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Effects of credit constraints on the productivity of small and medium-sized enterprises in Cameroon

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This paper assesses the determinants and effects of credit constraints on the productivity of small and medium-sized enterprises (SMEs) in Cameroon. Use is made of the Cameroon enterprise survey data collected by the World Bank in 2009 and an endogenous switching regression model. Results show that interest rates, size of enterprise, size of loan, size of collateral, maturity of loans and legal status of enterprises are major sources of credit constraints faced by SMEs. Results also indicate that medium enterprises are more credit constrained than small enterprises; meanwhile the effects of credit constraints affect small enterprises more than medium enterprises. Credit constrained firms have lower levels of productivity relative to unconstrained firms. These results have implications for the creation of credit bureaux, prudential stringency and rationalization of the Cameroon tax system.

Key words: Small and medium-sized enterprises, credit constraints, endogenous switching regression model, Cameroon tax system.

INTRODUCTION

The recent enterprise survey conducted by the National Institute of Statistics (NIS) (NIS, 2009) reveals that there are 93 969 enterprises in Cameroon out of which 99.2% are small and medium-sized enterprises (SMEs).They account for 62% of permanent employees and 31% of turnover before tax of all enterprises in Cameroon (NIS, 2009).The importance of SMEs has been underlined as a focal point of the vision 2035 of the 2009 growth and employment strategy paper (GESP) of the government of Cameroon (Government of Cameroon, 2009). The creation of the Ministry of Small and Medium-sized Enterprises, Social Economy and Handicraft in December 2004 is an indicator of the importance of this sector to the economy of Cameroon.

In general, SMEs have been reporting difficulties in financing their activities (Beck, 2004; Slotty, 2009).The enterprise survey(World Bank/IFC, 2008) shows that 51% of small enterprises (5-20 employees) and 45% of medium enterprises (21-99 employees) in sub-Saharan Africa consider access to finance as their major obstacle and this reduces with size. The same survey also indicates that only 38% of big (100 and more employees) enterprises mention access to finance as their major obstacle. Results from a survey carried out by NIS in 2009 shows that 37.6 % of the SMEs in Cameroon have problems of access to credit (NIS, 2009). The 2009 and 2010 Doing Business reports show that enterprises in Cameroon passed from 131st position in 2009 to 135th in

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2010 as far as access to credit is concerned (World Bank, 2010).

Apart from the problem of financing SMEs, bad business environment has been identified as one of the main predicaments to their development. The business environment in Cameroon is characterised by corruption, long administrative procedures, insufficient or lack of infrastructures like roads, electricity, poor legal system and very high transaction costs and custom duties at the ports of shipment. These problems force SMEs to use inappropriate methods of production or out-dated technology (NIS, 2009).The problem of access to credit has always been and remains a major drawback for the growth of SMEs in Cameroon (Berk et al., 2006). The government of Cameroon recently created a bank for financing SMEs. Although this bank is still in the process of implantation, it may respond to the important constraints that SMEs face in financing their activities only if the general business environment is improved.

Despite the important role of SMEs in the economies of the developing world as one of the major employers with very high contribution to GDP, recent research provide evidence that SMEs face greater financing obstacles than large firms (Beck et al., 2005; Beck and Demirgüç-Kunt, 2006; and Beck et al., 2006). Ayyagari et al. (2007) show that finance, crime, and political instability directly affect the rate of growth of firms, with finance being the most robust variable affecting firms' growth rate. Access to credit by SMEs is extremely limited. Banking penetration of the private sector is very low in Cameroon; it is only averaging 18% of GDP (World Bank, 2006) and it is only major corporations or big enterprises that benefit from the bulk of financing.

This paper outlines the principal credit constraints faced by SMEs and analyses the effects of credit constraints on the productivity of credit constrained and unconstrained firms in Cameroon. In this context, this paper makes a contribution by extending knowledge on credit constraints in Cameroon and empirically evaluating the impact of credit constraints on the productivity of SMEs. The rest of the paper is structured as follows: Section II summarizes recent literature on credit constraints faced by SMEs, section III dwells on the methodology; while Section IV presents the results and discussions.

LITERATURE REVIEW

A model of imperfect information, uncertainty and credit rationing was published by Dwight and Russell (1976). It is assumed in this model that there are both ″honest″ and ″dishonest″ borrowers. Honest borrowers are those that accept loan contracts they are sure they would repay on time; while dishonest borrowers are those that accept loan contracts they know they won't be able to repay on time. The model shows that the loan market is composed of borrowers who detain more information about their likelihood of default than the lenders. In the case of a perfect competition market there are two cases, in the first case; borrowers are rationed in the amounts they can repay so there is no default. In the alternative case, the market can alternate in an unstable fashion with lenders entering and making short-run profits and then disappearing in the long-run. In reality loan markets may not exhibit any of these features. Although bank failures may absorb a percentage of the default, the market does not show instability as predicted by the model. Entry into the loan market entails non-price terms such as collateral, and down payment requirements. Government intervention may also be justified as one of the solutions to market failures. Changes in the legal system may equally correct bank failures.

The credit and financial markets are considered in institutional economics as institutional structures and arrangements that can mediate the exchange process and minimise transaction costs. The nature of costs is very important because it determines the structure of the market (Saleh, 2004). For example; in a country where transaction costs are relatively low, borrowers would be able to finance their projects with bank loans instead of their small savings or ask for help from friends or family. It is important to bear in mind that these costs are generally a function of factors such as uncertainty, structure of the market, economic rationality and the ability of agents to access opportunities. Consequently, in a situation of uncertainty like that which characterises the credit market in Cameroon, it is difficult or expensive to negotiate credit contracts that take into consideration all the above exigencies. In addition, the fact that this market is dominated by some banks limits competition thus giving them market power that can influence the cost of transactions.

Due to information asymmetry, external funds are imperfect substitutes of internal funds (Braun and Larrain, 2003). Thus, enterprises with higher cost of information are more likely to be credit constrained. Empirically the credit constrained statuses of SMEs are generally identified by their sensibility to investment (Bönte and Nielen, 2010). The principle behind this reasoning is that due to credit constraints external funds are more expensive than internal funds.

The development of the financial system has also been used as an important tool to determine the vulnerability of SMEs to be credit constraint (Laeven, 2003). Better protection of property rights increases external financing of small firms significantly more than it does for large firms, particularly due to the differential impact it has on bank and supplier finance (Beck et al. 2004). Beck et al. (2005) show that the effect of obstacles on firm growth is smaller in countries with better-developed financial and legal systems. Using cross-industry, cross-country data for 44 countries and 36 industries in the manufacturing sector, Beck et al. (2005) show that financial development

exerts a disproportionately large positive effect on the growth of industries that are naturally composed of more small firms. Their results suggest that the furniture industry (an industry with many small firms) should grow 1.4% per annum faster than the spinning industry (an industry with relatively fewer small firms) in Canada (a country with a well-developed financial system) than in India (which has a lower level of financial development).

Mina et al. (2011) developed a model with inspiration from that of Brixiova and Kiyotaki (1997) which is based on the situation prevalent in African economies where SMEs are credit constrained and are limited by lack of collateral. The model is applied to African countries where formal and productive private sector is under-developed. The empirical implementation was based on panel data involving 20 African countries. The results from the study show that new enterprises are considered as risky. It also highlights the importance of the legal system in reducing information asymmetry and enforcing credit contracts, which is still a big problem in Africa. The lack of competition is also identified as one of the factors leading to limited access to credit by SMEs, engendering high collateral demands. Due to this, we have the cohabitation of excess liquidity and credit constraints, thus interventions aimed at reducing cost of credit and strengthening of the legal system are required (Calvin, 2008).

Tieguhong et al. (2012) highlighted the problem faced by SMEs through an analysis of the financial gap of 151 pilot enterprises (63 in Cameroon and 88 in the Democratic Republic of Congo, DRC). The total capital required for the development of these 151 pilot enterprises was evaluated at US$1 335 025 out of which the own contribution of the enterprises was US$ 843 433 (63%) and the other US$ 492 159 (37%) was subject to external assistance. They also found that there was consistent variation in capital requirements, own contributions and levels of assistance sought among the enterprises. The research also shows that the level of assistance sought in Cameroon is less than that in the DRC.

Ngoa and Niyonsaba (2012) used a multinomial logit model to verify the impact of entrepreneurial social capital on the credit access of SMEs in Cameroon. A sample of 413 Cameroonian SMEs where questioned and five indicators where used; the ratio of family labour, government support, belonging to a business network, personal relation with the client bank and the level of human capital predominant in the enterprise. The results show that only the three last variables positively affect access to bank credit. However, their effects and amplitudes vary with respect to the maturity of the loan.

The study also shows that thanks to social capital, SMEs that have access to bank credit survive for a longer period than the others. The present paper contributes to a better understanding of the impact of credit constraints on the productivity of SMEs in Cameroon.

DATA AND METHODOLOGY

Data

The dataset used in this study is secondary data from the World Bank 2009 enterprise survey in Cameroon. The enterprise survey aims at factors that shape the business environment of the economy. It examines the accommodating and constraining factors to enterprise growth. The accommodating factors are those that contribute to the growth and productivity of the enterprise and also the economy. Meanwhile, constraining factors are obstacles to sustainable development and growth of enterprises.

The enterprise survey covers small, medium and large firms. The survey is administered to representative firms of the non-agricultural formal private economy. It includes the manufacturing sector, service sector, and transport and construction sectors. Public utilities, health care, government services and financial sectors are not included in the sample. A wide variety of quantitative and qualitative information was collected in Cameroon through face to face interviews with firm managers and owners on diverse topics; infrastructure, trade, finance, regulations, taxes, business licensing, corruption, crime, informality, innovation, labour and perceptions about obstacles to doing business in Cameroon.

In Cameroon, business owners and managers of 363 firms were interviewed from April through October 2009. The survey was carried out in 03 main towns in Cameroon: Douala, Yaoundé and Bafoussam. The enterprise survey was organised in two stages, in the first stage a telephone screening was organised to confirm eligibility and to schedule an interview. In the second stage, a face to face interview with a top manager of the firm was conducted. When needed, follow-up questions and corrections were implemented in person, by phone, through emails or web interface.

Methodology

In this research, the definition of credit constrained firm follows from Casey and O'Toole (2013). In this regard, a SME is said to be credit constrained if it requested more loans than was supplied, did not apply for a loan because of unfavourable credit conditions or if it required loans but was unable to borrow. When estimating the impact of credit constraints on productivity, two issues come up (Maddala, 1986). The first step to estimate SMEs credit constraints is by a probit function with the following specification:

$$C_i^* = \alpha Z_i + u_i > 0 \tag{1}$$

where C^* is a latent continuous variable, which determines the credit constraint status of a SMEs. It takes two values;

$C_i = 1$ if $C_i^* > 0$ (credit constraint)

$C_i = 0$ if $C_i^* \leq 0$ (credit unconstraint)

The SME credit constraint criterion equation is a reduced form equation, i.e. the condition of whether a SME is credit constrained or unconstrained, and is given by an index model, C_i^* which is a latent variable that cannot be observed but can be estimated via assumptions on how it is characterized, Z_i represents a vector of explanatory variables, α is a vector of parameters to be estimated and u_i is a random error term, distributed as a normal function with mean zero and the variance normalised to one in order to allow for estimation of coefficients. Finally SME productivity equation is estimated by the following regression equation; regime 1 represents

credit constrained SMEs and regime 0 represents unconstrained SMEs.

Productivity of credit constrained SMEs is given as equation 2:

$$Y_{1i} = \beta_1 X_1 + \varepsilon_{1i} \text{ if } C_i = 1 \qquad (2)$$

Productivity of credit unconstrained SMEs is given as equation 3:

$$Y_{0i} = \beta_0 X_0 + \varepsilon_{0i} \text{ if } C_0 = 0 \qquad (3)$$

Where Y_{1i} and Y_{0i} are the productivity for credit constrained and unconstrained SMEs, X_1 and X_0 are vectors of the explanatory variables for credit constrained and unconstrained SMEs respectively, while β_1 and β_0 are vector of corresponding parameters to be estimated. The terms ε_{1i} and ε_{0i} are random error terms, distributed as normal function with zero means.

As demonstrated in Maddala (1983), the expected value of the error terms ε_{1i} and ε_{0i} are not zero. This is because the counterfactual productivity that credit constrained SMEs would have had without being constrained is not observed. In addition, we do not observed the productivity that SMEs that are not credit constrained would have had if they were constrained. If we could estimate such counterfactuals, this problem could be solved. This is known as the sample selectivity problem and is well known in economic literature (Heckman, 1979; Puhani, 2000; Lung-Fei, 2001). This makes direct OLS estimation of equations (2) and (3) inappropriate. In this study, a strategy developed by labour economists is adopted; mostly by Heckman (1979).This problem is addressed by calculating the inverse Mills ratio from equation (1), and inserted as explanatory variables in (2) and (3). The second problem with this model is that the annual sales revenues (productivity) of SMEs depend on the credit equation criterion and also on other characteristics of the SMEs. Therefore, the errors of the credit constraint criteria are correlated with that of the productivity of credit constrained SMEs and unconstrained SMEs. Thus, there is a problem of endogeneity. Due to these issues, the OLS method is inappropriate to estimate the coefficients; the maximum likelihood method is used. To achieve this, stata movestay command is used, which uses the maximum likelihood function to estimate the coefficients and does a joint estimation of a probit model for the credit constraint status equation and the regression equations of regime 1 and regime 0 respectively.

In order to capture the unobserved characteristics of SMEs that affect productivity, the inverse Mills ratio is introduced in the expected SME productivity. The expected productivity of SMEs conditional to credit constrained regime can be computed as;

$$E[\frac{y_{1i}}{x_i}, C_i = 1] \quad = E[\frac{y_{1i}}{x_i}, \alpha_{zi} + \mu_i > 0]$$
$$= \beta_1 x_1 + E\left[\frac{\varepsilon_{1i}}{\mu_i}\right] > -\alpha z \qquad (4a)$$
$$= \beta_1 x_1 + (\sigma_1 \sigma_\mu \rho_1)[\emptyset \frac{\alpha_{zi}}{\Phi(\alpha z_i)}]$$

In the same way, the expected SME productivity, unconditional to the constrained regime is given by;

$$E[\frac{y_{0i}}{x_i}, C_i = 0] \quad = E[\frac{y_{0i}}{x_i}, \alpha z_i + \mu_i < 0]$$
$$= \beta_0 x_0 + E[\varepsilon_{0i}/\mu_i > \alpha z] \qquad (4b)$$
$$= \beta_0 x_0 + (\sigma_0 \sigma_\mu \rho_0)[-\emptyset \frac{\alpha z_i}{1-\Phi(\alpha z_i)}]$$

Where y is the SME productivity, X_1 and X_0 are vectors of the explanatory variables for credit constrained and unconstrained SMEs respectively, while β is a vector of corresponding parameters to be estimated. The terms ε_{1i} and ε_{0i} are random error terms, distributed as normal function with zero means. The terms ∅ and Φ are the probability density function and the cumulative distribution function of the standard normal distribution, respectively. According to Greene (2003), the ratio ∅ and Φ evaluated at αz is the inverse Miller ratio (λ). This reflects the truncation of a normal distribution at α'z.

$$\lambda_1 = [\emptyset \frac{\alpha z}{\Phi(\alpha z)})] \text{ and } \lambda_0 = [-\emptyset \frac{\alpha z}{(1-\Phi(\alpha z))})] \text{ could} \qquad \text{be}$$

added to the X_1 and X_0 vectors respectively in equation (5a) and (5b) to yield:

$$E[\frac{y_{1i}}{x_i}, C_i = 1] = \beta_1 x_1 + (\sigma_1 \sigma_\mu \rho_1) \lambda_1 + \eta_{1i} \qquad (5a)$$

$$E[\frac{y_{0i}}{x_i}, C_i = 0] \quad = \beta_0 x_0 + (\sigma_0 \sigma_\mu \rho_0) \lambda_0 + \eta_{0i} \qquad (5b)$$

The covariance of the credit constrained criterion equation (1), and the credit constrained SMEs productivity equation (5a), and the credit unconstrained criterion equation (1), and the credit constrained SMEs productivity equation (5b) are represented by the multiplicative terms $\sigma_1 \sigma_\mu \rho_1$ and $\sigma_0 \sigma_\mu \rho_0$, respectively. This covariance can be split into the standard deviation of the appropriate equations $\sigma_\mu \sigma_1 \sigma_0$ and the correlations ρ_1 and ρ_0.

However σ_μ cannot be estimated and is normalise to 1 because of the structure of the model and the nature of the derived data (Greene, 2003).

To measure the endogeneity of the credit constrained condition, a test of whether ρ_1 and ρ_0 are statistically different from zero is required, since estimates of ρ_1 and ρ_0 show correlation of the "unobservable" of the credit constrained criterion equation with the "observables" of the credit constrained and unconstrained SME productivity equations, respectively. If ρ_1 and ρ_0 are zero then the credit constraint is exogenous, and it would be necessary to include the credit constrained criterion equation in estimating the effects of credit constraints on the productivity of SMEs.

This system can be estimated in two steps. The two steps approach required the estimation of probit function (1), which is first estimated by maximum likelihood. The predicted values from the probit function are then used to calculate the inverse Mills ratio, which is subsequently included as an explanatory variable when estimating equation (5a) and (5b). A single parameter is estimated for σ1ρ1 and σ0ρ0 because of the linear structure of these equations. The one-step approach (endogenous switching regression model) entails the estimation of β1,β0 and α for starting values equations (1),(5a) and (5b) jointly by maximum likelihood. With the maximum likelihood estimation (MLE) equation, separate estimates of ρ1 and σ1 and then ρ0 and σ0 are possible. In a nutshell, the endogenous switching model is implemented in two stages. In the first stage, a probit model is estimated to detect enterprises that are credit constrained, while in the second stage, simultaneous equations are used to estimate productivity of constrained enterprises compared to unconstrained enterprises. This implies two dependent variables, one at each stage. From the above we can specify two hypotheses;

• Non-credit constrained SMEs outperform their credit constrained counterparts

Table 1. Variables selected for study.

Variable	Nature	Expected sign (positive(+), negative (-))	Description
Access to credit (cc)	Dependent		1 if credit non constrained (have a line of credit or a loan or does or has enough funds and 0 otherwise (loan application rejected or did not apply because of long procedures to get a loan, high interest rate, high collateral demands, size and maturity of loan insufficient, did not think it would be approved)
Log of annual sales(sales)	Dependent		It evaluates the productivity of SMEs
Size of Enterprise	Independent	Small(+) Medium (+) Large(-)	Dummy variable (1=yes and 0=no) • Small • Medium • Large
Current legal status	Independent	Sole proprietor(-) Partnership (+) Limited partnership (-)	Dummy variable : (1=yes and 0=no) • Sole proprietor • Partnership • Limited partnership
Top female manager	Independent	+	1= yes and 0=no
Average interest rate	Independent	-	It is the rate charged by banks when you borrow.
Size of Collateral	Independent	+	It is the log of the value of collateral
Credit history	Independent	+	1 if the enterprise had applied for a loan before and 0 if not
Age of the enterprise	Independent	-	It is counted from 2009 minus the year it was officially registered
Bank account	Independent	-	1= yes and 0=no
Existing assets	Independent	-	1= yes and 0=no

Source: Compiled by authors.

• Credit constrains have significant negative effects on the productivity of SMEs

Presentation of variables

The two endogenous variables are access to credit and productivity.

Access to credit (cc): it is a variable which is used to estimate the probability of an enterprise being credit constrained or unconstrained. It is a binary variable with outcome zero or one

Productivity (log annual sales): it is a variable that is used to evaluate the performance of credit constrained and unconstrained enterprises. It is a continuous variable. The variables of interest are summarized in Table 1.

EMPIRICAL RESULTS

Determinants of SMEs credit constraints in Cameroon

The results in Table 2 below shows that the probability of

being credit constraint increases with increase in size of enterprises. This can be seen by higher positive value of the coefficient of small and medium enterprises; these coefficients are significant at 10% and 5% levels, respectively. This phenomenon contradicts the findings of Beck et al.(2005) and Beck et al.(2006) that Small firms face greater financing obstacles than medium-sized firms. This is mainly because many small enterprises easily get loans from credit unions and microfinance institutions because of their personal relationship with the microfinance operators. The manager of the microfinance knows the owners of the small enterprises in person, their houses and the location of their business centers. This makes it easier to give out loans to small enterprises, this confirms the findings of Ngoa and Niyonsaba (2012) where there was a positive and significant impact of relationship with bank on credit access in Cameroon, and small enterprises typically lack the capacity to deal with commercial banks. Another reason is the over liquidity phenomenon in the CEMAC region where banks receive short-term deposits and consequently cannot give out

Table 2. Probit regression estimates of determinants of SMEs credit constraints condition: endogenous switching regression -part 1.

Variable	Coefficient	Standard error	t-statistics
Size of Enterprise			
Small	0.823166*	0.4358359	1.89
Medium	0.9803419**	0.4752202	2.06
Legal status of Enterprise			
Sole proprietorship	-1.150219***	0.3602106	-3.19
Partnership	-0.7260604	0.4527223	-1.60
Limited partnership	1.82318	1.430684	1.27
Experience of top manager	-0.0029877	0.0164781	-0.18
Interest rate	0.1541037***	0.0282023	5.46
Age of enterprise	0.007695	0.0113611	0.68
Size of loan	0.1439886***	0.0274468	5.25
Size of collateral	-0.0167842	0.0217931	-0.77
Credit history/relationship with bank	2.01287***	0.4348153	4.63
Existence of fixed assets	-0.6887105***	0.2996057	-2.30
Have saving account	-0.1153333	0.4613401	-0.25
Top manager female	1.092383***	0.4519805	2.42
Constant	-3.765733***	0.7713068	-4.88

Notes:***, **, and * denote significance of estimated coefficient at 1, 5, 10 percent levels of probability respectively. Source: By the author using the switching regression technique SMEs survey in stata SMEs data collected by the world bank. Number of obs = 363; Number of obs = 363; Wald chi2(8) = 60.67; Prob> chi2 = 0.0000; Log likelihood = -813.12613 ; LR test of indep. eqns. : chi2(1) = 13.74 Prob> chi2 = 0.0002.

long-term loans. In this regard, only small enterprises that demand short-term loans at higher interest rates can have access to credit, making medium enterprises to be more credit constrained.

As far as the legal status of the enterprise is concerned, the probability of being credit constrained significantly decreases for sole proprietors at the 1% level. This is principally because sole proprietors have personal relationships with their microfinance or credit union institutions so the problem of information asymmetry is highly reduced and they usually demand short-term loans. Partnerships have lower risk while limited partners have a positive non-significant relationship with the probability of being credit constrained.

The probability of an enterprise being credit constrained increases with interest rate. This is to be expected because it is the price which borrowers have to pay for the credit. Some enterprises may not apply for a loan because they feel the interest rate is too high, not because they have sufficient funds. It is also used by banks as a measure to cover other costs of obtaining information, especially in an economy like that of Cameroon with high information asymmetry (Williamson, 1987).

The age of an enterprise has a positive non-significant relation with the probability of a SME being credit constrained. That is, the age of older SMEs have very little or no influence on the probability of being credit constrained.

The bigger the size of the loan demanded by enterprises the higher the probability of the SMEs being credit constrained. Indeed, the effect of bigger loans may increase the probability of an enterprise being credit constrained by about 14%. This is because bigger loans are likely to require bigger collateral or the maturity period demanded by the borrower may be longer. This contrasts with the vision of most banks that are more willing to give out short-term loans.

Collateral is often demanded as one of the alternative measures by banks to reduce the risk of default by borrowers. The size of this collateral (Table 2) is negatively related to the probability of the enterprise being credit constraint. Some enterprises may not be awarded the loan they demanded or only awarded a partial amount because they do not have the required collateral. Some SMEs may just decide not to apply for a loan or line of credit because they feel the collateral needs are prohibited for them. So the higher the value of the collateral, the lower the probability of being credit constrained.

When enterprises have fixed assets the probability of those enterprises being credit constrained is reduced. This is so because the enterprises have assets that can be presented as collateral. Thus, an enterprise can borrow more when she possesses substantial collateral. This is a great cover for the enterprises because it is an assurance to the banker that the loan would be paid even if it means selling the collateral. From our results, the

probability of a SME being credit constrained reduces by 68% when the SME have fixed assets. This variable is significant at the 1% level.

Having a bank account by a SME is an important step towards obtaining loans or lines of credit from financial institutions. This variable is negatively related to the credit constrained condition of SMEs.

Access to credit is highly gender sensitive. Enterprises with women top managers increase their probability of being credit constrained - coefficient is significant at 1% level. Female managers in Cameroon still do not have the same rating as men to the extent that bankers find it easier to give out loan to a male top manager rather than a female manager.

Effects of credit constraints on the productivity of SMEs in Cameroon

The log of annual sales revenue is used as an indicator of the productivity of SMEs it models the probability of a variable increasing or reducing sales revenue with respect to the credit constraint status of the firm. The results of the effects of credit constraints on the productivity of SMEs can be seen in Table 3.

Credit constrained equation

The first panel of Table 3 shows that small- and medium-size enterprises have negative and significant effects on sales revenue, but the absolute magnitude of the coefficient on small enterprises larger than that of medium-sized firms. This means that credit constrained small and medium firms have lower annual sales revenue, but that of small enterprises is much lower than that of medium-sized enterprises. Thus, the consequence of credit constraints is more for small firms than for medium firms.

As far as the legal status of SMEs is concerned, partnerships, sole proprietors and limited partners all have a negative and significant effect on annual sales revenue. However, this is larger (by 0.64) for sole proprietors compared to partners, while limited partners have the lowest negative value. The implication is that sole proprietors and partners are highly touched by the credit constrained status than limited partners.

The experience of the manager has a positive effect on the annual sales revenue of SMEs. There is a 2% increase in sales revenue due to a unit increase in the experience of the manager. Interest rates have negative and significant effects on the annual sales revenue of enterprises. This means that an increase in the interest rate for credit constrained firms reduces their productivity.

The credit unconstrained equation

The second panel of Table 3 shows the estimated results of the credit unconstrained firms when the log of annual sales is the dependent variable. As far as the size (small, medium, large) of SMEs are concerned, they all have negative and significant effects on the annual sales revenue. Small firms have a higher negative (0.51) effect than medium firms. This means that even when firms are not credit constrained, small firms record lower annual sales revenue compared to medium firms while the coefficients for credit constraints firms is much lower.

Limited partners have a positive and significant effect on annual sales revenue, while partners and sole proprietors have negative effects on annual sales revenue.

At the level of management of the enterprise, the experience of the top manager has a positive and significant effect at 10% level on sales revenue. Sales revenue tends to increase by 2.5% with a year increase in experience of the top manager

The correlation coefficients rho_1 indicates the correlation between the credits constrained situation and the effects of credit constraints on credit constrained firms. The value is negative and statistically significant. The value is 0.82, which is a very strong correlation, meaning that being credit constrained has significant adverse effects on sales revenue (Table 3). Thus, sales revenue tends to reduce because of credit constraints.

The correlation coefficients rho_2 indicates the correlation between the credits constrained situation and the effects of credit constraints on credit unconstrained firms. The value is negative but it is only significant at the 10% level. The value is 0.43, reflecting a weak correlation. Therefore, credit unconstrained firms turn to have higher annual sales revenue compared to credit constrained firms, which confirms the observation that credit constraints have significant negative effects on the productivity of SMEs. These results show that credit constraint is endogenous and thus it is necessary to model the credit constraint criterion equation in estimating the effects of credit constraints on the productivity of SMEs.

Concluding remarks

This paper outlined the important role that the size of collaterals may have on the probability of a firm being credit constraint. The probit regression showed that when the size of the collateral is large the probability of SMEs being credit constrained is reduced by 1.6%. Thus, having collateral in Cameroon is a good guarantee to secure credit from a microfinance institution. On the other hand, having fixed assets is a big guarantee to have a loan in Cameroon; the probability of credit constraints reduces by 68.87%. Size of loan and interest rate are the principal elements which increase the probability of enterprises being credit constraints; they increase this probability by 14.39 and 13.41% respectively.

Table 3. Effects of credit constraint on productivity of SME, estimated by maximum likelihood switching regression - switching regression (part 2).

Variable	Coefficient	Standard error	t-statistics
Credit constrained equation			
Size of Enterprise			
Small	-2.575423 ***	0.5373712	-4.79
Medium	-1.175191***	0.488681	-2.40
Legal status of Enterprise			
Sole proprietorship	-1.185184 ***	0.4577519	-2.59
Partnership	-2.233041***	0.6799892	-3.28
Limited partnership	-0.4192783	0.8429436	-0.50
Experience of top manager	0.0212495	0.0209463	1.01
Interest rate	-0.0847042***	0.035304	-2.40
Top female manager	-1.249014	1.000087	-1.25
Constant	22.50572***	0.7806397	28.83
Credit unconstrained equation			
Size of Enterprise			
Small	-2.18498 ***	0.372059	-5.87
Medium	-1.670859***	0.3736549	-4.47
Legal status of Enterprise			
Sole proprietorship	-1.150219***	0.3602106	-3.19
Partnership	-0.510959	0.4795876	-1.07
Limited partnership	1.556253	1.978229	0.79
Experience of top manager	.0252573*	0.0143036	1.77
Top female manager	-0.5175267	-0.5175267	-1.37
Constant	20.01186 ***	0.4594352	43.56
/lns1	0.7837656 ***	.0757205	10.35
/lns2	0.6761087***	.0467539	14.46
|r1	-1.180721 ***	0.5467111	-2.16
r2	-0.4719994	0.3090944	-1.53
sigma_1	2.189702	.1658053	
sigma_2	1.966212	0.091928	
rho_1	-0.8276789	0.1721854	
rho_2	-0.4398134	.2493045	

Notes: ***, **, and * denote significance of estimated coefficient at 1, 5, 10 percent levels of probability respectively. Source: By the author using the switching regression technique SMEs survey in stata SMEs data collected by the World Bank. Number of obs = 363; Wald chi2 (8) = 60.67; Prob> chi2 = 0.0000; Log likelihood = -813.12613; LR test of indep. eqns. : chi2(1) = 13.74 Prob> chi2 = 0.0002.

The effects of credit constraints on the productivity of SMEs was captured by the coefficients of the variables, but the correlation coefficients rho_1 and rho_2 gave the global effects of credit constraints on SMEs. The correlation coefficient, rho_1, indicates the correlation between the credits constrained equation and the effects of credit constraints on credit constrained firms. The value was negative and statistically significant indicating a strong correlation between the two models. The implication is that being credit constrained has significant adverse effects on sales revenue, thus sales revenue tends to reduce because of credit constraints. Therefore, credit constrained firms would turn to have lower sales revenue compared to their credit unconstrained counterparts.

These findings have implication for increasing SMEs access to credit by reducing information asymmetry and strengthening prudential stringency. For example, the government of Cameroon could accompany the creation of the public bank for SMEs, with an effective credit registry bureau, which indicates firms listed in the private or public domain together with their credit histories.

Financial institutions could, then, be given the permission to easily access this information. This would reduce information asymmetry and enable the banks to be able to give out loans to SMEs that do not have huge collaterals or at lower interest rates subject to stringent regional prudential controls. It would encourage loans of higher value to be given out for investment to qualified SMEs and also increase employment opportunities.

Conflict of Interests

The authors have not declared any conflict of interest.

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