

# **GENDER IMPACT, TYPICAL PROFILES OF ACCESS TO CREDIT AND SAVINGS MARKETS: A CASE OF RURAL HOUSEHOLDS IN COTE D'IVOIRE**

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## **Abstract**

*Unlike the other two components of the financial trinity savings and insurance, the demand for credit has been the subject of much work. Using data from the household standards of living survey in Côte d'Ivoire (ENV2015), we use two logit models to identify the determinants of demand for credit and savings in rural Ivorian. Our work shows that the social, economic and demographic characteristics of the household and its head are significant determinants of demand for those services. The study revealed that each of these two services is a significant determinant of the other. Following this first analysis, we have identified the typical profiles of households with the highest and lowest probabilities of access to savings and credit. Finally, the gender approach of this study has shown that unlike the number of men who has no influence on the demand for savings among households without access to credit, the number of women considerably increases the level of access to credit for households with or without access to savings. And that households led by a woman have a better access to credit.*

## **Keywords**

credit; saving; rationing; gender; rural households; Côte d'Ivoire

## **JEL Classification**

D14; J16; R22; R51

## **Introduction**

Making sure that farmers have adequate access to financial resources is a key principle of successful rural development strategies. Policymakers have long understood that rural producers who can not meet their capital needs must be content with suboptimal production strategies. When they are unable to make the necessary initial investments or bear no additional risk, these producers are forced to give up their productivity, improve their incomes and improve their well-being (Besley & Coate, 1995). In addition, without adequate access to loans or insurance, producers facing negative shocks such as drought, disease or significant price declines may lose some of the few assets they own (Diagne & Zeller, 2001). Lack of access to finance is often the key mechanism for generating persistent income inequality and slower economic growth. As a result, expanding access remains a major challenge around the world, leaving much to be left to governments (Beck et al, 2009). Access to the financial market and especially credit remains the basic requirement for the adoption of new technologies in agriculture and the improvement of productivity and incomes for a subsequent reduction of poverty.

Unfortunately, many obstacles prevent the rural poor from accessing the financial market and receiving credit for financing sustainable agriculture. Social and geographical constraints can be the major obstacles. Geographical considerations or physical access to a financial institution is one of the barriers that prevents small and

poor households in many developing countries from using financial services. For example, while Spain has 96 branches per 100,000 people and 790 branches per 10,000 square kilometers, Ethiopia has less than one branch per 100,000 people and Botswana has one branch per 10,000 square kilometers (Beck et al, 2007). The poor may not have anyone in their social network who is aware of the various services available to them. Lack of education can make it difficult for them to complete loan applications, and the small number of transactions that may be undertaken may allow loan officers to think that it is not worthwhile to help them. In addition, many institutions have minimum requirements or fees for opening accounts: for example, in large areas of Africa, it is not unusual for banks to require a minimum deposit of 50 percent of GDP per capita of the population to open a current account (Beck et al, 2008). The high cost of maintaining these accounts can thus exclude a large part of the population.

The financial market takes into account three types of services that are commonly known as the financial trinity; it's about credit, savings and insurance. Given the importance of these services for the development of rural areas, it is necessary to understand the factors likely to have an impact on their access by rural people in order to identify the profiles of households rationed or not in their access to these financial services including credit and savings. Subsequently, the gender impact analysis could be an additional asset. This study will be divided into four sections: the first relates to the review of the literature while the second relates to the presentation of the level of access to financial services in Côte d'Ivoire. The third section deals with the methodology, the fourth section presents both the results and discussions and the last one concludes.

### **Literature review**

It should be noted that credit, savings and insurance markets are generally non-existent in the rural areas of developing countries, and when they come to exist, many are working imperfectly (Morduch, 1995). The exclusion of the financial system means that poor and small businesses depend on their personal wealth or internal resources to invest in education, become entrepreneurs or engage in promising growth opportunities. The question of the analysis of access to the financial sector by the rural poor was mainly oriented around the demand for credit. As such, this review of literature will first discuss the benefits of financial inclusion and then focus on the thorny issue of credit rationing and the policy solutions that flow from it. The last part will give a brief account of the work that has tried to identify the determinants of credit demand.

We can note that an inclusive financial system offers a number of benefits to the economy. It provides more resources for investment especially for the promotion of small and medium-sized enterprises (SMEs). It creates employment opportunities, ensures economic and financial stability by reducing vulnerability and contributes to poverty reduction. Access to a well-functioning financial system can economically and socially empower individuals, especially the poor and women, to better integrate into the economy and contribute actively to development.

Ellis, Lemma and Rud (2010) empirically shows that access to financial services allows households to invest in education (which contributes to human capital), start or develop a business or invest in agricultural inputs or new equipment (which contribute to physical capital and technological progress). This study thus succeeded in establishing one of the main potential links between access to financial services and growth, with important policy implications. Schrieder and Heidhues (1995) analyze

the impact of the financial market on the income and food security of rural households in three regions of Cameroon. Their results show that the provision of sustainable financial services improves incomes, which in turn have a positive effect on the food security of rural households. Such a financial market improves the provision of production and consumption credit. Production credit improves the productive capacity of households while consumer credit enables these households to smooth their consumption during the lean season. Despite its importance for development, many households are rationed in their access to financial services and credit in particular. What is credit rationing?

Stiglitz and Weiss (1981) presented a credit rationing model in which, among the observably identical borrowers, some receive loans and others do not. Potential borrowers who are denied loans would not be able to borrow even if they showed a willingness to pay more than the market interest rate, or provide more collateral than what is required of the beneficiaries of the loans. Increasing interest rates or increasing collateral requirements could increase the risk of the bank's loan portfolio, either by discouraging safer investors or by encouraging borrowers to invest in riskier projects. Therefore, credit restriction, in limiting the number of loans the bank is willing to give, helps the market to reach its equilibrium. Thus, households emit the desire to obtain credits, if they get the full amount requested, they are not rationed otherwise they are. Rationing is more related to the formal credit market than to the informal market.

Also, the question of credit rationing by rural people can not be analyzed without taking into account the contribution of the information economy. Azam, Biais, Dia, and Maurel (2001) analyzes the question of moral hazard in the rationing of access to credit by firms in Côte d'Ivoire on formal and informal markets. The empirical results of this work highlight serious moral hazard issues for all firms and a reduction in the cost of credit in the informal market. Although it is true that information contributes to the effectiveness of the rural financial system and leads to the rationing of these rural poor, the consequences of this rationing on the life of these rural households can not be ignored. Baland and Robinson (2000) show that constraints to access credit can lead to underinvestment in human capital.

The critical factor explaining externalities, lack of markets and local monopolies in rural financial markets is the imperfection of information (Stiglitz, 1996). The promise feature of financial transactions makes it essential for participants to be well informed about the ability and willingness of other contractors to honor their contractual obligations. In the formal sector, information asymmetry issues can be significant and drives formal lenders to set up pricing and non-tariff mechanisms of selection. In the informal sector, the cost of unobservable effort for the borrower can be relatively low because related people can easily monitor the behavior of the borrower. Thus, the absence of such information will constrain the ability of the lender to not only discern the creditworthiness of potential borrowers but also to enforce the contract. Governments should provide a sound legal and regulatory legal framework for successful contract enforcement.

In recent years, a growing number of observers have criticized the performance of the rural financial market (RFM). To overcome the shortcomings of the rural financial market, a new consensus has been proposed by some authors. A key element of the new consensus is the identification of the expected real interest rate as the main determinant of the behavior of the lender, the borrower, and the saver (Gonzalez-Vega, 1977). Real rates should also strongly influence the overall performance of the financial markets. The real interest rate is defined as the nominal interest rate (the contractual rate) adjusted by an overall price index for the economy. Proponents of the new consensus argue that low real interest rates seriously disrupt the supply of the

financial system. Because interest on savings deposits is low, savers minimize the amount of financial savings they hold. This forces formal lenders to rely on external funds to finance loans. Moreover, since the funds lent under these programs are not mobilized locally, borrowers feel less obliged to repay funds belonging to national or foreign governments. The new consensus suggests that the rural poor can have larger savings, much greater capacity than previously thought, especially when given adequate opportunities and incentives to save (Adams, 1978). In such circumstances, what factors have been identified by the literature as influencing access to credit?

Increasing consumption requires the use of external capital, in this case the credit, to cover the needs of the household. Many studies have shown that access to credit has a positive impact on the well-being of the household (Wright 2000 ; Khandker 2001a ; Khandker and Faraque, 2001b ; Khandker 2003, etc). Bendig, Giesbert, and Steiner (2009), using household survey data from rural Ghana show that poor households are less likely to intervene in the formal financial sector than better-off households and that the demand for financial services also depends on various other factors such as household risk assessment and exposure to shocks. Mpuga (2008) uses data from Uganda's household surveys conducted in 1992/93 and 1999/2000 to shed light on access and the characteristics of the demand for credit among the rural population. Using the estimates of the probit, tobit and multinomial logit model, the author finds that the Ugandan credit market is highly segmented. Rural producers are widely served by relatives / friends and self-help credit associations, and their loan applications are less likely to succeed, and of those that are, only smaller loans are granted. Educated people and young people are more likely to apply for credit, whereas women are less likely to do so, and to apply for smaller loans.

Mohamed and Temu (2009) analyze the gender characteristics of the determinants of access to formal credit in Zanzibar. Using a probit model, they show that the factors influencing credit access constraints differ according to whether the head of the household is a man or a woman. Azam, Biais, Dia, and Maurel (2001) find that large firms, with European managers and operators in the formal sector, are more likely to apply for loans from the formal sector, and less likely to be rationed, while informal small businesses run by Africans are more likely to obtain financing from the informal sector or to be rationed in their access to formal credit.

In comparison with the literature on credit demand, there are significantly fewer contributions on the savings behavior of households in developing countries. Access to savings has not been the subject of real interest by researchers contrary to the demand for credit. In addition to this, to the best of the author's knowledge, very little work has been directed to analyzing the case of rural households in Côte d'Ivoire in order to understand the determinants of these households' access to services such as credit and savings. It is therefore to fill this gap that this study is conducted. This research is focused around the following questions: What are the typical profiles of access to savings and credit in rural Côte d'Ivoire? Do gender variables affect the level of rural households' access to savings or credit? As a result of this review, it is necessary to make a state of the financial market in Côte d'Ivoire.

### **A brief description of the Ivorian financial market**

According to the World Bank Group's systematic country diagnostic (2015), improved access to finance is a critical constraint to the growth of SMEs and micro-enterprises in both urban and rural areas, and can have immediate benefits for poverty reduction by helping absorb the growing unemployed and underemployed labor force.

Financial sector deepening and inclusion will be critical to achieve growth and poverty reduction in Côte d'Ivoire. Although the ratio of credit to GDP (20 percent) increased rapidly over the last two years, it is still inferior to levels observed in Burkina (25 percent), Senegal (32 percent) and Kenya (40 percent). Only 12 percent of the population had access to a bank account in 2013; and possibly 15 percent if accounts at microfinance institutions (MFIs) are included. This is significantly below the credit-to-GDP ratios of other African countries.

Organizational weaknesses in the cocoa, coffee and cotton sectors, etc. have a significant negative impact on the Ivorian economy, which is highly dependent on the agricultural sector. Traditional cultural practices and poor access to efficient plant material induce low crop yields. Also, the financing gap remains one of the major causes of the shortcomings of this agriculture (DSRP, 2009).

Since the end of 2011, the Government has been developing a social and affordable housing program. The strategy comprises supply-side measures to support the construction of social and affordable units (with a target of 60,000 units over 2012-2015); as well as market measures, including increased budget support for the Housing Mobilization Account to provide low-interest, long-maturity mortgage refinancing for low-income households. Increasing access to housing for low-income households will require the Government to broaden its social and affordable housing program in a sustainable way. Unfortunately, housing finance barely exists and benefits only a few. Only 696 mortgage loans were granted in 2013, essentially to bank employees and a few staff from ministries and a few large companies. In a region where housing finance is barely developed, Côte d'Ivoire fares particularly poorly, representing only 5 percent of all mortgage loans granted in the WAEMU region by number and 18 percent by value. Inclusion is far worse than in regional peers. Banks have expressed interest in growing housing finance, especially to support the Government's affordable housing program, but are concerned about the availability of collateral.

The banking system showed remarkable resilience during the years of political unrest, due in large part to regional arrangements. The industry capital adequacy ratio (CAR) improved in 2013 (9.2 percent compared to 8.2 percent in 2012) for the first time since 2010, but remains significantly below the average WAEMU ratio of 12.9 percent. The profitability of the banking system improved in 2013 after several years of losses (2008, 2010, 2011) but still faces significant headwinds. Also, there has been progress in launching the restructuring of state-owned banks. An action plan was adopted on May 5<sup>th</sup> 2014. Its full implementation will help resolve non-viable institutions and strengthen and reorganize others.

Unfortunately, the capital market does not contribute to financing economic activities, and therefore provides no competition for banks in providing credit. A regional stock exchange, *Bourse Régionale des Valeurs Mobilières* (BRVM), was created in 1998 in Abidjan and lists 37 companies, of which 31 are Ivorian. However, due to political unrest and lower than expected privatizations, the exchange has seen little activity. The regional market capitalization reached only 14 percent of the regional GDP in September 2014. Float and turnover are limited. Some government bonds are listed, but most are issued by the Central Bank of West African States (*Banque Centrale des Etats de l'Afrique de l'Ouest*, BCEAO) and held to maturity by commercial banks. Contractual savings are also limited, which affects the availability of term financing and capital market development. Existing pension schemes are not sustainable and have not accumulated meaningful assets. Actuarial studies are being commissioned to design a reform of the pension system. The insurance industry is growing but remains small in terms of turnover and assets.

The payment infrastructure is modern but under-utilized. Cash remains a dominant means of payment for individuals and small businesses. Mobile payments have been slow to develop, with some rapid progress observed in 2013. The World Bank is supporting the design of a regional retail payment strategy to increase the penetration of retail payments, including mobile payments. In addition, regional authorities are working on the introduction of a modern credit bureau, with IFC support.

To address these constraints, the Government articulated a comprehensive Financial Sector Development Strategy (FSDS) in 2013 with the support of the Bank. Full implementation of the FSDS is critical to ensure that the financial sector contributes to sustained growth and poverty reduction.

Following the presentation of the Ivorian financial market situation, we will focus on the methodological approach of this study.

## Methodology

### Database

The data in this study come from the household standard of living survey (ENV) conducted in 2015 by the National Institute of Statistics (INS). It is the result of similar surveys carried out in 1995, 1998, 2001 and 2008. These surveys made it possible to analyze the evolution of living conditions of households throughout the territory, necessary for the establishment of national policies to fight against poverty and reduce inequalities. The survey provides various types of information on the socio-economic characteristics of households living in Côte d'Ivoire, including education, health, housing, consumption of food, water, electricity and fuel, the level of employment, income, expenses, etc.

The universe of the survey is made up of all African households residing in Côte d'Ivoire. The General Census of Population and Housing (RGPH2014) served as a sampling frame. The sampling follows a two-stage draw: first-stage, proportional allocation of Census Districts (CD) or Enumeration Area (EA) in the strata of the study; in the second degree, systematic drawing of 12 households by EA. The sample is stratified into three sets and provides significant results for the region and place of residence; the city of Abidjan; and all of Côte d'Ivoire, urban and rural areas. The rest of the work will be directed towards the presentation of the analysis models.

### Presentation of the models

As Mpuga (2008), we use a logit model to analyze the determinants of demand for savings and credit services among rural households in Côte d'Ivoire. Both models are as follows:

$$\begin{aligned}
 SV_i = & \beta_0 + \beta_1 CA_i + \beta_2 EL_i + \beta_3 SA_i + \beta_4 OD_i + \beta_5 AS_i + \beta_6 FA_i + \beta_7 FW_i + \beta_8 SC_i \\
 & + \beta_9 Cred_i + \beta_{10} SCP_i + \beta_{11} HS_i + \beta_{12} HI_i + \beta_{13} NAL_i + \beta_{14} CS_i \\
 & + \beta_{15} MN_i + e_i
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 Cred_i = & \beta_0 + \beta_1 CA_i + \beta_2 EL_i + \beta_3 OD_i + \beta_4 AS_i + \beta_5 FA_i + \beta_6 FW_i + \beta_7 SC_i + \beta_8 HS_i \\
 & + \beta_{10} HI_i + \beta_{11} NbMal_i + \beta_{12} FEM_i + \beta_{13} SV_i + \beta_{14} HHS_i + \beta_{15} AL_i \\
 & + e_i
 \end{aligned} \tag{2}$$

Where  $SV_i$  is the dependent variable of the first model (equation 1). This is a binary variable taking the value 1 if the household has saved during the last 12 months preceding the survey and 0 if no. The dependent variable of the second model is the

credit request of the household identified by  $Cred_i$  (equation 2). It takes the value 1 if the household  $i$  solicited and obtained a credit during the last twelve months preceding the survey and 0 if not.

The other variables are the independent variables of our two models.  $CA_i$  is a variable representing the age categories of the head of the household, ie  $CA_{i35}$  who takes the value 1 if the head of the household is under 35 and 0 if not,  $CA_{i55}$  who takes the value 1 if the head of the household is between 36 and 55 and 0 if not then,  $CA_{i105}$  who takes the value 1 if the head of household is over 56 years old and 0 if not. .  $EL_i$  is a categorical variable representing the education level of the household head. This variable takes into account four categories  $EL_{i0}$  that take the value 1 if the head of the household has no level of education and 0 if not,  $EL_{i1}$  which takes the value 1 if the head of the household has the primary level and 0 if not,  $EL_{i2}$  which takes the value 1 if the head of household has the secondary level and 0 if not, and  $EL_{i3}$  which takes the value 1 if the head of household has the university level and 0 if not.

The variables  $SA_i$ ,  $OD_i$  respectively, represent whether the head of the household is employed or not and the fact that the household lodges in their own home or not.  $AL_i$  is a binary variable taking the value 1 if the household has agricultural land and 0 if not;  $AS_i$  is a variable with four categories representing different sectors of activity.  $AS_{1i}$ ,  $AS_{2i}$ ,  $AS_{3i}$  and  $AS_{4i}$  are binary variables representing respectively the fact that the household head operates in the sector of agriculture, industry, trade and services.  $FA_i$ ,  $FW_i$ ,  $SC_i$  are binary variables representing respectively the fact that the household  $i$  received or not assistance during the past 12 months, the fact that the head of household has a full-time job or not, the fact that the household has whether or not a social capital (member of an association or not).  $HS_i$ ,  $HI_i$ ,  $NAL_i$ ,  $CS_i$ ,  $MN_i$  are independent continuous variables representing respectively the size, the main income, the number of agricultural parcels owned, the number of children enrolled and the number of men in the household  $i$ . The variable  $SCP_i$  represents the household's  $i$  perception of their social capital or level of solidarity in the village where they live. Variables  $NbMal_i$  and  $FEM_i$  designate respectively the number of people suffering and the number of women in the household  $i$ .  $HHS_i$  is a binary variable taking the value 1 if the head of the household is a man and 0 if not and  $AL_i$  is related to the possession of farmland.  $\varepsilon_i$  is the random error which is distributed logistically with  $Var(\varepsilon) = \pi^2/3$  for a logit model.

Let's say  $Pr(SV = 1|x, d)$  the probability that the given household is saving or obtaining credit given the independent variables  $x$  and  $d$ , the probability models of  $SV_i$  and  $Cred_i$  are as follows :

$$Pr(SV = 1|x, d) = \frac{\exp(\alpha + \beta x + \delta d)}{1 + \exp(\alpha + \beta x + \delta d)} \quad (3)$$

$$Pr(Cred = 1|x, d) = \frac{\exp(\alpha + \beta x + \delta d)}{1 + \exp(\alpha + \beta x + \delta d)} \quad (4)$$

Where  $\alpha$ ,  $\beta$  et  $\delta$  represent the parameters of the equation and  $x$  and  $d$  are respectively continuous and binary variables of our model. This model can be interpreted in several ways. Let's consider the following model:

$$y = \beta_0 + \beta_1 x + \beta_2 d + \varepsilon \quad (5)$$

That  $\sigma_k$  is the standard deviation of the variables  $x$  and  $d$ . By dividing each variable by  $\sigma_k$  and multiplying the corresponding value of  $\beta_k$  by  $\sigma_k$ , we obtain :

$$y = \beta_0 + (\sigma_1\beta_1)\frac{x}{\sigma_1} + (\sigma_2\beta_2)\frac{d}{\sigma_2} + \varepsilon \quad (6)$$

$\beta_k^{Sx} = \sigma_k\beta_k$  is an  $x$ -standardized coefficient.

To standardize the dependent variable,  $\sigma_y$  is the standard deviation of  $y$ . We standardize  $y$  by dividing equation (5) by  $\sigma_y$  :

$$\frac{y}{\sigma_y} = \frac{\beta_0}{\sigma_y} + \frac{\beta_1}{\sigma_y}x + \frac{\beta_2}{\sigma_y}d + \frac{\varepsilon}{\sigma_y} \quad (7)$$

So,  $\beta_k^{Sy} = \beta_k/\sigma_y$  is a  $y$ -standardized coefficient.

We can standardize all the coefficients of both  $x$  and  $y$  :

$$\frac{y}{\sigma_y} = \frac{\beta_0}{\sigma_y} + \left(\frac{\sigma_1\beta_1}{\sigma_y}\right)\frac{x}{\sigma_1} + \left(\frac{\sigma_2\beta_2}{\sigma_y}\right)\frac{d}{\sigma_2} + \frac{\varepsilon}{\sigma_y} \quad (8)$$

In this work, we want to evaluate the typical profile of households in relationship with their level of access to credit and saving. This can be managed with discrete change as mentioned by Long and Freese (2014). In some other ways, we could predict the probability of achieving each of these events (saving or obtaining credit) when we make discrete changes in the binary or categorical variables of our models. This evaluation is based on these equations :

$$\frac{\Delta Pr(y=1|x,d)}{\Delta d_1(0 \rightarrow 1)} = Pr(y = 1|x, d, d_1 = 1) - Pr(y = 1|x, d, d_1 = 0) \quad (9)$$

With  $d_1$  the categorical variable being changed. We could make joint changes in the categorical variables of our models :

$$\begin{aligned} & \frac{\Delta Pr(y = 1|x, d)}{\Delta d_1(0 \rightarrow 1) \& d_2(0 \rightarrow 1)} \\ & = Pr(y = 1|x, d, d_1 = 1, d_2 = 1) \\ & - Pr(y = 1|x, d, d_1 = 0, d_2 = 0) \end{aligned} \quad (10)$$

We use combinations of changes in categorical or binary variables to identify the typical household profiles with the highest probability of saving or having access to credit, as well as those households with the lowest probability of having access to these financial services (highly constrained or highly rationed households).

We can also compute discrete changes when a variable increases by some amount  $\delta$  from its observed value. Defining  $Pr(y = 1|x, d, x_k)$  as the probability at  $x$ , noting in particular the value of  $x_k$ , the discrete change for a change of  $\delta$  in  $x_k$  equals

$$\frac{\Delta Pr(y=1|x,d)}{\Delta x_k(x_k \rightarrow x_k + \delta)} = Pr(y = 1|x, d, x_k + \delta) - Pr(y = 1|x, d, x_k) \quad (11)$$

It is the consideration of these discrete changes that will identify the characteristics of the typical households in our sample. In this case, assumptions must be made about the other variables that are not subject to change. Several possibilities exist. The value of these variables could be set to their overall averages within the analysis sample. Although using global means for each ideal type is simple, it's not often realistic. For example, it is reasonable to assume that levels of income and household size would be higher for college-educated respondents than for those who have not attended college and that they would change with age, which is not reflected in the global means. To address this problem, we can use local means that are defined based on the characteristics specified.

## Results and discussion

### Descriptives statistics

The descriptive statistics of the rural household savings analysis model are presented in Table 1. The sample studied consists of 2998 observations. 36% of households in our sample were able to save during the last 12 months preceding the survey and the remaining 64% did not. Young heads of households (under 35 years) are dominant in the sample with more than half (59%) of the sample while older households represented only 12% of the workforce. This is typical of the life expectancy of individuals in Côte d'Ivoire which is between 40 and 50 years old.

Unfortunately, there has been a decreasing trend in numbers as the level of education increases (EL variable). Households whose head has no level of education represent 56%, 25% for the primary level, 15% for high school and only 4% for the university level. For us, the more the level of education, the less people return to rural areas to live.

**Table 1 Descriptive statistiques of Savings determinants analysis model**

Estimation sample logit		Number of obs = 2998		
Variable	Mean	Std. Dev.	Min	Max
SV	.3555704	.4787656	0	1
CA				
55	.3915944	.4881882	0	1
105	.1160774	.3203711	0	1
EL				
1	.2498332	.4329886	0	1
2	.1517678	.3588556	0	1
3	.0436958	.2044515	0	1
1.SA	.3842562	.4865001	0	1
1.OD	.5086724	.5000082	0	1
AS				
2	.0903936	.2867927	0	1
3	.0880587	.2834275	0	1
4	.1157438	.3199709	0	1
1.FA	.0286858	.1669497	0	1
1.SC	.2418279	.428262	0	1
1.Cred	.9116077	.2839119	0	1
SCP				
1	.4416278	.4966638	0	1
2	.2861908	.4520551	0	1
3	.2118079	.4086576	0	1
HS	2.70447	1.899033	1	12
HI	872.906	1090.669	4.5	22500
NAL	1.573716	.9344925	1	6
CS	.2961975	.6110365	0	6
MN	1.432622	.9367536	0	6

Source: Our computation with data from ENV2015

The variable SA reveals that 38% of heads of households are salaried. We note in the same time that 51% of rural households in Côte d'Ivoire live in their own home. In fact, in rural Côte d'Ivoire, the price of residential land is relatively accessible and it was quickly made to build a mud house for the needs of the family. The AS variable reveals that about 3/4 (72% exactly) of the heads of households operate in the agricultural sector while only 9% are in industry, 8% in commerce and 11% in services. As the DSRP (2009) stated, the Ivorian economy has its essence in the agricultural sector, hence the importance of the free trade whose main activity is agriculture. The level of assistance and social protection is unfortunately very low in Côte d'Ivoire. Only 3% of households received assistance during the last 12 months. In general, these helps come from friends and acquaintances and not from state structures. 24% of households are members of an association and have social capital.

These descriptive statistics show that 91% of households received a credit in the last 12 months preceding the survey. Remember that nearly  $\frac{3}{4}$  of the credits granted in Ivorian rural areas come from individuals (friends, relatives, acquaintances, pawnbrokers, etc.), therefore from the informal sector, and the banks only give 4% of the credits available in this sector (Ouoya, 2018). The variable SCP shows that 6% of the individuals surveyed said they could not assess this spirit of solidarity while 44%, 29% and 21% respectively have a low, medium and high opinion of this spirit of solidarity. Let's finally note that the average household size in the sample is 3 individuals while the average annual income per household is around 900 thousands. The number of agricultural land per household is between 1 and 6 and the number of male (male adult) in the household is between 0 and 6 individuals.

Descriptive statistics for the second model of analysis of the determinants of access to credit for rural households are presented in Table 2. The sample size is 5267 individuals. Some variables of the first model were not taken into account and other variables were added. Household saving status was retained as an independent variable and access to credit, became the model dependent variable. In the second model 85% of households have access to credit while the first model reported that 91% of households had access to credit. The level of access to savings remains approximately the same for both models. The distribution of households by age group, level of education and industry remains virtually the same in both models. There are some slight differences in the variables taken into account in the two models. This difference is relatively pronounced in the proportion of households operating in services (11% in the first model and 22% in the second).

Several new variables have been incorporated into the household credit analysis model. Thus, the HHS variable identifies the sex of the household head. About 84% of rural households in Côte d'Ivoire are headed by men and only 16% by women. The NAL variable has been replaced by a binary variable (AL) making reference to whether the household holds agricultural land or not. It has been found that 63% of households hold agricultural land, 57% of households estimate that they have a full-time job. The gender consideration was slightly modified in this analysis by replacing the HOM variable (number of males in the household) with the variable FEM (number of females in the household). FEM is a numeric variable taking values between 0 and 7 with an average of about one woman per household. The ENV2015 revealed a variety of pathologies within households and there are 12 to 14 pathologies per household in the sample. The second part of this section is about the results and discussion.

**Table 2 Descriptive statistics of Credit model**

Estimation sample logit		Number of obs = 5267		
Variable	Mean	Std. Dev.	Min	Max
Cred	.8555155	.3516137	0	1
CA				
55	.3778242	.4848894	0	1
105	.100057	.3001044	0	1
1.SV	.3565597	.4790287	0	1
1.SC	.2077084	.4057054	0	1
1.HHS	.8399468	.3666902	0	1
1.AL	.6331878	.4819804	0	1
EL				
1	.2107462	.4078772	0	1
2	.2139738	.4101475	0	1
3	.0337953	.1807191	0	1
AS				
2	.0953104	.2936711	0	1

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3		.0943611	.2923582	0	1
4		.2272641	.4191044	0	1
1.OD		.3704196	.4829629	0	1
1.FW		.5714828	.4949108	0	1
1.FA		.0248718	.1557493	0	1
FEM		.9783558	1.335735	0	7
NbMal		13.83216	.3742651	12	14
HS		2.290298	1.774676	1	12
HI		1328.482	4205.864	4.5	34500
CS		.2462502	.5691148	0	6

Source: Our computation with data from ENV2015

## Results and discussion

The results of the household savings determinants analysis model show that the explanatory variables have diverging effects on the level of rural households' access to savings. These results are shown in Table 3. The first things to note is that all our explanatory variables are significant at 1 percent and only three variables are not. These variables are  $CA_{i55}$ ,  $EL_{i1}$  et  $SC_i$ .

Concerning the age category of the head of household we see that the fact for the head of household of being in the 35-55 age group increases the odds of saving by 7% compared to heads of households in the under-35 age group. On the other hand, there is a 95% reduction in the odds of saving for households whose head is in the over-55 age group compared to households headed by people under 35 years of age. These differences in the probability of saving according to the age category of the household head could be explained by the fact that heads of households in the 35-55 age group are generally employed and salaried. On the other hand, those in the under-35 age group are generally more in training than in an employee situation. This could explain our results. On the other hand, when one is in the class of more than 55 years, one does not have big project of future and one is rather directed towards the daily management, the problems of health including. It is this fact which, in our opinion, explains this reduction in the probability of saving from this class.

The results of our work have shown that the education level of the head of the household (categorical variable EL) is a significant determinant of the saving status of household. The analysis was conducted compared to class 0 which corresponds to the fact that the head of household has no level of education. It has been observed that, except for class 1, which corresponds to the fact that the head of the household has the primary level, there is an increase in the probability of saving when the head of the household has secondary level of education or higher compared to heads of households with no level of education. When moving from a household whose head has no level of education to a household whose head has a high school level or higher, there is an increase in the odds of saving respectively from 238 % and 250%. This would be explained by the fact that the higher the level of education is, the more the head of the household has sufficient skills and information to open a bank account by filling all the documentation pertaining to such a company and to subscribe to the saving products plans offered by these financial institutions. In the same vein, the level of education would be an indicator of the standard of living of the household.

The third categorical variable of our analysis relates to the sector of activity (variable AS) in which the head of household exercises. Households headed by person in trade sector are more likely to save money than households headed by farmers. On the other hand, there is a 68% and 89% reduction in the odds of saving at the level of households whose head is respectively in industry or services compared to heads of households engaged in agriculture.

In terms of the household's perception of the spirit of solidarity within the village or its social capital, compared to the household with no opinion to share on this issue, there has been a substantial decrease in 99% of the odds of saving no matter the level of this spirit perception by the household. An explanation that might emerge from this result is that households with any estimate of their social capital tend not to save for hedging in the event of shock. This social capital is therefore perceived by these households as a risk hedging instrument. Note that this variable is statistically significant at the 1 percent level. Households whose head is salaried compared to those whose head is not salaried and those who have their place of residence compared to those who do not see their odds of saving increase by 679% and 60% respectively. Households with a salaried head receive some permanent cash flow that could partly be used to feed a savings account. Households with their own place of residence can capitalize the cash flows that would in other way be used for house renting. Such a monetary surplus could be at the origin of the constitution of savings by the household. Among the following variables: HS (household size), HI (household income), NAL (number of farmland owned by the household) and MN (number of men in the household), only the increase of household's size by an individual leads to a reduction in the odds of saving. Increasing the remaining variables by one unit increases the odds of saving. All of these variables are significant at the 1 per cent level. This decrease in the odds of saving at the HS variable level is explained by the fact that the increase in household size inexorably leads to an increase in household expenditures. In this case, it is necessary to disburse more resources to meet these burdens and this consequently reduces the savings possibilities of such a household. In another sense, the more are the men in a household, the more human resources are available to carry out activities and generate income that could increase the likelihood of saving money. Similarly, the increase in the number of farmland allows the household to have additional space that could be exploited or rented to generate additional income that could improve the ability of the household to save. A similar explanation could be the reason for the increase in the odds of saving when household income increases by one currency unit.

**Table 3 Change in odds of saving**

logit (N=2998) : Percentage change in odds							
Odds of: 1 vs 0							
	b	z	P> z	%	%StdX	SDofX	
							CA
55	0.0658	0.487	0.627	6.8	3.3	0.488	
105	-3.1444	-10.740	0.000	-95.7	-63.5	0.320	
							EL
1	-0.1516	-0.946	0.344	-14.1	-6.4	0.433	
2	1.2206	6.270	0.000	238.9	55.0	0.359	
3	1.2529	4.711	0.000	250.0	29.2	0.204	
1.SA	2.0528	14.109	0.000	679.0	171.5	0.487	
1.OD	0.4702	3.624	0.000	60.0	26.5	0.500	
							AS
2	-1.1710	-5.445	0.000	-69.0	-28.5	0.287	
3	0.7693	3.766	0.000	115.8	24.4	0.283	
4	-2.2860	-8.050	0.000	-89.8	-51.9	0.320	
1.FA	5.4407	7.042	0.000	22961.4	148.0	0.167	
1.SC	-0.1431	-1.061	0.289	-13.3	-5.9	0.428	
1.Cred	12.0454	8.863	0.000	1.7e+07	2956.4	0.284	
							SCP
1	-6.5644	-11.757	0.000	-99.9	-96.2	0.497	
2	-5.7911	-10.377	0.000	-99.7	-92.7	0.452	
3	-6.8511	-11.983	0.000	-99.9	-93.9	0.409	

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HS		-0.1725	-3.540	0.000	-15.8	-27.9	1.899
HI		0.0011	14.990	0.000	0.1	214.3	1090.669
NAL		0.5452	7.040	0.000	72.5	66.4	0.934
MN		1.1178	10.263	0.000	205.8	184.9	0.937
constant		-10.0709	-6.761	0.000	.	.	.

b = raw coefficient / z = z-score for test of b=0  
P>|z| = p-value for z-test / % = percent change in odds for unit increase in X  
%StdX = percent change in odds for SD increase in X  
SDofX = standard deviation of X

Source: Our computation with ENV2015 data

There is a strong relationship between the fact that the household has been able to benefit from a loan and the likelihood that the household will save. Whether the source of the credit is informal or formal, the relationship is very strong and the first explanation would be that households that have benefited from credit have resources that they could keep in the form of savings for risk coverage. For households that have received credit from a credit institution or a bank, they have to create savings account that must be regularly fed to cover the risk of non-repayment at the bank. This compulsory savings is a guarantee recommended by formal credit institutions when setting up the credit file. Also, households receiving credit are uncomplicated and accustomed to receiving financial services. They perceive the opening of a savings account as a necessity. Thus, from all points of view, households that have obtained a credit have a higher probability to save.

Following the results of the analysis of the determinants of household savings, we turned to studying the determinants of credit demand. The null hypothesis of the coefficients of dependent variables of the credit demand analysis model was tested. Except for variables AL (ownership of agricultural land), EL<sub>2</sub> (secondary education level) that are significant at the 5 percent level, the SC variable which is significant at the 10 percent level, and the older age group of more than 55 years which is not significant, the other variables are significant at the 1 percent level as we can see in table 4. Like the first model, the analysis of the determinants of credit demand reveals diversified effects of the independent variables on the demand for credit.

**Table 4 Factor change in saving model odds**

logit (N=5267): Percentage change in odds							
Odds of: 1 vs 0							
		b	z	P> z	%	%StdX	SDofX
				CA			
55		0.7504	6.634	0.000	111.8	43.9	0.485
105		-0.3101	-1.379	0.168	-26.7	-8.9	0.300
1.SV		1.6613	13.531	0.000	426.6	121.6	0.479
1.SC		0.2367	1.890	0.059	26.7	10.1	0.406
1.HHS		-0.7598	-4.219	0.000	-53.2	-24.3	0.367
1.AL		-0.2724	-2.286	0.022	-23.8	-12.3	0.482
				EL			
1		-0.5409	-3.954	0.000	-41.8	-19.8	0.408
2		-0.2802	-2.263	0.024	-24.4	-10.9	0.410
3		3.1564	3.096	0.002	2248.7	76.9	0.181
				AS			
2		0.7519	3.981	0.000	112.1	24.7	0.294
3		-1.7466	-11.239	0.000	-82.6	-40.0	0.292
4		-0.5311	-4.370	0.000	-41.2	-20.0	0.419
1.OD		1.8246	13.229	0.000	520.0	141.4	0.483
1.FW		1.0628	10.096	0.000	189.4	69.2	0.495
1.FA		-1.2839	-4.765	0.000	-72.3	-18.1	0.156
FEM		1.1188	8.901	0.000	206.1	345.7	1.336
NbMal		0.3442	2.432	0.015	41.1	13.7	0.374
HS		-0.3821	-4.879	0.000	-31.8	-49.2	1.775
HI		-0.0001	-4.048	0.000	-0.0	-29.4	4205.864
CS		0.5542	3.078	0.002	74.1	37.1	0.569
constant		-3.3836	-1.714	0.087	.	.	.

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$b$  = raw coefficient /  $z$  = z-score for test of  $b=0$   
 $P>|z|$  = p-value for z-test / % = percent change in odds for unit increase in X  
%StdX = percent change in odds for SD increase in X  
SDofX = standard deviation of X

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Source: Our computation with ENV2015 data

Taking first into account the categorical variables of our model, namely the age category of the household head (CA variable), the education level (EL variable), and the sector of activity of the head of household, we recorded diverging influences of on access to credit. When we move from the category of heads under 35 to those aged between 35 and 55, there is a 111% increase in the odds of accessing to credit. On the other hand, there is a 26% decrease in this probability when we move from household heads under 35-years-old to heads over 55 years old. From our point of view, the 35-55 age group is likely to be the period of completion in the life cycle of individuals. Household heads in this bracket are generally workers and more reassuring about their creditworthiness than heads under 35. On the other hand, heads of households who are in the over-55 age group have little confidence in their ability to stay in good health and face the deadlines of their debts. Life expectancy in Côte d'Ivoire is in the range 45-50 years, such leaders do not guarantee their longevity and may pass on their loans on their descendants, which could cause conflict situations. Such an explanation could be at the origin of the variations of this probability of access to credit.

Access to credit differs according to the sector of activity of the head of household. Using the agricultural sector as the reference, it can be seen that only households operating in industry experience an increase in their odds of having access to credit. Households headed by a chief operating in commerce or services record a reduction in their likelihood of having access to credit. For us, the industry sector would refer to a certain degree of formalization of employment, unlike trade and services where everyone could set up their own business. It is probably the precariousness of employment in these two sectors that negatively influences the creditworthiness of these different households.

Based on the analysis of the head of the household with no level of education, there is a decrease in the odds of access to credit for heads of primary and secondary education level and a substantial increase when head of household has the upper level. From our analysis, heads of households who reached the primary or secondary level were at one time forced to return to rural area without much intellectual baggage. The difficulties of adaptation both in the social environment and in the chosen economic activity create a lack of confidence between these new comers and the others. Thus, that could make it difficult for those new comers to access both to informal credit widely available and to formal credit (due to lack of information and credit history with formal institutions). On the other hand, the achievement of higher education level offers a guarantee of success in several activities and thus put credit actors in confidence concerning these such heads creditworthiness.

The transition from the status of non-saver to saver has a strong influence on the odds of access to credit. Households that once had access to savings are more likely to build a loan application file with formal institutions. This also improves their solvency so that certain sources of financing are favorable to them.

Our results are consistent with some empirical evidence that revealed that the usage of savings products, loans and insurances depend on the socio-economic status of households, but also on various other factors, such as households' risk assessment and the past exposure to shocks (Bendig, 2009). There is an increase in the probability of access to credit with the number of pathologies suffered by household members. Households must make use of credit to meet the expenses of care for these

pathologies. Informal credit being the most available, the spirit of solidarity in rural areas makes these households in crisis use more credit and obtain this credit on the informal market certainly.

Social capital also has a positive influence on the level of access to credit. By moving from a household with no social capital (ie not a member of a village association) to a household with social capital, there is a 26% increase in the probability of access to credit. Social capital creates an environment of trust between individuals. Individuals have good knowledge of each other and are more likely to trust each other. Thus, they are more willing to enter into credit relationships with each other. This social capital reduces considerably the problem of information asymmetry for that it is more easy to monitor related people. In the same way, households with their own homes are more likely to have access to credit, as well as those whose heads have full-time jobs. Elis (2010) has shown a correlation between investment so asset disposition and access to credit. Assets can serve as collateral for the loan and put the lender in confidence in this credit relationship.

As Mohamed and Temu (2009), we find that access to credit differs according to the gender of the head of household. When moving from a household headed by a woman to a household headed by a man, there is a 53% decrease in the probability of access to credit. In addition, as the number of women in the household increases by one individual, the likelihood of access to credit records a 203% increase. Lenders, whether formal or informal, have a long time ago opted for women's credit rather than men's credit. Women may be more involved in the repayment of the credits received, but they also use the funds received to actually implement the activity for which the loan application was made. Finally, it should be noted that the increase in the number of children to enroll by an individual leads to an increase in the odds of access to credit by 74%. Taking care of these children from the beginning of the school year to the school holidays requires the household to make use of additional resources such as credit and whatever the conditions of granting the loan, this could explain this improvement of probability.

**Table 5 Result of saving model classification test**

Logistic model for SV			
Classified	----- True -----		Total
	D	~D	
+	655	201	856
-	411	1731	2142
Total	1066	1932	2998
Classified + if predicted Pr(D) >= .5			
True D defined as SV != 0			
Sensitivity	Pr( +   D)		61.44%
Specificity	Pr( -   ~D)		89.60%
Positive predictive value	Pr( D   +)		76.52%
Negative predictive value	Pr( ~D   -)		80.81%
False + rate for true ~D	Pr( +   ~D)		10.40%
False - rate for true D	Pr( -   D)		38.56%
False + rate for classified +	Pr( ~D   +)		23.48%
False - rate for classified -	Pr( D   -)		19.19%
Correctly classified			79.59%

Source: Our computation with ENV2015 data

**Table 6 Result of credit model classification test**

Logistic model for Cred	
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GENDER IMPACT, TYPICAL PROFILES OF ACCESS TO CREDIT AND SAVINGS MARKETS: A CASE OF RURAL HOUSEHOLDS IN COTE D'IVOIRE

Classified	True		Total
	D	~D	
+	4325	630	4955
-	181	131	312
Total	4506	761	5267

Classified + if predicted Pr(D) >= .5  
True D defined as Cred != 0

Sensitivity	Pr( +  D)	95.98%
Specificity	Pr( -  ~D)	17.21%
Positive predictive value	Pr( D  +)	87.29%
Negative predictive value	Pr( ~D  -)	41.99%
False + rate for true ~D	Pr( +  ~D)	82.79%
False - rate for true D	Pr( -  D)	4.02%
False + rate for classified +	Pr( ~D  +)	12.71%
False - rate for classified -	Pr( D  -)	58.01%
Correctly classified		84.60%

Source: Our computation with ENV2015 data

Other variables in the model have a negative influence on the probability of access to credit. This is the case for the family assistance (FA) variable, household size (HS) and household main income (HI). We believe that assisted households have fewer arguments to use credit, which would explain this negative relationship. Increasing the size of the household improves the human capital required to conduct activities that can increase the household's level of financial independence. Likewise, increased income increases the financial independence of the household, which is less and less dependent on external funds, and this may explain our results.

Barslund and Tarp (2008) find countervailing impacts of education, number of dependants, assets, credit history, and secure land rights on the demand for formal and informal loans, but most of the mentioned variables (except for assets) have a statistically significant effect only on either formal or informal credit demand. Other variables, such as connections to credit institutions, exhibit a positive significant impact on the demand for both formal and informal loans. The authors' analysis suggests that the demand for formal loans is largely driven by factors such as land holdings, and hence geared towards production purposes and asset management, while informal credit demand is negatively associated with factors such as age and education and positively associated with a bad credit history and the number of dependants, indicating a household's tendency to use informal loans for consumption smoothing rather than investment.

At the end of the study of the determinants of rural households' access to savings and credit, the level of classification of each of the two models was tested. The results of these two tests are presented in Tables 5 and 6 above. The classification level is relatively interesting. The model of the analysis of the determinants of savings has a classification level of 80% while that of the demand for credit reaches a level of 85%. Thus, the predicted probability of access to savings and credit for rural households is correct at 80% and 85% respectively. More than  $\frac{3}{4}$  of the predictions of our analysis models are correct.

The second stage of our work consists in identifying four typical households in relation to the level of access to credit and savings. These typical profiles are:

- Households with the highest probability of access to savings
- Households with the lowest probability of access to savings
- Households with the highest probability of access to credit

- Households with the lowest probability of access to credit

Several tests were carried out by pair of binary variables to identify the different typical household profiles. It is a question of constituting combinations of the modalities of these different variables and of predicting the probability of access to these services. The numerical variables of our model are evaluated at their averages within the groups identified from the modalities of the categorical variables. Two subparts will be analyzed. The first relates to the identification of standard profiles relating to access to savings while the second refers to access to credit.

The identification of savings access profiles is done through the prediction tables presented in tables 7, 8, 9 and 10. In each of these tables, two categorical variables have been taken into account. These modalities have identified the smallest and the highest probability of access to the service in question. The lowest probabilities of access to savings were described as following: a household whose head is over-55 age category with no education or primary level, non-salaried and with no housing ownership, working in the service sector and who did never receive family assistance nor credit during the last 12 month preceding the survey. This household has a social capital (member of village association) and has a strong perception of spirit of solidarity within the village. On the other hand, the highest probabilities of access to savings were obtained according to the following modalities of our categorical variables: a household whose head is in the 35 to 55 age group with the level of high school, salaried and with a home owned and operating in trade. This household has received family assistance and credit and is not a member of an association (does not have social capital). It is also indifferent to the spirit of solidarity within its community. In table 11, we see that the probability of the first profil is very close to 0 the second one is close to 100%. The difference between these two profiles is statistically significant at the 1% level as mentioned in Table 11.

In the second part, we have to identify the typical profiles of access to credit. Tables 12, 13, 14, 15 and 16 present the results of our tests. The other control variables are maintained at their local means within each group identified by the terms of our predictor variables. According to the level of access to credit, the most rationed households profil is this: a household whose male head is over 55, trader and part-time worker who was unable to save; this leader does not have social capital, holds agricultural land and has primary education level.

**Table 7 Predicting the probability of saving by age and level of education**

	CA	EL	Pr (y)
1	35	0	0.207
2	35	1	0.183
3	35	2	0.470
4	35	3	0.478
5	55	0	0.218
6	55	1	0.194
7	55	2	0.486
8	55	3	0.494
9	105	0	0.011
10	105	1	0.010
11	105	2	0.037
12	105	3	0.038

Source: Our computation with ENV2015 data

**Table 8 Predicting the probability of saving according to SA and OD**

	SA	OD	Pr (y)
1	0	0	0.075
2	0	1	0.115

3	1	0	0.388
4	1	1	0.504

Source: Our computation with ENV2015 data

**Table 9 Predicting the probability of saving according to SA and OD**

	AS	FA	Pr (y)
1	1	0	0.209
2	1	1	0.984
3	2	0	0.076
4	2	1	0.950
5	3	0	0.363
6	3	1	0.992
7	4	0	0.026
8	4	1	0.861

Source: Our computation with ENV2015 data

**Table 10 Predicting probabilities of saving according to SC and SCP**

	SC	SCP	Pr (y)
1	0	0	0.990
2	0	1	0.119
3	0	2	0.227
4	0	3	0.092
5	1	0	0.988
6	1	1	0.105
7	1	2	0.202
8	1	3	0.081

Source: Our computation with ENV2015 data

This household does not have its home ownership and has received family assistance. On the other hand, it was possible to identify household characteristics with full access to credit. It is a household headed by a high school woman in the 35-55 age group working in the industry, a head who was able to save and then is not a member of an association. This household does not have agricultural land but has its own home and a full-time job and has not received family assistance. The difference between these two profiles is statistically significant as shown in Table 17.

In the last part of our analysis, we tried to understand the impact of gender on the level of access to savings and credit. Figures 1 and 2 allowed us to capture this impact. In the first model of this work, the variables MN (number of males in the household) and Cred (access or not to credit) were taken into account.

**Table 11 Typical household profiles of access to the savings market and significance of the difference in profiles**

	CA	EL	SA	OD	AS	FA	Cred
1	55	2	1	1	3	1	1
2	105	0	0	0	4	0	0
	SCP	Pr (y)					
1	0	1.000					
2	3	0.000					
Specified values of covariates							
	SC	HS	HI	NAL	CS	MN	
Current	0	2.7	873	1.57	.296	1.43	
	lincom	pvalue	ll	ul			
1	-1.000	0.000	-1.000	-1.000			

Source: Our computation with ENV2015 data

**Table 12 Prediction of the probability of access to credit by savings and age**

	CA	SV	Pr (y)
1	35	0	0.862
2	35	1	0.971
3	55	0	0.930
4	55	1	0.986
5	105	0	0.821
6	105	1	0.960

Source: Our computation with ENV2015 data

**Table 13 Predicting probabilities of access to credit by SC and AL**

	SC	AL	Pr (y)
1	0	0	0.943
2	0	1	0.926
3	1	0	0.954
4	1	1	0.941

Source: Our computation with ENV2015 data

**Table 14 Predicting probabilities of access to credit by OD and FW**

	OD	FW	Pr (y)
1	0	0	0.801
2	0	1	0.921
3	1	0	0.962
4	1	1	0.986

Source: Our computation with ENV2015 data

Recall that there was a statistically significant relationship between these variables and the odds of access to savings (SV). We tried to analyze the behavior of the relationship between the variables MN and SV in case of access or not to credit. Figure 1 shows the evolution of the probability of access to savings by households as a function of the evolution of the number of male persons with access to credit or not. When the variable MN equal zero, the probability of access to savings is higher among households with a credit than among those who did not. Also, while this probability increases with the increase in the number of men in the case of households receiving credit, it is still close to zero for households with no credit.

**Table 15 Predicting probabilities of access to credit by HHS and FA**

	HHS	FA	Pr (y)
1	0	0	0.966
2	0	1	0.887
3	1	0	0.930
4	1	1	0.786

Source: Our computation with ENV2015 data

**Table 16 Predicting probabilities of access to credit by Education Level and Business Line**

	EL	AS	Pr (y)
1	0	1	0.951
2	0	2	0.976
3	0	3	0.771
4	0	4	0.919

5	1	1	0.918
6	1	2	0.960
7	1	3	0.662
8	1	4	0.868
9	2	1	0.936
10	2	2	0.969
11	2	3	0.717
12	2	4	0.895
13	3	1	0.998
14	3	2	0.999
15	3	3	0.987
16	3	4	0.996

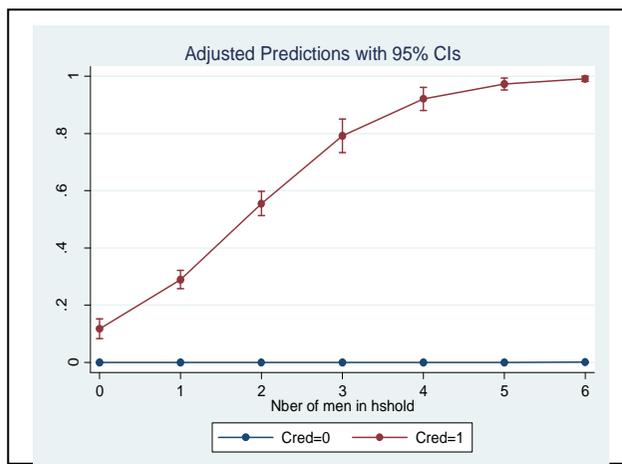
Source: Our computation with ENV2015 data

**Table 17 Summary of typical profiles of access to the savings market and significance of the difference in profiles**

Expression: Pr(Cred), predict()								
	CA	SV	SC	HHS	AL	EL	AS	
1	55	1	1	0	0	3	2	
2	105	0	0	1	1	1	3	
		OD	FW	FA	Pr(y)			
1		1	1	0	1.000			
2		0	0	1	0.033			
Specified values of covariates								
	HI	FEM	NbMal	HS				
Current	1328	.978	13.8	2.29				
. mlincom 2-1								
	lincom	pvalue	ll	ul				
1	-0.967	0.000	-0.997	-0.937				

Source: Our computation with ENV2015 data

Thus, while this probability is close to 100% when the number of men is 4 among the households receiving credit, it is still close to 0 for households that have not received credit. We can conclude from this first analysis that access to credit strongly determines access to savings and the presence of more men (male) in the household improves the level of access to savings only in the case where the household has prior access to credit.

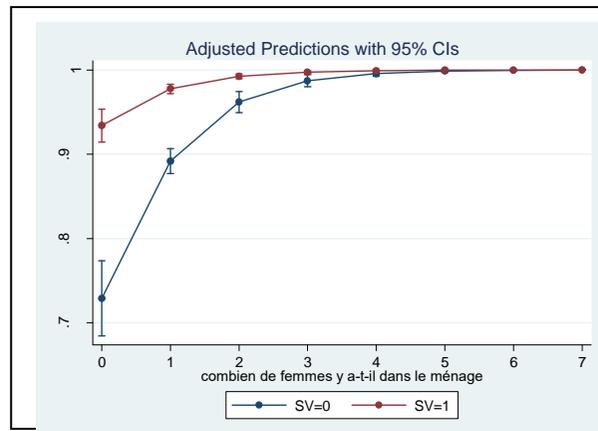


**Figure 1 Evolution of access to saving by number of men and access to credit**

Source: Our calcul from ENV2015 data

The second graph analyzes the relationship between the level of access to credit and the change in the number of women (variable FEM) in the household according to whether or not the household had access to savings. The red curve shows the evolution of the probability of access to credit by the number of female persons in the households that made savings while the blue shows this same probability for households that did not have access to savings. When the variable FEM equal zero, the probability of access to credit is higher among households with a saving than among those who did not.

We can see that, unlike figure 1 where the probability remains stationary for households that did not have access to credit, there is an increase in the probability of access to credit when the number of women increases, whether the household has made savings or not. When the number of women reaches 4 to 5 individuals, these probabilities are both close to the unit. It can be concluded here that access to savings determines the level of access to credit, but the presence of more women in the household makes it possible to greatly improve the level of access to credit.



**Figure 2 Evolution of access to saving by number of men and access to credit**

Source: Our calcul from ENV2015 data

### Conclusion

At the end of our analysis, we were able to understand that many determinants influence access to credit and savings. As stated by Bendig, Giesbert and Steiner (2009), many social factors influence the level of access to savings. These factors could include the characteristics of the household head. As Kiiza and Pederson (2002), we found that several factors can influence households demand for savings. As them in their works in Uganda, we find that the decision to hold a bank savings deposit in is positively related to the level of education and work experience of the household head. Age categories of heads of households and the sector of activity have diverging effects on household decision to hold a savings account. This decision is further influenced by the level of permanent income.

The analysis of the determinants of credit demand revealed results as divergent as those of the demand for savings. The characteristics of the head of the household have diversified effects on household savings. In addition, households in which many members suffer are making more use of credit to meet the costs of caring for their sick members. Also, the spirit of solidarity in rural areas makes these households

obtain better access to credit. As many studies have noted, it has been found that female-headed households have better access to credit than those headed by men (Mohamed and Temu, 2009). Similarly, households that have assets such as their own place of residence are seeing their level of access to credit improved. Finally, the increase in the number of children attending school improves the level of access to credit. On the other hand, there was a negative relationship between the demand for credit on the one hand and obtaining family assistance, the size of the household and its income on the other hand. One of the major facts that emerges from this study is the reciprocal causal relationship between the demand for these two financial services. We found that households with access to credit significantly improve their level of access to savings and the opposite too.

Following this initial analysis, our work focused on the identification of typical household profiles relative to the level of access to (savings and credit). Regarding savings, two typical profiles have been identified: firstly, the household profile having an almost zero probability of access to this service, and secondly, the profile of the household with the highest probability of access to this same service. The lowest probabilities of access to savings were identified in the following categories: a household whose head is over-55 age category with no education or primary level, non-salaried and with no housing ownership, working in the service sector and who did never receive family assistance nor credit during the last 12 months preceding the survey. This household has a social capital (member of village association) and has a strong perception of spirit of solidarity within the village. On the other hand, the highest probabilities of access to savings were obtained according to the following modalities of our categorical variables: a household whose head is in the 35 to 55 age group with the level of high school, salaried and with a home owned and operating in trade. This household has received family assistance and credit and is not a member of an association (does not have social capital). It is also indifferent to the spirit of solidarity within its community. The difference between these two profiles is statistically significant.

Subsequently, two standard profiles have also been identified in terms of access to credit: firstly, the household most rationed in their access to credit, and secondly, the household with the highest probability of having access to credit. Thus, the analysis of the results of the prediction tables made it possible to identify the following characteristics concerning the most rationed household in their access to credit: According to the level of access to credit, the most rationed household's profile is this: a household whose male head is over 55, trader and part-time worker who was unable to save; this leader does not have social capital, holds agricultural land and has primary education level. This household does not have its own home and has received family assistance. On the other hand, it was possible to identify household characteristics with full access to credit. It is a household headed by a high school woman in the 35-55 age group working in the industry, a head who was able to save and then is not a member of an association. This household does not have agricultural land but has its own home and a full-time job and has not received family assistance. The difference between these two profiles is statistically significant.

The last part of our work allowed us to take into account the gender impact on access to saving and credit. We discovered that the increase in the number of males in the household has a positive influence on the level of access to savings only if the household has previously had access to credit. On the other hand, we note that although the initial level (level where there is no woman in the household) of access to credit is much better among households with access to savings compared to those without access to saving, increasing the number of women in the household greatly

improves the likelihood of access to credit for both types of households (those with or without access to savings). As the number of women increases, these two probabilities of access to credit increase, but the increase is faster for households without access to savings, so that these two probabilities are almost equal to 1 when the number of women increases goes to more than 5 persons.

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