Investment Climate and Business Environment Research Fund

TRUSTAFRICA IDRC CRDI

The Effects of Investment Climate on Manufacturing Firms' Growth in Uganda

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ICBE-RF Research Report No. 19/12

Investment Climate and Business Environment Research Fund
(ICBE-RF)
www.trustafrica.org/icbe

Dakar, April 2012

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This research report was supported by a grant from the Investment Climate and Business Environment (ICBE) Research Fund, a collaborative initiative of TrustAfrica and IDRC. It's a working paper and hence research in progress, circulated for discussion and comments. The findings and recommendations are those of the author(s), and do not necessarily reflect the views of the ICBE-RF Secretariat, TrustAfrica or IDRC

Abstract

This study investigated the effects of investment climate factors on manufacturing firms' growth in Uganda using panel data. The low and stagnant levels of manufacturing sector share in Gross Domestic Product in most African countries has been widely recognized to be an important policy problem. This study adopted Gibrats Law of Proportionate Effect (LPE) and Learning model due to Jovanovic with some modifications to analyze investment climate factors that determine firm growth in Uganda. Results show that firm size, firm age, and average education are the main determinants of firm growth in a sample of Ugandan manufacturing firms. These results have important policy prescriptions to increase firm growth.

Key words: firm growth, investment climate, manufacturing, Gibrats law.

Acknowledgement

This is to acknowledge grant support from ICBE (joint project of TrustAfrica and IDRC) which enabled me to carry out this study. I would like to acknowledge the constructive comments from the anonymous reviewer and Dr. Sunday Khan for his guidance.

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1. Introduction and background

This study investigates the effects of investment climate factors on manufacturing firms' growth in Uganda. The low and stagnant levels of manufacturing sector share in Gross Domestic Product (GDP) in most African countries has been widely recognized to be an important policy problem. It is imperative for manufacturing firms in Sub Sahara African countries to be able to grow over time if they are ever to play an increasing and predominant role in economic growth and facilitating poverty reduction through fiscal transfers and income from employment and firm ownership. However, there is controversy on why the share of manufacturing sector in Gross Domestic Product is so low and stagnant and on what would be the appropriate policies to raise manufacturing firms' growth in Sub Sahara African countries. Although some studies have been carried out on the determinants of manufacturing firms growth in Sub Saharan African economies, more studies are still required to shed more light on the firm growth factors. Recognizing the importance of firms' growth, politicians, policy makers, researchers and international development agencies have devoted substantial resources to the creation and implementation of policies to assist firms' growth and in that way create employment and reduce poverty. One of the major objectives of the reforms towards the manufacturing sector in Africa is to improve the investment climate. One of the potential benefits of such reforms to firms is that they may induce firm growth. In order to ensure effectiveness of these policies, it is imperative to understand what factors contribute to manufacturing firms' growth.

The idea that the manufacturing sector is a dynamic engine of growth can be traced to contributions by Lewis (1954), Kaldor (1966) and others. For instance, in the short period, beginning in the early 1960s, Taiwan, Korea and Singapore raised their shares of manufacturing in GDP by more than 15 percent and their per capita incomes nearly quadrupled. The same has been true of countries like Malaysia, Thailand and Indonesia, where manufacturing shares increased and living standards have grown rapidly. These newly industrialized countries were almost at the same level of development as most Sub Saharan African countries including Uganda. Sub Saharan countries have not followed the development pattern of increasing shares of manufacturing output in GDP. The manufacturing share in GDP in most Sub Saharan Africa has remained below 20 percent and stagnant since their independence. Thailand, Malaysia and Indonesia which had comparable shares of manufacturing output in GDP in the 1960s have

increased their shares to 34.5 percent, 29.8 percent, and 27 percent respectively compared to Uganda where the share has remained below 9 percent(see Table 1).

Table 1: Manufacturing output as a percentage of GDP

	1987	1997	2007
Thailand	24.3	30.2	34.5
Indonesia	16.9	26.8	27
Malaysia	19.8	28.3	29.8
Uganda	5.9	8.6	8.8

Source: World Bank (2008), World Development Indicators

The implications of low and stagnant share levels of manufacturing in GDP for economic transformation and modernization, and ultimately for Ugandan standards of living, are serious. The crucial question here thus becomes "what determines the successful growth of firms in Uganda?" This study takes up this important question and attempts to provide an answer using firm-level survey data sets from Uganda.

2. Research problem

The low and stagnant levels of manufacturing sector share in Gross Domestic Product in most Sub Sahara African countries has been widely recognized to be an important policy problem. The crucial question here thus becomes "what determines the successful growth of firms in Uganda?" This study takes up this important question and attempts to provide an answer using firm-level survey data sets from Uganda. The main thrust of this study is empirical, contributing to existing evidence on investment climate factors that determine manufacturing firms' growth in Uganda. The empirical evidence on investment climate factors that determine manufacturing firm's growth that emerges from this study will be useful to politicians, policy makers, firm managers and international development agencies that aim at assisting firms' growth in Uganda.

Gibrat's (1931) pioneering model of stochastic firm growth makes the key assumptions that firm growth rates are independent of initial firm size, and the variance of firm growth rates is also independent of firm size. If the Gibrats Law of Proportionate Effect (LPE) is correct, the implication would be that large firms are preferable in the context of private sector development given that they create more employment than small firms. The learning model due to Jovanovic contradicts Gibrats LPE model (Jovanovic, 1982). The model stipulates that younger firms learn

over time, which helps them improve their performance as they accumulate market knowledge. According to this model, young firms grow faster than old ones. Moreover, given that younger firms are usually smaller than older businesses for the reasons discussed above, Jovanovic deduces that small firms grow faster than large ones. This is a convergence process where small firms will eventually become as large as any other large firm in the same sector over time.

The Jovanovic model has been extended by several researchers. One of the extensions to Jovanovic's model introduces human capital as an important determinant of firm growth (see Pakes and Ericson, 1987). These authors argue that firms with more qualified and experienced managers are more able to stimulate and manage the growth process than those managed by people without qualifications and experience. As a result the higher the stock and quality of human capital possessed by a firm the higher the chances that the firm will grow.

With the exception of Gibrat's LPE, all other theories of firm growth indicate that there are systematic factors that determine firm growth. The empirical literature on developed economies shows that the key determinants are size and age (see Evans, 1987). This confirms Jovanovic's hypothesis but contradicts Gibrat's law. In Africa, there are empirical studies that seem to confirm the importance of age and size for firm growth in Botswana, Kenya, Malawi, Swaziland, Zimbabwe, Ethiopia, Burundi, Lesotho, South Africa and Swaziland (see Mead and Liedholm, 1998; Mengistae, 1998; Sleuwaegen and Goedhuys, 1998; and McPherson, 1996; Aguilar and Kimuyu, 2001). In contrast, using the Ghana RPED data, Teal (1999) finds some support for Gibrat's law, i.e., firms of different sizes growing at the same rate, suggesting that there is no convergence. Slow growth of firms in Africa has been explained as being the result of the lack of access to financial resources (McCormick et al, 1997; Biggs and Srivastava, 1996 and Nkurunziza, 2005). However, contradictory findings were obtained in a study covering four Southern African countries: Botswana, Malawi, Swaziland and Zimbabwe, which showed that access to formal credit helps firms to survive only in Malawi (McPherson, 1996). In a study on investment behavior in Cameroon, Ghana, Kenya and Zimbabwe, it was found that firms in these countries rely heavily on retained earnings to finance investments (Bigsten et al. 1999). In this light, firms without the required internal capital abandon or postpone their investments thus limiting a firm's growth opportunities. Human capital variables were also found to be important determinants of firm growth in Botswana, Lesotho and Zimbabwe (McPherson, 1996). Ethnicity

is another significant factor that has been shown to influence firm growth in Africa. Using RPED data set, Raturi and Swamy (1999), showed that large firms are mostly in the hands foreign-owned firms or firms held by Zimbabweans of European origin relative to those of Zimbabweans of African origin. These firms usually have better access to markets and factors of production than those in the hands of Zimbabweans of African origin.

Although the determinants of firm growth have been investigated, the literature suffers from several deficiencies. While there are many empirical studies that focused on firm growth in the advanced economies, such as Javanovic (1982), and Evans (1987), very few studies focused on the determinants of firm growth and more specifically on investment climate factors in Sub Sahara African countries. Although recent studies attempt to link determinants from different perspectives or dimensions (Baum, Locke & Smith, 2001; Covin & Slevin, 1997), their explanatory power is low due to the relatively small number of variables (Davidsson, Delmar, & Wiklund, 2006). It is therefore of special interest to examine the determinants of firm growth in an integrated way, and to identify the most important determinants of firm growth in Uganda. A new survey data on manufacturing firms, conducted by World Bank (2006) in conjunction with Uganda Manufacturing Association Consultancy (UMACIS), provides information on a wide range of explanatory variables. It gives us an opportunity to investigate investment climate factors that determine manufacturing firms' growth in Uganda. We attempt to identify the most important investment climate factors from a wide range of perspectives within the framework of an integrated extended model. In addition, evidence on the key factors that determine firm growth in Sub Sahara African countries, i.e., firm size and access to credit, is mixed thus providing no clear guidance to policy makers. It is also important to carry out more studies to confirm the robustness of previous findings on the factors that determine firm growth in Uganda before generalizing them. Finally, some of the studies reviewed could be misleading as their conclusions are based on results that are methodologically flawed. This study intend to use more rigorous methodology that addresses most econometric problems by exploiting the panel dimension of recent data collected by World Bank unlike previous studies that utilized cross sectional data.

3. Justification

This study brings some light in the area of manufacturing firm growth in Uganda and help to fulfill the gaps described above by providing empirical evidence that contribute to a broader understanding of investment climate factors affecting manufacturing firms' growth in Sub Sahara African countries. Empirical evidence from this research also contributes by assisting firm managers, to focus efforts on the most important factors determining firm growth as well as researchers and policy makers in the design and implementation of efficient policies to promote growth of firms in Uganda. Designing reforms to encourage manufacturing firm growth must be based on a clear understanding of the determinants of firm growth.

This study also provide insights into the dynamics of the competitive process, strategic behavior, the evolution of market structure, and perhaps even the growth of the aggregate economy. The findings from this proposed study give rise to several policy implications that are crucial for the competitiveness of the manufacturing sector, especially in view of the globalization process. If we are able to have manufacturing firms growing successfully in Uganda, it would contribute substantially to the achievement of the millennium development goals (MDGs).

4. Objective

The overall objective of this study is to establish the investment climate factors that determine manufacturing firms' growth in Uganda.

5. Methodology

5.1 The Model

As a basic theoretical framework, our study relies on the Law of Proportionate Effect (LPE) by Gibrat (1931) and learning model due to Jovannovic (1982). Gibrat's LPE pioneering model of stochastic firm growth makes the key assumptions that firm growth rates are independent of initial firm size, and the variance of firm growth rates is also independent of firm size. The learning model due to Jovanovic stipulates that younger firms learn over time, which helps them improve their performance as they accumulate market knowledge. According to this model, young firms grow faster than old ones.

In classical works on firm growth in the advanced economies (Evans 1987), the model takes the following very simple form:

$$(\ln S_{t'} - \ln S_t) / d = \mathrm{F}\,(A_t, S_t) + u_t \qquad (1)$$

where S_t stands for size at time t, A_t for age at time t, $d = t' - t$ (time difference) and u_t is normally distributed with mean zero and possibly a non-zero constant variance and is independent of size and age. Without other firm characteristic variables, the key two variables of size and age, are supposed to represent everything happening inside the firms. Size may represent the size of firm capacities and resources, and age may represent learning process in which firms uncover their true inefficiencies, accumulate capabilities, and conduct innovations (Jovannovic 1982; Nelson and Winter 1982). Such reasoning makes sense at least when we consider long term performance and growth of firms.

We extend the models of Gibrat (1931) and Jovannovic (1982), which traditionally focus on size and age alone (e.g. Brock and Evans, 1986), to an integrated extended firm growth model with additional explanatory variables: investment climate variables, firm level variables, and growth strategy variables, by taking advantage of richness of our data set covering diverse aspects of firm behavior, characteristics and business environment. Thus, for our purpose, equation (1) is modified as follows.

$$(S_{t+1} - S_t) / S_t = \mathrm{F}\,(IC_t, R_t, G_t , C_t) + \gamma + \alpha_{it} + \varepsilon \qquad (2)$$

where IC_t, stands for investment climate variables, R_t stands for firm-level variables, G_t for growth strategy variables, and C_t for other control variables, γ represents the firm fixed effects, α_{it} is a set of time dummies defined separately, ε is a random disturbance. We estimate two econometric models: a basic age-size-growth model (equation 1); and an integrated extended growth model (equation 2), using stepwise regression procedure. We use stepwise regression analysis on a sample of firms, adding one more explanatory variable to the equation to identify the primary determinants of the firm's growth.

5.2 Discussion of variables

Dependent variable

Firm growth can be measured by several attributes such as turnover/sales, employment, assets, market shares, and profits. Among these measures, sales and employment are in particular broadly used indicators for growth (Ardishvili, Cardozo, Harmon & Vadakath, 1998; Davidsson, 1991; Delmar, 1997; Weinzimmer, Wiklund, 1998). This is because growth in sales and employment reflect both short-term and long-term changes in a firm and they are easy to obtain. Furthermore, compared to other indicators such as market shares, sales and employment are more objective measures (Delmar, 1997). This paper defines firm growth as the relative change in a firm's number of permanent employees over a period of time. In the literature on developing countries, this measure is preferred to other proxies such as sales, given that it is less prone to measurement errors and it does not need to be deflated (see Nkurunziza, 2004). Apart from the fact that it is a measure of economic growth, for the entrepreneur, it can serve as an indicator of his success and, for the company as a whole, it is a measure of the economic contribution of the firm to a common good (Dunkelberg and Cooper, 1982). In addition, since the manager in principle expects demand to stabilize before recruiting personnel, employment is theoretically a less volatile measure than sales (Delmar, 1997).

Independent variables

According to theoretical views and empirical research findings explained above, a large set of variables are used as regressors. Several authors (Grinyer et al., 1988; Miller and Friesen, 1984) consider it necessary to test the impact of a large number of variables simultaneously in order to create a more complete and realistic image of the firm growth phenomenon.

Investment Climate Variables

Investment climate variables are generally divided into subjective and objective measures. Subjective measures capture firm managers' own perceptions or experiences, and thus are subject to some arbitrariness and incomparability across firms and across countries. In this regard, the survey questionnaires ask the firms perception about the hard infrastructure (telecom, electricity, transportation) and soft infrastructure (problems in tax administration, custom clearance, business regulations, corruption). Using a rating index from 0 (no problem) to 4

(severe problem), we create a dummy variable of one for each problem by looking at whether the firm rates a given problem as serious/severe, and zero otherwise. If the firm answers that there are serious problems (i.e. 3 or 4 in the rating scale) in each of the infrastructure indicators (3 areas in hard and 4 areas in soft), we assign the value of 1 or 0 otherwise.

Objective measures on the other hand include the following: borrowing interest rates, days to clear customs for exports and imports, number of days of power outages per year, days to get power connection and days to get telephone connection once all the application procedures were completed by the firm. While firm growth is naturally affected by the surrounding economy- or location-level SOC capital (social overhead costs) or infrastructure (hard and soft investment climate indicators), the operating climate facing each firm should be the same regardless of firms' own capabilities. Thus, we hypothesize that the impact of investment climate variables is not firm-specific or clearly observed at the firm-level, but rather at the regional or national level. To put it differently, investment climate contribute much to differences across firms in the same location or even to those in the same country but more so to cross-county differences.

Firm level variables

Physical capital is measured by the *ratio of value added to net book value* in dollars of machinery and equipment, which is also the accumulated stock of net fixed investment. *Human capital* will be measured in terms of both generic and specific human capital. Generic human capital is measured by the *average educational attainments of workers*. Specific human capital is measured by a dummy indicating whether workers in a firm have received *on-job-training* or not. *Managerial capital* will be measured by a dummy indicating whether the manager has the tertiary education or not. *Research and Development (R&D) capital* is meant to try to indicate whether a firm has the capacity to develop the products with its own plans by conducting in-house R&D (a dummy variable will be used for firms introducing a new production process or a new product). *Profit* could be a good proxy indicator of the financial resources of the firm. A more profitable firm can invest from retained earnings and has more potential to capture external sources of capital. More importantly, profits and retained earnings are especially more important as a source of financing in emerging economies without well-developed financial markets. Profitability is measured as the return on investment (i.e. net profit over total assets). Profits are measured as value-added less wages and interest payments. A positive and significant relation is

expected for this variable. Managers were asked to respond whether the firm had good, intermediate or poor access to bank loans. A dummy variables (*FINGOOD*) is constructed to see if firms with good and intermediate access to financial resources have a differential growth performance with respect to firms that have a poor access to financial resources. A positive and significant relationship is expected for this dummy variable (*FINGOOD*). *Market share* and more specifically relative market share as viewed for this study serves as a proxy for some firm-specific relative competitive advantage resulting from learning effects and other firm specific assets. In addition, basic economic theory informs us that monopolies will prefer to restrict output in order to earn supernormal profits. We use a dummy variable indicating whether any of three main product lines have more than 60% of the market share. *Unionization dummy* is used to capture firms that have workers that belong to a trade union. *Diversification* into several products gives firms more opportunities to sell in diverse markets, attain a larger number of customers and reduce variability on sales. A larger demand directed to the firm and more stability would impact on larger rates of growth. To measure diversification by product, the proportion of sales of the most important product was used (*DIVPROD*). A negative coefficient is expected to mean that the more diversified is the firm in products, the larger should be the rate of growth.

Growth strategy variables

As growth strategy variables, we consider the following variables; *Export Orientation* as exporting allows the firm to get an opportunity to learn from foreign buyers and let them be subjected to more tough quality controls (Dahlman, et al, 1985). Exporting is not simply an act of making goods and selling them abroad but also a way to learn from foreign buyers and through quality control as argued by Dahlman, et al (1985). Thus, we can hypothesize that export-orientation is positively related to firm growth in developing countries. The second option would be to invite foreigners (*percentage of foreign owned shares*) directly into the firm as a major stakeholder so that they have incentives to provide help in managerial, production and marketing know-how. The third option would be to introduce advanced or foreign technology / knowledge (*purchase of new machinery*) in the form of machinery and equipment that embody them.

Control variables

As control variables, we consider *age*, *initial size* of the firm, *firm size* and *dummies for sectors* and *countries*. Besides the use of the continuous firm size variable we use dummies to represent the three groups of firm sizes (i.e. small (<50 employees), medium (50<100 employees) and large (100+employees)) to detect variations in sensitivity of growth in the different size groups[2]. Following most recent findings allied with the Javanovic's model, we hypothesize that the size of the firm negatively affects the growth of the firm. For the *firm age*, two alternative proxies are used, first, a variable showing the years that each firm is under operation and second, a dummy variable that takes the value of 1 for firms with less than 5 years in operation, 2 for firms with more than 5 but less than 10 years in operation, and 3 for firms with more than 10 years in operation. Ugandan firms are young with an average of 14.4years because of the country's short history of development.

The World Bank has been conducting investment climate surveys around the world since 2001. The standard questionnaire administered in these surveys has a number of sections covering firm characteristics, firm strategies, and perception about investment climate. The surveys cover a diverse range of sizes and activities, with stratified samples of several hundred firms from multiple locations in each country. Data is gathered through face-to-face interviews conducted with senior managers or owners and accountants. The current study uses data that was collected by the World Bank in 2003 covering a period of previous 3 years.

To guarantee robustness of the results, we use instrumental variable regressions for a suspected endogenous variable. While there is no a priori reason to suspect the endogeneity of other variables, one can reason out that the fast growth firms have more capacity to build their physical capital, which might thus be endogenous. Thus, we use lagged value added capital ratio as an instrumental variable for physical capital. Following the instrumental variable procedure for panel data that Griliches and Hausman (1986) developed, we use lagged values of independent as choices for instruments to eliminate concerns about potential reverse causation problems.

[2] Most studies in Sub Saharan counties categorize firms using this criterion (see Nkurunziza, 2005).

6. Discussion of Results

6.1 Descriptive Results

Summary statistics of major variables used in the analysis are presented in Table 2 and Table 3. The tables provide the summary statistics of the dependent and the explanatory variables. It reports the overall mean, standard deviations, minimum and maximum values as well as the number of observations. The standard deviations of most variables are larger than the means, indicating a wide spread around the means. Size and age variables are expressed as natural logarithm. We carried out correlation analysis of independent variables and the largest correlation (between age and size) is 0.5. All the 300 firms can be classified into one of five sectors, with 122 firms in the agricultural sector, 54 in the furniture and wood sector, 40 in the construction and wood sector, 25 firms in the chemical and plastics sector and 59 firms under other sectors(metals, textile and leather, and paper, printing and publication).

Table 2: Summary statistics for 2002

Variable	Observation	Mean	Std. Dev.	Min	Max
Growth rate of firms	293	.051096	.4517186	.8571	6.714286
Diversification	289	62.34176	32.57425	.4	100
Invest in new machinery	300	.4733333	.5001226	0	1
Training	300	.2966667	.4575515	0	1
Unionized	298	4.441141	17.72389	0	100
Skilled proportion	293	65.19162	34.07132	0	100
Rate of return on investment	274	.158354	.8951554	0	13.9
Foreign ownership	300	.2266667	.4193747	0	1
African	242	.7396694	.4397244	0	1
Ln(Firm size)	279	1.141588	.6825563	0	3.778151
Export dummy	300	.1466667	.3543644	0	1
City location	300	.68	.4672556	0	1
Ln(Age of a firm)	281	.840093	.4561472	0	1.959041
Gender	241	.9460581	.2263732	0	1
Monopoly power	179	.1620112	.3694946	0	1
Education manager	298	.6879195	.4641219	0	1
Credit financing	300	9.206667	24.69826	0	100
Capacity utilization	265	55.78981	23.1676	1	100
Debt capital ratio	274	.0644032	.2215963	0	1.7424
Value added capital ratio	262	.3342566	1.195859	-2.864	7.853403
Efficiency	241	.4448174	.332852	0	1
Training	300	.2966667	.4575515	0	1

Table 3: Summary Statistics for 2001

Variable	Observation	Mean	Std. Dev.	Min	Max
Growth rate of firms	293	.051096	.4517188	-.857143	6.71429
Diversification	289	62.34176	32.57425	.4	100
Invest in new Machinery	300	.4733333	.5001226	0	1
Training	300	.2966667	.4575515	0	1
Unionized	298	4.441141	17.72389	0	100
Skilled proportion	293	65.19162	34.07132	0	100
Rate of return on Investment	274	.158354	.8951554	0	13.9
Foreign ownership Dummy	300	.2266667	.4193747	0	1
Ln(size)	279	1.141587	.6825562	0	3.77815
Export dummy	300	.1466667	.3543644	0	1
City location	300	.68	.4672556	0	1
Ln(age)	281	.8400928	.4561472	0	1.95904
Gender	241	.9460581	.2263732	0	1
Monopoly power	179	.1620112	.3694946	0	1
Education of top Manager	298	.6879195	.4641219	0	1
Credit access	300	9.206667	24.69826	0	100
Capacity	265	55.78981	23.1676	1	100
Debt/ capital ratio	274	.0644032	.2215963	0	1.7424
Value added/ Capital ratio	262	.3342566	1.195859	-2.86471	7.8534
Efficiency	241	.4448174	.332852	0	1
Training	300	.2966667	.4575515	0	1

Ugandan manufacturing firms in the sample were utilizing 56 percent of installed capacity. This was higher than Tanzania with 51 percent, but lower than Kenya with 63 percent during the same period. The average level of education by the top manager of manufacturing firms in Uganda is vocational training. The average age of the manufacturing firms is 13.2 years, not far from the median age of 14.4 years, implying that most of the firms are young. In addition, the average firm size is 78 employees.

Exporting is less common as only 15% of the manufacturing firms in Uganda participate in export markets compared to 25 percent in Tanzania and 57 percent in Kenya during the same period. The average value of lost production due to power outages or surges, as a percentage of total annual sales was 6 percent in Ugandan manufacturing firms compared to 9 percent in

Kenya and Tanzania. As regards financing of new investment in machinery and equipment, only 9 percent of new investments are financed with credit from banks compared to 16 percent and 32 percent in Tanzania and Kenya respectively.

Regarding the three biggest obstacles to doing business in Uganda, crime and theft was reported by 32 percent of the firms, compared to 31 percent of the firms for inadequate access to credit. Insufficient demand for products was also reported by 20 percent of the firms compared to 25 percent for inadequate infrastructure. Skilled labor shortage was rated by 15 percent of the firms as among the three major obstacles to operations compared to 25 percent in Tanzania and 29 percent in Kenya. Competition from imports was also reported by 8 percent of the manufacturing firms as one of the three biggest obstacles of doing business in Uganda.

On average, 95 percent of the manufacturing firms are owned by males as majority shareholders. In terms of foreign ownership, 23 percent of the firms were foreign owned. The majority of the firms, for example, 68 percent are located in the major city. On average, 16 percent of firms interviewed can be described as having at least one local monopoly market, that is, at least one of their three main product lines possesses at least 60 percent of the Ugandan market. The average share in total sales of the major product was 62 percent implying that most firms are not highly diversified.

Table 4 presents the distribution of the growth of firms in the sample according to age, size, unionization, level of diversification, accessibility to credit, gender, education of the manager, export status, location, foreign ownership and year. It is important to note that there was reduction in the average growth rate of firms from 14 percent in 2001 to 5 percent in 2002. Around 24 and 40 percent of the firms in the sample experienced positive growth and compared to 21 and 16 percent of the firms that experienced negative growth in 2002 and 2001 respectively. In addition, around 55 and 44 percent of the firms in the sample did not experience any growth in 2002 and 2001 respectively.

Table 4: Descriptive Statistics

Variable	Average growth rate of firms in 2002	Average growth rate of firms in 2001
Foreign owned firms	.054(67)	.119(59)
Non Foreign owned firms	.050(225)	.144(213)
Firms located in main City	.073(200)	.152(184)
Firms located outside the main city	.0043(93)	.110(87)
Diversified firms (major product <50%)	.029(110)	.153(102)
Non-diversified firms (major product>50%)	.067(171)	.097(157)
Firms exporting	.041(43)	.270(44)
Firms not exporting	.053(250)	.113(228)
Firms owned by males	.025(223)	.146(206)
Firms owned by females	.117(13)	.267(12)
Managers with education above secondary	.043(201)	.140(186)
Managers with education equal and below secondary	.061(90)	.133(82)
Unionized	-.099(23)	-.020(23)
Non-unionized	.064(270)	.154(247)
Old firms(10+ years)	.020(101)	.0453(107)
Young firms(<10 years)	.030(180)	.199(165)
Credit access	.018(42)	.0544(40)
No Credit access	.057(251)	.0153(232)
Small size firms(<50 workers)	.066(241)	.141(216)
Medium firms(50-100 workers)	-.0175(21)	.286(24)
Large firms(100+ workers)	-.0126(32)	.008(32)
Overall	.051(293)	.138(272)

Figures in the bracket are the number of firms.

The average growth rate of firms for the present sample of firms does not show much variation among most groups. There are, for example, no significant differences between the average growth rates of exporting and non-exporting firms, firms owned by foreigners and non-foreigners, firms with managers whose education is above secondary and managers whose education is below secondary education level. However, firms owned by females compared to those owned by males, non-unionized firms compared to unionized firms, young firms compared to old firms, small firms compared to large firms, and firms located in the main city compared to those located outside the city were more likely on average to grow faster. These descriptive

statistics are consistent with what has been found for manufacturing firms in other sub-Saharan countries. We proceed next by analyzing these mechanisms using econometric methods.

6.2 Regression Results

Table 5 (see annex) present regression results of variables that determine the rate of growth among Ugandan manufacturing firms. We use stepwise regression analysis on a sample of firms, adding one more explanatory variable to the firm growth equation to identify the primary determinants of firm growth. In each equation, we run the model with the traditional variables. The inclusion of control variables does not change the sign and statistical significance of the traditional variables. The model is correctly specified, as indicated by the p-values.

Firm size is shown to be an important determinant of firm growth, a finding that is consistent with that of Singh and Whittington (1975) who found a positive relationship between firm size and firm growth in a study on manufacturing firms in UK. This finding contradicts both the Gibrat's LPE model which predicts that firm growth is independent firm size. The existence of a positive relationship between firm growth and firm size and no association between firm size squared and firm growth suggest that that firm growth increases with size of firm until when a firm size threshold is reached and firm growth is no different from the growth of small firms. Regression results in equation 3 confirm this result because medium sized firms are shown to grow faster than small firms but large firm's growth rates are not significantly different from the growth rates of small firms. This finding is also consistent with Bain (1956) argument that there is a Minimum Efficient Scale (MES) which is achieved when a firm attains a size corresponding with the minimum long run average cost. Firms with sizes smaller than the MES enjoy economies of scale until they reach the MES but all firms beyond the MES are characterized by constant returns to scale. However, MES may differ according to the type and level of technology for respective firms.

Firm age is shown to be consistently negatively associated with firm growth in Ugandan manufacturing firms. This finding is consistent with Jovanovic's model, which predicts a negative relationship between age and firm growth. This finding is also consistent with empirical studies that seem to confirm the negative relationship between firm age and firm growth in Botswana, Kenya, Malawi, Swaziland, Zimbabwe, Ethiopia, Burundi, Lesotho, South Africa and

Swaziland (see Mead and Liedholm, 1998; Mengistae, 1998; Sleuwaegen and Goedhuys, 1998; Oliveira and Fortunato, 2008; McPherson, 1996; Aguilar and Kimuyu,2001).The study also showed that old and medium aged firm's growth rates are lower than the growth rates of young firms. This is also consistent with the findings of studies in both Africa and Latin America which show that young medium scale firms are more likely to grow at high rates of growth compared with medium scale firms that have been in existence longer (Parker, 1995). A study by Kantis and Koenig (2004) also revealed that the major expansion of dynamic enterprises occurs during their third year of operation. Firms may fail to invest sufficiently in existing or emerging technology, leaving them with relatively outmoded equipment and hindering productivity levels relative to younger firms. Jovanovic (1982) explains this negative relationship between firm age and growth with a learning model in which a firm expands quickly at first, and then tapers off its growth as it approaches its optimal size. However, our results do not confirm a nonlinear relationship between firm age and growth.

Average education as expected was shown to be positively associated with firm growth suggesting that firms with workers with higher average levels of education grow faster than firms with workers with low average levels of education. This finding is consistent with a finding by McPherson (1996) that found human capital variables to be important determinant of firm growth in Botswana, Lesotho and Zimbabwe. This finding is also consistent with the argument by Pakes and Ericson (1987), that the higher the stock and quality of human capital possessed by a firm the higher the chances that the firm will grow.

Access to bank credit, was shown to be negatively associated with firm growth, a finding that is consistent with a study covering four Southern African countries: Botswana, Malawi, Swaziland and Zimbabwe by McPherson (1996) which showed that access to formal credit helps firms to survive only in Malawi. This finding suggests that credit harmed firm growth by increasing debt which may destabilize firms and eventually force them to shrink or collapse. It is also possible that some other factors within the firm such as managerial competence might explain poor understanding of the debt management. However, the negative association between access to credit and firm growth is weak as the association is not consistently significant under different model specification.

Firms with trade union workers recorded lower growth rates than those without workers who are union members. However, the negative association between unionization and firm growth is weak. Similarly, value added per capital was shown to be negatively associated with firm growth but the association is weak. The results also show a negative coefficient on diversification as expected to mean that the more diversified is the firm in products, the larger should be the rate of growth. Diversification affects the growth process positively by helping firms to cope with demand constraints on a specific product line and creating new opportunities for growth. However the association between diversification and firm growth is weak.

The majority of explanatory variables that influence firm growth that were analyzed had the expected signs. These include; gender, sector effects, export participation, infrastructure problems , level of education of the top manager, capacity utilization, technical efficiency, theft and crime, monopoly dummy, ownership of firms by foreigners, location in the city, and loss of output due to power outages. However the coefficients of these variables are not significantly different from zero probably because of short panel (cohort) period.

7. Conclusion and policy implications

The aim of this study was to analyze the determinants of firm growth in Ugandan manufacturing firms. The study was based on descriptive and explanatory analysis using econometric modelling and analysis. It was deemed necessary to identify the determinants of firm growth in manufacturing as this sector is vital for growth and job creation, and need higher levels of growth than in the past. The regression results showed that firm size, firm age, and average education were the main drivers of firm growth in a sample of Ugandan manufacturing firms. Access to credit, value added capital ratio and unionization, were shown to be negatively associated with firm growth but the association was weak. Most of the variables that were analyzed such as; gender, sector effects, export participation, inadequate provision of infrastructure , inadequate demand for produced products, location in the city, foreign ownership, education of the manager and loss of output due to power outages had the expected signs but the coefficients are not significantly different from zero. In general, the results are consistent with comparable studies.

Accelerating manufacturing firms' growth holds the promise of economic growth and poverty reduction not only in Uganda but also in Sub Sahara African countries. Some policy

implications emerge from the findings of this study. It is clear from the results that firm age, firm size and average education are the main drivers of firm growth in Ugandan manufacturing firms. If the private sector is to be the "engine of growth" in the economy, then these factors need to be given serious attention. Apart from education, policy designs with direct impact on firm size and age are complicated. Empirical evidence from this study on the growth pattern of firms across the size distribution should guide government policy makers to target firms that make the best use of such assistance programmes. It is important for Ugandan policy makers to design policies that promote growth of small firms such as extending incentives such as tax holidays that are currently being enjoyed only by medium and large firms. There is also need to extend the same preferential treatment to new startups and young firms irrespective of their size because their potential to grow are high compared to old firms. The policy makers should simplify regulations and reduce costs for more informal and new firms to register and help these firms to expand. Empirical evidence from this research can guide firm managers, to focus efforts on the most important factors determining firm growth, for example, human capital, by increasing their human capital base in their firms. The government should increase funding to education, more especially to technical and professional development training institutions which produce educated workers that are in high demand by manufacturing firms.

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Annex

Table 5: Determinants of firm growth: GLS estimates for equations 1-10

Dependent variable: Growth rate

Variable	1	2	3	4	5	6	7	8	9	10
Constant	.098 (2.08)**	.269 (1.77)*	.171 (5.06)***	.0894 (1.30)	-.273 (-1.29)	-.0263 (-.39)	.048 (.97)	.143 (2.36)**	.0939 (1.99)	-.0441 (-.50)
Ln(size)	.089 (2.61)***	.0769 (3.95)***		.0608 (3.3)***	.077 (4.2)***	.228 (4.92)***	.136 (3.95)***	.122 (3.44)***	.118 (3.58)***	.0897 (4.11)***
Ln(age)	-.142 (-2.79)***	-.143 (-4.26)***	-.103 (-2.76)***		-.127 (4.0)***	-.158 (-2.26)**	-.120 (-2.32)**	-.135 (-2.58)***	-.149 (-2.94)***	-.158 (4.17)***
Ln($size^2$)		-.0144 (-.90)								
Ln(age^2)		.014 (.94)								
Median size firm dummy			.091 (1.68)*							
Large size firm dummy			-.039 (-.78)							
Median age firms dummy(5-<10years)				-.152 (-2.3)**						
Old firms(10+years)				-.235 (3.3)***						
Ln(average education)					.187 (2.22)**					.181(1.68)*
ΔValue added/ Capital						-.0191 (-2.20)**				-.0083(-.61)
Unionised							-.0035 (-2.38)***			-.00159 (-1.05)
Diversified								-.001 (-1.82)*		-.0008 (-1.21)
Credit financing									-.00015 (-1.89)*	-.00028 (-.31)
R^2: Within	.130	.024	.0344	.026	.047	.245	.350	.230	.207	.161
R^2:Between	.0287	.085	.0663	.054	.074	.006	.031	.032	.027	.060
R^2:Overall	.0245	.064	.0240	.040	.055	.014	.032	.030	.026	.060
Wald chi2	13.38	25.35	13.38	17.81	27.45	30.60	20.50	16.16	16.19	31.72
Prob>chi2	.0039	.000	.0039	.0005	.000	.000	.0001	.0008	.001	.000
No. of observations	546	454	548	454	446	477	542	524	546	371

Note: The values in parentheses are the t-statistics. ***, ** and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.