BIBLIOGRAPHIC DATA SHEET

1. CONTROL NUMBER: PN-AAK-053

2. SUBJECT CLASSIFICATION (695): DK00-0000-0000

3. TITLE AND SUBTITLE (240)

Growth of exports and income in the developing world: a neoclassical view

4. PERSONAL AUTHORS (100)

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5. CORPORATE AUTHORS (101)

AID/PPC

6. DOCUMENT DATE (110)	7. NUMBER OF PAGES (120)	8. ARC NUMBER (170)
1973	28p.	

9. REFERENCE ORGANIZATION (130)

PPC

10. SUPPLEMENTARY NOTES (500)

(In A.I.D. Discussion Paper No. 28)

11. ABSTRACT (950)

12. DESCRIPTORS (920)

exports
income
economic development
commerce
foreign exchange
demand
supply

13. PROJECT NUMBER (150)

14. CONTRACT NO.(140)

PPC

15. CONTRACT TYPE (140)

16. TYPE OF DOCUMENT (160)

70

A.I.D. DISCUSSION PAPER NO. 28

GROWTH OF EXPORTS AND INCOME IN THE DEVELOPING WORLD: A NEOCLASSICAL VIEW

BUREAU FOR PROGRAM AND POLICY COORDINATION, A.I.D.

DEPARTMENT OF STATE

AGENCY FOR INTERNATIONAL DEVELOPMENT

Washington, D.C.

Bureau for Program and Policy Coordination

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GROWTH OF EXPORTS AND INCOME IN THE DEVELOPING WORLD: A NEOCLASSICAL VIEW

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November, 1973

I. Introduction

The relationship between export growth and economic development has been the object of scrutiny, analysis, debate and controversy since the early days of modern economics. In the course of the lengthy debate it has become apparent that the relationship between export and GNP growth is multiple and complex. Exports have been viewed as an engine of growth--driving and powerful or sputtering and weak, depending on the author's viewpoint--or as a handmaiden of growth; as a strong stimulus to increased savings; in the context of foreign exchange constraint models, as a means of obtaining imports which themselves are essential for GNP growth; or as a stimulus to increased specialization and efficiency.[1]

Many earlier studies have shown a positive correlation between GNP growth and export growth either through the use of simple regression analysis or in the context of more elaborate growth constraint models [5, 6, 7]. This significant finding must be further refined through the identification of the factors responsible for the relationship before it can be useful in devising appropriate development strategy and policies.

The purpose of this study is to explore a number of hypotheses others have offered in the past with respect to the relationship between export and GNP growth and the factors responsible for it, in order to determine how well these hypotheses hold up in the context of recent LDC experience. We will concentrate primarily on investigating the

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[1] Several of the models used to explain export-GNP relationship deal with separate facets of the relationship and can thus be considered to explore complementary rather than alternative hypotheses.

neoclassical thesis that export growth is beneficial to GNP growth by enabling the LDC economy to sustain increases in productivity through increased competition, specialization and improved resource allocation.

In the next section a simple growth model is specified and the neoclassical thesis explored. The investigation uses cross-country regression analysis of 39 LDCs for the decade 1960-69.[1] Section III examines alternative hypotheses about the relationship of output to export growth. Section IV discusses some of the factors affecting export growth performance of LDCs, and the last section draws conclusions and tentative policy implications from the overall findings.

II. The Basic Model

In the context of the neoclassical model, a strong correlation between export and GNP growth would hardly be startling. A rapidly growing export sector would have beneficial effects on general economic growth, because it would result in increased specialization and competition as well as possibilities for exploiting economies of scale from a wider market. In a dynamic setting the net effect would be improved efficiency in resource utilization and faster growth in factor productivity.[2]

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[1] A list of the LDCs included can be found in Table 1. The sample has been limited by data availability on a number of variables, particularly pertaining to the composition of foreign trade.

[2] In a somewhat different vein, increased exports could increase factor productivity by increasing X-efficiency [13]. The increased contact with the outside world may result in substantial improvement of production methods with attendant beneficial results on productivity.

The studies by OECD [15] and others [2] essentially argue that developing countries, through the adoption of highly restrictive, extensive and haphazard import controls, have provided disincentives to export expansion and foregone the opportunities of specialization and increased productivity through trade; and further, that some of the internal obstacles inhibiting export expansion are in part the result of inappropriate policies tending to distort relative factor prices; also, that countries could exploit the opportunities offered by international trade, even in the face of stagnant demand for their traditional commodities.[1] Thus the argument can be made, that (a) productivity growth would be higher in countries which are better placed in international trade, in the sense that their exports are rising rapidly; and that (b) such countries would experience more rapid growth in output. As a result, the link between export growth and output growth is productivity growth generated from increased specialization, competition, and other factors attendant to the opening of an economy to international trade.[2]

While a strong correlation between GNP and export growth may in fact be present, it is possible that both export and GNP growth can be explained by other factors which are themselves basically responsible

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[1]Although it can also be argued that developing countries' performance in primary exports also has been adversely affected by inappropriate exchange policies which have discouraged exports by unduly inhibiting supply.

[2]The effect of trade controls and other LDC trade policies on productivity has been noted in a number of writings, especially by Bruton [3].

for economic development. The hypotheses to be tested are, first, whether the effect of export growth on GNP is in fact additional to the effect of changes in primary factors of production, and, second, whether export growth can be related to estimates of productivity growth, across countries.

For this purpose, let us construct a simple production model:

$$(1) \quad Y = A\, K_d^a\, K_f^b\, L^c$$

where Y stands for output, K_d is domestic capital, K_f is foreign capital, L is labor force and A is a constant. Capital in this model is defined in financial terms rather than in physical units. Thus, K_f must be interpreted to be that portion of the capital stock attributable to net foreign capital inflow. Differentiating (1) with respect to time we obtain:

$$(2) \quad \frac{\frac{dY}{dt}}{Y} = a\frac{\frac{dK_d}{dt}}{K_d} + b\frac{\frac{dK_f}{dt}}{K_f} + c\frac{\frac{dL}{dt}}{L}$$

We note that (2a) $\frac{dK_d}{dt} = I_d$ and (2b) $\frac{dK_f}{dt} = I_f$ where I_d and I_f represent investment from domestic and foreign sources respectively, and assume that base year K_f and K_d are some multiple of base year GNP, i.e.,

(2c) $K_d = k_d Y$ and (2d) $K_f = k_f Y$.

Substituting (2a) - (2d) into (2) and denoting $\frac{dY}{dt} = \dot{Y}$ and $\frac{dL}{dt} = \dot{L}$, we obtain:

$$(3)\quad \frac{\dot{Y}}{Y_o} = a' \frac{\sum_{o}^{t-1} I_d}{Y_o} + b' \frac{\sum_{o}^{t-1} I_f}{Y_o} + c \frac{\dot{L}}{L_o}$$

where the subscript o refers to base period values of the variables.

We first fit this equation for 39 LDCs for the decade 1960-69. All variables were expressed in constant prices; I_f was defined as the net balance on current account; I_d was obtained as a residual by subtracting I_f from total gross fixed capital formation.[1] The following results were obtained:

$$(4)\quad Y = \underset{(7.81)}{.25\, K_d} + \underset{(3.35)}{.20\, K_f} + \underset{(2.44)}{.66\, L}$$

$$\bar{R}^2 = .53 \qquad n = 39$$

where $Y = \frac{\dot{Y}}{Y_o}$ $K_d = \frac{\sum_{o}^{t-1} I_d}{Y_o}$ $K_f = \frac{\sum_{o}^{t-1} I_f}{Y_o}$ $L = \frac{\dot{L}}{L_o}$ and $\bar{R}^2$ is the coefficient of determination adjusted for degrees of freedom.[2]

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[1]The common assumption that net foreign capital inflow as determined by the current account balance represents savings which are assumed to be fully additional to domestic savings has been questioned [1]. On this account it would appear that our estimate of the portion of capital formation attributed to domestic resources is subject to a downward bias. On the other hand, in order to obtain capital formation attributable to domestic sources, gross fixed capital formation was converted into dollars for the purpose of comparability with the dollar current account balance. In cases of currency overvaluation, this procedure would tend to impart an offsetting upward bias to the portion of total capital formation financed from domestic sources [14].

[2]The numbers in parentheses are t values. All t estimates of the regression coefficients or F ratios are statistically significant at the .01 level of confidence unless noted by an asterisk.

It can be easily observed that (4) yields a good fit with the regression coefficients for capital accumulation and growth of the labor force statistically significant. Capital accumulation financed from both domestic and external sources, as well as changes in the labor force, as can be expected, explain a good deal of the variations in GNP growth among countries.[1] This is hardly a novel finding. With the exception of introducing labor in the analysis, similar estimates and results have been obtained before [17, 19]. The interesting question is whether part of the unexplained variation is related to LDC export growth.[2]

The traditional interpretation of the residual in simple production functions such as (4), estimated over time, is that the unexplained variation results in large part from technological change or other factors which affect the quality and hence productivity of primary inputs but are not included in an estimation based on quantitative measurement of changes in the volume of inputs. In the context of the cross-country model used here, the residual would result from differential productivity

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[1]Note that the sum of the coefficients in (4) does not appear statistically different from unity. However, this result should be considered with care insofar as the coefficients for K_d and K_f must be adjusted by k_d and k_f in order to obtain a and b. For example, if $k_f = 2$, then (1) would be subject to increasing returns. Also, an effort to adjust L in order to take into account changes in skill resulting from increased participation in the educational system yielded non-significant statistical estimates.

[2]This is a different question from that investigated by Papanek [19], who concludes that "growth is not correlated with exports." His analysis relates the ratio of exports to GNP in the original period to GNP growth. As such, the export variable is a measure perhaps of the openness of the economy or its dependence on trade. Instead, our investigation is concerned more with the dynamic relationship resulting from the interaction of export growth with GNP growth.

growth which is not accounted for in the simple estimates of changes in the volume of primary inputs used.[1] Thus we can simply hypothesize that, ceteris paribus, productivity growth would be greater, the faster the growth of the export sector and hence the rate at which overall efficiency in resource utilization is increasing over time through participation in international trade. As a preliminary test of this hypothesis, we related export growth (X) to the residuals from equation (4),

$$(5)\quad Y_{res} = \underset{(-2.73)}{-.07} + \underset{(4.93)}{.04X} \qquad \bar{R}^2 = .36, \quad n = 39$$

where Y_{res} is the difference between the actual values of Y and the values estimated from (4).

In light of the positive and statistically significant relationship between Y_{res} and export growth, we reestimated equation (4) to include export growth as a separate variable and obtained the following results:

$$(6)\quad Y = \underset{(9.62)}{.24\,K_d} + \underset{(2.33)}{.12\,K_f} + \underset{(2.81)}{.60\,L} + \underset{(4.82)}{.04X}$$

$$\bar{R}^2 = .71 \qquad n = 39$$

As in the earlier specification, the overall fit is good.[2] But most important, as could be expected from the results in (5), the

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[1]The shortcomings of this interpretation are well known. Jorgenson and Griliches, e.g., argue in [8], that if qualitative changes in inputs are measured properly, little residual productivity growth is observed. However, no alternative specifications which would account for such differences are readily available.

[2]The sum of the coefficients is not substantially different from (4), with the biggest change occurring in K_f. The simple correlation coefficient between GNP growth and export growth was .53.

regression coefficient for exports, though small, was statistically significant and the overall fit improved substantially as the $\bar{R}^2$ increased from .53 to .71. Equation (6) is clearly not a production function. The role of exports must be sought in the variety of factors normally left unexplained by simple aggregative production functions, and resulting in productivity increases.

Before proceeding to discuss this equation, however, we decided to explore further the possibility that the export-GNP relationship results simply from the fact that they are both dependent on growth of primary inputs, as some have suggested [11]. For this purpose we regressed export growth on the other primary inputs. The results are shown in equation (7):

$$(7)\quad X = \underset{(.37)^*}{.18\ K_d} + \underset{(2.21)}{1.98\ K_f} + \underset{(.35)^*}{1.42\ L} \qquad \bar{R}^2 = .07,\ n = 39$$

The results strongly indicate that export growth is not dependent on the growth of primary inputs. There is a weak positive relationship with net foreign capital inflow. However, this relationship suggests, if anything, that the pattern of distribution of aid and private capital flows has tended to favor countries with strong export performance.[1] On the other hand, growth in domestic inputs is apparently not correlated with export growth.

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[1] There may be a very good reason for such a relationship: Private capital flows might well be strongly attracted to countries with fast-growing exports, as such countries might appear to offer good prospects for repayment or profit repatriation. Alternatively, foreign private direct investment itself may be instrumental in expanding exports. A test of the latter hypothesis showed only a weak and not statistically significant positive relationship between export growth and the sum of private direct investment flows in 1960-69 deflated by base year GNP.

In light of these findings we are inclined to reject the hypothesis that export growth is a handmaiden to GNP growth in which both are dependent on growth of primary inputs. Export growth does contribute substantially to explaining GNP growth, over and above the contribution of primary inputs.[1]

III. Some Alternative Hypotheses

A. Savings

The model specified in Section II allows us to investigate some of the hypotheses relating exports to GNP growth. In particular, Maizels [16] and Lee [12] have shown in the context of time series analysis that the domestic savings rate is positively correlated to export growth for a number of developing countries. Papanek [19], using cross-country analysis, finds a relationship between the export rate and the domestic savings rate. In fact, he attributes his finding of no relationship between GNP growth and the export rate to multicollinearity between the export and savings rates.

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[1] It could be argued that if exports account for a large portion of GNP, the relationship identified is no more than a correlation between a variable and part of itself. To account for this eventuality, it would be appropriate to correlate exports with GNP after adjusting for the value added in GNP accounted by the export sector. The problem, of course, is that exports are measured in gross value terms while GNP is measured in value added or at factor cost, and no easy adjustment is available. We do not believe in general this to be a significant problem since exports, even in gross value terms, account on the average for only 15 per cent of GNP for the countries examined. Under most reasonable assumptions about the ratio of value added to gross output in the export sector, it would seem that exports amount to no more than 10 per cent of GNP on the average.

To demonstrate a separate and independent relationship of exports to savings, it is necessary to argue that the export sector in developing countries has a marginal propensity to save which is higher than other sectors. If that were the case, a more rapid export growth, ceteris paribus, would raise the rate of savings and hence the rate of capital accumulation and GNP. Our results do not support this hypothesis. Another way of viewing K_d is as the rate of domestic savings over time. But as equations (6) and (7) show, K_d appears to be independent of export growth. Papanek's finding of a relationship between the export and savings rates may be explained by the fact that a higher export-GNP ratio is an indication of a relatively more open economy. Such an economy may be expected to use its resources more efficiently and conceivably attain a higher savings rate. Thus, while it may be valid to suppose that the export rate affects the savings rate and through it GNP growth, in the context of our analysis it is clear that the effect of export growth is distinct and separate from the effects of domestic savings.

B. The Foreign Exchange Constraint Hypothesis

It is possible that the relationship between export growth and the residual of the production function (5) results from the operation of a foreign exchange constraint on the growth of developing countries. It is well known that in the context of the two-gap model, the higher the export growth rate, ceteris paribus, the less likely that a country's growth will be inhibited by foreign exchange availability. A high growth rate of exports raises the availability of foreign exchange and a

developing country is able to procure the imports "needed" to attain a certain rate of domestic investment.[1] One might hypothesize that this effect would not be captured by the production function and would be one of the factors related to the unexplained residual.

Serious problems arise in testing this effect empirically. In the first place, the foreign exchange constraint is an ex ante planning concept, rather than one which can be tested by looking at LDC experience ex post. Secondly, using the foreign exchange constraint model, the role of exports can best be investigated in the context of a single country over time, rather than using a cross-country analysis. Obviously, not all countries were subject to a foreign exchange constraint during the period considered. A case can be made that a test for the presence of this particular relationship between exports and GNP growth should be limited to a sample of those countries in which GNP growth was subject to a foreign exchange constraint. On the other hand, it may be argued that a high export growth rate may be the very reason which has allowed countries to escape from potential bottlenecks resulting from lack of foreign exchange and that the whole sample should be included in the investigation. We have decided on the latter approach, which also has the additional advantage of not requiring us to judge which countries were subject to a foreign exchange constraint and which were not.

To get at the foreign exchange constraint hypothesis by using a cross-country model, one must focus on the effect of import growth on

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[1]There are considerable problems with the assumptions of this model. For a discussion see [9, 18].

GNP. But it is necessary to go beyond the simple statistical relationship between GNP and import growth. E.G., introducing import growth in equation (4) would not be meaningful, because the relationship depicted may simply reflect the fact that imports are a function of GNP through the traditional income relationship just as much as GNP may be a function of imports as postulated under the foreign exchange constraint hypothesis.

Thus, we must attempt to isolate the effect of the growth of imports over and above the expected growth that would result from the growth in GNP. To do this, we employed the estimates of "expected" import to GNP ratio (M) calculated by the IBRD [4] on the basis of a sample of 101 countries for the period 1950-1970 and related it to the actual imports to GNP ratio for each country at the beginning and end of the period. One could hypothesize consistently with the growth constraint model that the difference in the ratio $M/\hat{M}$ (1969) and $M/\hat{M}$ (1960), M_d, would be positively related to the rate of GNP growth attained in the 1960-1969 period. A positive relationship between M_d and the residuals of the equation estimating GNP would be open to two interpretations not necessarily mutually inconsistent: (a) A low value for M_d may reflect relative foreign exchange stringency and conversely. If export growth were correlated to M_d, then it could be argued that the effect of exports on GNP is through the provision of foreign exchange with which to obtain imports. (b) A positive relationship of M_d to the residuals of (4) may simply reflect the fact that LDCs which over the period progressively opened up their economies more relative to other LDCs were able to reap the benefits of specialization and avoid the inefficiencies associated with inward-looking industrialization. This interpretation would be

in keeping with the neoclassical view of the role of exports and trade in general.

It is not entirely satisfactory to have a test whose results cannot be interpreted unambiguously. Unfortunately, no other alternatives seem readily available.

We first correlated the residual estimated from (4) with both M_d and X. The results, shown in equation (8),

$$(8)\quad Y_{res} = \underset{}{.08} + \underset{(-3.10)}{.03\,X} + \underset{(3.84)}{.10\,M_d} \qquad \underset{(1.77)^*}{}$$

$$\bar{R}^2 = .41 \qquad n = 39$$

suggest that M_d is positively correlated with the residual although the statistical significance of the relationship is rather weak. The import coefficient is significant only at about 5% with a two-tail test. But the relationship holds in the presence of the export growth variable and in spite of a substantial correlation between M_d and X ($r_{M_d X} = .42$). If the first interpretation above is valid, these results suggest that perhaps export growth may play a role over and above that identified in the neoclassical model, through the provision of foreign exchange with which to import needed inputs. On the other hand, it could be argued that a rapid export growth makes it possible for LDCs to avoid limiting import growth and thus not incur the costs in terms of inefficiencies resulting from import restrictions.

Introducing M_d into (4) yields the following results:

$$(9)\quad Y = \underset{(8.12)}{.24\,K_d} + \underset{(3.40)}{.19\,K_f} + \underset{(2.50)}{.62\,L} + \underset{(2.91)}{.19\,M_d}$$

$$\bar{R}^2 = .61 \qquad n = 39$$

The coefficient for M_d is, as expected, significant, and the $\bar{R}^2$ increases considerably by comparison to (4). However, if both M_d and X are introduced into (4), the significance of M_d falls off considerably while that of X is unaffected and the $\bar{R}^2$ increases marginally over (6).

$$(10)\quad Y = \underset{(9.55)}{.24\ K_d} + \underset{(2.47)}{.12\ K_f} + \underset{(2.80)}{.59\ L} + \underset{(3.83)}{.03\ X} \quad \underset{(1.52)^*}{.09\ M_d}$$

$$\bar{R}^2 = .72 \qquad n = 39$$

These results appear to us to be suggestive of a possible link between foreign exchange availability and more than normal import growth, and between the latter and GNP growth. This relationship might simply reflect the fact that countries experiencing good export growth rates avoided the pitfalls of arresting their import growth; alternatively, that export growth was crucial to GNP growth because it enabled LDCs to import "needed" inputs. Thus, we cannot rule out the possibility that in some countries the role of export growth may be the one postulated in two-gap models.

IV. Factors Affecting Export Performance

Our analysis so far seems to support strongly the neoclassical hypothesis. Yet we have not addressed ourselves specifically to the important criticism of the hypothesis concerning the deleterious effects of stagnant demand for LDC exports. It is this question that rests at the heart of the "export pessimism" argument so popular in many LDCs until recently. In order to deal with this question, we must investigate the factors responsible for differential LDC export performance, and specifically how important external demand factors have been in determining

this performance. In answering this question we also hope to bring out additional information bearing on the nature of the relationship between export and GNP growth.

A. External Demand

To determine the effect of external demand conditions on LDC export growth in the 1960s, the following approach was used. First, we estimated the rate of growth of world trade (based on import estimates) for 26 commodity categories from 1960 to 1969. These growth rates were used as proxies for changes in world demand for these commodities.[1]

We then applied the growth rates in world trade for each commodity to the commodity composition of each LDC's exports, in the base year 1960. The resulting growth rate D is what each LDC's growth of exports would have been if its commodity exports in the base year had grown at the same rate as world trade in those commodities, and, in addition, the commodity composition of its trade remained unchanged. More precisely:

$$(11) \quad D = \sum_{i=1}^{26} (X_i/X)\, W_{xi}$$

[1] We are disregarding here differences in the growth of demand for the same commodity in different markets. Thus, if an LDC is exporting commodity i to market j, and world trade in i is expanding rapidly but imports into j for a variety of reasons are not, ceteris paribus, the LDC in our analysis would fare well on the demand side. This approach neglects to take into account the obvious costs in shifting to new markets, overcoming perhaps large transport costs, etc. However, it is not possible to obtain data for a large LDC sample both by disaggregated commodity classification and country of destination. Thus the effects of differential demand shifts in the same commodities but for different countries of destination were ignored, or, more precisely, incorporated in the non-demand component of export growth.

where i designates commodity categories. $(X_i/X)_{60}$ is the ratio of the category of exports to total exports in 1960, W_{xi} is the total growth of world trade (imports) in the i category relative to the base year ($W_{xi} = \frac{X_{wi}{}_{1969}}{X_{wi}{}_{1960}}$) and X_{wi} stands for world exports of category i.[1]

B. Other Factors

Subtracting D from the actual growth rate of each LDC's exports, we obtain an estimate, C, of the growth rate of LDC exports attributable to factors other than aggregate world demand. Thus, if X is the growth rate of exports, and D is the portion of that growth attributed to growth in world demand, we have the following identity:

(12) $X \equiv D + C$

There are two main determinants of C. First, C depends on whether the share of each LDC in the total world trade of its base year commodity exports increased or decreased. Second, C depends on the extent to which each LDC introduced new commodities in its exports. The larger the value of commodities introduced as exports since 1960, the larger the C, and vice versa.

What then are the factors responsible for the divergent performance of LDCs both with respect to demand and other factors? It is important to recall that (12) is an identity and in order to get at the factors affecting export expansion besides external aggregate demand, one must analyze what it is that affects the residual C.

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[1]Twenty-six commodity categories were used employing SITC 2- and 3-digit classifications.

An increased share of world exports is primarily an indication of increased competitiveness of the LDC; to a smaller degree it reflects differences in the import growth of different geographical regions which are not offset by LDCs through shifts in the geographical distribution of their export trade.[1] Competitiveness in turn presumably depends on increases in productivity, good management, and absence of impediments to exports, in addition to active marketing policies.[2] Similarly, countries with a good performance in this respect presumably would be better able to respond to demand shifts in their traditional geographical markets which are at variance with world trends in these products, and hence take advantage of expanding markets or shift away from stagnating ones.

Ability to break into markets for new products can be similarly thought to be determined by competitiveness. Such factors as rising productivity, maintenance of appropriate exchange rates, marketing of new products, etc., are just as important in increasing the share of established commodity exports as in promoting the expansion of old ones. In sum. the value of residual factor C can be considered indicative of the relative LDC export competitiveness.[3]

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[1]See footnote, page 15.

[2]By this we mean all the various policies, such as quality control, marketing, advertising, etc., that make it possible to market a commodity abroad.

[3]In previous interpretations of the factors affecting the competitiveness variable, emphasis has been placed on increased supply of exportables. Such an explanation does not appear to us to reflect the situation in developing countries adequately. Supply of potential exportables has increased in a large number of developing countries; however, the supply has not been translated into actual exports, in large part because of the biases against exporting introduced by the developing countries, particularly through trade and trade-related policies.

Looking at Table 1, we note that 16 of the 39 LDCs had negative values for C; in other words, the growth in world demand for their product was more than their actual growth of exports. In one instance (Sri Lanka) the competitiveness factor far exceeded, on the negative side, the rate of growth in demand for their commodities. On the other hand, the LDCs with the highest aggregate export growth, such as Korea, Taiwan, Panama, and Greece, exhibited large and positive competitive factors.

Had all the LDCs in the sample maintained their structure of exports in 1960 and had their exports grown at the 1960-1969 world rates, exports from LDCs in the sample would have been $1 billion more or 3.7% greater than actual exports in 1969. Their aggregate export growth rate would have been 6.18% per annum compared to an actual rate of 5.7%.

These results can be extended to all the 39 countries. Aggregate export growth is highly correlated to the competitiveness factor (13a) and almost totally unrelated to growth in external demand (13b).

(13a) $R_{XC} = .99$ $\quad F = 1822.4$ $\quad (1, 37)$

(13b) $R_{XD} = .13$ $\quad F = .636$ $\quad (1, 37)$

In light of the very high correlation between X and C in (13a), C would do just as well as X if inserted in equation (6). These findings suggest strongly that variations in export growth are not related to demand considerations as postulated by early "engine of growth" theories and more recent export pessimists but on the ability of LDCs to survive and respond to a competitive international environment.[1]

[1]Similar results were obtained by Kravis [10].

In the next step of our investigation we explored the factors that may be thought to lie behind the competitiveness variable: Recent analysis has suggested that perhaps the two factors most inhibiting LDC competitiveness have been (a) the adoption of a restrictive trade policy, and (b) overvalued exchange rates. The two combined are supposed to have created serious biases and disincentives towards export expansion [15].

It is difficult to devise an empirically testable variable that would fully reflect these considerations. One estimate might be provided by the degree of bias against exports as calculated through an effective rate of protection approach. However, such estimates have been made for only a few LDCs and not for comparable periods [2]. Consequently, we used as a proxy the change in the ratio of manufacturing exports to manufacturing output (B).[1] How open or restrictive a trade regime is may best be determined by examining the export performance of the manufacturing sector. Thus, a high value for this variable (B) would suggest a successful manufacturing exporter which in turn would imply, at least in part, a low bias against exports.

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[1]This openness variable differs from that used by other authors who used either total exports to GNP [19] or the change in the ratio of total exports to GNP. The change in the ratio of manufactured exports to manufacturing output was used as a measure of openness in this paper because it was believed that this variable reflected the shift in the country's ability to move into the export sector over and above that which would occur because of the increase in output over time. It was also felt that changes in the manufacturing sector would more clearly indicate changes resulting from policy decisions rather than external demand shifts. One disadvantage of this variable should be noted: A country starting with an open trade regime which could not liberalize further would rank low on this scale. E.g., Malaysia and Mexico rank unduly low on this scale. However, there are few countries where this ranking yields results inconsistent with other indicators.

The second variable we used was the degree of commodity concentration of exports in each country at the beginning of the period (Con). It could be argued that the higher the base year concentration, the lower the likelihood that an LDC would be able to expand into new activities. A less concentrated pattern in the beginning of the period may be evidence that an LDC has overcome the initial problems of breaking into a foreign market. On the other hand, LDCs which were dependent on a few commodity exports in the beginning of the period might well have made stronger efforts to diversify production, and hence that C would be inversely related to an index of base year concentration.[1]

The results of this analysis are shown in equation (15):

$$(15)\quad C = \underset{(11.71)}{2.08} + \underset{(3.74)}{.21\,B} - \underset{(-1.92)}{4.47\,Con}$$

$$\bar{R}^2 = .30 \qquad n = 38$$

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[1] The Hirschman index for 1962 estimated by UNCTAD was used to obtain relative commodity concentration of LDC exports. The values vary from 0 to 1 (maximum concentration) as follows:

$$(14)\quad Con = \frac{m}{m-100} - \frac{100}{m-100}\sqrt{\sum_{i=1}^{n}(x_i/X)^2} \quad \text{where}$$

n = number of commodities;

m = minimum value of Hirschman index ($100/\sqrt{n}$);

x_i = value of export commodity i defined at the 3-digit SITC level;

$$X = \sum_{i=1}^{n} x_i$$

As can be seen, although the $\bar{R}^2$ is only .30, the coefficients for both independent variables are statistically significant. The coefficient for the variable testing the degree of openness of the trade regime (B) is of the hypothesized sign; with respect to concentration, the negative coefficient suggests simply that countries dependent on relatively few commodities did not do as well as others in increasing their share of the commodity categories in which their exports were concentrated and/or in expanding their exports of new commodities. One can only speculate as to whether this is because they did not try as hard or simply because they were operating under more serious handicaps in breaking into new export markets.[1]

We believe that these findings help us clarify the role of exports in economic growth. It is clear that good export performance is not related to rapidly rising demand for traditional commodities. The "engine of growth" has not worked in the traditional way; but it has worked nevertheless. It has worked successfully for those countries which have maintained a competitive edge and broken into new commodity

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[1]Whichard [20] undertook an essentially similar analysis to ours for 1959-1966. His results are basically consistent with our findings. His model points to changes in the export structure as the most important determinants of export performance. He obtains equally unsatisfactory results as far as demand effects are concerned. On the other hand, his findings that increased commodity concentration is positively correlated to export growth are theoretically difficult to reconcile with the weak demand effects operating on primary commodities. He also correlates a competitiveness residual with various independent variables. The competitiveness variable is closely correlated with the same variables as export growth. This confirms our findings that competitiveness and export growth are correlated, although Witchard does not extend his analysis in this direction.

markets. The picture that emerges is that countries do well in expanding exports if they maintain an open economy and seek to diversify their export structure rather than rely on rising demand for traditional commodity exports. Countries with such characteristics also exhibit rapid growth in output. The crucial link appears to be productivity growth. This growth in turn is likely to be higher in open economies, not sheltered through trade controls, which take advantage of the gains from specialization through trade.

V. Conclusion

The preceding empirical investigation of the relationship between income growth and export growth was undertaken in the hope of gaining some insight into the relationship and the relative merits of the alternative hypotheses which are used to explain the income-export relationship in developing countries. The results are broadly consistent with and supportive of the neoclassical model with its emphasis on increased efficiency resulting from specialization through trade. The specific findings can be summarized as follows:

(1) The growth rate of GNP and the growth rate of exports are highly correlated with each other. Export growth rates explain a significant portion of the variance in income growth rates which remained unexplained by the growth in primary inputs. This empirical relationship is of basic importance to our findings.

(2) The divergent export performance of less developed countries had almost no relationship to differences in the international demand conditions for their commodities; rather export performance was

primarily determined by LDCs' own policy, particularly with respect to export diversification and the openness of their economy.

(3) The competitive factor of export growth is positively and significantly related to the degree of openness of the economy but negatively related to the original degree of export concentration. These results are consistent with the argument that export performance is strongly dependent on the developing countries' internal policies and capacity to adjust to external situations.

(4) A positive relationship between export growth and the savings rate could not be supported from the empirical analysis undertaken. On the other hand, there is some weak evidence in support of the role of exports in enabling LDCs to avoid a foreign exchange constraint on growth. Though this effect may well be important in some individual cases, it is difficult to generalize that it was of importance in the sample of LDCs examined as a whole.

These conclusions, based on the experience of the 1960s, are supportive of the argument that less developed countries can promote the attainment of their economic development objectives by policies which encourage exports, particularly through the diversification of their export structure. The specific policy instruments are well known: elimination of disincentives to manufactures exports, maintenance of realistic exchange rates, and measures increasing the mobility of resources away from the traditional primary sources where external demand may be stagnant. It is, of course, possible that had all LDCs in the past adopted such policies, or should they do so in the future, they would have encountered or may encounter significant resistance on the part of the DCs in the form of increased

trade controls in the sectors where LDC expansion was the fastest. While this possibility cannot be excluded, quite obviously the expansion of the exports of high-export-growth LDCs in the past decade has occurred despite protectionist tendencies in the DCs. Whether such reaction would be a significant constraint on aggregate LDC export expansion in the future only time can tell.

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Table 1

Growth in Factors of Production and External Characteristics

	Y	L	K_d	K_f	X	D	C	Openness	Concentration	M_d
Argentina	.3668	.1049	2.304	.023	.494	.553	-.059	3.259	.236	-.004
Bolivia	.5807	.2119	.986	.723	2.585	.773	1.812	.389	.795	.256
Brazil	.5866	.2595	1.644	.135	.821	.481	.340	3.768	.513	.068
Ceylon	.5227	.1964	1.461	.397	-.167	-.053	-.114	.935	.650	-.378
Chile	.4536	.0456	1.522	.359	1.191	1.207	-.016	1.557	.654	.172
Colombia	.5418	.2470	2.043	.374	.290	.474	-.184	6.849	.713	-.115
Costa Rica	.7033	.2744	1.761	.888	1.257	.551	.706	35.409	.589	.126
Cyprus	.7746	.1277	2.328	.553	.782	.681	.101	5.679	.397	128
Dominican Republic	.3604	.3934	1.177	.441	.055	.371	-.316	.085	.567	.213
Ecuador	.5124	.2672	1.132	.379	.265	.626	-.361	-.271	.621	.089
El Salvador	.6815	.2956	1.303	.448	.730	.378	.352	4.074	.608	.057
Ethiopia	.5179	.1576	1.328	.255	.627	.499	.128	1.596	.549	.091
Ghana	.2242	.2376	1.167	.519	.191	1.030	-.839	na	.696	.013
Greece	.9118	.0406	2.206	.868	1.724	.550	1.174	9.311	.322	.093
Guatemala	.5622	.3771	1.247	.340	1.247	.401	.846	8.430	.610	.084
Honduras	.5954	.3263	1.400	.401	1.650	.506	1.144	9.431	.484	.278
India	.3874	.1714	1.416	.283	.370	.753	-.383	1.265	.232	-.729
Indonesia	.3043	.2053	.681	.222	.129	.472	-.343	.820	.494	.891
Iran	.9719	.1449	2.511	.243	1.485	.910	.575	-.012	.660	.310
Israel	1.1340	.3647	1.261	2.413	2.342	.968	1.374	2.936	.339	.151
Jamaica	.5050	.0477	2.098	.853	.822	.562	.260	1.777	.521	.201
Korea	1.2171	.2406	1.272	1.176	17.979	.900	17.079	22.741	.237	.930
Malaysia	.7547	.2914	2.597	-0.349	.378	.462	-.084	.616	.550	-.594
Mexico	.8483	.2751	2.402	.258	.870	1.757	-.887	.740	.235	-.041
Morrocco	.4316	.2148	1.112	.334	.372	.702	-.330	.651	.318	-.050
Nicaragua	.7756	.3065	1.529	.737	1.764	.228	1.536	3.526	.449	.196
Pakistan	.6510	.1830	1.342	.545	.729	.477	.252	2.132	.411	.039
Panama	1.0022	.2636	2.018	.616	3.348	.622	2.726	18.350	.532	1.849
Paraguay	.4755	.3004	1.150	.538	.919	.932	-.013	-.090	.318	.153
Peru	.5066	.2543	1.647	.275	1.008	.586	.422	.881	.293	.017
Philippines	.6649	.2819	2.124	.239	.525	.413	.112	2.648	.342	.200
Taiwan	1.3257	.3298	2.437	.375	5.395	.484	4.911	6.647	.218	.481
Thailand	1.0083	.2602	2.433	.296	.721	.366	.355	3.669	.399	.312
Tunisia	.4000	.1402	1.384	1.322	.397	.626	-.229	.624	.310	-.047
Turkey	.6339	.1631	1.856	.305	.674	.518	.156	1.339	.317	.041
Uganda	.7395	.2146	1.812	-0.081	1.029	.264	.765	.715	.582	.039
Uruguay	.0658	.0582	1.180	.038	.548	.309	.239	.603	.445	.004
Venezuela	.6961	.2923	1.662	-.440	.119	.948	-.829	.618	.705	.448
Zambia	.9822	.1551	3.757	-0.523	.458	1.356	-.898	2.200	.911	.819

Notes:

Y, L, and X are ratios of the changes of output, labor force, and exports, respectively, over the period 1960-69 over the base year (1960) values. For definitions of K_d, K_f, D, C, Concentration, and M_d, see text.
Openness = $\dot{x}^m / \dot{m}$ where $\dot{x}^m$ is the growth rate of manufactured exports and $\dot{m}$ is the growth rate of manufacturing output.

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