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SOCIO-ECONOMIC AND GEOGRAPHICAL DETERMINANTS OF FINANCIAL INCLUSION IN CAMEROON

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Abstract

The purpose of this article is to identify the socio-economic and geographic determinants of financial inclusion in Cameroon. In terms of methodology, the data used come from two Global Findex databases in 2011 and in 2014 built by the World Bank. Multiple correspondence analysis (MCA) allowed us to transform the qualitative variables of financial inclusion into a composite index of access and use of financial services for each individual. The respective application of the dissimilarity index method and the multiple linear regression model allowed us to highlight the different determinants. Ultimately, the results show us that socioeconomic and geographic factors (income, education, gender, age, area of residence) determine financial inclusion. Following these results, we recommend that the state authorities set up a banking plan which consists in finding the means which allow the population to have a bank account and to have easy access to formal financial services in order to reduce the income inequality. Particular attention must be paid to school infrastructure in rural areas to avoid the long distances to be traveled which delay the first registration of children at school age.

Introduction

The reforms for financial inclusion date from 2002, the year in which the United Nations (UN) castigated the constraints that excluded the majority of the world's populations from the financial sector. The reason given is that the financial sector is the best channel for integrating people into economic activities so that they participate in economic growth. According to the UN (2005), 2005 was also called the year of micro credit to testify to the importance that the international community attaches to financial inclusion. Clearly, the broad consultations undertaken around the world from 2004 to 2005 had led to a better precision of the content of financial inclusion as being the access of the majority of populations and businesses to a variety of financial services including savings, credit, insurance, money transfers and payment methods at reasonable costs. In addition to these, these consultations had helped identify legal, institutional and financial reforms to be adopted by different countries for better financial inclusion (UN, 2006).

The international community through the G20 summit in Toronto on June 27, 2010 had also set out 9 principles intended to guide decision-makers in making decisions that are most unfavorable to innovation in financial inclusion. They are called the principles of innovative financial inclusion (improving the access of disadvantaged people to financial services through the rational dissemination of new approaches) and include leadership that maintains a widespread commitment within government to financial inclusion to help reduce poverty. Diversity implements strategic approaches that promote competition and offer market-based incentives to ensure sustainable access to financial services and the use of a wide range of affordable services such as, savings, credit, payments and transfers, insurance, and the diversity of service providers. Innovation within it brings together technology and the institution to expand access to and use of financial systems, including by strengthening infrastructure. Protection is about fostering consumer protection with a view to adopting a comprehensive approach that takes into account the roles of government, suppliers and consumers. Empowerment builds financial knowledge and skills in financial matters. Collaboration creates within the government an institutional framework in which the hierarchy of responsibilities and coordination are clearly defined. Knowledge uses better data to develop evidence-based policy, measure progress, and envision a step-by-step "learning by doing" approach that works for both regulators and service providers. Proportionality establishes a strategic and regulatory framework that is



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proportional to the risks and benefits of these innovative products and services. According to the declaration of the summit, these are principles flexible enough to be adapted to the context of different countries (G20, 2010).

In addition, some economists like Betbèze (2008) and Salin (1979) had explained the financial crisis of 2008 by financial exclusion which results in a gap between the demand and the supply of financial services and by a lack financial literacy. According to these economists, there has been a crisis because certain institutions such as micro-finance and post offices are kept outside of banking and financial regulations. Another reason is related to the fact that the law of supply and demand that governs trade should not be applied in all directions in the financial field. As asset prices rise, banks tend to increase credit. It is this gear that had generated the crisis by an excess of bank credits (Aglietta, 2008; Monnerie, 2011).

Long before this financial crisis of 2008, Cameroon's contemporary economic history was marked by the economic crisis of the mid-1980s. Unable to resolve the crisis on its own, the Cameroonian authorities had to resolve to appeal to Wood's Breton institutions, in particular the International Monetary Fund (IMF) and World Bank (WB) which imposed structural adjustment programs (SAP) on it, the objectives of which were: stabilization of the economy through the restoration of major balances macroeconomic growth, and the reduction of its vulnerability to external shocks. These programs are characterized, among other measures, by a policy of liberalization of the financial sector whose objective is to improve the growth and the efficiency of the economy. According to Mac Kinnons (1973) and Shaw (1973), this policy aims not only to rehabilitate the banking sector, but also to increase the growth rate of a country. However, financial liberalization has helped restore confidence and strengthen the solidity of banks; it has not been able to respond effectively to the expectations of the populations, in particular the poorest (Taylor, 1983; VanVijnbergen, 1982). Countries that have adopted it have had mixed results in favor of the most disadvantaged. Thus, banks with completely private capital (SGBC, SCBC ...) were created. In these banks, the resource collection system has retained all of its main handicaps, as has the high level of transaction costs; some bank customers cannot get credit as much as they want even if they are willing to bear high interest rates. It is in this movement that Micro-Finance establishments (EMF) will be born and develop. These are generally considered to be the supply of financial services for the benefit of poor populations with little or no access to the services of conventional financial institutions (Prescott, 1997).

Despite the existence of MFIs, a significant number of poor people are turning to informal financial services, namely tontines, usury, means of hoarding. Indeed, between 1985 and 1986, almost half of the population of Cameroon participated in at least one tontine (Sandretto and Tiani, 1993) and this generated in Central Africa sums between 200 and 300 billion CFA francs per year (Alibert, 1989).

Nowadays, current ideas go beyond MFIs who opt for the concept of financial inclusion. These analyzes comfort the international community, which intends not only to encourage countries in their initiatives to promote financial inclusion, but to coordinate these initiatives.

These national initiatives and this international coordination have borne fruit because recent statistics show that from 2011 to 2014, 700 million people were financially included and benefited from a bank account (Demirque-kunt *et al.*; 2015). But most people have remained financially excluded, especially in the underdeveloped countries. In fact, in these countries in 2009, out of 40% of adults who had saved, two-thirds did so outside any banking network. In addition, less than 5% of adults received credit from a formal financial institution. However, over the same period, almost half of adults borrowed but informally for 9/10 of them (World Bank, 2012). This finding justifies why this research is precisely about financial inclusion in an underdeveloped country, specifically Cameroon.

Given these shortcomings, our contribution will be to show that financial inclusion is an effective factor for problems of income inequality in the Cameroonian context. Indeed, it promotes economic development and economic growth by allowing a growing share of households and SMEs to access a wide range of financial services at a reasonable cost (Guerineau *et al.* 2014). Likewise, it increases the poor's access to financial services. This is why it is considered to be an instrument capable of reducing poverty and income inequality (Cyn-Young



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Park and Rogelio, 2015). As a result, financial exclusion could only exacerbate income inequality between countries.

In light of all of the above, the objective of this article is to highlight the determinants of financial inclusion. Achieving its objectives will involve testing the assumption that the factors socioeconomic and geographic conditions determine financial inclusion. Hence the next question, what are the determinants of financial inclusion. Our article will be organized as follows: firstly, the presentation of the stylized facts, secondly a review of the literature, thirdly the methodology and finally the results and discussions.

Characterization of the sample data

It is a question here of presenting the general characteristics of the population studied, the description of the qualitative variables.

General Characteristics of the population studied

From Table 1 below presenting the data collected from the Global Findex 2011 database indicates that the data was collected on a group of 1000 individuals made up of 50.50% of men whose age is between 15 and 91 years old and 49.50% of women with an age group between 15 and 90 years old. The average age of the study population is 32 years. However, according to the level of education it was found that 33.07% of men and 42.22% of women have a primary education level; 64.55% of men against 56.57% of women and 2.38% of men against 1.21% of women have a secondary and higher education level respectively. As for the 2014 data, it consists of 48.90% of men aged 15 to 90 and 51.10% of women aged 15 to 82.

Table 1: General characteristics of the population studied

	Percentage		Average age	
	2011	2014	2011	2014
Man	50,50	48,90	32,76 ans	33,81
Woman	49,50	51,10	31,31 ans	31,98
Total	100,00	100,00	-	-

Source: Authors from Global Findex data

Thus, we can see that the more the level of education increases, the more the percentage of educated women decreases considerably.

Description of qualitative variables

There are several qualitative characteristics of our sample based on Global Findex data

Table 2: Characteristics of the population according to the income, health loan and school loan variables

Income quintile			Loan for health			Loan for schooling		
caractéristiques	Percentage		caractéristiques	Percentage		caractéristiques	Percentage	
	2011	2014		2011	2014		2011	2014
Poor	46,40	51,00	No	78,50	79,20	No	86,76	87,40
Not poor	53,60	49,00	Yes	21,50	20,80	Yes	13,24	12,50
Total	100,00	100,00	Total	100,00	100,00	Total	100,00	100,00

Source: Authors from Global Findex data

With regard to income quintiles, this statistical table indicates that 46.40% in 2011 against 51.00% in 2014 of the population belong to the income quintiles of the poor. Similarly, 53.60% in 2011 against 49.00% in 2014 of the population belong to the income quintile of the non-poor. Through this result, it comes to light that between 2011 and 2014, the number of poor people increased in Cameroon by 4.6%. The number of non-poor has also decreased in Cameroon and in the same proportion. This can be explained either by the fall in income or by the loss of



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employment of part of the population in the non-poor category. Regarding health loans, we note that during the surveys in 2011, 78.50% against 79.20% in 2014 of the population did not benefit from health loans. On the other hand, 21.50% in 2011 against 20.80% in 2014 had access to loans for health. Consequently, the percentage of the population not receiving health loans increased by 0.7% between 2011 and 2014 and for those benefiting from health loans fell by 0.7% in the same period.

Finally, it emerges from this statistical table that 86.76% in 2011 against 87.40% in 2014 of the population did not benefit from loans for schooling. Similarly, 13.24% in 2011 against 12.50% in 2014 of the population benefited from education loans. Consequently, the percentage of the population who did not receive a loan for schooling is high than that of the population who had access to a loan.

Table 3: Characteristics of the population according to the gender variable and level of education

Gender			Level of education		
Characteristics	Frequency		Characteristics	Percentage	
	2011	2014		2011	2014
Male	50,50	48,90	Primary	37,60	51,10
Female	49,50	51,10	Secondary	60,60	47,10
Total	100,00	100,00	Superior	1,80	1,80
			Total	100,00	100,00

Source: Authors from Global Findex data

This table indicates on the one hand that during the surveys, 50.50% in 2011 against 48.90% in 2014 of the population is male, a decrease of 1.6%. On the other hand, 49.50% in 2011 against 51.10% in 2014 of the population is female, an increase of 1.6%.

It appears from this table that in 2011, 37.60% against 51.10% in 2014 of the population is in primary education; 60.60% and 1.80% against 47.10% and 1.80% of the population is in secondary and higher education respectively. Thus, the percentage of the population that is in elementary school increased by 13.50% between 2011 and 2014, the percentage of the population that has a secondary level decreased by 13.50% and the percentage of the population at the higher level n has not changed in the same period. The educational level of women compared to that of men is high and still with a higher percentage of women in primary education than men.

Literature review

The latest reforms on the liberalization of the financial sector with the abolition of interest rates, the privatization of commercial banks, did not intensify the blossoming of access to financial services which was planned especially for low-income households and small and medium-sized enterprises (SMEs).

In the case of this article, it is a question of setting out the existing theories which relate to financial inclusion. During the 1980s, the development of the theory of endogenous growth made it possible to show that the financial factor can have effects, not only on the level of productivity, but also on their rate of growth. Thus, the works of Greenwood and Jovanovic (1990), Bencivenga and Smith (1991) have used endogenous growth models to analyze the interactions between financial factors with economic growth. The basic model of these models is that of Pagano (1993).

Literature of theoretical works

Theoretical analyzes on banking exclusion come to the conclusion that it is made up of "processes used to prevent certain social groups and individuals from accessing the financial system" (Leyshon and Thrift, 1995). These analyzes maintain that low income, gender, unstable forms of employment, psychological and cultural reasons discourage access to and use of banking services. In addition, these disadvantaged groups represent too great a risk to become clients of banking institutions (Kempson, 2006). These works converge with those developed by Beck and Torre (2006). Indeed, the latter have developed a theory explaining the obstacles linked to access to banking services. Named the theory of the borders of the possibilities of access, it constitutes a base for the identification of the socio-economic factors of banking exclusion. The purpose of this section lies in the theoretical



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analysis of the socioeconomic factors of banking exclusion. In order to highlight it, it is a question for us, to expose on the theory of borders possibilities of access on the one hand and the theory of barriers to access on the other hand, which bring out the convergence with the determinants of financial inclusion.

The theory of frontiers of access possibilities

Beck and De la Torre (2006) developed the theory of borders to access to financial services. Based on the economic theory of supply and demand, he identifies the problems of access to banking and financial services and their causes. The efficiency with which financial institutions and markets can overcome market frictions depends primarily on several invariable short-term state variables that affect the supply side of financial services and can limit participation. on the demand side. Thus, state variables impose an upper limit on the expansion of financial circuits in an economy at a given time.

The use of the concept of state variables allows us to define the border of the depth of the financial sector as a reasoned balance of demand and realized supply, variously affected by market friction. In other words, it is the depth (eg, volumes of credits and deposits), scope (eg, proportion of population reached) or maximum sustainable magnitude that 'a financial system (eg, diversity of domestic sources of long-term finance) can reasonably be achieved at any given time. In principle, this boundary can vary for various types of financial services depending on the sources of market friction. Thus, the border for payment and savings services and for equity markets, where transaction costs are the decisive constraint, may be different compared to credit and insurance services, where risk is a important additional element.

Theory financial inclusion / financial exclusion: the theory of barriers to access

Several studies have been developed to promote inclusion in order to involve all segments of the underbanked population in access to financial services and products. These are the theory of barriers to access and the theory of market imperfections. Studies show that access is the main factor in encouraging the financial inclusion of the excluded population. Yet the barrier to access is a factor behind the financial exclusion of the majority of the excluded population.

The theory of barriers to access has been developed by several authors on the level of penetration of banking and financial services. Some such as Amidzic, Massara and Mialou (2014) and Sarma (2008), Honohan (2008) have constructed a financial access indicator for 160 economies which combines both a household survey and data published by financial institutions in a composite indicator to capture the proportion of the population with access to financial services. While Clarke, G, Xu, L and Zou, H (2006) built the econometric model allowing to understand the existing relationship.

For access to financial services, studies by Leyshon and Thrift (1995), Kempson and Whyley (2001) highlight the implication of geographic factors (for example, lack of roads) in the exclusion of certain social strata. In fact, people living in rural areas and in places far from financial centers are more likely to be financially excluded. Thus, countries with low levels of income inequality tend to have a relatively high level of financial inclusion (Buckland et al. 2005; Kempson and Whyley, 1998).

The construction of a composite indicator of access to financial services has made it possible to highlight the influence of several factors on the level of national income. This is the age-related dependency ratio, the density of the population which explains very weakly the access to financial services. Thus, access to financial services significantly reduces poverty but, this result is valid only when access to financial services is the only regressive factor (i.e. it loses its significance when other variables are added to it).

Review of literature of empirical works

Financial institutions play a crucial role as financial intermediaries between fund providers and fund seekers through the financial services they provide; it is therefore essential to create an environment conducive to the furnishing of efficient financial services. In recent decades, the African financial system has grown rapidly (Allen et al. (2013); Allen et al. (2011); Beck and Cull (2013); Beck, Fuchs, and Uy (2009)). In the 1980s, public banks, subject to very restrictive regulations, underwent major changes in the financial systems of many countries on the



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continent. According to Beck and Cull (2013), many financial market indicators improved from 2000 to 2011. For example, the median value of the economy's liquid liabilities as a percentage of GDP fell from 20% to 31%, credits domestic relative to GDP from 11% to 18% and total deposits as a percentage of GDP from 12% to 22%. According to (Claessens, 2006), "financial access" or "financial accessibility" can be defined by distinguishing between accessibility and use, in a supply and demand framework. "Access" is the availability or supply of quality financial services at a reasonable cost while "use" is the actual consumption of financial services. Thus, access represents supply and use constitutes the intersection of supply and demand (World Bank 2008). Along the same lines Beck et al. (2008) explain that access is the possibility of using financial services while use is the actual use of services. Similarly, Servet et al. (2007) agree that the availability of an offer of reasonable quality and at an affordable cost (access) is distinguished from the actual use of services.

The term "FI" refers to providing access to financial services to "all" (CGAP and Monadia 2009). The United Nations targets two main dimensions of the IF (UNCDF, 2006). The first is access to a "wide variety" of "formal" financial services. The second is the possibility of choosing from "several providers" of financial services. "Inclusive finance does not require that all those who qualify use all the services, but that they should be able to choose to use them if they wish" (UNCDF, 2006). On the contrary, for Servet et al. (2007), it refers to "use", not financial "accessibility". Ramji (2009) adds a temporal aspect, by specifying that the delivery of services must be done in a "timely manner". Some are limited to "direct" access to services Beck, Hesse, et al. (2009) while others suggest considering access "indirectly" by a family member or friend Anne-Marie et al. (2006). In contrast, "financial exclusion" refers to the inability to access appropriate financial services Carbó, et al. (2005); Ramji 2009), marginalization, and even a "handicap" in access or use (Servet et al. 2007).

The FI seeks to ensure their financial viability and to increase their horizontal and vertical reach. The "horizontal scope" refers to the number of clients and the volume of services involved (size of the clientele), while the "vertical scope" refers to the socioeconomic level of the population served or their degree of exclusion (Christen et al. 2004; Helms 2006). Other researchers also use the concepts of extent and scale to speak of horizontal reach and the terms of social reach, degree of reach or simply reach to refer to vertical reach (Ledgerwood, 1999; Schreiner, 2002;; Christen et al. 2004; Lafourcade et al. 2005; CGAP, 2007).

Some studies have examined the individual determinants of financial inclusion.

Using the World Bank's Global Findex 2012 database, Allen et al. (2016) analyze these individual characteristics on a global scale. They find that the probability of having an account with a formal financial institution is higher for wealthier, more educated, older, urban, employed, married or separated individuals. The likelihood of formal savings is higher for the same individual characteristics. Finally, the probability of borrowing officially increases for older, educated, wealthy and married men.

According to the World Bank (2009), income is the factor that most affects the probability of an individual having a bank account and one of the main causes of the poor's inability to maintain a bank account. According to a World Bank survey (2013), 81% of respondents cited lack of funds as the main reason for not opening an official bank account. Almost all countries in sub-Saharan Africa require customers to have a minimum book balance. In most cases, the balance can reach 50% of gross national income (now GNI) per capita (Fosu, 2013). It also seems that the more the wealth of individuals increases, the more they borrow (Claessens, 2006, UNCDF, 2006). The poorest people are more concerned with their lack of financial income and that another family member has an account, while the more educated are more concerned with costs and confidence in the banking system. In addition, the difficulties encountered in obtaining the appropriate documentation necessary to open a bank account are often cited as obstacles to the lack of formal financial services (Akudugu, 2013; Hendricks and Chidiac 2011), exorbitant bank charges such as direct debits, withdrawal fees and monthly maintenance costs from banks worsen the situation (Tchouassi, 2012). Finally, average annual bank charges in SSA represent around 20% of the country's GNI per capita and for some commercial banks, bank service charges represent a quarter of their income (Beck and Maimbo, 2013).

Low income individuals represent riskier clients, but also shorter term loans, smaller amounts and more flexible (Collins et al., 2009). Small transaction sizes are costly for financial organizations (Matin, et al 2002; UNCDF, 2006; World Bank, 2008; Beck and Demirgüç-Kunt, 2008; Beck et al., 2009; Acclassato, 2010). Beck and De la



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Torre (2004) point out that financial organizations must increase the volume of their transactions to reduce the unit cost. Following the logic of Stiglitz and Weiss (1981), the increase in interest rates of financial organizations promotes the use of credit services by the wealthy; the poorest not being able to afford these higher costs. Although wealthy, age is a determining factor for financial inclusion.

Honohan and King (2012) found that up to the age of 45, the older the person, the more likely they are to be banked. From 45, however, the older she gets, the less likely she is to have a bank account. Also, an increase in the level of education increases the probability of the individual to be banked. Using the Global Findex 2012, Fungáčová and Weill (2015) study IF in China and find that wealthier, more educated and older men are more likely to be included financially. While in Africa (zing and Weil 2016) the elderly are therefore more likely to be financially included, but after a certain age, the probability of being financially included decreases as would be the case for the low level of education.

In addition, the regulatory, political, legal and economic environment matters (Kempson et al., 2000; Beck et al., 2004; Claessens, 2006; Vanroose, 2007a; World Bank, 2008; Demirgüç-Kunt and Levine, 2008; CGAP and World Bank, 2010b). The contractual, informational and regulatory frameworks influence the ease with which financial intermediaries can provide financial access to the population (IMCE, 2006; World Bank, 2008; Demirgüç-Kunt and Levine, 2008). Allen et al. (2016) provide evidence of the characteristics of countries influencing FI through high quality institutions, effective legal rules, rigorous contract enforcement and political stability lead to greater financial inclusion. In addition, the characteristics of the banking sector also play a key role. The high costs of opening and using bank accounts, but also the high requirements for distance and disclosure reduce formal inclusion. Moreover, oGauthier et al. (2000) observed a significant risk of non-performance of contracts among African manufacturing companies given their more elastic definition of flexibility; they expect contracts to be flexible. Furthermore, Beck and Honohan (2007) point out that the difficulty for providers to have access to information on the solvency of clients and on the reliability of execution of contracts often reflects a weak legal system. Moreover, "it is formal property which brings the process, the formalism and the rules for fixing goods in a state which will make it possible to realize them as active capital" (De Soto, 2000: 58). According to De Soto (2000), as long as there is no legal property regime, people spontaneously organize themselves into extralegal groups that operate outside official law.

The state can facilitate financial access by strengthening institutional infrastructure, liberalizing markets and encouraging competition in the sector (Claessens, 2006). In addition, financial liberalization and economic stability would increase competition and encourage targeting of niche markets (Vanroose, 2007a). Several countries have adopted such policies (Kempson et al., 2000; Carbo et al., 2005). Despite this, Claessens (2006) argues that government intervention can discourage financial intermediaries from reaching low-income individuals and that different financial services require different forms and degrees of regulation and supervision.

According to Morvant-Roux and Servet (2007), it is cheaper for providers to offer their services in urban areas, where the population density is higher (economy of scale). In rural areas, transport costs are higher and security of funds lower (Claessens, 2006; Morvant-Roux and Servet, 2007).

Adopted methodology

In general, the methodological framework sets out the approach, that is to say the methodological route used to study the problem. It will first be a question of presenting the data and the different variables, then presenting the different econometric models and estimation methods and finally present the hypothesis tests obtained.

Data and sources

The data used in this article are from secondary sources. They come from the Global Findex database (2011, 2014) on financial inclusion and income inequality indicators. The World Bank's Global Findex (2011) provides more than 60 indicators for 148 savings on how adults save, borrow, make payments and manage risk. It is the first public database of indicators to offer a consistent measure of use of financial products across savings for 2011. This survey collects information on 150,000 nationally representative adults chosen at random from 148 countries around the world. While the Global Findex database (2014) provides more than 100 indicators for 143 economies



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around the world. As in the first edition, its indicators are drawn from survey data covering nearly 150,000 people in more than 140 countries and representing more than 97 percent of the world's population.

The main feature of Global Findex is the availability of demographic parameters and the regular measurement of all countries over time. Its core indicators provide valuable data for a wide range of users. The global questionnaire provides detailed information on financial inclusion. It contains a large number of questions on access; the use and the reasons for the use of financial services. In addition, the database contains information on four characteristics of individuals (income, education, age and sex), which we will use in the estimates.

Presentation of variables

Through these different data sources, the literature has allowed us to identify three types of variables. On the one hand, the variables linked to income inequality (the explained variables), on the other hand, the variables linked to financial inclusion (explanatory variables) and the control variables.

➤ **Endogenous variable: Financial inclusion indicator (IF)**

It groups the variables related to access to financial services and those related to the use of financial services.

*** Variables related to access to financial services.**

In Global Findex, they are linked to the offer of financial services and correspond to the opening of an account either in a financial institution (microfinance institution, in a cooperative, in the post office or have a debit card linked to a financial institution) or by mobile money. The question usually asked is whether you have a bank account? And the coding adopted is: 1 for yes and 2 for no. In this study, a composite access index will be constructed to be able to capture all the information on the different aspects of access to financial services.

Table 3: Composite variables of access to formal financial services

Variables	Nature	Modalities
Has a account (Account)	discontinuous	1 = No 2 = yes
Has a debit card(Debit _ card)	discontinuous	1 = No 2 = yes
Has a créditcard (Credit _ card)	discontinuous	1 = No 2 = yes

Source: Global Findex 2011 and 2014

*** Variables related to the use of financial services**

For the Global Findex database, savings, borrowing and payment transfers are the main instruments used to measure the use of financial services and determined on the basis of demand for financial services. Individuals save for future needs (investing for studies, for a productive activity, to buy a good or even for retirement), borrow in the face of immediate needs and transfer payments either for settling bills. However, variables like: type_savings, type_credit, and use_mob_Fin will be generated here from other variables.

The Global Findex thus shows how individuals save, borrow and make transfers for expected or unintended expenses. The variables will however be represented in this work by the composite consumption index (ICU).

Table 4: Composite variables of the use of financial services

Variables	Nature	Modalities
Type of credit (Type _ credit)	discontinuous	1 = Informal 2 = Formal
Type of savings (Type _ savings)	discontinuous	1 = Informal 2 = Formal
Use mobile finance (Use_ mob_ Fin)	discontinuous	1 = No 2 = yes
Deposit frequency (Deposit _ frequenc)	Discontinuous	1 = 0 times a month 2 = once or twice a month 3 = more than three times a month



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Withdrawals frequency	discontinuous	1 = 0 times a month 2 = once or twice a month 3 = more than three times a month
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Source: Global Findex 2011 and 2014

*Construction of the financial inclusion composite index

A composite indicator is an indicator that aggregates a series of complex indicators to build a single measurement standard for a socioeconomic situation (notably in the assessment of the investment climate, poverty analysis and its deprivation). Its advantage over a series of specific indicators comes from the simplification of rankings and comparisons, while providing a clearer picture of complex issues.

Computing composite indices often uses a group of statistical methods called "data reduction techniques". Two of the most commonly used techniques are Principal Component Analysis (PCA) or Multiple Correspondence Analysis (MCA), which identifies groups of indicators whose scores (or behaviors) depend on the same underlying factors, and the analysis of the unobserved component, which removes the isolated indicators. In this work, the construction of composite indices of financial inclusion will be inspired by the calculation of the composite index of income inequality and the reduction technique used will be that of Multiple Correspondence Analysis. The construction of these indices supposes that we were going to aggregate the responses of individuals to a numerical quantity. However, it is necessary to determine the weight (score) of each variable in the aggregation process. These weights are determined using multiple correspondence analysis.

❖ Multiple Correspondence Analysis Method (ACM)

It is a method of multidimensional statistical description of a table of qualitative data. The MCA is therefore applicable when we have qualitative and ordinal variables (Asselin, 2002). The variables to be analyzed are qualitative, which is the case in our study. Its computational interest lies in two parts: firstly the identification of the different dimensions that measure the variables of access and use of financial services and secondly, constructed for each individual, a composite index of access to financial services (ICA) and a composite use of financial services index (ICU). The different choices of variables to include in the calculation of the ICA and the ICU will be made according to the properties of the Ordinal Consistency of the First Factorial Axis (COPA). This property specifies that an individual's income inequality improves from the least favorable to the most favorable.

❖ Application of ACM to ICA and ICU indicators

For the construction of the composite indicators (ICA and ICU) several variables (8 in total) were chosen at the start. These are the variables: an account, a debit card, a credit card, type of loan, type of savings, transactions via mobile finance, frequency of deposits, frequency of withdrawal.

Regarding the composite indicator of access to financial services, at the start, we retained three variables (6 modalities in total). As for the composite indicators of use in financial services, we initially selected five variables (12 methods in total). However, two variables were eliminated due to non-response because these variables indicate the rate of missing responses of 81.20% each. These include the frequency of deposit and the frequency of withdrawal. In conclusion, three variables (6 modalities) are retained for the ICA and three variables (6 modalities) for the ICU. The description of the variables, the methods and their coordinates on the first axis are shown in Table 5.



Table 5: Modalities of variables and their coordinates on the first factorial axis

VARIABLES	MODALITIES	CORDATA 2011	CORDATA 2014
Has an account	1=YES	1,97	2,39
	2=NO	-0,34	-0,33
Has a debit card	1=YES	5,64	2,73
	2=NO	-0,12	-0,03
Has a credit card	1=YES	3,58	3,43
	2=NO	-0,07	-0,25
Borrowed from a financial institution	1=FORMAL	3,00	2,15
	2=INFORMAL	-0,22	-0,18
Operation via mobile finance	1=YES	0,73	0,08
	2=NO	-0,08	3,14
Savings type	1=FORMAL	2,50	2,51
	2=INFORMAL	-0,15	-0,22

Source: Authors from the Global Findex 2011 and 2014 database

Functional form and calculation of the composite index

The harmonization of the variables will be done by cutting the ordinal variables into binary variables (dumming) so that, each binary variable represents a modality of the ordinal variable. Considering K primary indicators (number of variable initially selected) which reflect the conditions of financial inclusion of the individual (access to and use of financial services for example). The basic idea is to summarize the information provided by these qualitative indicators in a single composite index noted and written in the following general form:

$$A_i = \sum \gamma_j I_{ij} \dots\dots\dots(1)$$

Where, I_{ij} is the primary indicator $j = (1, 2, 3 \dots, K)$ for the individual $i, i = (1, 2, \dots, n)$. γ_j is the weight assigned to the indicator in the calculation of the composite index A_i of individual i .

The composite index A_i for individual i can be rewritten in the following functional form:

$$A_i = \frac{\sum_{k=1}^K \sum_{j_k=1}^{J_k} W_{j_k}^k I_{ij_k}^k}{K} \dots\dots\dots(2)$$

Where, K is the number of primary indicators (variables retained initially); J_k is the number of modalities of the indicator k; $W_{j_k}^k$ is the weight or score given to the modality (factorial coordinates on the first axis); $I_{ij_k}^k$ is a binary variable (0/1) taking the value 1 when the individual i has the modality, 0 otherwise. The index for the individual is simply the average of the weights of the binary variables. After construction, the ICA and ICU indices obtained are quantitative variables. The minimum and maximum values of the ICA and the ICU constructed from data from the global Findex 2011 and 2014 are grouped respectively in the table below:

Table 6: summary of the min and max values of the ICA and the ICU

Variables		Obs	Minimal	Maximal
ICA	2011	1000	-0,1767	3,73
	2014	1000	-0,2033	1,9433
ICU	2011	1000	-0,15	2,0767
	2014	1000	-0,1333	2,6

Source: authors from global Findex data

Control variables

As control variable we will retain: education level, age, sex, savings, loan for reason (education, health), account opening fees and areas of residence.



Econometric specification and model estimation method

The different models for presenting the determinants of financial inclusion (multiple linear regression model) and the estimation methods of the different models are given.

➤ Model of the determinants of financial inclusion: Multiple linear regression model

It is a question for us here to show how certain explanatory variables (gender, age, level of education) can influence (positively or negatively) financial inclusion in Cameroon. The multiple regression model will thus be used to identify the determinants of financial inclusion. This model makes it possible to specify the relationship between a dependent variable (financial inclusion: FI) and several independent variables (Sex, Age, Level of education, income) which can be quantitative or qualitative.

We can then model our problem as follows:

$$IF = X\beta + \varepsilon \dots \dots \dots (3)$$

Where **IF** stands for the financial inclusion indicator. In this work, we retain two indicators of financial inclusion, notably access to and use of financial services and products. **β** is the matrix of parameters of the model to be estimated. **X** is the matrix representing the set of variables used to explain access to and use of financial services and products (gender, level of education, age, income, savings and borrowing for educational reasons) **c** is the determinants of the IF. **ε** is the error term. It summarizes the missing information that would explain the values of IF linearly using the explanatory variables.

➤ Estimation of the Model of the determinants of financial inclusion

In the absence of heteroskedasticity and autocorrelation of the residuals, the ordinary least squares (OLS) method is used to estimate otherwise the OLS method corrected for heteroskedasticity or the maximum likelihood method (MV) will have to be applied. In this article, the Generalized Least Squares (GLS) method has been used because it takes into account any possible autocorrelation or heteroscedasticity problem.

Results and discussions

The main purpose of this section is to present and interpret the test results. To do this, the descriptive statistics of the study variables (2011 and 2014) will be presented first. In a second step we will present the results based on descriptive analysis (dissimilarity index) and the results of the multiple linear regression model of the study variables (2011 and 2014).

The results of multiple linear regression allow us to identify the determinants of financial inclusion. The literature has allowed us to highlight a number of determinants of financial inclusion in Cameroon: age, gender, level of education, opening costs, loans and savings. It will therefore be a question of identifying the influence of these variables through the respective indicators of financial inclusion (ICA and ICU) for the year 2011 and 2014.

**Determinants of financial inclusion measured by ICA**

The results are presented in the table below:

Table 7: Result on the determinants of the composite access to financial services index (ICA)

Year	Endogenous variable: ICA	
	2011	2014
Determinants	Coefficients (standard deviation)	Coefficients (standard deviation)
Age (between 30 and 50 years old)	0.0241*** (0.0047)	-0.0053*** (0.0020)
Age2 (over 50 years)	-0.0023*** (0.0001)	0.0001*** (0.0001)
Sexe (male)	0.0837** (0.033)	0.0151** (0.0168)
Secondary	-0.1275* (0.0929)	-0.0537** (0.0183)
Superior	0.8058 (0.2279)	0.1895 (0.1109)
Poor(1)	0.2063 (0.0370)	0.0006** (0.0150)
Mean_poor(2)	-0.0149* (0.0879)	-0.0474** (0.0205)
Rich	0.0553 (0.4347)	0.0248** (0.0214)
very rich	-0.3306** (0.0459)	-0.0779** (0.0248)
Constant	-0.6514 (0.9989)	0.8045 (0.0430)
Number of observations	1000	1000
Fcal	F (9, 989) = 10.36	F (9, 990) = 4.29
Prob(F)	0,000	0,000
R ²	0,6882	0,6730
R ² adjusted	0,6247	0,6189

*; ** and *** represent significance at the 10%, 5% and 1% thresholds respectively. (...) Represent the standard deviations

Source: authors based on our estimates

It appears from this table that the model is globally significant at 1% (prob> F = 0.000). This means that the composite index of access to financial services in Cameroon can be explained overall by the variables: age, age2, male, secondary, higher and the income quintiles (poor, moderately poor, rich and richer)

In 2011, we note that people under 30 years of age (Age) have easy access to financial services unlike in 2014 where people under 30 have a negative influence on access to financial services. Likewise, older people (over 50 = age2) have a negative and significant impact on the CLI while the effect is positive and significant on the CLI. These results join those obtained by Claessens, S and Perotti (2007) and Clarke, G. et al. (2006) but contradict those of the works of Park, C. Y., and Mercado, R. (2015). However, the positive sign in front of the variables: age, secondary, higher and richer indicates that these variables are positively significant. The negative sign in front of age2 tells us that from a certain age (threshold), individuals' access to financial services gradually decreases until canceled. The individual significance test attests that the income quintiles (poor, average, rich) are not individually significant. The poor and rich modalities of the income inequality variable positively influence



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the CLI despite their non-significance. The moderately poor variable negatively influences the CLI. Thus, people with an average level of poverty, do not have easy access to ICA. This is more demonstrated for wealthier people who do not generally like the services offered by microfinance but rather those offered by conventional banks. Regarding the ICA data for 2011 and 2014, we can notice that the model is globally significant at 1%, that is to say that the ICA is explained by age, age2, sex, secondary and higher education level.

Determinants of financial inclusion measured by ICU

The results from the estimates are presented in Table 8 below:

Table 8: Result on the determinants of the composite consumption index for financial services (ICU)

Determinants	Endogenous variable: ICU	
	2011	2014
	Coefficients (standard deviation)	Coefficients (standard deviation)
Age	-0.0003*** (0.0035)	0.0014*** (0.0021)
Age2	-0.00000052*** (0.0001)	-0.00002*** (0.0001)
Male	0.0626 (0.2365)	-0.0061** (0.0154)
Zon_yes	-0.0538 (0.2221)	-0.0314** (0.0194)
Frais_yes	-0.0288** (0.0246)	0.0187 (0.1922)
Emp_yes_educ	0.0330** (0.0389)	0.0502** (0.0338)
Emp_yes_soin	0.0510** (0.0331)	0.0641** (0.0259)
Epa_yes_educ	0.0025** (0.0235)	0.0146** (0.0207)
constant	-0.0811* (0.0738)	-0.0806** (0.0330)
Number of observations	469	864
Fcal	F (8, 460) = 3.49	F (8, 855) = 3.92
Prob(F)	0.0210	0.0125
R ²	0,6745	0,6987
R ² adjusted	0,6025	0,6351

*; ** and *** represent significance at the 10%, 5% and 1% thresholds respectively. (...) Represent the standard deviations

Source: authors based on our estimates

The ICU results reveal that the model is globally significant at the 5% level (prob> F is less than 0.05). This means that age, gender, area of residence, opening costs, borrowing and savings influence the ICU. The positive sign in front of the coefficient for the male variable indicates that at a significance level of 10%, this variable has a positive effect on the UIC. Similarly, the positive sign in front of the coefficient the variables emp yes edu, emp yes care and epa yes edu indicates that these variables have a positive, but not significant effect on the ICU. While age and opening costs have a negative and insignificant effect on the use of financial services, the area of residence has a negative and significant effect on the ICU.

The result in the table above tells us that with the 2014 data, the model is globally significant at 5%, i.e. the CLI is explained by age, age2, gender, secondary and higher education and income inequality. The individual



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significance test attests that the male sex and the quintile of poor and moderately poor individuals are not individually significant. The negative sign in relation to age, secondary education and quintile of the moderately poor, wealthy and wealthier negatively affects the ICA. However, the positive sign before age 2 indicates that there is no threshold beyond which any increase in age would have a negative influence on the ICA.

The result of the model indicates that the model is globally significant ($\text{prob} > F = 0.0185$) and that all the variables except for emp_oui_care are not individually significant. Male gender, zon_oui, age 2 negatively affects ICU. The variables age, frais_oui, emp_oui_educ, emp_oui_soin, epa_oui_educ are all positively significant at the ICU. As for the 2011 and 2014 ICU data, we contact that the model is globally significant at 5%, that is to say that the ICU is explained by age, age2, sex, secondary and higher education level, emp yes care, emp yes edu, epa yes edu and income quintiles in Cameroon. The individual test attests that only the variables emp yes edu, epa yes edu and frais yes are not individually significant.

Conclusion and recommendations

In this article, we have presented the different results on the determinants of financial inclusion. Specifically, it emerges from these analyzes that income, level of education, sex, age, area of residence, opening costs, borrowing for education or for health care, savings for education are the determinants of financial inclusion through indicators of access and use of financial services in Cameroon.

Following these results, some recommendations can be proposed in order to increase the beneficial effect of financial inclusion on the economy. To this end, policies could be directed more towards the channels of financial development through which financial inclusion affects economic performance, and more particularly institutional policies facilitating access to and use of formal financial services. Thus, policymakers should analyze the empirical relationship between certain barriers (such as price, financial illiteracy, confidence) and the socioeconomic characteristics of individuals to obtain clarification on the reasons why certain people are excluded from the formal financial system. This is important for governments and financial institutions to promote policies to improve more inclusive financial systems, which enhance well-being and sustainable economic growth.

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LIST OF ACRONYMS AND ABBREVIATIONS

- ACF :** Analyse de CorrespondanceFactorielle
- ACM :** Analyse de Correspondance Multiple
- AFD :** Agence Française de Développement
- AFI :** Alliance for Financial Inclusion
- BM :** Banque mondiale
- COPA :** Consistance Ordinal du Premier Axe factoriel
- EMF :** Etablissements de Microfinance
- FMI :** Fonds Monétaire International
- GCAP :** Groupe Consultatif d'Assistance aux Pauvres
- GLOBAL FINDEX:** The Global Financial Inclusion
- ICA :** Indice Composite d'Accès
- ICU :** Indice Composite d'utilisation
- IDH :** Indice de Développement Humain
- IF :** Inclusion Financière
- MCO :** Moindres Carrés Ordinaires
- MCG :** Moindres Carrées Généralisés
- PAS :** Programme d'Ajustement Structurel
- PME :** Petite et Moyenne Entreprise
- PNUD :** Programme des Nations Unies Pour le Développement
- SGBC :** Société générale des banques Camerounaises
- UNCDF:** United Nations Capital Development Fund
- WDI:** World DevelopmentIndicators