GLOBAL JOURNAL OF SOCIAL SCIENCES VOL 5, NO. 2, 2006:97-109

 ISSN 1596-6216

EXPORT FLUCTUATIONS AND ECONOMIC DEVELOPMENT: A THEORETICAL AND EMPIRICAL ANALYSIS

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(Received 11 August 2006; Revision Accepted 21 September 2006)

ABSTRACT

This paper provides an integrated perspective on the effect of export fluctuations on economic development for 23 countries belonging to Africa, Asia and Latin America. It reveals that specialized production and export yield enormous benefits and costs. The paper makes a break with the traditional approach of cross sectional analysis to country specific time-series analysis using recent data, thus, favouring socio-cultural cleavages and levels of development. Investigations from the models of export scenario show that export instability acts as an impediment to economic growth in the selected countries overtime because of the uncertainty it generates. The results for Nigeria indicate the largest impact of export fluctuations on economic growth. Also, it is not evident that export instability is higher for LDCs than industrially advanced countries in the sample. The paper makes a strong case for export diversification programmes in these countries as a policy response to the challenge posed by instability in export earnings.

KEYWORDS: Capacity utilization, Capital formation, Economic growth, Export diversification, Export instability.

INTRODUCTION

The causes of fluctuation in primary commodity exports and the effects of the instability on economic growth and development of Third World countries have attracted widespread interest among scholars, policy-makers, and non-governmental organizations (NGOs) and Aid agencies. The interest is stimulated in part by the need to assist developing countries to catch-up with the advanced countries or to provide effective strategies to promote the development of poor and backward regions. Such policy concerns include not only the need for export diversification but also for liberalization of financial capital flows.

While some of these studies have developed an index of export instability to determine whether export earnings fluctuated largely as a result of either price or quantity instability or both, others used aggregate index of instability to measure the effect on economic growth and development. MacBean (1966) for instance found no statistically significant effect of export instability on GNP for a cross section of 35 LDCs. Coppock (1962), Kenen and Voivados (1972), Voicados (1974) found similar results. However, David Lim (1976), using cross sectional data found a positive and statistically significant effect of export instability on savings due to a ratchet effect. A positive relationship between export instability and economic growth means that if we assume risk-adverse behaviour, uncertainty about export earnings can lead to reduction in consumption and in turn, an increase in savings and investment and thus, and to increase in economic growth. But it is also possible that increase in export earnings fluctuations complicate the process of economic planning for development because it destabilizes the capacity to import to promote rapid economic development. Results obtained in David Lim (1987) are indicative of the relevance of the competing hypotheses.

Akpokodje (2000) examines the effect of export earnings fluctuation on capital formation and economic growth in Nigeria. The results show that fluctuations in export earnings adversely affect private and public capital formation and that the effect was larger in the case of public capital formation. Knudsen and Parnes (1975) use a transitory index to measure export instability and find that the marginal propensity to consume out of permanent income is negative related to export instability based on cross sectional data (average from 1958-68) for 28 developing countries. In a related study Glezakos (1973) found that export instability acts as an impediment to economic growth because it destabilizes the capacity to import. He also found a negative relationship between price instability and export growth. However, his results also show that export volume instability has no statistically significant effect on economic growth prompting him to conclude that price stabilization policies were more important than other trade policy measures.

Ragarajan and Sundarajan (1976) developed an aggregate macro model, which assumes that the impact of export earning would be through aggregate demand, money supply, and foreign exchange shortages. Export volume or earning behaviour were considered exogenous and hence there was no interaction between them. Glezakos (1973), Voivodas (1974), Ozler and Harrigan (1988) regress GDP growth rate against export instability index using cross section data. They found a negative relationship. Gyimah-Brempong (1991) using average data for 1960-86 for 34 SubSaharan African countries within a production function framework found that no matter how export instability is measured, it exerts a negative impact on economic growth. Love (1992) examines the issue of causality between export instability and instability in economic growth. His empirical results revealed that instability in export causes income instability.

Most of the studies reviewed above used cross sectional analysis, thus, ignoring country and commodity differences. They did not determine whether specific country policies can minimize or magnify the instability since no macroeconomic variables were included in the analysis. In addition, the results of the previous studies have been conflicting and inconclusive. Thus, Mullor-Sebastian (1988) asserted that "three decades of research on export instability have resulted in consensus on only one of the main areas of study, namely, that export instability is higher for LDCs than for developed countries (DCs). Consensus has not been achieved on other areas (p. 217).

In this paper we make a break with the traditional approach of cross sectional analysis to country specific time-series analysis to examine the effect if any of export instability on the growth records of some countries. This is necessary because countries differ in their policy stance, level of development, socio-cultural cleavages, and in the nature of the shocks hitting them which may lead to misleading results in cross sectional studies which assumes homogeneity.

The rest of this study is organized in four sections as follows. Section I as been the introduction. In section II we present the theoretical underpinning of export promotion

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strategies and its links to economic growth. We also identify some of the export promotion strategies that are being adopted in many developing countries and their implications for economic growth and development. The issue of export diversification is also examined in greater detail because export diversification is one of the avenues by which LDCs can protect themselves against the detrimental effect on their economic development of fluctuations in export earnings. In section III we articulate the analytical methodology. In Section IV we present the empirical results and analysis. Section V concludes.

II THEORETICAL FRAMEWORK AND LITERATURE REVIEW

The theoretical underpinning of export and economic growth has been articulated in some of the papers cited above. In this paper we present the main arguments of the theory and their policy implications. A detailed exposition of export promotion policies would be attempted to situate the policy issues emanating from the empirical results in the proper context.

Export-Led Growth Theories

The theoretical nexus between exports and economic growth rests mainly on the gains from trade. Three gains have been identified. These include static comparative advantage, which increases capacity utilization through "vent for surplus" argument and productivity growth or "engine of growth". Export oriented countries thus earn foreign exchange through increased exports and are able to finance imports of essential raw materials and inputs which are essential to facilitate an increase in overall capacity utilization Helleiner (1993). In the case of the vent for surplus outward orientation facilitates extra use of hitherto idle (surplus) resources (labour in most cases in LDCs) in production. The third gain: productivity gain has become well touted recently: increased exports are known to facilitate growth in a fast paced manner resulting in specialization and increasing returns to scale, human capital formation and dynamic spill over effects (Abdulai and Jaquet, 2002).

The contribution of exports are both direct and indirect in nature, where the direct include increased factor productivity and foreign exchange which could be used to import intermediate raw materials and capital goods to expand productive capacity. The indirect contributions include efficient resource allocation, greater capacity utilization of economies of scale technological improvements and increased employment in labour – surplus economies, (Kravis 1970 and Feder 1983). Export biased policies are conducive to faster growth because they promote competition, encourage learning by doing, improve access to trade opportunities, raise the efficiency of trade allocation, and enhance positive externalities, resulting from access to improved technology, (Grossman et al 1991).

Evidence from empirical research has by no means been conclusive on this subject. Whilst some earlier works Michaely (1977), Helleiner (1986) found no such relationship between exports and growth, others, Bhagwati (1988), Grossman and Helpman (1991) found a relationship, which was bi-directional. Yet others Ram, Tyler (1981). Fosu (1990) and Weeks (1995) have also found a positive relationship. Just as there are a variety of studies on this subject so are the methods of analysis. These methods have ranged from simple correlations Emery (1967), Maizels (1968), Kravis (1970), Michaely (1977), Balassa (1978), Heller and Porter (1978) to causality tests Jung and Marshall (1985), Chow (1987) etc. and multiple regression analysis, Tyler (1981), Feder (1983), Kavoussi (1984), Ram (1987), Balassa *et al* (1989), Fosu (1990) Weeks (1995) and Adulai et al. (ibid).

The most used multiple regression model has been an export augmented production function growth model in a neo-classical framework. Again most of the analysis has been on a cross sectional basis with few country-specific or time series analysis. However to understand the dynamics in each country especially in developing countries it is prudent to go behind the general cross-country and investigate the country specific cases. While export promotes economic growth, a number of studies have shown that fluctuations in export revenue generate instability in economic growth and hence that export revenue fluctuations lead to poor growth performance.

Sinha (1999) for instance investigate the relationship between export stability, investment and economic growth in nine Asian countries using time series data within a stationarity and cointegration framework. The results indicate that export revenue fluctuation induces adverse effect on economic growth Japan, Malaysia, Philippines and Sri Lanka. For South Korea, Myanmar, Pakistan and Thailand, a positive relationship was found while for India the results were mixed. Thus, the results are inconclusive.

Previous study conducted by Yotopoulos and Nugent (1976) has shown that the effect of export instability on economic growth is sensitive to the different measures of the export instability index. Similar and inconclusive results were obtained in the case of Moran (1983) for a cross section of 30 countries. In the same way Aillo (1999) investigates the relationship between export instability and economic growth in African-Carribean-Pacific countries (ACP). His results show that export earnings instability damages economic growth in members' countries of African-Carribean-Pacific economies covered by the Lome Convention. His results confirm the importance of the financial assistance (STABEX) received by this group of countries to guarantee financial flows to those of them who suffer from reduction in export earnings.

A recent study by Aillo (1999) indicated results which are consistent with those of David Lim (1991). According to Lim, the problems of export instability should be seen as an integral part of the general problem of economic underdevelopment, and that the IMF, the World Bank and other international organizations should pay attention to the problem of export instability in their adjustment programme.

A more recent study by Achy and Sekhat (2001) finds that exchange rate management plays a significant role in providing incentives for exports. Thus, eliminating exchange rate mismanagement particularly overvalued exchange rate and uncertainty or volatility of exchange rate promote export diversification and hence economic growth. These findings direct attention to export diversification as policy imperative to minimize the adverse effect of fluctuations of export earnings on economic growth and development. The results by Achy and Sekhat are consistent with Sorsa (1999) and Cherkaou (2001) which indicate that depreciation of the exchange rate could lead to export diversification.

Export Promotion Policies.

Various export promoting policies have been adopted in developing countries in the context of outward-oriented economic policies. This follows the failure of inward-looking import substitution industrialize-tion strategy. These include export diversification, liberalization of financial capital flows, currency devaluation (exchange rate), implementation of export commodity stabilization fund (STABEX), the establishment of export processing zones (EPZ), and the establishment of export-import bank to provide export finance facilities. Others include the introduction of manufacture-in-bond scheme which allows for quick clearance of imported raw materials for use by export oriented industries, the Special Initiatives on particular exportable commodities such as cassava, garments and textiles, and the US led African Growth and Opportunities Act (AGOA) to provide more favourable market access to African commodity exports. The response of exports to these policy measures in various countries have been as varied as the trade policies and countries being investigated, thereby indicating heterogeneity rather than homogeneity.

Perhaps, one of the most important policy measures to promote exports is measure to induce export diversification – both vertical and horizontal. It is well know that export diversification is another approach by which developing countries could cushion themselves against the fluctuations in export commodity prices and export earnings, so as to carry out sustained development programmes with minimum external shocks. According to UNESCAP (2005), a more diversified export mix may enable a country to accomplish stability and growth oriented policy goals. UNESCAP insists that by providing a broader export base, replacing commodities with positive price trends and adding value to commodities through additional processing and marketing, a diversified export portfolio would be expected to minimize the volatility or fluctuations in export earnings and to foster rapid economic growth and development. It argues further that a country that specializes in commodities in which it has comparative advantage may also achieve greater degree of allocative efficiency. Achy and Sekhat (2001) find that MENA's increased export to Europe was promoted by export diversification and modernation. Similarly, Stanley (1999) finds that export diversification is important to economic stabilization and eases the pain of adjustment.

Herzer *et al* (2004) investigated the link between export diversification and growth via the externalities of learning by doing and learning by exporting fostered by competition in the international economy. Using three different techniques of estimation namely Johansen Multivariate cointegration approach, Multivariate Error Correction model, and the dynamic ordinary least squares method, they found that export diversification plays an important role in economic growth. In some studies (Sinha 1999), It is argued that the adoption of export promotion development policy coupled with liberalization of financial flows can help the country.

Export diversification initiatives in most countries where it has been successful has been undertaken within a broad policy framework where national governments design and support coherent macroeconomic policy framework consistent with export promotion strategies (UNCTAD 1997). In these countries export diversification is a private sector driven initiative while the government provides the enabling environment for growth diversification drives. According to UNCTAD (1997)

... government activities should be broad based and limited to pursuing sound macroeconomic policies, establishing an open economy, providing the basic social, legal, and economic infrastructure, creating a sustainable climate for private enterprise, and ensuring a high level and appropriate composition of human capital formation.

It seems to be conventional wisdom that export diversification and export promotion trade policies may lead to faster economic growth. However, whether such a relationship exists in real life is an empirical issue. Despite the inconclusive findings of most researchers many countries are diversifying their exports more towards manufacturing commodities.

III ANALYTICAL METHODOLOGY

Most studies investigate the influence of export fluctuations on economic growth within a neoclassical production function framework in the tradition of Feder (1983).

This is a sophisticated version. In this present chapter we use a simple version of the model. Export fluctuations were measured as deviations around the trend.

$$LogY_t = a + bT + u \quad \ldots\ldots 1$$

where Y_t is the actual value of the variable in time t, a is the constant term, and b is the coefficient, u is the stochastic error term with the usual properties . The predicted value of Y_t is the fitted value. Export instability is defined as the deviation from trend.

The estimating equation for the empirical test is of the form:

$$ECMY_t = b_0 + b_1 ECMX_t + e \quad \ldots\ldots 2$$

Deviation from trend of GDP (ECMY) were regressed against deviations from trend of export[1] (ECMX). If export instability leads to adverse effect on economic growth or to growth instability, then a positive sign for the coefficient of ECMX will be found.

Index of Export Diversification

Three indices of export diversification are found in the literature. These include commodity-specific cumulative export experience function (CSCEF), the orgive index (OG) or concentration ratio (CONC) and the Hirschmann and Herfindhal (HH) index. The commodity-specific cumulative export experience function is defined by

$$CSCEF_{it} = \sum_{t=1}^{tc} X_{it} - \sum_{t=1}^{N} X_{it} \quad \ldots\ldots 3$$

where tc is current period and N is terminal period of the sample, X_{it} real value of exports of the ith commodity. The commodity –specific cumulative export experience function is similar to cumulative distribution function as it takes smaller values at the initial period and rises to unity in the terminal period. For traditional export commodity the graph bulges to the left in initial period and may be linear while for the non-traditional commodity, its experience is concentrated in the latter years and hence to shift towards the right. A comparison of CSCEF across different commodities may also shed light on the diversification of export commodities. Commodities, which shift more to the right, are not only more non-traditional but also are also more vertically diversified.

Ogive index or concentration ratio is the second index of export diversification. There are two types of diversification. Vertical diversification means that export mix has moved into commodities with higher value added components, particularly exports of manufactured product. The degree of diversification may reflect both the number of export commodities as well as the distribution of their individual proportions. Horizontal export diversification means movement into other traditional or primary export commodities such as banana, cassava and cashew nuts etc in addition to the traditional commodities such as cocoa, coffee, groundnut, hides and skins, cotton, palm oil and rubber.

A more sophisticated approach is to use the model of the form:

$\Delta Y_t/Y_t = A_0 + A_1\Delta GDIY_t + A_2\,\Delta LAB_t + A_3\Delta EXPG_t + A_4\Delta VEX + U$

where Y=real GDP, GDIY=investment /GDP ratio, EXPG =export growth, VEX=coefficient of variation of export, We use three year moving average of export to derive the export instability index. Coefficient of variation is defined as standard deviation divided by mean i.e s/θ. Where s=standard deviation, θ=mean of the variable.

Ogive index measures the degree of diversification, the smaller the value, the more diversified the export base, and hence the more it may promote increased stability of growth in export earnings.

$$OG = \sum_{i=1}^{n} \{SXi - 1/N\}2 / 1/N \quad \ldots\ldots 4$$

where N=total number of export commodities in the export portolio, SXi = actual share of export commodity I in the portfolio, and 1/N is the ideal share of export earnings for each commodity. A diversified export base should have low value of OG or CONC. In the case of perfect diversification or equal shares OG or CONC=0. An unequal distribution of export shares will give a larger value of CONC.

The third measure of export diversification is the Hirschmann- Herdfindhal Index (HH). The less diversified the composition of exports, the higher the value of the index. But the smaller the value of HH, the more diversified the export basket, and the better is the economy in terms of the capacity to withstand shocks from the vagaries of the international commodity prices. The Hirschmann-Herdfindhal index is measured as:

$$\text{Hirschmann-Herdfindal Index} \quad HH = \sum_{n} [Xi/ \Sigma Xi]2$$

$$\text{or} \qquad HH = \sum_{n} Si2 \quad \ldots\ldots 5$$

The higher the value of HH the more undiversified or less diversified the export base.

Export fluctuations, export diversification and economic growth

To identify the extent of the moderating effect of export diversification on growth instability in the presence of export fluctuation we specify a model of the form:

$$ECMYt = b0 + b1ECMXt + b2CONCt + e \quad \ldots\ldots 6$$

Data were obtained from International Financial Statistics Yearbook (various issues), the Internet, and CBN Statistical Bulletin. Ordinary least Squares Estimation method issued. The period for studies is 1980 to 2000 for most of the countries. For others such as Nigeria the period is from 1970 to 2003 and for Japan the data series run from 1975 to 2000. The sample of countries includes 23 which cover Africa (8) including Nigeria, Latin America (6) including Columbia and Asia (9) including Japan and Singapore, Hong Kong. The results are presented in the next section.

IV EMPIRICAL RESULTS AND DISCUSSION

Table 4.1 presents the results of the effect of export instability on instability in economic growth for the 22 countries and three continents. The estimated regression coefficients for ECMX, the associated t-values and p-values are provides. The coefficient of determination R^2, the F-ratio and Durbin Watson statistics are all also presented to provide further test of the adequacy of the fitted model. Although the model did not perform very well in terms of explanability of instability in economic growth performance, the results indicate an interesting pattern among the regions.

Table 4.1: Summary of Results of Export Instability

S/n	Country	Contribution to Variability in GDP
1	NIGERIA	11.6
2	TOGO	0.4
3	BOTSWANA	2.6
4	KENYA	3.5
5	BURUNDI	8.0
6	GHANA	3.0
7	ZAMBIA	16.0
8	SOUTH AFRICA	7.52
9	GUATEMALA	10.0
10	COLUMBIA	28.6
11	NICARAGUA	7.7
12	COSTA RICA	5.1
13	AGENTINA	30.0
14	CUBA	11.0
15	INDONESIA	4.0
16	SINGAPORE	19.3
17	HONG KONG	0.1
18	MALAYSIA	5.6
19	KUWAIT	12.4
20	AUSTRALIA	30.0
21	FIJI ISLAND	62.0
22	NEW ZEALAND	3.9
23	JAPAN	59.8

The results show a positive sign for the coefficient of ECMX in most of the countries under investigation indicating that fluctuations in exports increased the instability in economic growth during the period under review. The low value of R^2 (with few exceptions) for all the countries suggests that other factors were at work in generating instability in growth performance in the selected countries. Approximately 62 percent of the fluctuations in the GDP can be attributed to export volatility in the case of Fiji Island. The t-values are significant at better than 0.1 percent, suggesting a 1 percent variation in export receipts tends to be associated with a change in GDP of order 1.377 percent, a strong confirmation of the hypothesis that export instability leads to macroeconomic instability or volatility.

Japan, Hong Kong, Malaysia and Singapore have followed a successful policy of export promotion and it will be interesting to see how the results for Japan differ from those of other countries. Many Asian countries have moved towards a policy of export diversification and liberalization of financial capital flows.

The results for the Asian countries are mixed. Japan indicates a positive and statistical significant effect of export instability on growth instability. The explanability of the model is equally high with approximately 60 percent of the variability in Japanese growth record attributable to export instability. For the other countries, export instability seems to have no significant effect on growth instability particularly for Singapore, Hong Kong, Malaysia, New Zealand and Australia.

The results are different in the case of Latin American countries. For these countries we find that export stability is an important source of instability in economic growth contributing about 10 percent in the case of Guatemala, about 29 percent in Columbia, about 11 percent in Argentina and Cuba.

In Africa continent we find that export instability is an important source of growth instability particularly in Zambia where it contributes 16 percent, Nigeria where it contributes about 11.6 percent (see Table 4.2).

Table 4.2: Structure of Commodity Export (1970-2003)

YEAR	AGRICULTURE (Percentage)	MINERAL (Percentage)	MANUFACTURING (Percentage)	EXPORT N million
1970	29.95	57.83	12.22	885.4
1971	18.93	73.76	7.31	1293.4
1972	11.99	82.09	5.92	1434.2
1973	10.98	83.17	5.85	2278.4
1974	4.76	92.62	2.62	5794.8
1975	4.68	92.69	2.63	4925.5
1976	4.06	93.68	2.26	6751.1
1977	4.92	92.77	2.31	7630.7
1978	6.81	89.09	4.1	6064.4
1979	4.32	93.83	1.85	10836.8
1980	2.4	96.09	1.51	14186.7
1981	1.62	96.89	1.49	11023.3
1982	1.05	98.61	0.34	8206.4
1983	3.61	96.39	0.01	7502 5
1984	2.29	97.28	0.43	9086
1985	1.64	95.76	2.6	11720.8
1986	4.57	93.81	1.62	8920.6
1987	5.23	92.91	1.86	30360.6
1988	5.75	91.16	3.09	31192.8
1989	0.51	99.48	0.01	57971.2
1990	0.42	99.53	0.05	109886.1
1991	0.37	99.2	0.43	121535.4
1992	0.44	99.33	0.23	207266
1993	0.34	99.09	0.57	21877001
1994	0.33	99.58	0.09	206059.2
1995	0.33	99.57	0.1	950661.4
1996	0.17	98.79	1.04	1309543
1997	1.6	97.65	0.75	825670
1998	2.17	96.12	1.71	1125690
1999	1.3	98.00	0.7	1188970
2000	1.7	98.00	0.3	1945720
2001	1.7	98.00	0.3	2001230
2002	1.7	98.00	0.3	1882670
2003	1.7	98.00	0.3	2889850

Nigeria: Regression Analysis of the Influence of export diversification on economic growth.

Having shown that export instability adversely affects economic growth in most of the countries in the sample, there is need to investigate further whether export diversification could have mitigated the adverse effect on economic growth arising from export fluctuations. To this end we use data only for Nigeria for the period 1970 to 2003. Nigeria is chosen largely for the availability of data and the fact that its dependence on a single commodity (oil) more easily

emphasize the dangers of export fluctuations and the potential for export diversification. For all of the African countries considered in the study the results for Nigeria indicate the largest impact of export fluctuations on economic growth.

The Table reveals the gradual decline in export of agricultural commodity and its replacement by oil in the 1970s. For example in 1970 agricultural commodity was about 30 percent of total export earnings while oil was about 58 percent. But by 1979 agricultural export earnings have fallen to 4.32 percent and oil export earnings have risen to 93.83 percent. The trend has continued till date

Figure 1 shows the graph of index of export diversification as measured by the commodity-specific cumulative experience function for the three categories of exports namely primary agricultural commodity export, mineral or petroleum export commodities, and manufactured export commodities. Figure 2 and Figure 3 provide alternative measures of export diversification for the three categories of export commodities in Nigeria. The results indicate the preponderance of oil/petroleum export in total basket of export earnings. Whereas, the Nigeria export base was more diversified in the early seventies with agriculture contributing about 30 percent, the picture changed thereafter with mineral exports occupying the lion share of export value.

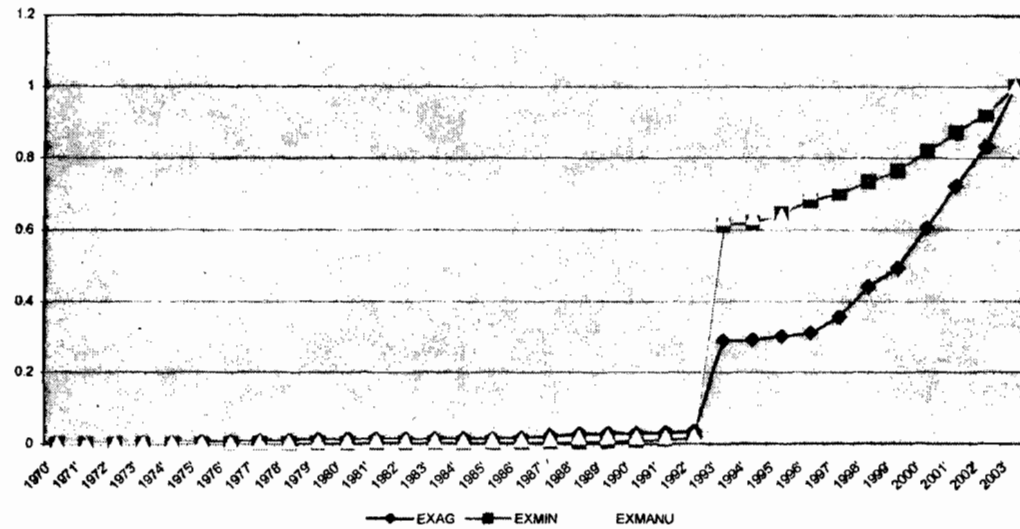

FIGURE 1: COMMODITY-SPECIFIC EXPORT CUMULATIVE EXPERIENCE FUNCTION

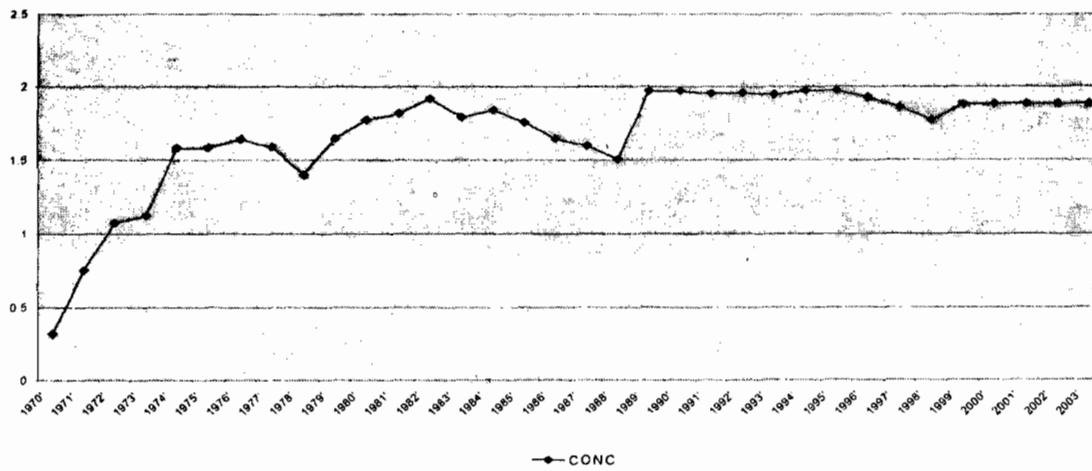

FIGURE 2: OGIVE INDEX AS INDICATOR OF EXPORT DIVERSIFICATION

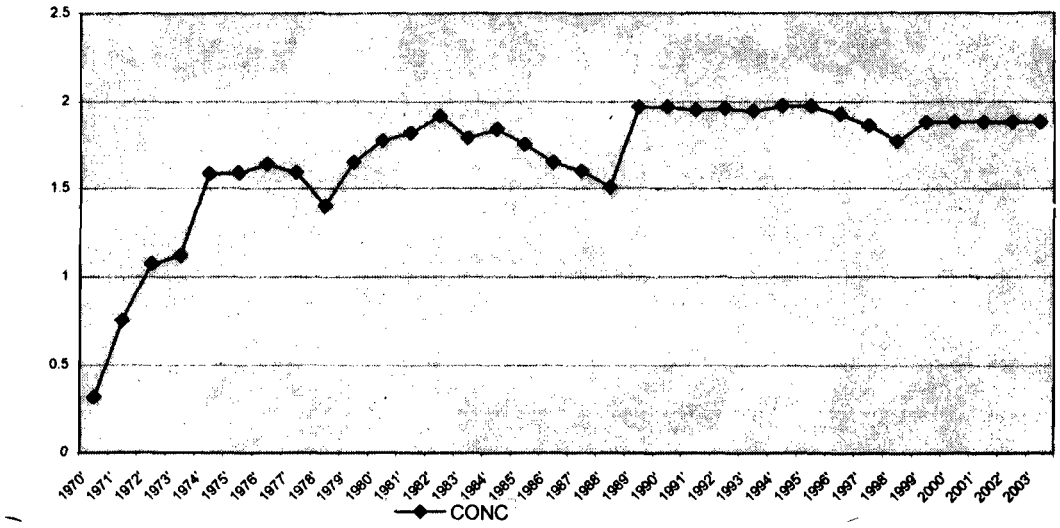

FIGURE 11.2: OGIVE INDEX AS INDICATOR OF EXPORT DIVERSIFICATION

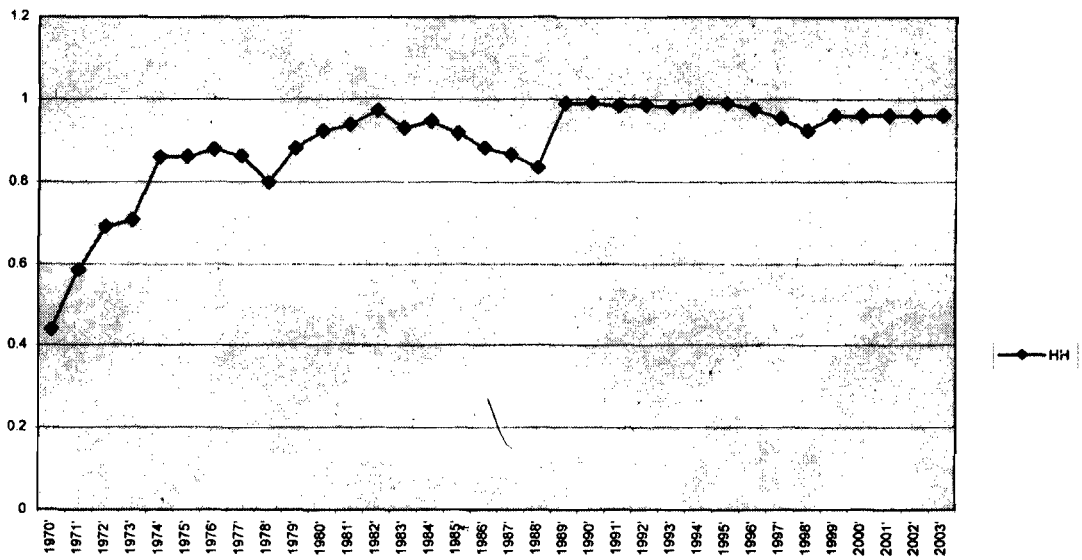

FIGURE 3: HIRSCHMANN-HERDFINDHAL INDEX OF DIVERSIFICATION

The regression results for Nigeria shows that export diversification has limited impact on instability in economic growth and that the degree of export diversification did nothing to reduce the detrimental effect of export fluctuations on economic growth (see Table 4.4). The results were robust to various measures of the diversification index. However, the Nigerian result should not be generalized to other countries where prospects for export diversification are greater and where the export sector is less monolithic. The general thinking is that export diversification helps to mitigate the adverse effect of fluctuations in export earnings. Export diversification is more than not putting your eggs in one basket.

CONCLUDING REMARKS

In this study an attempt has been made to present times series evidence of the effect of export fluctuation on instability in economic growth of 23 countries belonging to Africa, Asia and Latin America. Whereas previous studies concentrated on cross-section studies, this study presents country-specific evidence on the role of export instability on the growth records of these countries and using more recent data. The results obtained were mixed. It is also not evident that the effect of export instability on economic growth is greater for developing countries than for developed countries. However, the results presented above are indicative rather than definitive. They were obvious cases of autocorrelations in the residuals which were not corrected in this study.

Overall, the results show that fluctuations in export receipts is a significant source of instability in the poor growth performance of the selected countries over time because of the uncertainty it generates. The results confirm the findings of Glezakos (1973) that export instability acts as an impediment to economic growth because it destabilizes the capacity to import. There is need to encourage export diversification programmes in these countries as a policy response to the challenge posed by instability in export earnings. The Nigerian case should not be generalized. Future studies could adopt the more rigorous model of Feder as indicated and correct for serial correlation for more definitive results to be obtained.

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APPENDIX

TABLE 4.1: Regression Estimates and Related Statistics

1. NIGERIA

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.285963E-08	.036919	-.774578E-07	[1.00]
ECMX	.101950	.044274	2.30272	[.028]

R^2 =0.1159 F-RATIO =21.599 DW=1.7750

2. TOGO

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.648660E-07	.016288	-.398237E-05	[1.00]
ECMX	.143289	.137255	1.04396	[.310]

R^2=0.00447 F-ratio =1.089 DW = 0.766

3 BOTSWANA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.225903E-06	.944318E-02	.239223E-04	[1.00]
ECMX	.025595	.059520	.430021	[.672]

R^2= 0.042 F-RATIO=0.1849 DW=0.665

4. KENYA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.908261E-07	.731006E-02	.124248E-04	[1.00]
ECMX	.079296	.060622	1.30802	[.206]

R^2=0.0345 F-ratio =1.7109 DW = 0.552

5. BURUNDI

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.220354E-07	.017061	-.129154E-05	[1.00]
ECMX	.118227	.072371	1.63363	[.119]

R^2=0.0779 F-ratio =2.66 DW = 1.045

6. GHANA

7.

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.606766E-09	.023866	.254237E-07	[1.00]
ECMX	.026722	.0123906	2.1566424	[.0525]

R^2=0.0299 F-ratio =0.416 DW = 1.986

7. ZAMBIA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.206985E-18	.019428	.106540E-16	[1.00]
ECMX	.078885	.036348	2.17024	[.043]

R^2=0.1564 F-Ratio =4.7099 DW = 1.911

8. SOUTH AFRICA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.333201E-17	.044629	.746600E-16	[1.00]
ECMX	1.10031	.678879	1.62078	[.122]

R^2=0.0752 F-ratio =2.626 DW = 1.012

LATIN AMERICAN COUNTRIES

9. GUATAMELA

Dependent variable: LGDP
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.295205E-18	.886160E-02	.333128E-16	[1.00]
ECMX	.029905	.016579	1.80374	[.087]

R^2=0.10126 F-ratio =3.256 DW = 0.1932

10 COLUMBIA

Dependent variable: LGDP
Current sample: 1980 to 2000
Number of observations: 21

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.444414E-07	.519486E-02	-.855489E-05	[1.00]
ECMX	.171170	.056750	3.01618	[.007]

R^2=0.286 F-ratio =9.097 DW = 0.5913

11 NICARGUA

Dependent variable: LGDP

Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.220354E-07	.017061	-.129154E-05	[1.00]
ECMX	.118227	.072371	1.63363	[.119]

R^2=0.077 F-ratio =2.6656 DW = 1.045

12 COSTA RICA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.227065E-07	.018205	-.124730E-05	[1.00]
ECMX	.029944	.165345	.181099	[.858]

R^2=0.0508 F-ratio =0.228 DW = 2.045

13. ARGENTINA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.395014E-07	.022928	-.172288E-05	[1.00]
ECMX	.520701	.214318	2.42957	[.025]

R^2=0.2968 F-ratio =5.90 DW = 0.839

14 CUBA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.317953E-06	.618314E-02	-.514226E-04	[1.00]
ECMX	.021806	.011761	1.85405	[.079]

R^2=0.1086 F-ratio =3.437 DW= 1.4007

ASIAN COUNTRIES

15. INDONESIA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.227065E-07	.017409	-.130431E-05	[1.00]
ECMX	.992050E-02	.736861E-02	1.34632	[.194]

R^2=0.03904 F-ratio =1.815 DW = 1.9777

16. SINGAPORE

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.227065E-07	.018043	-.125843E-05	[1.00]
ECMX	-.160922	.263095	-.611652	[.548]

R^2=0.193 F-ratio =0.374 DW = 2.10

17. HONG KONG

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.135404E-09	.015584	.868885E-08	[1.00]
ECMX	.023853	.026519	.899450	[.380]

R^2=.0099 F-ratio =0.551 DW = 0.3734

18. MALAYSIA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.242635E-08	.983109E-02	.246804E-06	[1.00]
ECMX	.106857	.071956	1.48502	[.154]

R^2=0.0558 F-ratio 2.209 = 1.778

19. KUWAIT

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.317891E-06	.612897E-02	-.518670E-04	[1.00]
ECMX	.019263	.983528E-02	1.95855	[.065]

R^2=0.124 F-ratio =3.735 DW = 1.9202

20. AUSTRALIA

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.606766E-09	.023866	.254237E-07	[1.00]
ECMX	-.026722	.041287	-.647224	[.525]

R^2=0.0299 F-ratio =0.41 DW = 1.966

21 FIJI ISLAND

Dependent variable: ECMY
Current sample: 1980 to 1999
Number of observations: 20

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	1.39352	.182728	7.62620	[.000]
ECMX	1.37742	.245236	5.61670	[.000]

R^2=0.617 F-ratio =31.548 DW = 0.509

22. NEW ZEALAND

Dependent variable: ECMY
Current sample: 1980 to 2000
Number of observations: 21

Variable	Estimated Coefficient	Standard Error	t-statistic	P value
C	-.420497E-07	.047313	-.888748E-06	[1.00]
ECMX	-.925939	1.88000	-.492521	[.628]

R^2=0.0.039 F-ratio =10.242 DW = 0.939

23. JAPAN

Dependent variable: ECMY
Current sample: 1975 to 2000

Number of observations: 26

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	.128379E-06	.024125	.532141E-05	[1.00]
ECMX	1.02194	.170968	5.97737	[.000]

R^2 =0.598 F-RATIO =25.729 DW= 0.995

TABLE 4.4: Sensitivity of Growth Instability to Alternative Measures of Export Diversification

Ogive index of export diversification

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.045042	.100402	-.448615	[.657]
ECMX	.090183	.025595	3.52339	[.001]
CONC	.026827	.058433	.459101	[.649]

R^2 =0.243 F-Ratio =6.277 DW=0.9143

Degree of Agricultural export Diversification

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.020619	.024703	-.834693	[.410]
ECMX	.085166	.024962	3.41184	[.002]
EXAG	.117689	.077361	1.52129	[.138]

R^2=0.290 F-ratio =7.745 DW=0.905

Degree of Mineral export Diversification

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.015957	.025700	-.620883	[.539]
ECMX	.084007	.025791	3.25721	[.003]
EXMIN	.064217	.059520	1.07892	[.289]

R^2= 0310 F-Ratio =6.942 DW=0.865

Degree of Manufacture Export Diversification

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.015893	.025919	-.613179	[.544]
ECMX	.084147	.025819	3.25918	[.003]
EXMANU	.059607	.056774	1.04989	[.302]

R2=0.263 F-Ratio=56.899 DW=0.8641

Agriculture Cumulative Export Experience Function

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
Constant	-.020619	.024703	-.834693	[.410]
ECMX	.085166	.024962	3.41184	[.002]
CUAGRIC	.403175E-06	.265022E-06	1.52129	[.138]

R^2=0.290 F-Ratio =7.745 DW=0.905

Mineral Cumulative Export Experience Function

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.015957	.025700	-.620883	[.539]
ECMX	.084007	.025791	3.25721	[.003]
CUMIN	.176500E-08	.163590E-08	1.07892	[.289]

R^2=0.2647 F-Ratio=6.9425 DW=0.8653

Manufacture Cumulative Export Experience Function

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.015893	.025919	-.613179	[.544]
ECMX	.084147	.025819	3.25918	[.003]
CUMANU	.291701E-06	.277841E-06	1.04989	[.302]

R^2=0.259 F-ratio=6.89 DW=0.864

Hirschmann-Herfindhal Export Diversification Index

Dependent variable: ECMY
Current sample: 1970 to 2003
Number of observations: 34

Variable	Estimated Coefficient	Standard Error	t-statistic	P-value
C	-.071832	.158005	-.454614	[.653]
ECMX	.090183	.025595	3.52338	[.001]
HH	.080441	.175322	.458817	[.650]

R^2=0.24 F-Ratio=6.277 DW=0.9143