Determinants of a Firm's Level of Exports: Evidence from Manufacturing Firms in Uganda

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Abstract

The aim of this study was to establish why Ugandan manufacturing firms decide to enter the export market. The study built on previous studies by including business environment factors, factor intensity variables and specific firm characteristics in one integrative model to investigate the determinants of level of manufactured exports by firms using tobit and probit estimation procedures. The econometric results showed that higher levels of capital to labour ratio, firm size, Asian ownership, and being an agro-based and chemical firm are the major determinants of propensity to export. The major determinants of propensity to export to Africa region were firm size, capital–labour ratio, skill intensity and being a chemical firm. This compares with firm size and being an agro-based firm for exporting to the Western Europe region. On the determinants of the decision to export or not, firm size, Asian ownership, capital–labour ratio, being an agro–based and chemical firm were the only significant variables. To promote exports, Uganda should design specific incentives to attract new firms to agro-based and chemical sectors such as tax holidays. Strategies should also be designed to grow small firms into large ones, such as loan guarantee schemes for small and medium firms, tax holidays for joint ventures and mergers, etc. In addition, the government should provide incentives for capital imports such as maintaining the current zero rating of capital imports. Finally, policy makers should also design policies aimed at attracting foreign investment such as increasing economic productivity and political confidence.

Acknowledgements

1. Introduction

Africa currently accounts for less than 1% of global GDP and about 2% of world trade. Its share of global manufactured exports is almost zero. In terms of manufactured exports, Uganda's performance has been equally poor; for example, its manufactured exports as a percentage of GDP was only 0.6% in 2002. Only 19% of Ugandan manufacturing firms export some of their output, compared with 26% of those in Tanzania and 57% in Kenya. Exports as a percentage of sales in Uganda amount to 10% compared with 17% in Kenya and 12% in Tanzania in 2002 (World Bank, 2004). Uganda's share of exports to Europe which is the major trading region is also on decline although this is being compensated for by an increase in the share of exports to Africa (see Table 1).

Table 1: Uganda's domestic exports percentage shares by region

Region	2001	2002	2003	2004	2005
Africa	29.4	32.3	34	32.5	35.5
COMESA	23.6	20.4	25.4	26.8	30.7
Other African countries	5.8	11.9	8.6	5.7	4.8
Europe	48.9	53.0	46.6	44.4	41.2
Asia	12.6	9.6	8.5	8.9	7.5
The Rest of the World	9.1	5.1	10.9	24.2	15.8
Total	100	100	100	100	100

Source: UBOS (2006)

Since 1987, the Government of Uganda has implemented a number of trade and fiscal reforms that were partly intended to encourage investment and increase export activity by manufacturing firms. Subsequently, Uganda registered an increase in investment in manufacturing projects and consequent increase in manufactured output (see Table 2) but the level of manufactured exports was only 10% in 2002 (World Bank, 2004).

The low levels of exports have caused a lot of concern in government and academic circles about the sustainability of the achievements so far. Since Uganda is one of the success stories in reforms in sub-Sahara Africa, including trade liberalization. Despite these achievements, the country's manufactured exports remain extremely very low.

As the Uganda government tries to forge ways to avoid being marginalized in the globalization process and trading blocs such as East African Community and COMESA, the need for vital information on the determinants of level of exports of firms has become more sought after than ever. Other African countries are taking advantage of these opportunities, such as those under the African Growth and Opportunity Act

(AGOA), compared with Uganda, which has done poorly. From a policy point of view, it is important to know what determines a firm's level of exports. If these determinants can be identified, policy can be directed towards improving conditions of potential exporters. However, controversy remains as to why manufacturing firms export so little. Can these outcomes be explained in terms of firm-level specific characteristics, business environment factors or factor intensity variables? What would be the appropriate policies to raise levels of exports?

Table 2: Industrial production index of five major industrial groups (1997=100)

Group	1999	2000	2001	2002	2003	2004	2005
Food processing	123.6	118.2	131.9	135.3	136.4	141.6	123.8
Tobacco and beverages	112.3	116	119	122.5	137.3	153.9	179.2
Textiles and clothing	185.4	178.9	166.3	168.4	208.2	267.1	249
Timber, paper and printing	134.1	163.5	183.8	156.7	196.2	189.4	182.8
Chemicals, paint and soap	125.3	124.8	138.2	132	150	149.1	183.1
Index of all items	127.5	127.5	141.4	145.5	150.5	169.2	175.3
Manufactured output as a ratio of GDP	9.4	9.3	9.5	9.4	9.1	8.9	8.3
Growth rate of manufactured output	9.3	3.7	9.7	3.0	6.5	11.1	-1.6

Source: UBOS (2006)

The debate on the determinants of exports by manufacturing firms in Africa has traditionally suffered from lack of data, specifically firm-level data. The Regional Programme on Enterprise Development (RPED) was designed to improve the understanding of these determinants in Africa and to develop recommendations to improve enterprise development. Starting in 1992, RPED surveys have been conducted in over 10 African countries including Uganda.[1] However, only two studies (World Bank, 2004; Clarke, 2005) have analysed the data to establish the determinants of level of exports by firms in Uganda; since these were also cross-country studies, they have limited policy application.

The results from RPED surveys have shown that in Africa macroeconomic reform is a necessary condition for private sector growth but not a sufficient condition. There are enterprise-level constraints and business environment factors that inhibit the growth of exports of existing firms and impede the entry of new ones (see, for example, Servin, 1997; Teal, 1999). These surveys reveal that there is indeed a problem. Yet manufactured exports have important implications for employment and poverty reduction. Also recent evidence shows that exporting improves productivity (Bigsten et al., 2004; Mengistae and Pattillo, 2004). Clearly manufacturing firms offer the greatest potential for high wage employment generation. This potential will not be realized if the determinants of levels of exports are not identified.

Most of the work related to determinants of exports from a firm-level perspective has so far attempted to identify and test the effect of a variety of variables. While having made progress, the export literature is often criticized as investigating simplistic research questions, lacking both methodological rigor and conceptual frameworks (Aaby and Slater, 1989). The purpose of our study was to develop a model that describes factors influencing firms' export performance. We did this by using existing theories regarding

determinants of level of exports by firms and tested the model empirically. A core issue is how business environment factors, factor intensity variables and firm-specific characteristics influence manufactured exports of firms.

Statement of the research problem

Export levels of manufacturing firms remain low in Uganda despite an increase in manufactured output, but there are few firm-level studies to find out what determines the levels of exports in the country. Little was therefore known about the determinants of the level of exports of manufacturing firms in Uganda. Many of the studies in developing countries that currently exist are macro in nature and generally rely on cross-country data rather than country and firm-level data. Therefore, policy formulation has been hampered by a lack of timely relevant empirical studies at firm level. The policy question that arises is: What determines a firm's level of exports? The purpose of this study was therefore to investigate the factors that determine the level of exports of manufacturing firms. The controversy was whether the main reason for low export levels is a result of firm characteristics, factor intensity variables or business environment factors. The study investigated the determinants of levels of exports by manufacturing firms to fill the existing literature gap.

Objectives

Overall, the objective of the study was to analyse the determinants of exports in Ugandan manufacturing firms. The specific objectives were:
- To identify the determinants of the propensity to export among Uganda manufacturing firms.
- To identify the determinants that influence the decision to export to different destinations.
- To establish the determinants that influence the decision to export or not, and the decision on how much to export.

Hypotheses

Five null hypotheses were tested to guide the study in arriving at meaningful results. These are:
- Older firms are more likely to export than young firms as predicted by productivity learning models.
- Larger firms proxied by the number of employees are more likely to export than small firms, as larger firms have more resources with which to enter foreign markets.
- The propensity to export varies with location.
- Foreign-owned firms are more likely to export than locally-owned firms.
- Business environment factors such as access to credit, government efficiency, etc., are negatively associated with propensity to export.

Organization of the study

The rest of the study is organized as follows. In Section 2 we trace the literature of related theoretical and empirical studies. This is followed by a review of the methodology, which covers discussion of the empirical model estimated in this study. Results are provided and discussed in Section 4. Finally, Section 5 gives the conclusion and recommendations.

2. Literature review

There are several ongoing debates in the trade literature about the determinants of level of export by manufacturing firms. Very recently, export activity of individual firms has been the focus of a significant body of theoretical and empirical research. Trade theory suggests factor intensities and technical innovations as the standard determinants of trade structure. Factor intensity theories argue that factor-based advantages may be important if the firm has either a natural monopoly of a particular factor or is located in a particular region where a factor is plentiful. According to the Heckscher–Ohlin model of comparative advantage the focus is on the mapping from factor proportions to trade patterns (Graner and Isaksson, 2002). If the comparative advantage model is correct then firms producing commodities that make intensive use of the country's abundant factor should have a higher probability of being exporters than firms using a scarce factor intensively. Extending the more traditional range of factors included in the trade models, beyond labour and capital, different dimensions of human capital, organizational resources and natural resources are usually included.

Technical innovations reflect the technology gap theory of trade originally suggested by Posner (1961) and formalized by Krugman (1979), together with the product cycle theory of Hirsch (1965) and Vernon (1966). Both these theories assign a crucial role of technological innovation in the structure of trade. Technology-based models of export performance focus on firms' investments or achievement in implementing new technologies or the development of new products or processes. This capability will depend both on the internal strengths of the plant, including where applicable its links to other group companies and on the support available from the regional or national innovation system within which the firm is operating (Nelson, 1993; Metcalfe, 1997). The presence of a research and development (R&D) function within a plant, for example, may stimulate innovation through the type of technology push process envisaged in linear models of innovation.

A set of theoretical models by Dixit (1989), Krugman (1989) and others suggest that hysteresis in exports may be due to the sunk costs in entering the export market at firm level. The underlying theory is that there are fixed costs of exporting that deter those firms operating below a threshold level of efficiency because their prospective profits from exporting do not compensate for additional costs (Roberts and Tybout, 1997). Sunk costs may include expenses related to establishing a distribution channel and modification of commodities to foreign tastes. These costs may vary with the skill of staff, firm age, firm size and ownership structure of the firm (Graner and Isaksson, 2002).

Firm age may capture the extent of a firm's learning experience (Graner and Isaksson, 2002). If market forces sort out technically inefficient producers, then older plants will

tend to be more competitive in the world markets (Roberts and Tybout, 1997). The structure of ownership may also be important for the cost to access foreign markets, proprietary information and access to marketing networks abroad (Berry, 1992). Similarly, foreign-owned firms may have better access to finance, making it easier to bear the fixed costs associated with entering the export market. The skill intensity of operations may capture the potential for technological activities such as research and development.

Exporting may give the firm higher marketing costs than domestic sales, and the larger the firm the lower the average cost of exporting (Bigsten et al.,1997).

Related to sunk costs, firm size may also serve as a proxy for the magnitude of the firm's resources that are important for the decision to enter into the international markets (Bernard and Jensen, 1999; Sterlacchini, 1999; Wagner, 1995). Firms that are relatively more productive may self-select into the export market because they expect the future returns to be greater than the entry costs (see Clerides et al., 1998). Both the learning by exporting and the self-selection arguments predict that exporting firms ought to be more technically efficient than non-exporters.

The literature on economic geography and trade (Krugman, 1992) hypothesizes that activities of neighbouring firms may reduce entry costs. Geographical location is thought to capture factors that influence transport costs and infrastructure, spillover effects and natural resources.

Another set of explanatory variables that determine the level of exports is that related to future profitability of exporting (Graner and Isaksson, 2002). Trade liberalization, for example, may increase the future profitability from exports by increasing the prices of tradeable relative to non-tradeable goods. A real exchange rate depreciation may also be expected to increase the volume of exports as well as the export share. However, since the destination of a large percentage of African countries exports is in Africa, what may matter to export prices is movements of the local currency relative to currencies of other African countries rather than changes in the real exchange rate. Other factors that determine a firm's future profit from exporting include their size, technical efficiency and their geographic location (Graner and Isaksson, 2002).

The empirical literature on the firm level export behaviour of less developed countries is scarce. Among a few others, Roberts and Tybout (1997) and Clerides et al. (1998) carried out studies in Colombia, Mexico and Morocco, South Africa, Mauritius, and Ghana. These studies mostly focus on a few variables, for example the effect of firm size and R&D expenditures on export performance. Yet export performance may be influenced by a multitude of other variables that may also be important.

Firm specific influences on export activity have been revealed as important in a series of recent studies for the US (Bernard and Jensen, 1999), Germany (Bernard and Wagner, 1997) , and a number of developing countries (Clerides et al., 1998; Roberts and Tybout, 1997; Aiteken et al., 1997). Comparing firms at a point in time, Bernard and Jensen (1999) document large, significant differences between exporters and non-exporters among US manufacturing firms. However these substantial cross section differences between exporters and non-exporters cannot tell us about direction of causality – do good firms become exporters or do exporters become good firms?

Roberts and Tybout (1997) include some plant characteristics in their work and find that plant size, plant age and the structure of ownership are positively related to the

propensity to export. In contrast, Fafchamps and Hamine (2002) found that it is the young firms that export and that old firms are unlikely to switch to exports, even in response to changes in macro incentives. Aiteken et al. (1997) report evidence that plant size, wages and especially foreign ownership are positively related to the decision to export. Several studies have found that large enterprises are more likely to export than small firms in low- and middle-income countries. Clerides et al (1998) find evidence consistent with this for Colombia, Mexico and Morocco.

Braunerhjelm (1996), for example, provides evidence from Sweden that R&D expenditures and investments in skilled labour both have positive effects on firms export intensity, while more conventional cost factors have no effect. In terms of internal resources, Wakelin (1998) identifies positive links between export performance and average capital intensity among UK firms. While other studies have identified positive relationship between export propensity and technological level of firm's capital stock (Sterlacchini, 1999).

Several enterprise level studies have been conducted using RPED surveys in Cameroon, Cote d'Ivoire, Ghana, Uganda, Kenya, Zimbabwe, Tanzania and South Africa.[2] We reviewed the major findings from these studies so as to compare them directly with our results and establish any stylized facts from the RPED surveys.

Azam et al. (2001) showed that the probability of a firm's exporting decreases with increased competition. Moreover, the impact of increased competition on export performance by the firms is ambiguous and may be negative for a non-trivial range of parameter values. Neil et al. (2006) showed that firm size is a robust determinant of a decision to export. They also found that efficiency only affects the decision to export regionally, defined as within Africa, not internationally.

Bigsten et al. (1997) use panel data for a total of 502 firms over 1991 to 1995 to establish the determinants of exports. They found that most large firms export, but only a small portion of output. Size was consistently found to influence the decision to export. There are fixed costs for marketing and access, which require a certain scale of operations. On the basis of evidence presented by Bigsten et al. (1997), this minimum size appears to be firms with 100 employees; these authors show that for Cameroon, Ghana, Kenya and Zimbabwe, 71% of firms with more than 100 employees export, but only 35% of those with between 29 and 100 employees do so. For firms with less than 30 employees, only a negligible proportion enters the export market. The factor found to be correlated with a higher share of output being exported was being in the wood group except Kenya where it was in the food sector.

Bagachwa and Mbelle (1995) found that exports tend to require specific technological capacity, as in general the products have to meet higher or different quality standards than production for the domestic market. The principal constraint identified was investment capability, especially access to financing but more generally information and capacity to adapt.

Helsinki School of Economics (1995), Teal (1999), Soderbom and Teal (2003), Bigsten et al. (2004), Clarke (2005), and Grenier et al. (1998) found that larger firms are more likely to export than smaller firms. Grenier et al. (1998) found that state-owned enterprises and large firms in Tanzania were more likely to export and found weak evidence that foreign-owned enterprises were more likely to export. Bigsten et al. (1997) did not find

similar results. Clarke (2005) found that foreign-owned enterprises were more likely to export than similar private domestically-owned firms. Clarke (2005) found that older firms don't appear to export more or less than similar younger firms.

A study by World Bank (2004) using cross sectional data from Uganda and Tanzania found that larger firms are more likely to export than smaller firms and typically export more of their output. Foreign-owned firms were also found to be more likely to export more than domestically-owned firms. It was also found that firms that produce construction materials, metals, furniture and wood tend to export less than other firms. This is a cross-country study, however, and the findings have limited policy application.

The stylized fact that emerges from the studies reviewed above is that firm size is a major determinant of a firm's propensity to export. The evidence on the association of firm age, foreign ownership, efficiency and propensity to export is mixed. Average wage, capital intensity, R&D, skill intensity were shown to be positively associated with propensity to export in some studies. These findings provide a framework to compare and contrast the Ugandan results that emerges from this study.

Most of the studies reviewed include only a number of operational variables. These studies focus on simple bivariate relationships. Excluding possible relevant variables leads to biased results. Some authors used macro level and sectoral level time series and others cross-country data. For Uganda, the most important reforms that rapidly changed export incentives were undertaken in the early 1990s and the use of time series data would run into problems of degrees of freedom and other statistical issues. Since an estimation based on pre-reform information will not be informative, there is a need to use cross sectional data. In addition, there are many variables – especially qualitative ones— that affect exports but cannot be captured in time series data.

These studies suggest that there are important specific firm-level factors, business environment factors and factor intensity variables that need to be examined to understand industrial dynamics and consequently the determinants of Ugandan firms' propensity to export. Many of the policy implications from our list of studies depend on what determines the percentage of output exported. There may be a number of explanations as to why firms export so little, yet most of these factors have not been adequately investigated. Our study built on previous studies by incorporating a wider range of variables, including business environment factors, factor intensity variables and specific firm characteristics, into one integrative model to provide a more informative insight into determinants of propensity to export of manufacturing firms in developing countries, with Ugandan manufacturing firms as a case study.

3. Methodology

Firm specific characteristics and the business environment factors can be integrated into traditional trade theory in the production at the firm level. In cross-industry regressions, firm specific characteristics and business environment factors would just add an extra element to residual variance.

Thus, if firms within an industry vary significantly in efficiency and other characteristics, then one would expect the export activity of an individual firm to be influenced by a combination of factor intensity variables, the specific characteristics of the individual firm and business environment factors. The export activity Xij of firm i in sector j will then be a function of factor intensity variables, Tij, business environment factors, Eij, and a firm's specific characteristics, Fij.

$$Xij = X(Tij, Eij, Fij)$$

The factor intensity variables that we investigated are the standard ones suggested by trade theory; they included human capital intensity, capital intensity and technical innovation. The inclusion of technical innovations reflects the technology gap theory of trade originally suggested by Posner (1961) and formalized by Krugman (1979) amongst others, together with the product theory of Hirsch (1965). Both these theories assign a crucial role to technological innovation in the structure of trade.

There is now an established body of literature that points to the overwhelming importance of firm specific factors, on which competitive advantages for export are built (Wakelin, 1998; Sterlacchini, 1999). We included factors such as firm size, firm age, ownership, education of the top firm manager, firm's technical efficiency and sector and geographical location dummies.

We also included business environment factors that might stimulate or inhibit exports of manufacturing firms. No company operates in a vacuum, but deals with an external environment. Yet the literature on export performance has largely ignored the business environment as a determinant of export performance. An exhaustive description of the external setting of the firm is almost impossible, as this means including everything outside the firm that could affect business. Some of these aspects are usually referred to as barriers or stimuli to which firms react. In this study we consider perceptions about infrastructure and other business environment factors that were covered in the RPED survey.

The Model

As noted earlier, the innovation of this study is that we modelled firms' export activity by nesting firm-specific characteristics, business environment factors and factor intensity variables within the same model. We maintained the assumption of no state dependence in exporting.[3] This suggests a basic model of the form:

$$Xij = \beta + \phi Tij + \lambda Fij + \varphi Eij + \varepsilon$$

where Xij is the export propensity (i.e., share of exports in total sales) of firm i in sector j; Fij is the set of specific firm characteristics; Eij is a vector of business environment variables; and Tij is a vector of factor intensity variables. β is a constant, ϕ, λ and φ are vectors of parameter estimates, and e is the error term.

Variables

Taking into account the findings of previous studies in both the neo-endowment and technology-based traditions, our model of export propensity included a number of indicators of factor intensity variables, specific firm characteristics and business environment factors.

Propensity to export

This was measured by the ratio of exports to total sales made as the dependent variable. The chosen specification of the dependent variable is preferable to factor intensity determinants of a firm's exports, since we would expect the factor intensity variables to help predict not only whether a firm exports but also how much (Wakelin, 1998). This measure has the advantage of capturing the level of exports. We also used a binary export/non-export specification for probit regressions that is typical of the literature on firm specific effects on export activity.

Business environment factors

To construct the business environment factors we used the ratings (on a 1–5 scale) of the stimuli or barriers of infrastructure and business environment variables. The infrastructure that were considered included electricity, roads and telecommunications; business environment factors considered included access to land, tax rates, customs and trade regulations, labour regulations, access to finance, cost of finance, economic and regulatory policy uncertainty, government efficiency, corruption, crime, and anti-competitive practices.

Factor intensity variables

Our analysis included the ratio of white collar to total employees, which was used as a proxy for the measure of human capital intensity in a given firm. A firm is thought to be more likely to export if its production is intensive in a factor whose price is relatively low, which in the Heckscher–Ohlin model would be the result of a relatively large endowment of the factor concerned. Thus, we expected a negative association between skill intensity and export participation since Uganda is endowed with relatively more unskilled labour compared with its trading partners in Africa and the rest of the world.

    We also included the education of the manager as a proxy for organizational resources. Managers with university degrees might be more likely to have contacts abroad, especially if they obtained their degrees outside their home countries, or might be willing to overcome bureaucratic barriers to exporting (see Wood and Jordan, 2000). We categorized the education levels of the manager into three; graduates, those with vocational training, and those who completed only secondary and lower levels of education. The last category was used as our base category.

    The ratio of capital to labour was used as a measure of capital intensity. Capital is defined as the replacement cost of existing machinery and other equipment used in the production process, multiplied by the degree of capacity utilization.

    Newer machines, as proxied by a higher capital–labour ratio, embody newer technology that leads to better productivity and better quality products. One result is the ability to compete both at home with imports and abroad with other firms. In addition, a high capital–labour ratio, which is likely to be a result of expensive skilled labour in Uganda, can be expected to result in a better price competitiveness because of lower unit labour cost.

Specific firm characteristics

Among these characteristics are ownership, age and size of firm, and technical efficiency variables. Others are dummies for industrial sectors and geographical location.

Ownership. A sizable body of research has focused on the role of multinationals, and ownership more generally, in cross border trade. The structure of ownership may be important for the cost to access foreign markets. The importance of foreign ownership reflects the advantages of proprietary information, as well as special access to marketing networks (Berry, 1992). We used the foreign ownership ratio to capture these ownership effects. We also disaggregated ownership according to ethnic backgrounds of the major shareholders of firms. We identified three major ethnic groupings: Africans, Asians including Lebanese and those from the Middle East, and Europeans who were grouped with Americans. We used dummies to capture these ethnic origins. Africans were used as our base category.

Firm age. A firm's maturity may lead to stronger local linkages and greater local sourcing. Older firms may have had time to establish and expand their distribution networks and also to position themselves to tap export markets. In addition, mature firms may have

accumulated considerable knowledge stocks (Baldwin, 1988). On the other hand, core capabilities can become core rigidities or competence traps (Leonard-Barton, 1992) and younger firms may be more proactive, flexible and aggressive. Relatively younger firms may utilize more recent technology, while older firms are stuck with obsolete physical capital. We included age and age squared in order to capture potential changes in the quality of the firm, as models of learning suggest (Jovanovic, 1982; Hopenhayn, 1992). We used the actual ages of firms from when they started operating in Uganda until the time of the survey.

Firm size. Firm size was proxied by the number of employees in a firm, a general indicator of the strength of a plant's resources base. This was expected to have a positive relationship to export propensity as larger plants have more resources with which to enter foreign markets. This may be particularly important if there are fixed costs to exporting such as information gathering or economies of production or marketing, which may benefit larger firms disproportionately. Scale may be important in overcoming such initial cost barriers as gathering information or uncertainty of a foreign market but may be less significant in determining the extent of firms export activity. There may also be economies of production and marketing that benefit large firms. Support for this assertion comes from the non-linear relationship between plant size (employment) and export propensity found by Wakelin (1998) and Sterlacchini (1999), each of which identifies an inverted U-shaped relationship.

We therefore included both plant size and its square in the estimated models to test for non-linearities and expected to find a quadratic relationship with export propensity. Since large firms have larger outputs, they are therefore more likely to export than small ones. The same holds if there are fixed costs to exporting (such as search costs). Consistently in all samples and time periods, exporters are much larger plants. Size may proxy for several effects; larger firms by definition have been successful in the past, but size may be associated with lower average, or marginal costs, providing separate mechanisms for size to include the likelihood of exporting. One key question is how these firms acquire the characteristics that allow them to easily enter the export market. Although the traditional assumption that in order to compete globally you have to be big (Chandler, 1990) holds in several studies, a significant number of researchers have found no relationship, or a negative relationship, between size and exports (Calof, 1993). We used the actual number of permanent employees as a proxy for firm size.

Technical efficiency variable. Both the learning by exporting and the self-selection argument predict that exporting firms ought to be more technically efficient than non-exporters. Firms' technical efficiency variable was expected to be positively related to the decision to export, since more productive plants self-select into the export market, because the returns to doing so are relatively high for them (Clerides et al., 1998).

We adopted the data envelopment analysis (DEA) approach to estimate the technical efficiency scores. We used an input-based measure of technical efficiency and assumed variable returns to scale as it is inconceivable that each firm is operating at an optimal scale. The reason for adopting this non-parametric mathematical programming technique in favour of stochastic frontier is that it does not impose a prior assumption on technology underlying the production process.[4]

Sector dummies. Export behaviour is likely to vary across sectors. Sector dummies were included to capture unobserved sector specific variables such as the extent of domestic and foreign competition and product characteristics with respect to export behaviour. For example, some products might be more difficult to transport than others, thus limiting export potential. We grouped firms under the following sectors: agro-industry and food processing, textiles, garments and leather, wood products and furniture, metal work and machinery, chemicals, paints and plastics, construction, and paper, printing and publishing. We used the construction sector as our base category.

Geographical location dummies. Geographical location was defined as a dummy variable that took on a value of unity if the firm was located in the major cities (Kampala and Jinja) and zero otherwise. This dummy variable captures factors that influence transport costs, infrastructure and business services (Graner and Isaksson, 2002).

Estimation strategy

Questions about the correct estimation procedure arise from the empirical model. If the propensity to export is used as an indication of export behaviour, it varies by definition between zero and one. As a result, OLS regression may not be the most suitable estimation procedure, as it can give estimates that imply predictions of the propensity to export outside the feasible range.

Wagner (2001) reviewed a way to model export behaviour that deals with this problem. He distinguished between two basic approaches – a one-step model and a two-step model. In the one-step model one equation is estimated using data of both non-exporters and exporters, whereas in the two-stage model, the decision to export is modelled separately from the question of how much to export. Wagner rejects the two-stage approach on the grounds that a profit maximizing firm does not make such a distinction and simultaneously decides whether and how much to export.

Of the one-stage procedures, tobit estimation is the most popular in empirical studies on export behaviour (see Wagner, 1995) compared with other models such as the Cragg model (Tsai-Fen and Schmidt,1984). The tobit model assumes that any variable that increases the probability of positive exports must also increase the average volume of exports of the exporting firms. The tobit model incorporates the decision of whether to export and the level of exports relative to sales in one model, that is, it imposes the same coefficients on the explanatory factors for the two decisions. The tobit model is also appropriate for censored data. Although the Cragg model is more flexible than the tobit, it is mainly useful for showing the effects of a policy change on the probability of exporting and the effects on the average amount of a representative exporting firm. This study thus used the tobit estimation procedure.

We also estimated one additional model explaining the decision to export determined mainly by the magnitude of sunk costs using probit regression. The theoretical basis of sunk cost models was developed by Dixit (1989) and Krugman (1989). And the relationship between exporting and sunk costs has been the subject of a number of inquiries (Roberts and Tybout,1997; Bernard and Wagner, 2001; Bernard and Jensen, 1999). The presence of sunk costs can be detected by testing if the previous export

activity of the firm can be used to explain its current status, controlling for other firm-level characteristics that may influence export activity. Previous studies found that significant sunk costs exist in entering the export market, with exporting in the previous period increasing the probability of current exporting by over 30%. Previous studies used firm-level panel data with a relatively long time-series component using a two-stage procedure that controls for initial conditions to analyse the relationship between the decision to export and the sunk costs. This two-step procedure involves first estimating the initial conditions probit equation (for the first year of the sample period) and then using the generalized residuals from this as a correction to the random effects probit model for the rest of the sample. The data we have for Uganda do not have sufficient time series observations to allow us to use this procedure explicitly in this study. We instead use firm size, foreign ownership and sector effects as proxies for sunk costs following previous studies (Roberts and Tybout, 1997; Aiteken et al., 1997). We also assumed that there is no state dependence.

Although some questions from the RPED study ask for information pertaining earlier years, we are not convinced of the reliability of the data. Since we had only one year of observations, we neglected the panel dimension of the sample and we did not estimate a fixed or random effect model. We did use some observed time invariant variables, however, like dummy variables indicating the firm's location.

To control for potential endogeneity of perception-based variables, we substituted individual firms' rating with average rating of firms in the same location and sector. Since this does not depend upon whether the enterprise actually exports or not, reverse causation would be unlikely. To control for potential endogeneity of some of the explanatory variables such as technical efficiency, human intensity, capital intensity and average wage, we were supposed to use the first lag of these variables. Given the nature of the data, however, we were not able to use lags. Previous studies have shown the difference to be marginal when control for potential endogeneity of some explanatory variables is undertaken and when there is no such control (see Graner and Isaksson, 2002). We used the STATA computer package in our analysis.

Data sources

Primary data were taken from a recently concluded RPED survey of 300 manufacturing firms in Uganda in 2002. (RPED, 2002). The sample frame consisted of all manufacturing firms with 10 or more employees in the 2001/02 Census of Business Establishments (UBOS, 2002). A stratified random sample was drawn from this frame with location, size and sector as the stratification dimensions. The stratification yielded 56 populated clusters. The sampled firms represent a sampling rate of 41% and account for about 70% of employment of the sampling frame. The data are reliable and of reasonably good quality.

The survey collected information on perceptions about infrastructure and access to land, tax rates, customs and trade regulations, labour regulations, skill of workers, access to finance, cost of finance, economic and regulatory policy uncertainty, corruption, and anti-competitive behaviours. It also asked about the firm's sales, exports, plant age,

employment, technology and investment, along with the experience, education and skills of entrepreneurs among other details.

The relevant sample included all firms that had complete data on all variables of our interest. This was around 266 firms, which included both exporting and non-exporting companies. Although the data are not strictly comparable to surveys in other countries, useful comparisons were made between the results obtained from the survey data and those obtained in other African countries.

4. Empirical results

Summary statistics of major variables used in the study are presented in Table 3. The standard deviations of most variables are larger than the means, indicating a wide spread around the means. Table 4 represents the proportion of exporters by sector, size and ownership, while Table 5 shows the proportion of exports by education level of the top manager, location and age of the firms. The number of exporting firms was used to measure the propensity to export with respect to different firm characteristics.

Table 3: Summary statistics of major variables

Variable	Mean	Standard deviation	Unit of measurement
Firm size	113	475	Number of permanent worker
Firm age	13	14.4	Years
Foreign ownership	0.20	0.39	Ratio
Skilled proportion	0.66	0.33	Ratio
Export propensity	0.09	0.26	Ratio
Capital–labour ratio	7,736	29,538	US dollars
Crime	1.6	1.3	Perception ratings on a scale of 1 to 5
Corruption	1.8	1.4	"
Anti-competition	1.6	1.3	"
Labour regulation	0.8	1.0	"
Customs	1.5	1.3	"
Tax rates	2.4	1.2	"
Access to land	1.0	1.2	"
Transport	1.5	1.2	"
Telecommunication	0.7	0.9	"
Economic regulations	1.6	1.2	"
Government efficiency	3.4	1.1	"

From the descriptive results, foreign ownership seems to be an important factor in determining the propensity to export: 35% of firms with some high percentage of foreign ownership are exporters compared with only 12% of firms with domestic ownership. When the ownership is disaggregated according to ethnicity, however, European and Asian-owned firms appear to be more export-oriented than firms owned by other ethnic groups.

Sector effects seem to be significant in some sectors; for example, the chemical, paint and plastics sector, and the agro-industry sector, account for 78% of all exporting firms in the study sample (see Table 4). The size of the firm – more especially being large – appears to be important as has been shown in previous studies: 61% of large firms are exporters compared with 17% and 8% of medium and small firms, respectively (Table 4).

Table 4: Proportion of exporters by sector, size and location

Category	No. of firms	No. of exporting firms	Proportion of exporters
Sector			
Agro-industries	109	27	0.25
Chemicals, paints and plastics	23	8	0.35
Construction	36	5	0.14
Paper, printing and publishing	21	3	0.14
Textiles, garments and leather	14	1	0.07
Metals and machinery	16	0	0
Furniture and wood	47	1	0.02
Size			
Micro (<10)	48	1	0.02
Small (10-49)	140	11	0.08
Medium (50-99)	30	5	0.17
Large (100+)	46	28	0.61
Ownership			
Foreign ownership (<50%)	54	19	0.35
Foreign ownership (=>50%)	212	26	0.12
Ethnicity			
Asian	53	22	0.42
European	4	4	1
African	161	9	0.06
Others	48	10	0.21
All	266	45	0.17

In our sample of firms the location effects seem to be marginal, given the small difference in the proportion of firms from the two regions, as can be seen in Table 5. This could be a result of Uganda's being landlocked and thus all firms are affected equally. The level of education of the top manager of the firm also seems to have an impact on the propensity to export. Around 29% of firms managed by university graduates export, compared with 10% of firms managed by those with vocational training, and 8% with managers having secondary and less than secondary education training.

Clear patterns also emerge from comparisons of capital–labour ratios between exporters and non-exporters (see Table 6). The average capital–labour ratio among exporters is generally higher than that of non-exporters except in the paper, printing and publishing sector. The average capital–labour ratio in the chemical, paint and plastic, and construction sectors is more than three times larger for exporters than for non-exporters and more than two times larger for exporters in the agro-industrial sector compared with non exporters. Capital–labour ratio thus seems to be an important factor in determining a firm's propensity to export. These indicators should be interpreted with caution, however, because they are not weighted to solve for the stratification bias in the data.

Table 5: Proportion of exporters by location, age of the firm and education of the top manager

Category	No. of firms	No. of exporting firms	Proportion of exporters
Location			
City (Kampala and Jinja)	185	35	0.19
Other regions	81	10	0.12
Age of the firm			
Young	35	12	0.34
Middle	160	27	0.17
Old	71	6	0.08
Education of the top manager			
Secondary (<=)	85	7	0.08
Vocational training	80	8	0.1
University	101	30	0.29
All	266	45	0.17

Table 6: Average capital–labour ratios of exporters and non-exporters

Sector ($)	No. of firms	Exporters ($)	No. of firms	Non Exporters
Agro-based industries	27	15,948	82	6,066
Chemical, paint and plastic	8	28,882	15	8,697
Construction	5	41,462	31	2,506
Paper, print and publishing	3	12,517	18	15,002
Textiles, garments and leather	1	-	13	4,290
Metals and machinery	0	-	16	1,867
Furniture and wood	1	-	46	787

Estimates of the empirical model

Tables 7 and 8 present marginal effects of variables that determine the propensity to export among Uganda manufacturing firms. We estimated the empirical equation by including and excluding some variables as shown in the tables. Equation 6, for example, excludes chemical firms to establish whether the results will change for the significant variables, but we did not detect any change. We excluded from Equation 1 the non-significant variables for the sake of parsimony. To facilitate interpretation we report marginal effects for continuous variables (capital–labour ratio, firm size, firm age, firm age squared, efficiency, foreign ownership) and for agro industries, education of the manager and foreign ethnic origin of major shareholder dummy variables, the discrete change in estimated propensities to export as the dummy changes from 0 to 1. The direction of causality may go both ways for some of the determinants of propensity to export. The estimated marginal effects, for this reason, should be interpreted as the nature of association, rather than causation, between the determinants and export propensity.

Table 7: Determinants of propensity to export: Tobit estimates for Equations 1–6
Dependent variable: Export sales ratio

Variable	1	2	3	4	5	6
Constant	-3.48 (4.59)*	-3.377 (-4.42)*	-3.517 (-4.5)*	-3.42 (-4.57)*	-3.949 (-4.2)*	-3.379
(-4.48)*						
Log (capital–labour ratio)	0.0923 (2.47)*	0.0898 (2.4)**	0.09 (2.39)**	0.0913 (2.44)**	0.11 (2.38)**	0.088
(2.37)**						
Log (firm size)	0.340 (5.83)*	0.339 (5.82)*	0.331 (5.37)*	0.331 (5.58)*	0.329 (4.56)*	0.302
(4.88)*						
Log (firm size squared)	-.0386 (1.24)	-.0369 (-1.18)	-.038 (-1.21)	-.0468 (-1.51)	-.053 (-1.38)	-.049
(-1.57)						
Asian dummy	0.296 (1.97)**	0.305 (1.99)**	0.323 (2.12)**	0.254 (1.74)*	0.488(2.5)*	
Agro-industry dummy	0.812 (4.46)*	0.732 (3.13)*	0.833 (4.43)*	0.808 (4.56)*	0.801(3.87)*	0.825
(4.58)*						
Chemical dummy	0.552 (2.32)**	0.473 (1.68)***	0.579 (2.42)**	0.566 (2.45)**		
Paper dummy		-.0593 (-.15)				
Textile dummy		-.0593 (-.15)				
Furniture dummy		-.417 (-.86)				
Vocational trained manager				0.266 (1.26)	0.41 (1.55)	0.330
(1.55)						
Graduate manager				0.251 (1.31)	0.273 (1.11)	0.303
(1.57)						
Skilled proportion				0.0010 (.47)		
Location in city dummy				-.221 (-1.36)		
Efficiency					0.212 (.48)	
European			0.627 (1.39)		1.02 (1.7)***	
Log (age)			-.0133(-.15)			
Log (age squared)			0.0246 (.6)			
Foreign owned						0.231
(1.32)						
Pseudo R squared	0.36	0.36	0.37	0.38	0.37	0.37
No. of firms	266	266	266	266	232[5]	243

Note: Reported values are marginal effects and the values in parentheses are the Z-statistics. ***, **, and * indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8: Determinants of propensity to export: Tobit estimates for Equations 7–10

Dependent variable: Export sales ratio

Variable	7	8	9	10
Constant	-.337(-4.2)*	-.3.44(-4.11)*	-3.60(-4.59)*	-3.61(-4.55)*
Log (capital–labour ratio)	0.0892(2.36)**	.0935(2.47)**	0.0952(2.51)*	
Log (firm size)	0.33(5.47)*	0.32(5.31)*	0.317(5.39)*	0.337(5.6)*
Log (firm size squared)	-.032(-1.03)	-.0403(-1.26)	-.0452(-1.45)	-.0407(-1.28)
Asian	0.298(1.99)**	0.322(2.09)**	0.32(2.1)**	0.295(1.97)**
Agro-industry dummy	0.788(4.3)*	0.827(4.43)*	0.852(4.55)*	0.793(4.26)*
Chemical dummy	0.555(2.32)**	0.491(1.95)**	0.468(1.89)***	0.479(1.98)**
Labour regulation	-.0259((-.37)			-.087(-1.16)
Financial access	-.233(-1.33)			-.248(-1.57)
Financial cost	0.0026(.02)			
Government efficiency	-.0175(-.28)	-.017(-.28)		
Telecommunication	-.016(-.23)	-.0299(-.4)		
Electricity	0.0346(.61)	0.0148(.25)		
Transportation		0.0148(.25)	0.0555(.92)	
Access to land		0.0699(1.07)	-.0042(-.08)	
Tax rates		-.0282(-.46)	-.0283(-.45)	
Customs			0.105(1.63)	0.104(1.6)
Economic regulation			-.033(-.51)	-.006(-.09)
Corruption			0.0312(.55)	0.0233(.41)
Crime & disorder				.0861(1.44)
Pseudo R^2	0.37	0.37	0.38	0.39
No. observations	266	266	266	266

Note: Reported values are marginal effects and the values in parentheses are the Z-statistics. ***, ** and * indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Specific firm characteristics emerge as important determinants of propensity to export compared with business environment factors. Firm size, capital–labour ratio, Asian ownership, agro-based firms and chemical firms were found to have the highest export propensities.

Firm size is shown to be an important determinant of propensity to export, suggesting that fixed costs may be important for exporting. This result is not surprising since the high fixed costs of exporting make it difficult for small firms to enter export markets. This result is comparable to the findings of other studies (Bigsten et al., 1997). Our result thus supports the existing theory of sunk costs of entering into the export market.

The results also show that exporting is most likely in agro-based firms than in firms of other sectors with the exception of the chemical sector, all factors held constant. Quantitatively, the effects are large. The greater export orientation of firms in food processing than in other manufacturing sectors seems more likely a result of transport costs. Firms in food processing

use locally available intermediate inputs, while firms in other manufacturing sectors, in order to be competitive in world markets, need to use imported intermediates, which are expensive in Uganda, because of the high transport costs of getting them into the landlocked country. The greater likelihood of exporting by firms in the chemical sector could be arising simply from the coincidence of high capital intensity (see Table 6) and unusually strong economies of scale in production that take advantage of the regional market.

The estimated positive marginal effects of log capital–labour ratio together with the insignificance of education level of the top manager and skill intensity, which were human capital proxies, suggest that the marginal effect of exporting increases with the capital intensity. Capital intensity plays a more important role in explaining variations in export activity than human capital intensity, which is not significant. This finding of positive association between capital intensity and propensity to export confirms our expectation and this may suggest that newer machines, as proxied for by a higher capital–labour ratio, embody newer technology that leads to better productivity and better quality products and as a result, the ability to compete both at home with imports and abroad. In addition, a high capital–labour ratio – which is likely to be a result of expensive skilled labour in Uganda – is likely to result in better price competitiveness because of a lower unit labour cost. This finding contradicts an earlier finding by Graner and Isaksson (2002), which showed that in Kenya the marginal effect of exporting increases with labour intensity. This finding is consistent with those of Wakelin (1998) among UK firms.

The associated coefficient on foreign ownership is positive but not significant. When we disaggregated foreign ownership ratio according to ethnic backgrounds of the major shareholders of firms, we found that being Asian compared with being African is associated with greater propensity to export.

Empirical evidence provides only weak support for business environment factors that act as barriers to propensity to export. Although most of these barriers, such as labour regulation, economic and regulatory policy uncertainty, telecommunication, government efficiency, access to credit, access to land, and tax rates, had the expected signs they were not statistically significant. This may not mean that the barriers have no marginal effect on Ugandan firms' propensity to export. Rather, such barriers may be affecting all firms more or less equally and thus may not predict the variation between firms as far as propensity to export is concerned.

The location effects are insignificant, leading to the rejection of the hypothesis that the propensity to export varies across locations. This finding thus provides no support to the theory of economic geography and trade by Krugman (1992). The technical efficiency variable was also found to be insignificant, although it had the expected sign.

Older firms do not appear to export more or less than similar younger firms. In most specifications the effect of firm age and firm age squared were found to be insignificant, thus providing no evidence for the theory predicting that older firms are more efficient than younger ones as a result of a self-selection process taking place.

We also found a quadratic or non linear relationship between firm age and firm size with export propensity. However, the non-linear relationship between firm age and export was not significant. The finding of a non-linear relationship is consistent with earlier findings by Wakelin (1998) and Sterlacchini (1999) study, that identified an inverted U-shape relationship between firm size and export propensity.

To establish whether some of the independent variables may interact with one another we carried out regressions including interaction terms. As can be seen in Table 9, the firm size and capital–labour ratio interaction term was the only significant interaction term. The significant interaction term exhibited a negative association with export propensity, suggesting that large firms with a high capital–labour ratio were less likely to export than large firms with low capital labour ratio.

Table 9: Determinants of propensity to export (with interaction terms): Tobit estimates
Dependent variable: exports sales ratio

Variable	1	2	3	4	5
Constant (-4.4)*	-4.73 (-4.7)*	-9.3 (-4.72)*	-3.79 (-5.07)*	-6.19 (-3.04)*	-3.56
Log (capital–labour ratio) (2.48)*	0.155 (2.85)*	0.467 (3.86)*	0.0813 (2.19)**	0.24 (2.04)**	.0922
Log (firm size) (2.81)*	0.305 (5.65)*	1.652 (4.08)*	0.376 (-4.72)*	0.324 (5.84)*	0.28
Agro-industry dummy (1.15)	0.955 (4.13)*	0.716 (4.32)*	0.779 (4.37)*	0.387 (1.89)***	0.565
Chemical dummy (2.15	0.499 (2.1)**	0.253 (.75)	0.838 (1.26)	-.168 (-.05)	0.515
Asian dummy (2.02)**	2.862 (2.18)**	0.209 (1.38)	0.912 (2.0)**	0.329 (2.13)**	0.302
Agro*Asian	-.380 (-1.2)				
Agro*size (.49)					.0534
Agro capital–labour ratio				-.192 (-1.56)	
Chemical*Asian		0.173 (.44)			
Chemical*size			-.0849 (-.49)		
Chemical*capital–labour ratio				.0424 (.22)	
Size*Asian			-.142 (-1.42)		
Size*Capital–labour ratio 3.06)*		-.0878 (-3.44)*		-.137(-	
Pseudo R²	0.37	0.40	0.36	0.37	0.35
No. observations	266	266	266	266	266

Note: Reported values are marginal effects and the values in parentheses are the Z-statistics. ***, **, and * indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

We also explored the determinants of export propensity to different destinations: Africa and Western Europe, accounting for around 29% and 49% of Ugandan exports, respectively. Our results are shown in Table 10. The only significant

determinant variables that were consistently positively associated with the propensity to export to Western Europe were firm size and being an agro-based firm. This seems to suggest that Uganda has comparative advantage in agricultural products. Although other variables exhibited the expected signs, the coefficients were insignificant.

Table 10:   Determinants of propensity to export to different regions: Probit estimates

Dependent variable: exporting dummy

Variable	Africa region		Western Europe region	
	1	2	1	2
Constant	-7.726 (-4.28)*	-7.044 (-4.44)*	-4.424 (-2.79)*	-2.762 (-2.04)**
Log (capital–labour ratio)	0.309 (3.54)*	0.304 (3.63)*	0.0249 (.31)	0.0133 (.18)
Log (firm size)	0.500 (4.12)*	0.514 (4.11)*	0.338 (2.57)*0	0.284 (2.01)**
Log (firm size squared)	-0.102 (-1.66)***	-0.14 (-2.35)**	-.0985 (-1.4)	-0.0411(-.57)
Asian dummy	0.38 (1.33)	0.398 (1.41)	0.339 (.86)	0.367 (.88)
European dummy	-.00236 (-.00)	-0.0142 (-.02)	1.287 (1.32)	1.688 (1.64)***
Vocational trained manager	-0.264 (-.57)	-0.25 (-.43)	0.0216 (.04)	-0.0998 (-.18)
Graduate manager	0.133 (.35)	0.175 (.45)	0.243 (.52)	0.178 (.36)
Agro-industry dummy	0.457 (1.38)	0.414 (1.24)	1.381 (2.63)*	1.466 (2.76)*
Chemical dummy	1.0447 (2.52)*	1.104 (2.66)*		
Skilled proportion	0.955 (1.76)***		-.334 (-.57)	
Financial access	-0.136 (-.46)		0.191 (.52)	
Government efficiency	-0.141 (-1.2)		0.242 (1.31)	
Log (age)		-0.189 (-1.12)		0.0469 (.16)
Log (age-squared)		0.06 (.74)		-0.240 (-2.18)**
Location in city dummy		0.0666 (.18)		-0.24 (-2.18)**
Pseudo R-squared	0.41	0.40	0.31	0.36
No. of observations	266	266	266	266

Note: Reported values are marginal effects and the values in parentheses are the Z-statistics. ***, ** and * indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Turning to the determinants of export propensity to the Africa region, we found a consistent positive association of firm size, chemical firms, capital–labour ratio and skill intensity with the propensity to export to the Africa region. This again confirms our earlier finding that firm size matters as far as export propensity is concerned.

To establish the determinants that influence the decision to export or not, which is determined by the magnitude of sunk costs**,** we estimated an additional model. Following

Graner and Isaksson (2002) we analysed the factors explaining this decision using probit regression. The findings from the probit regressions are presented in Table 11.

Table 11:   Determinants of decision to export or not
Dependent variable: Export dummy

Variable	Decision to export or not (probit estimates)		
	1	**2**	**3**
Constant	-5.906 (-4.54)*	-5.88 (-4.72)*	- 6 . 1 7
	(-5.06)*		
Log (capital–labour ratio)	0.202 (2.98)*	0.224 (3.37)*	0 . 2 1 8
	(3.28)*		
Log (firm size)	0.476 (4.83)*	0.539 (4.96)*	0 . 4 8
	(5.02)*		
Log (firm size squared)	-0.0727 (-1.25)	-0.0957 (-1.65)***	-.0876
	(-1.57)		
Asian	0.634 (2.46)*	0.613 (2.37)**	0 . 6 8 1
	(2.63)*		
European	0.89 (1.11)	0.841 (1.05)	0 . 9 5 6
	(1.20)		
Vocational trained manager	0.0563 (.15)	0.128 (.33)	0.0826
	(.22)		
Graduate manager	0.213 (.65)	0.264 (.77)	0 . 2 6 8
	(.81)		
Agro-industry dummy	0.953 (3.18)*	0.224 (3.37)*	0 . 2 1 8
	(3.28)*		
Chemical	0.922 (2.34)**	1.0217 (3.08)*	0 . 8 2 5
	(1.9)***		
Paper			-0.189
	(-.37)		
Textile			-0.597
	(-.90)		
Skilled proportion	0.00236 (.56)		
Log (age)		-0.15 (-.95)	
Log (age squared)		-0.0347 (-.48)	
Location in city dummy		-0.232 (-.76)	
Financial access	-0.162 (-.64)		
Government efficiency	-0.0958 (-.90)		
R-Squared	0.41	0.42	0.41
No. of observations	266	266	266

Note: Reported values are marginal effects and the values in parentheses are the Z-statistics for probit regressions. ***, ** and * indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

As far as the decision to export is concerned, firm size, Asian ownership, capital–labour ratio, being an agro-based and being a chemical firm are the only variables that are consistently shown to be statistically significant. Other variables were insignificant.

5. Conclusion and policy implications

Our aim in this study was to establish the determinants of exports by Ugandan manufacturing firms. The study was based on descriptive and econometric analysis. Our focus was on factor intensities, firm characteristics and business environment factors.

The results from the descriptive analysis showed that exporting firms tend to operate on a larger scale than non-exporting firms and firms with foreign ownership tend to have higher percentage of exporting firms. In addition, most exporting firms also had top managers who had training beyond secondary education and the majority of exporting firms were from the agro-based and chemical, paint and plastic sectors.

The econometric results showed that capital–labour ratio, firm size, Asian ownership, being an agro-based and chemical firm are the major determinants of propensity to export. The major determinants of propensity to export to African countries were firm size, capital–labour ratio, skill intensity and being a chemical firm. Being an agro-based firm and firm size were the only significant variables determining propensity to export to Western European countries. On the determinants of the decision to export or not, firm size, Asian ownership, capital–labour ratio, being an agro-based and being a chemical firm are the variables that are consistently shown to be statistically significant.

Several policy implications arise from these findings. First, to promote exports, Uganda should design specific incentives such as tax holidays to attract new firms to agro-based and chemical sectors. Second, strategies should be designed to grow small firms into large ones; measures could include loan guarantee schemes for small and medium firms, tax holidays for joint ventures and mergers, etc. Third, the government should provide incentives for capital imports such as maintaining the current zero rating of capital imports. Finally, strategies aimed at attracting foreign direct investment, especially of Asian origin, should be designed such as improving economic productivity through the provision of infrastructure, labour force training and the creation of political confidence.

Notes

1. The countries reviewed included Burundi, Cameroon, Cote d'Ivoire, Uganda, Ghana, Kenya, Tanzania, Zambia and Zimbabwe, covering approximately 200 manufacturing firms.

2. See Bigsten et al., 1997; Helsinki School of Economics, 1995; Bagachwa and Mbelle,1995; Grenier et al., 1998; Teal, 1999; Clarke, 2005; Mengistae and Pattillo, 2004; Soderbom and Teal, 2003; Azam et al.; Neil et al., 2006; World Bank, 2004.

3. The data we have for Uganda do not have sufficient time series observations to allow us to use previous export activity of the firm to explain its current export status in this study.

4. See Lovell (1993) and Coelli et al. (2002) for more detailed discussion about the advantages and disadvantages of stochastic frontier approach and DEA approach.

5. The number of firms used in the regression is not equal to the rest of the regressions because some firms did not have all the data required to calculate technical efficiency using the DEA approach.

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