Analysis of Kenya's Export Performance: An Empirical Evaluation

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ABSTRACT

With globalisation, export-led growth strategy has become a major focus for many countries including Kenya. Although there have been efforts towards diversification of the export sector, Kenya's exports are still dominated by primary agricultural products. This paper broadly examines the factors that have influenced Kenya's export volumes by disaggregating total exports of goods and services into three categories: traditional agricultural exports (tea and coffee) and 'other exports of goods and services'.

For each of the three categories of exports, an empirical model is specified along the standard trade models that incorporate real exchange rate (proxy for relative prices) and real foreign income (of major trading partners) as explanatory variables. An additional variable (investment as a proportion of GDP) is included as a proxy to capture the supply constraints.

An error correction formulation is used to distinguish between the long-run and short-run elasticities. In the case of tea, the results were found to be inconsistent – no cointegration and therefore no error correction model. However, in general, real exchange rate has a profound influence on export performance. The supply response to price incentive (real exchange rate depreciation) for exports of goods and services is significant. On the other hand, the other explanatory variables provided mixed results. Investment as a proportion of GDP used as a proxy for supply constraints had a positive and significant impact on the export volumes of coffee but not for exports of other goods and services. Contrarily, income of trading partners was found to be more paramount in explaining export volumes of 'other exports of goods and services' than coffee exports. However, it is important to keep in mind that investments as a proportion of GDP have been falling and markets for Kenyan exports are expanding beyond the traditional markets, particularly with advances in economic integration such as COMESA and EAC. With liberalization, some sectors such as the coffee sector appear to have been adversely affected as indicated by the liberalization dummy.

However, like studies of similar nature, this study acknowledges that other non-price factors (cost of inputs, labour costs, access to credit, etc) play a vital role in production and export supply response. That notwithstanding, the results are quite informative and arguably point out several issues of policy concern. Potential for export supply response exists, even for sub-sectors like coffee where performance has been poor. For maximum benefit from an export-led growth strategy, there is need for incentives that boost exports. The positive response to a price incentive (depreciation of real exchange rate) could be taken as an indication that while maintaining a stable exchange rate is important, strategies that maintain a highly overvalued exchange rate could be a disincentive to export. This implies that flexibility in the exchange rate movements, in line with the fundamentals of the economy, might be favourable. However, increased openness is likely to be associated with increased volatility, especially for commodity exports, therefore justifying the need for strategic domestic policies to help those sectors that might not be able to cope with the wave of globalisation. Additionally, there is need for further diversification of export products and markets while at the same time improving their quality.

ACKNOWLEDGEMENT

ABBREVIATIONS

ADF	Augmented Dickey-Fuller (test)
ADL	Autoregressive Distributed Lag
BOP	Balance of Payments
COMESA	Common Market for Eastern and Southern Africa
DF	Dickey-Fuller (test)
EAC	East African Community
ECM	Error-Correction Model
ELG	export-led growth
EPPO	Export Promotion Programme Office
EPZs	Export Processing Zones
GDP	Gross Domestic Product
ISI	import substitution industrialization
KETA	Kenya Export Trade Authority
MUB	Manufacturing Under Bond
OLS	ordinary least squares
PP	Phillips Perron (test)
PPP	Purchasing Power Parity

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1.   INTRODUCTION

The role of exports in economic development has been widely acknowledged. Ideally, export activities stimulate growth in a number of ways including production and demand linkages, economies of scale due to larger international markets, increased efficiency, adoption of superior technologies embodied in foreign-produced capital goods, learning effects and improvement of human resources, increased productivity through specialisation (Basu et al., 2000; Fosu, 1990; Santos-Paulino, 2000; and Giles and Williams, 2000) and creation of employment.

While practical evidence in support of export-led growth (ELG) may not be universal, rapid export growth has been an important feature of East Asia's remarkable record of high and sustained growth. In particular, the wave of growth in the four tigers (Hong Kong, South Korea, Singapore and Taiwan) and the Newly Industrialised Countries (such as Malaysia, Indonesia and Thailand) has been used to support the argument that carefully managed openness to trade through an ELG is a mechanism for achieving rapid growth (Giles and Williams, 2000). The experiences of these countries have provided impetus to the neoclassical economists' view that ELG strategy can lead to growth.

The subject of ELG can also be approached from the wider debate on openness (or trade) and growth. What appears to be gaining currency in recent years from cross-country growth differences is that most of the countries pursuing growth successfully are also the ones that have taken most advantage of international trade (Martin, 2001; Masson, 2001). These countries have experienced high rates of economic growth in the context of rapidly expanding exports and imports.

The supportive evidence in favour of ELG and global trend towards trade liberalization appears to have influenced Kenya to adopt an export-led growth strategy. ELG is envisaged in Kenya's Poverty

Reduction Strategy Paper (PRSP) as the strategy towards being industrialized (GoK, 2001). In this era of trade liberalization and globalisation, the importance of exports cannot be over-emphasised.[1] However, as a developing country, Kenya will undoubtedly need to become competitive to be able to curve a niche in the world market and realise its long-term goal of becoming an industrialised nation. This requires a combined effort to develop its production potential and move away from mere processing towards product brand in coffee and tea exports while at the same time encouraging the non-traditional exports.

In this paper, exports are considered based on ELG in Kenya, which is likely to be more efficient beyond the openness arguments. This is because export-led growth will bring in technology transfer, efficient allocation of resources imposed by international competition and cost-efficient allocation of resources. These effects provide a further impetus to growth beyond what openness can provide through dynamic interactions in the economy (Ndulu and Ndung'u, 1998).

This paper attempts to examine factors that are likely to have influenced trends in Kenya's exports from a macroeconomic perspective. However, in consideration of the diversity of Kenya's export sector, an attempt is made to disaggregate the export sector for precise and comprehensive analysis. Different sub-sectors are likely to respond differently to macroeconomic policies and price incentives—this is unlikely to be captured using the highly aggregated export data. Kenya's leading exports are mainly primary agricultural products whose price movements and production factors differ in contrast to manufactured exports. Consequently, as a starting point, this study decomposes

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[1] By virtue of their importance, exports of goods and services form one of the vital components under the real sector block in the KIPPRA-Treasury Macro Model (KTMM). This paper was partly motivated by the need to disaggregate the export equation into major export categories.

exports into three major categories: traditional agricultural exports of coffee and tea, and 'other exports of goods and services'. This also makes it possible to gauge the commodities export supply response.

The next section of this paper provides background information on the evolution of the export sector in Kenya, including policies adopted since independence. A brief description of the structure and composition of exports is given in section three while section four provides a general review of theoretical and empirical work. This is followed by an overview of methodological issues in section five. Section six presents and discuses the data and empirical results while conclusions and policy implications are given in section seven.

2.   TRADE POLICIES SINCE INDEPENDENCE

It is important to parade the evolution of trade policies pursued since independence in order to understand Kenya's export structure and performance. This would then allow an assessment of the effects of these policies on export performance.

2.1   Post-Independence Trade Policies (pre-Liberalization Era)

The evolution of Kenya's trade policy can be traced to the later years of the colonial era during which the country was used and protected as a producer of agricultural and other raw materials for Britain's manufacturing sector and a ready market for manufactured goods from Europe. With increased competition for the Kenyan market (mainly from cheaper goods from India and Japan), the British government initiated a protected manufacturing sector in Kenya — the beginning of the import-substitution industrialization (ISI) strategy — to cater for the local market (SIMASG, 1989). At independence therefore, Kenya adopted an

industrialization policy based on import-substitution strategy which was highly characterised by protective trade barriers. At that time, the preoccupation of the government was on the use of the import-substitution strategy to achieve economic independence and faster 'Kenyanisation' in ownership, management, production and distribution (SIMASG, 1989). Since the incentive structure was biased towards import substitution, a large proportion of the industrial output was geared towards the domestic captive market, which was more profitable than the export market. This discouraged a strong drive towards export promotion and partly accounted for the poor export performance of Kenya's manufacturing sector and orientation towards consumer goods. The failure in export promotion or in industrialization may not be wholly blamed on the ISI strategy but rather on the failure of ISI to move beyond the first stage and therefore the fact that most first generation firms of ISI strategy remained at the infant stage.

The first decade of independence recorded faster and higher economic growth in Kenya's economic history. There was expansion of output and employment propelled by expansionary fiscal policy (Wagacha, 2000). By the 1980s, Kenya had achieved a reasonable level of industrialization by regional standards (Lall and Pietrobelli, 2002). That notwithsatnding, ISI like in most African countries failed to achieve the intended objectives despite the considerable protection and government patronage the industries enjoyed. In general, the policy structure was heavily biased against exports—characterised by high effective rates of protection, price controls, foreign exchange controls and import licensing—leading to difficulties in accessing imported inputs, bureaucratic and cumbersome administrative procedures, and over-valued currency. Several public enterprises enjoyed monopoly status. The relatively rapid real growth in the 1970s, particularly in the last half, was mainly due to sharp increases in international prices of tea and coffee (for example the coffee export boom of 1977). The

performance of manufactured exports remained weak; manufacturing exports declined significantly as a share of total exports. Besides other effects, the control regime also contributed to the negative effects on exports and the macro-economic distortions in the economy. The break up of the East African Community (EAC) adversely affected the share of manufactured exports to the region and intensified the inward orientation.

With a series of external shocks in the 1970s, the inefficiency and inadequacy of the import-substitution policy became evident. The first oil crisis of 1973 that led to severe problems in balance of payments (BOP), and the collapse of the EAC in 1977, adversely affected the performance of import-substitution enterprises. The latter removed the disguised competitiveness of Kenya's manufactured exports (Wagacha, 2000). The resultant high import costs and limited market led to excess capacity and inefficiencies (SIMASG, 1989). The indiscriminate and open-ended protection distorted resource allocation, constricted foreign competition and restricted technology inflows from abroad (Lall and Pietrobelli, 2002). By the end of the 1970s, the government started recognising the need for an export-oriented industrial strategy as indicated in National Development Plans of 1974-1978 and 1979-83. Nonetheless, adherence to import-substitution still lingered.

In the early 1980s, partly due to the increasing pressure for structural adjustment reforms, the government began to demonstrate commitment to a liberalization policy, a major component of which was a shift from import-substitution to export-promotion strategy. The major turning point in policy was in the form of *Sessional Paper No.1 of 1986 on Economic Management for Renewed Growth* in which the government committed itself to liberalize the economy and adopt an outward-looking development strategy. By this time, Kenyan exports had deteriorated tremendously. Merchandise export earnings as a percentage of GDP had for example declined from 19.6% in the 1970s to 16.97% over 1980-

84 and to 13.6% over 1985-89 (Glenday and Ndii, 2000). Besides the export compensation scheme established in 1976, a number of export promotion programmes were initiated. These include Manufacturing under Bond (MUB) and Export Processing Zones (EPZs) established in 1988 and 1990, respectively. Other export incentive schemes were Green Channel, Export Guarantee and Credit Scheme, the revival of the Kenya Export Trade Authority (KETA), Export Promotion Council and the Export Promotion Programmes Office (EPPO) for tax rebates on imported inputs for exporters.

The export promotion programmes were mainly geared towards promoting manufactured exports — mainly labour-intensive manufactures. MUB and EPZs targeted new investments while others like duty and VAT exemption schemes targeted existing manufacturers (Glenday and Ndii, 2000). The MUB/EPZs were aimed at using the abundant semi-skilled labour to produce labour-intensive manufactures, notably garments and foot wear for overseas market — perhaps something similar to 'sweat shops' in Asia (Glenday and Ndii, 2000).

That notwithstanding, export orientation in the 1980s remained weak largely due to very high effective rates of protection accorded to domestic industries, exchange rate bias against exports, high cost of imported inputs, foreign exchange controls and administrative delays, high transaction costs that militated against the profitability of exports, among others. In addition, the export incentive schemes remained unattractive and less successful due to weaknesses in implementation and poor coordination.

2.2   Trade Liberalization Period

Trade liberalization started with a conversion of quantitative restrictions to tariffs equivalent. The government embarked on phased tariff reductions and rationalisation of the tariff bands in 1990[2]. By 1991, quantitative restrictions affected only 5% of imports compared with 12% in 1987 (Swamy, 1994). Over the 1987-92 period, the number of tariff categories and maximum tariff rates were reduced from 25 to 11 and 170% to 70% respectively (Mwega, 2002). By 1997/98, the simple average tariff rate had been reduced to 16.2% and the trade weighted tariff rate to 12.8%, down from 25.6% (Glenday and Ndii, 2000). The number of tariff bands (including duty free) was reduced from 15 in 1990/91 to four (4) in 1997/98 and the top regular tariff rate from 100% to 25% over the same period. That notwithstanding, the most significant shift in trade policy regime came in May 1993 with the abolition of trade licensing requirements and more importantly, foreign exchange controls (Ndung'u, 2000 and Were et al., 2001). Foreign exchange retention schemes for exporters were introduced at a rate of 50% and later increased to 100% in February 1994 (Mwega, 2002).

Over the 1993-94 period, all current account and virtually all capital account restrictions were lifted. The response on the imports and exports was immense but the export response seems to have been combined with a price effect due to a steep devaluation of the Kenya shilling in 1993. In totality, the effect seemed to raise export earnings because export earnings rose dramatically in the early 1990s from 13% of GDP in 1992 to over 20% between 1993 and 1996. The recovery in manufacturing exports in particular was mainly because of macroeconomic reforms, trade liberalization measures and regional integration. Liberalization measures were also extended to the agricultural sector. In the coffee

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[2] There were initial attempts to liberalize imports during 1980-84 and 1988-91 but these, particularly in the first attempt, were less successful (Swamy, 1994).

sub-sector for instance, processing, delivery to millers and milling were liberalized and government controls on the Coffee Board of Kenya (CBK) withdrawn (Nyangito, 2000). The tea sub-sector, which was subject to government controls implemented by Kenya Tea Development Authority (KTDA), was also liberalized and the role of KTDA redefined.

Regional trade integration measures under the East African Cooperation and the wider Common Market for Eastern and Southern Africa (COMESA) also accounted for the dominant share of the increase in Kenya's exports, particularly in manufactured exports. The economic recovery and trade liberalization initiatives in the region, particularly in Uganda, have provided an impetus for overall increase in import demand. Recorded exports to COMESA increased from an average of 15% for the period 1990-1992 to 34% in 1996-98 (Glenday and Ndii, 2000). On the other hand, Kenyan exports to European Union (EU) showed a downward trend in the late 1990s, and especially from 1997. Exports to the EU have mainly been agricultural products—tea, coffee and horticultural products.

The impact of export incentive schemes especially MUB and EPZs designed to target dedicated export processing for overseas' markets has not been significant (Glenday and Ndii, 2000). Unlike in the fast growing Asian countries, Kenya has not been successful in gaining competitiveness in labour-intensive export processing. Some of the incentives such as exemption from foreign exchange controls were overtaken by the liberalization of the foreign exchange market in 1993. Other incentives have also been eroded over time. As tariff rates have declined over time, the net subsidy provided by the export promotion schemes have also declined. Other subsidies like the import duty and VAT rebates by EPPO have been marred by delays and therefore eroded their incentive value. Other indirect additional costs associated with restriction of choice of location, bureaucracy and risk of excess capacity

have tended to discourage entry into the EPZs. Most of the parks have remained undeveloped and under-utilised.

3. STRUCTURE AND COMPOSITION OF EXPORTS

Like most sub-Saharan African countries, Kenya's export structure is predominantly composed of primary commodities—mainly tea, coffee and horticulture—besides tourism. This has made the export sector to be more vulnerable to fluctuations in world prices. While certain non-traditional exports such as horticultural products have experienced rapid growth in the last few decades, manufactured goods make only a small proportion of total exports. Besides horticultural products, coffee and tea still remain key export commodities. The share of manufactured exports has not only remained small but has also been declining. Consequently, export growth has been highly erratic, based on fluctuations in earnings from a few traditional primary exports and the tourism sector. The decline in Kenya's export performance is mainly attributed to muddled policies that produced an anti-export bias (Wagacha, 2000).

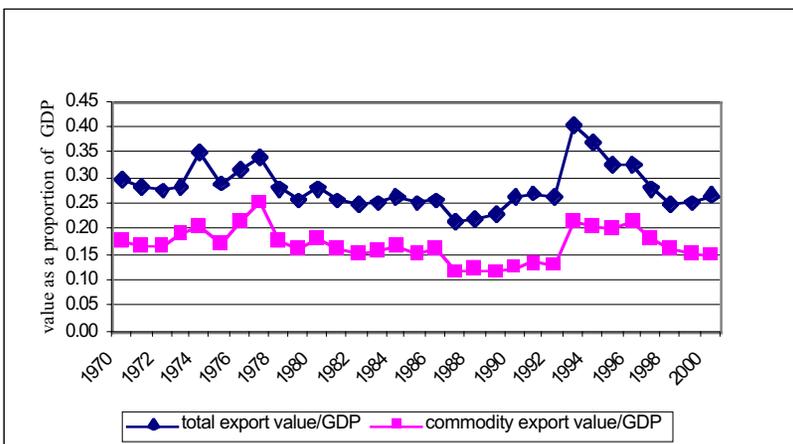Figure 1: Export value as a proportion of GDP

Figure 1 shows both the value of commodity exports and total value of exports of goods and services as a proportion of GDP. The trend of total export value of goods and services mimics that of commodity exports, underscoring the importance of the latter in total export value. Table 1 shows the principal export commodities as a percentage of total commodity export value, while Figure 2 indicates trends of tea and coffee earnings as a percentage of total commodity export value. Until the late 1980s, coffee exports contributed the largest share to total commodity exports, with notable performance in 1977 and 1986 which is highly attributable to the positive price shocks in the international markets. In 1977, severe frost in Brazil resulted into a 'coffee boom' for Kenya. However, this trend appears to have changed since the early 1990s, with tea exports taking the lead. The performance of coffee exports has continued to worsen in recent times, having been overtaken by the steadily rising horticultural exports. A similar trend is depicted by the graph showing production of tea and coffee, which indicates a widening gap over time (Figure 3). The combined share of the two commodities has been less than one-half since the peak in 1986 (Table 1). However, the total share of tea, coffee and horticultural products accounts for over 50% of total value of commodity exports, reflecting the dominance of agricultural commodity exports.

Sectoral analysis shows that production in the coffee industry has been declining, as indicated in Figure 3. For instance, production declined from about 117,000 tonnes in 1989 to about 53,000 tonnes in 1998. While factors underlying production are many and varied, liberalization of the input markets in 1993 and removal of government subsides led to a rise in the cost of inputs, therefore adversely affecting production (Nyangito, 2000). Farm-level cost of coffee production in Kenya is considered to be among the highest in the world, with costs of

Table 1: Principal commodities as a percent of total export value of commodities

Year	Coffee (not roasted) (1)	Tea (2)	Petroleum products (3)	Horti-culture (4)	Tea & coffee (1 +2)	Total agr. 1+2+4	Total 1+2+3+4	Others
1962-63	26.5	13.3			39.8			
1964-66	31.6	13.6	8.2		45.2			
1967-69	26.0	16.3	12.2		42.3			
1970-72	20.0	12.5	13.3		32.5			54.2
1973-75	18.9	10.1	16.9		29.1			54.1
1976-78	35.2	14.0	16.4		49.2			34.4
1979-81	24.1	13.4	26.5		37.4			36.1
1982-84	26.3	19.6	21.0		45.9			33.2
1985-87	31.9	21.4	12.6	9.5	53.3	62.8	**75.3**	24.7
1988-90	21.6	24.3	11.2	12.2	45.9	58.1	**69.4**	30.6
1991-93	13.6	25.8	13.0	11.5	39.4	50.9	**63.9**	36.1
1994-96	15.2	19.8	5.7	11.1	35.0	46.1	**51.8**	48.2
1997-99	12.1	26.2	7.5	13.4	38.3	51.7	**59.3**	40.7
2000*	9.8	29.3	7.9	17.7	39.1	56.8	**64.7**	35.3

*Provisional

Source: Authors' computation from *Statistical Abstracts* (CBS, various issues)

production estimated at about US$ 0.95 to US$ 1.5 per kilogram (Nyoro et al., 2001). Liberalization also led to controversies regarding the regulation of the coffee industry and the role played by the various institutions (Nyangito, 2001).

Besides the role of output and input prices in determining profitability, the final payment to the farmer also depends on processing and marketing services offered by various institutions such as cooperatives, coffee factories, coffee millers, among others. The high costs of production are exacerbated by high transaction and management costs in these organizations (Mutunga, 1994; Nyangito, 2000).

Figure 2: Tea and coffee exports as % of total export value of commodities
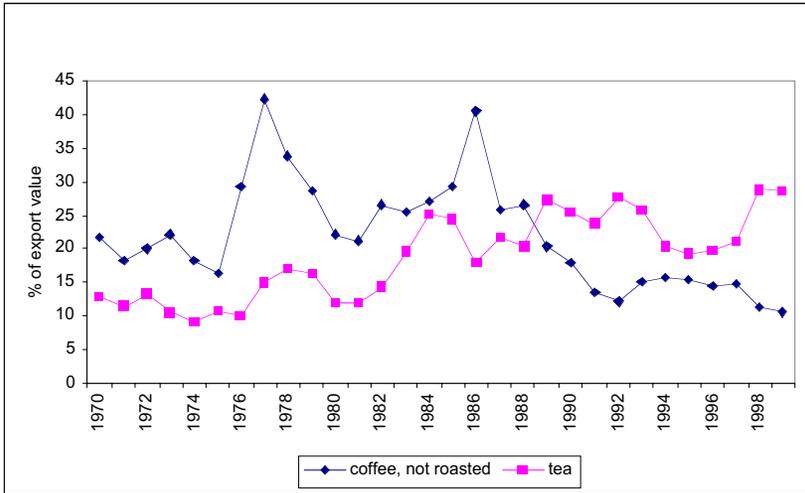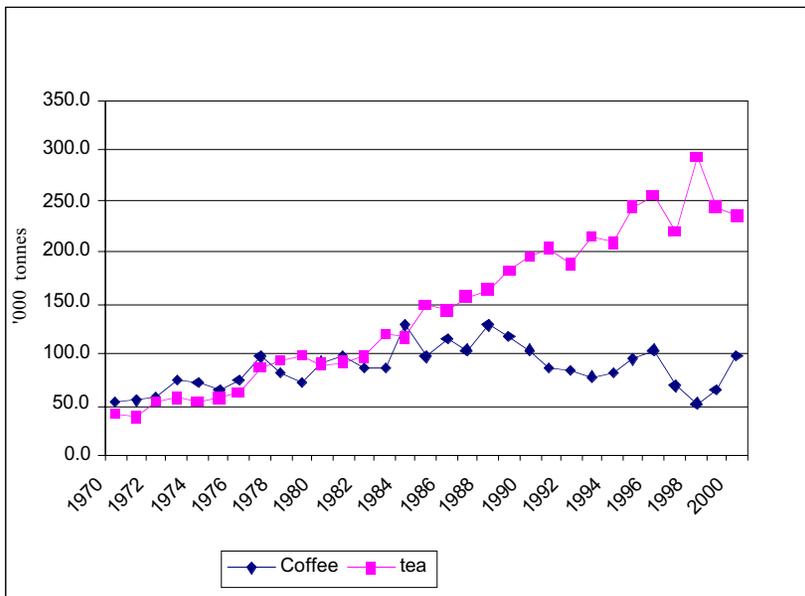

Figure 3: Coffee and tea production

Low capacity utilisation, over-employment, poor investment, and management wrangles are among the myriad of problems afflicting these organisations (Argwings-Kodhek, 2001). The costs incurred in the process are high, resulting in high deductions and therefore low coffee payments (Nyangito, 2000 and 2001). Therefore, (favourable) world market prices are unlikely to be adequately transmitted to farmers. Smallscale farmers do not benefit directly from liberalization of the foreign exchange market since they are paid through their cooperative societies. Payout to farmers is determined by charges for services rendered, such as processing, storage, bulking, transportation and overhead costs, but these expenses are exaggerated (Nyangito, 2001). It has been noted that the success of price incentives depends on the absence of intermediaries who affect the devaluation's pass-through to producers (Boccara and Nsengiyumva, 1995). Nonetheless, like other agricultural commodities, the sector is also vulnerable to the vagaries of the international market and has adversely been affected by the rapid and persistent fall in the international prices of coffee, especially since the collapse of the International Coffee Agreement in 1989. The other difficulty in the coffee industry is that it has been stuck on the primary level production. Draconian regulations have prevented brand development where income is high.

In general, the high production and transaction costs coupled with declining prices have adversely reduced profitability leading to severe decline in coffee production and in some cases abandonment of what was once a leading export crop. Frustration on the part of farmers has led to widespread uprooting or neglect of coffee trees in favour of other profitable crops like horticulture and tea. Other farmers, especially those close to the capital city of Nairobi, have subdivided their former coffee plantations into smaller plots, which they sell to real estate developers.

The tea industry has remained stable, with increases in production levels and therefore earnings from exports. However, the industry has also been faced by problems of overproduction, declining prices in the world markets and poor institutional management. There have been management conflicts especially in the smallholder tea sub-sector. In general, institutions dealing with agricultural products have been slow to respond to liberalization and most still retain their historical government-dominated parastatal structure. On the other hand, the horticultural export sector has flourished with minimal government involvement. The growth in tea, horticulture and tourism notwithstanding, the decline in earnings from coffee exports remains a major challenge to the economy.

4.   ANALYTICAL FRAMEWORK

One of the underlying questions that need to be answered is what determines the supply of primary commodity exports. From the literature available, the factors that determine the supply of primary commodity exports include cost and accessibility of consumer goods, farm subsidies and taxes, research and extension, infrastructure, access to credit, among others (Alemayehu, 1999). Although literature on commodity export supply functions starts from structural equations, which accommodate a wide spectrum of these factors, the estimated reduced form equations are generally price-focused; they include either current or lagged (relative) prices. The price-focused supply models stem from Nerlove's (1958) model. Nerlove describes the dynamics of agricultural supply by maintaining the assumption that producers are influenced by their perception of normal price, which is captured through adaptive price expectation mechanism. Consequently, production is a function of prices and other adjustment costs.

Alemayehu (1999) has conducted a deep review of literature on the supply of primary commodity exports, which indicates a distinction between the long run (potential supply) and the short run (a proportion of potential supply). In this review for instance, Alemayehu (1999) notes that some studies define the structural equations of supply as the sum of utilisation of potential output (the utilisation rate approach) and the potential output (potential supply approach). This has led to the *potential supply* approach and *utilisation rate* approach respectively. However, the reduced form model is specified as a function of current and lagged prices, exchange rate and a supply shock indicator. Such classification is typically used for perennial crops and minerals.

As indicated in Alemayehu (1999), models that include other factors other than price include Ady (1968). In this model, the existing acreage (stock of crop) in the previous period is included as additional explanatory variable. In the 'liquidity model', farmer's income is incorporated as an additional variable indicating capacity to invest. The latter relates investment to the difference between desired and actual level of capital. Such models have been summarised under models based on capital and investment behaviour theory presented in the Nerlovian adjustment model. Alternative forms of this theory arise in specifying the factors that determine the desired level of capital stock. These include capacity utilisation (capacity utilisation theory), net output or return to capital (neo-classical), internal cash flow (liquidity theory) and expected profit-based approach (Alemayehu, 1999). Some studies consider supply as a function of expected price, expected opportunity cost, production costs, stock of output (trees in the case of perennial crops), potential of the industry and tax considerations (for example Kalaitzandonakes et al., 1992). Others incorporate the dynamic effects of the exchange rate, the general price level, and an index of productivity (Bond, 1987).

In general, the emphasis in commodity supply modelling is on relative prices. Most studies on the exports of African countries tend to follow a similar approach. For small African countries, Rwegasira (1984) as cited in Alemayehu (1999) shows that for the period 1960s–1970s, the short-run elasticities are high for annual crops while long-run elasticities are high for tree crops and minerals.

Although there is a wide range of factors that have been identified as affecting supply of primary commodities, most studies empirically tend to narrow these factors to price variables, indicating the difficulty of quantifying non-price variables or obtaining reliable and complete set of data (Alemayehu, 1999; Mckay et al., 1998; Branchi et al, 1999). In addition, there is a tendency to ignore the influence of the non-agricultural sector, therefore implicitly assuming that the interactions between the two sectors are insignificant. Nonetheless, the bias of literature on supply-side reflects the dominance of the small country assumption, according to which countries have a negligible weight in the world market. But generally, time series studies have tended to produce rather low empirical estimates of elasticities (Mckay et al., 1998; Whitley, 1994; Ogbu, 1991).

Conventional commodity models usually incorporate the real foreign income (of trading partners) and real exchange rate (proxy for relative prices) as explanatory variables in the estimation of the export supply functions in general (Ogun 1998; Klaassen 1999; Whitley, 1994; Ndung'u and Ngugi, 1999; Alemayehu, 1999; Balassa et al., 1989; Branchi et al., 1999, Mckay et al., 1998, among others). This study adopts a similar approach.

Time series models are specified for three categories of exports: volumes of tea (*TEA*) and coffee (*COFF*) exports derived by deflating the values by the respective 1982 (constant) prices, and exports of other goods and services (X*OTHER*) obtained as total value of exports of goods and

services less the value of tea and coffee exports deflated by the export price index.

For each of the three categories of exports, we focus on the following explanatory variables: real exchange rate (RER$K), real foreign income (income of major trading partners (*YTRADI*)) and total investment as a proportion of GDP (INVGDP). Therefore:

Export Volume = f(RER$K, YTRADI, INVGDP)

The inclusion of income and real exchange rate, as indicated above, is standard in trade models. The additional variable—investment to GDP ratio—is a proxy for capital formation to capture the supply constraints. A priori, all variables have positive effects on exports. Real income of trading partners is computed as GDP volume index for Kenya's major trading partners—UK, Germany, Netherlands, Uganda and Tanzania—weighted by export share. All the variables are in logarithm form so that the estimated parameters could be interpreted as elasticities. For each export category, the model takes explicit account of the dynamic nature of international trade by specifying a distributed lag model for estimation.

5. METHODOLOGICAL ISSUES

The traditional approach used in estimating supply functions of primary commodity exports has been criticised on methodological grounds. In particular, there does not appear to be a clear distinction between short-run and long-run elasticities. In addition, it has been acknowledged that the application of simple OLS using time series data is likely to produce spurious regression results (Charemza and Deadman, 1992; Mckay, et al, 1998; and Alemayehu, 1999). However, modern time series modelling techniques provide a better way of addressing these problems. Cointegration analysis can be used to avoid spurious regressions while at the same time providing a means of explicitly distinguishing between long-run and short-run elasticities through the error correction formulation. If long-run elasticities exist and are permanent, then it makes sense to analyse how short-run behaviour responds to long-run elasticities. This technique is best suited for estimating the export supply functions and is therefore adopted in this study.

The other difficulty lies in determining the (relative) price variable as a measure of competitiveness[3]. Although most studies use real exchange rate (for example Alemayehu, 1999 and 2001; Mwega, 2002; Ndung'u and Ngugi, 1999; McKay et al., 1998; and Branchi et al., 1999) the difficulty lies in the choice of the deflator (for example consumer price index, input prices, etc). Moreover, the definition of real exchange rate is complex and controversial both in theory and in practice. Real exchange rate, for instance has several definitions in economic literature. The traditional approach defines the real exchange rate as the nominal

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[3] In fact, Krugman (1994) as cited in Branchi et al. (1999) argues that there is no such a thing as competitiveness in the strict sense since prices (including wages) can be flexible enough to allow balanced international trade to take in some specific sectors, whatever the respective international productivity differentials. The exchange rate is just but one of these prices.

exchange rate multiplied by the ratio of foreign to domestic price level. In this context, the real exchange rate is referred to as the purchasing power parity (PPP) exchange rate. Real exchange rate has also been defined as the (domestic) relative price of tradable to non-tradable goods (Edwards, 1989). For intuitive reasons and data considerations, this study adopts the traditional definition of the exchange rate, commonly used as a measure of competitiveness of the tradable sectors of a country, under *ceteris paribus* conditions. The general real exchange rate (*RER$K*) is therefore computed as:

$$RER\$K = \frac{ep^*}{p}$$

where e = the nominal exchange rate (shillings per foreign currency), p* = world price index (US wholesale price) and p = domestic price (consumer price index).

Other studies such as Alemayehu (1999) go a step further by defining real exchange rate using commodity-specific prices instead of general world price in gauging primary commodity export supply. An attempt was made to explore the same in this study but this did not produce any robust results.[4] The estimation results reported in this paper are therefore based on the conventional real exchange rate as commonly used in the trade literature—the PPP assumption.

The other difficulty lies in obtaining reliable data and quantifying the non-price variables as often acknowledged in the literature. Consequently, most econometric time series studies often fail to find

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[4] For instance, the correlation between commodity-specific relative prices and the conventional general real exchange rate was not only weak but also negative in some cases. Commodity-specific real exchange rate for tea *(RERTEA)* and coffee *(RERCOF)* were defined as *RERTEA=ep^{tea}/p* and *RERCOF=ep^{coffee}/p* where p^{tea} and p^{coffee} are export prices of tea and coffee denominated in US dollars and p is the consumer price index.

robust estimates. Also, given the length of the productive life of perennial crops, decisions about planting imply some kind of assumption on the level of prices decades ahead. This implies that the full impact of price policies on the producers' economic behaviour can only be evaluated over quite a long period of time—data covering several decades. Therefore, data covering only a quarter decade (as is usually the case in most studies including this study) may not reflect the true long-run price elasticities (Branchi et al., 1999). In Mckay et al. (1998), Peterson (1979) argues that time series data is not best-suited to estimating long-run elasticities because only short-run, year to year, fluctuations are observed. Long-run elasticity estimates are likely to be small since farmers will respond strongly to price changes only if they are perceived to be permanent. This may partly explain why even the long-run elasticities from time series data are biased downwards. That notwithstanding, time series remains the most widely used approach for estimating supply response and one can therefore argue that the long-run elasticities derived from time series analysis are a better measure of the long-run response.

6. DATA AND EMPIRICAL RESULTS

6.1 Time Series Properties

For estimation purposes, time series data covering the period 1972-1999 are used. Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests are used to test for stationarity of the data. The results are given in Table 2.

Table 2: Unit root tests

	ADF	PP	I(d)
TEA	-1.43	-1.34	I(1)
COFF	-2.26	-2.86	I(1)
INVGDP	-2.29	-2.91	I(1)
RER$K	-1.33	-1.41	I(1)
XOTHER	-0.65	-0.70	I(1)
YTRADI	1.82	2.11	I(1)

Critical values for both tests are –3.72 and –2.98 at 1% and 5% respectively. I(d) refers to the order of integration.

Both tests show that all the variables are non-stationary at 5% level. However, the variables become stationary in first differences and are integrated of order one. The next step is to examine whether the integrated variables are cointegrated.

Modeling using variables in the first difference to achieve stationarity leads to loss of long-run information. The concept of cointegration implies that if there is a long-run relationship between two or more non-stationary variables, deviations from this long-run path are stationary. Johansen's cointegration multivariate procedure is used to establish whether the variables are cointegrated in the long run. The results are given in Table 3 for different models—coffee, tea and other exports.

Table 3: Cointegration tests

Model	Eigen value	λ trace	Critical values −5%	Critical values −1%
Coffee				
r=0	0.69	50.64	47.21*	54.46
r≤1	0.45	21.35	29.68	35.65
r≤2	0.23	6.58	15.41	20.04
r≤3	0.003	0.08	3.76	6.65
Tea				
r=0	0.59	40.65	47.21	54.46
r≤1	0.31	18.37	29.68	35.65
r≤2	0.27	9.09	15.41	20.04
r≤3	0.05	1.21	3.76	6.65
Other exports				
r=0	0.51	40.95	39.89	45.58
r≤1	0.45	23.03	24.31	29.75
r≤2	0.18	8.08	12.53	16.31
r≤3	0.11	3.04	3.84	6.51

*Note: The test assumes linear deterministic trend in the data (for coffee and tea)

The test fails to reject cointegration except in the case of tea where cointegration is rejected at 5%. For 'other exports', the test rejects cointegration when total investment as a proportion of GDP is incorporated but fails to reject cointegration when private investment as a proportion of GDP is incorporated, assuming no trend in the data. From an economic point of view, one would expect the variables in the tea equation to be cointegrated but as the statistical evidence from the data indicates, this is not obvious. However, one needs to take into consideration that given the small sample of the data used, the test is merely a proxy. For further verification, the Engle-Granger two-step procedure was carried out on the respective long-run equations reported in the next section by testing the residuals from the long-run equations

for stationarity using the ADF and DF tests. The long-run relationships are therefore analysed before proceeding to the error correction model as explored in the next sub-section.

6.2   Estimation Results

Regression results: long-run elasticities

Table 4: long-run elasticities

Variables	Coffee (Model I)	Coffee (Model II)	XOTHER (Model I)	XOTHER (Model II)
Constant	7.57(9.26)**	10.62(12.5)**	6.05(10.1)**	3.03(4.02)**
RER$K	0.46(2.08)*	0.81(3.51)**	0.33(2.05)*	0.23(2.71)*
RER$K_1		-0.41(-1.38)		
RER$K_2		0.45(1.71)		
INVGDP	0.65(2.28)*	0.43(1.71)	0.06(0.29)	
INVGDP_1		0.32(1.35)		
YTRADI	0.04(0.14)		0.71(3.53)**	0.37(2.89)*
YTRADI_1		3.05(1.92)		
YTRADI_2		-3.90(-2.39)		
XOTHER_1				0.48(4.76)**
D1984				-0.42(-5.64)**
R^2	*0.27*	*0.67*	*0.72*	*0.94*
F	*2.83(0.06)*	*4.62(0.01)*	*19.5(0.00)*	*75.9(0.00)*
AR	*1.87(0.18)*	*1.05(0.38)*	*10.6(0.01)*	*0.50(0.62)*
ARCH	*0.05(0.82)*	*0.11(0.75)*	*2.47(0.13)*	*0.51(0.48)*
Normality χ^2	*0.55(0.76)*	*0.94(0.62)*	*6.47(0.04)*	*2.64(0.27)*
RESET	*1.25(0.28)*	*0.22(0.65)*	*7.65(0.01)*	*0.66(0.42)*
n	*27*		*27*	*25*

Note: The number in brackets refers to t-value: *(**) significant at 5% (1%) significance level.

Coffee: The long-run cointegrating equation for coffee is reported as model I (second column) in Table 4. The coefficients for real exchange rate and investment as a ratio of GDP are significant and positive. However, income of trading partners is not significant. The results show that coffee export supply is responsive to prices in the long run. Therefore, depreciation of the general real exchange rate and a rise in investments positively influences coffee export volumes. The results indicate that investments, perhaps in the form of improved infrastructure, could boost coffee production and therefore export supply. Using the Engle-Granger two-step procedure, the resultant residual was found to be stationary, further confirming that the variables are cointegrating in the long run.

Given that coffee is a perennial crop, an attempt was made to capture lagged effects by incorporating lagged variables in the estimation (Model II). Except for real exchange rate and income of trading partners lagged two years, other lagged variables are only significant at more than 5% level. Real exchange rate lagged once has a negative effect while the second lag has a positive effect. Arguably, the latter captures the sluggish response of coffee to prices.[5] Similarly, investment as a portion of GDP also has a positive lagged effect as expected. Although income of trading partners is insignificant, one period lag has a positive effect but the two period lag indicates a negative effect. The constant is still significant and perhaps points to the fact that the equation does not include all the other relevant variables.

Tea: An attempt was made to estimate the long-run equation for tea but just like the Johansen's cointegration test, the Engle-Granger two-step procedure indicated non-stationarity of the error term, therefore indicating no cointegration and no ECM. In fact, the equation

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[5] Ideally, lags of prices of 4 to 6 years are appropriate in the case of coffee but this could comprise the degrees of freedom, given the sample size.

persistently produced poor diagnostic tests. An attempt to obtain long-run coefficients by solving an ADL bore no better results.[6] Similar results were obtained for the long-run equation estimated with real exchange rate and volume of tea exports only. Based on these results, it was concluded that there is no support for a cointegrating long-run relationship and therefore no ECM. Other studies such as Mckay et al (1998) established a similar outcome — no cointegrating relationship for total export crop and price indices. However, short-run dynamics are considered in the next sub-section.

Other exports of goods and services: The estimation results are given in Table 4. Income of trading partners and real exchange rate were found to be significant determinants of real exports of goods and services (excluding coffee and tea). Based on the cointegration test results, private instead of total investment as a proportion of GDP was incorporated but turned out to be insignificant. Also, the income of trading partners was significant for 'other exports' even though this variable was insignificant in the coffee equation. The significance of the latter could be partly explained by export of processed and manufactured goods to Uganda and Tanzania, which do not import tea and coffee from Kenya.

Another model (model II, last column) with lagged variables that include a dummy for 1984 to stabilize the equation was also estimated. The results still confirm the findings that depreciation in real exchange rates positively influences exports. Income of trading partners is also significant and positive. However, all the lagged variables, except lagged export volumes, were found to be insignificant. The positive coefficient for the latter is consistent with the positive trend in other major categories of exports such as horticulture. The devastating effects of the drought in 1984 also appear to have adversely affected export volumes.

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[6] The equation produced overly standard errors rendering all the coefficients insignificant.

The ECM results

Using general to specific estimation procedure (Charemza and Deadman, 1992), the preferred error correction models for coffee and 'other exports', as well as short-run model for tea are given in Table 5.

Table 5: Short run tea and ECM models (coffee and other exports**)**

Variable	Coffee (Model I)	Coffee (Model II)	Other exports	Tea
Constant	0.003(0.6)	0.095 (2.55)*	-0.01(-0.42)	0.37(5.64)**
DRER$K	0.41(1.70)		0.29(2.58)*	
DRER$K_1		-0.285(-1.29)	0.17(1.49)	-0.47(-3.14)**
DCOFF_2		-0.58(-3.64)**		
DTEA_1				-0.70(-4.04)**
DTEA_2				-0.39(-2.13)*
DINVGDP	0.41(1.96)			0.37(2.62)*
DINVGDP_1				0.27(1.82)
DYTRADI				-3.73(-3.41)**
DYTRADI_1	2.13(1.46)		1.29(1.64)	
DYTRADI_2				-2.42(-2.33)*
ECT_1	-0.78(-4.14)**	-0.72(-3.65)**	-0.40(-3.44)**	
D9798	-0.36(-3.28)**			
S1993		-0.20(-2.88)**		
D1984			-0.46(-6.28)**	
R^2	0.69	0.64	0.79	0.78
F	7.85(0.001)	8.29(0.001)	12.9(0.00)	8.00(0.0003)
AR	0.14(0.72)	0.03(0.86)	2.26(0.14)	0.45(0.65)
ARCH	0.89(0.36)	0.94(0.34)	0.01(0.93)	0.45(0.51)
Normality chi^2	0.30(0.86)	0.50(0.78)	1.32(0.52)	1.36(0.51)
RESET	0.07(0.80)	3.34(0.08)	0.33(0.57)	0.04(0.84)
Standard error	0.001	0.14	0.07	0.09
n	24	24	23	24

Notes: 'D' at the start of the variable acronym indicates the first difference of the variable. The value in brackets refers to the t-value: *(**) significant at 5% (1%) significance level.

The error correction term in the equations for coffee and 'other exports' is derived from the respective long-run equations indicated as models I in Table 4. In the case of coffee, the ECM regression results show that all the variables have the expected signs. However, the price effect is only significant at 10% level while (current change) in income of trading partners was found to be highly insignificant. Therefore, the price effect in the short run is relatively weaker (not highly significant) than in the long run. Lagged variables are not significant at all. The error term is significant and negative with a relatively high speed of adjustment of about 78%–suggesting that about 78% of deviation from long-run equation is made up within one time period. A dummy for 1997-98 period included after an examination of the recursive residuals showed instability in the regression due to influential points. The dummy can be motivated based on aftermaths of the heavy rains (*El Nino*) that characterized the larger part of that period. These, coupled with the relatively low international coffee prices, adversely affected the export volumes for coffee.

To gauge the impact of liberalization on supply of coffee exports, a liberalization dummy for the period 1993-1999 was introduced in the model (model II). The impact of liberalization as proxied by the dummy shows a negative effect on coffee exports. Trade liberalization, as has been observed, had adverse effects on coffee exports. It has been argued that this sector was adversely affected by the liberalization of inputs, among other things (Nyangito, 2000). Although this can also be purely attributed to the nature of these crops (long time lags), the rigid and inefficient structure of the myriad institutions that deal with these crops also played a role in hampering effective realization of the potential benefits of the liberalization policy. This particular model also shows that the impact of prices (depreciation in real exchange rate) on export volume of coffee is insignificant in the short run. In fact, the impact of lagged changes in real exchange rate is negative though not significant.

Perhaps, this partly confirms what has been observed in the coffee industry that high transaction costs lead to lower prices received by farmers. One can also argue that the significance of the long-run elasticities in comparison with the short run is expected since the adjustment mechanism for coffee, being a perennial crop, takes relatively longer to respond to prices. But even in the short run, it is still possible to respond to price incentives through increased capacity utilization and short-term investments (pruning, increased use of fertilizers, harvesting labour, etc) in order to achieve higher production from existing trees. The negative coefficient on lagged volume of coffee exports is consistent with the downward trend in coffee exports, attesting to de-investments and neglect of the crop as has been observed in the recent past.

Tea: As indicated earlier, it is assumed that there are important relationships among the variables in the tea equation in the short run and it is therefore possible to explore the short run dynamics even though there is no ECM model. All the same, the results for tea should be interpreted cautiously. The immediate price effect (depreciation of real exchange rate) is statistically insignificant while the same variable lagged one period is significant but negative. Like in the case of coffee, this could be explained by the fact that adjustments to price response in the short run are not likely to be considerable. Nonetheless, improvements in the investment as a proportion of GDP (both current and lagged) have a positive influence on volume of tea exports in the short run. Surprisingly, income of trading partners has an unexpected negative sign. May be this can be explained by the shifting markets for the Kenyan commodities, especially with the rising economic integration and the decline in exports to the European Union.

Other exports: In the short run, depreciation of the real exchange rate (both current and with a two-year lagged effect) leads to increased

volume of exports of goods and services (excluding tea and coffee). Unlike in the case of coffee and tea, the impact of a current depreciation in real exchange rate is quite significant. Intuitively, this makes a lot of sense considering the components of 'other exports'—tourism, horticulture, manufacturing, etc—that have the potential to adjust much faster to price incentives in the short run compared to perennial crops. A period dummy for 1984 incorporated after examination of the recursive residuals captures the devastating effects of a drought on the level of exports that year. The error term is negative and shows a speed of adjustment of about 40%, indicating the rigidity in the export sector in moving towards equilibrium. However, just like in the long run equation, the impact of investment as a proportion of GDP is positive and not less significant.

Regression results for exports of other goods and services in nominal values

Another model was purposely estimated for 'other goods and services (excluding coffee and tea)' in nominal values. A similar procedure to the above was used. After establishing that the variable is integrated of order one, cointegration test was carried out before running the ECM model. The long-run and the ECM equations are reported as equations 1 and 2 respectively. Both equations show the significance of real exchange rate. As would be expected, the magnitude of the coefficient for real exchange rate is higher compared to that from the model results for real exports. However, income of trading partners, which has an unexpected negative sign in the ECM model, is positive and significant in the long-run equation. This may be partly because of the large share of flourishing tourism sector in 'other exports of goods and services', which was not taken into consideration in the income index variable. It is also argued that short-run changes in the country's GDP growth might not yield a significant positive response on its imports as would in the long run. The markets for Kenyan exports are also changing.

xother = -11.18+0.90RER$K+0.15PINVGDP+4.48YTRADI *1*

     (-11.31) (3.38)   (0.45)   (13.62)**

     R^2 = 96; F = 200.1(0.00) where:

xother is the nominal value for exports of goods and services excluding tea and coffee.

Dxother=0.19+0.77DRER$K+0.19DRER$K$_{t-2}$+0.19DPINVGDP-1.50DYTRADI

    (7.61)** (8.56)**   (2.10)*   (2.61)*   -(2.30)*

-1.40DYTRADI$_{t-2}$+0.11S1993-0.44ECT$_{t-1}$ *2*

(-2.01)*   (3.69)**   (-5.56)**

R^2=0.88; F=16.6(0.00); AR=0.38(0.69); ARCH=1.58(0.23); Normality χ^2=1.05(0.59; RESET=2.82(0.11)

The impact of trade liberalization period as captured by a dummy (1993-1999) on exports of other goods and services is evident. The results indicate that this period had profound positive effects on the value of exports. The liberalization of the foreign exchange market in particular played a significant role. These measures, particularly the steep devaluation of the Kenya shilling and removal of trade restrictions in the early 1990s, boosted exports and especially manufactured exports.

7. CONCLUSION AND POLICY IMPLICATIONS

Kenya has reduced its dependence on traditional major export commodities (mainly tea and coffee) by introducing non-traditional exports such as horticulture. That notwithstanding, the share of commodity exports is still relatively high in sharp contrast with developments in South East Asia where the share of primary commodities has fallen considerably. This paper has examined factors likely to have influenced Kenya's export volumes by disaggregating total exports of goods and services into three categories—traditional agricultural exports of tea and coffee, and 'other exports of goods and services'.

In general, real exchange rate has a profound effect on export performance and the potential for export supply response is evident. However, like in the literature especially for developing countries, there are some inconsistencies—most econometric time series studies often fail to find robust estimates—for example wrong signs and insignificant price coefficients (Jaeger, 1992; Gabriele, 1994; Mwega, 2002; Branchi et al., 1999; Mutunga, 1994, etc). Most studies end up attributing their outcomes (low elasticities and/or insignificant results) to non-price variables and lack of reliable data. However, most of these studies do not also indicate the robustness of the methodologies used; that is time series and cointegration properties.

In this paper, inconsistencies were noted in the tea equation where results indicated that there was no cointegrating long-run relationship therefore no ECM—partly explaining the unexpected signs and poor diagnostic tests. Additionally, while the price effect (real exchange rate depreciation) on exports of goods and services is clear, the results for other explanatory variables are mixed. Investment as a proportion of GDP used as a proxy for supply constraints was found to have a significant and positive impact on the export volumes of coffee but not

for exports of other goods and services. Perhaps this variable, used as a proxy, may not be the appropriate measure of supply constraints. However, it is important to keep in mind that investments as a proportion of GDP have been declining. Similarly, income of trading partners was found to be paramount in explaining decline in export volumes of 'other exports' than coffee and tea. The shifting markets for the Kenyan exports, especially with the rising economic integration, may also be used to explain this decline. Kenya's export markets have also expanded to other countries including African countries while exports to the EU have been on the decline.

With trade liberalization, some sub-sectors (horticulture and to some extent tourism and manufacturing) seem to have thrived while others such as the coffee sub-sector have suffocated, partly because of increased costs of inputs following the liberalization of the market. However, the problem might have been worsened by the rigidity of the institutions that serve the traditional commodity export sub-sectors, making them slow to effectively respond to the wave of liberalization. Some of these organisations have been characterised by mismanagement and inefficiency, therefore affecting production for the export market. Nonetheless, the world prices especially for coffee have generally been low. With the enactment of the Coffee Act 2001, there is hope that the coffee industry might thrive once more since the Act aims to reduce the high transactional costs that coffee farmers have been incurring, among other things. That notwithstanding, these results can be taken as an indication that lumping everything together in the analysis by using aggregated export data can be quite misleading, and may blur the specific response from sectors.

Like studies of similar nature, the paper acknowledges that non-price factors (costs of inputs, labour costs, access to credit, etc) play a vital role in production and export supply response. A comprehensive analysis of these factors would require micro/sectoral studies, which

is beyond the scope of this paper. However, a detailed sectoral analysis would help to understand and appreciate the transmission mechanisms between macro level policies and farm-household behaviour in the case of agricultural exports like tea and coffee. This can also help to establish the actual price received by the producers and extent of disparity with the international prices. This approach might be preferable for a detailed analysis of other key categories of exports such as horticulture and tourism. Nonetheless, the results of this study are quite informative and arguably point out several issues of policy concern.

Potential for export supply response exists, even for sub-sectors like coffee where performance has been dismal. The positive response to a price incentive (depreciation of real exchange rate) could be taken as an indication of the type of policies that could boost exports.

While maintaining a stable exchange rate is important, strategies that lead to a relatively overvalued exchange rate could be a disincentive to export, implying that flexibility in the exchange rate movements, in line with the fundamentals of the economy might be beneficial.

With the rising level of globalisation, openness through an export-led growth strategy is inevitable, particularly in consideration of other development constraints currently facing the country such as limited external financing. However, to compete globally, costs including transaction costs should be minimal. That notwithstanding, trade liberalization or openness might also be associated with increased volatility, especially for commodity exports, therefore justifying the need for strategic supportive domestic policies to help those sectors that might not be able to cope with the wave of globalisation.

With advances in economic integration, particularly the EAC and COMESA, together with African Growth Opportunity Act (AGOA), there are potential export opportunities that can be explored to Kenya's advantage, including promotion of the non-traditional exports.

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