



**Access to Credit and the Effect of Credit Constraints on the
Performance of Manufacturing Firms in the East African Region:
Micro Analysis**

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Abstract

The study set out to investigate the factors influencing manufacturing firms' access to credit and the effect of credit constraints on firm performance in the East African Community (EAC). We used the World Bank (2006) enterprise survey for 5 EAC countries. We used both bivariate and multivariate approaches. The bivariate approach involved the use of cross-tabulations by generating average percentages of manufacturing firms along some pertinent performance indicators. The multivariate approach involved employing simple probit, simple OLS, tobit, and a two-step probit model. Amongst the top five business constraints, electricity outages and costs were found to be the most severe business constraint followed by access to finance, high and volatile tax rates, corruption, and macroeconomic instability. Exporters are 10 years older than their counterparts while those that obtained a loan are 5 years older than their counterparts. Exporting firms and those that obtained a loan, compared to their counterparts, are bigger, have greater penetration of information technology. Manufacturing firms in the region are more concentrated in metal fabrications (34%) followed by the food processing sector (25%). Manufacturing firms in the EAC are mainly privately held limited companies with a negligible percentage under the publicly listed companies. Exporters and firms that obtained a loan are more concentrated under the privately held limited company (81% and 63%, respectively) compared to other business organizations. Non-exporters and those firms that did not borrow are concentrated under sole proprietorship (44% and 45%, respectively) compared to other business organizations. The most credit constrained sectors in the EAC are wood and furniture with only 8% of firms obtaining loans followed textiles and garments with only 14% of firms obtaining loans. The majority of firms within the EAC are credit constrained because the average percentage share of the best performing sector (metal fabrications) is also quite low at 37% of firms having obtained a loan.

Quantitatively, an increase in firm sales or value added by one unit increases the probability of credit access by 6-8%. Being an exporter increases the probability of credit access by 14% compared to their counterparts that are non-exporters. Medium firms, compared to small firms, increase the probability of access to credit by 18-19%. Large firms, compared to small firms, increase the probability of access to credit by over 50%. Having access to credit, compared to counterparts that are credit constrained, increases firm performance by 0.2 to 0.3 percentage points. An increase in the annual interest rate by one unit reduces firm productivity by 0.3 percentage points. An increase in loan duration by one month increases firm performance by 0.14 to 0.2 percentage points. Governments in the EAC should put in place policies aimed at creating a stable and conducive microeconomic environment that can enhance the performance of firms and by extension increase their participation in the credit market. Governments in the region should tackle the top five business constraints rated as very severe. EAC governments should make credit access easier by lowering the annual interest rates and also negotiating for a longer pay back period for individuals in the business sector. Governments in the region should put specific attention on those sectors which are observed to have an extreme disadvantage in accessing finance. These firms are mainly concentrated in sole proprietorship and partnership meaning that government policy that can ease access to finance should squarely focus on this group of firms. Additionally, governments should ease the process and preconditions of business registration so that firms can easily move from sole proprietorship to partnership and eventually to privately held limited companies.

Key words: Credit access and constraints, sales, value added, and performance

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1. Introduction and Study Concern

The importance of bank credit in enhancing the process of economic development and growth through availing finances to manufacturing firms cannot be underscored. Credit access enhances the possibility of firms to increase their capital stock by acquiring capital goods that may not be possibly produced in the less developed country. Noteworthy is the fact that some capital goods especially plants and machinery may well be beyond the savings of the business entrepreneurs in the EAC and hence need an extra source of funding. Owing to the usually strong synergies between capital goods accumulation on the one hand and an increase in productivity and growth of firms on the other, countries the world over have designed purposeful policies that are aimed at enhancing the acquisition of capital goods especially in developing countries where there is an extreme disadvantage in the production of capital goods. Capital goods accumulation is a key for technological advancement of a country. Therefore, credit constraint affects a firm's technology choice by limiting the number of investment alternatives that can be considered in regard to the available resources.

Many manufacturing firms may use an inappropriate technology because it is the only one that is within the resource envelop of the firm. In some cases, even where credit is available mainly through banks, the entrepreneur may lack freedom to choose an array of machinery and software that may be more relevant to the type of technology that a firm may want to adopt. Instead, the bank's lending conditions may force firms to purchase heavy, immovable equipment that can serve as collateral for the bank. It is against this background that credit programs have been a favored intervention by donors and governments in Africa (Bigsten et al., 2000). These authors argue that the core of these interventions is the concern that credit markets are not functioning well and their malfunctioning results in low economic activity and growth. At the microeconomic level, credit constraints limit the size of firms, as well as their growth, profits, activations and liquidations; their scope of operations may also be limited (Monge-Naranjo et al., 2003). Thus, understanding the implications of credit constraints especially in a developing country context has always been a matter of great policy concern.

Lack of access to credit has been rated the second most severe constraint (Table 1 in the appendix) facing manufacturing firms in our countries of interest; Uganda, Kenya, Tanzania, Rwanda and Burundi. There are various pathways through which credit constraints are teething in developing countries, the EAC not an exception. One of such pathways includes

the undeveloped capital market which forces entrepreneurs to rely on self-financing or borrowing informally from friends and/or relatives (UBOS, 2010). This, by extension, leads to lack of access to long-term credit for small enterprises forcing them to rely on high cost short term finance. Other pathways worth noting for the case of the EAC include the high cost of credit, high bank charges and fees. As an example, Uganda witnessed a scenario during the climaxing period of the year 2008 which testifies the need for credit among the common and low earning entrepreneurs. During the time, numerous money lenders in the name of microfinance institutions and informal money lenders came up, promising hope among the 'little investors,' by availing financial freedom through soft borrowing. The rationale behind turning to these schemes among a good number of entrepreneurs is mainly to seek alternatives and soft credit with low interest rates while making profits. Financial constraint remains a major challenge facing manufacturing firms in Uganda and the east African region at large (BOU, 2010).

The main objective of this study was to investigate the factors influencing access to credit by manufacturing firms within the EAC and the relationship between credit access and firm level performance measured in terms of sales and value added. This was intended to draw insights into the factors hampering access to credit by manufacturing firms in order to suggest possible policy options. We also intended to understand whether firms having access to credit outperformed their counterparts in order to understand whether credit constraint is teething in the EAC. In line with the main objectives of study, we sought to answer two pertinent research questions. First, what factors determine whether a firm has access to formal financial markets? It is well known that, typically, credit from formal institutions is less expensive than credit from informal creditors or commercial partners. Second, what is the relationship between credit access and firm productivity? In line with this question we hypothesize that firms having access to credit outperform their counterparts. Large and exporting firms have a higher probability of credit access and, by extension, outperform their counterparts. While the existence of credit market imperfections is uncontested in the context of the EAC, and that credit constrained firms are also poor performers but an empirical regularity has been missing for the case of the East African Community (EAC).

The findings from the study will be of great importance to the government policy makers in an effort to eliminate credit constraints especially amongst small entrepreneurs. The findings will also offer insights into the types of manufacturing firms/sectors that are more credit constrained than others so as to help government and other stakeholders know where to target

their efforts in an attempt to providing access to easy and cheap credit. The findings will point out the impact of annual interest rates on the possibility of credit access and the performance of manufacturing firms. Another important issue that this paper throws light upon is the importance of loan duration in influencing firm performance since it has a bearing on the cost of business operations. We conjecture that firms should be given a pay-back period long enough for them to comfortably pay-back the loan without stressing other operations of the firm that compete for the same financing. In addition, the study findings will assist manufacturers by opening their eyes to alternative sources of finance and probably giving them a better chance of survival, growth and success in the global competitive corporate setting.

1. Related Literature

Literature presents several plausible theoretical underpinnings of the credit constraint faced by manufacturing firms. One of the factors that is frequently mentioned in the literature is the information asymmetry problem where firm owners know more about the functioning and strength of their business firms compared to the potential provider of financing (Tucker et al., 2003). This problem is even more pronounced for small compared to their large counterparts since the former are not financially sophisticated meaning that at times they lack records to show the financial inflows and outflows. This problem is compounded by the fact that new or recent start-up businesses may be unable to provide evidence of a good financial performance track record. Banks in particular rely on past financial performance as an indicator of the future profitability of projects. Other small firm financing problems relate to the characteristics of the firm itself and the attitude and objectives of the owner/manager. Such characteristics include their diversity, their inability to provide strong collateral, and stage of development effects. Thus, the information asymmetry problem is partly one relating to difficulties in the spheres of communication and credibility.

Early theoretical models of entrepreneurship assume directly that credit contracts for business start-ups and ongoing financing are very limited. For example, in the model of Bernhardt and Lloyd-Ellis (2000), there are no credit possibilities at all. In their economy, the operation and formation of firms has to be funded by entrepreneurs' accumulated savings and firms' past profitability. In other models, the maximum amount credit firms can obtain to fund their productive ventures is modeled as a direct function of wealth or available collateral. Examples of those models are Evans and Jovanovic (1989), Hart and Moore (1994), and Banerjee and

Newman (1991). Some of these models allow trade credit, i.e., funds that are backed by the goods supplied.

According to Titman et al. (2004), a principal source of the financial constraint, influencing capital-structure, may be the existence of asymmetric information and the cost of contracting between companies and potential providers of external financing. Problems of financial constraint are potentially high in presence of a poorly developed financial system. A well-developed financial system can facilitate the ability of a company to gain access to external financing, providing cheaper finance to worthy companies (Guiso et al., 2004).

Owing to the lack of business experience of many small owner firms and the managers in the early years of the business, their business risk may be more significant than for larger firms. Small firms generally have smaller financial reserves to draw on in times of crisis and are also relatively highly geared compared to larger firms due to the difficulty and expense of attracting new equity finance. Thus, such firms are characterized not only by higher business risk but also higher financial distress risk. Banks tend to respond to this risk by adopting a capital-gearing rather than an income-gearing approach to lending. Thus, rather than focusing their attention on evaluating the income streams flowing from an investment project, they may focus more on the value of collateral available in the event of financial distress. This creates a problem for small firms in that they often do not have significant fixed assets to secure on in their early years of establishment. The stage of development, then, may be an important determinant of, and constraint on, the type and amount of external finance raised. Small firm financing, then, will typically be a heavily secured debt, with few incidences of external risk capital contribution (Cruickshank, 2000).

The attitude and objectives of the owner-manager can exert an important impact on the firm's ability to secure external finance. Such managers are often unwilling to provide personal assets as collateral. Furthermore, many small businesses have objectives other than growth as a priority (e.g. "lifestyle businesses"). However, Binks and Ennew (1996) argue that many small firms will be forced to provide yield expansion to protect their limited liability status (which would otherwise be eroded by the provision of personal assets as loan collateral). A primary motive for starting a small business is to exert greater control over the work environment and to internalize the benefits of personal effort and risk-taking. In this regard, then, it is understandable that many small business managers would not countenance any dilution of this control through the introduction of outside equity from venture capitalists or

business angels. Thus, the attitudes of managers may sometimes constitute an important constraint on the range of external financing sources available to the firm.

Generating an entrepreneurial idea is one thing but accessing the necessary finance to translate such ideas into reality is another. Many novel entrepreneurial ideas have been known to die simply because their originators could not fund them, and banks could not be convinced that they were worth investing in. To fund a business idea, there are two major sources to access; internal and external finance. Internal finance is concerned with sourcing funds through personal savings, and those of friends and relatives. However, as the firm grows, its financing requirements may go beyond personal savings. The next source is external finance. External funding is based on merit according to the evaluation of financial institutions. There are two notable variants of external finance: debt financing and equity financing. Debt financing involves the procurement of interest bearing instruments. They are secured by asset-based collateral and have term structures, that is, either short or long term. The equity component of external finance gives the financier the right of ownership in the business and as such may not require collateral since the equity participant will be part of the management of the business (Ogujiuba et al., 2004).

2. Data and Methodology

2.1 Data

The study uses the World Bank's Enterprise Surveys (2006) for Uganda, Kenya, Tanzania, Rwanda and Burundi. The World Bank's Enterprise Surveys collect data from key manufacturing and service sectors in every region of the world. The Surveys use standardized survey instruments and a uniform sampling methodology to minimize measurement error and to yield data that are comparable across the world's economies. This micro-econometric study is based on a sample of 1532 manufacturing firms that are found in survey database of the World Bank (2006).

The manufacturing and services sectors are the primary business sectors of interest. Formal (registered) companies with 5 or more employees; 5-19 (small), 20-99 (medium), and 100+ employees (large-sized firms) were targeted for interview. In each country, businesses in the cities/regions of major economic activity are interviewed. The standard Enterprise Survey topics include firm characteristics, gender participation, access to finance, annual sales (domestic and foreign), costs of inputs/labor, workforce composition (by skill and gender),

bribery, licensing, infrastructure, trade, crime, competition, capacity utilization, land and permits, taxation, informality, business-government relations, innovation and technology, and performance measures. In addition, the data set exposes other imperative firm characteristics such as: export status, export destinations, output level, raw materials (domestic and imported), and experience and education attainment of the firm manager, ownership, location, source of startup finance, industry, firm age (year of startup), and capital stock among others. The data set provides all the variables required for both descriptive and quantitative analyses of this study. Over 90% of the questions objectively ascertain characteristics of a country's business environment. The remaining questions assess the survey respondents' opinions on what are the obstacles to firm growth and performance. To researcher's knowledge, this is the only recent representative data set of firms that includes such information required for this study. The survey sample size constituted 307, 781, 102, 59 and 273 for Uganda, Kenya, Rwanda, Burundi and Tanzania respectively.

2.2 Methodology and Analytical Techniques

This study used both qualitative/descriptive and quantitative statistical techniques to analyze the World Bank Enterprise Survey (2006) for the East African countries; Uganda, Tanzania, Kenya, Rwanda, and Burundi using the Stata software. The descriptive analysis entailed the use of cross-tabulations where we generated the average percentages of firms and by key background characteristics in order to draw insights on the interactions between different characteristics. Specifically, we picked the key firm characteristics pertinent to the study (credit status and export status) and we cross-tabulated it with other background characteristics of firms. The quantitative analysis entailed the use of two different methodologies; one for factors influencing credit access and the other analyzing the relationship between credit constraint and firm performance.

2.2.1 Quantitative Analysis for Credit Access

If the objective were only to examine whether a firm receives credit at all, dichotomous Probit models are sufficient. Using such models we classified firms into two groups: those with some banking credit and those with no banking credit at all. We then estimated the probability that a firm belongs to either group as a function of the observable characteristics. Whereas we obtained insightful findings using a Probit model, however, it does not make use of all the information available, as it neglects the intensity of use of credit by firms with banking credit.

To include that information, we employed a Tobit model during our analysis. The intensity of use of credit was measured by the share of banking credit in total credit. The model can be described as follows. For firm i , we consider the standard Tobit model (Tobin, 1958) expressed as:

$$y_{ij}^* = X_{ij}\beta_w + \varepsilon_{ij}, \text{ for } i = 1 \dots n, \text{ and } j = 1 \dots 5 \quad (1)$$

From Equation 1, y_{ij}^* is a latent variable which satisfies the properties of the linear model. That is, it is a binary variable equal to 1 if the i^{th} firm in country j got banking credit and is equal to zero otherwise. This response is determined by the latent variable y_{ij}^* . In order to parametrically estimate the model, X_{ij} is the set of exogenous (independent) explanatory variables, β is a vector of parameters to be estimated and ε_{ij} is the error term normally distributed with mean zero and constant variance.

Moving from overall patterns of financing, to access credit specifically, the study examined the relationship between constraints in access to credit and firm performance measured in terms of sales and value added. Firms with access to credit were defined as those that expressed a demand for credit, apply for a bank loan and receive it. On the other hand, credit constrained firms were those that expressed a demand for a bank loan but either i) applied for a bank loan and were rejected, or ii) did not apply.

$$y_{ij} = \begin{cases} y_{ij} = 1: \text{ if } y_{ij}^* > 0 \\ y_{ij} = 0: \text{ if } y_{ij}^* \leq 0 \end{cases} \quad (2)$$

From Equation 2, y_{ij} is a binary variable equal to 1 if the i^{th} firm from country j got a banking credit and is equal to zero otherwise. This response is determined by the latent variable y_{ij}^* .

With the assumption that ε_{ij} follows the normal distribution with mean zero and variance σ_ε^2 and is independent across firms, Equation 2 represents a conventional Tobit model which can be estimated consistently by a maximum likelihood estimator. A maximum likelihood estimator (the appropriate estimator for Tobit models) is used to estimate these parameters. If we estimate by maximizing the underlying likelihood, we have the density of a firm which got bank credit in country j $y_{ij} > 0$ given by the following expression:

$$f(y_{ij} | x_{ij}) = f(\beta_0 x_{ij} + \varepsilon_{ij} | x_{ij}) = \left(\frac{1}{\sigma_0}\right) \phi\left(\frac{\varepsilon_{ij}}{\sigma_0}\right) \quad (3)$$

In addition, the probability that a firm did not get bank credit in country j ($y_{ij} = 0$) is given as:

$$\Pr(y_{ij} = 0 | x_{ij}) = \Pr(\beta_0 x_{ij} + \varepsilon_{ij} \leq 0 | x_{ij}) = 1 - \Phi\left(\frac{\beta_0 x_{ij}}{\sigma_0}\right) \quad (4)$$

Thus, writing both Equation 3 and 4 simultaneously, we obtain the following expression:

$$f(y_{ij} | x_{ij}) = \left[\left(\frac{1}{\sigma_0}\right) \phi\left(\frac{y_{ij} - \beta_0 x_{ij}}{\sigma_0}\right)\right]^{1(y_{ij} > 0)} \left[1 - \Phi\left(\frac{\beta_0 x_{ij}}{\sigma_0}\right)\right]^{1(y_{ij} = 0)} \quad (5)$$

Therefore, the likelihood for observation i in country j is given as Equation 6. Maximizing the underlying likelihood function of Equation 2 we are able to obtain estimates of β and, as well as the probability of credit access by the firms:

$$L_{ij}(\beta, \sigma) = 1(y_{ij} > 0) \log\left(\left(\frac{1}{\sigma}\right) \phi\left(\frac{y_{ij} - \beta x_{ij}}{\sigma}\right)\right) + 1(y_{ij} = 0) \log\left(1 - \Phi\left(\frac{\beta x_{ij}}{\sigma}\right)\right) \quad (6)$$

The values of the Tobit model estimates do not directly correspond to changes on the dependent variable as a result of a unit change of the explanatory variables. Rather, normalised coefficients are reported which can be transformed into first order derivatives. The marginal effects of the explanatory variables on the observed variable represents the expected value of y_{ij} conditional on y_{ij} being greater than zero. The marginal effect of a standard case, censoring at zero and normally distributed disturbances, estimated at the means of the set of covariates.

From Equation 6, ϕ denotes the cumulative standard normal distribution. Because the results of this study are of interest for policy recommendations, the marginal effects on the observed values of the dependent variables due to a one percent change given on the independent variables is a valuable result of the Tobit analysis.

The variables x_{ij} in this study contain information on firm i in country j (age, assets, employment, type of ownership, total debt, etc) including their industrial sector, as well as the characteristics of the owner or manager (age, sex, education, ownership of a house, previous experience, etc.).

In addition, we use a two step maximum likelihood probit with sample selection, to deal with possible selection bias between access to credit and demand for a credit. This model allows us to estimate the probability of being unconstrained given that firm i in country j demanded for a loan. In the first stage (model 7) we estimate the probability of having a demand for a bank loan, and in a second stage (model 8) we shall estimate access to credit defined by the probability of having a formal bank loan. The first model can be interpreted as demand for credit and the second model as supply of credit. Firm characteristics and the firm's willingness to invest explain the demand for credit as given by the following model specification.

$$\text{Credit } D_{ij} = \alpha + \beta \text{ firmcharacteristics}_{ij} + \beta \text{ finvest}_{ij} + v_{ij} \quad (7)$$

The supply of credit shall reflect firms characteristics and the banks' evaluation of firms' risk as outlined in the following model.

$$\text{Credit } S_{ij} = \alpha + \beta \text{ firmcharacteristics}_{ij} + \beta \text{ finvest}_{ij} + e_{ij} \quad (8)$$

From Equation 7 and 8, the firms' characteristics (which explain both models) are firm size, region, sector, ownership, managers' education, capacity utilization, age, export status, legal status, among others.

2.2.2 Quantitative Analysis for Credit Constraints and Firm Performance

The fundamental question addressed under this section is what is the effect of the credit constraint on manufacturing firms' performance in the EAC? We shall consider three main variables measuring the extent of the credit constraint. We considered a dichotomous variable equal to 1 if a firm has access to credit and zero if a firm is credit constrained or in other words has no access to credit. We also considered the annual interest rates in order to capture the cost of borrowing. We finally used loan duration in months to capture the period in which the firm can utilize the borrowed funds before the pay-back period. We hypothesized that the shorter the period the more beneficial the loan becomes to the firm. The higher the cost of borrowing, the greater the credit constraint. In order to estimate the effect of the credit constraint on firm performance, we considered a simple regression of the form:

$$P_{ij} = \alpha + \gamma c_{ij} + X_{ij} \beta + v_{ij} \quad (9)$$

From Equation 9, P_{ij} denotes alternative measures of firm performance (sales and value added) of a typical firm i ; c_{ij} denotes whether the firm i in country j has banking credit ($c_{ij} = 1$) and zero otherwise ($c_{ij} = 0$). Alternatively, c_{ij} would also represent a continuous variable such as the annual interest rate and the loan duration in months. X_{ij} denotes observable characteristics of the same firm i in country j . Here v_{ij} indicates random, unobserved heterogeneity.

Equation 9 is estimated using OLS to examine the potential impact of access to credit on firm performance controlling for other covariates. Our measures of firm performance are sales and value added. It is argued that credit access/constraint affects the performance of firms along with other firm-level characteristics aforementioned.

3. Results

In this section, we present the results from all our model estimations as well as the descriptive findings concerning credit and other issues for manufacturing firms in the EAC.

3.1 Descriptive Evidence

We started our analysis with some descriptive evidence presented in form of cross-tabulations indicating the average share of manufacturing firms following key firm characteristics. The descriptive analysis is to be indicative of the scenario facing manufacturing firms and hence helps to lay a firm foundation for the regression based empirical findings.

Table 1 shows the average percentage share of firms by background characteristics. Considering the business constraints that were rated as very severe by manufacturing firms, overall electricity or power outages ranks highest amongst all constraints and across different firm categorizations; export status and credit status. Forty three percent (43%) of all manufacturing firms in the East African Community (EAC) ranked electricity as the most severe constraint of doing business in the region. Not to start sentence with numeral This average percentage share remains highest, compared to all other business constraints, even after we categorize firms into exporters, non-exporters, those that obtained a loan and those that did not obtain a loan. 43% of exporting and non-exporting firms reported electricity as a very severe business constraint respectively. 39% and 45% of firms that obtained a loan and

those which did not obtain a loan reported electricity as a very severe business constraint respectively. These preliminary descriptive findings suggest that electricity outages and probably the cost per unit is one of the most teething constraints to manufacturers in the EAC. Therefore the governments in the region and the key stakeholders (especially) donors must take keen interest into solving the electricity problem as a means of improving the microeconomic environment.

Table 1 shows that overall manufacturing firms ranked access to finance as the second most severe business constraint in the EAC after electricity. The non-exporting firms and firms that did not obtain loans also ranked access to finance as their second most pressing business constraint in doing business. As expected, access to finance was ranked fourth by firms that obtained loans. The implication of this finding is that the firms that can afford loans are in a position to invest into alternative sources of power and hence find that electricity is not a severe business constraint. Governments in the region and other stakeholders should design a set of policies to ensure increased penetration of loans amongst business firms in order to realize high capital intensity and technological progress.

Table 1 further shows that tax rate is ranked third most severe business constraints by manufacturing firms in the EAC. This constraint is manifested in terms of highly volatile and very high tax rates. 21% of all manufacturing firms in the region ranked it as the third most pressing business constraint. Also 21% of exporters and firms that obtained loans ranked tax rate as their second most pressing business constraint while 20% the non-exporters and firms that did not obtain loans ranked it as third. Hence governments in the region ought to adopt a more predictable tax rate regimes which are affordable by the investors in order to create a conducive environment for them. It is also important to note that corruption was reported by 15% of firms in the region as the fourth severe constraint that affects the smooth operation of business firms in the region. At the same time, exporting firms and firms that obtained loans ranked corruption as their third most pressing business constraint in doing business while 14% of non-exporters and firms that did not obtain loans ranked corruption as their fourth most pressing constraint. Governments in the region ought to develop a political will with a strong stance to fight corruption in order to create a conducive atmosphere for business operations. Macroeconomic instability was ranked fifth among the business constraint by about 10% of the sampled firms in the region. Similarly, 10% of East African exporting firms and the firms which did not get loans ranked macroeconomic instability in terms of high inflation rates as the fifth most pressing business constraints. Governments in the region

should pursue prudent macroeconomic policies which aim at a single digit inflation rate and with accelerated economic growth rate.

Table 1 does not show any significant difference in capacity utilisation among exporters and non-exporters and firms that obtained loans and those that did not obtain loans. In regard to firms age, on average, all manufacturing firms in the region have been in operation for 14 years while the exporting firms are 10 years older than their counterparts and firms that obtained a loan are 5 years older than their counterparts. This might imply that it takes some time for firms to penetrate into the global trade arena and slightly more time for them to penetrate into the financial markets. With globalisation and economic integration, our study further analyses the use of emails by firms. Table 1 reveals that on the overall 43% of EAC firms use internet while 57% do not use internet. In case of exporting firms 88% of firms use email compared to 65% of non-exporting firms. As far as credit access is concerned, 62% of firms with loans use emails compared to only 35% of firms with no loans. This issue points to the issue of affordability to install internet and to pay the monthly charges. There might also be a possibility of technology illiteracy, particularly among the older self entrepreneurs, especially given the fast declining cost of internet in the region.

In addition, our analysis looks at managers' experience at the foreign firm cross-tabulated with key characteristics of interest to this paper. On average, managers of manufacturing firms in the EAC have about 12 years of experience at a foreign firm before starting to manage the current enterprise. On the other hand, managers of exporting firms are 6 years more experienced compared to their non-exporting counterparts. Furthermore, managers of firms that obtained a loan are 3 years more experienced compared to their counterparts that did not obtain a loan. Our findings clearly articulate the fact that having more experience before managing the current enterprise leads to better performance and hence the ability to penetrate into global markets and into the financial markets for borrowing.

Analysis of firms by size reveals that the majority of manufacturing firms within the EAC are small firms constituting on average 54% of the sampled firms. The average percentage of manufacturing firms drops drastically when we observe the average percentages on medium and large firms. 31% of firms within the EAC are medium firms while only 15% are large firms. This finding implies that the business capital in the EAC has not yet grown to admirable levels. In terms of export status, about 52% of exporting firms are large compared to only 7% of non-exporting firms while 34% of exporting firms are medium firms compared

to only 30% of non-exporting firms. These findings are in line with earlier expectations that exporting firms are larger and outperform their non-exporting counterparts. In terms of access to credit, 37% of medium firms obtained credit compared 28% of firms that did not obtain loans. It is evident that very few exporting firms (12%) compared to the non-exporting firms (63%) are small firms and at the same time only about 31% small firms obtained loans compared to 65% firms that did not obtain loans.

Further analysis of firm characteristics in terms of sectors indicate that metal fabrications subsector constitutes the highest average percentage of firms (34%), followed by the food processing subsector (25%), wood and furniture (15%), Textile and Garments (14%) and the subsector with the lowest share is Machinery and Chemicals (12%). In terms of export status, most exporting firms are in the Metal fabrications subsector (32%), followed by Food processing (25%), machinery and chemicals (19%), textile and garments (17%) and Wood and Furniture (7%). Additionally, non-exporting firms are dominated by firms in the metal subsector (35%) followed by food processing (25%), Wood and Furniture (17%) and the least is Machinery and Chemicals (10%). In terms of firms' access to credit captured by firms that obtained loans and those which did not obtain loans, Table 1 shows that in the Metal fabrications subsector 37% of firms obtained loans compared to 33% of firms which did not, followed by food processing with 28% of firms that obtained loans compared to 24% of firms that did not obtain loans, for Machinery and Chemicals firms 14% obtained loans compared to 10% of firms that did not, in the Textile and Garments, 13% obtained loans compared 15% of firms that did not, while in Wood and Furniture only 8% of firms obtained loans compared to 18% which did not obtain loans. This differential access of manufacturing firms to credit implies that government attention should also be specifically targeting more those sectors that are more credit constrained, in this case the Wood and Furniture as well as the Textiles and Garments subsectors.

Finally, the analysis of firms by their legal status reveals interesting findings. First, the manufacturing sector is dominated by privately limited companies (44%), followed by sole proprietorship (38%), partnership (15%) and the public listed companies are about 1% given the privatisation of most state enterprises in the region. By export status, 82% of the privately held limited companies are exporting firms compared to only 37% non-exporting firms. However, sole proprietorship (44%) dominate the non-exporting firms followed by the privately held limited companies (37%). In terms financial access, 63% of privately held

limited companies obtained loans while 35% did not. However, publicly listed limited companies had the lowest share of firms that obtained loans in the region.

Table 2 helps us to draw insights on the distribution of firms by background characteristics in the EAC. Overall, Food manufacturing firms lamped together 74% are owned by Africans, 23% by Indians and 4% by Europeans. However, looking at the use of ICT in terms of emails and websites, 58% and 21% firms in the Machinery and Chemicals subsector use emails and website respectively. The Metal fabrications subsector is the second outstanding user of ICT with email 48% and website 16%, followed by the Food processing subsector with 44% and 14% for emails and website respectively, while the share of firms in Garment and Textile subsector that uses email is 42% and website is 18%. In terms of concentration in the Industrial zones, the Metal fabrications subsector dominate with over 46%, followed by the food processing firms (36%), Garment and Textiles and Wood and Furniture with both 31%. Analysis of foreign market destinations of firms reveals that the Sub-Saharan African (SSA) market is a major destination to about 20% of manufacturing firms compared to only 5% of firms exporting to the developed markets. 40% of the Machinery and Chemicals firms export to the SSA market, followed by the metal fabrications with 25% and food processing and Garment and Textiles with 18%. It is noteworthy that the Food and Garment and Textile firms export to the development market up to a meagre 7% of their production. In regrad to raw material importation, 84% of the Machinery and Chemicals firms depend on local materials, followed by 72% of the Metal fabrications, 67% of the Food processing firms while wood and furniture firms largely depend on imported raw materials as only 35% use local raw material. Analysis of firm ownership revealsl that 90% of the Wood and Furniture are owned by Africans, followed by 74% of the Metal fabrications and food processing firms owned by African, 70% of Machinery and Chemicals firms and Garment and Textiles also owned by African investors. This finding support the government policy of privatisation in support of domestic ownership. Domestic ownership of firms refers to firms in which Ugandan national own more than 50% of the shares.

From the Enterprise Surveys (World Bank, 2006), we provide an analysis of the firm characteristics by managers education level (Table 3). The findings reveal the importance of education in driving foreign market penetration with over 25% of firms managed by graduates participating in exporting compared to only 5% of firms owned by managers with less than tertiary education. Overall, 42% of firms uses emails, but 25% of firms managed by managers with tertiary education use emails while less than 21% of firms managed by manager with less

than tertiary education use emails. In response to government industrial development policy, over 42% of firms managed by university graduates are located in industrial zones while 3% managed by secondary education level managers are located in industrial zones and 38% of firms managed by managers with no education are situated in industrial zones. In terms of market destination, no firms managed by managers with no education access developed markets while about 28% of firms managed by managers with post secondary education export to SSA and 7% export to developed markets. As regards raw material sources, 44% of firms managed by secondary education managers and 76% firms managed by university education managers do use local raw materials compared to only 29% of firms managed by managers with no education. Analysis of firm ownership reveal that over 82% of firms in the region are owned by Africans with tertiary education while Indian tertiary and university education managers own 18% and 34% respectively.

Table 4 reports the legal status of firms by background characteristics in the EAC region. It is observable that 50%, 30%, 4% and 4% of the publicly listed companies, privately held firms, partnership and sole proprietorship are exporters, respectively. In regard to access to finance, 46% of privately held limited companies obtained loans, followed by publicly listed firms (44%), partnership (25%) and only 20% of sole proprietors obtained loans. The dominance of limited companies in access to loans can be explained by their ability to have collateral against which they get loans from financial institutions as opposed to other firms. In regard to the use of ICT in terms of email and website, 69% publicly listed firms use emails and 63% use website in their activities, followed by 66% of privately held firms use emails and 23% use website, 32% of partnership firms use email and 5% use website and 21% of Sole proprietors use emails and 4% use website. In regard to firm location, more privately held firms are located in the industrial zone (52%) followed by publicly listed firms (36%), partnerships (30%) and sole proprietorship (22%). Table 4 further reveals that publicly listed firms dominate the export market by 43% exporting to the SSA market and 21% to the developed market, followed by 31% of privately held firms exporting to the SSA market and 6% to the developed market. As regards raw material sources, 75% of privately held firms and 60% publicly listed firms use local raw materials, followed by 54% of partnership firms and 35% sole proprietors. Analysis of firm ownership reveals that over 93% of sole proprietors, 86% of partnership, 79% of publicly listed firms and 56% of privately held firms in the region are owned by Africans while 43% publicly listed and privately held ,13% and 5% are partnership and Sole proprietors, respectively, are owned by Indians.

Table 5 shows further insights into capacity utilization distribution of firms by background characteristics. It is revealed that of all firms with capacity utilization range 10-29, 13% are exporters meaning that a higher share of non-exporters is found in this range. Compared to all capacity utilization ranges portrayed in Table 5, there is a higher share of exporting firms (26%) within 30-49% distribution of capacity utilization. At a higher distribution of capacity utilization, say in the range of 90-100%, the highest share of exporting firms is only 20%. However, this share of exporting firms (20%) within 90-100% capacity utilization is higher than the share of exporting firms (13%) found within 10-29% distribution. Overall, these results suggest that exporters, compared their non-exporting counterparts, are fewer at each range of capacity utilization. Our findings also reveal that 53% of firms that obtained a loan are found within the 10-29% capacity utilization compared to only 34% of firms within 90-100% distribution of capacity utilization. This might imply that firms at a higher distribution of capacity utilization are less likely to borrow compared to firms whose capacity utilization is still a lower distribution. This also implies that firms that are just starting or those whose capacity utilization is still lower, compared to older firms, are more likely to borrow money for expanding their business firms. Looking at the relationship between email use and capacity utilization, more interesting findings are revealed. Table 5 shows that only 40% of firms within capacity utilization distribution of 10-29% used emails during their business contacts compared to 58% of firms in the distribution of capacity utilization of 90-100%. Overall, this might imply that firms at a higher distribution of capacity utilization have the required resources that can enable them to install internet facilities and use emails during their business contacts. This further means that the use of emails is closely related to the level of development or maturity of business firms in terms of affordability of the costs involved and also the availability of the need to use the email especially if the firm gets involved in global trading arena. Our findings further indicate that there are minor differences between firms in an industrial zone at a lower end and at an upper end of capacity utilization distribution. 47% of firms in the industrial zone are within the capacity utilization distribution of 10-29% compared to 48% of firms in the industrial zone within the capacity utilization distribution of 90-100%. Overall, these findings imply that being in an industrial zone might enhance a greater capacity utilization compared to firms in isolated locations.

We also find an interesting relationship between the use of websites and capacity utilization. Table 5 indicates that 13% of firms that operate a website are within 10-29% of capacity utilization distribution compared to 19% of firms within the 90-100% capacity utilization

distribution. This implies that operating a website is more likely for firms whose capacity utilization is at a higher distribution compared to their counterparts. Our descriptive results on export destination, either to the developed or underdeveloped market is in line with the results on export status of firms discussed earlier. We also show that a greater share of firms with a higher capacity utilization do not use imported raw materials. It is indicated that 67% of firms in the capacity-utilization distribution of 10-29% do not import raw materials compared to 72% of firms within 90-100% distribution of capacity utilization. This implies that firms with higher capacity utilization are less likely to import raw materials; this is counterintuitive since the reverse is expected.

Observing the relationship between ownership of firms and capacity utilization, there is a higher share of African owned firms (73%) within the lower capacity utilization distribution (10-29%) compared to 67% of African owned firms within 90-100% distribution of capacity utilization. On the other hand, for firms owned by Indians, there is a lower share of firms (20%) within the 10-29% distribution of firms compared to firms (32%) in the higher distribution of capacity utilization (90-100%). On the other hand, similar to African owned firms, there is a higher share of European owned firms (13%) at a lower distribution of capacity utilization compared to firms (8%) at a higher distribution of capacity utilization (90-100%). It is hence evident that ownership has a bearing on capacity utilization mainly because of differences in capital stock, knowledge and technology between foreign and domestic firms.

Table 6 shows descriptive findings relating the experience of the manager and the key characteristics of interest. It is revealed that only 6% of exporting firms are in the range of 0-4 years of experience of the manager compared to 31% of firms whose managers have over 20 years of experience. It is evident that the share of exporting firms keeps increasing as the years of experience of the manager increase. These findings might imply that experienced managers have the required capacity to steer business firms to successfully penetrate into the global trading arena. It is further revealed that the share of firms that obtained a loan increases with the years of experience of the manager. Only 26% of firms that obtained a loan are those whose managers had experience of less than 5 years compared to 47% of firms that obtained a loan whose managers had over twenty years of experience. Additionally, only 29% of firms who used emails had managers with less than 5 years of experience compared to 58% of firms of firms that used an email whose managers has over 20 years of managerial experience. There is also an association between firms located in an industrial zone and the years of

experience of the manager. Only 29% of firms located in an industrial zone had managers with less than 5 years of experience compared to 43% of firms located in an industrial zone whose managers had over 20 years of managerial experience. Similarly, only 8% of firms which operated a website had managers with experience less than 5 years compared to 19% of firms which operated a website whose managers had over 20 years of experience. The results on export destination are similar to those on the general export status of manufacturing firms discussed earlier.

Furthermore, 58% of firms that did not import raw materials had managers with experience less than 5 years compared to 68% of firms that did not import raw materials whose managers had over 20 years of experience. Ownership and experience of the manager reveals interesting relationships. Over 85% of firms owned by Africans have managers with experience of less than 5 years compared to 52% of firms owned by Africans whose managers had over 20 years of experience. On the other hand, only 11% of firms owned by Indians had managers with less than 5 years of experience compared to 48% of firms owned by Indians whose managers had over 20 years of experience. Additionally, only 4% of firms owned by Europeans had managers with less than 5 years of experience compared to 8% of firms owned by Europeans whose managers had over 20 years of experience.

Table 7 shows descriptive findings relating the age of the firm and the key characteristics of interest. It is revealed that only 4% of exporting firms are in the range of 0-4 years of existence compared to 35% of firms with over 20 years of existence. It is evident that the share of exporting firms keeps increasing as the age of the firm increases. These findings might imply that mature firms have overcome the strenuous period of covering the sunk costs of exporting, and hence are more productive and bigger to penetrate into global trading arena. It is further revealed that the share of firms that obtained a loan increases with firm's age. Only 19% of firms that obtained a loan are those with less than 5 years of operation compared to 47% of firms that obtained a loan with over twenty years of existence. Additionally, only 26% of firms which used emails had less than 5 years of existence compared to 67% of firms of firms which used email that had over 20 years of existence. There is also an association between firms located in an industrial zone and the years of existence of the firm. Only 26% of firms located in an industrial zone had less than 5 years of existence compared to 50% of firms located in an industrial zone that had over 20 years of existence. Similarly, only 6% of firms who operated a website had less than 5 years of existence compared to 25% of firms which operated a website that had over 20 years of existence. The results on export

destination are similar to those on the general export status of manufacturing firms discussed earlier.

Furthermore, 52% of firms that did not import raw materials had less than 5 years of existence compared to 79% of firms that did not import raw materials that had over 20 years of existence. Ownership and the age of the firm reveal interesting relationships. Over 87% of firms owned by Africans had less than 5 years of existence compared to 52% of firms owned by Africans that had over 20 years of existence. On the other hand, only 8% of firms owned by Indians had less than 5 years of existence compared to 49% of firms owned by Indians that had over 20 years of existence. Additionally, only 2% of firms owned by Europeans had less than 5 years of existence compared to 5% of firms owned by Europeans that had over 20 years of existence.

Table 8 has interesting insights into the relationship between firm size and key characteristics of interest in this paper. Only 4% of small firms were exporters compared to 60% of large firms that were exporters. This might imply that it is more likely for large firms than small ones to penetrate the global trading arena. Additionally, only 19% of small firms obtained a loan during the business operations compared to over 70% of large firms. Large firms are usually more productive and are more able to pay back the loan faster with limited stress on other business operations. Further, only 23% of small firms used emails during business operations compared to 90% of large firms. This might imply that large firms have the capacity to install internet connection and to pay the service charges. In addition, only 23% of small firms are located in an industrial zone compared to 65% of large firms. This might imply that an industrial park creates an environment conducive for firms to grow and expand by exploiting economies of scale and synergies. Similar to using emails, only 4% of small firm operate a website compared to 46% of large firms. This is related to the cost of internet installation and service payments as well as employing a web technician which is more affordable to large than small firms. The results on export destinations are similar to those of the general export status discussed earlier.

Only 36% of small firms used imported raw materials compared to over 88% of large firms. This might imply that the larger the firm, the more sophisticated are the activities and hence the need to import raw materials from abroad. Ownership of the firms in relation to firm size, reveal interesting findings. Over 88% of small firms are owned by Africans compared to only 44% of large firms. On the other hand, only 10% of small firms are owned by Indians

compared to 58% of large firms. Additionally, only 2% of small firms are owned by Europeans compared 14% of large ones. This can be accounted for by the limited experience, capital and knowledge of African entrepreneurs compared to the foreign entrepreneurs.

3.2 Quantitative Findings

3.2.1 Factors Influencing Firm Access to Credit Facilities

We used maximum likelihood probit model to estimate the factors influencing access to credit amongst manufacturing firms in the EAC. Our dependent variable equals to one if a firm had a loan and zero otherwise. The key independent variables of interest are the measures of a firm's performance; we used firm sales and value added and we included other controls such as capital stock, export status, sector, and capacity utilization among others. Our analysis reveals that firm performance has a bearing on the probability of a firm's access to credit. An increase in the sales of the firm by 1 percent increases the probability of access to credit by 0.08 percent and this relationship is statistically significant at one percent level. Similarly, an increase in the firm's value added by 1 percent increases the probability of a firm's access to credit by 0.06 percent and this relationship is highly statistically significant at 1 percent level. Therefore, government policy should be focused against the business constraints that impede the superior performance of business firms if firm growth through credit accessibility is to be realized. During our descriptive analysis (Table 1), we identified electricity and the most severe business constraint faced by firms in the region, access to finance comes second, and high and volatile tax rates come third. If the governments in the region focus on these in their order of severity, there will be a bright future for manufacturers in the region through borrowing to accumulate machinery, land, and hiring highly qualified workers.

Capital stock of the firms is revealed significant in influencing the probability of a firm's access to credit. An increase in a firm's capital stock by one unit reduces the probability of access to credit by 0.02 percent and this relationship is significant at 10 percent level. Whereas this result may appear counterintuitive, there is a convincing explanation that can be argued out logically. That is, a firm with a higher capital stock is believed to have accumulated the necessary machinery, plants, and land and hence may not need to borrow money. Instead such a firm has the capability to raise money internally by sale of shares and retaining part of the profits for investment purposes. A firm with lower capital stock on the other hand, may not have the capacity to mobilize own resources without borrowing. Hence

governments in the EAC should target small firms to make it cheaper for them to access credit since it is these firms that are at an extreme disadvantage of accumulating capital goods from own savings². In addition, a firm that pays higher wages is less likely to borrow money compared to counterparts paying lower wages. An increase in the wages paid by the firm by 1 unit decreases the probability of access to credit by 0.08-0.1 percent points and this relationship is highly statistically significant. Whereas this may also appear to be counterintuitive, on the other hand, it can be argued out logically. Firms that pay higher wages are those that have also accumulated enough capital and have also consolidated their position in the market and hence can afford to mobilize own resources without borrowing.

As expected, export status of the firm significantly influences the probability of accessing credit facilities. Being an exporter, compared to counterparts that are non-exporters, increases the probability of access to credit by approximately 14 percentage points. This can be attributed to the sophisticated nature of activities that exporters are supposed to do which may be well beyond their savings. Some of these activities are preconditions for exporting set in the global trading arena and in many of the cases require enormous investment in terms of machinery and equipment which can only be done by using borrowed funds. Additionally, exporters face a number of problems like operating in a distant market, acquiring market information and dealing with a different legal and regulatory framework. All these require a sound financial stand for exporters which may go beyond own savings. Governments in the EAC region should advocate for easy loans for exporters so that it is cheaper for them to carry out their activities successfully.

Furthermore, our findings articulate the importance of firm size in influencing the probability of credit access. Being a medium firm, compared to counterparts that are small firms, increases the probability of credit access by approximately 19 percent. Additionally, being a large firm, compared to counterparts that are small firms increases the probability of credit access by 50-51 percent. This can be attributed to the fact that large firms have the required collateral which financial institutions need as a precondition for credit disbursement. Additionally large firms have the capacity to service the loan without exerting a lot of stress on other activities of the firm. Therefore, governments in the EAC can put in place a conducive microeconomic environment that can enhance the expansion of business firms. For

² Possible footnote that firms with limited stock find it difficult to provide adequate collateral assets.

example, governments should strive to solve the business constraints we identified earlier as being very severe; electricity, tax rates, access to finance and corruption.

3.2.2 Credit access and Firm Performance in the EAC

We estimated various models relating credit access and firm performance in the EAC. Our key dependent variables are firm sales and value added and yet the key independent variable are credit access, annual interest rate and loan duration in months and other control variables. As expected, credit access is significantly related to firm performance. Firms having access to credit increase the level of firm performance by 0.2 to 0.3 percentage points and this relationship is statistically significant at one percent level (Table 10). In the same line of argument an increase in the annual interest rate by one percent reduces firm performance by 0.3 percentage points and this relationship is statistically significant at 5 percent level. Additionally, an increase in the loan duration by one month increases firm performance by 0.1 to 0.2 percentage points and this relationship is highly statistically significant. Our findings clearly articulate the fact that access to credit is beneficial to firm performance yet the cost of credit has a dampening effect on firm performance. Similarly, the longer the duration of the loan the higher the scope for firms to benefit by utilizing the loan funds and also paying back smaller bits of money spread over a long period without stressing other business activities. Therefore, governments in the region through central banks should advocate for more friendly credit conditions in terms of the preconditions like collateral and the cost of borrowing in terms of interest rate as well as the duration of the loan that ensures a fairly long repayment period.

As expected the capital stock of the firm is significantly associated with firm performance. An increase in the stock of capital by one unit increases firm performance by 0.15 to 0.18 percentage points. Given that developing countries are at an extreme disadvantage in the production of capital goods, governments in the region should design policies that can support manufacturing firms in their attempt to accumulate enough capital. Since most of the machinery and plants used in the production processes are imported, governments should make it cheaper for firms to import capital goods by exempting them from taxation or by imposing a modest tax rate. Additionally, much of the required capital in terms of machinery, land and buildings are too expensive to acquire using own savings, hence business firms should be assisted to get access to cheap and easy credit which can facilitate quicker capital accumulation.

Our findings indicate that an increase in the wage rate by one unit increases firm performance by approximately 0.8 percentage points. This finding fully supports the efficiency wage theory, which argues that highly paid workers are healthier and hence more productive. Government policy that can influence a minimum wage legislation can go a long way in improving firm productivity which is a pre-condition for fuelling economic growth at an aggregate level. Additionally, employment significantly influences firm performance. An increase in employment by one worker increases the level of firm performance by 0.1 percentage points and this relationship is statistically significant. However, this result should be treated with caution because the quality of the labour force in terms of education and health matters in influencing firm productivity. Therefore, governments in the region should target to influence higher institutions of learning to develop a curriculum that is driven by the skill demands of the private sector. Additionally, government should establish independent institutions that are relevant to the private sector skills gaps such that the graduates from such institutions can fit very well in the private sector production processes or activities.

Capacity utilization of firms is revealed significant in influencing firm productivity. An increase in capacity utilization by one unit increases the level of firm performance by 0.2 to 0.4 percentage points and this relationship is highly statistically significant. Therefore, governments in the region should create a conducive microeconomic environment that facilitate the full utilization of the installed capital of firms. Such problems as electricity outages, corruption, limited access to finance and high tax rates should be tackled by the governments as a matter of priority. As expected the years of experience of the manager at the foreign firm significantly influences the level of firm performance in our analysis. The level of the years of manager's experience reduce the level of performance by 0.15 to 0.17 percentage points yet the square of the years of manager's experience positively and significantly influence the level of firm performance. This relationship produces the expected statistically significant quadratic term on the years of the manager's experience.

The sector in which firms are located significantly influence the performance of the manufacturing firms. A firm in textiles and garments compared to one in the food processing reduces the level of firm performance by 0.2 to 0.7 percentage points and this relationship is statistically significant at one percent level. A firm in the wood and furniture to compared to one in the food processing reduces the level of firm performance by 0.2 to 0.4 percentage points and this relationship is statistically significant at 5 percent level. A firm in the metal fabrications compared to one in the food processing reduces the level of firm performance by

0.3 percentage points and this relationship is statistically significant at 10 percent level. Our findings also articulate the importance of the ownership of the firm in influencing firm performance. A firm owned by an African entrepreneur compared to one owned by the Middle Eastern increases the level of firm performance by 0.4 to 0.45 percentage points. Similarly a firm owned by a European entrepreneur compared to the one owned by a Middle Eastern increases the level of firm performance by 0.6 to 0.7 percentage points and this relationship is statistically significant at 5 percent level.

3.2.3 Two stage Probit Analysis of Credit access and Constraints

Table 11 reveals further insights into the factors influencing access to credit by manufacturing firms in the East African Community. We use a two-step probit analysis in order to control for the selectivity bias, where highly productive firms are more likely to self-select themselves into the credit market. The first stage regressions show the demand for loans where we include all firms that applied for the loan whether they succeeded in accessing the loan or not. The second stage regressions indicate the supply of loans where we included only those firms that accessed the loan.

Our first stage regressions are not any different from our earlier findings of the probit analysis in Table 11. The level of performance of the firms is revealed significant in influencing the probability of demand for credit in the East African manufacturing sector. An increase in the level of sales of the firm by one unit increases the probability of demand for credit by approximately 0.3 percent. Similarly, an increase in the level of value added of the firms by one unit increases the probability of demand credit by 0.2 percent. On the supply side, an increase in the level of sales by one unit increases the amount supplied of credit by 0.7 percentage points. This result might imply that highly efficient firms induce credit supply, that is, financial institutions supply more credit to above average performing firms compared to their counterparts. These results, just as in the previous analysis, clearly articulate the importance of firm performance in increasing the demand for credit. Therefore, governments in the EAC should design policy options that are intended eliminate hindrances in the microeconomic environment that may limit the good performance of business firms. In particular, governments should pay close attention to those business constraints that manufacturing firms rated as being very severe; electricity outages, access to finance, corruption, and macroeconomic instability among others.

Our findings also reveal the importance of capital stock of manufacturing firms in influencing the amount of credit that business firms are likely to supply. An increase in capital stock by one unit increases the amount of credit that financial institutions are willing to offer by 0.03-0.16 percentage points. This might imply that lending institutions prefer to lend money to business firms that are already successful compared to their counterparts that are in episodes of struggle to survive in the business environment. Government effort and policy aimed at helping struggling firms gain access to finances is long overdue for the case of the manufacturing firms in the EAC. Furthermore, our findings articulate the importance of export status in influencing the probability of demand for credit. Being an exporter, compared to non-exporting firms, increases the probability of demand for credit by 0.4 percent. This is in line with the argument that exporting firms are usually more productive and bigger than their non-exporting counterparts and hence is more likely to self-select themselves into the credit market. Government policy intended to eliminate or at least reduce the sunk cost which inhibit firms from breaking into the global trading area is therefore called for. Surprisingly, however, export status is not significant in influencing the supply of credit in the region.

In line with the previous analysis, firms paying higher wages are less likely to demand for credit. An increase in wages by one unit decreases the probability of demand for credit by approximately 0.3 percent. This result might imply that firms paying higher are those that are already mature, accumulated enough capital and have the capacity to mobilize resources through other channels other than borrowing. They may mobilize resources internally through the sale of shares or by using part of the profits made. Similarly, a firm with higher capacity utilization is less likely to demand for credit. An increase in capacity utilization by one unit reduces the probability of demand for credit by 0.4-0.7 percent. This might imply that firms that have utilized much of their capacity might have limited need for further financing since the scope for expansion might have been exhausted.

Firms that use emails during their business operations are revealed to increase the probability of demand for credit. Firms that use an email, compared to counterparts that don't, increase the probability of credit demand by approximately 0.4 percent. These are firms that are usually more efficient and also connected to the global trading arena. As expected, and also in line with the previous analysis, firm size is revealed important in influencing the probability of demand for credit. Being a medium firm, compared to small firms, increases the probability of demand for credit by approximately 0.6 percent. Being a large firm, compared to small firms, increases the probability of credit by over 0.6 percent. Therefore, government effort

that eliminates severe business constraints will lead to fast growth of firms and also enhance participation in the credit market.

3.2.4 Analysis of Credit Constraint Using Tobit Model

Table 12 below presents the Tobit models estimates of the determinants to credit access and credit constraints in the EAC region. In estimation the model is left censored at 0.2 and the right censoring is at 1. Tobit model 1 estimated using 204 observations while Tobit model 2 is based on 202 observations. The likelihood ratio chi-square of 69.19 with a p-value of 0.0001 tells us that our model as a whole fits significantly better than an empty model (i.e., a model with no predictors). In the Table 12 we present the coefficients and their standard errors. The results indicate that for a one unit increase in loan duration by one month, there is a 0.046 point (sales model 1) and 0.045 point (value added model) increase in the predicted value of access to credit by manufacturing firms in the EAC region. Therefore, government efforts that ease access to credit for manufacturing firms will lead to fast growth of firms and also enhance participation in the credit market. In addition, a one unit increase in capacity utilization is associated with a 0.19 decrease in the predicted value of the firm sales and 0.15 decrease in the value added of the firms in the EAC. In this aspect governments in the EAC region should direct efforts that eliminate market barriers in order to enable firms to use up their installed capacity and hence promote industrial development.

Our findings in Table 12 further articulate the importance of export status in influencing the probability of demand for credit. Note that a firm being an exporter, compared to non-exporting firms, increases the probability of demand for credit by 0.01 percent. This is in line with the argument that exporting firms are usually more productive and bigger than their non-exporting counterparts and hence is more likely to self-select themselves into the credit market. Therefore, governments in the EAC need to promote policy measures that are aimed at eliminating barriers to trade. Additionally, the predicted value of sales values is 46.14 points lower for Private held limited companies than publicly listed company in the region. Furthermore, Sole proprietorship and partnership firms' sales value are 0.39 and 0.38 points lower respectively than publicly listed company. In terms of value added, it is only private held limited companies that lower value added by 0.43 points compared to the publicly listed company in the region. Note that other forms of business organization also depict negative effects though not statistically significant. From this finding the key policy message is that

governments in the EAC should harmonize commercial laws and ease business registration as a means to promote capital markets.

4. Summary, Policy Implications and Conclusion

This study set out to investigate the factors influencing manufacturing firms' access to credit and the effect of credit constraints on firm performance in the East African Community. We used the most current enterprise survey data sets of the World Bank (2006) for Uganda, Kenya, Tanzania, Rwanda, and Burundi. During the analysis, both bivariate and multivariate approaches were employed. The bivariate approach involved the use of cross-tabulations by generating average percentages of manufacturing firms along some pertinent performance indicators. It also involved the use of Kaplan-Meire survival functions to establish the probability of firm survival given the credit constraint and other firm characteristics. The multivariate approach involved employing maximum likelihood probit, simple Ordinary Least squares, Tobit, and a Two-step probit model.

From our descriptive analysis, we ranked the business constraints of manufacturing firms in order of their severity as mentioned by business managers during the survey. Amongst the top five business constraints, electricity outages and costs were found to be the most severe business constraint followed by access to finance, high and volatile tax rates, corruption, and macroeconomic instability. We also find that exporters are 10 years older than their counterparts while those that obtained a loan are 5 years older than their counterparts. Exporting firms and those that obtained a loan, compared to their counterparts, are bigger, have greater penetration of information technology in form of email and website usage. On the other hand, irrespective of the export and loan status, manufacturing firms in the region are more concentrated in metal fabrications (34 percent) followed by the food processing sector (25 percent). By legal status, the majority of manufacturing firms are privately held limited companies with a negligible percentage under the publicly listed company. However, exporters and firms that obtained a loan are concentrated under the privately held limited company (81 and 63 percent, respectively) compared to other business organizations. Non-exporters and those firms that did not borrow are concentrated under sole proprietorship (44 and 45 percent, respectively) compared to other business organizations. By sectors, the most credit constrained sectors in the EAC are wood and furniture with only 8 percent of firms obtaining loans followed textiles and garments with only 14 percent of firms obtaining loans. However, overall, the majority of firms within the EAC are credit constrained because the

average percentage share of the best performing sector (metal fabrications) is also quite low at 37 percent of firms having obtained a loan.

Quantitatively, our findings reveal that firm productivity or efficiency is a critical factor influencing the probability of access to credit. An increase in firm sales or value added by one unit increases the probability of credit access by 6-8 percent. This might imply that highly productive firms self-select themselves into the credit market. In line with our expectations, being an exporter increases the probability of credit access by 14 percent compared to their counterparts that are non-exporters. We also find that firm size is imperative in influencing the probability of credit access. Medium firms, compared to small firms, increase the probability of access to credit by 18-19 percent. The effect of firm size is even more pronounced for large firms. Large firms, compared to small firms, increase the probability of access to credit by over 50 percent. Considering credit access and firm performance, having access to credit, compared to counterparts that are credit constrained, increases firm performance by 0.2 to 0.3 percentage points. Additionally, an increase in the annual interest rate by one unit reduces firm productivity by 0.3 percentage points. On the other hand, an increase in loan duration by one month increases firm performance by 0.14 to 0.2 percentage points. Other factors significantly influencing firm performance include; labor force, wages, capacity utilization, manager's experience, and ownership.

By way of policy implications, the governments in the EAC should put in place policies that are aimed at creating a stable and conducive microeconomic environment that can enhance the performance of firms and by extension increase their participation in the credit market. Governments in the region should tackle those business constraints rated as very severe by manufacturing firms; electricity outages, access to finance, high and volatile tax rates, corruption, and macroeconomic instability. Additionally, governments' policy in the region should make credit access easier by lowering the annual interest rates and also negotiating for a longer pay back period for individuals in the business sector. This is aimed at creating affordable source of firm financing and a period of loan utilization that is long enough to ensure maximum benefit from the loan by creating the pay-back terms that can avoid stressing the different activities of firms. Easing loan accessibility to manufacturing firms will also present a great opportunity of increasing capital intensity given that many developing countries are at an extreme disadvantage of producing capital goods and also that own savings may be inadequate to purchase machinery, equipment, plants, and land. Governments in the region should put specific attention on those sectors which are observed to have an extreme

disadvantage in accessing finance; wood and furniture with only 8 percent and textiles and garments with only 13 percent of firms that obtained a loan. These firms are mainly concentrated in sole proprietorship and partnership meaning that government policy that can ease access to finance should squarely focus on this group of firms. Additionally, governments should ease the process and preconditions of business registration so that firms can easily move from sole proprietorship to partnership and eventually to privately held limited companies.

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Appendix

Table 1: Average Percentage share of firms by background characteristics

Variable	All firms	Exporters	Non-exporters	obtained loan	obtained no loan
Business constraints rated as very severe obstacles by manufacturing firms					
Tax rate	0.2051282	0.210744	0.204066	0.212245	0.201746
Access to land	0.0492773	0.016461	0.055512	0.03055	0.058196
Tax administration	0.0906702	0.115226	0.086005	0.118126	0.077595
Telecommunication	0.0407359	0.074074	0.034402	0.050917	0.035888
Electricity	0.4323259	0.432099	0.432369	0.386965	0.453928
Customs clearance	0.0788436	0.152263	0.064894	0.142566	0.048497
Labor regulation	0.0131406	0.024691	0.010946	0.020367	0.009699
Less educated workers	0.0262812	0.045268	0.022674	0.038697	0.020369
Business licenses and permits	0.0722733	0.082305	0.070368	0.075356	0.070805
Access to finance	0.2496715	0.106996	0.276779	0.183299	0.28128
Political instabilities	0.0992116	0.102881	0.098515	0.118126	0.090204
Macroeconomic instability	0.1024967	0.127572	0.097733	0.101833	0.102813
Corruption	0.1452037	0.17284	0.139953	0.185336	0.126091
Other firm characteristics					
Full time workers	27.37688	73.87281	18.78606	38.6226	22.06546
Production workers	61.97181	187.8696	29.97569	101.2285	40.02473
Non production workers	18.21778	42.46667	11.18686	29.37215	10.94719
Female production workers	25.89851	75.14201	9.287425	31.37943	21.91495
Female non-production workers	6.858571	12.425	4.632	8.978056	5.08399
Skilled production workers	33.18274	92.28194	17.61949	56.27525	19.98701
Unskilled production workers	39.08571	110.6965	17.72997	56.25893	28.38033
Capacity	71.33641	71.42424	71.31402	70.2176	71.96497
Firm age	14.22054	23.81481	12.39342	17.93469	12.4519
Email use: No	0.565703	0.102881	0.653636	0.380855	0.653734
Yes	0.4343	0.8971	0.3464	0.6191	0.3463
Experience of the manager in years	11.54205	16.11111	10.67396	13.3055	10.70223
Firm size: Small	0.541	0.119	0.629	0.314	0.654
Medium	0.3097282	0.359504	0.299308	0.369893	0.279743
Large	0.1494993	0.520661	0.071799	0.316129	0.066452
Sector: Food	0.251	0.251	0.251	0.2811	0.237
Textiles and Garments	0.1425756	0.168724	0.137608	0.12831	0.14937
Machinery and Chemicals	0.1149803	0.193416	0.100078	0.14053	0.102813
Wood and Furniture	0.1498029	0.065844	0.165755	0.081466	0.182347
Metal	0.3416557	0.320988	0.345583	0.368635	0.328807
Legal status: publicly listed company	0.01	0.033	0.006	0.0143	0.0087
Privately held limited company	0.4428384	0.814815	0.372166	0.627291	0.354995
Sole proprietorship	0.3810775	0.090535	0.436278	0.230143	0.452958
Partnership	0.153088	0.041152	0.174355	0.11609	0.170708
Other	0.0124836	0.020576	0.010946	0.01222	0.012609
Obtained a Loan : Yes	0.3226018	0.600823	0.269742		
No	0.677	0.399	0.73		
Non-exporter	0.84			0.703	0.91
Exporter	0.1596583			0.297352	0.094083
Number of firms	1522	243	1279	491	1031

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 2: Sectoral distribution of firms by background characteristics (number of firms in parentheses)

Sector	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Don't import raw materials	African owned	Indian owned	European owned
Food	0.16	0.36126	0.4372	0.355	0.13613	0.179	0.069	0.6723	0.7427	0.23	0.0398
	382	382	382	310	382	291	291	119	377	377	377
Garment and Textiles	0.189	0.29032	0.424	0.307	0.08796	0.177	0.066	0.4958	0.6959	0.31	0.0092
	217	217	217	205	216	181	181	119	217	217	217
Machinery and chemicals	0.269	0.39429	0.5771	0.6	0.20571	0.394	0.018	0.8409	0.7011	0.28	0.1322
	175	175	175	120	175	109	109	88	174	174	174
Wood and Furniture	0.07	0.17544	0.2368	0.313	0.04386	0.068	0.021	0.3472	0.8947	0.09	0.0351
	228	228	228	211	228	190	190	72	228	228	228
Metal	0.15	0.34808	0.475	0.457	0.15769	0.248	0.049	0.7163	0.7408	0.26	0.0503
	520	520	520	291	520	266	266	208	517	517	517
Total	0.16	0.3226	0.4343	0.391	0.13084	0.199	0.049	0.6386	0.7535	0.24	0.0489
	1522	1522	1522	1137	1521	1037	1037	606	1513	1513	1513

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 3: Education of the manager by background characteristics (number of firms in parentheses)

Education of the manager	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Don't import raw materials	African owned	Indian owned	European owned
No education	0.053	0.31579	0.2105	0.357	0	0.111	0	0.2857	0.8947	0.11	0
	19	19	19	14	19	9	9	7	19	19	19
Primary	0.034	0.18103	0.0948	0.213	0	0.073	0.036	0.1563	0.9741	0.03	0
	116	116	116	75	116	55	55	32	116	116	116
Secondary	0.057	0.14035	0.1228	0.266	0.0307	0.069	0.042	0.3191	0.8728	0.08	0.0175
	228	228	228	154	228	144	144	47	228	228	228
Tertially	0.065	0.27042	0.2507	0.304	0.02817	0.069	0.005	0.4388	0.822	0.18	0.0169
	355	355	355	237	355	218	218	98	354	354	354
University	0.251	0.41791	0.658	0.472	0.22665	0.288	0.069	0.763	0.6533	0.34	0.0804
	804	804	804	657	803	611	611	422	796	796	796
Total	0.16	0.3226	0.4343	0.391	0.13084	0.199	0.049	0.6386	0.7535	0.24	0.0489
	1522	1522	1522	1137	1521	1037	1037	606	1513	1513	1513

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 4: Legal status distribution of firms by background characteristics (number of firms in parentheses)

Legal status	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Don't import raw materials	African owned	Indian owned	European owned
Publicly listed	0.5	0.4375	0.6875	0.357	0.625	0.429	0.214	0.6	0.7857	0.43	0.5
	16	16	16	14	16	14	14	10	14	14	14
Privately held	0.294	0.45697	0.6632	0.519	0.23031	0.307	0.063	0.7506	0.5572	0.43	0.0921
	674	674	674	597	673	567	567	397	673	673	673
Sole proprietors	0.038	0.19483	0.2121	0.216	0.03621	0.051	0.024	0.3511	0.9328	0.05	0.0034
	580	580	580	348	580	295	295	131	580	580	580
Partnership	0.043	0.24464	0.3133	0.296	0.04721	0.062	0.014	0.541	0.8584	0.13	0.0129
	233	233	233	159	233	146	146	61	233	233	233
Other	0.263	0.31579	0.3684	0.368	0.10526	0.133	0.2	0.5714	1	0	0
	19	19	19	19	19	15	15	7	13	13	13
Total	0.16	0.3226	0.4343	0.391	0.13084	0.199	0.049	0.6386	0.7535	0.24	0.0489
	1522	1522	1522	1137	1521	1037	1037	606	1513	1513	1513

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 5: Capacity Utilization distribution of firms by background characteristics (number of firms in parentheses)

Capacity utilization	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Don't import raw materials	African owned	Indian owned	European owned
10-29.	0.133	0.53333	0.4	0.467	0.13333	0.167	0	0.6667	0.7333	0.2	0.1333
	15	15	15	15	15	6	6	12	15	15	15
30-49	0.26	0.39583	0.5833	0.365	0.16667	0.244	0.058	0.7308	0.6842	0.35	0.0526
	96	96	96	96	96	86	86	52	95	95	95
50-69	0.194	0.37276	0.4588	0.376	0.09712	0.188	0.066	0.6917	0.7348	0.2	0.0789
	279	279	279	279	278	256	256	133	279	279	279
70-89	0.199	0.34871	0.4465	0.367	0.15129	0.192	0.048	0.5686	0.7127	0.29	0.041
	542	542	542	542	542	501	501	299	536	536	536
90-100	0.205	0.34146	0.5756	0.478	0.18537	0.213	0.027	0.7182	0.665	0.32	0.0788
	205	205	205	205	205	188	188	110	203	203	203
Total	0.203	0.35972	0.4837	0.391	0.14525	0.199	0.049	0.6386	0.7074	0.28	0.0594
	1137	1137	1137	1137	1136	1037	1037	606	1128	1128	1128

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 6: Experience of the Manager distribution of firms by background characteristics (number of firms in parentheses)

Experience of manager	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Don't import raw materials	African owned	Indian owned	European owned
0-4.	0.063	0.26042	0.2917	0.288	0.07639	0.105	0.021	0.5811	0.8596	0.11	0.0351
	288	288	288	170	288	143	143	74	285	285	285
5-9.	0.103	0.25172	0.3799	0.308	0.10092	0.132	0.029	0.6111	0.8372	0.15	0.0367
	437	437	437	295	436	272	272	126	436	436	436
10-14.	0.169	0.36158	0.4802	0.452	0.15819	0.206	0.043	0.6419	0.75	0.24	0.0483
	354	354	354	279	354	257	257	148	352	352	352
15-19	0.207	0.28994	0.4852	0.5	0.14793	0.244	0.053	0.6322	0.7289	0.27	0.0602
	169	169	169	144	169	131	131	87	166	166	166
20+	0.31	0.4708	0.5803	0.426	0.18978	0.299	0.094	0.6842	0.5292	0.48	0.0766
	274	274	274	249	274	234	234	171	274	274	274
Total	0.16	0.3226	0.4343	0.391	0.13084	0.199	0.049	0.6386	0.7535	0.24	0.0489
	1522	1522	1522	1137	1521	1037	1037	606	1513	1513	1513

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 7: Firm age distribution of firms by background characteristics (number of firms in parentheses)

Firm age	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Don't import raw materials	African owned	Indian owned	European owned
0-4.	0.039	0.19281	0.2614	0.26	0.05882	0.071	0.032	0.5231	0.8693	0.08	0.0229
	306	306	306	146	306	126	126	65	306	306	306
5-9.	0.106	0.33494	0.3687	0.345	0.10386	0.124	0.036	0.517	0.8285	0.15	0.029
	415	415	415	310	414	274	274	147	414	414	414
10-14.	0.137	0.25573	0.4008	0.382	0.08015	0.151	0.036	0.58	0.8168	0.19	0.0382
	262	262	262	212	262	192	192	100	262	262	262
15-19.	0.133	0.29697	0.4545	0.395	0.14545	0.16	0.034	0.6143	0.75	0.25	0.0488
	165	165	165	129	165	119	119	70	164	164	164
20+	0.348	0.47439	0.6658	0.494	0.24798	0.355	0.08	0.7857	0.5247	0.49	0.1016
	371	371	371	338	371	324	324	224	364	364	364
Total	0.16	0.32258	0.4345	0.391	0.13043	0.199	0.049	0.6386	0.753	0.24	0.049
	1519	1519	1519	1135	1518	1035	1035	606	1510	1510	1510

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 8: Size distribution of firms by background characteristics (number of firms in parentheses)

	Exporters	Obtained a loan	Email	Industrial zone	Website	Export in SSA market	Export in Developed market	Import raw materials	African owned	Indian owned	European owned
Small (5-19 employees)	0.0384	0.19312	0.2341	0.229277	0.044	0.038776	0.02041	0.364532	0.88329	0.098143	0.01724
	756	756	756	567	756	490	490	203	754	754	754
Medium (20-99 employees)	0.2009	0.39723	0.6559	0.498667	0.164	0.216292	0.03371	0.704918	0.62413	0.37123	0.07657
	433	433	433	375	432	356	356	244	431	431	431
Large (100 employees)	0.6029	0.70335	0.8995	0.651282	0.455	0.575916	0.15183	0.886793	0.43627	0.583333	0.13725
	209	209	209	195	209	191	191	159	204	204	204
Total	0.1731	0.33262	0.4642	0.390501	0.142	0.19865	0.04918	0.638614	0.73722	0.25414	0.05328
	1398	1398	1398	1137	1397	1037	1037	606	1389	1389	1389

Source: Own calculation from World Bank Enterprise Surveys for Uganda, Kenya, Tanzania, Rwanda, and Burundi; 2006

Table 9: Factors influencing firm access to credit (marginal effects after a probit analysis)

Variables	Model (1)	Model (2)
Sales	0.0834*** (3.08e-05)	
Capital stock	-0.0223* (0.0676)	-0.0186 (0.126)
Export status	0.135*** (0.00986)	0.137*** (0.00855)
Wages	-0.102*** (3.48e-06)	-0.0822*** (0.000150)
Capacity utilization	-0.0950 (0.116)	-0.100* (0.0992)
Firm age	-0.0390 (0.133)	-0.0375 (0.147)
No use of email	-0.108** (0.0143)	-0.110** (0.0123)
Manager's experience	0.0546 (0.135)	0.0484 (0.184)
Manager's experience squared	-1.56e-05 (0.819)	-2.24e-06 (0.974)
Sector : Textiles and Garments	-0.0698 (0.164)	-0.0888* (0.0691)
Machinery and Chemicals	0.0670 (0.321)	0.0532 (0.424)
Wood and Furniture	-0.0980* (0.0553)	-0.114** (0.0236)
Metal s	-0.0323 (0.495)	-0.0362 (0.442)
Size: Medium	0.184*** (0.000308)	0.189*** (0.000205)
Large	0.499*** (6.96e-10)	0.513*** (1.67e-10)
Value added		0.0609*** (0.00210)
Region	Yes	Yes
Legal status	Yes	Yes
Ownership	Yes	Yes
Observations	794	793
Number of countries	5	5
Log likelihood	-384.60134	-386.66701
Pseudo Square	0.1996	0.1933

pval in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Table 10: Credit access and firm performance (Pooled OLS)

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Loan	0.306*** (1.61e-05)	0.239*** (0.00106)				
Capital stock	0.155*** (0)	0.149*** (0)	0.164*** (2.82e-05)	0.180*** (3.41e-06)	0.153*** (6.95e-05)	0.164*** (1.73e-05)
Export status	0.114 (0.217)	0.137 (0.149)	0.0641 (0.668)	-0.00646 (0.965)	0.0886 (0.547)	0.0208 (0.887)
Wages	0.789*** (0)	0.783*** (0)	0.842*** (0)	0.838*** (0)	0.839*** (0)	0.843*** (0)
Labor force	0.111*** (0.00309)	0.111*** (0.00398)	-0.0191 (0.778)	-0.00275 (0.967)	0.00908 (0.890)	0.0266 (0.692)
Capacity utilization	0.204** (0.0473)	0.356*** (0.000785)	-0.0247 (0.909)	-0.0618 (0.772)	0.0233 (0.913)	-0.00176 (0.993)
Firm age		0.0162 (0.723)	0.115 (0.226)	0.0750 (0.420)	0.149 (0.107)	0.101 (0.275)
No use of email	-0.125 (0.101)	-0.129 (0.100)	0.0665 (0.689)	-0.00487 (0.976)	0.0429 (0.796)	-0.00139 (0.993)
Manager's experience	-0.169*** (0.00295)	-0.148** (0.0171)	-0.0756 (0.613)	-0.127 (0.389)	-0.0916 (0.535)	-0.126 (0.385)
Manager's experience square	0.000271** (0.0271)	0.000213* (0.0912)	0.000101 (0.724)	3.74e-05 (0.895)	9.25e-05 (0.744)	7.12e-05 (0.798)
Size: Medium	0.0788 (0.374)	0.0624 (0.493)	-0.0805 (0.670)	-0.0208 (0.911)	0.0173 (0.923)	0.00707 (0.969)
Large	0.227 (0.110)	0.0582 (0.690)	0.0986 (0.691)	-0.000471 (0.998)	0.212 (0.378)	0.00243 (0.992)
Sector : Textiles and Garments	-0.404*** (5.53e-06)	-0.211** (0.0211)	-0.722*** (4.75e-05)	-0.474*** (0.00602)	-0.699*** (7.09e-05)	-0.488*** (0.00447)
Machinery and Chemicals	-0.0587 (0.618)	0.0874 (0.471)	-0.283 (0.192)	-0.0453 (0.831)	-0.269 (0.203)	-0.117 (0.580)
Wood and Furniture	-0.176** (0.0467)	-0.0783 (0.392)	-0.359* (0.0891)	-0.250 (0.235)	-0.357* (0.0862)	-0.283 (0.174)
Metal s	0.00510 (0.952)	0.0425 (0.623)	-0.270 (0.107)	-0.116 (0.480)	-0.312* (0.0653)	-0.194 (0.241)
Ownership: African	0.150 (0.146)	0.132 (0.216)	0.389** (0.0283)	0.207 (0.233)	0.452*** (0.00994)	0.227 (0.189)
Indian	0.0251 (0.823)	0.0510 (0.661)	0.258 (0.169)	0.131 (0.475)	0.263 (0.158)	0.182 (0.319)
Europe	0.105 (0.497)	0.186 (0.240)	0.688** (0.0261)	0.654** (0.0317)	0.640** (0.0346)	0.577* (0.0543)
Interest rate annual			-0.327** (0.0403)	-0.321** (0.0409)		
Loan duration in months					0.144* (0.0856)	0.217*** (0.00913)
Constant	1.549* (0.0537)	0.510 (0.538)	1.204 (0.472)	1.206 (0.465)	-0.220 (0.884)	-0.895 (0.568)
Regions	Yes	Yes	Yes	Yes	Yes	Yes
Legal status	Yes	Yes	Yes	Yes	Yes	Yes
Observations	781	777	223	222	223	222
Number of countries	5	5	5	5	5	5
R-squared	0.854	0.838	0.888	0.890	0.886	0.891
pval in parentheses; *** p<0.01, ** p<0.05, * p<0.1						

Table 11: Two stage Probit estimates for determinants of credit constraint in EAC

Variables	First stage prob	Second stage	First stage prob	Second stage
Sales	0.251***	0.708***		
	(0.0605)	(0.121)		
Capital stock	-0.027	0.162*	-0.0186	0.146*
	(0.0365)	(0.066)	(0.0364)	(0.066)
Export status	0.402**	-0.0493	0.403**	-0.00955
	(0.15)	(0.25)	(0.15)	(0.248)
Wages	-0.331***	0.0939	-0.288***	0.0335
	(0.066)	(0.133)	(0.0649)	(0.135)
Capacity utilisation	-0.441*	-0.712	-0.469**	-0.715
	(0.177)	(0.369)	(0.179)	(0.366)
Firm age	-0.12	-0.0245	-0.117	-0.0151
	(0.0766)	(0.154)	(0.0764)	(0.153)
Email	0.385**	-0.0975	0.390**	-0.105
	(0.128)	(0.281)	(0.128)	(0.279)
Manager's experience	0.139	0.123		
	(0.106)	(0.106)		
Manager's experience squared	0.000051	(0.0008)		
	(0.000203)	-0.00034)	-0.000201)	-0.000342)
Textile and Garments	0.0328	-0.623*	-0.0293	-0.776*
	(0.154)	(0.311)	(0.152)	(0.302)
Machinery and Chemicals	0.288	0.289	0.249	0.128
	(0.195)	(0.361)	(0.194)	(0.357)
Wood and Furniture	-0.132	0.0761	-0.183	-0.000104
	(0.157)	(0.36)	(0.157)	(0.361)
Metals	-0.0752	0.524	-0.0886	0.438
	(0.144)	(0.292)	(0.144)	(0.289)
Medium firms	0.591***	0.0667	0.604***	0.0153
	(0.142)	(0.309)	(0.141)	(0.307)
Large firms	1.257***	-0.00858	1.305***	0.0408
	(0.217)	(0.395)	(0.216)	(0.392)
African	-0.266	-0.178	0.243	-0.26
	(0.175)	(0.293)	(0.174)	(0.289)
Indian	-0.0972	-0.657*	-0.105	-0.740*
	(0.188)	(0.313)	(0.188)	(0.309)
Europe	-0.204	-0.426	-0.194	-0.447
	(0.257)	(0.486)	(0.258)	(0.481)
Value added			0.202***	
			(0.0593)	
Constant	1.798	3.806	2.097	4.303*
	(1.112)	(2.184)	(1.104)	(2.155)
Region	Yes	Yes	Yes	Yes
Sectors	Yes	Yes	Yes	Yes
N	794	229	793	228

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 12: Tobit estimation of credit constraint faced by Manufacturing firms in EAC

model				
Loan duration	0.0462*	(0.0195)	0.0448*	(0.0192)
Capital stock	0.00513	(0.00766)	0.00476	(0.00728)
Export status	0.00766**	(0.234)	0.00197*	(0.1331)
Fulltime workers	-0.00678	(0.0148)	-0.00714	(0.0145)
Capacity utilisation	-0.108*	(0.048)	-0.108*	(0.0471)
Firm age	-0.0368	(0.0216)	-0.0341	(0.0211)
Email	-0.0319	(0.0374)		
Manager's experience	-0.00448	(0.0335)	-0.00952	(0.0333)
Manager's experience squared	0.0000229	(0.000068)	0.00035	(0.000075)
Medium firm	0.0122	(0.0431)	0.00911	(0.041)
Large firms	0.0734*	(0.3554)	-0.0818	(0.0546)
Private held limited company	-0.428***	(0.120)	-0.430***	(0.122)
Sole proprietorship	-0.387**	(0.126)	-0.384**	(0.130)
Partnership	-0.287*	(0.128)	-0.290*	(0.131)
Indian	0.0646	(0.034)	0.0615	(0.0329)
Interest		(0.0074)	-0.0355	
Constant	0.938***	(0.276)	0.920**	(0.300)
Sector		Yes		Yes
Region		Yes		Yes
Sigma	0.181***	(0.0091)	0.182***	(0.0091)
N	204		204	
Standard errors in parentheses * p<0.05, ** p<0.01, *** p<0.001				