

Export Expansion, Economic Growth and Economic Development Revisited

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This paper addresses two shortcomings in the prevailing literature on export expansion and economic growth. Firstly, the need to test for parametric inconstancy is widely acknowledged, but remains untackled. Secondly, evidence on the presence of a critical minimum development level below and above which the effect of exports on growth is different has been conflicting. Using the expansion methodology, the analyses here indicate that there is tremendous variation in the export parameter with development levels. Furthermore, export growth contributes most to economic growth at intermediate development levels, not low or high development levels. The results highlight the problem of arbitrary divisions of income levels as well as the assumption of linear economic development in current export-growth studies.

I. Introduction

The contribution of exports to the economic growth of a country has been investigated considerably since the 1960s. Several studies have established that a favorable export performance leads to a higher growth in the income of a country. Such a view has gained wide acceptance since the 1970s with the result that developing countries have been encouraged to pursue export-promotion policies (as in *World Development Report* 1988 for example). From a policy viewpoint, these studies are important given that more and more developing countries are following the path of the superexporting Asian newly-industrializing countries.

The most popular model that has been used to explore the effect of exports on economic growth is the aggregate production function. The

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justification for this being that export growth is said to exert a positive effect on total factor productivity through economies of scale and efficiency of resource allocation [Balassa (1985)]. Under this framework, part of the unexplained variation in the standard production function is argued to be related to export growth [Michalopoulos and Jay (1973)].

But two problems have emerged with respect to prevailing empirical studies on the relationship between export expansion and economic growth. Firstly, the assumption of parametric constancy, which implies a similar structural and behavioral export-growth relationship for all the countries study, has been widely questioned and criticized [Feder (1983), Rana (1985), Helleiner (1986), Ram (1987), Salvatore and Hatcher (1991), Greenaway and Sapsford (1994)]. Secondly, efforts to try and locate a minimum development threshold level above and below which the effect of export expansion on economic growth is different have resulted in mixed and contradictory conclusions.

This paper addresses the above shortcomings. In testing for parametric inconstancy, the evidence suggests that the export parameter varies widely with development levels, and, that the form of this variation is non-linear rather than linear as is currently assumed in the literature. This implies that there is not only a minimum, but a maximum development threshold level as well above which the contribution of exports to growth diminishes.

The paper is organized as follows: a brief summary of the theoretical and empirical literature documenting the positive role of exports in economic output as well as the impact of development levels is given in the next section. This is followed by a description of the model and the data in section III. Section IV discusses the regression results from the model and some concluding statements are made finally in section V.

II. Exports, Economic Growth and Economic Development

The literature abounds with both theoretical and empirical arguments for the optimism expressed towards the role of exports in growth. The theoretical foundations may be summarized in terms of market principles, dynamic learning and technological knowledge, ease of balance-of-payments, and employment and income distribution. Exports make it possible for countries to overcome the limits of their domestic markets by exploiting economies of scale and ensuring greater capacity utilisation [Balassa (1988)]. Export-oriented regimes tend to display a more marked industrial character [Joint ECLA/UNIDO In-

dustrial Development Division (1986), Westphal (1978)], are more amenable to importing industrial capital [Spetter (1970)], and produce higher quality products because of the exposure to international consumption patterns [Krueger (1985)].

Since the import capacities of countries are dependent on their export earnings, exports provide the necessary financial means to achieve the material prerequisites for industrial development. Krueger (1988) has also argued that an "export-oriented approach in a labor surplus economy permits the rapid expansion of employment and real wages. For countries which tend to be more labor abundant, export-promotion encourages the use of labor and the growth of employment. Banerji and Riedel's (1980) study for instance, indicates that Taiwan's rapid growth in industrial employment has been enhanced by its shift towards labor-intensive export activities.

Finally, Balassa has suggested that income growth is achieved at a substantially lower cost in terms of investment in export-oriented countries. Such arguments of efficiency in the export sector have been incorporated by Feder (1983) who established that the export sector generates growth by increasing the aggregate levels of labor and capital.

The above arguments of the positive contribution of exports to growth are supported by a large empirical literature. Table 1 summarizes some of these export-growth analyses. All of the studies listed in the table have found that some level of threshold in income exists below and above which the effect of export growth on economic growth is different. However, the conflicting export values reported in Table 1 also means that it is difficult to conclude if it is higher income or lower income countries which benefit more from export expansion.

In one of the earliest investigations on the effect of a minimum income threshold, Michaely (1977: 52) concluded that "growth is affected by export performance only once countries achieve some minimum level of development." His observation was supported subsequently by others such as Tyler (1981), Kavoussi (1984) and Ram (1985), all of whom employed production function frameworks in their studies. Kavoussi found that the export coefficient of the more advanced developing countries was about twice that of less advanced developing countries and inferred from this that the contribution of exports to factor productivity is greater in the former. Balassa (1984) and Moshos (1989) however came to the opposite conclusion. Moshos (p. 100) notes that "the effect of export expansion on economic growth tends to diminish as the stage of development passes the critical level."

Table 1
SUMMARY OF EXPORT-GROWTH ANALYSIS

Sample	Time	Constant	K	L	X	n	R ²
1. Middle Income	1960-1977	1.997	0.264 (5.92)	0.981 (2.57)	0.057 (1.69)	41	0.685
2. Non-Opec Middle Income		2.036	0.256 (5.67)	0.955 (2.47)	0.055 (1.60)	37	0.706
2. Lower Income	1960-1978	0.78 (0.83)	0.213 (3.83)	0.900 (1.91)	0.077 (2.47)	37	0.57
Higher Income		2.82 (4.77)	0.243 (4.53)	0.124 (0.50)	0.163 (3.00)	36	0.65
3. Lower Income	1960-1970 and 1970-1977	0.043	0.812	0.071	0.021		
Upper Income		0.661 (0.54)	0.103 (1.93)	1.028 (3.46)	0.129 (2.83)	73	0.53
4. Lower Income	1970-1980	0.005 (0.35)	0.107 (1.70)	-0.005 (0.08)	0.556 (5.25)	13	0.724
Higher Income		0.011 (1.90)	0.280 (8.75)	0.618 (2.87)	0.143 (4.05)	58	0.748
5. African LDCs	pooled 1960-1980	0.003	0.078 (2.39)	0.838 (2.09)	0.123 (2.66)	28	0.303
Non-African LDCs		1.035	0.096 (2.78)	0.707 (2.79)	0.149 (4.67)	36	0.439

Notes: K, L and X are indices of capital, labor and export inputs in the aggregate production function (t-values are in parentheses). LDCs refer to developing countries.

Sources: (1) Tyler (1981), (2) Kavoussi (1984), (3) Ram (1985), (4) Moschos (1989), and (5) Fosu (1990).

The above contradictions may be attributed to the arbitrary separation of countries into "low" and "high" development levels. This led Moschos (1989) to search for a critical switching point. More recently, Greenaway and Sapsford (1994) found that the strength of the relationship between exports and growth changes through time and interpreted this as the indirect evidence of a threshold effect at work.

It is argued here that the different conclusions of the export-growth studies reflect the methodological problem of parametric constancy associated with Newtonian-type models [Boulding (1992)]. The presence of income threshold effects, for example, implies that the export-growth relationship changes beyond some critical development level. But the mixed evidence on this also suggests that there may be a problem with the assumption of linear associations implicit in these studies. Indeed, the historical development path of countries indicates otherwise, that is, the relationship between growth and development is non-linear. The rest of the section elaborates on this.

Different income levels lead to different propensities to export because economies at different economic stages have distinctive production and structural characteristics [Syrquin (1988)]. Therefore dissimilar income levels reflect dissimilar productive capabilities. A higher economic development level is frequently accompanied by a successful transformation of the productive sectors which involves allocating factors efficiently from lower to higher productivity sectors. In many cases, sustained economic growth occurs as a "spurt" and is led by exports [Reynolds (1983)] so that exports are credited with growth effects that are due in part to the other transformations of the economy. But a high growth rate of exports alone does not assure growth [Bruton (1989)]. The link between export growth and output growth is productivity growth. Kavoussi (1984) argues that it is only when export expansion is accompanied by a rapid growth of resources with major gains in factor productivity that the export-growth relationship will be positive. This helps explain the observations made of a minimum development threshold level.

Staple theories of export-led growth [North (1961)] as well as stages-of-development [Balassa (1977)] also point in the same direction. Staple theories which link the growth of a region to exports highlight the catalytic role of staple exports in mobilising the region's productive factors therefore creating an upward trend in economic output. Similarly, the stages-of-development argue that a country's comparative advantage is likely to shift with its stage of development in alignment with economies of scale and changes in the export structure.

But the literature also suggests that historically, the developmental trajectory of countries is not continuous. Morawetz (1977) noted that one important feature of developing countries' post-war development is their high rate of growth. He found that that developing countries' 3.4 percent growth rate annually between 1950 to 1975 represents a real growth rate that is faster than the developed countries at any comparable period before 1950. This acceleration of growth has been most conspicuous for middle income countries. Such an observation may be related to the latecomers thesis. Gerschenkron (1962) examined a country's industrial development in relation to its degree of economic backwardness on the eve of its "spurt." As a consequence of discontinuous industrial development, the more delayed the industrial development of the country, the greater the "spurt" of its industrialization.

Latecomers to the economic process such as the newly-industrializing countries are likely to progress relatively more rapidly than their western counterparts because they have the benefit of learning from their predecessors and a larger body of technological knowledge available to them. Due to shortages of capital and skilled manpower, the poorest countries tend to experience low economic growth. And the most developed countries also move closer to low rates of economic growth as their economies become more tertiarized. Overall then, a country's transition from low to high development is characterized by an acceleration in the growth of labor and capital [Syquin (1988)] with the result that middle income countries tend to grow faster than low or high income countries. Both theoretical and empirical considerations indicate that the relationship between economic growth and development has an inverted-U shape [Russett, Deutsch and Lasswell (1964)].

The discontinuous progress of economic development has important implications for assessing the export-growth relationship. Reynolds (1983) intimated that in the typical growth scenario, once a country's sustained growth is initiated, there is an acceleration in growth due mainly to export growth. Subsequently, the rate of economic growth levels off as the ratio of exports to national product stabilizes. This is due in part to the fact that over time, technological improvements become more critical in lubricating the growth engine [Lewis (1979), Joint ECLA/UNIDO (1986)]. All these suggest that linear assumptions of the effect of export expansion on economic growth may be oversimplified. The model in the next section considers such non-linearity associated with the economic progress of countries.

III. Model and Data

A. Model

In the previous section, two problems were identified: (i) parametric constancy associated with the export parameter, and (ii) contradictory conclusions of income threshold effects on exports and growth. The conventional approach to the relationship between export expansion and economic growth uses the general production function in order to control for the influences of other factors such as capital and labor inputs. Such models have been tested in both cross-section as well as time series data.

There are pros and cons for using either frameworks. Cross-section models are thought to be fraught with heteroskedasticity [Ram(1985)] and incapable of showing causality [Greenaway and Sapsford (1994)]. They also tend to assume similar structural and behavioral relationships for all the countries in the sample. On the other hand, time series procedures have the problem of estimating the lag structure between exports and growth as well as the tendency to overstate the degrees of freedom [Lubitz (1973)]. Ni, Biswas and Tribedy (1990) also highlight the failure of time series analyses to investigate stochastic trends on exports and growth.

Despite its weaknesses, cross-section investigations offer high level generalizations and as Fosu (1990) has pointed out, the lack of detailed data for individual countries prevent their evaluation in any general fashion. This paper employs a cross-section approach and attempts to rectify some of its weaknesses by (i) performing the White's (1980) test for heteroskedasticity, and (ii) exploring parametric inconstancy through shifting income levels so that similar structural and behavioral relationships are not presumed.

As in other studies, the relationship between export expansion and economic growth is captured in the following initial equation:

$$(1) \quad \dot{Y} = a_0 + a_1 \dot{I} + a_2 \dot{L} + a_3 \dot{X} + \epsilon$$

where, $\dot{Y}$, $\dot{I}$, $\dot{L}$, $\dot{X}$ are measures of output, capital, labor and export growth rates and ϵ is the error term. Casetti (1972; 1986) has shown in his expansion methodology, that the problem of parametric constancy may be addressed by "expanding" the relevant parameter(s) in terms of some appropriate functional contexts. In this case, the selection of the

function is based on the theoretical proposition discussed earlier that countries closer to the low and high ends of the development scale are associated with smaller rates of economic growth. The inverted-U thesis implies that the relationship between economic growth and development or income levels best takes the form of a parabola with a maximum. This leads to:

$$(2) \quad a_3 = a_{30} + a_{31}LY + a_{32}LY^2$$

where LY is the logarithm of GNP per capita, the latter of which is a proxy for the development level of a country as used in prevailing investigations. Thus equation (1) may be rewritten as:

$$(3) \quad \dot{Y} = a_0 + a_1\dot{I} + a_2\dot{L} + (a_{30} + a_{31}LY + a_{32}LY^2)\dot{X} + \epsilon$$

Equation (3) allows us to test the hypothesis that the export coefficient varies with economic development levels in a non-linear way (captured in (2)). Furthermore, it helps clarify the development threshold paradox by searching from the data, the income level beyond which the export parameter turns positive.

B. Data

The sample consists of 80 developed and developing countries for which data is available.¹ Developed countries are included because the paper is primarily interested in examining the effect of the whole spectrum of economic development levels on the export-growth model. The average annual growth rates of GDP, investment (as a proxy to the growth rate of capital stock), labor force and exports are used. This procedure was also employed by Tyler (1981) and Kavoussi (1984).

The time periods, 1960-1980 and 1980-1992, are investigated. The former covers the period of most studies. The latter explores the possibility of changes in the export-growth association and income threshold effects over time as observed by Greenaway and Sapsford (1994). The average GNP per capita (in constant \$1980) for each period is derived using the geometric of its natural logarithm. All data are taken from *World Development Report*, 1982 and 1994 issues.

¹ Data may be obtained from the author upon request.

IV. Regression Results

Table 2 reports the regression results of equations (1) and (3) for 1960-1980 and 1980-1992. The possibility of heteroskedasticity in the disturbance terms was examined using White's (1980) test. The chi-square statistics shown in the table are not significant so that homoskedastic disturbance terms of the estimated equations may be assumed.

As expected, Table 2 shows that the growth rate of I , L and X of the initial equation (1) for both periods are positive and significant at the 0.05 level. Of interest is the fact that the estimate for the export parameter is higher for 1980-1992 than for 1960-1980. This implies that the effect of export expansion on economic growth is greater for 1980-1992 despite the economic recession of the mid-eighties. The adjusted R^2 values also increased from 0.66 to 0.70 offering evidence for a stronger export-growth relationship in the second period. Both the R^2 as well as the sizes of $\hat{a}_3$ of 0.08 and 0.20 are also within the range documented in the other studies.

The above regressions associated with (1) represent the "average" effect of export expansion on growth in the absence of income variations within the sample. When the countries' development levels are considered as in equation (3), the regression results yielded:

$$(i) \quad \hat{a}_3 = -1.06 + 0.30LY - 0.02LY^2(1960-1980), \text{ and}$$

$$(ii) \quad \hat{a}_3 = -1.44 + 0.44LY - 0.03LY^2(1980-1992).$$

In both time periods, the estimated parameters, $\hat{a}_{30}$, $\hat{a}_{31}$, and $\hat{a}_{32}$ are significant at the 0.05 level or less. The implications of the results are captured in Figure 1. Here, the variation of $\hat{a}_3$ is shown when the parameter is graphed against GNP per capita. Figure 1 suggests that $\hat{a}_3$ varies tremendously with income levels in 1960-1980 as well as 1980-1992. Additionally in both periods, $\hat{a}_3$ is a parabola with a maximum. Specifically, the graphs show that the effect of export growth on economic growth is increasingly positive from low to intermediate income levels, and then levels off and declines at high income levels. The results here confirm the notion of minimum threshold income effect below and above which export expansion has a dissimilar effect on output growth. However, they also point to a second threshold effect, that is a maximum above which the effect of export expansion on growth begins to fall.

Table 2
REGRESSION RESULTS, 1960-1980 AND 1980-1992

Equation	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	$\hat{a}_3$	$\hat{a}_{30}$	$\hat{a}_{31}$	$\hat{a}_{32}$	Adjusted R ²	Chisquare
1960-1980									
(1)	1.41 (3.60)**	0.29 (7.75)***	0.37 (2.30)**	0.08 (3.55)***				0.66	7.18
(3)	1.43 (3.22)***	0.30 (7.62)***	0.35 (2.02)**		-1.06 (2.32)**	0.30 (2.25)**	-0.02 (2.11)**	0.68	16.88
1980-1992									
(1)	0.84 (2.86)**	0.27 (9.35)***	0.29 (2.39)**	0.20 (6.78)***				0.70	11.44
(3)	0.97 (2.40)**	0.27 (9.32)***	0.23 (1.47)*		-1.44 (1.96)**	0.44 (2.13)**	-0.33 (2.01)**	0.71	23.09

Notes: ***, **, and * are significant at 0.01, 0.05 and 0.10 levels respectively (t-values are in parentheses). R² refers to adjusted R-square. Chi-square statistics are White's test on heteroskedasticity.

Figure 1
Effect of One Percent of Export Growth
on Economic Growth with Income Levels

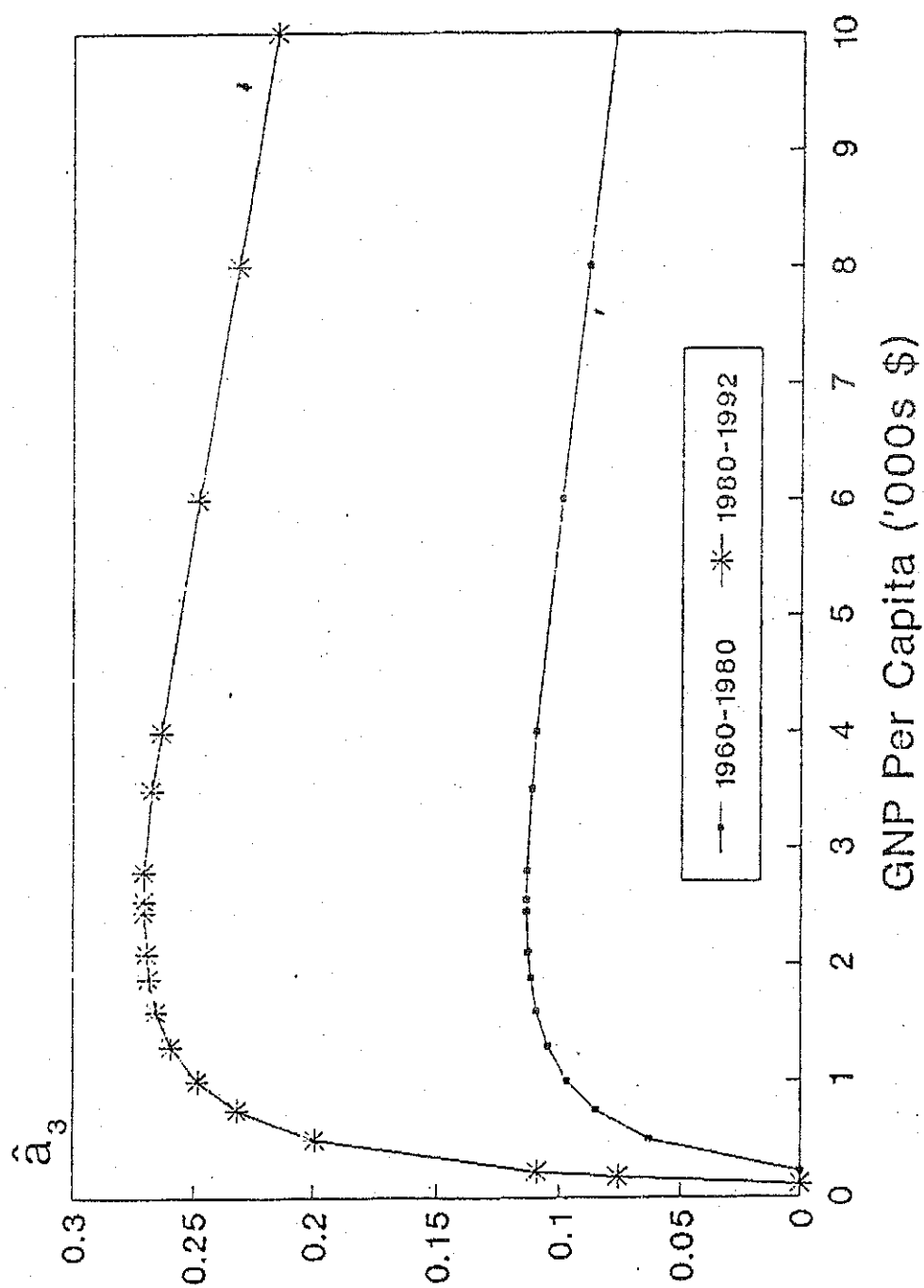


Figure 1 helps to reconcile the apparent contradictory conclusions derived by other authors (see Table 1). Authors who have observed that the export-growth relationship tends to be stronger for higher income countries, for instance, are supported by the rising end of the curve. Similarly, the declining end of the curve bolsters the arguments of authors who have arrived at the opposite conclusion, that is the export-growth relationship tends to be weaker for higher income countries. In actual fact, the problem lies in the definition of "low" and "high" income levels for as the graph shows, this depends on where the sample of countries' incomes is located. The analysis here cautions against the arbitrary selection of income thresholds and suggests instead that it is the intermediate income countries where the effect of export expansion is the greatest.

The increasing value of $\hat{\alpha}_3$ during the intermediate stages of countries' development may reflect the accumulation of industrial experience in a country's transition to modernization. As Kavoussi (1985) has observed, producers face difficulties in expanding foreign sales during the initial phase of export-promotion because of inexperience in meeting the demands of their foreign clients due in part to differences in tastes and quality. Over time, the necessary production and marketing skills for foreign markets accumulate and export expansion becomes easier.

The levelling off and subsequent decline of $\hat{\alpha}_3$ indicates that continued factor productivity is necessary to sustain economic growth. That is to say, the gains from reallocation due to exports are likely to be eliminated in the long run without increase corresponding increase in technical efficiency in the manufacturing sector [Pack (1988)]. The first tier Asian newly-industrializing countries (NICs), for example, are now witnessing the comparative advantage of their former labor-intensive export industries shifting to second-tier NICs. Thus, recent studies of highly export-oriented regimes such as Taiwan stress complementary strategies such as import-substitution [Chu (1994)], reinforcing the stages-of-development and comparative advantage thesis.

Figure 1 also shows that both the minimum and maximum are different for 1960-1980 and 1980-1992. In the first period, the minimum income level for the effect of export expansion on growth to be positive is approximately \$220. This is lower \$110 for the second period. This means that the threshold effect is lower for 1980-1992. On the other hand, the maxima occur at \$2545 for 1980-1992, and, \$2450 for 1960-1980. The curve associated with 1980-1992 is further higher so that for the same income levels, its associated $\hat{\alpha}_3$ has a larger value. As an example, at a GNP per capita of \$500, $\hat{\alpha}_3$ is 0.20 for 1980-1992, but only

0.06 for 1960-1980. This reinforces Greenaway and Sapsford's (1994) view that the export-growth relationship is stronger as time goes on.

It is noteworthy that the other explanatory variables of the growth model, namely investment and labor growth, are also mostly significant. That is, with the exception of $\hat{a}_2$ for 1980-1992 which is only marginally significant. The adjusted R^2 values are 0.68 for the first period and increased slightly to 0.71 for the second period.

Overall then, the picture which emerges is that there is tremendous variation in the export parameter when the factor of income levels is introduced. Table 3 reinforces such a conclusion with its summary

Table 3
SUMMARY STATISTICS OF $\hat{a}_3$

Time Period	Mean	Standard Deviation	Minimum	Maximum
1960-1980	0.065	0.046	-0.06	0.112
1982-1992	0.204	0.061	0.019	0.269

statistics on $\hat{a}_3$ reported for the range of incomes in the sample. The means of the parameter are 0.065 and 0.204 for 1960-1980 and 1980-1992 respectively. The minimum and maximum values however, vary from -0.06 to 0.112 in the first period, and, 0.019 to 0.269 in the second period. Both periods thus indicate wide variations in the size of $\hat{a}_3$.

V. Conclusion

This paper has focussed on the problem of parametric constancy and the mixed evidence concerning the effect of a minimum income level on the export-growth relationship in prevailing studies. The investigations carried out here suggest that the export parameter varies widely with development levels in both periods highlighting the deficiency of assuming similar export-growth relationships for all countries. Evidence for a minimum income threshold exists although such thresholds are best obtained from the data itself than through some predetermined process. This threshold is lower over time. In addition, a maximum threshold

above which the value of the export coefficient declines also has been found casting light on why some studies have found higher income countries to have smaller export parametric values. The existence of minimum and maximum income levels reflect the non-linear development trajectory of countries.

The above findings imply that the effect of export expansion on economic growth is greatest for countries situated at the intermediate loci of the development continuum. The above-average economic performance of export-oriented NICs observed for the post-war period best illustrates this. Optimism for export promotion, however, is less clear for countries at low and high development levels.

While the problem of parametric constancy is addressed in this paper through incorporating countries' variation in income levels to the export-growth relationship, there is no reason why parametric inconstancy may not be found in other contexts. The new growth theory [Pio (1994)] for example, now recognizes the importance of human capital as well as the role of the state in formulating growth models. There is thus much scope for exploring the effect of export expansion on economic growth under these contexts and influences.

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