

## Export Performance in Sub-Saharan Africa: An Explanation

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**Abstract:** This study attempts to explain export performance in SSA using a panel of 20 countries, over the period 1980-2005. Most of the studies that explain export performance in SSA assume that exports are determined by supply-side variables and ignore the demand-side determinants of exports in SSA. This gap in the literature seems to have arisen because the typical developing country is assumed to be small and to face an infinitely elastic demand for its exports, so that changes in foreign demand can influence exports only through changes in world prices. In addition, studies that have ignored the role of other factors such as natural barriers, infrastructural availability and market access in explaining SSA export performance. Ignoring such factors could yield inconclusive results. To our knowledge, no study has focus exclusively on SSA and address the issue by utilizing a system of equations from the demand and supply-side of exports. Evidence reveals that the exports of SSA have performed poorly because the demand for Sub Saharan African exports has low elasticity in relation to changes in world income and in most cases are uncompetitive in world market. In addition, declining infrastructure investment seems to have generated substantial transaction costs and have important roles to play in determining the magnitude and direction of export trade of SSA countries.

**Key words:** Export demand, export supply, panel data, elasticity, Sub-Saharan Africa

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### INTRODUCTION

The failure of the import-substitution strategy and the debt crisis in the early 1980s led to a new consensus on the importance of trade policy reform and exports in growth strategies. This new consensus was the main focus of the reforms initiated by SSA countries and the developing world in general from the early 1980s, within the framework of SAPs. As a result the mid 1980s witnessed the formulation and implementation of wide-ranging trade policy reforms by most SSA countries with the support of the IMF and the World Bank (2006).

The end result is that starting from the mid 1980s and especially in the 1990s, most SSA African countries liberalized their trade regime to some extent, with many countries reducing trade barriers significantly more than others (especially restrictions on imports). Import permits were abolished and duty rates as part of tariff liberalization were also lowered in many SSA countries. Export taxes and levies were either significantly reduced or totally eliminated in most of the SSA countries. Currencies were devalued to encourage exporters, with the aim of boosting exports and growth and fostering the integration of SSA into the global economy. Export Processing Zones (EPZs) were also established by the government in some of the SSA countries. These reforms were aimed at making it easier to import, by reducing tariffs and non-tariff barriers and encouraging exports, by eliminating export taxes and providing export incentives.

Thus, this new policy strategy attempted to promote greater openness in order to boost growth and encourage the competitive integration of the SSA economies into the globalizing world.

However, while the general consensus was on the need to design and implement economic reforms in SSA, it was and is still not certain if the exports and economic growth of the region would be enhanced through the adoption of programs that encourage more open economic policies. This is because despite significant trade policy reforms over the past two decades, export performance has remained dismal. Trade flows from SSA are still characterized by shrinking share of SSA's in world trade. The share of SSA in world exports and developed countries export fell from 3.74 and 5.72-1.40 and 2.31%, respectively between 1980 and 2003. Trade structure of SSA countries also reveals high dependence of exports on primary commodities and the direction of trade heavily leaning towards European trade partners. In SSA, 29 out of 47 countries depend on three primary commodities to provide at least 50% of their export revenues. Many SSA countries have also not put in place the policies necessary to raise living standards by improving export shares in traditional markets, thereby encouraging rapid diversification. SSA region has the highest export concentration index compared with other regions in the world. The concentration index stood at 0.569 and 0.492 in 1992 and 2002, respectively compared to the developed economies with indices of 0.08 and 0.115, respectively

over the same period (UNCTAD, 2004). Consequently, the objective of this study is to examine the determinants of export performance in SSA empirically.

However, some of the studies (Lyakurwa, 1998; Mold and Morrissey, 2006) on the determinant of export performance in SSA assume that exports are determined by supply-side variables, such as domestic prices (official or market determined), the growth of Gross Domestic Product (GDP), index of variable cost and capacity utilization. Fewer studies have focused on the demand-side determinants of exports in SSA, such as the income and prices in the competitor countries. This gap in the literature seems to have arisen because the typical developing country is assumed to be small and to face an infinitely elastic demand for its exports, so that changes in foreign demand can influence exports only through changes in world prices.

The lack of attention to the influences of export demand may also be traced to the almost total concentration on exports from individual countries rather than from groups of countries. If the focus is on a group of developing countries, two important differences arise. In the first case, the small country hypothesis is no longer relevant and thus the assumption that demand is infinitely elastic is inappropriate for a group of developing countries. Secondly, it is likely that pricing policies may not have the desired effect. Developing countries within a group that produce a product whose market price elasticity is low, may have to allow a considerable price fall for any increased supply to be absorbed. In addition, given the presence of tariffs and other restrictions in the export markets of developing countries, it is unlikely that even a small developing country can sell all it wants to at any given market price. Consequently, it would be incorrect to assume as it is often done, that the export demand of developing countries is perfectly elastic (Bond, 1985).

Furthermore, some studies (Lyakurwa, 1998; Mold, and Morrissey, 2006) that have addressed the supply-side performance of exports in SSA have ignored the role of other factors such as natural barriers and

institutions in explaining SSA export performance. Ignoring such factors could yield inconclusive results. An important consideration given in this study is to address the issue by utilizing a system of equations from the demand and supply-side of exports in SSA.

**Export performance in Sub-Sahara African countries:**

SSA has been losing market share in the world export trade. In the early 1980s, the share of SSA in world total exports was about 3.74%. Since then there has been a gradual decline and by 2003 the share was down to 1.49%. It however, increased slightly in 2004 (Table 1). Similarly, the share of SSA total exports from all developing countries, which stood at 12.71%, declined precipitously to 4.60% in 2003 and also increased slightly to 4.74 in 2004. This dismal trend can be linked to the composition of SSA merchandise trade (which mostly consist of primary products), their restrictive trade policies over the past two decades, poor infrastructure, lack of market access to external market and the nature of the agricultural policies in industrial countries among others. Nevertheless, the sluggish export performance of the SSA countries, as a whole since the early 1980s and especially in the 1990s cannot be said to be a typical developing country phenomenon. As a group, the developing countries have maintained their position in world exports over this period relatively well, although there have been large year-to-year swings (which could mainly have arisen from changes in the relative prices of commodity products). For instance, the average share of developing countries in world export trade stood at 30% between 1980 and 2004.

In terms of regional export performance, the Southern African region had the highest share in SSA exports. This was followed by the West African and East African region (Table 2). The Central African region had the lowest absolute export performance. However, the presence of countries such as Botswana, South Africa and Mauritius may be largely responsible for the significant dominance that the Southern African region recorded in terms of export trade in SSA (Table 3). In

Table 1: Value and shares of developed, developing regions and Sub Saharan Africa in World Exports, 1980-2003

Region	1980	1990	1995	1998	1999	2000	2001	2002	2003	2004
<b>Value (US\$ Million)</b>										
World	2031874	3491451	5137956	5458595	5667125	6364080	6121807	6396697	7443692	8975589
Developing countries	597931	845411	1425174	1519594	1653932	2034820	1908835	2038639	2410871	3003599
Sub-Saharan Africa	76009	69544	76537	71950	78712	92035	87824	90704	111097	142400
Developed countries	1326934	2516733	3577831	3808849	3884412	4158604	4042000	4297040	4803196	5660978
Share of LDCs in world exports (%)	29.43	24.21	27.74	27.84	29.18	31.97	31.18	31.87	32.39	33.46
Share of SSA in world exports (%)	3.74	1.99	1.49	1.32	1.39	1.45	1.43	1.42	1.49	1.58
Share of SSA in LDC exports (%)	12.71	8.23	5.37	4.73	4.76	4.52	4.60	4.44	4.60	4.74
Share of SSA in developed countries exports (%)	5.72	2.76	2.14	1.89	2.03	2.21	2.17	2.17	2.31	2.51

UNCTAD Handbook of Statistics (2004)

**Table 2: Regional export performance in SSA (Dollars)**

Years	Central Africa	East Africa	Southern Africa	West Africa
1980	637,248,166.7	581,351,166.7	2,297,854,545	2,361,743,417
1985	954,582,166.7	567,183,200	2,494,905,364	1,720,489,167
1990	1,050,542,000	768,869,833.3	2,870,368,273	2,002,499,583
1995	1,054,458,333	1,012,701,667	3,521,645,455	2,418,965,833
2000	1,264,795,667	1,152,860,000	4,599,848,182	2,730,781,000
2003	1,377,291,000	1,505,128,000	5,134,879,000	3,032,985,667

WDI, 2006

**Table 3: Absolute export performance by country (Billions of Dollars)**

Africa	1980	1985	1990	1995	2000	2003
<b>Central</b>						
Burundi	115	210	20	29	62	87
Cameroon	1239	2474	2178	1808	2728	2857
Chad	18	179	225	284	237	336
Congo, Rep.	1117	1604	2024	2144	2585	2800
Gabon	1118	1220	1646	2000	1825	1975
Rwanda	169	228	207	60	149	206
<b>East</b>						
Comoros	60	16	18	32	30	32
Ethiopia	478	473	579	502	984	1427
Kerya	1461	1519	2345	2759	2742	3248
Madagascar	975	627	755	930	1189	1567
Tanzania	382	482	685	1448	1306	1844
Uganda	183	198	228	403	662	911
<b>Southern</b>						
Botswana	690	1395	1993	2233	3221	2756
Lesotho	58	54	83	134	255	414
Malawi	314	335	354	378	446	474
Mauritius	731	907	1738	2214	2801	3177
Mozambique	211	87	114	236	474	996
Namibia	1096	1092	953	1515	1557	1747
South Africa	19626	20468	22755	28146	36953	37468
Swaziland	421	358	772	886	1124	1253
Zambia	811	677	558	568	681	1033
Zimbabwe	647	796	1025	1825	2118	2026
<b>West</b>						
Benin	390	401	247	314	342	384
Burkina Faso	226	194	253	206	236	300
Cote d'Ivoire	3051	3317	4087	3743	4211	4331
Gambia, The	112	156	182	165	201	192
Ghana	857	652	1010	1416	2440	2463
Guinea-Bissau	21	9	17	261	68	76
Mali	174	212	265	3751	648	956
Mauritania	338	510	411	442	378	306
Nigeria	21726	13822	16042	20865	22416	25340
Senegal	501	585	778	882	1306	1377
Sierra Leone	442	384	320	191	109	161
Togo	499	399	413	398	408	507

WDI (2006)

addition, it is noticed that only a few set of countries account for most of SSA exports. By way of illustration, Nigeria and South Africa accounted for about 24% and 35% of SSA exports trade in 2003 (Table 3).

Countries with high shares of manufactured exports are protected from instability in their export earnings despite operating in a competitive world market. However, primary commodities can be said to dominate SSA countries exports. Except for SSA countries such as Botswana, Lesotho, South Africa and Mauritius that had a significant part (over 50%) of their export being dominated by manufactured good, virtually all the other SSA countries have their exports being dominated by the

all food item and agricultural raw materials (Table 4). In addition, countries such as Nigeria, Cameroon, Gabon and Angola had a significant part of their exports in fuels with a low percentage share in the manufactured exports category. The export structure of SSA countries could therefore be one of the reasons why the sub-continent has been losing market share in the world market.

While the view in the empirical literature is that export concentration is an impediment to growth of export earnings, the main reason is not usually made explicit. The principle of comparative advantage suggests that relative factor supplies or technology differentials should determine the composition of exports. This may likely result in highly concentrated exports for technologically unsophisticated countries where unskilled labour and/or natural resources are the main factor endowments. As shown in Table 5, SSA region has the highest concentration index among the other regions for the 1992 and 2002 period, respectively. In addition, the diversification index for the period, respectively reveals a higher deviation of 0.396 and 0.369, respectively from the world average for SSA region exports. The region also exports the least number of commodities compared to other regions.

Thus, one would have expected export diversification by SSA countries away from primary commodities into new exportable products. However, this is not the case for most of the countries. Only a fraction of them diversified into new export products and they can be classified into three broad categories. Those that became major exporters of oil or a mineral product (Cameroon, Congo, Congo, Dem. Rep., Niger, Sierra Leone); major exporters of fishery products (Mauritania, Mozambique and Senegal) and those that diversified into the usual first stage manufactured exports of textiles and clothing (Mauritius and Chad) (UNCTAD, 2004). Consequently, one may conclude therefore that there is need for intensification of export diversification drive in SSA countries.

Although, there are other SSA countries that have had improved export trade, but these countries can be taken to be relatively small (even within SSA) and their success is attributed to certain features of their economy. For example, the Botswana economy is heavily dependent on diamond exports, while Mauritius preferential market access to the EU for its sugar and clothing exports have contributed immensely to its improved export trade. Also, crude oil in Gabon and Nigeria; coffee in Rwanda and the Central African Republic; cotton in Mali and tobacco, tea and sugar in Malawi has been the driving force in their export trade performance. Moreover, the decline in the demand for export products of crucial export interest to the region, added to the heavy reliance on primary

Table 4: Export structure of selected SSA countries by major commodity groups

Country/Year	Total value (millions of dollars)	All food items	Agricultural raw materials	Fuels	Ores and metals	Manufactured goods	Chemical products	Other manufactured goods	Machinery and transport equipment
<b>Benin</b>									
1995	333	11.8	38.9	2.8	38.9	6.6	0.2	4.9	1.5
2000	188	20.1	69.7	0	0.1	7.1	0.7	5.1	1.3
2002	304	37.2	45.1	0.4	0.1	8.5	0.7	6.5	1.2
<b>Botswana</b>									
2000	2763	2.8	0.3	0.1	7	89.5	0.9	85.1	3.5
2001	2533	3.1	0.5	0.1	5.5	90.6	1.2	86.5	2.9
<b>Burkina Faso</b>									
1995	171	22.1	59.1	1.6	0.3	8.6	0.4	5	3.1
2000	184	18.8	58	3.2	0	18.1	1.7	11.8	4.6
2002	171	19.4	61.5	0	0.1	0.1	18.3	0.6	12.3
<b>Cameroon</b>									
1990	2081	20.4	14.3	49.9	6.9	8.5	1.5	4.7	2.3
1995	1539	27	27.5	29.2	8.4	7.9	1	5.8	1.1
2000	1833	14.9	21	54.2	5.6	4.3	0.4	3.3	0.5
2003	2246	19.9	19.5	49.4	4.2	6.9	0.9	4.8	1.2
<b>Côte d'Ivoire</b>									
1995	3737	58.7	16	9.8	0.2	14.2	4.2	8.6	1.4
2000	3628	49.8	13.8	20.3	0.2	14.4	4.1	9.2	1
2003	5493	55.6	9.2	12.8	0.2	20	4	6.2	9.7
<b>Ghana</b>									
2000	1671	30.7	6.5	4.9	11.9	9.3	0.6	7.5	1.2
<b>Kenya</b>									
1990	1028	48.8	5.5	13.1	2.9	29.7	4.2	14.9	10.6
1995	1826	56.1	7.3	6.1	2.8	27.6	6.5	19.5	1.6
2000	1571	59	8.6	8.1	3.2	20.7	5.5	14.6	0.5
2004	2686	39.6	12	22.9	4.2	21	4.2	15.2	1.7
<b>Mauritius</b>									
1990	1221	31.9	0.5	1.4	0.2	65.8	0.9	63.5	1.4
1995	1538	28.6	0.7	0	0.2	70.2	0.8	67.1	2.3
2000	1490	17.8	0.5	0	0.2	80.8	0.9	78.6	1.3
2004	1925	26.9	0.5	0.1	0.4	70.9	1.7	64.5	4.7
<b>Niger</b>									
1995	273	26.3	2.4	0.6	55.4	14.4	0.6	7.9	5.9
2000	330	37.7	2.8	1.1	27.7	29.7	1.1	15.9	12.8
2003	209	30.4	3.6	1.6	54.9	7.9	0.4	6.2	1.2
<b>Nigeria</b>									
2000	27079	0.1	0	99.6	0	0.2	0	0.1	0.1
2003	24078	0	0	97.9	0	2.1	0.1	0.2	1.8
<b>Senegal</b>									
1990	783	53.2	2.7	12.4	9.3	22.5	14.9	5.2	2.4
1995	531	15.4	8.5	15.1	10.6	49.4	39.5	7.4	2.5
2000	693	52.4	1.7	14	4.8	26.9	17.3	6.1	3.5
2003	1151	37.1	3.5	20.1	3.4	34.3	22.6	7.5	4.2
<b>South Africa</b>									
2000	26075	8.5	3.8	10.2	10.7	53.9	7.8	28.6	17.5
2004	40206	8.7	2.8	9.1	22	56.5	7.8	29	19.7
<b>Togo</b>									
1990	268	23	21.5	0	44.7	9.1	0.4	8	0.7
1995	383	14.1	24.7	18.7	17.7	15.2	0.9	9.3	4.9
2000	192	19.6	23.4	0.6	25.5	30.8	0.6	26.3	3.9
2004	384	24	15.6	0.4	12.7	47.3	2.4	43.6	1.3
<b>Uganda</b>									
1995	575	86	4.4	0.1	0.6	4.2	1	2	1.2
2000	402	60.1	12.5	7.1	4.1	5.3	1.1	1.8	2.5
2004	639	58.1	14	4.2	0.3	13.8	2.6	7.2	4
<b>United Republic of Tanzania</b>									
2000	656	54.7	11.1	0.1	0.4	16.2	0.8	14.4	1
2003	1218	37.8	7.5	1.3	5.9	11.6	1.2	8.8	1.6
<b>Zambia</b>									
1995	1055	2.7	0.6	3.3	86.5	6.9	0.2	5.2	1.5
2000	666	10.2	3.6	1.6	55.5	27.7	0.5	23.7	3.4
2002	930	9.2	2.8	2.1	63.6	19.2	1	13.3	4.9
<b>Zimbabwe</b>									
1990	1470	44	7.3	0.7	15.9	30.8	1.7	25.5	3.7
1995	1846	43.2	6.8	1.3	11.6	36.9	2.6	31.6	2.7
2000	1925	47.1	12.5	1.1	10.9	28	2.7	22.9	2.4
2002	2327	25	10.6	1.1	19	34.8	4.1	25.9	4.8

UNCTAD Handbook of Statistics (2004)

Table 5: Export concentration and diversification indices by region

Country	1992			2002		
	No. of commodities exported	Diversification index	Concentration index	No. of commodities exported	Diversification index	Concentration index
World	223	0.422	0.139	224	0.419	0.157
Developed economies	231	0.353	0.098	231	0.348	0.115
Developing economies	199	0.601	0.250	210	0.545	0.234
SSA	116	0.818	0.569	123	0.788	0.492

Diversification index that ranges from 0 to 1, reveals the extent of the differences between the structure of trade of the country and the world average. The index value close to 1 indicates a bigger difference from the world average. A market concentration index value that is close to 1 indicates a very concentrated market. On the contrary, values closer to 0 reflect a more equal distribution of market shares among exporters and importers. UNCTAD Handbook of Statistics (2004)

exportable products has kept SSA vulnerable to vulnerable to market vagaries and weather conditions. According to Maduna (2005), supply shocks and their attendant price volatility, the decline in real commodity prices and the resulting terms of trade losses have culminated in heavy income loss, indebtedness, lack of investment, poverty and underdevelopment. Thus, it can therefore be said that SSA suffers a two-pronged problem: declining market shares for its major exports, which in turn are of declining relative importance in world trade.

### MATERIALS AND METHODS

**The model:** The imperfect substitutes model developed by Goldstein and Khan (1985) is adopted for this study. The basic assumption of the imperfect substitutes model is that neither imports nor exports are a perfect substitute for domestic goods. If domestic and foreign goods were perfect substitutes, a given country would be either an exporter or an importer. In addition, price differences for the same product in different countries (after conversion into a common currency) and also between the domestic and export prices of a given product in the same country does not allow imports or exports to be perfect substitutes.

Goldstein and Khan (1985) related the imperfect substitute model to the conventional demand theory in which the consumer was postulated to maximize utility subject to a budget constraint. The argument is that when the importer is a producer and when imports are intermediate goods that are inputs to the domestic technology, the demand for imports can analogously be derived by maximizing production subject to the producer's cost constraint. Under this scenario, the resulting import demand function will have as its arguments, the price of imports, the price of the domestic (composite) input and the level of domestic gross output. The resulting demand functions for imports and exports therefore represent the quantity demanded as a function of the level of income in the importing region, the imported good's own price and the price of domestic substitutes. On the supply side, the producer is assumed

to maximize profits subject to a cost constraint. This procedure yields an export supply function that depends positively on the price of exports, negatively on input prices and positively on productive capacity. Thus, the standard export supply function is presented in terms of the foreign market price relative to alternative prices in the domestic market and the economy's productive capacity to support export production.

The imperfect substitute model is represented as a system of equations for export supply ( $X^s$ ) and export demand ( $X^d$ ), which simultaneously determine the export price and the export quantity. Goldstein and Khan (1985) imperfect substitutes model of country  $i$ 's imports from and exports to, the rest of the world (\*) is formalized by a set of eight equations:

$$I_i^d = f(Y_i, PI_i, P_i), \quad f_1, f_3, f_2 < 0 \quad (1)$$

$$X_i^d = g(Y_{it}^*, PX_{it}, P_e^*), \quad g_1, g_3 > 0, g_2 < 0 \quad (2)$$

$$I_i^s = h[PI^*(1 + S^*), P^*], \quad h_1 > 0, h_2 < 0 \quad (3)$$

$$X_i^s = j[PX_i(1 + S_i), P_i], \quad j_1 > 0, j_2 < 0 \quad (4)$$

$$PI_i = PX^*(1 + T_i)e \quad (5)$$

$$PI^* = PX_i(1 + T^*)/e \quad (6)$$

$$I_i^d = I_i^s e \quad (7)$$

$$X_i^d = X_i^s \quad (8)$$

These eight equations determine the quantity of imports demanded in country  $i$  ( $I_i^d$ ). The quantity of country  $i$ 's exports demanded by the rest of the world ( $X_i^d$ ). The quantity of imports supplied to country  $i$  from the rest of the world ( $I_i^s$ ). The quantity of exports supplied from country  $i$  to the rest of the world ( $X_i^s$ ). The domestic currency prices paid by importers in the two regions ( $PI_i$  and  $PI^*$ ). The domestic currency prices received by

exporters at home and abroad ( $PX_i$  and  $PX^*$ ). In the framework, the exogenous variables are the levels of nominal income at home and abroad ( $Y, Y^*$ ); the price of (all) domestically produced goods at home and abroad ( $P_i, P^*$ ); the proportional tariff ( $T_i, T^*$ ) and subsidy rates ( $S_i, S^*$ ) applied to import and exports at home and abroad, the exchange rate ( $e$ ) linking the two currencies (expressed in units of country's currency per unit of the rest-of-the world's currency) (Goldstein and Khan, 1985).

Goldstein and Khan (1985) revealed that the advantage of presenting the supply side as well as the demand side of the imperfect substitutes model was to make it plain that the relationship between quantities and prices was simultaneous. Nevertheless, the majority of the time-series works on import and export equations have addressed the supply side only by assumption. The prevailing practice is the assumption that the supply-price elasticities for imports and exports (that is  $h_i$  in Eq. 3 and  $j_i$  in Eq. 4), respectively are infinite. The motivation for such an assumption is that it allows satisfactory estimation of the import and export demand by single equation methods, since  $PI$  and  $PX_i$  can be viewed as exogenous. However, if supply elasticities are less than infinite, one should either estimate the full structural simultaneous model or estimate the reduced form expression for quantities and prices as functions of only the exogenous variables in the system. SSA countries are price takers in the world market and as a result, the export supply functions should exist independently of the demand functions. In addition, it is not clear whether the explanatory variables in the export price equations represent supply or demand influences.

In specific terms, the long run export demand ( $X^d$ ) and supply ( $X^s$ ) relationships in the model are given by the following log-linear structures:

$$\log x_t^d = \phi_1 + \delta_t + \alpha_1 \log INC_{it} + \alpha_2 \log PRC_{it} + \alpha_3 \log x_{t-1} + \varepsilon_i \quad (9)$$

$$\log x_t^s = \phi_1 + \delta_t + \alpha_1 \log PDC_{it} + \alpha_2 \log PRC_{it} + \Phi Z + \varepsilon_i \quad (10)$$

Where:

- $x$  = Real merchandise exports
- $INC$  = Real foreign income
- $PRC$  = Relative prices adjusted for exchange rate
- $PDC$  = Productive capacity of the economy
- $Z$  = Vector of other variables that influence the supply of exports

Export demand is therefore, positively affected by income of the trading partners and the lagged value of

exports but is negatively affected by the foreign price of domestic exports ( $Px^* = Px/e$ ). We expect  $\alpha_1 > 0$ ,  $\alpha_3 > 0$  and  $\alpha_2 > 0$ . The long-run price and income elasticities are given as  $\alpha_2/(1-\alpha_3)$  and  $\alpha_1/(1-\alpha_3)$ . The quantity of exports supplied is specified as a positive function of the productive capacity of the economy and a positive function of the foreign price of domestic exports ( $Px^* = Px/e$ ). Other supply side variables include tariff rates, transport costs, import penetration, infrastructure costs, exchange rate undervaluation (overvaluation) and institutions. Tariff liberalization reduces the anti-export bias of production and thus induces a strong supply response. The restrictiveness of the trade regime can lead to import compression, which can adversely affect export performance.

However, tariff barriers may be only a part of the various barriers to trade among the numerous factors that increase the transactions costs of trade. These other factors include among others natural or geographic barriers, such as those associated with distance, being remote or landlocked. Transport cost is probably the most important non-policy barriers to trade in most countries. It isolates markets from competition, reduces economies of scale and directly raises import and export costs.

Economic infrastructure is a good indicator of the level of economic activity within an economy. Adequate infrastructure and services such as telecommunication, power generation, distribution and logistic services are essential to create an environment that contributes to the performance of industries and also for the conduct of business activities in general to facilitate diversification. Erratic supply of electricity can substantially increase exporter's cost. Persistent power outages affect production and increases operating costs. Exporters in most cases have to rely on generators to deal with the problem of outages at several times the cost of electricity from the national grid. In addition, telecommunications problem can raise the costs of international trade and constrain the development of new exports. Thus, infrastructure constraints are expected to negatively affect export supply.

Aghion and Griffith (2005) reveals that access to finance at reasonable cost can be important for export development for the simple reason that firms find it easier and less costly to finance working capital needs (including trade financing) and investments in technical upgrading and new innovative activities. In low-income countries, where many firms are far from the technology frontier, financial market imperfections can be particularly important in firms ability to export. In an environment with financial market imperfections and credit constraints, firms cannot borrow more than a multiple of their current profits

(Biggs, 2007). Domestic currency undervaluation (overvaluation) can encourage (discourage) export competitiveness, because it increases (reduces) returns to entrepreneurial activity, most likely in the process of discovering new, high-productivity exports. High volatility of the real exchange can therefore create a risky climate for new export investment, because it makes future returns and payments to be uncertain. Risks will be even higher where financial markets are underdeveloped and risks cannot be hedged. Hence, the market determined level and volatility of the real exchange rate in poor countries could be socially inefficient and dampen the response of exports.

The existence of weak and inefficient institutions could be a limiting factor in the ability of firms to take advantage of new trading opportunities in low-income developing countries. This is because entrepreneurs are likely to face difficulties moving into non-traditional exports if there exist ill-defined property rights, have problems enforcing contracts, lacked access to adequate financing and if they have problems meeting health and safety standards in foreign markets. Nevertheless, evidence from successful exporting countries indicates that adequate institutional arrangements have a role to play in inducing export supply response. Finally, import penetration affects exports by improving access to imported intermediate inputs; enhancing productivity growth and lowering mark-ups and hence the relative incentive to produce for the domestic market (Edwards and Alves, 2005).

For each SSA countries economy,  $x$  is defined as exports and measured as the real quantity of exports;  $PRC$  is relative price of exports measured by the Real Effective Exchange Rate (REER) and  $INC$  is the trade weighted average real income of SSA countries major trading partners. Trade weights are computed as the share of trade to each of these trading partners relative to SSA countries total trade. Tariff (TRF) is measured as the average nominal tariff rate and international Transport Cost (TC) as a proxy for natural barriers to trade is measured by the ratio of the cost, insurance and freight (c.i.f) price to the free on board (f.o.b) price of imports. The use of this proxy is standard in the literature. Import penetration as an outcome variable of trade policy reform is measured as imports as a percentage of GDP. The institutional environment (INST) is captured using the summary of ratings in the Economic Freedom Index (EFI). The rating for each country is between 0 and 10, the higher the rating, the better the institutional environment. The components of the EFI used in rating countries are size of government, legal structure, security of property rights, access to sound money, freedom to trade

internationally and regulation of credit, labour and business money and inflation. Access to finance (M2GDP) defined as financial depth is measured as the ratio of liquid liabilities to GDP.

The greater utilization of capacity is expected to lead to higher exports, although it is not likely that higher exports lead to a greater utilization of available capacity. The choice of the measure of productive capacity is inconclusive in the literature. Different studies have used different measures of the productive capacity. For example, Bond (1985) use trend or secular output with the argument that relative prices alone cannot fully explain the willingness and ability to supply exports. Muscatelli *et al.* (1995) used the stock of fixed capital to capture the effects of increasing productive capacity and productivity on export supply for some Asian newly industrialized economies.

In another dimension, Bayes *et al.* (1995), Hossian *et al.* (1997) and Ahmed (2000) measured capacity utilization as the predicted values of GDP. Milner and Zgovu (2004) however used Agricultural GDP as a measure of the productive capacity. The choice of the productive capacity for this study was data-constrained and we take manufacturing GDP as a proxy for capacity (PDC). Infrastructure (INFR) is measured as the addition of telephone mainlines per 1000 people and mobile phones per 1000 people. The traditional use of telephone mainlines per 1000 as a measure of infrastructure may be inappropriate with the growing trend of mobile phones in SSA. Exchange rate overvaluation (EXROV) is measured as real exchange rate overvaluation. The dummy variable (LAND) takes the value of one if the country is a landlocked country as classified by UNCTAD (2004) and zero otherwise.

The study focus primarily on aggregate merchandise exports and excludes oil and mineral exports. This is because oil and mineral exports are influenced by other fundamentals. In addition, the exclusion of oil and mineral exports would also allow us to isolate the evolution of exports from the fluctuations in the oil market and calculate reliable long run elasticities. To investigate the determinants of SSA export performance, this study estimates export demand and supply relationships using a panel of country's data from 1980-2005. The analysis extends existing empirical work in SSA in two ways. Firstly, the export demand function is estimated independently of the supply function. Secondly, a fuller specification of the export supply relationship is estimated. Infrastructure (TLPH) is measured as the addition of telephone mainlines per 1000 people and mobile phones per 1000 people. The traditional use of telephone mainlines per 1000 as a measure of

infrastructure may be inappropriate with the growing trend of mobile phones in SSA. All the variables are measured in logarithm forms. The data for this study were sourced from World Bank (2006) World Development Indicators CD ROM and African database. The study shall cover a period of 26 years for 20 SSA countries. This is between 1980 and 2005. The sampled SSA countries in the study are selected on regional basis. We divide SSA into four regions namely, West Africa, East Africa, Central Africa and the Southern Africa region. Five countries were selected per region. The choice of the period as well as the choice of the countries was guided by data availability considerations.

**RESULTS AND DISCUSSION**

Table 6 presents the summary statistics used in the regression analysis. It provides information about the means and standard deviations of the main variables. The mean value of the logarithm of trading partners' income and relative prices are at 11.25 and 2.10, respectively while the mean of the log of merchandise export stood at 8.98. Also, the correlation coefficient between the variables is presented in the correlation matrix in Table 7. This is to avoid inconsistency in the regression analysis by establishing the substitutability of the variables. As a result, they provide a useful guide in the specification of the models. The result reveals that most of the variables do not appear to be strongly correlated with each other.

The fixed and random effects regression result of merchandise exports in SSA is presented in Table 8. The estimation results present supportive evidence that export demand in SSA is dependent on the economic prosperity of trading partners of SSA countries and their ability to compete in the foreign market on the basis of price. As can be observed in column 1 of Table 8 in the fixed effects regression, there is a clear relationship between aggregate merchandise export, relative prices and SSA's trading partners' income. The sign from the coefficients confirm our a-priori expectation. The short run income and price elasticities (0.300 and -0.050) are both significantly

different from zero (at the 1 and 5% level of significance respectively). Relative prices and trading partners' income therefore emerge as significant factors in aggregate merchandise export demand model in SSA. The calculated long run income elasticity is 1.13, whilst the calculated long run price elasticity is -0.19. This low price elasticity implies a low response of exports to changes in relative prices. In addition, such low income and price elasticities of demand raise concerns about the possibility of losing export revenues in the process of SSA countries seeking to make themselves more competitive (for example, through the devaluation of the real effective exchange rate). A plausible explanation for the low price elasticities recorded could be the over-dependence of SSA countries on a narrow range of primary commodities as exports, which are of declining relative importance in world trade.

The result of the random effects presented in column 2 of Table 8 supported the fixed effects regression result with a slight difference in magnitude. The short run price and income elasticities (-0.050 and 0.007) are both significantly different from zero at the 5 and 10% level of significance, respectively. The calculated long-run income elasticity is 0.28, whilst the long run price elasticity is -2.00. The coefficient of the 1 year lag value of exports (merchandise, manufactured and agricultural) is significantly different from zero in all the three cases (merchandise, manufactured and agricultural exports) implying a degree of dynamic adjustment for SSA export

Table 6: Summary statistics of the variables used in the export demand model

Variables	Mean	Median	Maximum	Minimum	SD
LMCH	8.988	8.995	10.5620	7.380	0.609
LPDC	8.656	8.573	10.4220	7.589	0.578
LTRF	1.336	1.340	1.6839	0.756	0.185
LTLPH	0.944	0.809	2.7478	-0.426	0.633
LTC	2.048	2.047	2.7015	1.323	0.090
LINC	11.255	11.200	12.4150	10.160	0.531
LEXROV	2.016	2.031	2.7312	1.254	0.242
LPRC	2.105	2.048	3.3486	1.741	0.188
LAND	0.350	0	1	0	0.477
INST	4.932	4.981	7.348	2.309	0.931
LM2GDP	1.330	1.345	1.9224	-0.336	0.279

Author's Computation

Table 7: Correlation coefficients of the variables used in the export demand model

Variables	LMCH	LMGDP	LTRF	LINFR	LTC	LINC	LEXROV	REER	LAND	INST	M2GDP
LMCH	1										
LPDC	0.811	1									
LTRF	-0.301	-0.303	1								
LINFR	0.55	0.506	-0.442	1							
LTC	-0.047	-0.061	0.041	-0.049	1						
LINC	0.455	0.246	-0.016	0.148	-0.003	1					
LEXROV	-0.063	-0.149	0.38	-0.215	0.029	0.012	1				
LPRC	0.039	-0.127	0.188	-0.199	0.14	-0.045	0.319	1			
LAND	-0.539	-0.331	-0.038	-0.378	0.049	-0.094	-0.073	-0.078	1		
INST	0.262	0.2664	-0.292	0.653	-0.02	-0.006	-0.132	-0.288	-0.3499	1	
LM2GDP	0.33	0.4072	-0.047	0.568	-0.087	-0.133	0.117	0.0275	-0.4435	0.477	1

Author's Computation



Table 8: Panel data regression of export demand model in Sub-Saharan Africa

Explanatory variables	Fixed effects	Random effects
Constant	-0.887 (1.074)	0.253** (2.035)
LINC	0.300* (4.095)	0.007*** (1.693)
LPRC	-0.050*** (1.644)	-0.050*** (1.920)
MCH(-1)	0.734* (13.552)	0.975* (13.809)
INC <sub>LR</sub>	1.13	0.28
PRC <sub>LR</sub>	-0.19	-2.00
Adj. R <sup>2</sup>	0.968	0.966
SE of Regression	0.106	0.111
D-Watson	1.756	1.916
No. of observation	480	480
No. of countries	20	20

The dependent variable is the log of merchandise export. INC<sub>LR</sub> and PRC<sub>LR</sub> are the calculated long run income and price elasticities respectively. Absolute t-statistics are in parentheses. \*denotes significant at 1%, \*\*denotes significant at 5%, \*\*\*denotes significant at 10%. The regressions use the White cross-section standard errors and covariance (df corrected). In addition, the random effect made use of Swamy and Arora estimator of component variances

product. These price and income elasticity results are similar to the results obtained by other studies. For example, Reinhart (1994) and Senhadji and Montenegro (1999) found a negative relationship between exports and relative prices in the case of Africa. In a similar vein, a positive relationship is recorded between exports and income of trading partners. The short run price elasticity recorded by the Reinhart (1994) and the Senhadji and Montenegro (1999) studies are -0.266 and -0.02, respectively. In addition, the short run income elasticities recorded by the two studies are 1.253 and 0.51, respectively for Africa. This result compares with the short run price and income elasticities estimated by this study.

In the Santos-Paulino (2000) study, the short-run price and income elasticity recorded by her study are -0.11 and 2.09, respectively for aggregate merchandise exports of selected developing countries. In addition, the calculated long run price and income elasticity are -0.11 and 2.15, respectively. However, the region specific estimates from the Santos-Paulino (2000) result provide more diverse results. The region specific result reveals that the short-run price and income elasticities are -0.11 and 2.09, respectively in the case of merchandise exports for a group of selected developing countries. In addition, the calculated long run price and income elasticity are -0.11 and 2.15, respectively. However, in the case of Africa, the short run price and income elasticities from the study are -0.35 and 1.39, respectively. Furthermore, the calculated long-run price and income elasticities are -0.36 and 1.44, respectively for Africa. The slight difference recorded in the magnitude of the price and income elasticities (short run and long run) between this study and other studies may be attributed to the difference in the periods of analysis, sample size and the methodology adopted. In summary, although price and

Table 9: Fixed effects estimation of export supply model in Sub-Saharan Africa

Explanatory variables	Fixed effects (1)	Random effects (2)	Random effects (3)
Constant	1.765 (2.729)	0.198 (0.949)	0.458* (2.151)
LPDC	0.056 (1.212)	0.004 (0.218)	0.024 (1.168)
LPRC	-0.062*** (1.406)	-0.032 (1.193)	-0.037 (1.421)
LTRF	-0.028 (1.179)	-0.019 (0.646)	-0.011 (0.419)
LEXROV	-0.020 (0.467)	-0.007 (0.296)	-0.0004 (0.019)
LTC	0.075 (1.487)	0.057 (1.277)	0.058 (1.324)
LINFR	0.044* (2.307)	0.016 (1.233)	0.019*** (1.560)
INST	0.007 (0.856)	0.003 (0.507)	-0.003 (0.408)
LM2GDP	-0.052** (1.891)	-0.013 (0.630)	-0.037*** (1.730)
LMCH(-1)	0.746* (12.377)	0.966 (15.283)	-0.052* (13.582)
LANDLOCKED	-	-	-0.931 (12.021)
Adj. R <sup>2</sup>	0.969	0.965	0.966
SE of Regression	0.107	0.111	0.110
Durbin Watson-stat	1.766	1.901	1.892
No. of countries	20	20	20
No. of Obs	467	467	467

The dependent variable is the log of merchandise export. Absolute t-statistics are in parentheses. \*denotes significant at 1%, \*\*denotes significant at 5%, \*\*\*denotes significant at 10%. The regressions use the White cross-section standard errors and covariance (df corrected). In addition, the random effect made use of Swamy and Arora estimator of component variances

income elasticities are low in SSA and across the regions of SSA, they are statistically significant. These points to the important roles of relative prices and the income of SSA countries trading partners in the determining the demand for SSA exports.

The fixed and random effect regression results of the export supply model in SSA are presented in columns 1-3 of Table 9. In column 1 of Table 9, the fixed effect regression reveals that the proxy variable to capture the productive capacity of the economy is positive but insignificant. The variable also turned out insignificant in the random effects result presented in column 2. It may be argued that this is an indication that the productive capacity of SSA economies is on the decline. Furthermore, in columns 1, 2 of Table 9, the relative price coefficients remain consistently negative and statistically insignificant in the fixed and random effects model. The insignificance of the relative price variables could be an indication that while price may be a factor that stimulates demand for SSA exports, it is not a factor that stimulates supply of SSA exports.

In addition, the tariff rate variable is consistently negative and insignificant in the fixed and random effects model of export supply equation. The negative sign of the tariff rate variable confirms our a-priori expectation. A plausible explanation for this result could be the reduction of intermediate input costs for exports production due to tariff liberalization in virtually all the SSA countries. Nevertheless, the impact of trade policy reforms on export growth however appears to be limited. For example, a 1% reduction in tariff rate increases merchandise exports by 0.028% in the fixed effect regression and 0.019% in the random effects model.

The coefficient of the Exchange Rate Overvaluation Variable (EXROV) is negative from the regression results in columns 1 and 2. This conforms to our a-prior expectation. However, the variable turns out to be statistically insignificant in the two cases. The mismanagement of macroeconomic policies in many SSA countries in the late 1970's and early 1980's led to substantial overvaluation in the exchange rate. This has been quite damaging to economic performance since it decreases the profitability of production of tradables. The continuous devaluation of the exchange rate level in most SSA after trade was liberalized could be responsible for the insignificance of the exchange rate overvaluation indicator in SSA. In addition, a 1% reduction in exchange rate overvaluation raises merchandise exports by 0.020% in the fixed effect regression and 0.007% in the random effects model. The financial depth variable also indicates a negative relationship with export performance in SSA and significance in the fixed and random effects regression result in columns 1 and 3. The negative coefficient recorded on the financial depth variable may be a indication that there exist financial market imperfections among SSA countries, which can be particularly important in firms' ability to export. Consequently, in such an environment with financial market imperfections and credit constraints, firms can not borrow more than a multiple of their current profits and therefore inhibits export performance.

While the institution measures is positive in the results reported in columns 1 and 2, it is negative in the result reported in column 3 suggesting the presence of weak and inefficient institutions as a limiting factor to export performance in SSA. Economic infrastructure is a good indicator of the level of economic activity within an economy. The proxy for infrastructure (LINFR) in Columns 1 and 2 of Table 9 shows that the coefficient is positive and significant in the fixed effect regression result but insignificant in the random effect regression result. This confirms the a-priori expectation of a positive relationship between infrastructure and export in SSA. The transport cost variable is positive but statistically insignificant in the two regression results reported in columns 1 and 2. A similar result is obtained, when the transport cost variable was replaced by a dummy variable in the baseline export supply model to measure Landlocked (LAND) effect for SSA countries as a form of sensitivity analysis. The essence of the variable is to capture if being a landlocked economy can adversely affect export growth. The dummy variable takes the value of one if the country is a landlocked country as classified by UNCTAD (2004) and zero otherwise. The result is presented in column 3 of Table 9. The coefficient on the

dummy variable reveals that being a landlocked country in SSA can adversely affect the performance of merchandise export. The variable turns out to be negative and significant in the random effects regression result reported in column 3.

The result may be attributed to the fact that some SSA countries are landlocked and others that are not have large interiors. The bulk of primary commodities they produce have to be transported large distances overland to reach ports with the road and rail systems being inefficient in most SSA countries. Our estimation result is consistent with Limao and Venables (2001) and Fugazza (2004). The studies revealed that the level of trade flows observed for SSA countries are relatively low, essentially because of poor infrastructure. They observed that this could even be more acute in the case of landlocked economies due to their geographical locations. This was corroborated by Milner and Zgovu (2004) for Malawi and Milner *et al.* (1998) for Uganda. Thus, while the elimination of tariff barriers in a country as well as the elimination of external barriers can positively affects the performance of export trade in SSA, other factors such as income of trading partners, infrastructural supply, relative prices of exports have fundamental roles to play in determining the magnitude and direction of export trade of SSA countries. The insignificance of most of the supply side variables is an indication that factors external to SSA countries are more important determinants to SSA exports.

In comparison with past studies on Africa, the Lyakurwa (1998) study found that real exchange rate, government expenditure (both as measures of macroeconomic instability), gross investment and freight costs in the case of manufactured exports influence the supply of exports. The Lyakurwa (1988) model of agricultural and manufactured exports can be said to be deficient for ignoring other factors such as relative prices, productive capacity of the economy and the black market premium. In addition, the use of gross domestic investment as a measure of infrastructural development and government expenditure as a measure of macroeconomic instability is debatable. Next we compare our result with Morrissey and Mold (2006). Econometric evidence from their study reveals that the estimated price elasticity is -0.93. This is similar to the price elasticity reported for this study. In addition, their result shows that FDI as a percentage of Gross Domestic Product (GDP) and the trade policy variable (international trade taxes) are not significant. However, GDP has a highly significant positive impact on export volumes and export volumes appear to be lower when manufacturing share in GDP is higher. The export diversification index is also significant

and positive. The landlocked variable is negative, in the difference regression but positive in the levels regression. It is however insignificant in both cases.

Finally, their study reveals that relative prices exerts a significant negative impact on export volumes confirming the result obtained for this study. The divergence of their findings from ours may be explained by a number of factors. First, the Morrissey and Mold (2006) study also has some shortcomings. The study's measure of trade policy reform (international trade taxes) is debatable. The use of gross domestic product per capita (GDPCAP) in the model as a proxy for the productivity level of the economy is also debatable. In addition, their study also ignores other supply capacity variables such as domestic infrastructure, financial depth and the exchange rate overvaluation which could act as a form of trade restriction.

### CONCLUSION

This study yields a number of insights into the analysis of export performance in SSA. Although, the pace and patterns of trade policy reform varies among countries, the general trend tends towards lower barriers to trade. This is evident in the significant reduction of tariffs and non-tariff barriers and elimination of export marketing boards among other trade reform measures. While the study was able to confirm the distortions caused by trade barriers on export performance, there is not much evidence that the adoption of trade policy reforms since the mid-1980s have produced a significant export supply response. Exports have not increased consistently and also remain concentrated in natural resource based products, which are experiencing a declining share in world markets.

The inability to re-structure exports with low valued added, low prices and a very low elasticity of demand on world markets towards dynamic technology products is one of the explanations for the relatively poor export performance of many SSA countries. Declining infrastructure investment seems to have generated substantial transaction costs and dampened the response of exports to the more favourable trade environment being witnessed since the mid-1980s. The productive capacity of most SSA countries needs to be strengthened to achieve the expected gains from trade liberalization. Increasing domestic supply capacity and enhancing international competitiveness should rank high among the strategic objectives of policies at the macro, sectoral and micro levels. Addressing the problem of SSA countries' inability to diversify their exports from primary commodities should enhance export performance of the region.

In addition, factors external to an individual country, such as relative prices and income of trading partners appears to be more important determinants of exports than a country's own trade policies. Domestic policies are necessary to reduce the various constraints on supply response, increase transport and marketing efficiency and encouraging investment. While the study gives some useful guidance to policy makers, a number of points could be clarified by further work and this should give greater specificity to policy guidelines. For example, the analysis has been mainly cross-sectional at a relatively high level of aggregation. This approach precludes in-depth analyses of many country-specific and firm-specific issues that may be important. The analysis conducted here could thus be supplemented by detailed study of the individual countries, at best using a unified analytical approach.

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