

Microfinancing and Its Benefits to Women- Owned Micro-enterprises in Chad: A Case Study of the City of N'Djamena

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List of abbreviations and acronyms

CEMAC	Communauté Économique Et Monétaire D’Afrique Central (Economic and Monetary Community of Central African States)
INSEED	Institut National de Statistiques, des Etudes Économiques et Démographiques (National Institute of Statistics, Economic and Demographic Studies)
LAEREAG	Research Institute of Applied Economics and Management
MDGs	Millennium Development Goals
PADLFIT	Programme d’appui au développement local et de la finance inclusive au Tchad (programme for local development and inclusive funding in Chad)
PMEs	Petites et moyennes entreprises (small and medium-sized enterprises)
PSM	Propensity Score Matching
SMEs	Small and medium-sized enterprises
TPEs	Très petites entreprises
VSEs	Very small enterprises

Abstract

This study aims to examine the impact of finance on the profits derived by women-owned micro-enterprises in Chad, through undertaking a case study of the city of N'Djamena. In order to achieve this objective, the study uses both the two-step Generalized Least Squares estimation method, and the Maximum Likelihood method, which are adopted in order to correct the problem of heteroscedasticity associated with the survey data. The data used is derived from a survey on the economic empowerment of women in the city of N'Djamena, which was carried out in 2016 by the Research Institute of Applied Economics and Management of the University of N'Djamena (LAEREAG). The results show that financing is significantly and positively correlated to profits in women-owned micro-enterprises in Chad. This suggests that an improvement in microfinance lending conditions could improve women-run businesses. Financing that is derived from private microfinance institutions and the support in terms of training and management consultancy services (accounting and marketing) has a positive effect on profits. Finally, an endogeneity test allowed us to highlight the absence of a correlation between the residue and the profit variable. In light of these results, it becomes necessary to improve lending conditions and intensify the support in training and management consultancy services in favour of women.

Key words: Microfinance; Monthly profits; Women-owned micro-enterprises; Chad.

1. Introduction

The success of microfinance in Bangladesh has increased the interest of the research community in finance, notably in terms of its potential impact on poverty reduction, and the development of women's economic activities. This upsurge in interest has awakened the conscience of political authorities and economic and financial institutions on the practice and the importance of finance (Guérin, 2005). Furthermore, finance in general, and microfinance in particular, have been considered crucial to the achievement of the Millennium Development Goals (MDGs). In this regard, several microfinance programmes will be developed that target the most vulnerable groups, which are largely comprised of women (Dahoun et al, 2013). Several of these programmes focus mostly on developing countries in general, and on African countries in particular.

Considering the extent of poverty in Chad and the difficulties in its reduction, the government created the Department of Microfinance in July 2006 to promote and spread the practice of finance. Other programmes and agencies¹ were established in order to support the initiatives started by the youth by giving priority to projects started by women given that they comprise the gender that is the most vulnerable and that has the most numbers in terms of poverty. According to the report on the survey on consumption and the informal sector in Chad (ECOSIT3) undertaken in 2011, the rate of poverty in households headed by women is 42.6% against 47.4% in those households headed by men. Women are the majority and comprise 50.6% of the total population of which 50.1% is found in urban areas and 51.8% are in rural areas. Despite their number, statistics show that very few women benefit from the possibility of managing their own income. According to INSEED (2013), only 24% of women have accessed finance. Poor and non-poor women represent 9.4% and 13.4% of this proportion, respectively. Furthermore, women are also disadvantaged by their lack of education. They form the least educated section of the population in Chad. According to the same sources, 68.59% of women have never been to school, and only 8.29% attained a secondary school level of education and 0.41% have attained the tertiary level of education, whereas these rates are, respectively, 56.17%, 14.1% and 1.72% for men. Access to finance depends on the capacity of women to conduct and develop business. This capacity is related to the level of education (Dahoun et al, 2013).

¹ The support programme for graduates with no experience, Credit agricole, the National Bureau for Youth and Sports (formerly the National Youth Fund).

In Chad, women in general only run very small enterprises (VSEs) (INSEED, 2015). VSEs, in the context of this study, are defined as any firm with less than 10 people that sometimes escape the attention of the government in terms of tax registration. They are an important sector of the Chadian economy and supplement public structures in terms of recruitment of available manpower. The Chadian economy is dependent upon the activities of formal very small enterprises² and small and medium-sized Enterprises (SMEs) which represent 97% of the total number of formal enterprises, employing more than half of the active population (INSEED, 2015). However, women face, in a recurrent manner, difficulties in terms of access to loans to finance their activities. The guarantees required, the restriction in terms of eligibility for loans, the high interest rates, and the informal status of VSEs are some of the factors that limit access to loans by a large number of VSEs. These factors force this category of firms to resort to other sources of finance (informal credit, usury and commercial loans) which come at a high cost and do not favour the growth of VSEs in Chad.

Microfinance is a key element in the creation of employment that could increase the revenue of VSEs (Saïd, 2017; Waiswa and Phelps, 2017). Echaudemaison (2013) defined this as being short-term credit of a low amount, awarded generally to poor people especially women, who are excluded from traditional finance, to help them conduct small businesses that generate income. In this regard, the concept of microfinance, through its microcredit component, could be considered an opportunity to reduce constraints related to the financing of the activities of VSEs whose success risks are confused for failure risks (Koloma and Ratsimalahelo, 2015). Its relationship to poverty or the empowerment of women has been the focus of empirical studies (Huque, 2017; Dahoun et al, 2013, etc.). Huque (2017) concludes that microcredit is a powerful tool for poverty reduction and transforming the lives of members of vulnerable groups, particularly women. According to Huque (2017), microcredit affects women through increasing their income, the stabilization and professionalization of their business activity, the improvement of their status within the family unit, and strengthening of their capacity for self-organization. However, as a tool for fighting poverty, microfinance has its limits. According to Banerjee et al (2015), microfinance offers an option for supplementary financing and expands the range of choices. However, it is also probable that these new sources of finance destabilize some families insofar as they encourage them to go into debt in order to satisfy their expenditure needs; not for the purposes of investing, but in order to simply benefit from the availability of finance.

Even though microfinance is proving to be an important tool for income generating activities, and an improvement in the living standards of vulnerable groups in other countries, there is no study which has demonstrated the same in the case of Chad, where women are less educated and highly concentrated in rural areas. Also, previous studies focusing on this problem in sub-Saharan Africa focused on the relationship

2 These are VSEs registered in the Commercial Register or those that have a taxpayer identification number at the local level

between credit and the empowerment of women (Abalo, 2016; Hadizatou, 2017). To this end, the analysis of the impacts of finance on the profits of women-owned VSEs in Chad will bridge this literature gap in countries where high levels of illiteracy among women limit the possibility of their receiving support in terms of training and management consultancy services which are available to beneficiaries of financing.

This study aims at determining the effect of credit on the activities of women-owned VSEs in the city of N'Djamena. More specifically, it examines the effect of credit on the profits of women-owned VSEs. In order to achieve this objective, the study uses data from a survey on the economic empowerment of women in the city of N'Djamena carried out in 2016 by the Research Institute of Applied Economics and Management of the University of N'Djamena (LAEREAG). The two-step Generalized Least Squares method was used. Also, to correct the problem of heteroscedasticity related to the survey data, the Maximum Likelihood method is used. The results show that finance is significantly and positively correlated to profits in women-owned micro-enterprises in Chad. Financing that is derived from private microfinance institutions, the level of education of the husband and support in training and management consultancy services (accounting and marketing) have a positive impact on the profits. Finally, an endogeneity test allowed us to highlight the absence of a correlation between the residue and the profit variable.

The rest of the study is organized as follows. Section 2 presents a review of the relevant literature, Section 3 elaborates the methodology, Section 4 discusses the results, and finally, Section 5 will conclude and give the recommendations.

2. Literature review

External financing of enterprises is of great importance due to the rising costs of operational needs and investments that the firms experience (Pathak, 2018). This financing is achieved through loan applications so as to finance the production in the enterprise. The financial loans requested by the enterprise aim to increase production capacity or the marketing of existing products and to sell new products (Saïd, 2017). Furthermore, bank loans are necessary for the financial performance of a firm through its profits. Microfinance, on the other hand, agrees to the objectives of the fight against poverty through VSEs because it allows the poor, and more specifically women, to put into practice their capabilities³ (Sen, 1991). Studies that focus on the relationship between microfinance and the fight against poverty through the promotion of SMEs, end in controversial conclusions thereby generating two biases.

The first bias brings out the positive effects of microfinance activities on the activities of VSEs. According to this bias, microfinance allows for an increase in the income of VSEs and facilitates financial independence, stability and professionalism of entrepreneurial activities besides improving the status of women within the family and strengthening their self-esteem (Yunus, 1997; Mayoux, 2001; Robinson, 2001; Guérin, 2005). Several recent studies have tackled the question of the impact of microfinance on women-owned VSEs (Datta, 2004; et al, 2015; Koloma and Ratsimalahelo, 2015; Bismark, 2017; Becho, 2017). These studies show that microfinance is a strong tool for the reduction of poverty and transforming the lives of women through improving their living conditions, their family wellbeing and their social status. Thus, for women who are already carrying out economic activities, microfinance helps in boosting their working capital and its supply, thus the possibility to expand or diversify their income generating activities. The income generated could allow, through the leverage effect, for the mobilization of new resources which could be invested in activities at a larger scale.

Bismark (2017) and Ishtiaq and Rizwan (2017) show that credit linked to investment needs influences the performance of a firm as it is considered a sacrifice of economic resources today in the hope of obtaining higher income in the future. Using a similar approach, Pathak (2018) indicates that the influence of bank loans on the performance of a firm can also be demonstrated through this type of credit. Koloma

3 By capability, we refer to the totality of operational vectors which reflect the freedom which a person currently has to lead one type of life or another.

and Ratsimalahelo (2015) demonstrate that SMEs which have access to bank loans have a better economic and financial performance. Among the performance indicators used to this end are income, profit, and market share. However, the recourse to bank credit poses problems when some VSEs are rationed from the credit market despite the excess liquidity of certain banks. The example of CEMAC illustrates this (Beguy, 2012). This situation could be explained through the asymmetry in the information that exists between banks and enterprises. Credit rationing is one of the recurrent difficulties in the financing of SMEs. Furthermore, among other difficulties experienced by PMEs, one can also cite the practice of high interest rates, guarantee conditions, the low levels of education of entrepreneurs, and the lack of qualified personnel (Noumigue, 2012). Cheston and Kuhn (2002) and Saïd (2017) demonstrated that access to microfinance, accompanied by specific training (marketing and management consultancy services), give a new boost to the activities of women through an improvement of their relationship with their clientele and their suppliers, better planning of their activities and their tariffication. Thus, the success of women who benefit from loans would depend on their level of education. Sultana and Hasan (2011) demonstrate that an improvement of activities of women depends on level of education, age, family size, number of children of the woman, and the amount of credit received.

The second bias highlights the negative effects of microfinance on VSEs. Thus, initially appreciated for its effects on the life of the most poor, microfinance has been increasingly called into question, especially since the end of the 1990s (Stewart and Carina, 2010). One can only demonstrate very limited effects on the improvement of living standards and on the social dimension in scientific studies. Banerjee et al (2015) and Karlan and Zinman (2011) find negative effects following large scale debt distress as a consequence of an uncontrolled growth in the supply of credit. Aruna and Jyothirmayi (2011) also make it known that, as an instrument used in the fight against poverty, microfinance has its own limitations in terms of reaching the most poor. If the loan is not used for an activity that will generate income later, it will be difficult for borrowers to pay back their loans. It is quite evident in several studies that the loans are not always used as an investment, therefore, debt distress is always present (Aker and al., 2018). Thus, according to Aker et al (2018), the transformation from loan to debt could be due to the fact that microcredit is more often used for non-productive ends; in other words, it does not generate direct income and thus its payment leads to more debt distress. However, debt distress could also be due to the use of a loan as an investment, but that the latter is not profitable (Louis et al, 2013). Thus, although microfinance is a tool that serves to improve the living standard of the poor, it could sometimes make things worse. According to Louis et al (2013), the pressure exerted on the poor in regard to their loan payments explains this. The researcher explains that the most frequently used method in countries such as Bangladesh is that of group-lending which is influenced by a deadline and the pressure is felt among the members who try to preserve their dignity among their peers, or among the community. This method sometimes leads to suicide of a member or to violence towards a member of the group who does not meet their payment deadline (Mukherjee, 2014).

For Banerjee et al (2015), microfinance offers an option for supplementary financing and expands the range of choices. However, it is also probable that these new sources of finance destabilize some families insofar as they encourage them to go into debt in order to satisfy their expenditure needs, not for the purposes of investing, but in order to simply benefit from the availability of finance. Some, among these microfinance institutions, give loans without getting information on the repayment ability of their clients, or still, without knowing the purpose for which the loan will be used. Others increase both the interest rate and the ceiling of the amount loaned, which leads to an increase in the default of payments.

From research carried out in Mexico's rural areas, on the interactions between microfinance and the dynamics of debt distress in households, the access to microcredit does not exclude debt distress (Morvant-Roux and Bachelier, 2009). The econometric analysis by Morvant-Roux and Bachelier (2009) reveals two explanatory factors. The constraints of microcredit repayments, and the waiting period are incompatible with emergency needs. The modalities for the repayment of microcredit are quite rigid. The repayment of interest and of capital is fixed in advance (usually monthly) and does not allow for delays in payments. This rigidity often leads to problems considering the irregularity of income, and also because of the fact that the use of the microcredit very rarely generates direct income (Karlan and Zinman, 2011). Thus, borrowing to repay microcredit is something that occurs frequently.

Despite all these controversies, the impact of microfinance is crucial in the financing of the activities of VSEs in Chad, where the conventional financial system is not easily accessible to users. Thus, this subject remains an important one for research at a time when the government is looking for concrete solutions in order to make the woman the strongest link in the chain in order to have more robust economic development, through a support programme for local development and inclusive funding in Chad (PADLFIT).

3. Methodology

Since the 1970s, several studies have focused on the analysis of effects of finance on the empowerment of women, notably in developing countries. In Africa particularly, the studies carried out in this manner focused on Cameroun, Ghana, Senegal, South Africa, Zimbabwe, Benin, etc. (Dahoun et al, 2013; Ganle et al, 2015). In order to properly appreciate the influence of credit on the development of women-owned VSEs in Chad, this study has adopted a linear model approach, given the type of data used, in order to take into account the effect of credit on the profits of women-owned enterprises.

Econometric specification

The results of empirical studies indicate the existence of a possible relationship between finance and the turnover or even the profits of an enterprise (Berman et al, 1999; Hillman and Keim, 2001; Tioumagneng, 2011, etc.). This study is conceived within this methodological context in order to better understand the significance of credit in the development of business ventures engaged in by women, measured through the monthly profits earned in women-owned VSEs. Thus the following mathematical formalization:

$$Z_i = \beta_0 + \beta_1 \text{Crédit}_i + S_i \lambda + u_i$$

The variables of this model are presented as in Table 1.

Table 1: Description of variables of the model

Variables	Nature of the variable	Definition of the variable	Expected sign
Z_i	Quantitative	This variable designates the monthly profits realized by the enterprise i . It is the dependent variable of the model.	
Finance	Quantitative	Finance is the variable of interest and represents the amount received by the interviewee in terms of a loan from a credit institution or microfinance institution.	+
S	Vector of variables	It is comprised of eight control variables which are described below. These variables constitute the channels through which finance could affect profit.	
Age	Quantitative	Age is measured in terms of the number of years that the entrepreneur has lived.	+
Non-financial support	Qualitative	This variable designates the supply of non-financial services. It is a dummy and takes the value of 1 if the interviewee has benefitted from this, and 0 if not. It captures the effect of non-financial support such as technical support and management consultancy services on the development of business ventures by women.	+
Husband's level of education	Quantitative	The choice of this variable is justified through the fact that some husbands, those who are less educated, in the context of Chad, find it difficult to accept that their wives are engaging in their own business activities for various reasons (customs, religion, etc).	+
Level of education of the woman	Quantitative	The level of education of the entrepreneur and the number of years of schooling attained. A high level of education allows for better planning and management of the enterprise.	+
Marital status	Qualitative	The marital status is a dichotomous variable which takes the value of 1 if the woman is married and 0 if not.	-
Number of children	Quantitative	The number of children is captured by the children under the care of the household.	-
Source of finance	Qualitative	This variable takes the value of 1 if the finance comes from a private financial institution and 0 if not. It allows to take into account the degree of importance of each of these two sources of financing on the profits of VSEs.	+
Income of the head of household	Quantitative	The choice of this variable is justified through the fact that it could at a certain level have an influence on the profits realized.	+

β_0, β_1 et λ are the parameters and u_i is the error term.

Data

The data used to carry out this study is derived from a survey undertaken on the economic empowerment of women in N'Djamena carried out in 2016 by the Research Institute of Applied Economics and Management of the University of N'Djamena. This survey, which is the most recent, is undertaken within the standing framework of studies by the research institute and allows for the collection of a large quantity of information on the business activities undertaken by women, the practice of finance, employment, poverty, the sector of activity, and all characteristics that could influence the financial activities undertaken by women. It covers 301 women who own VSEs in N'Djamena. The sampling is done in a random manner. The methodology used involves obtaining in advance a list of the telephone numbers of the loan beneficiaries. This is provided by the microfinance institutions which operate in N'Djamena.

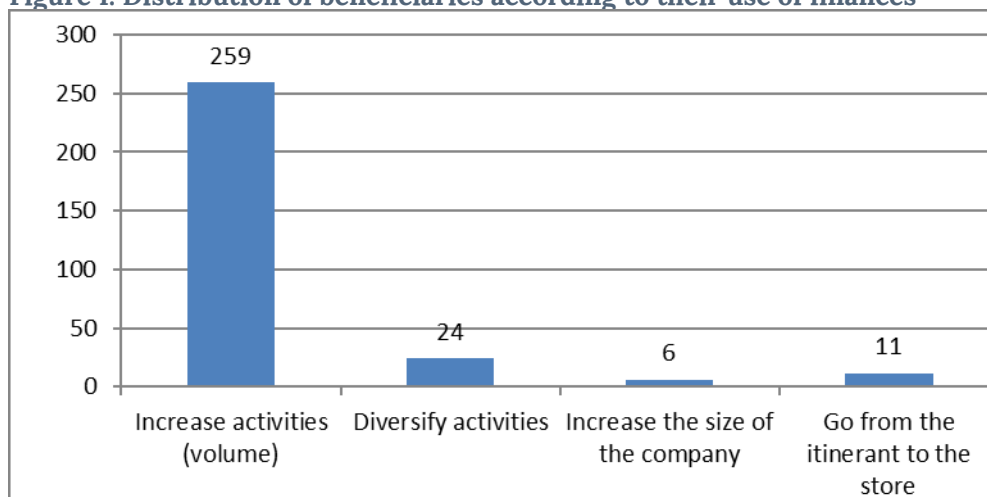
4. Results

This involves overall knowledge, in the case of Chad, of the impact of microfinance on the monthly profit of women-owned VSEs. To this effect, this section uses both a statistical and empirical analysis of the results so as to come up with information in regard to the economic policies that should be implemented.

Statistical analysis

The statistical analysis of survey data reveals that the microfinance received allows 87.8% of the beneficiaries to increase the volume of their activities, to diversify their activities (8%) and to stabilize their activities (4%) as is illustrated in Figure 1.

Figure 1: Distribution of beneficiaries according to their use of finances



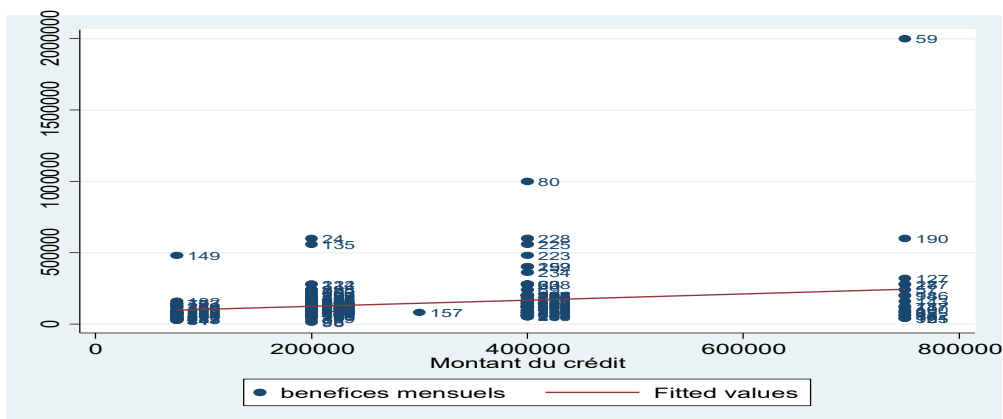
Source: Formulated by the authors using data derived from LAEREAG.

From the point of view of the beneficiaries, an increase in production comes from the competitiveness and the profitability of the business activities and of manpower use and, therefore, a reduction in the working hours. This result is in tandem with the studies undertaken by Abalo (2016) on Togolese SMEs, that examine the influence of microfinance on performance variables. Out of the 301 women microfinance beneficiaries interviewed, 96.7% affirmed having achieved financial empowerment

thanks to their status as women entrepreneurs. Out of this, 40.9% indicated that their business prosperity allowed them to provide for the needs of their family, 23.6% stated that they were in a better financial position and 19.6% indicated that they had improved their social status thanks to microfinance. It is also important to note that credit allowed 6.3% of the women surveyed to achieve financial independence from their husbands. However, many among them found that microcredit repayment deadlines were short and that the amounts applied for were often not granted.

Table A1 (in the Appendix) gives descriptive statistics of the key variables of this analysis, namely the monthly profits and the loan amount disbursed. It can be seen that the minimum amount of microcredit granted was 75,000 FCFA and the minimum monthly profit was quite low (10,000 FCFA). On average, the amount of microfinance granted to women was 285,300 FCFA. This average amount is quite insignificant for undertaking substantive income generating activities with high profits thus the low monthly profits calculated at 142,160 FCFA. Nevertheless, the maximum credit margin (750,000 FCFA) and the profits (2,000,000 FCFA) remain within the acceptable threshold. Furthermore, the statistics indicate that the coefficients of variation of all the variables of the model, with the exception of age of the credit beneficiary are mostly below the usual comparison threshold of 30%. Those of credit and of profit are 59.03% and 104.61%, respectively. This indicates a high variability of the credit amounts and the profits in relation to their respective averages indicating a heterogeneity of the distribution of variables. This heterogeneity suggests the presence of outliers as is illustrated in Figure 2.

Figure 2: Heterogeneity of the distribution of profits



Source: Author.

Justification of the estimation method

Table 2 presents the results derived from a linear regression obtained through the use of the Ordinary Least Squares method (OLS), the two-step Generalized Least Square

method, and that of Maximum Likelihood method. Breusch-Pagan's heteroscedasticity test (Table A2 in the Appendix) indicates that the variance is not a constant. Consequently, the estimators obtained through the Ordinary Least Squares method are not the best linear unbiased estimators. It is with this in mind that the two-step Generalized Least Squares method and that of Maximum Likelihood method proposed by Harvey (1976) are used in order to correct the problem. Thus, the estimators in the last two columns of Table 2 are obtained using the command "hetregress" which only works using version 15 of STATA. These two methods produce efficient and robust estimators in case of the violation of the hypothesis of homoscedasticity (Greene, 2018; Hill et al, 2003).

Furthermore, Figure 2 displays the heterogeneity of the distribution of finance and of profits. We also note the presence of outliers. The linear regression estimates the average responses of the monthly profits as a percentage of the loan awarded and other explanatory variables of the model. Araar (2016) establishes that, for cross-sectional data, the effect of explanatory variables on the endogeneous variables is heterogeneous following the different levels of the latter and suggests the use of quantile regression in order to take this heterogeneity into account. Indeed, the impact of finance on profits could vary according to the amount of profit. This method specifies changes in the impact of predictors following different percentiles (or quantiles).

Overall effect of finance on profits generated by women-owned VSEs

The results obtained through the two methods used by Harvey (1976) are similar in terms of the sign and the significance of the coefficients. These results suggest that the impact of credit on monthly profits of VSEs and SMEs is positive and strongly significant. These results are in agreement with those obtained by Becho (2017) who uses a quasi-experimental approach based on Propensity Score Matching (PSM) in order to evaluate the contribution of microcredit on the performance of informal microfinance institutions in Ivory Coast. An increase in the credit amount by 10% leads to an increase in profits by an average of 3.2%. This positive impact of credit could be explained through the fact that obtaining loans allows women to increase the volume of their business activities or to diversify them. Repayment deadlines constrain loan beneficiaries from better managing their resources, and also organizing their businesses in a better manner in order to avoid the non-payment of their loans as they risk incurring penalties. These results confirm those arrived at in studies by Hillman and Keim (2001) and Tioumagneng (2011) according to whom microfinance plays an important role in the success of enterprises.

The results demonstrate that level of education of the husband, non-financial support and private sources of finance have a positive and significant impact on the realization of profits in women-owned businesses. The positive effect of the level of education of the husband on profits indicates that educated husbands often give

support in terms of management advice to their wives who are owners of VSEs. Support in training and management consultancy services (accounting and marketing) that microfinance companies offer to women strongly impact on the level of profits that they obtain because this support allows them to engage in formal accountability of their activities. Finance, accompanied by non-financial support, has a positive and significant impact on the profits of SMEs. This confirms the results of studies undertaken by Cheston and Kuhn (2002) and Saïd (2017) which demonstrate that access to microcredit, accompanied by specific training (marketing and management advice), have a positive impact on the business activities of women. Also, women who benefit from microcredit from private microfinance institutions improve their average profits compared to those who obtain loans from public institutions. The possible explanation is that private microfinance institutions have systematic follow-up systems and often provide management and marketing advice to their clients. This situation could also arise from a selection effect. Indeed, with private microfinance institutions selecting SMEs with a high potential, the less profitable ones would then seek the services of public institutions. It is also important to note that some women, due to their religion, cannot obtain loans and freely undertake their business activities. They move towards public finance which has low interest rates (3%) and thus responds more positively towards religious demands. Indeed, Muslim women who have benefitted from loans are subject to stigmatization as they engage in their business practices. This situation is a major handicap for this category of women who can only depend on the government for loans, which then come without technical support.

However, the variable “marital status” has a negative impact on monthly profits. The fact that a woman is married does not have a positive impact on a woman because her marital duties limit her margins of manouevering in terms of freedom. These women are generally not in charge of their own time management. They have to divide their time between their homes and their businesses. The signs of age and of age squared alternate, thus demonstrating the non-linearity between profits and age. This negative effect, although insignificant, is rich in meaning in the context of Chad. These results suggest that young women experience more difficulties in realizing profits than older women. This situation could be explained through the “riskophobe” behaviour of young women. According to the views of the women who are beneficiaries of loans as collected during the survey, when profits from business activities increase, young women prefer to invest these benefits in the purchase of gold in order to hedge against risk, rather than reinvest in the business in order to increase their business volume.

Table 2: Linear regression

Dependent variable (monthly profits)	OLS	GLS two-step	ML
Loan amount	.2684725*** (.0659875)	.3258621*** (.0569644)	.320381*** (.060307)
Age	-2.965561 (4.676408)	-2.764229 (3.001978)	-2.887078 (2.926846)
Age squared	.4511188 (.6965864)	.4069358 (.4415629)	.4283832 (.4303259)
Marital status	-.278532** (.1332484)	-.3056923** (.1443653)	-.286357** (.1401489)
Education level of the beneficiary	.0111791 (.0460836)	.0241268 (.0470223)	.0167851 (.0456787)
Finance*Education level of the beneficiary	.0491089 (.0775148)	.0061012 (.0478015)	.0612928 (.0768354)
Education level of the husband	.0856772 (.0571647)	.1106666* (.0607162)	.1040101* (.0592035)
Number of people under care	-.0197592 (.0527798)	-.0055936 (.0473072)	-.0029599 (.046041)
Income of the head of household	.015424 (.0099676)	.0099233 (.0087495)	.011119 (.0085999)
Source of finance	.1763499* (.0950044)	.1413263* (.085709)	.1458482* (.0831226)
Non-financial support	.2317233*** (.0757319)	.2036641*** (.0735679)	.1932978*** (.0723408)
Finance*Non-financial support	(.2898246)** (.1369151)	.1016051* (.0575563)	.1402074*** (.0316207)
Constant	13.04976 (7.962522)	12.19930 (5.219214)	12.44322* (5.095672)
het(credit)	---	.4588027** (.2205987)	.2472494** (.1240837)
Number of respondents	301	301	301
Prob> F	0.0000	---	---
R-squared	0.1638	---	---
Wald chi2(10)	---	65.20	64.51
Prob> chi2	---	0.0000	0.0000

*p < 0.10, **p < 0.05, ***p < 0.01, and the standard deviations are in parentheses.

Source: Calculations by the authors.

The analysis undertaken using linear regression ignores the problem of endogeneity of variables in the practice of banking. The level of benefits could depend on the

amount of the finance variable introduced into the model. Thus, it is necessary to undertake an endogeneity test of the finance variable in the general basic model.

In a statistical model, the endogeneity of a variable is the correlation between that variable and the residue. The test of finance endogeneity in the model that examines the determinants of profits of VSEs, whose results are contained in Table A3 in the appendix, shows that the residue **r_lcredit** (Table A3) is not significantly correlated to profit. Which implies the absence of endogeneity for the credit variable.

The influence of credit on the various percentiles of profits

Table 3 presents the results derived from that regression. These results reveal that the impact of credit is highly significant following the different percentiles, and these effects become more and more significant when moving from the lower percentiles (q25) to those that are higher (q75). An increase in the credit amount by 10% leads to an increase in low, average and high profits by 2.4%, 2.9% and 3.2%, respectively. These results could be explained through the fact that high profit VSEs have a better form of organization in terms of management and the allocation of microcredit compared to those that realize low levels of profit. The effect of finance complemented by non-financial support is positive and significant for the low-income earners. However, the impact of marital status remains negative for all the sequences of benefits because of the reasons mentioned above. It is also important to note that sources of finance (private) have positive effects on the profits, but these effects are only significant when there are low profits. In other words, public or private sources of finance for VSEs and SMEs do not have a significant impact on high monthly profits. Furthermore, the level of education of the husband only plays an important role when it applies to those who have high profits. VSEs and SMEs which have low profits are indifferent towards the level of education of the husband. This could be explained through the fact that the firms that realize low profits are those whose owners do not put into practice the advice that is given to them. In this regard, the advice and support of an educated husband would not have an impact on the profits realized.

In summary, finance is of prime importance to the development of the activities of women and also for their economic empowerment and their success.

Table 3: Results of the quantile regression

Dependent variable (monthly profits)	OLS	Quantile regression		
		q25	q50	q75
Loan amount	.2684725*** (.0659875)	.2406249*** (.0864729)	.295131*** (.0816196)	.3210917*** (.0827486)
Age	-2.965561 (4.676408)	5.109535 (4.836569)	.875348 (4.731819)	-7.486933 (5.624348)
Age squared	.4511188 (.6965864)	-.7704479 (.7134864)	-.1312996 (.7111036)	1.137038 (.8465309)
Marital status	-.278532** (.1332484)	-.2640242* (.1383678)	-.282697** (.1205236)	-.2682545* (.1608524)
Education level of the beneficiary	.0111791 (.0460836)	.0768046 (.0627172)	.0259317 (.0471261)	.0603755 (.0601213)
Credit*Level of education of the beneficiary	.0491089 (.0775148)	.0005127 (.0896121)	.0034926 (.0941035)**	.0663758 (.1100155)
Number of people under care	-.0197592 (.0527798)	-.0607844 (.0961719)	-.005143 (.0689632)	-.0237775 (.0656786)
Income of the head of household	.015424 (.0099676)	.0199660 (.0136889)	.0159703 (.0131767)	.0135905 (.0106497)
Source of finance	.1763499* (.0950044)	.2999482*** (.1149075)	.1113363 (.10802)	.0625315 (.079114)
Non-financial support Finance*Non- financial support	.2317233*** (.0757319)	.1956215 (.1274216)	.137222 (.1269163)	.156774 (.1070226)
	(.2898246)** (.1369151)	.1402074 (.0316207)***	.1159703 (.1661733)	.1374364 (.1604357)
Constant	13.04976 (7.962522)	-.1773801 (8.13814)	6.635837 (7.908388)	20.43957 (9.900911)
Number of respondents	301			
.25 Pseudo R2	=	.0595		
.50 Pseudo R2	=	0.0685		
.75 Pseudo R2	=	0.0990		

*p< 0.10, **p< 0.05, ***p< 0.01, and the standard deviations are in parentheses.

Source: Calculations by the authors.

The signs of the coefficients obtained correspond to those expected, with the exception of the age of the beneficiary, which negatively influences the profits.

5. Conclusion and recommendations

The importance of microfinance in the fight against poverty on the one hand, and the empowerment of women on the other hand, has been the focus of several empirical studies. This study continues in the same vein to examine the impact of finance on the monthly profits of women-owned VSEs in Chad, through a case study of the city of N'Djamena. In order to achieve this objective, the study uses both the two-step Generalized Least Squares estimation method and the Maximum Likelihood method which is adopted for the correction of the problem of heteroscedasticity associated with the survey data. The data used is derived from a survey on the economic empowerment of women in N'Djamena carried out in 2016 by the Research Institute of Applied Economics and Management of the University of N'Djamena (LAEREAG).

The results show that finance is significantly and positively correlated to profits in women-owned micro-enterprises in Chad. This suggests that an improvement in microfinance lending conditions could improve women run businesses. Financing that is derived from private microfinance institutions and the support in terms of training and management consultancy services (accounting and marketing) has a positive effect on profits.

In light of these results, it becomes necessary to improve lending conditions and intensify the support in training and management consultancy services in favour of women. Microfinance institutions should reduce their interest rates, increase the amount of loans awarded and systematically provide support in terms of training and management consultancy services to the women, who benefit from microcredit because management consultancy would allow them to be accountable and manage their expenditure in a better manner. Also, these institutions should include these women in their training plans. The government should support microfinance institutions so as to make it easier for them to provide credit facilities.

The scope of this study goes beyond the city of N'Djamena, but does not cover the entire country. The database does not allow for having a control group which should serve as an element of comparison with the group under study (the beneficiaries), and does not take into account the cultural and religious aspects. Consequently, the results arrived at are only based on the 301 women who were granted loans by public and private microfinance institutions, which is perhaps the major handicap of this study. Because the sampling is from women who live in N'Djamena, the study cannot be generalized to apply to the whole of Chad. Future studies could be undertaken using

a larger sample of beneficiaries and non-beneficiaries of finance who are owners of VSEs in several provinces of Chad, so as to ensure that the results are solid and could apply to the entire country. The questionnaire should also be improved in order to adequately categorize the answers to questions.

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Appendix

Table A1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Coef. of Var	Min	Max
Monthly profit	301	142159.5	148712.3	104.61	10000	2000000
Amount of loan	301	285299	168429.7	59.03	75000	750000
Age	301	33.99336	7.083781	20.84	18	58
Marital status	301	0.564784	0.496610	87.93	0	1
Education level of the beneficiary	301	1.548173	0.767140	49.55	0	3
Education level of the husband	301	1.196013	1.17109	97.91	0	3
Number of people under care	301	5.813953	3.253501	55.96	1	15
Income of the head of household	301	147093.2	96273.36	65.45	0	375000
Non-financial support	301	.8039867	0.397639	49.46	0	1
Source of finance	301	.6744186	0.469372	69.59	0	1

Source: Calculations by the author.

Table A2: Heteroscedasticity test

Ho : Constant variance	Decision
chi2(1) = 3.62 Prob> chi2 = 0.0572	Ho is rejected at 10%

Table A3: Endogeneity test

Lbenefice	Coef	Std. Err	t	P> t
Lcredit	.2684725	.0659875	4.07	0.000
Résidu_lcredit	.3476841	.5482658	0.63	0.526
Age	.1130089	.1981338	0.57	0.569
(Age)2	-.001847	.0322314	-0.06	0.954
Marital status	-.3407998	.1624295	-2.10	0.037
Education level of the beneficiary	-.0374597	.0546998	-0.68	0.494
Education level of the husband	.1026708	.0640346	1.60	0.110
Number of people under care	-.02949	.0888062	-0.33	0.740
Income of the head of household	-.0118247	.0103268	-1.15	0.253
Source of finance	.1831293	.0950093	1.93	0.055
Non-financial support	.14996	.1343655	1.12	0.265
Constant	4.075445	6.295819	0.65	0.518
Number of respondents	=	301		
F(10, 290)	=	4.16		
Prob> F	=	0.0000		
R-squared	=	0.1638		
Root MSE	=	.5645		



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