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Export Performance and Investment Behaviour of Firms in Ghana

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Daniel Bruce Sarpong and Susanna Wolf

Abstract:
From the theoretical literature a strong relationship between export performance and investment behaviour at the firm level is expected. A 2003 survey of 100 Ghanaian enterprises is used to analyse the factors that influence the investment and exporting behaviour of firms using a simultaneous equation model to allow for the endogeneity of investment and exporting. In addition, the different factors that influence the investment and export decisions in different sectors are investigated. However, no significant positive relationship between exporting and investment could be found. There seems rather to be a negative association, which might be explained by constraints in the access to capital. On the other hand there are several factors that work in the same direction, for example, younger firms, larger firms and more efficient firms are more likely to invest and more likely to export.

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1. Introduction

After two decades of macroeconomic stabilisation policies, Ghana still has a low GDP per capita and is highly dependent on commodity exports. Specifically, it is one of the countries with the lowest proportion of exporting manufacturing firms in Sub-Saharan Africa. To change this situation a shift towards non-traditional exports with higher demand growth and less price volatility is a precondition. However, the declining terms of trade and external shocks have an impact on macroeconomic variables such as exchange and interest rates and therefore reduce the prospects for investment and growth (UNCTAD, 2004). Therefore at the macro level export and investment performance are closely linked.

From previous studies and theoretical considerations, a strong relationship between export performance and investment behaviour at the firm level is also expected (Collier and Pattillo, 2000; Rankin et al. 2002, Söderbom and Teal, 2003). Because of fixed costs of marketing and access to foreign markets, a certain scale of operations is needed for a firm to be a successful exporter. Furthermore firms need to invest in equipment and technology, to produce goods of the required quality for exporting and to exploit economies of scale to produce goods more cheaply. On the other hand profits from good export performance might be used for subsequent investment, as many firms depend on internally generated funds.

In the literature evidence is mixed on whether export activities cause an increase in size and productivity, which is associated with investment or vice versa. In this paper the main question is whether this relationship runs in both directions for the Ghanaian agricultural and manufacturing sector. The hypothesis is that firms that are successful exporters will invest more and that firms that invest more are more successful with exporting.

After an overview of recent trends in investment and exports in the commercial agricultural and manufacturing sector, the investment and export patterns of private firms from a survey of 100 enterprises in Ghana are described. On the basis of this survey the factors that influence the investment and exporting behaviour of firms are analysed using a simultaneous equation model

to allow for the endogeneity of investment and exporting. However, no significant positive relationship between exporting and investment could be found. There seems rather to be a negative association, which might be explained by constraints of access to capital.

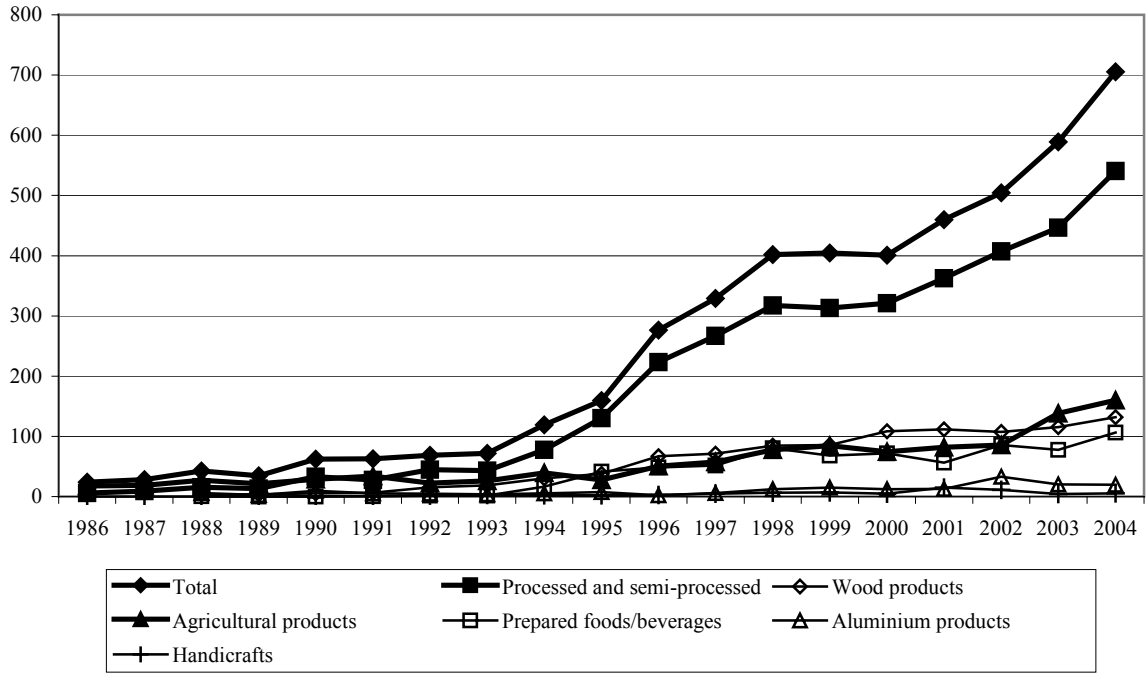
2. Growth, investment and export performance in commercial agriculture and manufacturing

After difficult times for Ghanaian firms in 1999 and 2000 because of macroeconomic instability - especially high inflation - the situation improved in 2001. The cedi stabilized after 2001 but the decline in the external value of the cedi in 1999/2000 led to a depreciation of the real exchange rate, which meant that exports became more competitive, whereas imports became relatively more expensive than domestically produced goods (Wolf, 2003). After some stagnation between 1998 and 2000, the value of NTE has increased by 75 per cent between 2000 and 2004, making it a suitable period for the study of export performance. However, the value of NTE started from a relatively low level of US$ 62.3 million in 1990 and has reached US$ 705.4 million in 2004, which represents a share of around one third in total export earnings in recent years but declined to one quarter in 2004, due to a jump in cocoa exports (ISSER, 2005). The number of NTE firms did not change significantly during that period, which means that the existing exporters have been able to expand their exports.

In 2004 the bulk of NTE was processed and semi-processed products including wood products (19 per cent of total, mainly builders woodwork and sliced veneers), prepared foods and beverages (15 per cent of total, mainly canned tuna), aluminium products (3 per cent of total) and other processed and semi-processed products (40 per cent of total, mainly cocoa products, cotton sheets and cut pineapples), which together constituted 77 per cent of the total. It has to be noted that the last category includes a large share of processed agricultural products (approximately 25 per cent of total). Other NTE are agricultural products with 23 per cent (up from 17 per cent in 2002) where pineapples and yams make the bulk of exports. Handicrafts only

constituted 1 per cent of total NTE, which is a decline from 3 per cent in 2001 (figure 1).

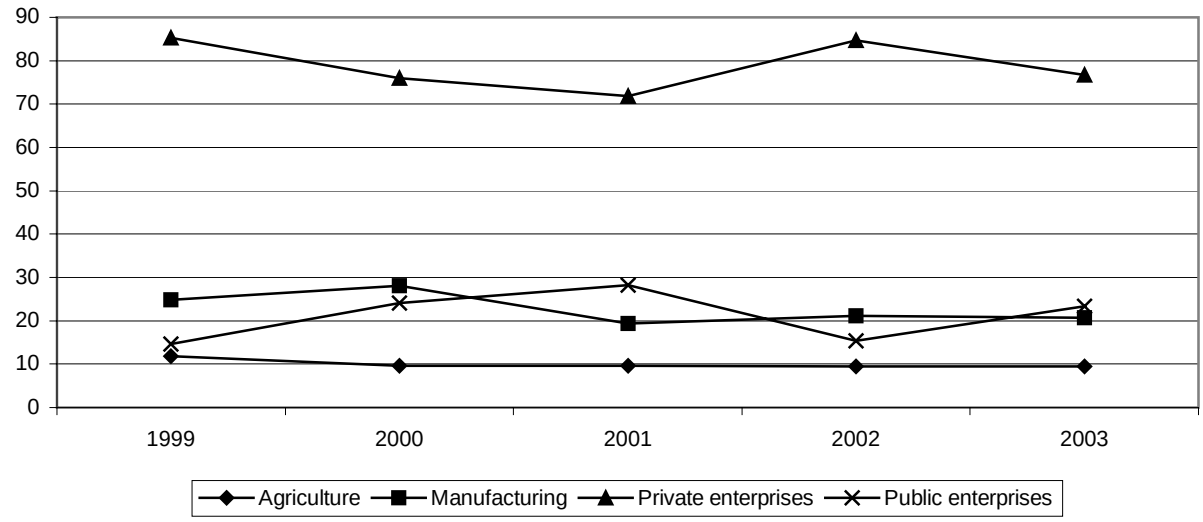
Figure 1: Non-traditional exports by sector 1986-2004, value in US$



Source: GEPC, 1987-2005.

One of the major constraints for the private sector in Ghana is its limited access to finance. High real interest rates make it more attractive for banks to buy government bonds than to finance investment in risky businesses. In recent years a number of special credit programmes were put in place, especially in the area of micro-credit, but so far they are not sufficient to meet the demand (Aryeetey et al. 2000). Bank lending to the private sector has not improved much in real terms from 2000 to 2002. The share of credits from Deposit Money Banks (DMB) to the manufacturing sector declined from 28% in 2000 to around 20% between 2001 and 2003. Also for the agricultural sector the share declined from 12% in 1999 to around 9.5% thereafter. Most of the credit to the private sector went into services. After a decline between 1999 and 2001 the share of the private sector in credits to all enterprises rose again (see Figure 2). In 2003 also the real value of credits to private enterprises increased by around 10% (BoG, 2004).

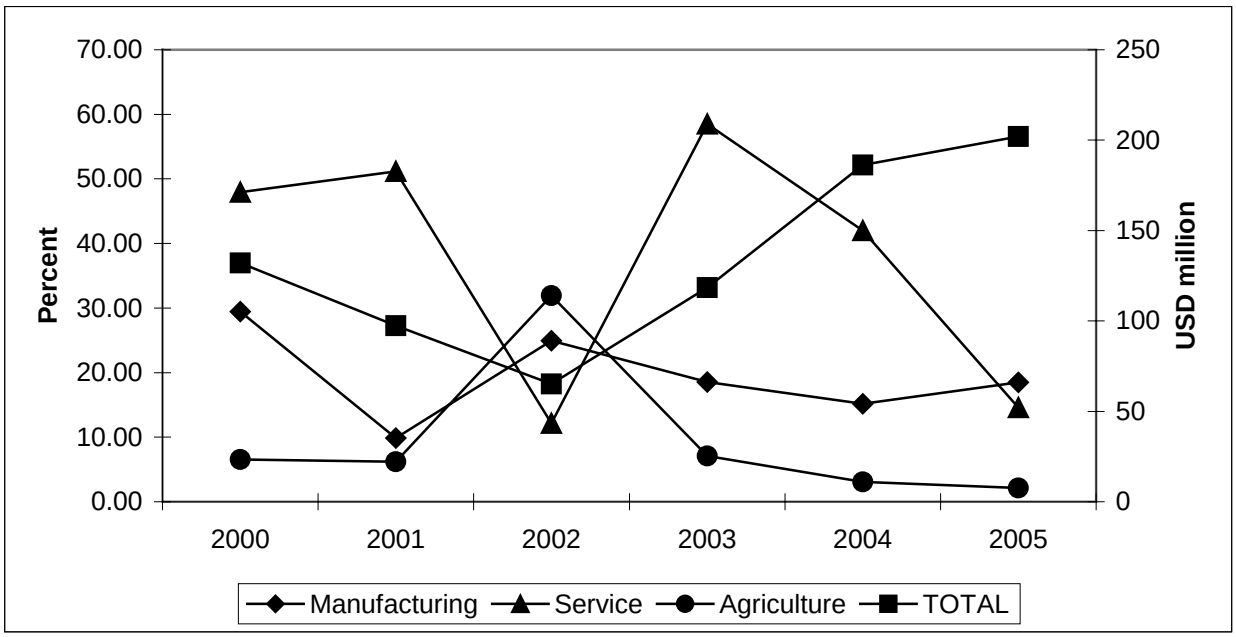
Figure 2: Sectoral Allocation of DMB Credit, 1999-2003 (%)



Source: ISSER, 2003 and BoG, 2004

Overall, the development of FDI follows a similar pattern as credit to the private sector. In the services sector, which accounts for the highest share of FDI, investment is associated with lower sunk costs and shorter turnover periods making investment more flexible and reversible.

Figure 3: FDI, 2000-2003, Total in million USD, manufacturing, agriculture and services in %



Source: GIPC, 2004

Note: GIPC figures do not include investment in the mining sector.

From 1999 to 2002 the Dollar amounts of FDI declined further and only from 2003 an increase to2 02 million USD in 2005 was observable, although the 2000 levels were not reached again. The share of the invested capital in the manufacturing sector was around 20% whereas agriculture played only a minor role for foreign investors with less than 10% of invested capital, except for 2002 where it increased to more than 30% (see Figure 3).

3. Characteristics of sample firms

A survey of 100 agricultural and manufacturing firms in Ghana that was administered in 2003 is used for the analysis. As the focus of the study is on investment behaviour and export performance, a stratified sampling approach (that oversamples larger firms and firms that do export) was used and only formally registered enterprises are included.[1]

To capture dynamic aspects of firm performance, most questions were asked for the years 2000, 2001 and 2002. The firms in the sample cover most sectors that are relevant in Ghanaian manufacturing and non-traditional agricultural export products.

In the enterprise sample, the agricultural sector comprises mainly pineapple and papaw producers as well as producers of cassava, yam, and pepper, but no cocoa producers as the focus of the study is on NTE. In the agricultural processing sector, there are a number of beverage producers (beer and soft drinks) as well as producers of vegetable oil, diary products etc. In the wood and furniture sector no producers of raw timber are included but mainly furniture companies. The textiles and garments and handicraft sectors are aggregated as the textiles sector includes batik and kente weaving which is often categorised as handicraft. In the aluminium sector producers of roofing sheets, louvre blades and cooking utensils are covered. The plastic and rubber sector covers producers of packaging material and household goods. Other

[1] A stratified sample is appropriate if firms within groups are relatively similar but there are significant differences between groups, especially size categories. The main lists from which enterprises were drawn are the list of non-traditional exporters in 2002 from GEPC and the list of agricultural and manufacturing companies with foreign investment between 1994 and 2000 from GIPC.

manufacturing is a residual category and captures salt, cosmetics, and other metal products among others.

Of the 100 firms, 68 are located in Accra, 13 in Tema, 11 in the Northern Region (mainly agricultural, agricultural processing and textiles) and 8 in other regions.[2] Some of the surveyed enterprises have been operating for quite a long time - roughly one quarter of them before the beginning of the Economic Reform Programme in 1983. These older firms were often started as state owned enterprises or taken over by the state and (partly) privatised later. The majority of firms have only been registered over the past decade. This reflects the relatively high exit rate especially of small and medium enterprises, which cannot be captured by this type of survey.

Investment behaviour

Overall only 43% of the enterprises did any new investment in a given year (see Table 1), an observation that is in line with previous findings of private firms in Ghana (Rankin et al., 2002). The propensity to invest was highest in agricultural processing, which also has a high capital intensity. In general, the propensity to invest increases significantly with size. The large proportion of big enterprises and subsidiaries of multinational firms in the agricultural processing sector explains the higher percentage of firms that invest, as access to finance is less problematic for these firms. However, due to loans denominated in foreign currencies, some firms experienced high exchange rate losses, especially in 2000 when the cedi depreciated heavily. Most of the smaller firms reported that they finance investments from profits.

The amount of investments a firm makes if it invests at all is 18% of the total capital stock on average. This level is also comparable with the results of other studies (Rankin et al, 2002). In the agricultural sector the high investment rate is driven by one relatively newly established firm.

[2] Because of time restrictions other commercial centers, especially Kumasi and Takoradi could not be included in the study. However previous studies of Ghana's manufacturing sector did not find any location specific effects (see Rankin et al., 2002).

Also in the plastic and rubber sector, which is relatively capital intensive, investment rates are relatively high, which is mainly driven by the growth of medium sized enterprises.

Table 1: Propensity to Invest and Investment Rates (%) by Size and Sector, av. 2000-2002

	size category (number of employees)			
Propensity to invest[a]	*less than 20*	*20 to 75*	*more than 75*	*Total*
agricultural	0.17	0.42	0.47	0.34
agricultural processing	0.47	0.46	0.72	0.60
textiles/garments + handicraft	0.15	0.31	0.60	0.28
wood and furniture	0.43	0.25	0.33	0.38
aluminium	0.47	0	0.46	0.42
plastic and rubber	0.25	0.38	0.36	0.36
other manufacturing	0.29	0.80	0.50	0.50
All	0.31	0.40	0.52	0.43
Average investment rate[b]				
agricultural	96	13	9	24
agricultural processing	21	32	14	19
textiles/garments + handicraft	16	9	2	8
wood and furniture	5	3	55	21
aluminium	29	-	14	18
plastic and rubber	1	53	16	23
other manufacturing	16	16	1	7
All	23	25	14	18

Notes: a - investment propensity means the likelihood that a firm in a specific sector invests.
b - amount invested divided by the total capital stock if a firm invests

Small and medium sized enterprises have on average a higher investment rate than large enterprises if they invest, but they are less likely to invest at all, which is consistent with earlier studies (Pattillo, 1998 and Rankin et al., 2002). This reflects the problems of access to credit for

small enterprises. They can only invest if they have accumulated enough profits. In addition, small firms are constrained by the fact that investment in office equipment, machines or vehicles has to be made in one large sum, as not many opportunities for leasing exist.

Characteristics of exporting firms

In total, 62% of the firms in the sample are engaged in exporting (table 2). This clearly is a higher percentage than the average for all firms in Ghana, due to the sampling procedure used. In total GEPC lists only 215 manufacturing enterprises, 27 handicraft producers and 178 agricultural producers, who were actively exporting in 2002 (GEPC, 2003). On average 36% of all exports are targeted towards other ECOWAS countries. However, it is likely that a significant proportion of exports towards other countries in the region is done by informal traders and therefore not reported, as the producers do not know its extent.

A clearly positive relationship exists between size and the likelihood to export, as can be seen from Table 2. Less than half of the small firms are engaged in exporting but 73% of the large firms export.[3] On average, exporting enterprises have approximately twice the number of employees than non-exporters. However, if small firms export, they tend to export a higher fraction of their production than larger firms. On average, exporting firms export around half of their output, which is comparable to other studies (Rankin et al., 2002). The positive relationship between size and exporting could be explained by different factors. Small exporters have a relatively high share of exports in total output. This observation is compatible with the high fixed costs of exporting, e.g. establishing contacts, acquiring market information or specific product design for overseas markets. Therefore, exports are only profitable for smaller firms, if a large proportion of output is exported. On the other hand, larger firms may be better able to finance these costs and are therefore more likely to export.

Table 2: Propensity to Export and Export Intensity (%) by Size and Sector, average 2000-2002

	size category (number of employees)			
Propensity to export[a]	*less than 20*	*20 to 75*	*more than 75*	*All*
agricultural	0.94	0.85	0.83	0.88
agricultural processing	0.21	0.65	0.60	0.54
textiles/garments + handicraft	0.70	1.00	1.00	0.85
wood and furniture	0.00	0.00	0.67	0.21
aluminium	0.45	0.00	0.65	0.53
plastic and rubber	0.67	0.50	0.92	0.81
other manufacturing	0.00	0.00	0.67	0.35
All	0.46	0.65	0.73	0.62
Export intensity if a firm exports[b]				
agricultural	94	70	86	84
agric. processing	60	67	40	50
textiles/garments + handicraft	57	95	32	66
wood and furniture	-	-	54	54
aluminium	72	-	18	33
plastic and rubber	5	5	35	30
other manufacturing	-	-	40	40
All	71	71	41	56

Source: Author's calculations
Notes: a - export propensity means the likelihood that a firm in a specific category exports.
b - percent of output that is exported if a firm exports.

The huge differences in export shares of the different sectors are due to various factors. For some sectors, transport costs are prohibitively high so they only can export to neighbouring countries (e.g. mattresses and beverages). Aluminium products and plastic and rubber articles are predominantly exported to other ECOWAS countries. This explains the relatively small percentage of exports in these sectors, which is hampered by the slow implementation of the free

[3] As exporting firms are over sampled the share of exporting firms does not represent a national average. There is evidence from other studies that less than 20% of all manufacturing firms in Ghana export (Rankin et al. 2002).

trade area. By contrast, almost all commercial agricultural as well as textiles, garments and handicrafts enterprises in the sample produce to some extent for the export market. These sectors export a high percentage of their output towards Europe and the US, which indicates a high degree of specialization.

In general, firms with some foreign participation tend to export less, which means that their main reason for producing in Ghana is not to exploit the Ghanaian comparative advantages, such as cheap labour, but rather to penetrate the Ghanaian market. This corresponds with the relatively high percentage of foreign investors in the agricultural processing and plastics sector which both serve mainly the domestic and regional market.

In a number of other characteristics, exporters differ from non-exporters. For example, exporters employ considerably more women, have a higher rate of capital utilization and use more modern, imported machines. These factors might contribute to lower costs of production and higher productivity.

On average, the percentage of firms that exported increased from 61% in 2000 to 65% in 2002, whereas the share of exports in total output for exporters declined from 61% in 2000 to 57% in 2002, although the differences are not significant. This means that the export intensity has declined over the period. As the real value of output has increased over the same period this is not necessarily associated with a decline in absolute exports and therefore compatible with the overall picture of Ghanaian non-traditional exports. As inflation and depreciation were high in 2000, firms were forced to export relatively more, as domestic demand was restricted. This is in line with the lower perception of insufficient demand as a major business obstacle by exporting enterprises compared to non-exporters. However, aspects like access to domestic raw materials, inappropriate industrial policies, high interest rates and shortage of skilled labour are perceived as more problematic by exporters.

Table 3: Export and investment categories, average 2000-2002

			investment category		*Total*
			no	*yes*	
exporting category	no	% of exporting category	56.3%	43.8%	100.0%
		% of investment category	37.3%	35.3%	36.4%
	yes	% of exporting category	54.1%	45.9%	100.0%
		% of investment category	62.7%	64.7%	63.6%
	Total	% of exporting category	54.9%	45.1%	100.0%
		% of investment category	100.0%	100.0%	

Note: The figures in the upper lines add up horizontally, whereas the figures in the lower lines add up vertically. For example the first figure in the first line means that 56.3% of those enterprises that do not export also do not invest.

The differences in investment behaviour between exporting and non-exporting enterprises in the sample are smaller than expected. However, more of the exporting enterprises also invest and more of the investing enterprises also export (see Table 3). However, these differences are not statistically significant at the 5% level.

4. Methodology

As the direction of the relationship between exporting and investment is not obvious, the methodology that is used to capture the possible endogeneity of export performance and investment behaviour is a simultaneous-equation model. As a significant proportion of firms do not invest and/or export in a given period, the decisions to invest and export are estimated using probit regressions. The share of investment in total capital and the share of exports in total output are then modelled in a next step conditional on the decision to invest and the decision to export respectively, using a two stage least-square approach.

To enter the export market new investment is needed in many cases to produce more goods of

higher quality (see above). The investment ratio can also be seen as a proxy for better technology. Technology is explicitly used in other studies (Bernard and Jensen, 2004) but no direct observation is available in the dataset used here.

Theoretically a firm will make an investment if the expected present value adjusted by risk aversion is greater than the investment costs. The expected payoff cannot be measured directly but it can be assumed that past efficiency and firm size are used as a basis for investment decisions. Indicators such as firm age and foreign ownership are assumed to have an impact on risk attitude and access to finance, which in turn influences investment costs. Unfortunately, variables that capture the risk attitude of entrepreneurs and the uncertainty of the environment directly were not available (see Pattillo, 1998).

The decision to export and the decision to invest

As the decision to export and the decision to invest are made at the same time, a simultaneous equations approach is used. Whether a firm exports or not does not change from year to year so it will depend more on long-term development, whereas the decision to invest in a given year varies much more. Therefore the following model is used:

$$P(I = 1) = G(z\delta_1 + \alpha_1 E + u_1) \quad (1)$$

$$P(E = 1) = G(z\delta_2 + v_1) \quad (2)$$

where I is an investment dummy, E is an exporting dummy, and z is a vector of explanatory variables. G is the standard normal distribution. The Rivers-Vuong approach was used to test for the exogeneity of E (see Wooldridge, 2002, p. 473ff). The test did not reject the Null hypothesis that E is exogenous, so equation (2) was also estimated with a simple probit regression.[4]

[4] For binary regressions the two stage approach cannot be used (Wooldridge 2002, p. 478). Although panel data are used for the analysis, in the binary regressions it is assumed that there are no firm specific fixed effects and therefore simple probit regressions can be used. Under the assumption that the model is dynamically complete this is a valid procedure (see Wooldridge 2002).

Export intensity and investment ratio

The basic model considered here allows for the endogeneity of export and investment intensity. Therefore a two-stage least squares approach is used with the following simultaneous equation model:

$$Exp = \alpha_{1,0} + \alpha_{1,1}\, Inv + \beta_1\, X_1 + u_1 \qquad (3)$$

$$Inv = \alpha_{2,0} + \alpha_{2,1}\, Exp + \beta_2\, X_2 + u_2 \qquad (4)$$

where Exp is the share of output exported, Inv is the investment ratio and X_1 and X_2 are different sets of exogenous variables.

To control for self-selection into exporting and investment the Heckman procedure is used to estimate the determinants of export and investment intensity (Greene 2000; Wooldridge 2002). To estimate equations (3) and (4) the inverse Mill's ratios t are obtained from results of equations (1) and (2) and are used to control for sample selection bias.[5]

For the analysis of the factors associated with the export intensity, random effects panel regressions are used. From the descriptive statistics, it is already known that larger firms are more likely to export but their export intensity is lower than for small firms. This leads to the assumption that the factors associated with export intensity might differ from those associated with the decision to export.

Variables

The independent variables include firm age, share of FDI in capital, firm size (measured as number of employees), importing, use of business services, technical efficiency and sector, which are mostly used in similar analysis (Pattillo, 1998; Bigsten et al, 1999; Rankin et al. 2002). The relationship of potential independent variables with exporting and investment is described in the following:

[5] To be able to include time invariant determinants of export intensity especially the sector dummies, random effects panel regressions are used for the estimation of the determinants of export shares and investment ratios. As the inverse Mills ratios differ for the two equations no identification problem occurs.

- Firm size is likely to increase both the probability of exporting as well as the export intensity as it allows firms to make use of economies of scale. Size may be associated with lower average or marginal costs. For example, it might lower capital costs and increase access to banking services, which might be more important for exports than domestic sales. For larger firms it might be also easier to cover the fixed costs of export market entry, such as product compliance, market studies, additional marketing efforts, and establishing contacts. Firm size, measured as number of workers or size of capital stock, is found to be a significant determinant of exporting in most studies of exporting. Larger firms have been more successful and therefore have higher resources from retained earnings for future investments. They also have better access to finance. Furthermore, for small firms, even the purchase of one machine might be beyond their means so they invest less frequently due to the indivisibility of investment goods. However, an increase in the workforce might lead to greater capital utilisation instead of more investment and a decrease in the workforce might not be associated with rationalisation investment (Roberts and Tybout, 1997; Bigsten et al., 1999; Kneller and Pisu, 2004; Bernard and Jensen, 2004).
- The age coefficient might also capture cost differences among firms as inefficient producers will exit over time and older firms might undergo some learning and have better access to credit as they are known to banks (Roberts and Tybout, 1997; Bigsten et al., 1999; Bernard and Jensen, 2004). Older firms might invest less frequently than younger firms as the older firms have come closer to their optimal size whereas new firms build up their business over a number of years and do not jumpstart operations. On the other hand there is evidence that entrepreneurs start small to test the market for their product and only increase operations once they have developed an accepted product. From the general investment pattern it can be concluded that younger firms will use

newer machinery and equipment, which is associated with more current technology (see Rankin et al., 2002).

- Higher import intensity gives access to higher quality inputs and might therefore result in higher quality products that are easier to export. However, as import barriers constitute taxes on exporting, the use of imported inputs could also reduce competitiveness (Greenaway and Kneller, 2005). Although the number of signatures needed for exports and imports is much less in Ghana than the SSA average the time needed to clear them is still around 50 days, which is about twice as much as in East Asia (World Bank, 2005). But imported inputs are also more expensive, especially as there was a major depreciation of the cedi in 2000, which reduced the competitiveness of firms that are dependent on imports. The use of imported inputs is also associated with higher risk as delivery of domestic inputs might be more regular and might have a shorter planning period as compared to imported inputs which are subject to border delays (see Söderbom, 2000). For the decision to invest it is not expected that imports would play a role.
- While FDI can be a strategy to penetrate foreign markets, there is also empirical evidence for export platform FDI, making use of cost differences and the availability of raw materials. In addition, their fixed costs of entering the export market may be lower as they already have knowledge of and contacts with foreign markets. Several studies find that not only in developing but even in industrial countries such as the UK foreign firms export more. Firms with foreign ownership are also more likely to invest as they have better access to credit (Kneller and Pisu, 2004; Bigsten et al. 1999; Bernard and Jensen, 2004).
- A higher capital-labour ratio could lead to more exporting, as it is associated with products of higher quality and more modern production processes. But if exporting is concentrated in labour-intensive activities the export propensity should fall with the capital-labour ratio (Bigsten et al., 1999; Bernard and Jensen, 2004).

- **T**rained workers are better able to use new machinery and thus could have a positive impact on both investment and exporting. The use of business services, such as accounting, feasibility studies and marketing is positively associated with exporting. The indicator used reflects the intensity of use of services in 4 categories (never, rarely, sometimes, regularly). The relationship between exporting and use of business services could run in both directions as firms that want to enter into exporting might use more business services.

Other independent variables that might play a role in exporting or investment are characteristics of the manager or owner like female ownership or years of education. A few firm characteristics that are used in other studies could not be used here, due to data restrictions. For example, the past export status is found to be a significant explanatory variable in most analyses of the decision to export but as for many firms only 2 observations are available the inclusion of past export status would reduce the number of observations too much (Roberts and Tybout, 1997; Clerides et al., 1998; Bernard and Jensen, 2004). The wage rate that is considered to capture skill differences has turned out to be not significant in several studies (Roberts and Tybout, 1997). Thus the omitted variable bias is expected to be small but it might still overstate the importance of the variables that are included in the analysis and that might be correlated with the omitted variables.

As a specific interest of this study is on the differences in exporting and investment between sectors, not only sector dummies are included but the firm characteristics are also interacted with the sector dummies. The firm characteristics are all treated as exogenous in both regressions although past export and investment performance might have an influence on some of them, for example profits from exporting might impact on firm growth and investment. Therefore the regression results cannot be interpreted as casual relationships, strictly speaking.

Efficiency of enterprises

Efficiency is also positively associated with exporting and investment. Theoretically the causality could run in both directions. There is widespread agreement in the literature that there is self-selection of more productive firms into exporting. The evidence for learning by exporting is less robust (Roberts and Tybout, 1997; Kneller and Pisu, 2004; Bernard and Jensen, 2004; Greenaway and Kneller, 2005). Likewise firms with higher investment in technology should be more efficient and more efficient firms should make more profit, which can be used for future investment.

In this paper technical efficiency is measured as the time invariant residual from a Cobb-Douglas production function using random effects panel regressions. Value added (VA) is expressed as a function of capital (K) and labour (L) (equation 5). Capital is measured as the replacement value of equipment, land and buildings. Labour is measured as wage expenditure to capture different skill levels, as the education indicator is not available for a number of firms. Firm age (also squared) is entered as a control to capture the experience of the firm, but is not significant. The production function is reported below with standard errors in parenthesis.[6]

$$\ln(VA) = \underset{[0.016]}{2.020} + \underset{[0.074]}{0.156^{*}}\ln(K) + \underset{[0.106]}{0.800^{**}}\ln(L) + \underset{[0.029]}{0.033}\,age - \underset{[0.0005]}{0.0003}\,age^{2} \qquad (5)$$

(Figures in parenthesis are standard errors)

In the estimation, year and sector dummies are used as further controls but not reported here. A test for the sum of coefficients for K and L being equal to one leads to acceptance so it can be concluded that in the overall sample there are no economies of scale.

[6] A random effects specification is used although the Hausman test rejects the assumption that the variables and the unobserved firm effect are not correlated. One reason is that otherwise time invariant factors (especially sector)

5. Empirical Results

The decision to export

First, the factors that are associated with the decision to export are determined. Table 4 reports the results of two probit regressions with and without interaction terms as explanatory variables. Although the significance is not robust to the inclusion of different control variables, the likelihood to export first decreases and then increases with firm age in specification [2]. This partly confirms the learning effects that are necessary for exporting. In the aluminium sector an increase in age is directly positively associated with exporting.

In all specifications the coefficient for firm size is positive and significant, which is in line with the observations in Table 2 and with findings of other studies of Ghana's exporting firms (see Rankin et al. 2002 and Söderbom and Teal 2003).

The percentage of raw materials that are imported seems to have a negative effect on the probability that a firm exports, a fact that could be explained by higher costs of imported inputs. However, this effect is overcompensated in the agricultural processing and plastic sector where the percentage of imported inputs has a positive impact on exporting. In agricultural processing, packaging material, that is often not available locally, is a crucial input and in the plastic sector 98% of all inputs are imported.

Likewise the firms with more foreign ownership tend to be less export oriented but rather serve the domestic market, in particular in the agricultural processing and plastic sectors. This is contrary to the expectation that firms with foreign ownership, that already have some links to foreign countries, face lower costs of exporting (Bigsten et al. 1999).[7]

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cannot be included in the regressions. When separate regressions are run for each sector the Hausman test does not reject the assumption that the variables and the unobserved firm effect are not correlated.

Table 4: Probit regression of decision to export, exporting = 1, marginal effects

	[1]		[2]	
Firm age	-0.007		-0.011	
	(0.008)		(0.005)	**
Firm age^2	0.0002		0.0002	
	(0.0001)		(0.0001)	*
% of FDI	-0.007			
	(0.002)	***		
Import intensity	-0.003		-0.004	
	(0.001)	**	(0.002)	***
ln firm size	0.239		0.235	
	(0.049)	***	(0.047)	***
Index business services	0.076		0.105	
	(0.041)	*	(0.033)	***
Firm efficiency (value added)	-0.040		0.072	
	(0.048)		(0.034)	**
age * agric. processing			0.004	
			(0.006)	
age * aluminium			0.012	
			(0.007)	*
FDI* agric. processing			-0.010	
			(0.002)	***
FDI* plastic			-0.020	
			(0.005)	***
imports*textiles etc.			0.005	
			(0.002)	**
imports * aluminium			0.008	
			(0.0029	***
Agriculture	-0.391		-1.844	
	(0.206)	*	(0.462)	***
Agric processing	-1.056		-2.176	
	(0.194)	***	(0.497)	***
Textiles/garments + handicrafts	-0.233		-1.693	
	(0.221)		(0.432)	***
Wood and furniture	-1.336		-2.443	
	(0.236)	***	(0.575)	***
Aluminium	-0.922		-2.668	
	(0.222)	***	(0.632)	***
Other manufacturing	-1.446		-2.785	
	(0.355)	***	(0.654)	***
No of observations	164		164	
Percent correctly predicted	81.71		90.24	
Pseudo R squared	0.4244		0.5899	
Log likelihood	-59.4		-42.3	

Source: Author's calculations

Notes: level of significance: * 10%, ** 5%, *** 1%; Heteroskedasticity-robust standard errors in parenthesis (using Huber/White corrections).

The use of various business services is positively associated with exporting as expected. Whereas in regression [1] the efficiency parameter derived from the value added specification of

[7] A dummy for subsidiaries of multinational firms was introduced to distinguish them from firms with foreign ownership that mainly operate in Ghana but this dummy is not significant (not reported).

the production function is not significant, in regression [2] it is positively associated with exporting, which means that firms with higher efficiency are more likely to export.

As was already seen in Table 2 the likelihood to export is highest in agriculture and textiles and handicraft as compared to the other sectors.

As stated earlier the likelihood to export increased from 2000 to 2002 but the coefficients of the year dummies are not significant and are therefore dropped from the final regressions. The insignificance of the time dummies could be due to the fact that changes in macroeconomic policies and business climate were either not very big or had no strong association with the decision to export. Many general managers of the sampled firms saw little improvement in the business environment.

The decision to invest

Table 5 reports the results of two probit regressions, with and without interaction terms as explanatory variables, in the decision to invest.

The likelihood to invest seems to decrease with firm age. However, in the agricultural processing sector an increase in age is positively associated with investing and therefore the negative effect is partly offset.

Firms with more foreign ownership tend to be more likely to invest, which is mainly due to their easier access to finance. This effect is especially strong in the plastics and rubber sector, where most enterprises are foreign owned. The fact that a firm does export does not have a significant relationship with investing.

In both specifications the coefficient for firm size is positive and significant, which is in line with the observations in Table 1 and previous studies (Pattillo, 1998 and Rankin et al., 2002). More efficient firms seem also more likely to invest, as they also expect higher payoffs in the future.

By contrast the coefficient of capital per worker is negative and significant for both specifications, which means that more capital-intensive firms are less likely to invest. This could indicate that some firms are too capital intensive and therefore do not use the optimal allocation of labour and capital.

Table 5: Probit regression of decision to invest, investing = 1, marginal effects

	[1]		[2]	
Firm age	-0.009		-0.014	
	(0.005)	**	(0.006)	**
% of FDI	0.003			
	(0.002)	*		
Export dummy	-0.006		0.075	
	(0.125)		(0.139)	
ln (firm size)	0.143		0.110	
	(0.053)	***	(0.055)	**
ln (capital per worker)	-0.046		-0.067	
	(0.027)	*	(0.033)	**
Firm efficiency (value added)	0.133		0.115	
	(0.057)	**	(0.068)	*
Female owner dummy	-0.019		0.041	
	(0.147)		(0.192)	
age * agric. processing			0.012	
			(0.007)	*
FDI* plastic			0.052	
			(0.005)	***
exports*agriculture			-0.006	
			(0.004)	
ln (size) * textiles etc.			0.353	
			(0.106)	***
Agriculture	0.063		2.063	
	(0.265)		(0.558)	***
Agric processing	0.443		1.928	
	(0.256)	*	(0.476)	***
Textiles/garments + handicrafts	-0.161			
	(0.262)			
Wood and furniture	0.309		1.941	
	(0.263)		(0.477)	***
Aluminium	0.294		1.958	
	(0.258)		(0.474)	***
Plastic and rubber	-0.098		-3.142	
	(0.696)		(0.122)	***
Other manufacturing			1.754	
			(0.538)	***
No of observations	157		157	
Percent correctly predicted	52.23		49.68	
Pseudo R squared	0.2348		0.3463	
Log likelihood	-82.6		-70.5	

Source: Author's calculations
Notes: level of significance: * 10%, ** 5%, *** 1%; Heteroskedasticity-robust standard errors in parenthesis (using Huber/White corrections).

The likelihood to invest is highest in commercial agriculture. This might be due to the fact that investment in agricultural machines is more easily reversible than investments in other sectors, as there are no installation costs and there are alternative possibilities for using the machines in the large Ghanaian agricultural sector (see Pattillo, 1998). Other factors being equal, firms in agricultural processing, wood and furniture, and aluminium production are also more likely to invest as compared to the other sectors.

The coefficients of the year dummies, that could capture changes in the uncertainty of the environment, are not significant and are therefore dropped from the final regressions. This indicates that the investment frequency has not changed over the period.

The goodness of fit of the models is not very high, probably because no dynamic effects could be included as available time periods are very short.

So far no relationship between exporting and investment could be found. However, some factors work in the same direction for both decisions. For example, firm age has a negative association with both the likelihood to export and invest whereas firm size and efficiency are positively associated with both decisions. On the other hand the share of foreign ownership has a negative effect on the likelihood to export and a positive effect on the likelihood to invest. For further investigation of the issue the export and investment intensity are analysed.

Export intensity

The results for the factors associated with the export intensity of exporting firms are reported in Table 6. The inverse Mill's ratio was obtained from regression [1] in Table 4 is used to control for sample selection bias.

In contrast to the decision to export, firm age seems to have no effect on the export intensity once the firm has entered the export market. Only for wood and furniture producers the export intensity increases, whereas for other sectors the coefficients of the interaction terms are not

significant and therefore dropped from the regression. Size is again positively associated with export intensity, which is contrary to other findings.

Firm efficiency is also positively associated with the export intensity so more efficient firms are not only more likely to export but also export a bigger share of their production. The coefficient of the capital labour ratio is not significant and therefore dropped.

Table 6: Random effects regression of export intensity, with correction for sample selection

	[1]		[2]	
Investment ratio[a]	-23.685		-25.424	
	(13.054)	*	(15.296)	***
Firm age			-0.058	
			(0.268)	
Share of regional exports	-101.516		-99.881	
	(19.494)	***	(21.007)	***
ln firm size	3.206		3.273	
	(1.530)	**	(1.569)	**
Firm efficiency (value added)	13.061		13.217	
	(4.695)	***	(4.783)	***
Index education	-4.679		-4.740	
	(8.453)		(8.528)	
FDI * other manufact.			3.969	
			(1.354)	***
Age * wood			4.422	
			(1.510)	***
Agriculture	98.248		99.124	
	(17.850)	***	(18.428)	***
Agric processing	86.076		86.925	
	(23.325)	***	(23.824)	***
Textiles and handicrafts	81.764		82.865	
	(18.010)	***	(18.837)	***
Wood and furniture	102.472			
	(34.258)	***		
Aluminium	138.859		138.892	
	(29.569)	***	(29.809)	***
Plastic	110.211		109.591	
	(26.953)	***	(27.336)	***
Other manufacturing	116.484			
	(38.432)	***		
Lambda (inv. Mills ratio)	-4.196		-4.325	
	(5.103)		(5.165)	
No of observations	83		83	
R^2 overall	0.7006		0.6982	

Source: Author's calculations

Notes: level of significance: * 10%, ** 5%, *** 1%; a - instrumented using all independent variables in equations (4) and (5), standard errors in parenthesis

The investment ratio (which has been instrumented) seems to be also negatively associated with export intensity. This is contrary to the theoretically positive relationship between exporting and investment discussed before. However, to investigate this relationship in more detail, time lags would have to be considered. Given the constraints in the capital market, additional investment could lead to the reduction of working capital, which makes it difficult to meet export orders unless they are pre-financed by the customer.

Again certain firm characteristics have different effects on the export intensity in different sectors. Firms with a higher share of FDI in capital in other manufacturing and older wood processing firms seem to export more.

The coefficients for the sector dummies are all significant in both regressions. Especially in aluminium processing the share of exports in total output is higher than the average for the whole sample, after controlling for other factors.

Other factors that might be associated with export intensity like education of the workforce, giving training to workers, and the rate of capacity utilization are not significant and are not reported here.

The investment ratio

For the analysis of the factors associated with the investment ratio, again random effects panel regressions are used. The inverse Mill's ratio was obtained from regression [1] in Table 5 is used to control for sample selection bias. The Hausman test was in favour of random effects regressions.

From the descriptive statistics it is known that larger firms are more likely to invest but their investment ratio is lower than for small firms. This leads to the assumption that the factors associated with the investment ratio might differ from those associated with the decision to invest. The results are reported in Table 7.

In contrast to the decision to invest, firm age seems to have no effect on the investment ratio once the firm has decided to invest and therefore age was dropped from the regression. The same holds for FDI. These findings are again in line with findings from other studies (Pattillo, 1998 and Rankin et al. 2002).

In line with the descriptive statistics in Table 1, size is negatively associated with the investment ratio in contrast to the decision to invest which can be explained by the indivisibility of investment. Firm efficiency is not significant in the investment ratio regressions, although more efficient firms are more likely to invest. The capital labour ratio is negatively associated with the investment ratio and the decision to invest, which means that firms with a high capital labour ratio try to reduce their investment.

The export share (which has been instrumented) seems to be also negatively associated with the investment ratio. This confirms the results from the regressions of the export share as dependent variable (see Table 6). To achieve an increase in exports a firm might incur extra costs so that less capital for investment is available, given the constraints in the capital market.

The share of imports in raw materials has a negative association with the investment ratio. This might be due to higher costs of imported inputs that leave less profit available for investment. The growth of the workforce (from previous to current year) which captures some dynamic effects of firm performance is not significant. Trained workers are better able to use new machinery.

As in the case of export shares, only few of the interaction terms were significant so apart from sector dummies the other investment determinants seem to have the same effects in all sectors. Only the imports of raw materials seem to have a bigger negative effect in the other manufacturing sector.

Table 7: Random effects regression of investment ratio, with correction for sample selection

	[1]		[2]	
Export intensity[a]	-0.013		-0.013	
	(0.006)	**	(0.006)	**
ln firm size	-0.245		-0.245	
	(0.077)	***	(0.077)	***
ln (capital/labour)	-0.072		-0.072	
	(0.036)	**	(0.036)	**
Growth of labour	-0.0003		-0.0003	
	(0.0004)		(0.0004)	
Import intensity	-0.002		-0.002	
	(0.001)	*	(0.001)	*
Dummy training	0.657		0.657	
	(0.376)	*	(0.376)	*
Firm efficiency (value added)	-0.088		-0.088	
	(0.079)		(0.079)	
Imports * other manufact.			-0.022	
			(0.013)	*
Agric processing	-0.959		-0.959	
	(0.365)	***	(0.365)	***
Textiles and handicrafts	-0.627		-0.627	
	(0.298)	*	(0.298)	*
Wood and furniture	-1.738		-1.738	
	(0.570)	***	(0.570)	***
Aluminium	-0.962		-0.962	
	(0.407)	**	(0.407)	**
Plastic	-0.766		-0.766	
	(0.423)	*	(0.423)	*
Other manufacturing	-0.648			
	(0.391)	*		
Year 2001	4.079		4.079	
	(1.231)	***	(1.231)	***
Year 2002	4.128		4.128	
	(1.234)	***	(1.234)	***
Year 2003	4.190		4.190	
	(1.241)	***	(1.241)	***
Lambda (inv. Mills ratio)	-1.049		-1.049	
	(0.364)	***	(0.364)	***
No of observations	63		63	
R^2 overall	0.4143		0.4143	

Source: Author's calculations

Notes: level of significance: * 10%, ** 5%, *** 1%; a - instrumented using all independent variables in equations (4) and (5), standard errors in parenthesis

As the change from the dummy of other manufactures to the interactive term dummy of other manufactures * percentage of imported inputs only affects very few observations, the other coefficients remain unaffected.

The coefficients for the sector dummies are all significant in both regressions. In agriculture, which is the omitted sector the investment ratio is highest, whereas in the wood and furniture sector it is lowest. Likewise the year dummies are all significant and indicate that the investment ratio was lowest in 2000 whereas there was not much difference thereafter. This might be explained by the higher macroeconomic instability in 2000.

For other factors that might be associated with the investment ratio, like education of the workforce, the ratio of sunk investment, and the rate of capacity utilization, too few observations are available so they could not be included in the regressions.

6. Conclusions

Contrary to the initial hypothesis, no positive association between exporting and investment could be found in the survey of private enterprises in Ghana for the period 2000 to 2003. This result might be due to limitations of the time period that does not allow capturing long-term effects. The time lag from an increase in investment to the production of more exports could be longer than a year. The depreciation of the cedi in 1999 stimulated total NTE immediately, whereas firms seem to have waited with bigger investment decisions for the outcome of the 2000 elections and the performance of the new government. Only in 2003 both credits from domestic banks to the private sector and FDI started to pick up. Therefore the bulk of the increased exports might have been produced by greater capital utilisation not by new investment.

On the other hand there is some evidence of a short-term trade off between exporting and investment. To export, firms usually need more working capital to produce higher quality goods and to pre-finance shipment so that less capital is available for investment. Most entrepreneurs rate access to finance and high interest rates as the major business obstacles. Hence, better access to finance could improve both exporting and investment. Initiatives like the establishment of the Export Development and Investment Fund (EDIF), that provides investment capital for exporters, are likely to contribute to the performance of exporters. EDIF was established in 2000 and has disbursed 225.2 billion cedis between June 2002 and March 2004. In total 97 companies out of the 420 exporters listed by GEPC and only eight of the sample enterprises (until July 2003) have benefited from its subsidised credits, mainly agro-processing and wood processing firms. It is only available for enterprises with majority Ghanaian ownership. As the commercial

banks that co-operate with EDIF have to bear the credit risk, whereas EDIF mainly subsidises the interest rate, access to these funds for small and new enterprises is very difficult.

The empirical analysis has confirmed the assumption that different factors have an impact on exporting and investment in different sectors. For example enterprises that import a higher share of raw materials are less likely to enter into exporting, whereas in the textiles and handicraft and aluminium sectors they are more likely to export. While for some sectors the high costs of imports reduce their competitiveness, for others the use of high quality inputs facilitates exporting or firms that export a larger share of output need a larger share of imported inputs to meet quality standards. For many agricultural and agro-processing goods, packaging plays a major role for being successful as an exporter. However, there are still significant shortages of adequate packaging material from Ghana, although the situation has improved. This is reflected by the perception of exporters that access to domestic inputs is a bigger problem as compared to non-exporters. Likewise, the availability of laboratory services as well as transport and storage infrastructure (which could partly be financed privately) are crucial for exporters, especially of high value agricultural products and agricultural processing.

The decision to export as well as the share of output that is exported by sample firms seems to be unchanged over the period of analysis. This is in line with Figure 3 that reports increases in exports only for the aluminium sector and other processed and semi-processed goods, the latter being not sufficiently captured in the survey. The stagnation of exports for most sub-sectors means that the business environment has not changed much in favour of exporting. However, positive changes in export performance might occur only over a longer period as a large amount of information has to be gathered and contacts have to be established before exports can take place. While the decision to export was also unchanged over time, the investment ratio has increased after 2000, which shows a small positive effect of macroeconomic stabilisation with respect to inflation, exchange rate and interest rates.

With respect to the provision of business services and information, still an awareness problem exists, although users of business services are more likely to export. Firms are not aware of the potential benefits from external services, and if they are looking for services, they have difficulties in finding the most appropriate provider as a large number of small private commercial and donor funded agencies exist. Because it is difficult for enterprises with little experience to assess the quality of service providers, transparency could be increased via export promotion agencies and business associations. General business services and training of entrepreneurs should have a high priority in private sector development, as efficiency is positively related to the decisions to export and invest as well as the export intensity.

To strengthen the competitiveness of Ghana's NTE does not mean that the traditional export sectors should be neglected. However, private and public revenues from cocoa production and gold mining should be used to diversify the economy and to improve the overall business environment. Focusing too much on direct incentives for exporters, instead of reducing overall distortions and improving the infrastructure, is likely to benefit mainly firms that are already exporting. The effect on current non-exporters might be very weak as evidence from other African countries shows (Adenikinju et al. 2002).

References

Adenikinju, Adeola, Ludvig Söderling, Charles Soludo and Aristomene Varoudakis (2002) "Manufacturing Competitiveness in Africa: Evidence from Cameroon, Côte d'Ivoire, Nigeria and Senegal." Economic Development and Cultural Change 50(3): 643-665.

Aryeetey, E., M. Nissanke and W. F. Steel, (2000): Intervention & Liberalization: Changing Policies & Performance in the Financial Sector. In: Aryeetey, E., J. Harrigan and M Nissanke (eds.): Economic Reforms in Ghana – The Miracle & the Mirage. Oxford, pp. 209 - 226.

Bank of Ghana (BoG) (2004) Statistical Bulletin April 2004, Accra.

Bernard, Andrew B. and J. Bradford Jensen, 2004, 'Why Some Firms Export', *Review of Economics and Statistics*, Vol.86, No.2, pp.561-596.

Bigsten, A., P. Collier, S. Dercon, M. Fafchamps, B. Gauthier, J.W. Gunning, J. Habarurema, A. Isaksson, A. Oduro, R. Oostendorp, C. Pattillo, M. Söderbom, F. Teal and A. Zeufack. (1999) "Exports of African Manufactures: Macro Policy and Firm Behaviour" Journal of International Trade and Development 8:53-71.

Clerides, Sofronis, K.; Saul Lach and James R. Tybout, 1998, 'Is Learning by Exporting Important? Micro-Dynamic Evidence from Columbia, Mexico, and Morocco', *Quarterly Journal of Economics*, Vol.113, No.3, pp.903-947.

Collier, P. and C. Pattillo (2000): Investment and Risk in Africa. In: Collier, P. and C. Pattillo (eds.): Investment and Risk in Africa. St. Martins Press, New York, pp. 3-30.

Daily Graphic, 2004, 'EDIF support benefits 97 companies' Accra, 16 April 2004.

Ghana Export Promotion Council (GEPC). (1987-2005) Comparison of Export Performance of Non-traditional Products, Photocopy, Accra.

Ghana Export Promotion Council (GEPC) (2003) List of Active Non-Traditional Exporters, Photocopy, Accra.

Ghana Investment Promotion Centre (GIPC) (2004) Cumulative and Yearly Sector Breakdown and Investment Cost of Projects, Accra.

Greenaway, David and Richard Kneller, 2005, 'Firm Heterogeneity, Exporting and Foreign Direct Investment: A Survey', GEP Leverhulme Cenre, Research paper 2005/32, University of Nottingham.

Government of Ghana (GoG) (2004) The Budget Statement and Economic Policy of the Government of Ghana. Accra.

Greene, William H. (2000) Econometric Analysis. 4th ed. New Jersey: Prentice Hall.

ISSER (2003 -2005) The State of the Ghanaian Economy in 2002. Accra: ISSER/University of Ghana.

Kneller, Richard and Mauro Pisu, 2004, 'Export-oriented FDI in the UK', *Oxford Review of Economic Policy*, Vol.20, No.3, pp.424-439.

Pattillo, C. (1998): Investment, Uncertainty, and Irreversibility in Ghana. IMF Staff Papers No. 45, Washington.

Rankin, Neil, Mans Söderbom and Francis Teal (2002) "Ghanaian Manufacturing Enterprise Survey 2000" CSAE / University of Oxford http://www.economics.ox.ac.uk/csaeadmin/reports (accessed January 15, 2004).

Roberts, Mark J. and James R. Tybout, 1997, 'The Decision to Export in Columbia: An Empirical Model of Entry with Sunk Costs', *The American Economic Review*, Vol.87, No.4, pp.545-564.

Söderbom, Mans (2000) Managerial Risk Attitudes and Firm Performance in Ghanaian Manufacturing, CSAE-UNIDO Working Paper no. 3, Oxford.

Söderbom, Mans and Francis Teal (2003) "Are Manufacturing Exports the Key to Economic Success in Africa?" Journal of African Economies 12 (1):1-29.

UNCTAD (2003) Economic Development in Africa, Trade Performance and Commodity Dependence, New York and Geneva: UNCTAD.

Wooldridge, Jeffrey M. (2002) Econometric Analysis of Cross Section and Panel Data, MIT, 2002.

Wolf, Susanna (2003) Private Sector Development and Competitiveness in Ghana." ZEF Discussion Paper No. 70, University of Bonn, Zentrum für Entwicklungsforschung.

World Bank, 2005, *Doing Business in 2006 – Creating Jobs*, Washington DC: World Bank.