# ARE FEMALEBORROWERS LESS RISKY THAN MEN? EMPIRICAL EVIDENCE FROM BURUNDIAN MICROFINANCE INSTITUTIONS.

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**Abstract**

The general purpose of this paper is to examine the creditworthiness of women compared to men.We use a database gathered from Burundian National Federation of Saving and Credit Cooperatives (FENACOBU) to measure the association between the default risk and five independent variables, namely gender, industry, maturity, credit amount and frequency of reimbursement from 2010 to 2014. The association is tested trough probit model and coefficients are measured by marginal effects.The main conclusion of our research is that when a financial institution lends to a man rather than to a woman, it incurs an additional default risk of about 2%. Incidentally, our study led us to following conclusions: a borrower who invests in sectors other than the primary one reduces the default risk by about 2 percent; one percent increase of credit amount reduces the default risk by about 1.5 percent; a credit repayment made at a frequency other than monthly increases the default risk of about 24%.Financial institutions should avoid discrimination against female borrowers and afford them with lower interest rates given they are less risky. To our knowledge, no scientific paper has analysed the gender-based differences in financial behaviour in Burundi. Hence, we can argue that our paper opens a new avenue for research in gender-based financial behaviour.

Key words: default risk, gender, FENACOBU, probit model, marginal effects.

## 1. Introduction

Discrimination against women in terms of access to credit is a global issue and has already been the subject of several studies. Rai (2014) reported that in the USA, women face greater credit constraint and pay higher costs of credit. In Italy, Alexina, Lotti and Mistrulli (2008) found that women pay a higher interest rate than men, after controlling for a host of personal characteristics, characteristics of the business and characteristics of local credit markets.In developing countries, Armendariz and Morduch (2005), among others, found that formal-sector commercial banks tend to favour men at the expenses of women.

The rationale for this segregation often advanced would be the female strong aversion to risk. In other words, women access to credit has become more difficult because they don't want to take financial risks by investing in projects that may not be profitable. But differences appear right away when it comes to explain this attitude to the risk. The reasoning of some authors (Bajtelmit and Bernasek, 1996) is circular in the sense that for them, this attitude is the logical consequence of discrimination from which are derived the apparent causes as income, wealth, and employment. For them, irrespective of gender, any person in a situation of deprivation in terms of income, wealth and employment would have the same aversion to risk comparable to the female one. Other authors (Huber, 1993 and LaBorde, 1994) attribute this aversion to biological and sociocultural factors. The woman would be naturally inclined to childbirth, education of children and other household chores. This biological predisposition combined to socio-cultural conditioning prevent her from taking financial risks.

Although victim of this financial discrimination, women, when they manage to get the credit, repay more easily than men (Armandariz and Morduch, 2005; Agier and Szafarz, 2011; Marrez and Schmit, 2009).Therefore, it becomes obvious that this segregation is not only detrimental to women but also to financial institutions who deprive themselves of good customer for free. As can be expected, Burundi is far from being an exception to this segregation against women. It is evidenced both by a report on financial inclusion (BRB, 2012) and the database of the customers of the Burundian National Federation of Saving and Credit Cooperatives (FENACOBU). The first source mentions that women represent 28.3% MIFs' customers; for the second, that proportion is, on average, less than a quarter (23%).

The main objective of our study is to scientifically verify if Burundian women, clients of Microfinance Institutions (MIFs), are financially more credible than men as it is the case in other developing countries. Our research is timely because, to our knowledge, no study has addressed this issue in Burundi. The results of our study will support our advocacy for women so that they can have easier access to credit and at relatively low levels, taking into account their relatively small risk of default.

For this, we built a probit model that we tested on the database of FENACOBU. We found that, any things remaining equal, when a MIF lends money to a man rather than to a woman, it increases the risk of default by about 2%. Incidentally, the interpretation of the control variables has taught us that a borrower who invests in sectors other than the primary one reduces the default risk by about 2 percent; one percent increase of credit amount reduces the default risk of about 1.5 percent; a credit repayment made at a frequency other than monthly increases the default risk of about 24%.This finding led us to advise MIFs to ease access to credit for women and, why not, with a preferential lending rate according to financial theory stating that the borrowing rate is a positive function of the borrower default risk (Wehn, Hoppe and Gregoriou, 2012).

The rest of the paper is organized as follows; section 2 presents the literature review. Section 3 presents the methodology and data used. Section 4 presents and discusses the empirical results, and section 5 gives the concluding remarks.

## 2. Literature Review

### a) Women financial exclusion, a worldwide phenomenon

Undoubtedly, women are discriminated against in credit market both in developed and developing countries. In addition to racial discrimination hotly debated in USA (Cavalluzzo and Cavalluzzo, 1998; Blanchower, Levine and Zimmerman, 2003), Rai (2014) examined if gender discrimination exists in the U.S. credit market. Specifically, he examined if women face greater credit constraints and pay higher costs of credit compared to men. He found evidence that women face greater credit constraint and pay higher costs of credit. Even after controlling for a wide array of demographic, household and credit risk characteristics, empirical

results confirm that credit applications of women are more likely to be rejected, and first mortgage rates are comparatively higher for women.

In Italy, where self-employed women and micro-firms owned by women comprise more than 25 percent of the total, Alexina, A.F., Lotti, F. and Mistrulli, P.E. (2008) found that women pay a higher interest rate than men, after controlling for a host of personal characteristics, characteristics of the business and characteristics of local credit markets. An obvious explanation could be that women are riskier borrowers, but the result remains strong after controlling for a variety of risk factors, including past credit history of the individual borrower, the sector in which the borrower operates and his/her type of activity. In fact, female-owned businesses have gone bankrupt significantly less often than male-owned, and women have a slightly better credit history. The result holds unchanged when they included bank fixed effects: therefore, it cannot be explained by the fact that women use a specific type of bank. They also found that firms asked to pledge collateral are charged higher interest, since they are perceived as more risky. Interestingly, they found that, when a woman has a male guarantor, her interest rate goes down, rather than up, while if a female borrower has a female guarantor, her interest rate is much higher even than that of a male/male pair. A woman guaranteed by a woman is considered the absolute worst possible borrower by banks. In order to further investigate the role of trust and risk, they considered social capital in different parts of Italy and its effects on credit relationship. As a large literature has discussed, the level of trust varies dramatically across provinces in Italy, and this correlates to a host of socio-economic outcomes.

They show that interest rates charged for these overdraft facilities were lower in places with higher social capital and trust, and this robust result is of interest in its own right. The differential between female and male rates, however, is not an artifact of low social capital. In fact, when they looked at the interaction of measures of social capital and the gender of the borrower, they found that women benefit from the trust effect of increased social capital less than men. In other words, both men and women pay relatively less in places with more trust, but women benefit less than men from this effect. They have also investigated whether the structure of the bank industry matters, for instance with more fragmentation in the system benefiting women (perhaps because of more competition), and whether the presence of

small banks, for which fiduciary and personal relationships with the clients matter, would benefit women. They did not find much. Women pay more with any structure of the banking sector.

In developing countries, Armendariz and Morduch (2005), among others, found that formal-sector commercial banks tend to favor men at the expenses of women.

**b) Risk aversion, the main cause of gender-based discrimination in credit market**

An abundant literature associates that segregation to risk attitude difference. Mittal, M. and Dhade, A (2007), through an empirical investigation carried out within the city of Indore with 167 respondents, found that women were less risk lovers than men and hold less risky portfolio. Hinz, McCarthy, and Turner (1996) used a logit model to prove that men are significantly more likely to hold risky assets and that the percentage of pension wealth that is invested in these asset categories is higher for males.Jianakoplos and Bernasek (1996) reported that 63% of the single women and 57% of the married women were not willing to accept any financial risk at all (compared to 43% of single men and 41% of married men in the sample).Wang (1994) reported that women received more conservative investment advice than men, either because they are believed to be more risk averse or because the investment adviser believes they "should" be. In the first case, this was an example of statistical discrimination where advice was being offered on the basis of a perception of average willingness of women to take risks rather than on the individual's willingness to take risks. Furthermore, some brokers recognized to treat male clients better than female clients, spending more time with them and offering them a wider variety of higher return (and presumably higher risk) investments. For Wang (1994), the impact of information on investment decision making had two separate dimensions to it. Women may differ in access to information and they may also differ in their ability or inclination to use available information. In the same vein, Handley (1994) reported that women experience exclusion from informal networks and, as a consequence, lack of prompt access to valuable information in the organization.

More recently, in his first essay, Rai (2014) examined whether women exhibited greater financial risk aversion than men using attitudinal and behavioral specifications of risk aversion. He found that while women display greater attitudinal risk aversion, gender difference in behavioral risk aversion depended upon individuals' marital status and their role in household finances. Single women exhibited greater behavioral risk aversion compared to single men. However, gender difference did not exist when the author compared behavioral risk aversions of married women and men in charge of household finances.

**c) Controversy on the explanation of the female risk aversion**

Despite numerous researches which evidenced the gender-based segregation in credit market, very controversial are explanatory factors of the female risk aversion.

Morrison, Raju and Sinha (2007), through their long literature review, pointed out that the existing research on credit markets in developing countries suggested that large women receive unfavourable treatment not because of discriminatory treatment per se, but rather because of gender differences in individual characteristics that are relevant for loan qualification.

However, for Bajtelmit and Bernasek (1996), gender differences in investing and risk-taking could be attributed to many possible causes but, ultimately, it can be shown that all the explanations have their root in discrimination and/or differences in individual preferences. These factors may influence risk aversion directly or through outcomes such as gender differences in wealth, income and employment. In other words, the discrimination creates differences in many aspects resulting in apparent causes of the differences in investing and risk-taking. Those apparent causes are wealth, income, employment and choices.

- Wealth: according to the expected utility theory, risk aversion decreases with wealth (Huang and Litzenberger, 1988). Because women have less wealth, it follows that they will be expected to exhibit greater absolute risk aversion than men. The implication is that women, on average, will hold a smaller dollar value of risky assets in their investment portfolios than men. Jianakoplos and Bernasek (1996) also found that women were

relatively more risk averse than men,i.e. they would hold a smaller proportion of their portfolio in risky assets.

- Income: Following Bajtelmit and Bernasek (1996), lower levels of income for women mean fewer resources available for savings and investment; hence, for less resources for risk-taking. However, it should also be noted that having income does not necessarily translate into controlling income. Seven years before, Zelizer (1989) found that husbands generally control income, except at the very lowest income levels (where control means allocating shortages and dealing with creditors). Then, researchers should not consider a household as a single decision-making unit, ignoring the issue of household decision-making (Ferree, 1990 quoted in Bajtelmit and Bernasek, 1996).

- Employment: Despite the growing insertion of women into traditionally male occupations, the labor market continues to be segregated by gender, with women concentrated in low paying occupations and at lower levels within occupations (Reskin and Hartmann, 1986; Reskin, 1988). And occupational segregation is an explanation for lower average female earnings. Managers may attempt to "protect" women by not promoting them into positions that are regarded as more risky, such as jobs that are paid on commission (Wall Street Journal, May 17, 1994 quoted in Bajtelmit and Bernasek, 1996). This has the potential to restrict advancement opportunities, and, to the extent that experience with risk improves one's understanding, it may perpetuate risk averse behaviour by women.
- Choices: The choice-based explanation for gender differences in investing and risk-taking derives from human capital theory in economics. Human capital theory (Becker, 1975) states that women rationally choose to invest in less human capital (education, skills, on-the-job training) than men, which in turn affects their employment opportunities, their incomes and their ability to accumulate wealth. Women make different choices than men primarily due to their greater family responsibilities. Interestingly, the gender division of labor within the family (this is the case for Burundi) which results in women taking primary responsibility for household work and child care, is seen alternatively as the result of inherent biological differences or as the

result of socialization. The continuing debate over biology versus socialization as the basis for women's choices has a long history (Huber, 1993). The biological argument maintains that because of women's greater biological responsibility for reproduction, evolution has led women to be less willing to take risks than men.LaBorde Witt (1994) explores the gendered division of labor in care-giving and presents an extensive review of the literature on the biology/socialization debate. According to him, public ideology dictates that families take responsibility for the care of their frail and vulnerable members. Women more than men are the unpaid, informal caregivers of family members. This gendered division of labor was examined by using the U.S. Survey of Income and Program Participation. Differences between metropolitan and nonmetropolitan sons' and daughters' parental caregiving activities were examined in order to contrast areas having more traditional, conventional or conservative values with those adopting more feminist values. Results show that in addition to daughters performing the vast majority of tasks, there was a difference between the types of care provided by metropolitan and nonmetropolitan daughters. Nonmetropolitan daughters tended to perform more caregiving tasks considered to be traditional "women's work" while metropolitan daughters performed significantly more tasks considered to be non traditional for women. The findings suggested that providing care is due more to socialization to gender roles than to women's supposed natural or biological tendencies for "nurturing."

### d) Evidence on female creditworthiness resulting from risk aversion

Such female risk aversion is also coupled with an interesting finding for credit suppliers: the microcredit industry has proved on a large scale that women are more trustworthy than men in terms of repayment conduct (Armendariz and Morduch, 2000). For example, in Maghreb region, Marrez and Schmit (2009) analyzed microfinance institution (MFI) credit risk, based on the loan portfolio of a leading maghrebian MFI, in terms of number of clients served and portfolio size. The study worked with a proprietary data set of 1,144,770 contracts issued between 1997 and 2007. They used a resampling technique to estimate the probability density function of losses and value-at-risk measures for a portfolio of loans granted to female and male

microfinance clients separately. They reached the conclusion that loss rates were higher for male client population than for female client population. In the same vein, Agierand Szafarz, (2011) arrived at the conclusion that women entrepreneurs were trustworthier borrowers than men, but do not benefit from this quality.

## 2. Analytical framework

### a. Hypothesis development

The above literature review conducts us to following conclusions: the gender-based discrimination in credit market is a worldwide phenomenon; women are more risk averse than man; there is still a controversy on the causes of risk aversion; some apparent causes rooted in gender-based segregation and individual characteristics may explain the difference observed in risk attitude; and female borrowers are more creditworthy than males.

Before pursuing our discussion, it is worthwhile to emphasize the relationship between risk attitude and creditworthiness. It is well established that risk taking is inversely proportional to creditworthiness. This brings us to investigate the existence of those up-mentioned apparent causes of risk attitude in the Burundian context before making any assumption on creditworthiness. Those apparent causes are: wealth, income, employment and choices. Given we don't have data on wealth and income, we elaborate only on employment and education.

According to the general population census realized in 2008, there is no gender-based difference in employment rates. Surprisingly, women are a bit more occupied than man: 58, 88% of at least ten- year-aged women are occupied while this rate falls slightly to 57,64% for man. Unfortunately, the population census did not distinguish the employment quality, in terms of the level of responsibility and remuneration, two relevant aspects tightly linked to the risk taking as well established above.

As well as education is concerned, the literacy rate is higher for man: 50,65% against 46,83% for women, that to say almost 4% as gender-based difference in literacy rate.

In addition to these four apparent causes, it is worthwhile to elaborate on cultural influence on risk attitude. In Burundi, culture is – despite some changes underway following western influence- characterized by a patriarchal system in which family ties are strong and the family is based on the more traditional roles of amale bread earner and a woman running the household. Because of that work division, the women's propensity to invest and to take risk is lower than for men. And even when they get into debt, women experience strong social pressure to repay. Instead, insolvency is more tolerated- or even encouraged- for men. There is even a traditional saying that the bravery of a man is measured by his ability to enjoy his own property but also those of others. In other words, men are somewhat encouraged to organize their strategic default.

All these reasons together lead us to the following hypothesis:

***"Female borrowers are less risky than male borrowers"***

**b. Empirical model and variables**

The model that we use allows us to establish a relationship between the gender and the default risk of borrowers. Specifically, we check whether gender influences the risk of default. However, as we know that other factors may influence the default risk, we are driven to add some of them as control variables. These variables are the following: borrower's industry, credit maturity, credit amount and repayment frequency.

Why these variables and what relationship can we expect?

- Payment default: symbolized by *DEF*, the dependent variable is set to 1 if the reimbursement is delayed by at least a month and 0 otherwise.
- Gender: this is the main explanatory variable. It is symbolized by *GEND* and is set to 1 if the borrower is a man and 0 if it is a woman. We expect a positive relationship between gender and the risk of default because, as discussed above, loans given to men are riskier than those granted to women.
- Industry: because of the climatic disturbances, it is common knowledge that the agro-pastoral activities are relatively risky. We can assume that customers who invest in this sector will experience

more difficulties in meeting their financial obligations. This variable symbolized by *INDUST* is set to 1 if the loan is invested in the primary sector, and 0 otherwise. For this, we expect a positive relationship between the risk of default and the variable "industry".

- Loan amount: symbolized by *LAMT*, this variable undergoes a logarithmic transformation to solve the heteroscedasticity issue. The relationship between this variable and the default risk can be either positive or negative. Positive if one assumes that the amount awarded to the borrower corresponds both to its financing needs and repayment capacity. This implies the MFI credit service has done a very good job in analyzing both the project's profitability and solvency of the borrower. Negative to the extent that the higher the amount of the loan, the more difficult will be the repayment.
- Payment frequency: this variable is symbolized by *FREQ*; it is set to 1 if the repayment is made either bi-monthly, quarterly or semi-annually and 0, if repayment is monthly. Experience has shown that when a client requests a lending institution to extend the repayment frequency, it means that he is usually in trouble. So a repayment frequency exceeding one month is a harbinger of default. This leads us to anticipate a positive relationship between that variable and default risk.
- Credit maturity: it ranges from 1 to 48 months. Generally, when the lender gives enough time to the borrower, the latter easily repays the loan because he has time to get return on investment and be able to pay his debt. We therefore expect a negative relationship between default risk and maturity of the loan. This variable is measured in terms of months and is symbolized by *MAT*;

The model to be estimated is in the form of the following equation:

$$DEF = \beta 0 + \beta 1 GENDi + B2INDUSTi + B3LN(LAMTi) + B4FREQi + B5MATi + \varepsilon i$$

### c. **Data description**

Our data come from FENACOBU, a national federation of savings and credit cooperatives in Burundi. This federation includes 124 cooperatives savings and credit (COOPEC) spread over the country. From historical point of view,

it may be noted that the first COOPEC was created in 1985 with the help of French cooperation. Eleven years after, the FENACOBU was created with the mission to represent legally, create, promote and supervise COOPECs. In order to comply with Decree No. 100/203 of 22 July 2006 on the regulation of microfinance activities, the FENACOBU requested its approval and that of his COOPECs to the Central Bank (BRB). It obtained the approval in March 2007. So we consider FENACOBU and its members as microfinance institutions (MFIs). It goes without saying that our population is defined as all MFIs' clients while our sample includes FENACOBU's customer base. The network has officially 223,000 members, making it by far the main point of access to financial services in the country. The total clientele of MFIs, apart from the National Postal Authority (RNP), is estimated to 500,000 people (BRB, 2012). So, our sample is fairly representative of the population for two reasons: its size is just under half the population (total clientele of MIFs is estimated to 500, 000) and the network embraces the entire country, all provinces and one hundred of communes out of 119 are represented.

We were lucky to get from FENACOBU the Excel file covering a five – year - period (2010-2014) and containing valuable information including gender, amount of the loan, late payment, maturity of the loan, customer type and customer's industry. Like most databases, ours accused unfilled EXCEL cells, at the same time it contained wrong encoded data (for example, dates in the column amounts). This is after cleaning the database that we got a new version that powered the econometric model presented below. Table 1 illustrates how we cleaned raw data to get new version conducive to the econometric analysis.

**Table 1 : Constitution of the sample**

| Years / Rubric | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Gross data | 11 735 | 14 943 | 29 082 | 38 406 | 42 179 |
| Collective credits | 0 | 13 | 0 | 122 | 2 |
| Missing / wrong data | 103 | 131 | 3 894 | 5 126 | 9 846 |
| Clean data | 11 632 | 14 799 | 25 188 | 33 158 | 32 331 |

Table 2 illustrates the unequal access to credit. Indeed, throughout the study period (2010-2014), women represent on average less than a quarter of MFIs' customers (23%). This corroborates the results of the survey on financial inclusion (BRB 2012) according to which, in 2011, women constituted only 28.3% of the clientele of MFIs[21].

**Table 2 : Male and female borrowers**

| Years / Gender | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Men | 9 114 | 11 469 | 19 560 | 24 437 | 25 381 |
| Women | 2 518 | 3 330 | 5 628 | 8 721 | 6 950 |
| Total | 11 632 | 14 799 | 25 188 | 33 158 | 32 331 |
| Men/total (%) | 78% | 77% | 78% | 74% | 79% |
| Women/total (%) | 22% | 23% | 22% | 26% | 21% |
| Women/total (%- average ) | 23% | | | | |

Conversely, these results are largely distant from the existing situation in some developing countries like India: Yunus (2001) reported that 95% of Grameen Bank's clients were women. However, when the bank started, most borrowers were men: just 44% percent were women in October 1983. What is more worrying for Burundian women is that the situation does not seem to improve in their favor while "...microfinance is all about banking for women" (Armendariz, B. and Morduch, J., 2005, p 179) and that pioneers in microfinance industry intended to serve primarily women.

Now let's look at the distribution of borrowed amounts as illustrated in Table 3. Two main findings emerge. On the one hand, the amounts borrowed are steadily increasing; and regardless of the gender of the borrower. Indeed, three quarters of female borrowers can borrow amounts ranging from 20,000[22] to 1.4 million Burundian francs in 2014 while this range was only 20,000 to 900,000 in 2010. This range was 20,000 to 800,000 Burundi francs in 2010 against 20000-1200000 in 2014 for male borrowers. This increased

[21] Even for customers of banks and financial institutions (other than MFIs), this situation is almost similar, 29.3%.

[22]This minimum amount corresponds to overdraft.

allocation to customers is justified by the growth of COOPECs' equities. On the other hand, the average credit is higher than that of men: 1.2 million against 1.1 million in 2014. This difference is explained by the fact that most women go into debt to make investments requiring significant amounts while lot of men borrow for consumption. This explanation is supported by Khandker's finding: "... a 100 percent increase in the volume of borrowing by a woman would lead to a 5 percent increase in per capita household nonfood expenditure and a 1 percent increase in per capita household food expenditure, while a 100 percent increase in borrowing by men would lead to just a 2 percent increase in nonfood expenditure and a negligible change in food expenditure." (Khandker, 2003 quoted in Armendariz and Morduch, 2005, p 180).

**Table 3 : Credit distribution**

| Years / Gender | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| **Men** | | | | | |
| Minimum | 20 000 | 20 000 | 20 000 | 20 000 | 20 000 |
| Quartile 1 | 350 000 | 400 000 | 450 000 | 160 000 | 250 000 |
| Quartile 2 | 500 000 | 600 000 | 450 000 | 1 200 000 | 800 000 |
| Quartile 3 | 800 000 | 900 000 | 1 200 000 | 1 200 000 | 1 200 000 |
| Maximum | 19 000 000 | 19 000 000 | 24 000 000 | 24 000 000 | 30 000 000 |
| Average | 700 000 | 800 000 | 1 000 000 | 1 150 000 | 1 100 000 |
| Standard deviation | 764 680 | 929 350 | 1 290 708 | 1 757 521 | 1 452 751 |
| **Women** | | | | | |
| Minimum | 20 000 | 20 000 | 20 000 | 20 000 | 20 000 |
| Quartile 1 | 500 000 | 500 000 | 450 000 | 450 000 | 500 000 |
| Quartile 2 | 610 000 | 750 000 | 1 200 000 | 1 200 000 | 1 000 000 |
| Quartile 3 | 900 000 | 1 000 000 | 1 200 000 | 1 200 000 | 1 400 000 |
| Maximum | 9 000 000 | 15 500 000 | 24 000 000 | 24 000 000 | 23 000 000 |
| Average | 777 467 | 925 503 | 1 071 805 | 1 353 513 | 1 211 854 |
| Standard deviation | 668 885 | 943 284 | 1 466 342 | 1 766 730 | 1 480 675 |

The discrimination against women documented above (Table 2) is all particularly surprising and paradoxical given they pay back better than men.

Table 4 : Borrowers in default

| Years / Gender | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Men | 13% | 12% | 11% | 9% | 10% |
| Women | 7% | 6% | 7% | 3% | 5% |

As Table 4 illustrates this, the default rate among women is generally half that of men. This is consistent with other findings that emerge from several studies, among which Armendariz, B. and Morduch, J. , (2005, p 183) : "Women are often more conservative in their investment strategies, and are often more easily swayed by peer pressure and the interventions of loan officers—making women more reliable bets for banks worried about repayment". Previously, Khandker, Khalily, and Khan (1995) found that 15.3 percent of male borrowers were struggling in 1991 (i.e., missing some payments before the final due date), while only 1.3 percent of women were having difficulties. That finding is echoed in studies elsewhere in Asia.

To prove that women are financially more credible than men, we need to deepen our analysis through an econometric model that we present below.

## 3. Empiricalresults and discussion

Table5 reports the results of the probit model. To make more plausible the economic interpretation of the results, we express the coefficients of the variables in terms of marginal effects.
From the outset, we note that the coefficients of determination (Pseudo $R^2$) are relatively low, except in 2013 (88%). This is due to the absence of certain key variables that we have dropped following the lack of related data. These variable are: civil status, wealth (Huang and Litzenberger, 1988), income (Bajtelmit and Bernasek, 1996), employment (reskin and Hartmann, 1986) and choices (Becker, 1975).

**Table 5: Synthesis of the probit model results**

| Years / Rubric | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|---|
| Sample size | 11632 | 14799 | 25188 | 32331 | 33157 |
| Pseudo $R^2$ | 0.5351 | 0.4782 | 0.6210 | 0.8792 | 0.6332 |
| GEND | .0545309*** | .0463362*** | .001975* | .0039341*** | .0086892*** |
| INDUST | -.0279848*** | .0113779** | -.001670* | -.0061884*** | -.0462656*** |
| LN(LAMT) | -.0251688*** | -.0177598*** | -.000049 | -.002581*** | .0138563*** |
| FREQ | .292787*** | .2894932*** | .032664*** | .0767237*** | .1994787*** |
| MAT | .0003161 | .0003918*** | -.9.68006*** | .0003989*** | -.0007257*** |

*: P.Value $\epsilon$] 5%; 10%]

**: P.Value $\epsilon$] 1%; 5%]

***: P.Value $\epsilon$ [0%; 1%]

Notwithstanding the absence of these variables, we manage to highlight the relationship between the default risk and gender. The value of the coefficient $B_1$ varies from year to year. The first two years of this period, it is around five percent. This means that, all other things being equal, when a MIF lends to a man rather than a woman, it increases the risk of default by five percent. During the following three years, the coefficient falls below 0.1% but remains statistically significant (p value remains less than 1% , except in 2012 where it is between 5% and 10%).

Despite the downward trend in the value of the coefficient of the gender variable, we hold that all credit granted to a man rather than a woman increases the risk of default by about 2%. Could this downward trend be interpreted as the equalization of risk profiles of men and women? The answer to this question will come from other studies incorporating the aforementioned variables that were significant in the studies conducted by the authors mentioned above.

In any case, the main lesson of our study is for MIFs who are called upon to account for this great female financial credibility by preferentially granting loans to women and, why not, at relatively low rates. Is it not true that the lending rate is a positive function of the borrower's default risk? Financial

theory (Wehn, Hoppe and Gregoriou, 2012) argues for a preferential rate for women. Thus, differences that are still observed in Burundi Customer level of MFIs will be reversed and Burundi will reach the level of the most of developing countries, where the clientele of MFIs is predominantly female. Also, this measure would increase the rate of female financial inclusion.

Incidentally, we find the following results for the control variables:

- If a MIF grants a credit to a client who invests in sectors other than the primary sector, it reduces average default risk by 2%. It goes without saying that the primary sector (mainly, agriculture and livestock in our study) is riskier. This confirmsour expectation.
- One percent increase of credit reduces, on average, default risk by 1.5%, except in 2012 where the $B_3$ coefficient is not statistically significant. This result conducts us to think that the MIF rations the credit to the extent that customers are not getting the funding required by their investment. This underfunding would be partly responsible for insolvency. Of course, this does not mean that we advise MFIs to systematically increase the amount of credit, but to analyze carefully the financing needs of customers in order to avoid that lack of funds hampers the realization of planned investments. Fortunately, we find that the MFIs have already registered in this dynamic because the average credit granted is on the increase among both men and women (Table 3).
- The results for the repayment frequency are callable: if a repayment is made at a frequency other than monthly (that is to say, bimonthly, quarterly or biannually), default risk increases by 24%. The MFIs should thus require the monthly repayment.
- However, the results for the variable maturity are quite mixed and do not lend themselves to any generalization: in 2010 $B_6$ coefficient is not statistically significant, while it is positive in 2011 and 2013 and negative in 2012 and 2014.

## 4. Concluding remarks and policy implications

This paper aimed mainlyto answer to this question: Are women financially more credible than men? Not being the first to deal with this issue, we have taken advantage of previous researches. From the financial literature we went through, we learned two major lessons. On the one hand, financial exclusion remains a global phenomenon; it is apparent in both the developed countries like USA (Rai, 2014) and Italy (Alexina, Lotti and Mistrulli, 2008) and developing countries (Armendariz and Morduch 2005). On the other hand, discrimination against women on the credit market is due to their high risk aversion (Mittal and Dhade, 2007).If it is observed near unanimity on women's attitude towards risk, differences remain on its causes. Some authors (Bajtelmit and Bernasek, 1996) suggest that risk aversion is rooted in discrimination but the latter creates apparent causes such as wealth, income, employment and choices in terms of investment in human capital. In other words, placed in the same situation as women in terms of wealth, income and employment, men would have the same risk aversion than women. In contrast, other authors argue that risk aversion is due to biological factors (Huber, 1993) or socio-cultural ones (Laborde, 1993).

As well as Burundian context is concerned, the female financial exclusion is well documented either by the report on financial inclusion (BRB, 2012) or database from FENACOBU (table 2). Furthermore, descriptive statistics show that women are less risky than men (table 3). This brought us to verify econometrically that assertion.

Through the probit model tested on FENACOBU's database, we confirmed the hypothesis and corroborated the existing literature on microcredit in developing countries stating that women are significantly more reliable borrowers than men (Armandariz and Morduch, 2005; Agier and Szafarz, 2011; Marrez and Schmit, 2009). Specifically, we demonstrated that all other things being equal, lending to a man rather than to a woman increases default risk by about 2 percent. This finding led us to advise MIFs to ease access to credit for women and, why not, with a preferential lending rate according to financial theory stating that the borrowing rate is a positive function of the borrower default risk (Wehn, Hoppe and Gregoriou, 2012).

Incidentally, the estimated model led us to additional findings below. First, the default risk decreases by about 2 percent each time a customer affects its

credit investments in the sectors of activities other than primary. One should not infer that investors are invited to abandon the primary sector, given its importance for the national economy. The default risk may rather decrease thanks to the creation of an agricultural guarantee fund and other accompanying measures (Ntawiratsa, 2014).Second, default risk decreases by about 1.5 percent when the credit amount increases by 1%. This means that the customer suffers from underfunding partly responsible for its insolvency. Third, the risk of default is growing at about 24 percent when the repayment is at a frequency other than monthly. Hence, the monthly repayments are highly recommended for MFIs to avoid that customers affect otherwise the outcome of their investments prior to financial discharge.

Ultimately, we confess weaknesses of our paper that would be corrected by further researches. These would extend the study on banks and include in the model variables (civil status, wealth, income, employment) we have dropped because of to lack of related data. Thus, the conclusions resulting there from would bear on the entire financial sector.

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