EXPORTS AND ECONOMIC GROWTH FOR THE 1960'S AND THE 1970'S

by

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Chapter 1

INTRODUCTION

There have been many studies of the relationship between economic growth and export growth. The hypothesis which has been tested by many economists is that a rapid growth of exports will accelerate economic growth. The logical grounds supporting this hypothesis can easily be seen by investigating the reasons for exporting.

Why do countries export? Basically, because it is profitable to do so. Trade between countries, like trade between individuals, business firms and regions in the same country, results because both buyer and seller can gain from it. If both parties do not expect to gain, there will be no trade. The law of comparative advantage explains that mutual gains arise from specialization and exchange. Each trading partner gains by specializing in the production of goods which he can produce at the lowest opportunity costs while trading for those goods which he can produce at the highest opportunity costs. This specialization minimizes the cost of production and leads to a maximum joint output between trading partners. The principle works in exactly the same way for trade between countries. We know that the resource base of countries varies. A country may lack some vital resources that it can get only by trading with others. Also, a country's climate,

labor force, and other endowments may make it a relatively efficient (low opportunity cost) producer of some goods and a relatively inefficient (high opportunity cost) producer of other goods. As long as the difference in relative efficiency exceeds transportation and other transaction costs, trade will lead to mutual gain because it enables producers in each country to specialize in the production of those goods that they can do the best. Also, it will maximize the global output and enable countries to consume a combination of goods that lies outside the production frontier. This leads to the suggestion that export growth can serve to relax some major constraints on a country's economic growth. More specifically, increasing exports may relax the constraint of imported capital goods to economic growth by increasing the country's ability to import capital goods. Export development also helps to relax constraints that limit the utilization of all resources. Exports tend to stimulate more efficient use of resources, to encourage low cost production, to concentrate investment according to its competitive advantage, and to make economies of scale possible because of market expansion. These elements tend to increase the country's productivity. Furthermore, growing exports encourage the flow of technology, market innovation, and managerial skills which are crucial to economic growth. Finally, exports can indirectly stimulate an increase in consumption, and attract more domestic and foreign investment. All these factors tend to reinforce each other and contribute an increasing rate of growth in real gross national products.

Chapter 2

RECENT TESTS OF THE HYPOTHESIS

A) Spearman Rank Correlation Tests

There are many published tests of the hypothesis that a rapid growth of exports accelerates economic growth. Those tests can be divided into two types.

i) A bivariate relationship between GNP (or GDP) and exports is examined by a Spearman rank correlation coefficient. It is focused on measuring the strength of the relationship of these two variables. This section discusses these tests.

ii) The relationship between the rates of growth of GNP (or GDP) and exports is tested by regression. It is focused on using econometric models to measure and quantify the relationship between these two variables. The next section discusses these tests.

Before examining some of the recent works, three problems which arise in the testing of this hypothesis should be noted. First, since exports are themselves a component of the national product, it is suggested that there is a positive correlation of exports and GNP (or GDP), whatever their true relationship to each other. In order to solve this problem, various economists have suggested different adjustments to the variables for export performance. Second, in the selection of countries to be included in the samples, differences in size and homogeneity of sample may lead to different results. And third, economists often encounter either lack of data or poor data.

For example, different sources give different values of data, even though their definitions and derivation of data are presumably the same. It raises the question of how accurate the data are.

We now summarize several recent published studies which examined the relation of export performance and economic growth by means by Spearman rank correlation coefficient. Studies by Michaely, Heller-Porter, Balassa and Tyler are summarized.[1]

Because exports are bound to be positively related to GNP, Michaely measured export performance by the rate of change of the proportion of exports in the national product (the mean of the annual change of Export/GNP). The rate of growth of the economy is represented by the rate of change of per capita GNP (the mean of the annual change of per capita GNP). Using a sample of some 41 developing countries over the period 1950-1973, Michaely found a positive relationship between these two variables. The Spearman rank correlation coefficient was 0.38 and significant at the 1 percent level. The correlation was particularly strong for the more

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[1] Michael Michaely, "Exports and Growth: An Empirical Investigation," Journal of Development Economics, 1977, 4, pp. 49-53 .

Peter S. Heller and Richard C. Porter, "Exports and Growth: An Empirical Re-investigation," Journal of Development Economics, 1977, 5, pp. 191-193 .

Bela Balassa, "Exports and Economic Growth: Further Evidence," Journal of Development Economics, 1978, 5, pp. 181-189 .

William G. Tyler, "Growth and Export Expansion in Developing Countries: Some Empirical Evidence," Journal of Development Economics, 1980, 9, pp. 121-130 .

developed countries (countries with income per capita above $300 show a coefficient of 0.523), and practically zero for the least developed countries (countries with income per capita less than $300). Michaely concluded that "growth is affected by export performance only once countries achieve some minimum level of development."[2]

In a criticism of Michaely, Heller and Porter pointed out that Michaely's criticism about correlation between GNP and exports applies also to his own test. They argued that "any change in the growth rate of the export share of output will change the output growth rate in the same direction even if it causes no change at all in the growth rate of other components of output."[3] They suggested that the correct correlation is between the rate of growth of exports and the rate of growth of nonexport components of output. Using Michaely's data, they found a relatively high Spearman rank correlation coefficient (0.452) between the rate of growth of exports and the rate of growth of nonexport components of output. Furthermore, they supported Michaely's finding that "a minimum threshold of development is needed before export growth and economic growth are associated."[4]

A similar study by Balassa found a significant positive relationship between economic growth and export expansion. Balassa's sample included eleven countries, all of which had established an industrial base; the period of investigation chosen was 1960-1973. He also used the Spearman rank correlation analysis to examine the relationships between total exports and GNP, manufactured exports and GNP, and also manufactured

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[2]Michaely, p.52 .

[3]Hellner & Porter, p.192 .

[4]Hellner & Porter, p.192 .

output and GNP. Balassa found a significant relationship between exports and GNP growth; his results showed a rank correlation coefficient (0.703), higher than Michaely's. This is possibly due to the greater homogeneity of Balassa's samples.

Finally, Tyler wanted to determine if the results of Balassa's statistical analysis would hold for a wider, less restrictive, sample of developing countries. He omitted the poorest countries in his analysis because he believed that "some basic level of development is necessary for a country to most benefit from export oriented growth, particularly involving manufactured exports."[5] With this rationale, Tyler included all countries defined by the World Bank as middle income countries in 1977 in his sample; the period analyzed was 1960-1977. Using the Spearman rank correlation method, he examined the relationships between the rate of growth of GDP and the rate of growth of other economic variables such as manufacturing output, gross domestic investment, total exports, manufactured export earnings, foreign private investment, and change in the net barter terms of trade. Tyler reported that there existed positive, significant relationship between GDP growth and the growth of all those variables, especially manufactured exports. In fact, Tyler said, "Those countries enjoying the fastest rates of economic growth also have witnessed the fastest rates of growth for manufacturing exports."[6] A summary of all the above studies is shown in Table 1 .

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[5]Tyler, p.124 .

[6]Tyler, p.126 .

Table 1
SUMMARY OF PREVIOUS
STUDIES ON RELATIONSHIP BETWEEN
EXPORT PERFORMANCE AND ECONOMIC GROWTH
BY SPEARMAN RANK CORRELATION ANALYSIS

STUDY	SAMPLE	PERIOD OF INVESTIGATION	VARIABLES	CORRELATION COEFFICIENT
M. Michaely	41 developing countries	1950 to 1973	The mean of annual change of export/GNP and the mean of annual change of per capita GNP	0.380 (0.001)
Peter Heller & Richard Porter	(Michaely's sample)	1950 to 1973	Rate of growth of exports per capita and the rate of growth of nonexport component GNP per capita	0.452 (0.001)
Bela Balassa	11 countries that had already established an industrial base	1960 to 1973	Rate of growth of exports and the rate of growth of GNP	0.888 (0.001)
			Rate of growth of exports and the rate of growth of GNP net of exports	0.770 (0.003)
			Incremental export-GNP ratio and the rate of growth of GNP	0.813 (0.002)
W.G. Tyler	55 middle income countries defined by the World Development Report 1979	1960 to 1977	Rate of growth of gross domestic investment and the rate of growth of GDP	0.640 (0.001)
			Rate of growth of exports and the rate of growth of GDP	0.470 (0.001)
			Rate of growth of manufactured exports and the rate of growth of GDP	0.430 (0.002)
			Rate of growth of manufactured output and the rate of growth of GDP	0.730 (0.001)

Table 1 - Continued

STUDY	SAMPLE	PERIOD OF INVESTIGATION	VARIABLES	CORRELATION COEFFICIENT
W.G. Tyler	49 Non-OPEC middle income countries defined by the World Development Report 1979	1960 to 1977.	Rate of growth of gross domestic investment and the rate of growth of GDP	0.690 (0.001)
			Rate of growth of exports and the rate of growth of GDP	0.500 (0.001)
			Rate of growth of manufactured exports and the rate of growth of GDP	0.570 (0.001)
			Rate of growth of manufactured output and the rate of growth of GDP	0.820 (0.001)

* Level of statistical significance involving a one-tailed test, is shown in parentheses beneath the correlation coefficients.

SOURCES:

Michael Michaely, "Exports and Growth : An Empirical Investigation," Journal of Development Economics, 1977, 4, p.52 .

Peter S. Heller and Richard C. Porter, "Exports and Growth: An Empirical Re-investigation," Journal of Development Economics, 1977, 5, p.192 .

Bela Balassa, "Exports and Economic Growth: Further Evidence," Journal of Development Economics, 1978, 5, p.184, Table 1 .

William G. Tyler, "Growth and Export Expansion in Developing Countries: Some Empirical Evidence," Journal of Development Economics, 1980, 9, p.125, Table 1 .

B) Regression Analysis Tests

Since the Spearman rank correlation approach can only examine the interdependency between two variables, it gives no explanation of the direction of causality and the aggregate relationship involved in the analysis. Regression analysis is used by economists to measure and quantify the relationships that exist among a set of variables. In this case, it involves seeking out those independent (exogenous) variables (such as the rate of growth of exports, gross investment, etc...) as well as the nature of the functional relationship (such as lagged, or current values, linear or exponential) that best predicts or explains the dependent variables (in this case, the rate of growth of GDP or GNP).

We now summarize the regression studies of Emery, Syron-Walsh, Massell-Pearson-Fitch, Lubitz, Severn, and Batchelor.[7]

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[7] Robert F. Emery, "The Relation of Exports and Economic Growth," Kyklos, 20(2), 1967, pp. 470-484.

Richard F. Syron and Bredan M. Walsh. "The Relation of Exports and Economic Growth: A Note," Kyklos, 21(3), 1968, pp. 541-545.

Benton F. Massell, Scott R. Pearson, and James B. Fitch, "Foreign Exchange and Economic Development: An Empirical Study of Selected Latin American Countries," The Review of Economics and Statistics, 54, 1972, pp. 208-212.

Raymond Lubitz, "Export-led Growth in Industrial Economies," Kyklos, 26(2), 1973, pp. 307-321.

Alan K. Severn, "Exports and Economic Growth: Comment," Kyklos, 21(3), 1968, pp. 546-548.

R.A. Batchelor, Industrialization and Basis for Trade, Cambridge University Press, 1980, pp.192-227.

Emery used a simple regression with the rate of growth of GNP per capita as the dependent variable and the rate of growth of exports as the independent variable for a cross-section analysis of 50 countries. The period of investigation was 1953-1963. He used the slope of the orthogonal regression estimate to support his claim that "for each 1 per cent rise in exports, GNP increases by 0.4 per cent."[8] Also Emery boldly asserted that if countries want to increase their growth rates they should adopt policies that will stimulate exports.

Before examining other econometric studies, it is important to understand the aggregate relationship involved in this kind of analysis. According to R.A. Batchelor, "Emery attempted to summarize all export-led growth arguments into a single empirical generalization of the form $g(y) = \alpha + \beta\, g(E)$,"[9] where g(y) is the rate of growth of income per head and g(E) is the rate of growth of exports. However, Batchelor pointed out, a more general formulation should be

> $g(y) = \psi\{g(E), u, v\}$ where u is a set of variables additional to export growth which might explain variations in output growth - for example, investment in our open-economy model - and v is a set of variables determining β, the impact of export growth on income growth.[10]

Syron and Walsh argued that it was necessary to split the sample into group of countries with shared (u, v) characteristics in order to achieve a more meaningful relationship. First, they

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[8] Emery, p.480 .

[9] Batchelor, p.204 .

[10] Batchelor, p.200 .

split Emery's sample into high income and low income groups. By comparing the $\bar{R}^2$ of the regression equations for the high income group and the low income group, Syron and Walsh reported that "the association of exports with economic growth is closer in the developed countries than in the less developed countries."[11] Also, by comparing the slopes of the regression equations between those two groups, they suggested that "a 1 per cent increase in exports in a developed country have a larger impact on income than the same increase in exports in a less developed country."[12] Second, the sample was split again into groups with high (more than 66%), moderate (between 33% and 66%), and low (less than 33%) shares of foodstuffs in exports. They found that $\bar{R}^2$ fell to zero and the slope was negative for those countries which had high share of foodstuffs in exports. However, for those countries which had low share of foodstuffs in exports, $\bar{R}^2$ was 0.72 and the slope took a positive sign. Syron and Walsh concluded that "the more dependent a country is upon food exports, the lower the impact of an increase in exports upon GNP."[13] As a whole, based on the result of the research, Syron and Walsh argued that

> Emery's conclusions are not acceptable without qualification. It seems essential to examine the nature of the country's exports before one may conclude that an expansion of their exports will lead to accelerated economic growth.[14]

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[11] Syron & Walsh, p.542 .

[12] Syron & Walsh, p. 542 .

[13] Syron & Walsh, p. 544 .

[14] Syron & Walsh, pp. 544-545 .

A number of economists have attempted to determine variables additional to exports which might explain the variation in output growth. Massell, Pearson and Fitch added capital inflow as an independent variable. Using a sample of eleven Latin American countries and a time-series analysis of less than twelve years, they found that not only did current exports appear to make an important contribution to GNP, but also capital inflow which was estimated to have the greatest effect on GNP. They used their results to support the claim that annual changes in foreign exchange receipts had significant short-run effects on imports, investment, and gross national product. Among those three types of foreign exchange receipt (exports, net private capital inflow, and net public capital inflow), they suggested that private capital inflows have the greatest impact on imports, investments and GNP.

Lubitz suggested that export growth would stimulate industries with significant economies of scale, and , by insuring a strong balance of payments, export growth would encourage investment. Based on his hypothesis, he added the rate of growth of manufactured exports and the investment ratio (Investment/GNP) as additional independent variables in his cross-section regression. His sample consisted of eleven developed countries and the period for analysis was 1950-1969. Lubitz found that when the rate of growth of exports and the rate of growth of manufactured exported were both in the same equation, the variable for the rate of growth of manufactured exports took a negative sign. Based on that result, Lubitz suggested that the rate of growth of manufactured exports did not add any special contribution to growth. Furthermore, based on the significance of the investment

ratio in the regression analysis, Lubitz suggested that "the positive relationship of *exports to* growth probably does not run through the effect on investment, since investment has an independent effect."[15]

Severn attempted to modify β, pointing out that this growth coefficient should depend on the share of exports in total income. He explained that in order to avoid the effect of different currency units, and size per se (due to difference in openness), the equation $GNP = \alpha + \beta(\Delta \text{Export})$ should be normalized by GNP to become $\frac{\Delta GNP}{GNP} = \alpha' + \beta \frac{\Delta Export}{GNP}$. If the rate of growth of exports, $\frac{\Delta Export}{Export}$, is used as an independent variable, one should multiply the right side of the equation by $\frac{Export}{GNP}$: $\frac{\Delta GNP}{GNP} = \alpha' + \beta \frac{\Delta Export}{Export} * \frac{Export}{GNP}$. In short, Severn argues that Emery's export variable should be modified by an openness coefficient ($\frac{Export}{GNP}$).[16]

Batchelor attempted a comprehensive study of the aggregate relationships between the rate of growth of GDP and the rate of growth of exports. He formulated the following regression equations :[17]

Equation (1) $g(y) = \alpha_0 + \beta_0 g(E)$ ---------- Emery's type equation where g(y) is the rate of growth of GDP and g(E) is the rate of growth of exports.

Equation (2) $g(y) = \alpha_0 + \beta_1 eg(E)$ ---------- Severn's type of equation, where e is export/GDP .

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[15] Lubitz, pp. 318-319 .

[16] Severn, p.548 .

[17] Batchelor, p.208 .

Equation (3) $g(y) = \alpha_0 + \alpha i + \beta_0 g(E) + \beta_2 Emg(E)$ ------- Lubitz's type of equation, where $i = \frac{\text{investment}}{\text{GDP}}$, and $Em = \frac{\text{Manufactured exports}}{\text{GDP}}$.

Equation (4) $g(y) = \alpha_0 + \alpha' f + \beta_0 g(E)$ ---------- Massell etal's type of equation, where $f = \frac{\text{capital inflow}}{\text{GDP}}$.

Equation (5) $g(y) = \alpha_0 + \alpha' f + \alpha i + \beta_0 g(E) + \beta_1 eg(E) + \beta_2 Emg(E)$ ---------- Batchelor's full model.

Using a cross section regression analysis of 116 countries for the period of 1961-1970, Batchelor reported the results as shown in Table 2 . His full model (equation #5) explained about two-thirds of the observed variations in growth rates across countries in the 1960s. Both eg(E) and Emg(E), the modifiers to export growth, performed poorly. The former had a small coefficient (β_1)of the wrong sign and the latter had an insignificant, small, positive coefficient (β_2). Batchelor's full model suggested that 1 per cent per annum increase in the rate of growth of GDP per capita would require an average growth of $1/\beta_0$ = 4.3 per cent in exports, a higher figure than that found by Emery. Of all other equations, Batchelor suggested that perhaps the most stable alternative to the full model was Lubitz's type of equation.[18]

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[18]Batchelor, pp. 208-209 .

Table 2

BATCHELOR'S STUDY ON
HIS 5 REGRESSION EQUATIONS

Equations	Intercept	Capital Inflow	Investment ratio	g(E)	eg(E)	Emg(E)	$\bar{R}^2$
#1	2.08 (10.07)			0.13 (10.18)			0.54
#2	2.53 (11.89)				0.23* (8.37)		0.44
#3	0.88 (2.05)		0.06 (2.27)	0.12 (10.11)		0.68* (2.22)	0.61
#4	2.10 (9.83)	-0.01 (0.44)		0.15 (10.13)			0.53
#5	0.10 (0.21)	-0.05 (2.48)	0.10 (3.55)	0,23 (4.96)	-0.23* (2.48)	0.20* (0.59)	0.64

NOTES: t-ratios are given in the brackets.

*Actual coefficients multiplied by 10^2 .

SOURCE: R. A. Batchelor, Industralization and Basis for Trade, Cambridge University Press, 1980, p.208, Table 7.6 .

Chapter 3

CRITICISM OF THE RECENT TESTS

It is suspected that there is a strong correlation among independent variables such as the rate of growth of total exports, the rate of growth of manufactured exports, and changes in export share of national income.

First, when Lubitz regressed the rate of growth of GNP on both the rate of growth of total exports and the rate of growth of manufactured exports, the rate of growth of manufactured exports took a negative sign. Lubitz then concluded that manufactured exports did not add any special contribution to growth. This conclusion was incorrect because there was multicollinearity in this model. Since Lubitz's samples (eleven countries) were all leading manufacturing exporters, most of the exports of those countries are manufactured goods, there obviously existed a strong collinearity between those two growth rates (that is, the rate of growth of total exports equals the rate of growth of manufactured exports plus Z, where Z has a very small numerical value). Therefore, the rate of growth of manufactured exports took a negative sign when the rate of growth of GNP was regressed on those two growth rates. However, when the rate of growth of total exports was removed, the rate of growth of manufactured exports took a significant positive sign.

Similarly, there was multicollinearity in Batchelor's models.

According to Batchelor's equation (5), when the rate of growth of GDP per capita was regressed on the rate of growth of exports ($\frac{\Delta \text{Export}}{\text{Export}}$), changes in export shares of GDP ($\frac{\Delta \text{Export}}{\text{GDP}} = \frac{\Delta \text{Export}}{\text{Export}} * \frac{\text{Export}}{\text{GDP}}$), and changes in manufactured exports ($\frac{\text{Manufactured Export}}{\text{Export}} * \frac{\Delta \text{Export}}{\text{Export}}$), the second variable took a negative sign and the third variable became insignificant. It was probably due to the strong collinearity among those independent variables. when the rate of growth of GDP per capita was regressed on each variable by itself, each variable appeared to be positively significant to the rate of growth of GDP per capita.

In most Spearman rank correlation tests and regression analysis, export growth rate was used as the independent variable representing a country's export performance. It seemed that export proportion (Export/GDP) was unimportant to economists. In fact, Michaely claimed that "export proportions appeared to either bear no relationship to the growth of GNP or are negatively correlated with the latter."[19] However, this does not mean that the rate of growth of total exports is the best variable to represent export performance. Severn argued that the use of the rate of growth of total exports was incorrect due to lack of "openness coefficient". He suggested the correct functional form should be $\frac{\Delta \text{GNP}}{\text{GNP}} = \alpha + \beta \frac{\Delta \text{Export}}{\text{GDP}}$, where $\frac{\Delta \text{Export}}{\text{GDP}} = \frac{\Delta \text{Export}}{\text{Export}} * \frac{\text{Export}}{\text{GDP}}$.[20] Even Michaely acknowledged

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[19] Michaely, p.53 .

[20] Severn, p.548 .

the weakness of using the rate of growth of total exports as variable for export performance and suggested as a replacement variable, the mean of the annual change of export/GNP. This raises the question of the accuracy of using the rate of growth of total exports as variable for export performance in testing the hypothesis.

Referring to Michaely's rank correlation analysis, he reported that,

> it is interesting to note that the positive association of the economy's growth with the growth of the changes in export shares appears to be particularly strong among the more developed countries, and not to exist at all among the least developed.... This seems to indicate that growth is affected by export performance only once countries achieve some minimum level of development.[21]

Heller-Porter, Balassa and Tyler all agreed with Michaely's suggestion. And Syron-Walsh reported that,

> the more dependent a country is upon food exports, the lower the impact of an increase in exports upon GNP.... it may be possible for exports to have as great a stimulative effect on income growth in a less developed country as in a developed country, provided the less developed country is not specialized in a pattern of exporting foodstuff.[22]

Therefore, it may be the case that the effect of export performance on a country's growth depends not only on the achievement of some minimum level of development, but also on the type of exports a country specializing in.

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[21] Michaely, p.52 .

[22] Syron & Walsh, p.544 .

Chapter 4

A RE-TESTING OF THE HYPOTHESIS

A) Statistical Procedures and Descriptions

This paper will also examine the relationship between economic growth and exports. Specifically, this paper aims at the following objectives:

(i) To determine the extent of multicollinearity among the independent variables, and to solve the problem.

(ii) To test alternative measures of export performance and to select the one which will be most useful.

(iii) To determine which types of exports contribute the most to country's economic growth.

The statistical procedures begin with Batchelor's five regression equations.[23]

Equation (1) $g(y) = \alpha_0 + \beta_0 g(E)$

Equation (2) $g(y) = \alpha_0 + \beta_1 eg(E)$

Equation (3) $g(y) = \alpha_0 + \alpha_2 I + \beta_0 g(E) + \beta_2 Emg(E)$

Equation (4) $g(y) = \alpha_0 + \alpha_1 F + \beta_0 g(E)$

Equation (5) $g(y) = \alpha_0 + \alpha_1 F + \alpha_2 I + \beta_0 g(E) + \beta_1 eg(E) + \beta_2 Emg(E)$

where

g(y) : Annual real rate of growth of GDP per capita. It was computed by dividing (1 + annual real rate of growth

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[23] Batchelor, p.208 .

of total GDP) by (1 + annual rate of growth of population). Both of these growth rates are from the World Development Report 1982.[24]

I : The investment ratio, defined as gross capital formation divided by GDP. This ratio is from the World Tables, 1980.[25]

e : The export share defined as total exports divided by GDP. This is from the World Tables, 1980.

m : The import share defined as total imports divided by GDP. This is also from the World Tables, 1980.

F : The capital inflow share, defined as the import share (m) minus the export share (e).

Em : The manufactured export share defined as manufactured exports being divided by total exports. This is from the Year Book of International Trade Statistics, 1980.[26]

g(E) : Annual real rate of growth of exports. This data is from the World Development Report 1982.

eg(E) : Annual real rate of growth of exports weighted by the export share of GDP. That is, eg(E) equals to e times g(E).

Emg(E) : Changes in manufactured exports defined as Em times g(E).

Data for the 1960's and 1970's are shown in Appendix (1).

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[24] World Development Report 1982, World Bank.

[25] World Tables, 1980, World Bank.

[26] United Nations, Year Book of International Trade Statistics, 1980.

Following Emery, national income data was converted to a per capita basis because it eliminates the influence of different rates of change of population among countries. However, exports, investment and other independent variables were not put on a per capita basis because there was much less reason to believe that their growth rates reflect increases in population.[27] A cross-section analysis was used. As Lubitz explained, in spite of the assumption that both the behavior and structural relationship were the same for all countries, it is a common procedure to use international cross-section over time, because individual country time-series might induce difficulties such as estimating the lag structures of variables, problems of overstating the true number degree of freedom. Also, he recommended that a period of ten years (rather than breaking up in a number of sub-period) be used in order to prevent distortion induced by business cycles.[28] Thus, in the equations, each country was an observation and each variable was measured by using data "averaged" over a period of ten years (if data were available, otherwise it would be a less than 10 year average). The periods of investigation chosen were 1961 to 1970 and 1971 to 1980. Variables of these two periods are identified by their subscripts 60 and 70, thus I_{60} and I_{70} represent the investment ratio for 1961 to 1970 and 1971 to 1980, respectively.

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[27] Emery, p.475 .

[28] Lubitz, pp. 314-315 .

Due to the problem of insufficient data, only 86 countries were available for this analysis.

First, Batchelor's equations were estimated for the 1970's (since variable Emg(E) was not available for the 1960's), and the results are shown in Table 3 . Capital inflow (F) takes a negative sign throughout. Variables eg(E) and g(E) are more significant when they are not used simultaneously. Also, Emg(E) appears negatively related (but insignificant) to the growth of GDP per capita. Furthermore, the full model (equation 5) has the lowest mean square error (MSE) but the significance of each variable decreases. These results suggest that there is possible multicollinearity among independent variables.

B) The Multicollinearity Problem and the Appropriate Measure for Export Performance

Artificial regressions are used to determine the existence of multicollinearity. That is, independent variables are regressed on to each other to see whether they are collinear to each other. Theory tells us that if one of the K variables is a linear combination of the other K-1 variables, one will get a high R^2 in the artificial regressions. The results are shown in Table 4 .

The high R^2 of equations 3, 4, 5, and 12 to 17 suggests that there exists multicollinearity among independent variables $g(E)_{70}$, $eg(E)_{70}$, and $Emg(E)_{70}$. This means variable g(E) contains much of the same information as variables Emg(E) and eg(E). The simplest solution for the multicollinearity problem is to drop one

Table 3
REGRESSION OF GROWTH IN GDP PER CAPITA ON
GROWTH IN EXPORTS FOR THE 1970'S --- BATCHELOR'S EQUATIONS

Equations	Intercept	F_{70}	I_{70}	$g(E)_{70}$	$eg(E)_{70}$	$Emg(E)_{70}$	$\bar{R}^2$	MSE
1	0.014 (5.65)			0.211 (5.28)			0.24	0.000428
2	0.015 (6.23)				0.681 (5.37)		0.25	0.000424
3	-0.006 (0.88)		0.016 (3.02)	0.22 (3.13)		-0.076 (0.72)	0.30	0.000393
4	0.017 (6.53)	-0.076 (3.08)		0.218 (5.69)			0.31	0.000389
5	-0.004 (0.56)	-0.069 (2.92)	-0.102 (3.20)	0.17 (2.81)	0.329 (1.64)	-0.125 (1.24)	0.38	0.000346

NOTES: t - ratios are given in the brackets.
N (number of observations) = 86 .

Table 4

ARTIFICIAL REGRESSIONS AMONG

INDEPENDENT VARIABLES FOR 1970'S

Equations	Dependent Variable	Independent Variables	$\bar{R}^2$
(1)	F_{70}	$g(E)_{70}$, $eg(E)_{70}$, $Emg(E)_{70}$, I_{70}	0.0335
(2)	I_{70}	$g(E)_{70}$, $eg(E)_{70}$, $Emg(E)_{70}$, F_{70}	0.078
(3)	$g(E)_{70}$	I_{70}, $eg(E)_{70}$, $Emg(E)_{70}$, F_{70}	0.78
(4)	$eg(E)_{70}$	I_{70}, $g(E)_{70}$, $Emg(E)_{70}$, F_{70}	0.67
(5)	$Emg(E)_{70}$	I_{70}, $g(E)_{70}$, $eg(E)_{70}$, F_{70}	0.7
(6)	$g(E)_{70}$	I_{70},	0.077
(7)	$g(E)_{70}$	F_{70}	0.0022
(8)	$eg(E)_{70}$	I_{70}	0.057
(9)	$eg(E)_{70}$	F_{70}	0.03
(10)	$Emg(E)_{70}$	I_{70}	0.059
(11)	$Emg(E)_{70}$	F_{70}	0.0001
(12)	$g(E)_{70}$	$eg(E)_{70}$	0.65
(13)	$g(E)_{70}$	$Emg(E)_{70}$	0.69
(14)	$eg(E)_{70}$	$Emg(E)_{70}$	0.53
(15)	$g(E)_{70}$	$eg(E)_{70}$, $Emg(E)_{70}$	0.77
(16)	$eg(E)_{70}$	$g(E)_{70}$, $Emg(E)_{70}$	0.66
(17)	$Emg(E)_{70}$	$g(E)_{70}$, $eg(E)_{70}$	0.70

of the collinear variables. Since the purpose of this paper is to test the relationship between national income growth and total export growth, and the variable $Emg(E)_{70}$ was only designed to give separate account of the rate of growth of manufactured exports, it is logical to drop this variable from the equations.

The second question is whether $g(E)_{70}$ or $eg(E)_{70}$ should be used as the variable for export performance. It has already been pointed out that there have been arguments about which variable best measures export performance. The rate of growth of exports was used as the variable for export performance, and it was claimed that export share was unimportant to economic growth. However, the rate of growth of total exports weighted by export share of GDP (eg(E)) was suggested as an alternative because it made possible the comparison of export performance among countries. It is noted that differences among countries in the ratio of eg(E) are due to differences in the rate of growth of export and the share of export to GDP, or both. In order to clarify this controversy and to select the best variable for export performance, eg(E), g(E) and e (the ratio of export to GDP) are considered for selection. Similarly, based on the same logic, the rate of growth of gross investment (with GI as defined by World Development Report 1982) is also considered. The following equations are estimated for these purposes and the results are shown in Table 5 .

Equations :

(1) $g(y)_{70} = F_{70} \quad I_{70} \quad GI_{70} \quad e_{70} \quad g(E)_{70}$

(2) $g(y)_{70} = F_{70} \quad I_{70} \quad GI_{70} \qquad g(E)_{70}$

(3) $g(y)_{70} = F_{70}\ \ I_{70}\ \ \ \ \ \ g(E)_{70}$

(4) $g(y)_{70} = F_{70}\ \ \ \ GI_{70}\ \ \ \ g(E)_{70}$

(5) $g(y)_{70} = F_{70}\ \ I_{70}\ \ GI_{70}\ \ \ \ \ \ eg(E)_{70}$

(6) $g(y)_{70} = F_{70}\ \ I_{70}\ \ \ \ \ \ \ \ eg(E)_{70}$

(7) $g(y)_{70} = F_{70}\ \ \ \ GI_{70}\ \ \ \ eg(E)_{70}$

The low t-ratio and the small coefficient of variable e_{70} of equation 1 (Table 5) suggest that the export share of GDP makes insignificant and little contribution to the explanation of the rate of growth of GDP per capita. In fact, equation 2 of Table 5 shows that when e_{70} is removed, $\bar{R}^2$ remains unchanged and MSE decreases. However, equations (2), (3) and (4) (or (5), (6), (7)) show that when either I_{70} or GI_{70} is removed from the equation, $\bar{R}^2$ will drop and MSE will increase. That suggests that both the rate of growth of gross investment (GI) and the share of investment in GDP (I) are important to the changes of the rate of growth of GDP per capita during the 1970's. Finally, the $\bar{R}^2$ and MSE of equation (2) and equation (5) are the same. However, the t-ratios of variables I_{70}, GI_{70} and $eg(E)_{70}$ of equation (5) are a little bit larger than the t-ratios of variables I_{70}, GI_{70} and $g(E)_{70}$ of equation (2). In addition, since the variable $eg(E)_{70}$ gives account to both the changes of export share of GDP and the rate of growth of total exports, it makes cross-sectional comparison possible. Therefore, both theory and statistical analysis seem to support the view that equation (5) of Table 5 is better and more meaningful than equation (2) in explaining the changes of the rate of growth of GDP

Table 5

REGRESSION OF GROWTH IN GDP PER CAPITA
ON VARIABLES F_{70}, I_{70}, GI_{70}, $g(E)_{70}$, e_{70}, $eg(E)_{70}$

Equations	F_{70}	I_{70}	GI_{70}	$g(E)_{70}$	$eg(E)_{70}$	e_{70}	$\bar{R}^2$	MSE
(1)	-0.016 (0.67)	0.088 (2.8)	0.128 (5.01)	0.14 (4.36)		0.0029 (0.2)	0.51	0.000274
(2)	-0.018 (0.80)	0.09 (3.1)	0.128 (5.07)	0.149 (4.38)			0.51	0.000271
(3)	-0.0175 (0.7)		0.13 (5.07)	0.17 (5.09)			0.46	0.00030
(4)	-0.073 (3.4)	0.102 (3.08)		0.18 (4.8)			0.38	0.00035
(5)	-0.007 (0.31)	0.097 (3.3)	0.13 (5.1)		0.459 (4.39)		0.51	0.000271
(6)	-0.06 (2.5)	0.11 (3.33)			0.568 (4.7)		0.36	0.00035
(7)	-0.0039 (0.163)		0.138 (5.1)		0.53 (4.8)		0.45	0.00030

NOTES: t-ratios are given in the brackets.

N = 86 .

per capita for the 1970's.

This result holds for the 1960's also. The above seven equations were estimated for the 1960's and their results are shown in Table 6 . The statistical analysis for the 1960's results in essentially the same conclusions as for the 1970's. The export share of GDP (e_{60}) is shown to be insignificant to the rate of growth of GDP per capita. Both the investment ratio (I_{60}) and the rate of growth of gross investment (GI_{60}) are found to be important to economic growth. Finally in comparing the respective $\bar{R}^2$ and MSE, it is obvious that equation (5) is better than equation (2) in explaining the changes of rate of growth of GDP per capita for the 1960's. Before drawing any conclusion, it is important to detect whether a multicollinearity still exists. Artificial regressions among the independent variables were estimated and the results are shown in Table 7 .

For the 1960's, equations (3), (4) and (7) of Table 7 show that there is a minor collinearity between variables $g(E)_{60}$ and GI_{60} (the R^2 of regressing $g(E)_{60}$ onto GI_{60} was 0.18). On the other hand, for the 1970's, there is a minor collinearity between variables GI_{70} and F_{70} (the R^2 of regressing GI_{70} onto F_{70} was 0.2). Other than those minor, insignificant collinearities, the R^2's of the remaining artificial regressions are very small. In fact, if we compare Table 7 with Table 4, we can see that the R^2's of regressing independent variables on each other are much lower in Table 7 than in Table 4 . This suggests that multicollinearity is not a problem in the equations.

Table 6

REGRESSION OF GROWTH IN GDP PER CAPITA
ON VARIABLES F_{60}, I_{60}, GI_{60}, $g(E)_{60}$, e_{60}, $eg(E)_{60}$

Equations	F_{60}	I_{60}	GI_{60}	$g(E)_{60}$	e_{60}	$eg(E)_{60}$	$\bar{R}^2$	MSE
(1)	-0.056	0.121	0.145	0.115	0.0086		0.58	0.000152
	(2.59)	(4.88)	(4.33)	(3.83)	(0.77)			
(2)	-0.061	0.127	0.146	0.116			0,58	0.000151
	(2.98)	(5.23)	(4.38)	(3.89)				
(3)	-0.070		0.139	0.152			0.44	0.00020
	(2.93)		(3.59)	(4.49)				
(4)	-0.087	0.12		0.116			0.49	0.00018
	(4.0)	(4.65)		(3.89)				
(5)	-0.037	0.118	0.169			0.393	0.61	0.000142
	(1.95)	(5.07)	(5.68)			(4.63)		
(6)	-0.055	0.11				0.524	0,46	0.000196
	(2.49)	(4.27)				(5.47)		
(7)	-0.037		0.168			0,506	0.49	0.000185
	(1.78)		(4.94)			(5.43)		

NOTES: t-ratios are given in the brackets.
N = 86 .

Table 7

ARTIFICIAL REGRESSIONS TO DETERMINE THE EXISTENCE OF MULTICOLLINEARITY IN EQUATION (2): g(y) = F I GI g(E), AND EQUATION (5): g(y) = F I GI eg(E) FOR THE 1960'S AND 1970'S

Period	Equations	Dependent Variable	Independent Variables			$\bar{R}^2$
1960's	1	F	I	GI	g(E)	0.107
	2	I	GI	g(E)	F	0.053
	3	GI	I	g(E)	F	0.248
	4	g(E)	I	GI	F	0.22
	5	g(E)	F			0.023
	6	g(E)	I			0.047
	7	g(E)	GI			0.180
	8	GI	F			0 035
	9	GI	I			0.05
	10	F	I	GI	eg(E)	0.037
	11	eg(E)	I	GI	F	0.149
	12	GI	I	eg(E)	F	0.11
	13	I	GI	eg(E)	F	0.074
	14	eg(E)	F			0.07
	15	eg(E)	I			0.074
	16	eg(E)	GI			0.084

Table 7 - Continued

Period	Equations	Dependent Variable	Independent Variables			$\bar{R}^2$
1970's	17	F	I	GI	g(E)	0.22
	18	I	GI	g(E)	F	0.08
	19	GI	I	g(E)	F	0.25
	20	g(E)	I	GI	F	0.11
	21	F	I			0.0001
	22	F	GI			0.156
	23	F	g(E)			0.0029
	24	GI	g(E)			0.034
	25	GI	I			0.015
	26	GI	F			0.2
	27	g(E)	I			0.077
	28	g(E)	GI			0.034
	29	g(E)	F			0.003
	30	F	I	GI	eg(E)	0.2
	31	I	F	GI	eg(E)	0.064
	32	GI	F	I	eg(E)	0.247
	33	eg(E)	F	I	GI	0.097
	34	eg(E)	I			0.057
	35	eg(E)	F			0.003
	36	eg(E)	GI			0.05

Therefore, the results of the statistical analysis of the 1960's and the 1970's seem to support the following inferences:

(i) The export share in GDP alone is not important to the rate of growth of GDP per capita.

(ii) Both the gross investment share in GDP and the rate of growth of gross investment are important to the rate of growth of GDP per capita.

(iii) Both the rate of growth of total exports (g(E)) and the rate of growth of total exports weighted by export share in GDP (eg(E)) are important in explaining changes in the rate of growth of GDP per capita. However, eg(E) appears to be a better and more meaningful variable for export performance in explaining changes in the rate of growth of GDP per capita among the countries.

It is noted that capital inflow (F), defined as trade deficit, appears to reduce growth rate both the 1960's and 1970's. Even though F_{60} appears to be more significant to changes in the rate of growth of GDP per capita than F_{70} does, both coefficients are very small. This suggests that if capital inflow is removed, it will affect the equations little. The estimations are shown in Table 8 .

The results of Table 8 shows that the removal of variable F is more beneficial to the 1970's equation than to the 1960's equation, partly because of the collinearity between GI_{70} and F_{70}. However, basically, the results are not much different from equations which include capital inflow as an independent variable. For the

Table 8

REGRESSION OF GROWTH IN GDP PER CAPITA ON VARIABLES WITH AND WITHOUT CAPITAL INFLOW (F) FOR THE 1960'S AND 1970'S

Period	Equations	Independent Variables				$\bar{R}^2$	MSE
		F	I	GI	eg(E)		
1960's	(A)	-0.037 (1.95)	0.118 (5.07)	0.169 (5.68)	0.393 (4.63)	0.61	0.000142
	(B)		0.119 (5.0)	0.179 (6.0)	0.398 (4.63)	0.60	0.000147
1970's	(C)	-0.007 (0.31)	0.097 (3.3)	0.13 (5.1)	0.459 (4.39)	0.51	0.000271
	(D)		0.0967 (3.3)	0.133 (5.9)	0.458 (4.3)	0.52	0.000270

NOTES: t-ratios are given in the brackets.
N = 86 .

1960's, equation (B) shows that a 1 per cent per annum increase in the rate of growth of GDP per capita required an average of 8.4 per cent (1/11.9) increase in investment share in GDP. Also, a 1 per cent per annum increase in the rate of growth of GDP per capita needed an average growth of 5.6 per cent (1/17.9) in gross investment. This suggests that investment is important to economic growth. As for export performance, it shows that a 1 per cent per annum increase in the rate of growth of GDP per capita required an average growth of 2.5 per cent (1/3.98) in the rate of growth of exports weighted by export share in GDP. On the other hand, for the 1970's, equation (D) shows that a 1 per cent per annum increase in the rate of growth of GDP per capita required an average of 10.34 per cent increase in investment share and an average growth of 7.52 per cent in gross investment. That means it required either greater investment share or greater investment growth to maintain economic growth during the 1970's. However, for the 1970's, it required less average changes in the rate of growth of exports weighted by export share in GDP (an average of 2.18 per cent) for 1 per cent per annum increase in the rate of growth of GDP per head. It was due to the influence of the oil-exporting countries in the sample which benefit from higher oil prices and increased demand for their exports. In order to get a more accurate comparison between the 1960's and the 1970's, eleven oil-exporting countries defined by the World Development Report 1981 are removed from the sample[29] and the results of the estimation are shown in Table 9 .

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[29] World Development Report 1981, World Bank, p. 69 .

Table 9

REGRESSION OF GROWTH IN GDP PER CAPITA
ON VARIABLES I, GI, AND eg(E)
FOR NON OIL-EXPORTING COUNTRIES

Independent Variables			$\bar{R}^2$	MSE
I_{70}	GI_{70}	$eg(E)_{70}$		
0.11	0.16	0.379	0.53	0.000227
(3.7)	(5.4)	(3.2)		

NOTE: t-ratios are given in the brackets.

N = 75, Eleven oil-exporting countries defined the World Development Report 1981 are Algeria, Congo, P.R., Ecuador, Iran, Nigeria, Syrian Arab Rep., Trinidad and Tobago, Venezuela, Indonesia, Saudi Arabia and Iraq.

Table 9 seems to support the claim that it required greater investment growth (or investment ratio) to maintain a 1 per cent per annum increase in GDP per capita for the 1970's. High costs of investments as a result of high oil prices and inflation are a very important reason for that. However, after taking out eleven oil-exporting countries. a 1 per cent per annum increase in the rate of growth of GDP per capita required a greater average growth of 2.64 per cent in the rate of growth of exports weighted by export share in GDP. Perhaps as a result of higher oil prices, oil-importing countries have to increase their export volume in order to earn enough revenue to purchase the same amount of real goods and services.

C) The Importance of the Type of Exports to Income Growth

In an attempt to accomplish the third objective, the sample of 86 countries was divided into three groups: the low income countries, the middle income countries, and the industrial market economies (the high income countries). These groups are defined by the World Development Report 1982 and the countries are listed in Appendix (1). Equations are estimated for each group and the results are shown in Table 10 . It shows that the rate of growth of exports weighted by export share in GDP (eg(E)) is important to the rate of growth of GDP per capita not only for the whole sample, but also for each group. However, the significance of the relationship appears to

Table 10

REGRESSIONS OF GROWTH IN GDP PER CAPITA ON VARIABLES I, GI AND eg(E) FOR THE LOW INCOME COUNTRIES, MIDDLE INCOME COUNTRIES AND HIGH INCOME COUNTRIES FOR THE 1970'S

Groups	Independent Variables			$\bar{R}^2$	MSE
	I_{70}	GI_{70}	$eg(E)_{70}$		
Low Income Countries (N = 22)	0.017 (0.257)	0.12 (2.57)	0.263 (0.705)	0.23	0.000266
Middle Income Countries					
(a) Including Oil-Exporting Countries (N = 46)	0.084 (1.801)	0.16 (4.23)	0.48 (3.504)	0.47	0.000345
(b) Excluding Oil-Exporting Countries* (N = 36)	0.15 (2.79)	0.18 (3.95)	0.31 (1.99)	0.54	0.000281
High Income Countries (N = 17)	0.04 (1 38)	0.40 (5.38)	0.43 (2.45)	0.75	0.000226

NOTES : t-ratios are given in the brackets.
* Oil-Exporting countries are Algeria, Congo, P.R. Ecuador, Iran, Nigeria, Syrian Arab Rep., Trinidad and Tobago, Venezuela, Indonesia and Iraq.

Saudi Arabia is not included in the analysis.

be stronger for the more developed countries (the middle income countries and the high income countries). The coefficient for the variable eg(E) and its respective partial t-statistics are larger for the more developed countries. A 1 per cent per annum increase in eg(E) increased the rate of growth of GDP per capita by 0.43 per cent in the high income countries, by 0.31 per cent in the middle income, non oil-exporting countries, and by 0.26 per cent in the low income countries. This seems to indicate that exports do contribute to economic growth and that the contribution is positively related to the level of development of the countries. In other words, it is suggested that a 1 per cent increase in exports in a developed country may have a larger impact on income growth than the same increase in exports in a less developed country.

In order to determine whether such differences are due to the level of development of a country or the type of goods a country exported, the sample was split into groups according to the percentage of total exports that consisted of agricultural products, manufactured products, and oil-mining-quarry products. Those groups are defined as: Group A, for whom agricultural products comprise 60 per cent or more of exports; Group B, for whom manufactured products comprise 60 per cent or more of exports; and Group C, for whom oil-mining-quarry products comprise 50 per cent or more of exports. These groups along with their composition of exports are listed in Appendix (2). The regression of the rate of growth of GDP per capita on the investment ratio (I_{70}), the rate of growth of gross investment (GI_{70}), and the

rate of growth of exports weighted by the export share in GDP ($eg(E)_{70}$) was performed for each of these groups and the results are shown in Table 11 .

Table 11 suggests that, during the 1970's, a 1 per cent increase in eg(E) in a country specializing in oil-mining-quarry products would have a larger impact on income growth than the same increase in exports in a country which specialized either in agricultural products or in manufactured products. On the other hand, for those countries which specialized in agricultural products, a 1 per cent increase in their exports would have the smallest impact on their income growth. This shows that the nature of exports does have an impact on economic growth and not all types of exports are equally efficient to increase economic growth. It depends on the global demand for the product relative to its scarcity and the countries' capabilities of meeting the demand. The 1973-1974 rise in oil prices showed that the manufactured exports were not the only desirable exports for increasing income growth. The great global demand for oil relative to its limited resources, made possible rapid growth in the oil-exporting countries.

> During the 1970's, for example, the export prices of the capital-surplus oil exporters went up 15 fold in nominal terms, almost four times as much as their import prices. The volume of developing country oil exports was the same in 1980 as in 1970, but the revenue they earned could of course buy far more real goods and services. [30]

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[30] World Development Report 1981, p.21 .

Table 11

REGRESSIONS OF GROWTH IN GDP PER CAPITA
ON VARIABLES I, GI, AND eg(E) FOR
DIFFERENT GROUPS WITH DIFFERENT
COMPOSITION OF EXPORTS
FOR THE 1970'S

Groups	N	Independent Variables			$\bar{R}^2$	MSE
		I_{70}	GI_{70}	$eg(E)_{70}$		
A	19	0.204 (2.603)	0.125 (2.4)	0.186 (0.513)	0.55	0.000225
B	36	0.10 (2.58)	0.20 (4.07)	0.303 (2.2)	0.54	0.000195
C	10	0.067 (0.67)	0.13 (1.81)	0.55 (1.48)	0.34	0.00066

NOTE: t-ratios are given in the brackets.

N = Number of observations.

However, the prices of non-fuel primary products (or agricultural products) were both erratic and generally weak during the 1970's. The World Development Report 1981 reported that the price fluctuation of 33 non-oil commodities had increased from an average of 5 per cent a year in the 1950's and 1960's to 12 per cent a year in the 1970's. Even though the volume of those types of non-fuel primary exports increased as fast as other type of exports, their relative price fell much more. As a result, those non-fuel primary product exporting countries were left with relatively small export earnings.[31] The fluctuation and deterioration of the non-fuel primary product export prices had reduced their impact on income growth. It was found that fourteen out of the sample of twenty-two low income countries are agricultural product exporting countries. This seems to suggest that the small impact of low income countries' export to their income growth is due to the low level of economic development and the type of products they exported. In fact, these two reasons seem to reinforce each other. The low development level and very limited resources and skill possessed by the low income countries reduce their export impact on income growth in at least three ways. First, it limits the commodities that the low income countries can produce and export. Second, it makes it difficult for low income countries which are heavily dependent on one or two exports to vary their output mix as relative prices change. Third, due to the lack of industrial skill and capacity, most low income countries do not have the ability and flexibility to shift their

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[31] World Development Report 1981, p.22 .

production according to the global demand. On the other hand, because of the nature of the exports and the inability to change, it is difficult for low income countries to make a processing break-through.

Chapter 5

CONCLUSION

The results of the statistical analysis of both the 1960's and the 1970's suggest that investment share in GDP (I), the rate of growth of gross investment (GI) and the rate of growth of exports weighted by export share in GDP (eg(E)) are all important to the rate of growth of GDP per capita. The rate of growth of gross investment appears to be more important to income growth than does the investment share in GDP in both decades. Because of high oil prices and inflation rate, it became more expensive to obtain a 1 per cent of income growth per head by investment. As for the export performance, the statistical analysis supports the hypothesis that a rapid growth of exports would accelerate economic growth. It was found that a 1 per cent per annum increase in the rate of growth of GDP per capita required an average growth of 2.5 per cent in eg(E) for the 1960's. However, for the 1970's, due to the high oil prices and inflation, it required a slightly greater average growth of 2.64 per cent of changes in eg(E) for a 1 per cent per annum increase in the rate of growth of GDP per capita. It was also observed that the contributions of export growth to income growth were positively associated with the level of development of the countries. This means a 1 per cent increase in exports in a developed country may have a larger impact on income growth than

the same increase in exports in a less developed country. Such differences seem to be the result of the development level of the country and the type of goods the country exports. The richer, more diversified economies are more able to adjust to relative price movements and to changes in demand, and thus experience a greater impact of exports on income growth.

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APPENDICES

APPENDIX 1

36 COUNTRIES DEFINED BY THE WORLD DEVELOPMENT REPORT 1982
Y=GROWTH RATES OF GDP PER CAPITA, GE=TOTAL EXPORTS GROWTH RATES
E=EXPORT SHARE OF GDP, EGE=E TIMES GE...CHANGES IN EXPORT SHARE OF GDP
M=IMPORTS SHARE OF GDP, F=M-E...CAPITAL INFLOW OF GDP
I=INVESTMENT SHARE OF GDP, GI=GROWTH RATE OF GROSS INVESTMENT
SUBSCRIPT 60 STANDS FOR A TEN YEAR (OR LESS) AVERAGE OF 1961 TO 1970

OBS	NO	NATION	Y60	GE60	E60	EGE60	M60	F60	I60	GI60
1	4	CHAD	-0.012770	0.059	0.244	0.014396	0.329	0.085	0.120	0.023
2	5	BNGLDESH	0.012695	0.065	0.094	0.006110	0.121	0.027	0.110	0.112
3	6	ETHIOPIA	0.019531	0.036	0.105	0.003780	0.122	0.017	0.130	0.057
4	9	BURMA	0.003910	-0.116	0.123	-0.014268	0.141	0.018	0.125	0.028
5	10	AFGHAN	-0.001957	0.025	0.084	0.002100	0.148	0.064	0.093	-0.010
6	12	MALI	0.008789	0.030	0.136	0.004080	0.232	0.096	0.173	0.049
7	14	RWANDA	0.000975	0.158	0.101	0.015958	0.149	0.048	0.077	0.035
8	15	UPVOLTA	0.009804	0.159	0.095	0.015105	0.206	0.111	0.099	0.047
9	16	ZAIRE	0.013725	-0.018	0.496	-0.008928	0.447	-0.049	0.221	0.096
10	17	MALAWI	0.020428	0.116	0.209	0.024244	0.332	0.123	0.153	0.154
11	19	INDIA	0.010753	0.030	0.046	0.001380	0.062	0.016	0.178	0.053
12	21	SRILANKA	0.021484	0.047	0.230	0.010810	0.256	0.026	0.161	0.066
13	22	SLEONE	0.020548	0.003	0.287	0.000861	0.298	0.011	0.132	0.084
14	23	TANZANIA	0.032132	0.034	0.260	0.008840	0.257	-0.003	0.160	0.098
15	26	CAFR	0.000000	0.081	0.267	0.021627	0.404	0.137	0.203	0.013
16	27	PAKISTAN	0.037938	0.082	0.085	0.006970	0.147	0.062	0.172	0.069
17	28	UGANDA	0.026239	0.050	0.239	0.011950	0.216	-0.023	0.140	0.075
18	29	BENIN	0.000976	0.050	0.151	0.007550	0.246	0.095	0.145	0.042
19	30	NIGER	-0.003872	0.060	0.113	0.006780	0.175	0.062	0.161	0.030
20	31	MDGASCAR	0.007835	0.053	0.187	0.009911	0.231	0.044	0.129	0.054
21	32	SUDAN	-0.007835	0.001	0.125	0.000125	0.138	0.013	0.103	-0.013
22	33	TOGO	0.056475	0.105	0.240	0.025200	0.263	0.023	0.141	0.111
23	34	GHANA	-0.002930	0.002	0.203	0.000406	0.243	0.040	0.152	-0.032
24	35	KENYA	0.027132	0.072	0.309	0.022248	0.300	-0.009	0.181	0.070
25	38	INDONESA	0.018627	0.040	0.109	0.004360	0.158	0.049	0.111	0.046
26	41	SENEGAL	-0.007744	0.012	0.276	0.003312	0.311	0.035	0.128	0.011
27	44	HONDURAS	0.021339	0.111	0.261	0.028971	0.283	0.022	0.171	0.102

APPENDIX 1 - CONTINUED

OBS	NO	NATION	Y60	GE60	E60	EGE60	M60	F60	I60	GI60
28	45	ZAMBIA	0.021401	0.022	0.538	0.011836	0.380	-0.158	0.249	0.106
29	46	BOLIVIA	0.028348	0.098	0.171	0.016758	0.212	0.041	0.155	0.096
30	47	EGYPT	0.020548	0.032	0.161	0.005152	0.200	0.039	0.152	0.031
31	49	ELSALVA	0.029155	0.054	0.245	0.013230	0.266	0.021	0.138	0.035
32	50	CMEROON	0.018664	0.071	0.249	0.017679	0.250	0.001	0.134	0.093
33	51	THAILAND	0.052427	0.052	0.180	0.009360	0.206	0.026	0.225	0.158
34	52	PHILLPP	0.020288	0.022	0.158	0.003476	0.169	0.011	0.201	0.082
35	53	NCARAGUA	0.045809	0.097	0.273	0.026481	0.306	0.033	0.189	0.109
36	55	CONGOPR	0.002930	0.051	0.318	0.016218	0.603	0.285	0.274	0.029
37	56	MOROCCO	0.018537	0.025	0.190	0.004750	0.205	0.015	0.119	0.088
38	59	PERU	0.020428	0.020	0.200	0.004000	0.191	-0.009	0.172	0.010
39	60	NIGERIA	0.005854	0.066	0.151	0.009966	0.182	0.031	0.151	0.074
40	61	JAMAICA	0.029586	0.047	0.352	0.016544	0.381	0.029	0.300	0.078
41	62	GUATMALA	0.025243	0.091	0.160	0.014560	0.174	0.014	0.120	0.079
42	63	IVCOAST	0.041466	0.088	0.374	0.032912	0.347	-0.027	0.181	0.127
43	64	DOMREP	0.017527	-0.023	0.181	-0.004163	0.213	0.032	0.144	0.114
44	65	COLOMBIA	0.020388	0.022	0.128	0.002816	0.139	0.011	0.200	0.045
45	66	ECUADOR	0.027184	0.029	0.153	0.004437	0.161	0.008	0.146	0.187
46	67	PARAGUAY	0.026585	0.054	0.138	0.007452	0.162	0.024	0.149	0.068
47	68	TUNISIA	0.027478	0.042	0.203	0.008526	0.282	0.079	0.233	0.042
48	70	SYRIA	0.013566	0.034	0.198	0.006732	0.230	0.032	0.135	0.088
49	75	KOREAS	0.059512	0.341	0.113	0.038533	0.218	0.105	0.232	0.236
50	76	MALAYSIA	0.035992	0.058	0.446	0.025368	0.398	-0.048	0.180	0.075
51	77	COSTAR	0.029981	0.096	0.254	0.024384	0.308	0.054	0.190	0.071

APPENDIX 1 - CONTINUED

OBS	NO	NATION	Y60	GE60	E60	EGE60	M60	F60	I60	GI60
52	78	PANAMA	0.0476190	0.105	0.363	0.038115	0.385	0.022	0.211	0.124
53	79	ALGERIA	0.0185547	0.045	0.232	0.010440	0.248	0.016	0.315	-0.001
54	80	BRAZIL	0.0242954	0.051	0.062	0.003162	0.062	0.000	0.213	0.070
55	81	MEXICO	0.0377541	0.028	0.091	0.002548	0.104	0.013	0.208	0.096
56	82	CHILE	0.0235064	0.006	0.149	0.000894	0.140	-0.009	0.159	0.042
57	83	SAFRICA	0.0560624	0.054	0.261	0.014094	0.235	-0.026	0.254	0.094
58	85	PORTUGAL	0.0641283	0.096	0.228	0.021888	0.282	0.054	0.189	0.077
59	86	ARGENTNA	0.0276134	0.034	0.087	0.002958	0.078	-0.009	0.193	0.041
60	87	YUGOSLAV	0.0475248	0.077	0.180	0.013860	0.202	0.022	0.313	0.047
61	88	URUGUAY	0.0009891	0.022	0.135	0.002970	0.126	-0.009	0.114	-0.018
62	89	IRAN	0.0816327	0.126	0.213	0.026838	0.156	-0.057	0.175	0.122
63	90	IRAQ	0.0290980	0.054	0.367	0.019818	0.208	-0.159	0.161	0.030
64	91	VNZUELA	0.0251451	0.016	0.294	0.004704	0.189	-0.105	0.239	0.076
65	92	HONGKONG	0.0721248	0.127	0.907	0.115189	0.980	0.073	0.210	0.069
66	93	TRINTOB	0.0196078	0.049	0.393	0.019257	0.358	-0.035	0.205	-0.023
67	94	GREECE	0.0636816	0.108	0.099	0.010692	0.183	0.084	0.239	0.104
68	96	ISRAEL	0.0454545	0.110	0.222	0.024420	0.372	0.150	0.258	0.057
69	98	SARABIA	0.0628627	0.109	0.587	0.063983	0.273	-0.314	0.169	0.107
70	101	IRELAND	0.0378486	0.071	0.359	0.025489	0.427	0.068	0.217	0.089
71	102	SPAIN	0.0593472	0.115	0.108	0.012420	0.126	0.018	0.259	0.114
72	103	ITALY	0.0467197	0.136	0.173	0.023528	0.163	-0.010	0.220	0.037
73	105	UK	0.0238806	0.048	0.210	0.010080	0.213	0.003	0.192	0.050
74	106	FINLAND	0.0438247	0.068	0.234	0.015912	0.241	0.007	0.295	0.039
75	107	ASTRALIA	0.0352941	0.065	0.155	0.010075	0.164	0.009	0.278	0.066
76	109	CANADA	0.0373281	0.100	0.206	0.020600	0.199	-0.007	0.231	0.058
77	110	AUSTRIA	0.0387674	0.096	0.270	0.025920	0.269	-0.001	0.279	0.063
78	111	USA	0.0296150	0.060	0.052	0.003120	0.048	-0.004	0.188	0.048
79	112	NETHLADS	0.0384995	0.099	0.458	0.045342	0.465	0.007	0.272	0.071
80	113	FRANCE	0.0445545	0.082	0.142	0.011644	0.138	-0.004	0.250	0.077
81	114	BELGIUM	0.0417910	0.109	0.376	0.040984	0.375	-0.001	0.224	0.060
82	115	NORWAY	0.0357143	0.091	0.415	0.037765	0.424	0.009	0.291	0.052
83	116	DENMARK	0.0466733	0.071	0.294	0.020874	0.313	0.019	0.239	0.079
84	117	SWEDEN	0.0367428	0.077	0.222	0.017094	0.224	0.002	0.247	0.051
85	118	GERMANY	0.0346878	0.101	0.196	0.019796	0.174	-0.022	0.264	0.041
86	119	SWITELND	0.0265748	0.085	0.300	0.025500	0.309	0.009	0.304	0.039

APPENDIX 1 - CONTINUED

86 COUNTRIES DEFINED BY THE WORLD DEVELOPMENT REPORT 1982
Y=GROWTH RATES OF GDP PER CAPITA, GE=TOTAL EXPORTS GROWTH RATES
E=EXPORT SHARE OF GDP, EGE=E TIMES GE...CHANGES IN EXPORT SHARE OF GDP
EM=MANUFACTURED EXPORT SHARE OF TOTAL EXPORT, EMGE=EM TIMES GE
M=IMPORTS SHARE OF GDP, F=M-E...CAPITAL INFLOW OF GDP
I=INVESTMENT SHARE OF GDP, GI=GROWTH RATE OF GROSS INVESTMENT
SUBSCRIPT 70 STANDS FOR A TEN YEAR (OR LESS) AVERAGE OF 1971 TO 1980

OBS	NO	NATION	Y70	GE70	E70	EGE70	EM70	EMGE70	M70	F70	I70	GI70
1	4	CHAD	-0.021569	-0.040	0.275	-0.011000	0.273	-0.010920	0.429	0.154	0.130	-0.005
2	5	BNGLDESH	0.012671	-0.019	0.058	-0.001102	0.648	-0.012312	0.145	0.087	0.080	0.018
3	6	ETHIOPIA	0.000000	-0.017	0.121	-0.002057	0.204	-0.003468	0.130	0.009	0.106	-0.012
4	9	BURMA	0.021484	0.040	0.054	0.002160	0.610	0.024400	0.073	0.019	0.113	0.080
5	10	AFGHAN	0.019512	0.037	0.125	0.004625	0.188	0.006956	0.149	0.024	0.092	0.124
6	12	MALI	0.021422	0.094	0.185	0.017390	0.167	0.015698	0.344	0.159	0.154	0.033
7	14	RWANDA	0.006770	0.035	0.133	0.004655	0.054	0.001890	0.208	0.075	0.124	0.189
8	15	UPVOLTA	0.016699	0.020	0.140	0.002800	0.191	0.003820	0.371	0.231	0.234	0.048
9	16	ZAIRE	-0.025316	0.022	0.327	0.007194	0.810	0.017820	0.396	0.069	0.264	0.011
10	17	MALAWI	0.033042	0.057	0.263	0.014991	0.150	0.008550	0.356	0.093	0.225	0.026
11	19	INDIA	0.014691	0.037	0.053	0.001961	0.618	0.022866	0.061	0.008	0.197	0.048
12	21	SRILANKA	0.024606	-0.024	0.190	-0.004560	0.193	-0.004632	0.206	0.016	0.163	0.098
13	22	SLEONE	-0.009747	-0.048	0.251	-0.012048	0.042	-0.002016	0.294	0.043	0.142	-0.002
14	23	TANZANIA	0.014507	-0.073	0.206	-0.015038	0.177	-0.012921	0.277	0.071	0.197	0.030
15	26	CAFR	0.008815	-0.011	0.217	-0.002387	0.135	-0.001485	0.356	0.139	0.220	-0.106
16	27	PAKISTAN	0.015519	0.012	0.105	0.001260	0.798	0.009576	0.187	0.082	0.162	0.024
17	28	UGANDA	-0.041910	-0.085	0.147	-0.012495	0.086	-0.007310	0.121	-0.026	0.084	-0.164
18	29	BENIN	0.006828	-0.076	0.277	-0.021052	0.369	-0.028044	0.404	0.127	0.172	0.072
19	30	NIGER	-0.000973	0.128	0.177	0.022656	0.220	0.028160	0.297	0.120	0.223	0.076
20	31	MDGASCAR	-0.021463	-0.012	0.213	-0.002556	0.258	-0.003096	0.249	0.036	0.146	-0.018

APPENDIX 1 -CONTINUED

OBS	NO	NATION	Y70	GE70	E70	EGE70	EM70	EMGE70	M70	F70	I70	GI70
21	32	SUDAN	0.013592	-0.057	0.128	-0.007296	0.123	-0.007011	0.209	0.081	0.138	0.067
22	33	TOGO	0.008780	0.016	0.306	0.004896	0.089	0.001424	0.372	0.066	0.248	0.105
23	34	GHANA	-0.030097	-0.084	0.134	-0.011256	0.253	-0.021252	0.138	0.004	0.089	-0.062
24	35	KENYA	0.029981	-0.010	0.321	-0.003210	0.390	-0.003900	0.340	0.019	0.222	0.012
25	38	INDONESA	0.051908	0.087	0.217	0.018879	0.135	0.011745	0.199	-0.018	0.187	0.144
26	41	SENEGAL	-0.002918	0.012	0.337	0.004044	0.689	0.008268	0.404	0.067	0.177	0.024
27	44	HONDURAS	0.001934	0.044	0.319	0.014036	0.320	0.014080	0.378	0.059	0.201	0.096
28	45	ZAMBIA	0.037827	0.012	0.443	0.005316	0.984	0.011808	0.416	-0.027	0.313	-0.109
29	46	BOLIVIA	0.022439	-0.016	0.220	-0.003520	0.503	-0.008048	0.236	0.016	0.207	0.029
30	47	EGYPT	0.051910	-0.007	0.167	-0.001169	0.984	-0.006888	0.260	0.093	0.204	0.165
31	49	ELSALVA	0.011662	0.015	0.324	0.004860	0.404	0.006060	0.347	0.023	0.193	0.052
32	50	CMEROON	0.033268	0.025	0.277	0.006925	0.269	0.006725	0.297	0.020	0.186	0.085
33	51	THAILANC	0.045854	0.118	0.202	0.023836	0.560	0.066080	0.236	0.034	0.248	0.077
34	52	PHILLPP	0.035054	0.070	0.193	0.013510	0.603	0.042210	0.225	0.032	0.269	0.105
35	53	NCARAGUA	-0.024178	0.023	0.315	0.007245	0.438	0.010074	0.366	0.051	0.221	0.025
36	55	CONGOPR	0.002918	0.089	0.400	0.035600	0.248	0.022072	0.611	0.211	0.235	0.027
37	56	MOROCCO	0.025243	0.021	0.204	0.004284	0.339	0.007119	0.302	0.098	0.239	0.092
38	59	PERU	0.003899	0.039	0.153	0.005967	0.676	0.026364	0.193	0.040	0.165	0.023
39	60	NIGERIA	0.039024	0.026	0.302	0.007852	0.041	0.001066	0.266	-0.036	0.241	0.158
40	61	JAMAICA	-0.025616	-0.068	0.329	-0.022372	0.678	-0.046104	0.380	0.051	0.229	-0.095
41	62	GUATMALA	0.026214	0.043	0.222	0.009546	0.419	0.018017	0.239	0.017	0.170	0.079
42	63	IVCOAST	0.016190	0.046	0.404	0.018584	0.281	0.012926	0.390	-0.014	0.236	0.132
43	64	DOMREP	0.034951	0.046	0.222	0.010212	0.533	0.024518	0.260	0.038	0.220	0.096
44	65	COLOMBIA	0.035191	0.019	0.153	0.002907	0.312	0.005928	0.145	-0.008	0.203	0.054
45	66	ECUADOR	0.056311	0.075	0.263	0.019725	0.140	0.010500	0.267	0.004	0.256	0.050
46	67	PARAGUAY	0.052326	0.071	0.141	0.010011	0.565	0.040115	0.172	0.031	0.214	0.187
47	68	TUNISIA	0.052889	0.048	0.282	0.013536	0.487	0.023376	0.340	0.058	0.262	0.110
48	70	SYRIA	0.061776	0.068	0.230	0.015640	0.174	0.011832	0.365	0.135	0.280	0.167
49	75	KOREAS	0.076696	0.230	0.296	0.068080	0.932	0.214360	0.343	0.047	0.272	0.134
50	76	MALAYSIA	0.052734	0.074	0.462	0.034189	0.502	0.037148	0.416	-0.046	0.231	0.103

APPENDIX 1 - CONTINUED

OBS	NO	NATION	YTO	GETO	ETO	EGETO	EMTO	EMGETO	MTO	FTO	ITO	GITO
51	77	COSTAR	0.0321951	0.035	0.309	0.010815	0.423	0.014805	0.385	0.076	0.238	C.C88
52	78	PANAMA	0.0166178	-0.002	0.391	-0.000782	0.514	-0.001028	0.457	0.066	0.278	0.011
53	79	ALGERIA	0.0368217	0.022	0.303	0.006666	0.108	0.002376	0.377	0.074	0.462	0.132
54	80	BRAZIL	0.0606654	0.075	0.075	0.005625	0.565	0.042375	0.097	0.022	0.232	C.C97
55	81	MEXICO	0.0203686	0.134	0.089	0.011926	C.480	0.064320	0.105	0.016	0.223	0.074
56	82	CHILE	0.0068830	0.109	0.185	0.020165	0.825	0.089925	0.184	-0.001	0.079	-C.018
57	83	SAFRICA	0.0087634	0.072	0.267	0.019224	0.586	0.042192	0.262	-0.005	0.283	0.027
58	85	PORTUGAL	0.0325765	-0.003	0.214	-0.000642	C.924	-0.002772	0.331	0.117	0.223	C.016
59	86	ARGENTNA	0.0059055	0.093	0.091	0.008463	0.606	0.056358	0.093	0.002	0.238	0.029
60	87	YUGOSLAV	0.0485629	0.039	0.200	0.007800	0.911	0.035529	0.252	0.052	0.317	0.065
61	88	URUGUAY	0.0319043	0.048	0.175	0.008400	0.760	0.036480	0.188	C.013	0.130	C.C93
62	89	IRAN	-0.0058196	-0.097	0.366	-0.035502	C.101	-0.009797	0.253	-0.113	0.271	C.220
63	90	IRAQ	0.0851888	0.022	0.534	0.011748	0.013	0.000286	0.336	-0.198	0.257	C.272
64	91	VNZUELA	0.0164569	-0.067	0.340	-0.022780	0.296	-0.019832	0.249	-0.091	0.303	0.118
65	92	HONGKONG	0.0634146	0.094	0.980	0.092120	C.980	0.092120	1.006	0.026	0.221	C.127
66	93	TRINTOB	0.0375123	-0.028	0.476	-0.013328	0.740	-0.020720	0.385	-0.091	0.226	0.053
67	94	GREECE	0.0396432	0.118	0.148	0.017464	0.713	0.084134	0.243	0.095	0.286	0.020
68	96	ISRAEL	0.0146199	0.096	0.312	0.029952	0.508	0.048768	0.497	0.185	0.265	C.CC1
69	98	SAFABIA	0.0593870	0.054	0.764	0.041256	0.047	0.002538	0.268	-0.496	0.194	0.426
70	101	IRELAND	0.0237389	0.086	0.438	0.037668	0.867	0.074562	0.518	0.080	0.248	0.031
71	102	SPAIN	0.0297030	0.112	0.141	0.015792	0.867	0.097104	0.167	0.026	0.248	C.022
72	103	ITALY	0.0233569	0.067	0.243	0.016281	C.954	C.063918	0.249	0.006	0.226	0.005
73	105	UK	0.0179820	0.075	0.272	0.020400	0.893	0.066975	0.282	0.010	0.197	-C.003
74	106	FINLAND	0.0258706	0.045	0.278	0.012510	C.960	0.043200	0.299	0.021	0.327	-0.002
75	107	ASTRALIA	0.0157791	0.036	0.157	0.005652	0.530	0.019080	0.153	-0.004	0.245	C.014
76	109	CANADA	0.0276954	0.040	0.235	0.009400	0.720	0.028800	0.232	-0.003	0.233	0.042
77	110	AUSTRIA	0.0370000	0.071	0.337	0.023927	C.965	C.068515	0.344	0.007	0.290	C.037
78	111	USA	0.0198020	0.069	0.074	0.005106	0.797	0.054993	0.077	0.003	0.180	C.016
79	112	NETHLADS	0.0208333	0.053	0.511	0.027083	C.840	0.044520	0.490	-0.021	0.236	0.001
80	113	FRANCE	0.0298507	0.068	0.194	0.013192	0.910	0.061880	0.195	0.001	0.248	C.019
81	114	BELGIUM	0.0279441	0.049	0.470	0.023030	0.910	0.044590	0.463	-0.007	0.225	C.015
82	115	NORWAY	0.0427861	0.073	0.420	0.030660	C.780	0.056940	0.473	0.053	0.336	0.029
83	116	DENMARK	0.0209163	0.047	0.292	0.013724	0.890	0.041830	0.318	0.026	0.244	-0.006
84	117	SWEDEN	0.0139581	0.024	0.277	0.006648	C.960	0.023040	0.283	0.006	0.226	-0.005
85	118	GERMANY	0.0249750	0.058	0.238	0.013804	0.965	0.055970	0.211	-0.027	0.237	C.016
86	119	SWITELND	0.0009970	0.041	0.326	0.013366	0.950	0.038950	0.322	-0.004	0.274	-C.019

APPENDIX 1 - CONTINUED

*NOTES: Countries with NO. from 1 to 33 are defined as "Low Income Countries".
Countries with NO. from 34 to 96 are defined as "Middle Income Countries."
Countries with NO. from 101 to 119 are defined as "Industrial Market Economies" or "High Income Countries".

SOURCES: United Nations, Year Book of International Trade Statistics, 1980.
*World Development Report 1982, World Bank.
World Tables, 1980, World Bank.

APPENDIX 2

COUNTRIES CLASSIFIED ACCORDING TO THE COMPOSITION OF THEIR TOTAL EXPORTS

Group A (19 Countries) Agricultural Products greater than 60% of total exports:		Group B (36 Countries) Manufactured Products greater than 60% of total exports:	
Countries	Percentage	Countries	Percentage
Chad	72.1	Bangladesh	64.8
Ethiopia	79.3	Burma	61.0
Mali	83.0	Zaire	81.0
Upper Volta	80.9	India	61.8
Rwanda	70.0	Pakistan	79.8
Afghanistan	68.6	Zambia	98.4
Sri Lanka	76.5	Egypt	98.4
Tazania	75.9	Senegal	68.9
Uganda	90.9	Phillippiness	60.3
Benin	63.1	Peru	67.6
Madagascar	69.1	Jamaica	67.8
Sudan	87.4	Korea	93.2
Ghana	70.1	Chile	82.5
Kenya	60.0	Portugal	92.4
Hondras	60.5	Argentia	60.6
Cameroon	73.1	Yugolsavia	91.1
Ivory Coast	71.7	Uruguay	76.0
Colombia	65.3	Hong Kong	98.0
Malawi	85.0	Tindad and Tobago	64.0

APPENDIX 2 - CONTINUED

Group B (Continued)		Group C (10 Countries) Oil-mining-quarry Products greater than 50% of total exports:	
Countries	Percentage	Countries	Percentage
Greece	71.3	Sierra Leone	77.7
Ireland	86.7	Nigeria	87.9
Spain	86.7	Algeria	87.8
Italy	95.4	Iran	87.4
U.K.	89.3	Iraq	98.6
Finland	96.0	Venezuela	61.7
Canada	72.0	Saudi Arabia	95.3
Austria	96.5	Indonesia	59.7
U.S.A.	79.7	Togo	51.6
Nethlands	84.0	Ecuador	50.0
France	91.0		
Belgium	91.0		
Demark	89.0		
Sweden	96.0		
Germany	96.5		
Norway	78.0		
Switzerland	95.0		

SOURCE: United Nations, Year Book of International Trade Statistics, 1980 .

EXPORTS AND ECONOMIC GROWTH FOR THE 1960'S AND THE 1970'S

by

KWOK WAH LUM

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ABSTRACT

There have been many tests of the hypothesis that rapid export growth will contribute to rapid economic growth. This paper summarizes some of the published tests of this hypothesis and performs some additional tests using more recent data. The published tests fall into two types: first, those using Spearman rank correlation analysis to measure the strength of the relationship between the rate of growth of GNP (or GDP) and the rate of growth of exports, and second, those using regression analysis to measure and quantify the relationship of these two variables.

This paper focuses on regression analysis because it not only tests the interdependency between the rate of growth of GNP (or GDP) and the rate of growth of exports, but also because regression measures and quantifies such relationship. In examining some of the published regression analysis, it is found that there exists the problem of multicollinearity among independent variables, the problem of determining the appropriate measure of export performance, and a question of what type of exported product contribute more to economic growth.

In order to deal with these problems, this paper reports regression equations with the rate of growth of GDP per capita as the dependent variable, and with the rate of growth of total exports, the rate of growth of total exports weighted by the export share in GDP, the share of exports in GDP, the rate of growth of gross investment, the share of gross investment in GDP, and the capital inflow share in GDP (import share minus export share)

as independent variables. The sample includes 86 countries for the periods 1961-1970, and 1971-1980. Data is from the World Bank Report.

The statistical analysis for both the 1960's and the 1970's suggests that both the rate of growth of gross investment and the share of gross investment in GDP are important to the rate of growth of GDP per capita. Concerning export performance, the statistical analysis suggests that the rate of growth of total exports weighted by the export share in GDP (eg(E)) is a better and more meaningful variable for export performance in explaining the changes in the rate of growth of GDP per capita. It is shown that there is no multicollinearity among those independent variables. The results also support the hypothesis that a rapid growth of exports would accelerate economic growth. It is found, for the 1960's, an increase of 1 per cent in the annual rate of growth of GDP per capita required an average of 2.5 per cent in eg(E). However, for the 1970's, perhaps due to high oil prices and inflation, it required a slightly greater average of 2.64 per cent in eg(E) for 1 per cent per annum increase in the rate of growth of GDP per capita. It is also observed that a 1 per cent increase in exports in a developed country may have a larger impact on income growth than the same increase in exports in a less developed country. Such differences seem to be the result of the development level of the country and of the types of goods the country export.