatorial Guinea, CAR, Chad.

4. Results

In order to understand the drivers of financial inclusion (FI) of formal enterprises, a summary analysis is conducted for five groups of variables: FI indicators, enterprise characteristics, business environment, characteristics leaders and countries. The results for these groups are presented in Table 1.

Table 1: Summary Statistics

Group variables	Variables	Comments	Mean	Std. Dev	Min	Max
Financial inclusion indicators						
	Check finance by external auditor	2,297	50.72	50.01	0	1
	No finance check by external auditor	2,297	49.28	50.01	0	1
	Have bank account	2,297	88.46	31.95	0	1
	No bank account	2,297	11.54	31.95	0	1
	Access to credit	2,297	23.29	42.28	0	1
	No access to credit	2,297	76.71	42.28	0	1
	Use Mobile Money	2,297	20.00	40.00	0	1
	Do not use Mobile Money	2,297	80.00	40.00	0	1
Enterprise characteristics						
	Manufacturing sector	2,297	31.35	46.40	0	1
	Sector services	2,297	45.62	49.82	0	1
	Retail sector	2,297	23.03	42.11	0	1

Group variables	Variables	Comm-ents	Mean	Std. Dev	Min	Max
	Legal status other	2,297	43.06	49.53	0	1
	Legal status own account	2,297	56.94	49.53	0	1
	City with 1 million and fewer people	2,297	3.29	46.98	0	1
	City over 1 million people	2,297	67.13	46.98	0	1
	Micro enterprise size	2,297	13.89	34.59	0	1
	Small business size	2,297	69.09	46.22	0	1
	Medium enterprise size	2,297	11.93	32.42	0	1
	Large enterprise size	2,297	5.09	21.99	0	1
	Total annual sales	2,297	18.62	3.84	7,495	26,427
	Number of forRDCty years	2,297	20.09	12.20	4	115
Business environment (easy of doing business indicators)						
	No informal competition	2,297	30.69	46.13	0	1
	Informal competition	2,297	69.31	46.13	0	1
	No take part of business association	2,297	39.88	48.98	0	1
	Take part of business association	2,297	60.12	48.98	0	1
	Number of Power outages per month	2,297	11.01	26.00	0	730
Top manager characteristics						
	Experience	2,297	18.26	10.28	1	60
	Experience Square	2,297	439.23	476.47	1	3600
	Male	2,297	88.59	31.76	0	1
	Female	2,297	11.41	31.80	0	1
Countries						
	Gabon	2,297	6.53	24.71	0	1
	Angola	2,297	31.43	46.43	0	1
	GE	2,297	13.06	33.70	0	1
	Cameroon	2,297	13.15	33.80	0	1
	DRC	2,297	16.11	36.77	0	1
	Chad	2,297	6.57	24.79	0	1
	CAR	2,297	6.62	24.86	0	1
	Congo	2,297	6.53	24.71	0	1

Note: This table displays the summary statistics for the dependent variables studied and characteristics used in our estimations.

4.1. Analysis of Key Factors in the choice of Determinants of Financial Inclusion

Table 2 shows the significant influence of company characteristics on the indicators External audit and bank account FI. The service sector has a positive and significant impact on the likelihood of a formal business choosing a bank account as a means of FI. Own-account legal status reduces the probability of a formal business being financially included by an external audit and a bank account by 1 to 5%. Additionally, being located in a large city significantly increases the likelihood of a formal company being financially included in the external audit. This result shows that external audit and the CGA are only present in urban areas. However, small and medium sizes significantly increase the probability of being financially included by bank account at 1% and 5%. This result shows the effectiveness of external audit such as CGA in providing tax and accounting

assistance to small businesses. As turnover increases, formal businesses tend to use all available modes of financial inclusion.

Regarding the business environment, informal competition significantly increases, by 5 to 10%, the probability of a formal business being financially included by an external audit and a bank account. Otherwise, being part of a trade association significantly increases by 1% the probability that a formal firm will be financially included by the external audit and have access to credit channels.

Taking into account the characteristics of the top manager, being a woman positively and significantly influences, by 10%, the probability that a formal company is financially included by owning and using a bank account. Furthermore, compared to men, being a woman reduces by 10% the probability that a formal business will be financially included thanks to access to credit.

Beyond the characteristics, the analysis of the countries shows that Gabon, Cameroon and the DRCsignificantly and positively increase, respectively by 1% and 5%, the probability that a formal company is financially included through the external audit channel.

This result may reflect the presence of the Approved Management Center (CGA) in business management. On the other hand, compared to Angola, Equatorial Guinea (GE), Chad and Congo significantly reduce by 1% the probability that a formal company is financially included through the external audit channel. This result may indicate the ineffectiveness of CGAs in these countries due to excessively high registration fees. THE Cameroon significantly and strongly increases, to 1%, the probability that a formal business is financially included through access to the credit channel.

Furthermore, the trivariate probit model estimation results reported in Table 2 show that the correlation coefficients of the trivariate probit error terms are significantly and statistically different from zero, confirming an interdependence of the FI indicators. Thus, the FI does not only depend on the specific characteristics of each indicator, but also on thepredominance of other characteristics.

4.2. Additional Analyzes

4.2.1. Predicted Probabilities and Treatment Effects

The results of our descriptive statistics show a predominance of small businesses. Table 3 first shows the marginal probabilities of the choice of the IF indicator. These include the probabilities of using an IF indicator conditioned on observable characteristics. It appears that the financial inclusion indicator by bank account is the most used by formal businesses.

Tables 2: Estimates of the Trivariate Probil Model

Variables	Coefficients			Marginal effects		
	External Audit	Bank Account	Access to Credit	External Audit	Bank Account	Access to Credit
Services	0.0582	0.193**	0.0234	0.0561	0.180**	0.0386
	(0.0692)	(0.0880)	(0.0718)	(0.063)	(0.089)	(0.073)
Retail	0.0222	0.102	-0.0427	0.0399	0.169	-0.039
	(0.0929)	(0.117)	(0.0909)	(0.933)	(0.123)	(0.094)
Own account	-0.402***	-0.223***	-0.112	-0.393***	-0.193**	-0.113
	(0.0639)	(0.0827)	(0.0692)	(0.064)	(0.09)	(0.07)
City over 1 million people	0.229***	0.131	-0.0375	0.213***	0.102	-0.062
	(0.0683)	(0.0828)	(0.0712)	(0.069)	(0.085)	(0.072)
Small size	-0.241***	0.251**	0.0683	-0.240***	0.201**	0.078
	(0.0912)	(0.106)	(0.0929)	(0.092)	(0.117)	(0.093)
Medium size	-0.0505	1,052***	0.0788	-0.051	0.878***	0.080
	(0.120)	(0.213)	(0.115)	(0.119)	(0.204)	(0.115)
Large size	-0.214	-0.256	-0.0730	-0.251	-0.347***	-0.082
	(0.162)	(0.186)	(0.142)	(0.16)	(0.191)	(0.146)
Dirty	0.168***	0.131***	0.123***	0.173***	0.139***	0.132***
	(0.0142)	(0.0176)	(0.0152)	(0.014)	(0.018)	(0.016)
Informal competition	0.129**	0.215***	0.0771	0.122**	0.195*	0.086
	(0.0629)	(0.0790)	(0.0679)	(0.063)	(0.081)	(0.068)
Business association	0.434***	0.0440	0.428***	0.429***	0.062	0.421***
	(0.0616)	(0.0791)	(0.0676)	(0.062)	(0.084)	(0.068)
Power outages	-0.000136	0.00362	-0.000611	-0.0001	0.004	-.0006
	(0.00113)	(0.00308)	(0.00130)	(0.001)	(0.003)	(0.0012)
Experience	-0.00929	-0.0215	0.0368***	-0.0076	-0.018	.039***
	(0.00993)	(0.0131)	(0.0108)	(0.01)	(0.0131)	(0.0111)
Experience Square	6.76e-05	0.000395	-0.000856***	.000035	0.00031	-.00088***
	(0.000210)	(0.000291)	(0.000233)	(0.0002)	(0.0003)	(0.00024)
Female	0.0109	0.328**	-0.169*	0.0127	0.322*	-0.145*
	(0.0909)	(0.127)	(0.101)	(0.091)	(0.128)	(0.101)
Gabon	0.249*	0.103	-0.00672	0.250**	-0.021	0.053
	(0.130)	(0.203)	(0.130)	(0.129)	(0.193)	(0.131)
GE	-0.749***	-0.172	-0.993***	-0.748***	-0.058	-0.980***
	(0.107)	(0.155)	(0.136)	(0.108)	(0.171)	(0.138)
Cameroon	0.996***	0.188	0.808***	1,032***	0.242	0.910***
	(0.151)	(0.173)	(0.158)	(0.153)	(0.176)	(0.167)
DRC	0.539***	-0.00525	-0.138	0.546***	-0.066	-0.112
	(0.0978)	(0.129)	(0.0944)	(0.098)	(0.130)	(0.095)
Chad	-0.284**	-0.266	0.0334	-0.313***	-0.330**	0.070
	(0.124)	(0.174)	(0.130)	(0.125)	(0.174)	(0.130)
CAR	0.429***	-0.0538	-0.188	0.636***	0.0067	-0.221
	(0.078)	(0.113)	(0.0009)	(0.008)	(0.171)	(0.0558)
Congo	-0.554***	-0.924***	-0.316**	-0.555***	-0.969***	-0.250*
	(0.137)	(0.143)	(0.149)	(0.137)	(0.143)	(0.145)
Constant	-3.163***	-1,349***	-3.584***			
	(0.330)	(0.402)	(0.361)			
log likelihood	-3040.7744					
Wald chi2(60)	925.57					
Prob > chi2	0.0000					

Correlation among dependent variables						
Rho (audit-account)		0.126***				
		(0.0407)				
Rho (audit-credit)		0.0826**				
		(0.0357)				
Rho (account-credit)		0.189***				
		(0.0441)				
Comments	2,297	2,297	2,297	2,297	2,297	2,297

Notes: Dependent variable: three dummies variables: checking financial state by external audit, having and using bank account and having access to credit in financial institution. The modality of reference for the estimates are: manufacturing sector, other legal status,City with 1 million and less of persons, micro size, no informal competition no business association, male and Ivory Coast.Standard errors in parentheses. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level.

Overall, the marginal probability of choosing the bank account indicator is 0.814%. This result is consistent with our synthetic analyses, which previously estimated the proportion of formal businesses financially included by the bank account indicator at 81.4%. Furthermore, the indicator with the lowest propensity in the FI process is access to credit, witha probability estimated at 0.203.

Furthermore, it is possible to highlight the effect of the use of mobile money on the choice of an FI indicator. More precisely, we observe the variation in the marginal probability with the use or not of mobile money for financial transactions. For example, the marginal probability of choosing a bank account as an FI indicator is approximately 0.803 for formal businesses that use mobile money and 0.824 for those that do not use mobile money. For formal firms that choose FI via external audit, the marginal probability is overall 0.501 and 0.420 for formal firms that usemobile money and 0.522 for those who do not use mobile money.

Additionally, Table 3 presents the predicted values of the joint probabilities of the IF indicators. These are the probabilities that a company will combine or choose more than one FI indicator. Overall, the joint probabilities decrease with the number of IF indicators. Indeed, the predicted probability of choosing any IF indicator is 1.02, while the probability of choosing all three IF indicators is 0.12. Similarly, the highest joint probability of using two FI indicators is 0.433, which means that formal firms are more likely to use external audit and bank account indicators, whether they use or not mobile money. Furthermore, we observe that the effect of mobile money remains relevant for all joint probabilities, since their average value increases for formal businesses that do not use it.

Table 3: Marginals and Joint probabilities

Marginal probabilities	Overall		Use MOMO		Not use MOMO	
P(A=1)	0.501	(0.251)	0.420	(0.237)	0.522	(0.251)
P(B=1)	0.814	(0.120)	0.803	(0.134)	0.824	(0.114)
P(C=1)	0.203	(0.141)	0.212	(0.124)	0.238	(0.145)
Probability joints						
P(A=1, B=1, C=1)	0.120	(0.140)	0.127	(0.117)	0.168	(0.144)
P(A=1, B=1)	0.433	(0.254)	0.389	(0.237)	0.494	(0.253)
P(A=1, C=1)	0.157	(0.137)	0.125	(0.134)	0.165	(0.141)
P(B=1, C=1)	0.217	(0.141)	0.193	(0.124)	0.2233	(0.144)
P(A=1, B=1, C=0)	0.313	(0.146)	0.262	(0.145)	0.325	(.143)
P(A=1, B=0, C=1)	-0.0029	(0.0224)	-0.0021	(0.018)	-0.0031	(0.0233)
P(A=0, B=1, C=1)	0.057	(0.040)	0.066	(0.0345)	0.055	(0.041)
P(A=1, B=0)	-0.437	(0.522)	-0.609	(0.482)	-0.396	(0.523)
P(A=0, B=1)	0.948	(0.487)	0.819	(0.498)	0.979	(0.479)
P(A=1, C=0)	-0.122	(0.652)	-0.346	(0.615)	-0.067	(0.649)
P(A=0, C=1)	-0.986	(0.405)	-1.009	(0.363)	-0.980	(0.415)
P(B=1, C=0)	0.948	(0.487)	0.819	(0.498)	0.979	(0.479)
P(B=0, C=1)	-1.046	(0.391)	-1.077	(0.345)	-1.038	(0.402)
P(A=1, B=0, C=0)	-0.435	(0.524)	-0.607	(0.482)	-0.393	(0.525)
P(A=0, B=1, C=0)	0.890	(0.491)	0.753	(0.496)	0.924	(0.484)
P(A=0, B=0, C=1)	-1.043	(0.393)	-1.075	(0.346)	-1.035	(0.403)
P(A=0, B=0)	-0.959	(0.362)	-0.955	(0.294)	-0.961	(0.376)
P(B=0, C=0)	-0.351	(0.460)	-0.487	(0.398)	-0.318	(0.468)
P(A=0, C=0)	0.974	(0.420)	0.874	(0.409)	0.998	(0.419)
P(A=0, B=0, C=0)	1.020	(1.326)	0.120	(0.120)	0.958	(1.305)

Notes: 'A' is external audit, 'B' is bank account and 'C' is access to credit. Standard Deviation are in parentheses.

The analysis of the effects of the treatments highlights two cases. Concerning the first case, we observe that the use of external audit and access to credit respectively as FI indicators has a negative and significant effect on the bank account up to 1%. The effect is significant when businesses do not use mobile money.

Regarding the second case, we observe that, for a formal company, the use of external audit and bank account as FI indicators has a positive effect of 0.402 on the access to credit indicator. This means that the probability of being financially included through access to credit increases by 0.402 when external audit and bank account are already chosen by a company as FI indicators, compared to the same probability for a company that is not financially included by external audit and bank account. This result is also observed when we consider companies that do not use mobile money.

Tables 4: Conditional probabilities and treatment effects

Conditional Probabilities	Overall		Use MOMO		Not use MOMO	
P(A=1|B=1)	0.348	(0.679)	0.306	(0.487)	0.358	(0.718)
P(A=1|B=0)	0.587	(5.124)	0.573	(5,684)	0.590	(4,980)
P(A=1|C=1)	-0.632	(12.162)	-0.239	(1,459)	-0.728	(13,539)
P(A=1|C=0)	-0.217	(31,560)	-1.018	(25,558)	-0.022	(32,860)
P(B=1|A=1)	2,090	(46,649)	2,419	(29.00)	-0.989	(19,610)
P(B=1|A=0)	8,648	(184.03)	0.131	(20,355)	1,287	(31,618)
P(B=1|C=1)	-0.863	(17,606)	-0.342	(1,695)	2.010	(50.011)
P(B=1|C=0)	1,502	(30,442)	2,391	(25,038)	10,717	(20,884)
P(A=1|B=1, C=1)	0.624	(0.238)	0.548	(0.222)	0.642	(0.238)
P(A=1|B=0, C=0)	1.042	(4.391)	0.912	(6,817)	1.074	(3,563)
P(A=1|B=0, C=1)	0.003	(0.036)	0.003	(0.028)	0.004	(0.037)
P(B=1|A=1, C=1)	0.624	(0.238)	0.548	(0.222)	0.642	(0.238)
P(B=1|A=0, C=0)	0.803	(1,265)	0.698	(1,495)	0.828	(1.202)
P(B=1|A=1, C=0)	0.711	(0.143)	0.721	(0.124)	0.709	(0.147)
P(B=1|A=0, C=1)	0.376	(0.238)	0.452	(0.222)	0.358	(0.238)
P(C=1|A=1, B=1)	0.289	(0.143)	0.279	(0.124)	0.291	(0.147)
P(C=1|A=0, B=0)	1,088	(0.112)	1.126	(0.132)	1,079	(0.105)
P(C=1|A=1, B=0)	-0.043	(0.155)	-0.046	(0.143)	-0.042	(0.157)
P(C=1|A=0, B=1)	0.376	(0.238)	0.452	(0.222)	0.358	(0.238)
Treatment Effects						
P(A=1|B=1) - P(A=1|B=0)	-0.239*	[0.109]	-0.268	[0.269]	-0.232**	[0.117]
P(A=1|C=1) - P(A=1|C=0)	-0.415	[0.706]	0.780	[1.209]	-0.706	[0.827]
P(B=1|A=1) - P(B=1|A=0)	-6.56**	[3,964]	-0.364	[0.323]	-0.432***	[0.083]
P(B=1|C=1) - P(B=1|C=0)	-2.366***	[0.734]	2,288	[1,681]	-8,708**	[4,909]
P(C=1|A=1) - P(C=1|A=0)	-0.239*	[0.108]	-2,733***	[1,184]	-2.276***	[0.865]
P(C=1|B=1) - P(C=1|B=0)	-0.415	[0.706]	-0.150***	[0.069]	-0.186***	[0.028]
P(A=1|B=1,C=1) - P(A=1|B=0,C=0)	-0.402***	[0.092]	-0.269	[0.269]	-0.232**	[0.117]
P(B=1|A=1,C=1) - P(B=1|A=0,C=0)	-0.179***	[0.026]	0.779	[1.209]	-0.706	[0.827]
P(C=1|A=1,B=1) - P(C=1|A=0,B=0)	0.402***	[0.092]	-0.364	[0.323]	0.432***	[0.083]

Notes: A' is external audit, 'B' is bank account and 'C' is access to credit. For conditional probabilities, Standard Deviation are in parentheses. For Treatments Effects, Standard Error are in brackets *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% high.

5. Discussion and Conclusion

This contribution made it possible to assess the impact of financial inclusion in Central African countries by considering, on the one hand, the correlation between FI indicators and, on the other hand, the existence of a continuum in the IF phenomenon.

We see that the majority of businesses are excluded from accessing credit because they are small businesses with their own account. Regarding the determinants of FI at the micro level, it appears that firm characteristics significantly influence external audit and bank account FI indicators. Additionally, power outages increase financial exclusion.

This result shows that to improve the business environment, reforms to promote access and supply of electricity are effective and good, but the quality of

Tables 5: Estimates of the Instrumental Variable Probil Model (coefficients)

VARIABLES	FINANCIAL EXCLUSION								FINANCIAL INCLUSION							
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
	dim_FI1	Power Outage	Annual Sales	Years of forRDCty	dim_FI2	Power outage	Annual Sales	Years of ForRDCty	dim_FI3	Power outage	Annual Sales	Years of ForRDCty	dim_FI4	Power outage	Annual dirty	Years of forRDCty
Power outages	0.0162*** (0.00555)				-0.00978* (0.00517)				0.00587 (0.00716)				0.0151*** (0.00546)			
Total annual sale	-0.0390*** (0.0145)				0.00583 (0.00899)				0.0173* (0.00991)				-0.00686 (0.0115)			
ForRDCtyyears	0.0748*** (0.00895)				-0.0837*** (0.00495)				0.0816*** (0.00856)				0.0406* (0.0222)			
Services	-0.135** (0.0679)	-0.497 (1.274)	0.222* (0.103)	0.652 (0.521)	0.0217 (0.0534)	-0.542 (1.277)	0.226** (0.103)	0.487 (0.517)	0.0675 (0.0603)	-0.478 (1.288)	0.220* (0.103)	0.422 (0.523)	-0.0216 (0.0707)	-0.412 (1.273)	0.229** (0.103)	0.735 (0.519)
Retail	-0.176* (0.0937)	-0.225 (1.666)	0.202 (0.135)	0.104 (0.663)	0.0148 (0.0646)	-0.505 (1.697)	0.208 (0.136)	-0.489 (0.641)	0.0375 (0.0664)	-0.213 (1.716)	0.197 (0.136)	-0.376 (0.648)	0.123 (0.0835)	-0.634 (1.685)	0.236* (0.136)	0.0271 (0.699)
Own account	0.395*** (0.0739)	-2.098* (1.166)	-1.276*** (0.0946)	-2.056*** (0.476)	-0.0293 (0.0660)	-1.929* (1.167)	-1.269*** (0.0946)	-1.986*** (0.473)	0.109 (0.0689)	-1.865 (1.168)	-1.269*** (0.0946)	-1.919*** (0.475)	-0.311** (0.140)	-1.816 (1.167)	-1.269*** (0.0946)	-1.850*** (0.475)
City over 1 million people	-0.243*** (0.0592)	0.785 (1.259)	0.599*** (0.102)	2.407*** (0.520)	0.134* (0.0550)	0.874 (1.262)	0.606*** (0.102)	2.370*** (0.513)	-0.117* (0.0656)	0.915 (1.274)	0.601*** (0.102)	2.283*** (0.522)	-0.0637 (0.0860)	1.149 (1.265)	0.602** (0.102)	2.640*** (0.513)
Small size	0.436** (0.104)	2.687* (1.614)	-1.318*** (0.131)	-6.646*** (0.658)	-0.307*** (0.0994)	2.919* (1.619)	-1.316*** (0.131)	-6.333*** (0.655)	0.412*** (0.106)	2.833* (1.624)	-1.311*** (0.131)	-6.321*** (0.657)	0.0666 (0.191)	2.862* (1.616)	-1.322*** (0.131)	-6.558*** (0.659)
Medium size	0.0841 (0.161)	-0.438 (2.115)	-0.0919 (0.171)	-5.440*** (0.863)	-0.326*** (0.101)	-0.226 (2.115)	-0.0885 (0.171)	-5.187*** (0.862)	0.388*** (0.104)	-0.242 (2.122)	-0.0829 (0.171)	-5.060*** (0.864)	0.295* (0.148)	-0.277 (2.114)	-0.0919 (0.171)	-5.343*** (0.862)
Large size	-0.0911 (0.167)	2.017 (2.768)	0.998*** (0.224)	-0.922 (1.130)	0.0768 (0.123)	2.008 (2.767)	0.998*** (0.224)	-0.926 (1.130)	0.0390 (0.120)	2.016 (2.767)	0.998*** (0.224)	-0.896 (1.132)	-0.0496 (0.144)	2.001 (2.767)	0.998*** (0.224)	-0.934 (1.128)
Informal competition	-0.218*** (0.0593)	1.900 (1.168)	-0.160* (0.0946)	1.311*** (0.476)	0.0868* (0.0517)	1.780 (1.169)	-0.162* (0.0946)	1.171** (0.475)	-0.0704 (0.0595)	1.810 (1.169)	-0.163* (0.0946)	1.164** (0.476)	0.00108 (0.0790)	1.723 (1.169)	-0.157* (0.0946)	1.220** (0.477)
Business association	-0.157*** (0.0569)	-0.832 (1.161)	0.394*** (0.0941)	1.339*** (0.472)	-0.107 (0.0666)	-0.981 (1.162)	0.393*** (0.0941)	1.119** (0.471)	0.0196 (0.0665)	-0.903 (1.165)	0.390*** (0.0941)	1.140** (0.472)	0.419*** (0.127)	-0.895 (1.160)	0.396*** (0.0941)	1.312*** (0.473)
Experience	-0.00544 (0.0102)	-0.201 (0.183)	-0.0133 (0.0148)	0.264*** (0.0741)	0.00637 (0.00850)	-0.266 (0.183)	-0.0149 (0.0148)	0.199*** (0.0739)	-0.0283*** (0.00809)	-0.259 (0.184)	-0.0155 (0.0148)	0.193*** (0.0744)	0.0322* (0.0154)	-0.274 (0.183)	-0.0137 (0.0148)	0.217*** (0.0746)
Experience2	-0.000598*** (0.000198)	0.00529 (0.00387)	0.000587* (0.000313)	0.00445*** (0.00157)	0.000672*** (0.000165)	0.00627 (0.00387)	0.000610* (0.000313)	0.00546*** (0.00157)	-0.000235 (0.000203)	0.00615 (0.00388)	0.000621** (0.000313)	0.00558*** (0.00157)	-0.00101*** (0.000222)	0.00633 (0.00387)	0.000592* (0.000313)	0.00510*** (0.00158)
Gabon		16.24*** (2.624)	-0.326* (0.191)	-2.440*** (0.921)		17.81*** (2.385)	-0.268 (0.191)	-1.418 (0.941)		18.05*** (2.365)	-0.268 (0.191)	-1.079 (1.122)		17.15*** (2.453)	-0.231 (0.190)	-1.412 (0.993)
GE		3.676* (1.951)	2.015*** (0.160)	-2.849*** (0.813)		2.451 (1.969)	1.972*** (0.160)	-3.707*** (0.762)		2.551 (2.028)	1.984*** (0.161)	-3.252*** (0.923)		1.297 (1.993)	2.012*** (0.162)	-4.300*** (0.784)
Cameroon		8,981*** (1.795)	-8.107*** (0.147)	-1,734** (0.738)		8,238*** (1.810)	-8.130*** (0.147)	-2.329*** (0.722)		8,279*** (1.813)	-8.130*** (0.147)	-2.258*** (0.748)		7,718*** (1.823)	-8.108*** (0.148)	-2.503*** (0.736)

VARIABLES	dim_FI1	Power Outage	Annual Sales	Years of forRDCty	dim_FI2	Power outage	Annual Sales	Years of ForRDCty	dim_FI3	Power outage	Annual Sales	Years of ForRDCty	dim_FI4	Power outage	Annual dirty	Years of forRDCty
DRC		1,275 (1,623)	-0.592*** (0.137)	-0.217 (0.568)		1,692 (1,741)	-0.606*** (0.139)	0.804* (0.453)		1,150 (1,815)	-0.586*** (0.138)	0.586 (0.461)		0.745 (1,620)	-0.611*** (0.136)	-0.629 (0.661)
Chad		13.68*** (2.297)	0.458** (0.195)	-2.577** (1.013)		12.48*** (2.367)	0.392* (0.195)	-2.804*** (0.867)		11.87*** (2.441)	0.406* (0.195)	-3.259*** (0.939)		12.56*** (2.339)	0.347* (0.194)	-3.809*** (1.034)
CAR		1,476* (0.549)	3.315*** (0.0160)	2.048*** (0.138)		1,341 (1.009)	1,356*** (0.018)	-0.207*** (0.262)		2,781 (2.002)	1,894* (0.341)	-4.052*** (0.234)		1,379 (1.394)	0.012*** (0.620)	-12800*** (0.442)
Congo		6.113*** (2.335)	-0.104 (0.191)	2.684*** (0.859)		3.323 (2.429)	-0.163 (0.192)	-0.281 (0.610)		3.439 (2.900)	-0.216 (0.194)	-1.538** (0.723)		2.879 (2.400)	-0.0963 (0.191)	0.769 (1.039)
Constant	-1.341*** (0.244)	6,348** (2.968)	20.42*** (0.241)	16.92*** (1.198)	1,256*** (0.242)	7,377*** (2.979)	20.44*** (0.241)	18.00*** (1.190)	-1,897*** (0.226)	7,223*** (2.996)	20.46*** (0.241)	18.11*** (1.196)	-2.018*** (0.319)	7,685*** (2.977)	20.41*** (0.241)	17.69*** (1.218)
Rho (pow_, dim_FIi)	-0.450** (0.178)				0.237* (0.143)				-0.117 (0.193)				-0.438*** (0.170)			
Rho (sale_, dim_FIi)	-0.162*** (0.0318)				0.0129 (0.0429)				-0.0713* (0.0442)				0.207** (0.0974)			
Rho (form_, dim_FIi)	-1.073*** (0.239)				1,251*** (0.189)				-1.162*** (0.296)				-0.434 (0.281)			
Rho (dirty, pow_)	-0.00776 (0.0209)				-0.00820 (0.0209)				-0.00812 (0.0209)				-0.00843 (0.0209)			
Rho (form_, pow_)	-0.00888 (0.0209)				-0.00979 (0.0209)				-0.01000 (0.0210)				-0.0106 (0.0209)			
Rho (form_, dirty)	0.154** (0.0209)				0.153*** (0.0209)				0.153*** (0.0209)				0.153*** (0.0209)			
Sigma (pow_)		3.235*** (0.0148)				3.235*** (0.0148)				3.234*** (0.0148)				3.235*** (0.0148)		
Sigma (sale_)			0.721*** (0.0148)				0.721*** (0.0148)				0.721*** (0.0148)				0.721*** (0.0148)	
Sigma (form_)				2.339*** (0.0148)				2.339*** (0.0148)				2.341*** (0.0148)				2.337*** (0.0148)
Comments	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297	2,297

Note: Dependent variables: dimensions of Financial Inclusion (FI). FI contains four dimensions: dimension_1 (dim_FI1): enterprise not use an FI indicator; dimension_2 (dim_FI2): enterprise use exactly one FI indicator; dimension_3 (dim_FI3): enterprise use exactly two FI indicators and dimension_4 (dim_FI4): enterprise use all the three FI indicators. OLS regression and three Probit regression for each dimension of FI. Instruments are power outages (pow_), total annual sales (sale_) and number of years of forRDCty (form_). The modality of reference for the estimates are: manufacturing sector, other legal status, City with 1 million and less of persons, micro size, no informal competition, no business association, and Côte d'Ivoire. Standard errors in parentheses. *** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level. Coefficients in the table.

electricity infrastructure is poor. It is important that leaders adapt their reforms by improving the quality of electricity infrastructure. Our study shows that external audits, such as CGA, are only available in urban areas. Furthermore, it has been shown that more businesses are informal due to weakvarious legislative reforms.

Finally, it seems that mobile money offered by mobile telephone operators makes it easier to send and receive money even if unlike a bank account, it does not allow you to borrow money. We then see that mobile money can be considered as an FI solution rather than an FI indicator, because it helped the other indicators in their function. We find that external audit as CGA is an important indicator of FI because it helps companies in Central African countries develop business strategies and encourages companies to use the other indicators of FI. Likewise, access to credit becomes possible when the company benefits from the strategies and advice of external audit asCGA.

We recommend to decision-makersCentral African countries to open their economies to allow their local financial systems to integrate into global financial markets, which constitutes a step towards advanced financial inclusion through the creation of innovative financial services. They must pay particular attention to increasing the enrollment rate in rural schools. It is also important to raise awareness among populations of the need to subscribe to financial services offered by appropriate establishments. Furthermore, financial sector leaders should prioritize the service sector, adopt effective strategies to promote the stability of the sector to avoid financial shocks, maintain consumer confidence and protect customer deposits.

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