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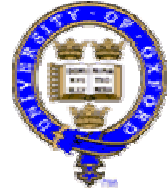
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

AND

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***What drives manufacturing exports in Africa?  
Evidence from Ghana, Kenya and Zimbabwe\****

***CSAE-UNIDO Working Paper No. 2***

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It has been suggested that sub-Saharan Africa will not be a significant exporter of manufactured goods because it lacks the necessary skills. Wood 1994 argues that Africa can only export unskilled labour intensive manufactures, as unskilled labour is relatively abundant. Elsewhere it has been argued that African exports will be dominated by natural resource intensive goods, and that manufacturing exports therefore will be marginal, even in the labour intensive sectors (Wood and Mayer 1998). In contrast to this line of thought, which is based on comparative advantage theory, is the view that firm-level factors are more important determinants of exports than factors related to industry (e.g. Krugman 1989). In particular, emphasising that entry into exporting is associated with significant fixed costs, this theory predicts that only relatively productive firms with relatively high returns to exporting will choose to incur the costs and enter the international market. In response, recent years have witnessed a rapidly growing empirical literature examining the determinants of exporting, and especially the role of productivity, at the firm level. From a policy perspective, this line of research appears to be highly relevant as the two theoretical frameworks (trade theory and firm-level theory) have quite different implications. If there are substantial entry costs, for instance, policies which are successful in facilitating enough firms to enter the foreign market will have effects on exports extending over several time periods.

Due to a shortage of micro data, there is not much empirical evidence on the current topic for Africa. Recent years, however, have seen an expansion in the availability of such data, primarily through the Regional Programme of Enterprise Development (RPED) surveys organised by the World Bank in the early and mid 1990s. To date, a handful of studies have used these data to examine various aspects of exporting behaviour.<sup>1</sup> Using data from manufacturing firms in three countries surveyed within the RPED, namely Ghana, Kenya and Zimbabwe, this paper attempts to

shed light on the issue whether exporting in Africa is more accurately described by recent theory stressing firm-level mechanisms or standard trade theory predicting close links between industry and exporting.<sup>2</sup> Among the potential firm-level determinants of exports I will focus on the role of skills possessed by firms, measured as human capital and technical efficiency.

I begin the empirical analysis by looking at some firm-level statistics about exporters. Figure 1 shows the sample proportions of exporters in six different industries.<sup>3</sup> In Ghana exporting is highly concentrated to the wood sector, whereas in Kenya and Zimbabwe exporters are much more spread out across industries. The latter pattern does not square very well with standard trade models, which typically predict close links between industry and exporting. Further, with the exception of Zimbabwe, the least export-oriented industry is the garments sector, which is also the most labour intensive industry. On the whole, export intensity is lowest in Ghana and highest in Zimbabwe.

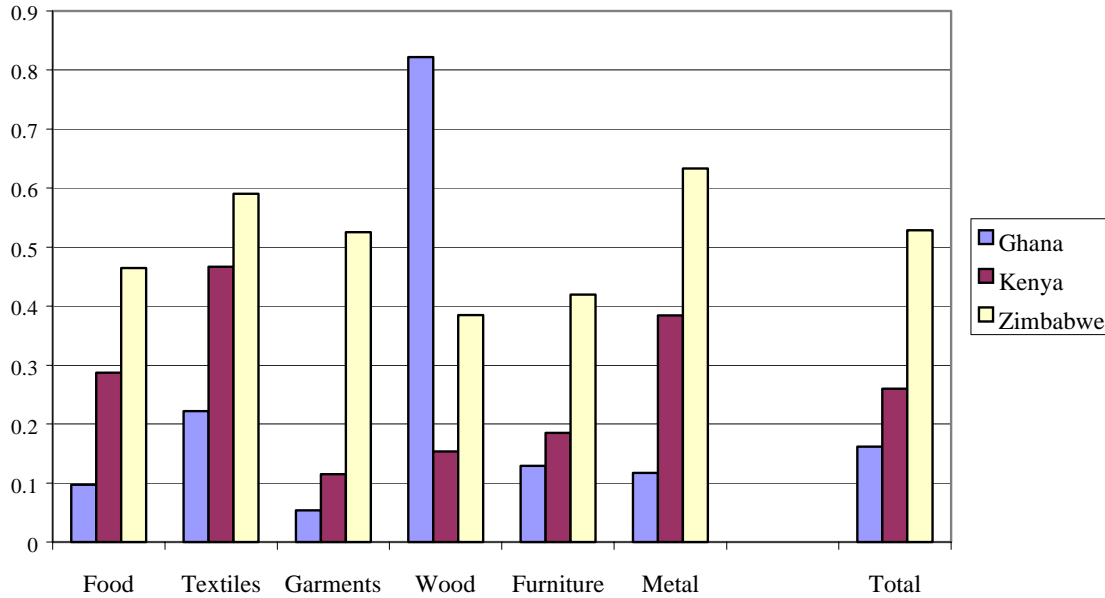
Having found the links between industry and exporting to be quite weak in Kenya and Zimbabwe, but stronger in Ghana, the next step is to examine firm-level mechanisms. Table 1

<sup>1</sup> Bigsten et al. 1999, 2000 have used RPED data from the Cameroon, Ghana, Kenya and Zimbabwe to undertake a comparative study of manufacturing exports. Country specific studies have been undertaken by Granér and Isaksson 1998, 1999 (Kenya), Hoogeveen and Mumvuma 1999 (Zimbabwe) and Söderbom and Teal 2000 (Ghana).

<sup>2</sup> The Ghanaian sample was constructed by combining data from the RPED with follow-up surveys organised by the Centre for the Study of African Economies at Oxford University. For Ghana there are seven years of panel data (1991-1997), and for Kenya and Zimbabwe three years (1992-1994). A data appendix providing details about variables and further sampling information is available from the author on request.

<sup>3</sup> These are unweighted sample averages. Large firms are over-represented in the samples, and as large firms are more prone to exporting, these averages overstate the population proportions of exporters.

**FIGURE 1**  
**PERCENTAGE OF EXPORTERS, BY INDUSTRY**



*Note:* Number of observations (firms): Ghana, 921 (233); Kenya, 469 (218); Zimbabwe, 316 (180). The reported percentages are based on pooled observations over the panels.

*Source:* Author's calculations.

shows how exporters and non-exporters differ with respect to three measures of productivity and two measures of human capital. In all countries, exporters have higher productivity and more human capital. For labour productivity (LP), defined as the logarithm of value-added per employee purged from time effects (see table notes), there are substantial wedges: in Ghana the difference in means is equal to 0.72, in Kenya it is 1.01 and in Zimbabwe it is 0.68.<sup>4</sup> For medians, the values are slightly smaller. Further, in addition to firms being heterogeneous in whether they export as shown in Figure 1, there is also a considerable heterogeneity in labour productivity, with standard deviations ranging between 1.16 (Zimbabwe) and 1.44 (Ghana). These numbers indicate standard deviations in levels well in excess of a factor of three.

<sup>4</sup> Close to zero, the difference in logarithmic values is a good approximation of the percentage difference.

**TABLE 1**  
**FIRM-LEVEL ABILITY AND EXPORTS**

	Standard deviation	Exporters' advantage <sup>#</sup>	
		Means	Medians
<b>GHANA</b>			
LP	1.44	0.72	0.56
LP, within industries	1.26	0.46	0.43
TFP, within industries	1.15	0.16	0.22
Employees' average education	2.29	0.03	0.06
Employees' average tenure	1.33	0.33	0.25
<b>KENYA</b>			
LP	1.39	1.01	0.76
LP, within industries	1.34	0.88	0.66
TFP, within industries	1.21	0.46	0.27
Employees' average education	2.24	0.24	0.22
Employees' average tenure	1.95	0.24	0.19
<b>ZIMBABWE</b>			
LP	1.16	0.68	0.65
LP, within industries	1.08	0.69	0.51
TFP, within industries	0.85	0.25	0.16
Employees' average education	2.12	0.04	0.02
Employees' average tenure	2.26	0.37	0.18

*Notes:*

The first measure of labour productivity (LP) is the residual from a regression of the logarithm of value-added per worker on time dummies. The second measure (LP, within industries) is the residual from the first regression with industry dummies added. Total factor productivity (TFP, within industries) is the residual from the second regression with the capital to labour ratio added.

Education and tenure are measured as logarithms of firm-level averages (in years).

The number of observations (firms) forming the basis for these calculations are as follows: Ghana, 921 (233); Kenya, 469 (218); Zimbabwe, 316 (180).

<sup>#</sup>Calculated as the difference between mean (median) values for exporting and nonexporting firms. Since the productivity and human capital measures are expressed in logarithms, these will be approximately equal to the percentage difference.

*Source:* Author's calculations.

To gauge the importance of industry in this context, the second measure of labour productivity is expressed as the deviation from industry averages. For Ghana, this decreases the exporting differential to 0.46 for mean values and 0.43 for medians, which indicates a substantially lower difference than without industry controls. In Kenya and Zimbabwe controlling for industry heterogeneity has much smaller effects. This difference between Ghana on the one hand and Kenya

and Zimbabwe on the other is consistent with the pattern in Figure 1 that industry matters much more in Ghana. A second finding is that controlling for industry leads only to a minor tightening of the labour productivity distribution.

The third measure of productivity accounts for heterogeneity in capital intensity across firms within industries. This leads to a significant fall in the differentials in all three countries: in Ghana the resulting wedge in total factor productivity means (medians) is 0.16 (0.22), in Kenya it is 0.46 (0.22) and in Zimbabwe 0.25 (0.16). Hence, although much of the previously documented labour productivity differential between exporters and non-exporters is due to firms in the former category being more capital intensive, controlling for such heterogeneity still attributes considerable productivity advantages to exporters. Examining finally the dimension of skills linked to the human capital of the workforce, measured as years of formal education and tenure, yields a similar picture to that above. The employees in exporting firms have on average more education and more tenure than in non-exporting firms. For education the gap is small except in Kenya, but for tenure the difference is around 30% for all countries.

Although the above descriptive statistics strongly indicate a positive association between exporting and firm-level skills, it cannot be determined at this stage if this relationship is at all causal, let alone in which direction. To shed some light on the effects of firm-level ability on the incentives for exporting, I proceed by estimating multivariate regression models for export participation controlling for various forms of firm-level heterogeneity. As above and following Söderbom and Teal 2000, I will distinguish between two forms of firm-level skills, namely observable human capital, measured as the years of education and tenure, and technical efficiency, which is the residual from a Cobb-Douglas production function.<sup>5</sup> I assume that the skill-variables operate with a one-year lag, because exporting activities usually require the firm to undertake a

<sup>5</sup> Due to lack of space the production functions are not reported here, but are available from the author on request. Separate regressions for each country are fitted, with the log of value-added as the dependent variable and employment, capital, education and tenure as inputs, along with controls for firm age, ownership, location, time and industry. Constant returns to scale are imposed in these models.



number of preparations which take time (e.g. establishing channels for distribution, negotiating with foreign buyers, etc.). This also has the advantage of preventing bias arising from feedback from exporting to skills, for instance through learning-by-exporting mechanisms. Other explanatory variables included in the regressions are the level of employment and the replacement value of the capital stock (both in logs), firm age, location, and control variables for industry, time and ownership. Due to fixed costs of entry, exporting participation is likely to be dependent on the exporting history of the firm. I allow for two forms of such state dependence. First, following a number of authors in this area I include among the explanatory variables a dummy variable for whether or not the firm exported in the previous year, i.e. a lagged dependent variable (Roberts and Tybout 1997, Clerides et al. 1998, Bigsten et al. 2000). Second, following Söderbom and Teal 2000 I interact the skill variables with the lagged dependent variable, which allows for a distinction between their effects on entry on the one hand and exit on the other. Finally, as is customary in this literature I use a random effects approach to allow for unobserved firm characteristics affecting exporting.<sup>6</sup>

Table 2 shows the results of logit regressions modelling export participation for the three countries. As in most other studies of this kind, the exporting decision is highly state dependent. The coefficient on the lagged dependent variable is everywhere positive and significant at the 1% level. Indeed, the coefficients are very large, implying odds ratios equal to 12.6, 44.9 and 68.7 for Ghana, Kenya and Zimbabwe, respectively.<sup>7</sup> This suggests considerable entry costs. The role of

<sup>6</sup> This is important in order to guard against “spurious” state dependence (see e.g. Clerides et al. 1998). Specifically, to integrate the random effect out of the model, I follow Mroz 1999 and Bigsten et al. 2000 and approximate its distribution by a step function. Because the panel is short, there is an initial conditions problem which I deal with by using a non-parametric approach as suggested by Arellano and Carrasco 1999, pp. 18-20. To conserve space I will refer the interested reader to the above references and not comment further on the econometric details here.

<sup>7</sup> The odds ratio measures the change in the ratio of the probability of exporting to the probability of not exporting, resulting from past experience. If the initial exporting probability (before entry) is 0.10, for instance, the reported estimates imply that for a firm equipped with the sample average levels of skills entry will increase the probability of subsequent participation to 0.58, 0.83 and 0.88 for Ghana, Kenya and Zimbabwe, respectively.

firm-level skills in the exporting decision appears to be quite complex.<sup>8</sup> For Ghana none of the skill-variables has a significant positive effect on entry.<sup>9</sup> However, there is strong evidence that technical efficiency prevents the firm from exiting from the export market, as the associated coefficient is positive and significant at the 1% level. This is somewhat surprising: whereas efficiency usually is thought to increase overall exporting activity through its positive effects on entry, the evidence for Ghana is that efficiency is unimportant for entry but of considerable importance for the exit decision. Contrastingly, in Kenya and Zimbabwe, the efficiency coefficients are positive and significant (at the 5% and 10% level, respectively) for entry. For Kenya the efficiency effect applies equally to the decision not to exit, whereas efficiency appears to play no role in the exit decision for Zimbabwe. There is some evidence that human capital is positively associated with exports in Zimbabwe, with education being significant at the 10% level, applying both for entry and non-exit, and tenure being significant at the 5% level for non-exit. For Kenya, however, the human capital variables are far from significant.

Turning finally to the rest of the explanatory variables, physical capital has a positive and significant coefficient for Ghana whereas employment is insignificant. This indicates that exports are intensive in physical capital rather than employment, which runs counter to the predictions of the comparative advantage theory. The pattern is the opposite in Kenya, while neither coefficient is significant in Zimbabwe. The coefficient on firm age is positive and close to being significant in Zimbabwe. In Ghana the age effect is highly significant and non-linear, with the exporting probability increasing up until the age of 26 years and then falls. In Kenya firm age is insignificant. Finally, the reported tests for sectoral differences in the propensity to export indicate that there are no significant differences in Kenya or Zimbabwe, but highly significant industrial heterogeneity in

<sup>8</sup>I started by estimating the model with interacting the lagged dependent variable with all three skill-variables. In the cases where the interaction terms were insignificant at the 30% level, I imposed the restriction that the variable affects entry and non-exit in the same way. Where this is done is indicated in the table by R-superscripts on the coefficients.

<sup>9</sup>In fact, tenure has a negative and significant (at the 10% level) coefficient applying both to entry and non-exit. Söderbom and Teal 2000 also obtain this result and discuss potential reasons.

**TABLE 2**  
**SELECTED PARAMETER ESTIMATES FROM LOGISTIC EXPORTING MODELS**

	GHANA		KENYA		ZIMBABWE	
	Coef.	z	Coef.	z	Coef.	z
Exports <sub>(t-1)</sub>	2.54***	3.70	3.80***	5.76	4.23***	7.75
Ln Employment <sub>(t-1)</sub>	0.27	0.89	0.70	1.95	0.48	1.29
Ln Capital <sub>(t-1)</sub>	0.35**	2.19	0.05	0.24	0.12	0.52
Firm age	0.31***	2.82	-0.03	-0.86	0.03	1.50
Firm age <sup>2</sup> /100	-0.60***	-2.77				
Capital city	1.10*	1.73	0.69	1.20	0.95*	1.80
<i>Skills Effects on Entry</i>						
Efficiency <sub>(t-1)</sub> × [1 - Exports <sub>(t-1)</sub> ]	-0.07	-0.31	0.64**	2.35	0.94*	1.75
Ln Education <sub>(t-1)</sub> × [1 - Exports <sub>(t-1)</sub> ]	1.66	1.02	0.38	0.28	2.34*	1.84
Ln Tenure <sub>(t-1)</sub> × [1 - Exports <sub>(t-1)</sub> ]	-0.63*	-1.73	0.14	0.24	-0.72	-1.46
<i>Skills Effects on Non-Exit</i>						
Efficiency <sub>(t-1)</sub> × Exports <sub>(t-1)</sub>	1.79***	3.66	0.64 <sup>R</sup>	-----	0.09	0.15
Ln Education <sub>(t-1)</sub> × Exports <sub>(t-1)</sub>	-2.41	-0.71	0.38 <sup>R</sup>	-----	2.34 <sup>R</sup>	-----
Ln Tenure <sub>(t-1)</sub> × Exports <sub>(t-1)</sub>	-0.63 <sup>R</sup>	-----	0.14 <sup>R</sup>	-----	1.56**	2.05
No industry effects <sup>(a)</sup>	0.00		0.25		0.82	
No time effects <sup>(b)</sup>	0.17		0.43		0.55	
Heterogeneity <sup>(c)</sup>	Yes		No		No	
Log Likelihood	-95.9		-55.3		-71.4	
NT (N)	627 (207)		281 (178)		306 (207)	

*Notes:*

These are logit regressions where the dependent variable is equal to one if there is any exporting and zero otherwise.

Interacting exogenous variables with the lagged dependent variable distinguishes between their effects on entry (which, by definition, implies that the lagged dependent variable is zero) and non-exit (in which case the lagged dependent variable is equal to one).

All equations control for industry, annual effects and ownership. Exogenous variables are expressed as deviations from their sample means. Positive coefficients imply indicate a rise in the probability of exporting, and vice versa.

Reported z-statistics are asymptotic. Significance at 1%, 5% and 10% are indicated by \*\*\*, \*\* and \*, respectively.

<sup>R</sup> Indicates that coefficient is restricted to be the same as for entry.

<sup>(a)</sup>Wald test of the hypothesis that the coefficients on the industry dummies are zero. Reported numbers are p-values.

<sup>(b)</sup>Wald test of the hypothesis that the coefficients on the time dummies are zero. Reported numbers are p-values.

<sup>(c)</sup> Unobserved heterogeneity in the form of firm specific random effects. Selection between the random effects model and the model without heterogeneity, was based on the Schwarz Information Criterion.

Source: Author's calculations.

Ghana. The latter result is driven by the concentration of exports to the wood sector documented in Figure 1.

The empirical findings above thus suggest a subtler picture of exporting behaviour in African manufacturing than implied by traditional trade theory. African firms, even within the same industries, are highly heterogeneous in their ability to transform inputs into outputs, and this kind of ability is important for firms to be able to export and compete in world markets. Especially in Kenya and Zimbabwe, industry is a poor predictor of exporting intensity. If this is true then Africa will be able export manufactured goods, possibly even capital intensive manufactures (see Ghana in Table 2), as trade restrictions are being abolished, provided that the firms have the necessary skills. Policy measures designed to enhance such skills along with measures taken to facilitate export entry may therefore be particularly rewarding in terms of improving the export performance of African manufacturing firms.

## References

- Arellano, Manuel, and Raquel Carrasco. 1999. "Binary Choice Panel Data Models with Predetermined Variables." Mimeo. CEMFI, Madrid.
- Bigsten, Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Willem Gunning, Jean Habarurema, Anders Isaksson, Abena Oduro, Remco Oostendorp, Catherine Pattillo, Måns Söderbom, Francis Teal, and Albert Zeufack. 1999. "Exports of African Manufactures: Macro Policy and Firm Behaviour." *Journal of International Trade and Development* 8(1): 53-71.
- Bigsten, Arne, Paul Collier, Stefan Dercon, Marcel Fafchamps, Bernard Gauthier, Jan Willem Gunning, Abena Oduro, Remco Oostendorp, Catherine Pattillo, Måns Söderbom, Francis Teal, and Albert Zeufack. 2000. "Exports and Firm-level efficiency in African Manufacturing." Mimeo. Centre for the Study of African Economies at Oxford University, Oxford.

- Clerides, Sofronis, Saul Lach, and James Tybout. 1998. "Is Learning by Exporting Important? Micro-Dynamic Evidence From Colombia, Mexico and Morocco." *Quarterly Journal of Economics* 113(3): 903-948.
- Granér, Mats, and Anders Isaksson. 1998. "Export Performance." In Arne Bigsten and Peter Kimuyu, eds., *Structure and Performance of Manufacturing in Kenya*. Unpublished manuscript. Department of Economics at Göteborg University, Göteborg, and Department of Economics at University of Nairobi, Nairobi.
- . 1999. "Understanding the Link between Exports and Productivity: New Evidence from Kenyan Manufacturing." Mimeo. Department of Economics at Göteborg University, Göteborg.
- Krugman, Paul. 1989. *Exchange Rate Instability*. Cambridge, Mass: MIT Press.
- Hoogeveen, Hans, and Takawira Mumvuma. 1999. "Manufacturing export performance, macro-economic adjustment and the role of networks." In Jan Willem Gunning and Remco Oostendorp, eds., *Industrial Change in Africa: Micro Evidence on Zimbabwean Firms under Structural Adjustment*. Unpublished manuscript. Free University, Amsterdam.
- Mroz, Tom. 1999. "Discrete Factor Approximations in Simultaneous Equation Models: Estimating the Impact of a Dummy Endogenous Variable on a Continuous Outcome." *Journal of Econometrics* 92(2): 233-274.
- Roberts, Mark, and James Tybout. 1997. "The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs." *American Economic Review* 87(4): 545-64.
- Söderbom, Måns, and Francis Teal. 2000. "Skills, Investment and Exports from Manufacturing Firms in Africa." *Journal of Development Studies*, forthcoming.
- Wood, Adrian. 1994. *North-South Trade, Employment and Inequality: Changing fortunes in a skill-driven world*. Oxford: Clarendon Press.
- Wood, Adrian, and Jörg Mayer. 1998. "Africa's Export Structure in a Comparative Perspective." African Development in a Comparative perspective, Study No. 4, UNCTAD, Geneva.