

Can Africa Export Manufactures? The Role of Endowment, Exchange Rates and Transaction Costs

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1. Introduction

The marginalization of Sub-Saharan Africa (hereafter Africa) in world trade, especially the global market for manufactured exports, has provided one of the most visible manifestations of the multi-faceted development failures of the Sub-Continent over the last thirty years or so. Moreover, the lessons from recent development success stories suggest that they have either been facilitated by export-orientation (e.g. Korea and Taiwan) or have in fact been export-led (e.g. Chile, Mauritius, Tunisia and South East Asia)¹. Therefore, it is not surprising that current academic and policy debates on Africa's development have been preoccupied with addressing the key question about how might Africa be able to build a strong comparative advantage in exports, especially exports of labor-intensive manufactures?². More recent research has focused on the impact on Africa's comparative advantage in manufactured exports of globalization of trade and capital markets³; and of the role of endowment, location and geography⁴. This new research and more importantly the changing landscape of global trade and international finance have pushed the debate towards more strategic issues such as: can Africa ever hope to have comparative advantage in manufactured exports?; can globalization facilitate (if not partially substitute for) traditional and usually complex strategies for achieving export-led economic transformation?; or is there a scope for poor African countries to jump-start their competitiveness through the "old-fashioned way" of sustained real currency depreciation in a world of capital market integration?

Export performance in many African countries has been responsive to macroeconomic reforms--especially to the deep real exchange rate depreciation in the 1980s in Anglophone Africa and since 1994 in the CFA zone of Francophone Africa. However, given the partiality of reforms and the frequent adverse terms of trade shocks that have impacted the region, observed growth patterns in aggregate exports, and especially in manufactured exports, have been neither deep nor stable (e.g. Rodrik, 1997). Even as Africa is still working on regaining its lost ground in the international market for traditional exports, there is a broad consensus that the ultimate goal of export-orientation in Africa should be to achieve significant export diversification, through building new comparative advantages in non-traditional exports, including labor-intensive manufactured exports. Manufactured exports as well as some other non-traditional exports, are more capable than traditional primary exports in supporting sustained overall economic growth for at least three reasons. First, compared to primary goods exports, manufactured exports are likely to grow faster when the global economy is expanding because their income elasticity of demand is higher. Second, due to the relatively higher price elasticities of demand and supply for manufactures compared to primary goods exports, the former are less susceptible to price variability. Third, the prospects for dynamic productivity gains are much higher in the manufacturing sector. Therefore, in the medium to longer runs the role of traditional primary exports should be to facilitate export diversification. However, in the short-run Africa should continue to consolidate recently achieved gains by avoiding economy-wide indirect taxation of traditional exports. For financing the process of export

¹ Perhaps unlike many other recent successful development experiences, Rodrik (1994,95) shows that even though export-orientation has facilitated the sustenance of high investment productivity in Korea and Taiwan for decades, both overall growth as well as the phenomenal export expansions in these two countries have been driven by sustained investment booms.

² See for example World Bank, 1998a,b; Elbadawi, 1998; Sekkat and Varoudakis, 1998.

³ For example, Collier, 1997; Elbadawi and Helleiner, 1998; and World Bank, 1998a.

⁴ For example, Wood, 1997; Wood and Berge, 1997; Wood and Owens, 1997; and Wood and Mayer, 1998.

diversification, only moderate and sector-specific taxes should be imposed.

Against this background, this paper contributes to this debate by estimating manufactured exports performance for a panel of African and other developing countries, taking into consideration endowment and geography and the potential effect of globalization. In particular, I will use the empirical model to assess the implications of three views on this issue. First, Adrian Wood and his research associates use a version of Hecksher-Ohlin model to argue that, under globalization, human capital and natural resource endowment rather than labor and capita are the main determinants of comparative advantage for manufactured exports. I call this view the *endowment* theory. This theory predicts that Africa basically has no prospects in manufactured exports because of its high natural resource endowment and low stock of human capital. Paul Collier uses a modified Hecksher-Ohlin framework and argues that Wood's prediction could only be valid if Africa is affected by a massive Dutch Disease problem because of its richness in natural resources, which however, is not supported by evidence (Collier, 1997). Instead, Collier develops an alternative theory (I call the *transaction* theory), which argues that because manufacturing is one of the most transaction-intensive activities, Africa's *comparative disadvantage* (at least in the short-to-medium runs) has been caused by high transaction costs due to poor policy environment. Following his critique of the endowment theory, Collier proposes a strategy for building Africa's comparative advantage, based on increased integration of African economies into global world trade, capital and risk-bearing markets. Finally, Gerry Helleiner and I argue that given Africa's current levels of development, comparative advantage in exports should be based on sustained real exchange rate competitiveness, until the economies are sufficiently developed to support a productivity-induced secular process of real appreciation (Elbadawi and Helleiner, 1998). This *real exchange rate-led* strategy also recognizes the dire need for re-capitalization of African economies to sustain the process of export expansion and export diversification, as has been convincingly argued by Collier (1997). However, Helleiner and I also argue that to protect macroeconomic competitiveness as well as to avoid possible future financial and currency crises, flexible and pragmatic approaches for integrating Africa into global capital markets may have to be adopted.

Section 2 provides preliminary country-specific and regional analysis of the evolution of manufactured exports and some of the key relevant variables over the 1980s and 1990s. Section 3 contains a discussion of the estimation results, including an assessment of the implications of the three views discussed above. The model of section 3 estimates the determinants of manufactured exports/GDP using a panel covering about 41 countries over the period 1980-95. The analysis of section 3 does not however, directly test the above views, since I estimate performance equations based on the ratio of manufactured exports to GDP, rather than comparative advantage equations using, for example, the share of manufactured to aggregate exports as the dependent variable⁵. Section 4 concludes.

2. Manufactured Exports in Africa and Other Developing Regions

Manufactured export performance between 1980s and 1990s (1994/95 relative to 1984/85) has varied considerably across eleven countries drawn from three developing regions, seven of which are Sub-Saharan African countries (Table 1.A)⁶. The best performers in terms of the

⁵ For a detailed discussion and direct testing of the three views, see Elbadawi and Randa (1999).

⁶ In addition to the North African country of Tunisia, the other seven African countries are: Burkina Faso, Cote d'Ivoire,

growth rates of manufactured export (MNEX) to GDP between the two periods are: Kenya (14%), Tanzania (10.6%), Burkina Faso (9.5%) and South Africa (8.1%). If we take the share of MNEX to GDP into account, the growth rates of Mauritius at 7.7% was impressive, given that the share of MNEX in its economy is more than 27%. To a lesser extent, the same assessment applies to Kenya and South Africa, for which the shares of MNEX to GDP are 6.5 and 8.6%, respectively. The second category consists of Burkina Faso and Tanzania, which achieved relatively high rates of MNEX growth, though starting from low shares of MNEX to GDP (at respectively, 2.2 and 1.3% in 1994/95). The third category consists of Cote d'Ivoire and Zimbabwe, which experienced less than 5% rates of growth in MNEX, though they have had relatively low to moderate shares of MNEX to GDP (at 5.7 and 9.9%, respectively). As the Table makes clear, except for Mauritius, all other Sub-Saharan African countries have much lower share of MNEX compared to world class performers such as Tunisia, Indonesia, Thailand, and especially Malaysia⁷. Moreover, all the African countries experienced lower growth rates in MNEX than the three Asian countries. Therefore, assuming that manufactured exports-- especially labor-intensive manufactured exports--are likely to be the most efficient engine of growth for Africa as it have been for other successful developing countries, African countries do not only need to significantly raise growth rates of MNEX, but they would also need to sustain them for a considerable time.

For the remainder of this section, I briefly review the extent to which MNEX performances of various countries in the sample were covariated with four sets of determinants: exchange rate policy, transaction costs, stock of skills relative to natural resource endowment, and aggregate investment (Table 1.B). The first three correspond to the three strategies discussed in the introduction to this paper, while the latter is associated with overall economic performance, including manufactured export growth. In fact Rodrik (1999) argues that the phenomenal expansions of exports in Korea and Taiwan were made possible by sustained rise in private returns to capital, engineered by the two governments through a range of strategic interventions--which include investment subsidies, administrative guidance, and the use of public enterprise. He also echoes this theme in his recent explanation of Africa's marginalization in world trade, though he does not suggest that Africa should pursue similar strategies to those adopted by the two successful Asian countries (Rodrik, 1997).

First, I analyze the evidence on the relationship between exchange rate policy and MNEX performance. Figure 1 depicts average MNEX/GDP ratios during 1990-95 for several countries together with indexes of real exchange rate (RER), RER misalignment (RERMIS) (measured as undervaluation relative to an equilibrium level ERER) and RER variability (see notes to Figure 1).

The figure suggests three important patterns. First, Indonesia, Thailand, Tunisia, Republic of Korea, Mauritius, Malaysia constitute a group of six countries that have managed to maintain large MNEX relative to the share of their economies (ranging from about 12% of GDP for Indonesia to 63% for Malaysia). Relative to other countries, these countries were also the ones

Kenya, Mauritius, South Africa, Tanzania and Zimbabwe. The other three non-African countries are Indonesia, Malaysia and Thailand.

⁷ Until the recent financial crisis, the three Asian countries rank among the most accomplished exporting economies in the world.

with uniformly more stable RER. Among the countries with lower than 10% MNEX/GDP ratios only Chile and South Africa have achieved high degree of RER stability. Second, there is a tendency for national real currencies to become stronger (more appreciated) as the share of MNEX/GDP reached 20% or more, as in the cases of Thailand, Tunisia, Republic of Korea, Mauritius and Malaysia. However, there is no clear pattern of appreciating RER as MNEX/GDP rises from the miniscule levels of less than 1% (for the cases of Nigeria, Gabon and Ghana) to about 10% for the case of Indonesia. However, this pattern may not be generalizable, given the presence of many CFA African countries in the sample. These are the members of the CFA monetary union, which adopts a fixed exchange rate system vis-à-vis the French franc⁸. Third, again may be due to the same reason there is no evidence of a tendency for real exchange rates to become more overvalued (or undervalued) as the share of MNEX/GDP rises.

Second, I consider the relationship between MNEX with aggregate investment. Notwithstanding efficiency consideration, the share of gross investment to GDP is a useful broad indicator of an economy's potential to sustain high rates of export (as well as overall economic) growth⁹. On this score most of the African countries are badly lagging behind. Except for Mauritius -which has investment ratios at 29 - virtually all remaining African countries have investment rates lower than 25%.

Table 1.A : MANUFACTURING EXPORTS IN A SAMPLE OF DEVELOPING COUNTRIES

		Aggregate Exports Current US \$m	Manufacturing Exports Current US \$m	% Share of Total Exports to GDP	% Share of Manufacturing Exports to GDP
Burkina Faso	1994/1995 Average	274.95	45.90	13.10	2.19
	Average Annual Growth Rate 84-95 (%)	8.56	18.99	1.27	9.46
Cote d'Ivoire	1994/1995 Average	3699.85	494.59	42.02	5.65
	Growth Rate 84-95 (%)	3.22	8.20	0.34	4.7
Kenya	1994/1995 Average	2815.06	432.17	36.08	6.5
	Growth Rate 84-95 (%)	6.07	12.62	3.60	14.09
Mauritius	1994/1995 Average	2179.55	1013.45	58.41	27.18
	Growth Rate 84-95 (%)	15.96	22.76	2.01	7.67
S. Africa	1994/1995 Average	31122.29	11018.56	24.34	8.6
	Growth Rate 84-95 (%)	5.46	12.42	0.16	8.07

⁸These countries (Gabon, Togo, Cameroon, Burkina Faso, Cote d'Ivoire, Central African Republic and Senegal) have experienced substantial real appreciation as well RER overvaluation for most of the period since 1985 (Baffes, Elbadawi and O'Connell, 1997).

⁹ According to robust evidence drawn from a vast set of developing countries, a 6% real GDP growth rate would require about 28% rate of investment (Williamson, 1997a).

Tanzania	1994/1995 Average	898.37	45.87	19.51	1.31
	Growth Rate 84-95 (%)	15.04	3.00	16.55	10.59
Zimbabwe	1994/1995 Average	2677.20	615.66	26.35	9.88
	Growth Rate 84-95 (%)	7.86	431	4.57	4.76
Tunisia	1994/1995 Average	3475.29	3910.92	44.76	23.19
	Growth Rate 84-95 (%)	18.06	18.06	3.14	9.87
Korea Rep.	1994/1995 Average	132762.61	101757.8	31.58	24.23
	Growth Rate 84-95 (%)	15.61	14.68	-0.47	-1.27
Malaysia	1994/1995 Average	72462.51	49200.77	92.59	62.89
	Growth Rate 84-95 (%)	15.13	26.36	5.36	16.11
Thailand	1994/1995 Average	62558.62	36892.33	40.05	23.63
	Growth Rate 84-95 (%)	20.78	29.93	6.14	14.30
Indonesia	1994/1995 Average	49849.55	21825.38	26.37	11.55
	Growth Rate 84-95 (%)	8.65	24.34	0.41	15.75

Notes:

1. Exports of goods and services represent the value of all goods and other market services provided to the world. Included is the value of merchandise, freight, insurance, travel, and other non-factor services

2 Manufactures comprise commodities in SITC revision 1, sections 5 through 9 (chemicals and related products, basic manufactures, machinery and transport equipment, other manufactured articles and goods not elsewhere classified) excluding division 68 (non-ferrous metals)

3. The Growth Rate 84-95(%) refers to percentage annual average growth rate between 1984-1995

TABLE 1.B : OTHER DETERMINANTS IN A SAMPLE OF DEVELOPING COUNTRIES

		Ratio of Gross Domestic Investment to GDP*	Ratio of School Enrollment to Land per worker	Fax Machines (per 1000 people)	Corruption	Roads Paved (%)
Burkina Faso	1994/1995 Average	20.87	0.61	–	4	17.35
	Annual average Growth Rate 84-95 (%)	4.29	10.12	–		-0.47
Cote d'Ivoire	1994/1995 Average	13.04	1.17	–	2.79	9.50
	Growth Rate 84-95 (%)	3.42	-0.04	–		1.99
Kenya	1994/1995 Average	20.55	2.71	0.14	2.81	13.70
	Growth Rate 84-95 (%)	1.24	0.12	10.96		1.57
Mauritius	1994/1995 Average	28.98	4.95	17.00	3.19	93.00
	Growth Rate 84-95 (%)	2.00	3.46	177.08		–
S. Africa	1994/1995 Average	17.95	1.13	2.11	5.64	41.50
	Growth Rate 84-95 (%)	-1.99	3.70	24.44		–
Tanzania	1994/1995 Average	23.37	3.28	0.07	2.56	4.20
	Growth Rate 84-95 (%)	3.14	-2.51	89.35		–
Zimbabwe	1994/1995 Average	23.66	1.97	0.35	2.94	51.45
	Growth Rate 84-95 (%)	3.68	6.14	27.35		46.09
Tunisia	1994/1995 Average	24.30	1.35	2.53	2.94	78.10
	Growth Rate 84-95 (%)	-2.91	5.08	58.24		0.71
Korea Rep	1994/1995 Average	36.55	11.37	8.67	2.38	76.90
	Growth Rate 84-95 (%)	2.02	2.05	10.82		1.40
Malaysia	1994/1995 Average	41.96	3.98	3.97	4.75	75.00
	Growth Rate 84-95 (%)	2.92	-1.00	70.81		1.41
Thailand	1994/1995 Average	40.94	1.77	1.48	3.19	96.05
	Growth Rate 84-95 (%)	3.5	1.17	126.29		13.94
Indonesia	1994/1995 Average	30.50	5.84	0.36	0.56	45.85
	Growth Rate 84-95 (%)	2.02	3.96	55.49		-0.19

Notes:

1. Gross domestic investment consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets cover land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including commercial and industrial buildings, offices, schools, hospitals, and private residential buildings.

2. Fax Machines is the estimated number of facsimile machines connected to the public switched telephone network, per 1,000 people

3. Paved roads is the percentage of paved roads that have been sealed with asphalt or similar road-building material

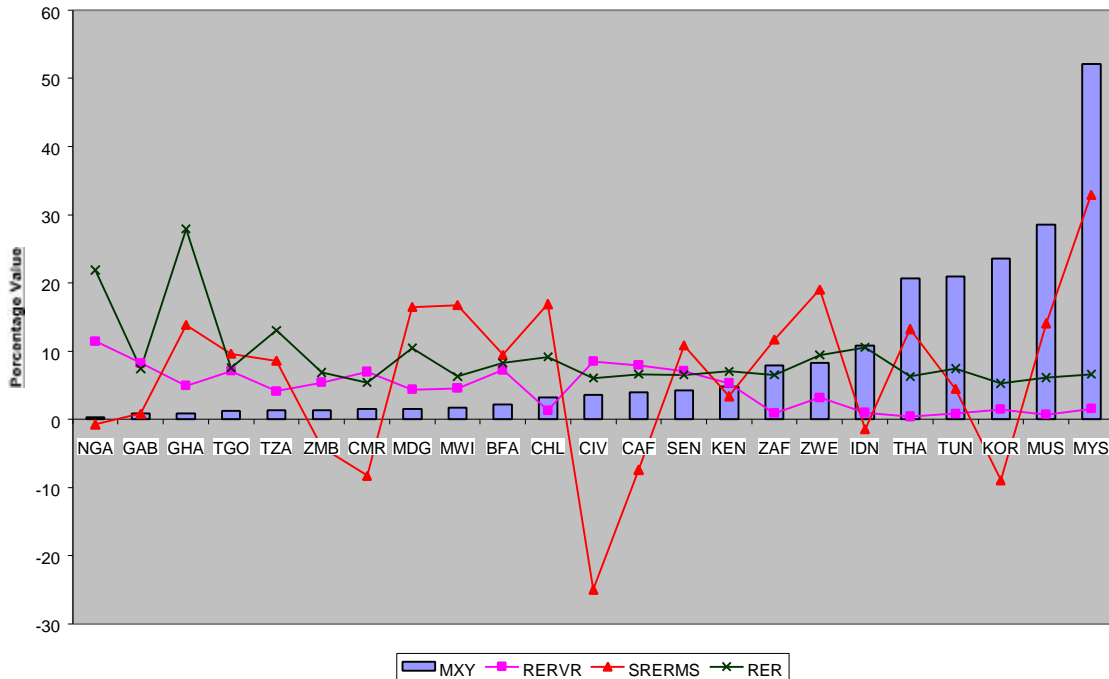
4. Corruption is an index of corruption around the world (high index means low corruption: Transparency International).

5. Schooling to land per worker is given by the ratio of the index of primary school Enrolment divided by the ratio of Arable land /100 worker.

6. Growth rates for Fax machines, corruption and Paved roads refer to 90-95 period.

7. The Growth Rate 84-95(%) refers to percentage annual average growth rate between 1984-1995

Figure 1: Real Exchange Rate and Manufacturing Exports in Developing Countries (1990-95):



Notes:

1. MXY is Manufacturing Exports to GDP, RER is Real Exchange Rate, SRERMS is Real Exchange Rate Misalignment and RERVR is Real exchange rate Variability.

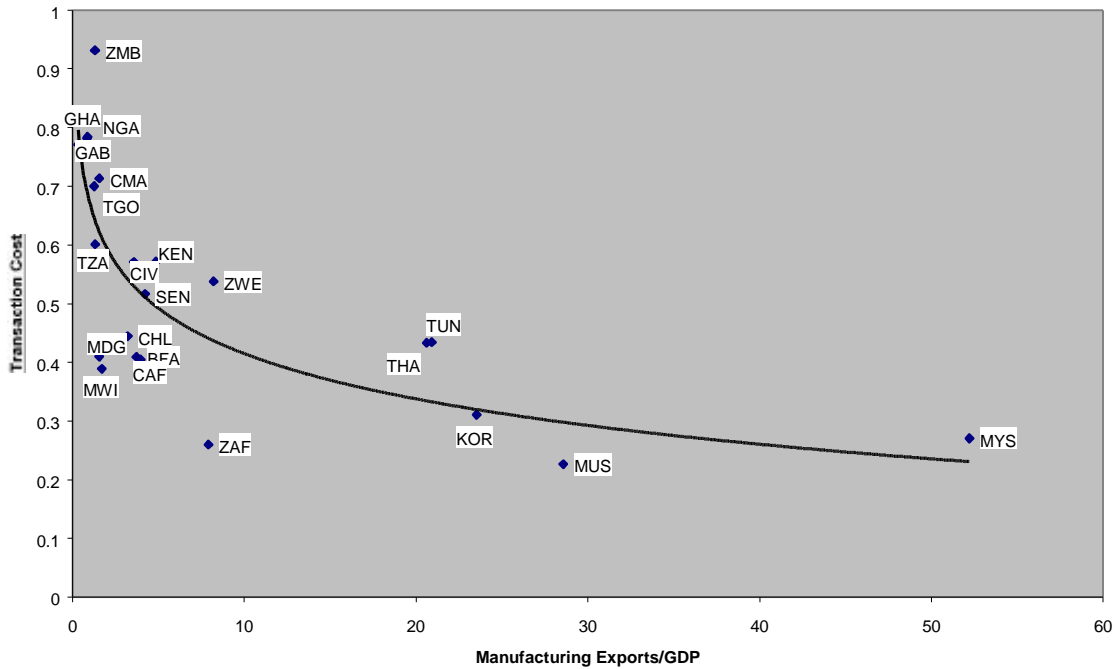
2. The index of real exchange rate misalignment (RERMIS) is computed as $(RER-ERER)/ERER \times 100\%$, where ERER is a model-based index of the equilibrium real exchange rate. RERMIS is an index of the extent of undervaluation (negative) or overvaluation (positive) of the real exchange rate relative to the equilibrium level. Therefore, according to Elbadawi and Helleiner RERMIS should be positively and robustly associated with manufactured exports. The RERMIS and the ERER indexes are taken from Elbadawi (1998) who constructs these indexes for 63 developing countries, based on a panel data model of the real exchange rate. Elbadawi's approach for modeling equilibrium real exchange rates is based on estimating RER levels consistent with 'sustainable' current account equilibrium (e.g. Edwards, 1997; Elbadawi, 1994; Williamson, 1994). Williamson (1994: p. 187) for example recommends an approach for estimating, "the set of real effective exchange rates (or paths) needed to achieve simultaneous internal and external balance by some date in the medium-run future, and to maintain balance thereafter." The so called "fundamental equilibrium exchange rate"--(FEER). This FEER concept, therefore, calls for specifying (or assuming) behavioral specifications for the fundamentals and using the real exchange rate equations in the context of a bigger model to derive (paths) for the equilibrium real exchange rate, given the assumed (paths) for the fundamentals. The approach adopted by Elbadawi (1998) for estimating "sustainable" fundamentals resembles the FEER approach. In particular, the capital account fundamentals are obtained using a model that links sustainable net capital flows and net foreign income to sustainable current account balance (Edwards, 1997), and sustainable change in reserves to long-term import requirements. In addition, sustainable foreign aid ratios are linked to levels that are judged to be consistent with avoiding excessive aid dependency.

A far superior support for exports, in terms of investment performance, is provided by the three Asian countries, which managed to increase their investment shares to 30% or more to register staggering rates of 42% for Malaysia, 41% for Thailand and 31% for Indonesia (Table 1.B).

Third, the transaction theory suggests a negative relationship between transaction costs and MNEX. Figure 2 shows the association between MNEX and a composite index of transaction costs. The latter is weighted index of three variables: a qualitative indicator of corruption, length of paved roads and the number of fax machines in the country. The weights are given by the corresponding coefficients of regression 4 of Table 2 (see notes to Figure 2). The composite index ranges from zero (no cost) to a maximum of one. The scatter fits a negative exponential curve, where it appears that a value of 0.5 for the transaction index establishes an important threshold in terms of the relationship between MNEX and transaction costs. For most countries, at levels of the index higher than this threshold MNEX was low and was fairly invariant to changes in transaction costs. About eleven countries, all of them from SSA, fall in this segment. Another group of countries have had lower transaction costs than this threshold, yet their MNEX shares are lower than the regression line. This set includes Madagascar, Malawi, Central African Republic, Burkina Faso, Chile, and especially South Africa. While transaction costs in South Africa are at par with that of Mauritius, its MNEX shares are less than 10%, which is only slightly more than one third the shares for Mauritius. In the case of South Africa and Chile, the dominance of mineral resources is clearly an important factor contributing to this outcome. Finally, the cases of Tunisia, Thailand, Korea, Mauritius, and especially Malaysia suggest that low transaction costs are strongly associated with high shares of MNEX.

Fourth, a version of the endowment thesis predicts a negative relationship between the MNEX and the stock of skills relative to natural resource endowment. The partial correlation between the two variables for 1990-95 averages is shown in Figure 3, where the ratio of school enrolment to land area per 100 workers was used as a proxy for the ratio of skills relative to natural endowment. The figure shows a strong and positive partial correlation between the two variables, albeit with a wide distribution around the mean at low levels of MNEX. At least five patterns could be identified. First, clearly Malaysia and to a lesser extent Thailand were able to increase their MNEX ratios to much higher levels than predicted by their skills ratios. Secondly, the MNEX ratios achieved by Mauritius are very close to what the levels predicted by its skills ratios, while Korea and to a lesser extent Tunisia have potential for further increasing their shares of MNEX to GDP, given current skills ratios in the two countries. A third group of countries (Chile, South Africa, Zimbabwe and Indonesia) have high potential for raising MNEX shares to higher levels commensurate with their skills ratios. A fourth group of nine African countries (Kenya, Ghana, Zambia, Nigeria, Togo, Cameroon, Gabon, Madagascar and Cote d'Ivoire) are either at or close to the regression line. Finally, the remaining four countries (Burkina Faso, Tanzania, Malawi and Senegal) have actually higher MNEX shares than their relative skills ratios would predict.

Figure 2: Transaction Cost & Manufacturing Exports (1990-95)



Note:

The composite index of transaction cost is calculated as a normalized index of TC, where TC is given by:

$$TC = \frac{1}{b_1 \bar{X}_1 + b_2 \bar{X}_2 + b_3 \bar{X}_3} \text{ where } \bar{X} \text{ 's are the average of LFAX, PROADS and LCORR and } \beta \text{ 's are the estimated coefficients from Table 2}$$

The analysis of this section establishes the relevance of the four set of variables as potential determinants of MNEX. Next I turn to a more formal behavioral analysis using panel data.

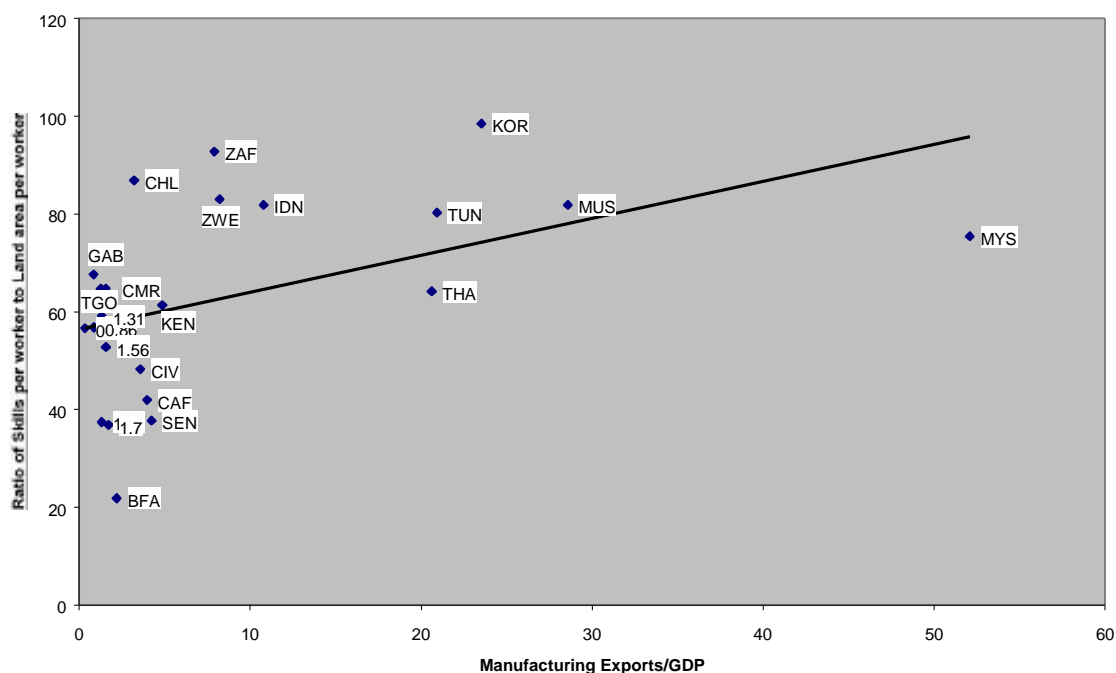
3. Econometric Analysis of Manufactured Exports in Developing Countries

Each of the three theories suggests a pivotal determinant of manufactured exports. First, Wood's endowment hypothesis suggests that a combination of high natural resource per worker (measured by the ratio of land area per 100 worker)¹⁰ and low human capital per worker (measured by schooling per worker) should both be negatively associated with manufactured exports. Another version of the theory assumes that both of the two factors have the same quantitative effect on exports, which leads to a restricted model with a single endowment variable (the ratio of human capital per worker to land area per 100 worker). This restricted version of the endowment theory predicts that countries with higher human capital per worker relative to their natural resource base per worker have a comparative advantage in

¹⁰ This variable is a variant of the population density, which as well, has been shown to be closely associated with the composition of exports (Perkins and Syrquin, 1989).

manufacturing. Both versions of the theory are assessed. Second, Collier's transaction theory predicts that transaction costs are the dominant factors. We account for transaction costs by three variables: index of corruption, length of paved roads and availability of telephone and fax machines. I analyze the implications

Figure 3: Manufacturing Exports and Schooling per land/ Labor Ratio (1990-95)



Note:
 Schooling rate to land per labor ratio is measured by the index of primary school Enrolment ratio to land area per 100 workers.

of this theory at two levels. At the first level, I test whether these three components have stronger effect on manufactured exports than overall aggregate investment. This is to make the point that those components of investment designed to reduce transaction costs relax the most critical constraints facing manufactured exports. If the prediction of the theory was corroborated, I test whether or not transaction costs are sufficient for policy. In particular I test for the significance of an index of real exchange rate misalignment. The test for the real exchange rate-led export orientation approach is given by examining whether or not real exchange rate misalignment matters for manufactures exports, regardless of whether we control for aggregate investment or for transaction costs.

In addition to the above pivotal set of variables, directly suggested by the three theories, I include other variables to account for macroeconomic instability of relevance to the export sector (real exchange rate variability); external shocks (measured by level and variability of terms of trade); external demand (measured by per capita GDP in OECD countries); and regional dummies for East Asia, Latin America and Sub-Saharan Africa.

Table 2 provides estimates of manufactured export performance (given by the log of the ratio of manufactured exports to GDP) for a panel of 41 developing countries over 1980-1995¹¹. Regressions 1 and 2 of the Table contain results for random effects¹² regressions, where aggregate investment rather than transaction cost variables are included. Instead, regressions 3 and 4 of the Table exclude aggregate investment but accounts for three measures of transaction costs (corruption, length of paved roads and number of fax machines)¹³. All of regressions fit the data very well, with about 95% of variations in manufactured export/GDP ratio explained by the model. To avoid picking spurious effects, the dependent variable is given by the log of the ratio of manufactures exports to GDP and all right hand side variables (other than relative prices) are expressed relative to appropriate scale variables (see the notes to Table 2).

First, the results of regressions 1 and 3 suggest that the ratio of schooling per worker was significantly and positively associated with manufactures exports, while the ratio of land area per labor was very insignificant. In regressions 2 and 4 the ratio of schooling per worker to land area per worker was highly significant and positively associated with manufactured exports. Since the significance of this variable is obviously driven by the schooling effect, this finding does not contradict the earlier results (of regressions 1 and 3) on the insignificance of land area per worker. This finding, therefore, permits the conclusion that: *adequately conditioning for other relevant determinants, a high ratio of natural resource endowment per worker was not found to be associated with manufactured export performance across countries. This suggests that— as far as manufactured export performance is concerned—the endowment thesis is not corroborated by empirical evidence.* This result can not be taken as a formal rejection of the “endowment thesis”, unless one is also prepared to assume that manufactured exports to GDP was highly correlated with manufactured to aggregate (or primary) exports. This, however, is not likely to be implausible.

Second, regressions 1 and 2 find that aggregate investment was robustly and positively associated with manufactured exports. Similarly, regressions 3 and 4 find the index of corruption (a higher index indicates lower corruption), length of paved roads and number of fax machines all positively associated with manufactures exports. However, the significance levels for the three transaction cost variables are more than double the one for aggregate investment. Moreover, regressions accounting for the simultaneous effects of aggregate investment and transaction costs (not reported) find only the latter to be significant.

Third, the remaining test is whether RERMIS (measured as undervaluation) is positively and significantly associated with exports when accounting for investment or for transaction costs. Our results find that in both cases RERMIS have had significant and positive effect on manufactured exports.

¹¹ Data on manufacturing exports and other related variables are obtained from the World Bank's World Development Indicators. The data allows estimation of a panel of 41 countries for regressions 1 and 2 and 32 countries for regressions 3 and 4, over five periods: 1980-81, 1982-83, 1984-85, 1986-89, 1990-95.

¹² Hausman specification tests (reported in the Tables) suggest that random effects results are superior to the results based on the fixed effects regressions.

¹³ The number of telephones were found to be consistently insignificant and was therefore dropped.

Therefore, the combined results corroborate the basic prediction of the transaction theory of manufactures exports: *that transaction costs are major determinants of manufactures exports and that investing on reducing these costs generates the highest payoff for the capacity to export manufactures*. However, our results also lend support to the view that: *real exchange rate-based competitiveness is a pre-requisite for a developing (especially low- income developing) country to become a successful exporter of manufactures*.

Finally, all of the four regressions find real exchange rate variability and the level effect of the terms of trade highly significant and negatively associated with manufactured exports. Also and as expected, terms of trade variability has a deleterious effect on manufactured exports, though its effect was only found to be significant in the case of the aggregate investment-version of the model (regressions 1 and 2). Moreover, A less clear result from a theoretical perspective, was the negative elasticity of the level of terms of trade. However, the GDP per worker in the OECD countries (a proxy for external demand) was only marginally significant in the aggregate investment-version of the model and was very insignificant in the transaction-version of the model. Therefore, it was subsequently dropped from regressions 3 and 4. Lastly, all regional dummies, especially the Africa dummy were not found to be significant. This is an important result because it suggests that Africa is on the regression line: *the gap in performance between Africa and others, most notably East Asia, should be explained by differences in the global determinants of manufactures exports*. I turn next to this issue.

3.1 Why was Africa Marginalized in World Manufactures Exports?

In the 1990s manufactured exports by the four East Asian countries considered in this study (Indonesia, Malaysia, Republic of Korea, Thailand) account for more than 30% of their GDP, while Sub-Saharan Africa only managed to export about 2.9% of their GDP during the same period. The Asian manufactured export/GDP share in the 1990s was, therefore, more than ten times the comparable share for SSA. Table 3— based on regression 4 of Table 2---simulates the sources that accounted for this outcome, and Figure shows the net contribution of four categories of determinants: endowment, exchange rate policy, transaction cost, and terms of trade. The evidence very strongly corroborates the transaction theory, where lower transaction costs in East Asia relative to SSA in the 1990

TABLE 2: AN EMPIRICAL MODEL OF MANUFACTURED EXPORTS IN DEVELOPING COUNTRIES

Dependent Variable	EQUATION 1		EQUATION 2		EQUATION 3		EQUATION 4	
Log (MXY)	RANDOM		RANDOM		RANDOM		RANDOM	
	COEFF.	T-STAT	COEFF.	T-STAT	COEFF.	T-STAT	COEFF.	T-STAT
RERMIS	0.4250	2.1749	0.4422	2.2738	0.5820	1.6718	0.6009	1.7469
RERVAR	-17.3195	-12.8317	-17.3846	-13.0912	-8.2117	-3.7173	-8.1503	-3.7214
Log (INV/GNP)	0.7266	2.2145	0.7637	2.3502				
Log (TOT)	-0.8786	-1.7076	-0.9398	-1.8566	-1.1567	-1.9771	-1.2207	-2.1485
TOTVAR	-2.8718	-3.0116	-2.8301	-3.0012	-1.0635	-1.1113	-1.0733	-1.1308
Log (SCH)	1.0817	4.5445			0.8851	2.7426		
Log (LARLAB)	-12.6392	-0.7393			-11.6882	-0.5641		
Log (SCHLAR)			1.0715	4.4827			0.8568	2.6891
OE CYB	0.00002	-1.3429	0.00002	-1.2900	0.00003	1.8980	0.00004	2.0335
Log (CORR)					1.3265	5.6388	1.3304	5.7010
Log (PROAD)					0.6333	4.7872	0.6419	4.9033

Log (FAX)					0.4640	4.0391	0.4839	4.4217
DSSA	0.0199	0.2374	0.0198	0.2341				
DEA	0.1700	1.4220	0.1839	1.5518				
DLAC	0.7880	1.0805	0.0878	1.2127				
CONSTANT	0.4427	0.3049	0.5369	0.3737	2.8234	-1.8473	-2.7415	
Adjusted R Squared	0.8660		0.8722					
R squared	0.9504		0.9511					
P Value	0.0000		0.0000		0.0000		0.0000	
Number of Observation	82		82		64		64	
Number of Countries	41		41		32		32	
Period of Estimation: 1980-81, 1982-83, 1984-85, 1986-89, 1990-95								

Note:

RER Real Exchange Rate **GDI** Gross Domestic Investment
SRERMS Real Exchange Rate Misalignment **CORR** Index of corruption
RERVR Real Exchange Rate Variability **PROAD** Paved Roads
TOT Terms of Trade **FAX** No. of Fax Machines
per 1000.
TOTVR Terms of Trade Variability **OECDYB** GDP of OECD Countries
SCH Index of Primary School Enrollment **DSSA** Dummy for Sub
Saharan Africa
ARLAB Arable Land / Labor Ratio **DEA** Dummy for East Asia
SALAB Schooling per land per labor Ratio **DLAC** Dummy for Latin
America
P Value Refers to the Hausman test for Fixed vs Random Effects Model

TABLE 3: THE EXTENT AND SOURCES OF AFRICA'S SHORTFALLS IN MANUFACTURED EXPORTS RELATIVE TO EAST ASIA (1990-95)

	(1)	(2)	(3)	(4)
	East Asia	Sub Sahara Africa	Difference	Net Contribution
MX/GDP	-0.5121	-1.5353	1.0232	10.55
RER Variability	-0.1125	-0.4238	0.3113	3.28
RER Misalignment	0.0070	0.0489	-0.0419	-0.44
Exchange Rate Policy				2.84
Terms of Trade	-2.4216	-2.3919	-0.0297	-0.31
Terms of Trade Variability	-0.0196	-0.0349	0.0153	0.16
External TOT effect				-0.15
Corruption	0.6696	0.6224	0.0472	0.50
Number of Faxes	0.2189	-0.2816	0.5005	5.28
Proportion of Paved roads	0.9024	0.6254	0.2770	2.92
Transaction Benefits				8.70
Skills to Land Ratio	1.6393	1.5109	0.1284	1.36
Endowments				1.36
Total Predicted (MX/GDP)				12.75
Actual				10.55
Residual				2.20

Source: Regression 4 of Table 2

Notes:

1. Column 1(2) is the fitted right-hand side components of Regression 4 of Table 2, using averages for E. Asia (Africa)
2. Column (3) is the difference between East Asia and Africa ((1)- (2))
3. Column (3) is based on the following expression:

$$\log\left(\frac{y_{EA}}{y_{AFR}}\right) = \mathbf{b}(X_{1_{EA}} - X_{1_{AFR}}) + \mathbf{b}2(X_{2_{EA}} - X_{2_{AFR}}) + \dots$$

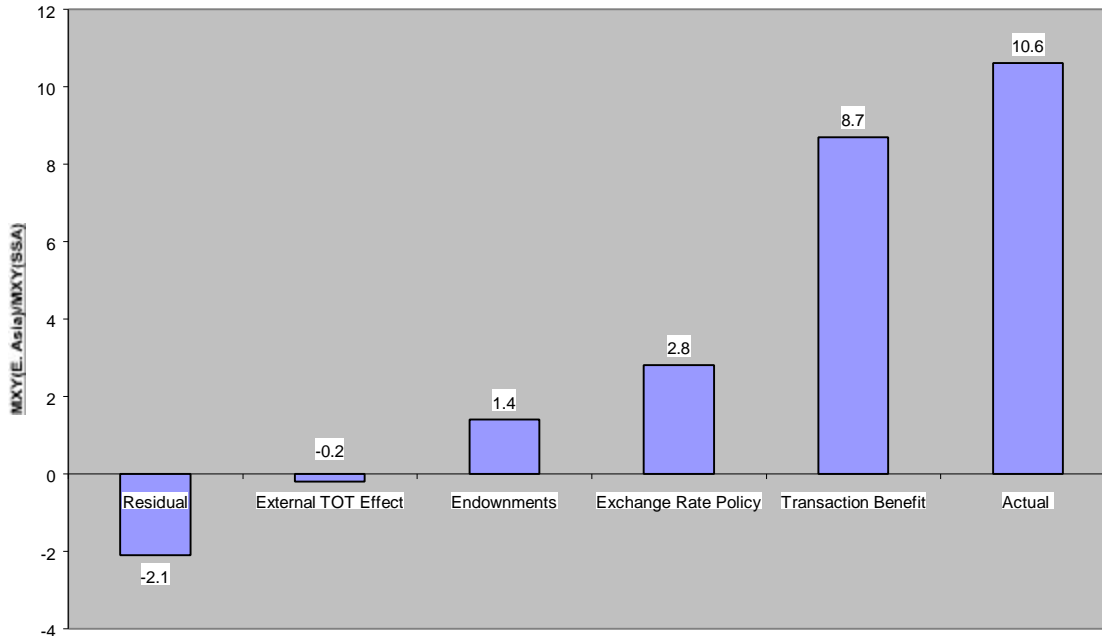
Where $y_{EA}(y_{AFR}) = (MANEX / GDP)$ in East Asia (Africa)

A simple Taylor's expansion of $\log\left(\frac{y_{EA}}{y_{AFR}}\right)$ around 1 leads to the following expression:

$$\left(\frac{y_{EA}}{y_{AFR}}\right) = \mathbf{b}_1(X_{1_{EA}} - X_{1_{AFR}}) \left(\frac{y_{EA}}{y_{AFR}}\right) + \mathbf{b}_2(X_{2_{EA}} - X_{2_{AFR}}) \left(\frac{y_{EA}}{y_{AFR}}\right) + \dots + \text{Residual}$$

4. Column (4) gives the components of $\left(\frac{y_{EA}}{y_{AFR}}\right)$ based on the above approximation.

Figure 4: The Extent and Sources of Africa's Shortfall in Manufactures Exports Relative to East Asia (1990-95)



Source: Table 3.

allowed the share of manufactured exports to GDP in the former to be as high as 8.7 times the share of SSA manufactured exports to its GDP. In particular, the number of faxes accounts for half of the shortfall of Africa's share of manufactured exports relative to that of East Asia.

However, this result should be interpreted as a proxy for the overall effect on manufactured exports of communication and other communication-intensive inputs (such as managerial practices, flow of information... etc). East Asia also outperformed SSA in terms of real exchange rate stability, which more than compensated for Africa's advantage in the area of exchange rate competitiveness. The net effect of exchange rate policy allowed East Asia to achieve manufactured export shares at about 2.8 times those of SSA. Assuming that there were no differences between East Asia and Africa in other determinants, East Asia's superior performance in these two main sets of policy variables would predict the share of East Asia's manufactured exports to be about 11.5 times that of SSA.

On the other hand, East Asia's advantage relative to Africa in terms of the ratio of skills per worker relative to land per 100 workers (endowment thesis) predicts the share of Asian manufactured exports to be about 1.4 times that of SSA. The results also show that terms of trade effects were favorable to Africa, however, the net effect was too small to make any measurable impact.

4. Conclusions

This paper analyzes the determinants of manufactured exports in Africa and other developing countries, guided by three pivotal views on the prospects for Africa in manufactured exports. According to Adrian Wood and his associates, Africa cannot have a comparative advantage in exporting of labor-intensive manufacturing--even if broadly defined to include processing of raw materials--because of its higher endowment of natural resources relative to human capital.

On the other hand, Paul Collier argues that, for at least the majority of Africa, unusually high, and policy-induced, transactions costs are the main cause of its comparative disadvantage in manufactures exports. Both approaches are directly based on a specific interpretation of the Heckscher-Ohlin model, which makes the fundamental prediction that comparative advantage will reflect differences in relative endowments. The third approach emphasizes stable and competitive real exchange rates for profitability of exports. All of the three views are very much influenced by the impact of globalization. The policy implication for Africa's development of the Wood's thesis is very dramatically different from the other two views.

The empirical results--based on a panel of 41 developing countries, of which eleven from Sub-Saharan Africa---suggest five important conclusions. First, this paper's empirical analysis suggests that, after adequately controlling for other relevant determinants, a high ratio of natural resource endowment per worker was not found to be robustly associated with manufactured export to GDP across developing countries. To the extent that GDP was strongly correlated with aggregate (or primary) exports, this finding permits the conclusion that the "endowment thesis" was not corroborated by empirical evidence. Second, our results corroborate the basic prediction of the "transaction theory" that transaction costs are major determinants of manufactured exports and that investing on reducing these costs generates the highest payoff for the capacity to export manufactures. Third, however, our results also lend support to the view that: real exchange rate-based competitiveness is a pre-requisite for a developing (especially low- income developing) country to become a successful exporter of manufactures. Fourth, as far as manufactured exports are concerned there was no evidence that Africa is different. Therefore, Africa's is on the regression line, which suggests that the gap in performance between Africa and others, most notably East Asia, should be explained by differences in the global determinants of manufactured exports. Fifth, the simulation exercise-- based on the manufactured export regressions---sheds some useful insight as to why Africa is marginalized in world manufactured exports. Fifth, East Asian manufactured export/GDP share in the 1990s was more than ten times the comparable share for SSA. Simulations of the net contribution of four categories of determinants: endowment, exchange rate policy, transaction cost, and terms of trade provide very strong support for the transaction theory. The evidence suggests that bad policy, especially in areas that affect transaction cost, rather than adverse endowment, remains the most serious hurdle for Africa to pass before it can build comparative advantage in the international market for manufactured exports.

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