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EXPORT INSTABILITY AND ECONOMIC GROWTH: A RETURN TO FUNDAMENTALS

By DAVID LIM

Five major cross-sectional studies have been carried out so far to test the effects of export instability on the economic growth of less developed countries (LDCs) and the results have been somewhat ambiguous. MacBean and Ariff found no significant negative relationship between (1) the growth rate of the real GDP (Y_g) and export instability (X_i), (2) the rate of growth of real investment (1_g) and X_i and (3) the real investment ratio (Q) and X_i .¹ The first two results were reproduced by Kenen and Voivodas but their study did show a statistically significant negative relationship between Q and X_i .² On the other hand, Glezakos argued strongly that export instability did have an adverse effect on economic growth.³ The recent study by Voivodas confused the issue even more by showing that completely different results could be obtained by using different estimating equations.⁴ Given that a case-study approach is generally not possible because of the severe shortage of data,⁵ what could a policy-maker, in a LDC with unstable export proceeds, prescribe with such conflicting evidence before him? The purpose of this paper is to show that the policy-maker would do well to examine critically some of the procedures adopted by the studies, and that he should return to the fundamentals of the *a priori* case against economic instability before he makes up his mind or conducts his own study.

I

The hypothesis that export instability affects the economic growth of LDCs adversely consists of three distinct but related parts. The first is that LDCs have a high degree of export instability, the second that such instability is transmitted to the rest of the economy,⁶ and the third that economic instability *per se* is detrimental to economic growth. These three parts have to be tested in sequence and failure to recognize this can easily lead to spurious relationships being established between export instability and economic growth.

The aim of the exercise is to find out whether the economic growth of those LDCs with unstable export proceeds and economies has been adversely affected. Some criterion must be used to decide which LDCs have high enough export instability to be included in the study. LDCs which have little or no export instability and economic instability cannot presumably be affected in the ways postulated by theory and should therefore not be included in the sample. The exercise is different in kind from those cross-sectional studies which attempt to identify and establish universal patterns of behaviour and change and which therefore require as comprehensive a sample as possible. It would be an unsatisfactory procedure, therefore, to refer to such official international publications as the United Nations *Yearbook of National Accounts Statistics* and include all the LDCs for which data on certain pre-determined variables are available. The lack of a criterion for selection may also leave room for bias if, for example, LDCs whose inclusion would have resulted in rather unexpected findings are left out because of data deficiency. Possible criteria for selection are to include only those LDCs whose indices of export instability exceed the average of the entire group, or those whose indices are greater than the average of the developed countries. There is admittedly no scientific reason for having such rules but they do have the advantage of introducing an element of consistency into the selection procedure.

However, it should be noted that the price one may have to pay for such consistency could be a reduction in the variation of the explanatory variable (X_1) and therefore also a reduction in the reliability of the test. Moreover, such a sample selection procedure can also introduce a significant degree of arbitrariness over the choice of the minimum level of export instability. We may well then have one of those impasses encountered in the empirical testing of economic hypotheses where the theory does not lend itself to a meaningful empirical verification.

Most of the existing cross-sectional studies have been quite careless in their selection procedure. They were right in spending a great deal of effort on constructing and improving indices of export instability.⁷ However, such care and refinements have not been made use of in improving the procedure for deciding on the composition of the sample. The indices should not only have been used to identify the real degree of export instability but also to ensure consistency in the selection of an appropriate sample of LDCs.

MacBean and Ariff both used basically the same sample of LDCs but did not say what the criterion was for their choice. Kenen and Voivodas's sample was quite different but no reason was given for the divergence, while the recent study by Voivodas did not even list the LDCs included. Only Glezakos could be said to have exerted some care in his sampling procedure for he criticized the use of samples containing countries 'which, according to a priori arguments, are not significantly affected by export instability'⁸ In view of the entirely different result obtained by Maizels when he re-estimated the relationship between V_g and X_i using basically the same function as MacBean but with a slightly different sample based on a more discriminate use of the data,⁹ the need for a criterion in the selection of the sample of LDCs is clear.

II

The second part of the hypothesis, that export instability leads to economic instability, has also been largely neglected in cross-sectional studies.¹⁰ It has been assumed that the former leads automatically to the latter, bringing with it factors which hinder the process of economic growth. Hence the attempt to establish the effects of such factors on growth by relating Y_g or I_g to X_i . This functional relationship and its underlying assumption, however, belie the complexity of the relationship between export instability and economic growth.

A change in export proceeds will affect the economy of the LDC in two ways. There is, firstly, the direct effect on the incomes of the producers in the export sector while, secondly, there are the indirect multiplier and accelerator effects. It may be expected that these effects will produce changes in GNP which are in the same direction and which, in the absence of any government intervention and leakages, will be more than proportional to the initial changes in the export proceeds. This is the gist of the theory and the empirical verification of it should consist of two steps. The first is to show that changes in GNP and export proceeds move consistently in the same direction and the second is to calculate the foreign-trade multiplier in order to know the size of the effect of export instability on the rest of the economy.

These two steps have not usually been taken. This is due, firstly, to a mistaken tendency to measure the impact of export instability on GDP and not GNP and, secondly, to an

unfortunate tendency to ignore the various characteristics of under-development. GDP includes profits repatriated overseas, and if foreign companies allow these to fluctuate while keeping operating costs and payments to the host LDC steady, the use of GDP will give an exaggerated picture of the degree of instability of the internal economy. Another way in which repatriated profits can play a crucial part in the analysis is the calculation of the foreign-trade multiplier. The multiplier should be given as $(1 - p_x - m_x - t_x)/(m_y + s_y + t_y)$ where p_x is the proportion of export earnings repatriated overseas, m_x the proportion paid for imports which are re-exported and t_x , the proportion which goes to export taxes. The items in the denominator are m_y the marginal propensity to import, s_y , the marginal propensity to save, and t_y , the proportion of the change in the domestic income which accrues to the government through taxes whose revenues respond to changes in the domestic income and expenditure. Very often p_x , and for that matter m_x are not deducted from the numerator, resulting therefore in an over-estimation of the foreign-trade multiplier.¹¹

The establishment of consistency of movements of changes in GNP and changes in export proceeds, and the correct estimation of the foreign-trade multiplier, are further complicated by problems of interpretation as far as the final part of the hypothesis on export instability and economic growth is concerned. Some LDCs may have been able to counteract export fluctuations through the use of monetary and fiscal measures, in which case there may not be much consistency between movements in GNP and export proceeds, and the foreign-trade multiplier will be small. However, this need not necessarily mean that export instability has had no effect on the economic growth of these LDCs. The stabilizers may not be automatic and the constant monitoring required may have diverted the attention of scarce skilled personnel from other equally important or more important developmental problems. In this case their imposition will have an opportunity cost and a meaningful negative relationship can be postulated between Y_g and X_1 in spite of inconsistency in the movements of GNP and export earnings. LDCs for which such characteristics are present should not be excluded from the sample.

III

The third part of the hypothesis, that economic instability *per se* slows down economic growth, has received the most attention. Yet most of the specifications of the relationship between instability and growth have not been satisfactory. They do not correspond much with either the spirit or the logic of the a priori arguments against economic instability.

There are basically three arguments against instability.¹² The first is that instability reduces the level of investment because of the business miscalculation and speculation it encourages and because of the inflation it generates.¹³ A low level of investment can only mean, *ceteris paribus*, a low rate of economic growth, given a Harrod-Domar capital-centred framework of analysis. The second argument concerns the opportunity cost of instability as scarce skilled personnel has to be diverted from other tasks to cope with the recurrent balance-of-payments crises and other administrative problems that result from instability. The third argument against instability is that it results in the discontinuous flow of the imports of intermediate and capital goods which are crucial to the implementation of development plans. These are, in brief, the major theoretical arguments against economic instability and they may be presented schematically as

- i. $X_1 \rightarrow$ inflation, business miscalculation \rightarrow low $I_g \rightarrow$ low Y_g
- ii. $X_1 \rightarrow$ renders development planning ineffective \rightarrow low Y_g
- iii. $X_1 \rightarrow$ discontinuous import of capital goods \rightarrow low $I_g \rightarrow$ low Y_g

It can be seen that the link between Y_g and X_1 is indirect in all the cases, the most indirect being the first where the link is through the effect that X_1 has on I_g via inflation and business miscalculation and speculation.

This indirectness, together with the fact that the third and fourth links in the chain may be affected by other factors, and also are not easily quantifiable, means that the arguments cannot be easily expressed as analytically manageable hypotheses. Take the case of the first argument, for example. The presence of inflation, business miscalculation and speculation which, it is argued, lowers I_g can be due to a host of other equally feasible reasons. This raises the problem of identification and the existence of a significant negative relationship between Y_g or I_g and X_1 may not mean much under such circumstances.¹⁴

Most of the estimating equations used in the existing cross-sectional studies have not been derived systematically in ways that are consistent with the hypotheses they are supposed to be testing. Take the case of the study by MacBean first. The following basic estimating equations were used:

$$Y_g = f(X_1, MC, T, R) \quad (1)$$

$$I_g = f(X_1, MC, FE) \quad (2.i)$$

$$I_g = f(X_1, MC, FE, MK_1, MK_2) \quad (2.ii)$$

$$Q = f(X_1, MC, MK_1, MK_2) \quad (3)$$

where MC is the growth rate of the total import capacity, T the foreign trade to income ratio, R the change in gold and foreign exchange reserves, FE the growth rate of foreign exchange reserves, MK_1 the capital goods imports to the domestic fixed capital formation ratio, MK_2 the capital goods imports to total imports ratio, Q the real investment ratio, and Y_g , I_g and X_1 are as previously defined.¹⁵

No explanation was given for the choice of the determining variables other than X_1 and no indication given as to which version of the general hypothesis was being tested. It would appear from the emphasis given to import-oriented variables that it is the third version that was of concern. Yet, if the logic of that argument were to be followed, then equations (2.ii) and (3) are mis-specified. The effect of export instability is to make imported intermediate and capital goods unavailable at crucial moments in the implementation of development plans so that X_1 acts on I_g and Q through its influence on MK_1 or MK_2 . As such X_1 and MK_1 or MK_2 should not appear as determinants in the same estimating equation.

I_g may be made a positive function of MK, which is imports of capital goods expressed as a proportion of either domestic fixed capital formation or the total import bill. For technical and economic reasons complementarity between locally produced and foreign produced

capital goods is present to a significant degree in LDCs. If MC and FE are also included as determinants of I_g , then the investment function can be written as $I_g = f(MK, MC, FE)$. The MK function should, if the logic of the third argument against export instability is to be followed, be presented as $MK = f(X_1)$. The substitution of the latter into the former would then yield an estimating equation which is similar to equation (2.i) and different from equation (2.ii) in not having X_1 , MK_1 and MK_2 as determinants in the same estimating equation. If the same procedure were followed in deriving the real investment ratio (Q) function, equation (3) would have to be presented as

$$Q = f(X_1, MC) \quad (3a)$$

The same type of criticism can be made of the estimating equations used by Kenen and Voivodas which were:

$$Y_g = f(X_1, AR, P_g, Q, A) \quad (4)$$

$$I_g = f(X_1, AR, P_g, A) \quad (5)$$

$$Q = f(X_1, AR, P_g) \quad (6)$$

where X_1 , the instability index, is the standard error of a regression trend line obtained by a first-order autoregressive scheme divided by the mean of the export proceeds, AR the autoregressive coefficient of the trend line, A the constant term of the equation divided by the mean of the export proceeds, and P_g the rate of change of the price level.¹⁶

No derivational procedure for the three estimating equations was given, though it would appear from the inclusion of P_g in all of the equations and the inclusion of Q in equation (4) that the first version of the argument against instability was being tested. However, as with some of the equations used by Mac-Bean, the equations have not been specified properly.

Take the case of equation (4) first. X_1 is hypothesized to act upon Y_g through its effect on P_g and therefore Q, so that the inclusion of X_1 , P_g and Q as determinants in equation (4) makes little sense. Kenen and Voivodas have implicitly adopted a Harrod-Domar framework by including Q as a determinant of Y_g in equation (4). Thus the derivational procedure would have to start by having $Y_g = 1/k \cdot Q$, where k is the incremental capital-output ratio. If Q is then made a negative function of P_g , $Q = -b_1 P_g$, and P_g a positive function of X_1 , $P_g = b_2 X_1$, then the estimating equation will be

$$Y_g = -(b_1 b_2 / k) X_1 + b_3 AR + b_4 A \quad (4a)$$

or

$$Y_g = f(X_1, AR, A)$$

in a general form where X_1 is measured by the method adopted by Kenen and Voivodas.

The same type of criticism can be made of the use of estimating equations (5) and (6). The use of Y_g and Q as the dependent variables has helped to reduce the indirect relationship between Y_g and X_1 by one step but the equations still leave X_1 and P_g together as determinants. The indirect nature of the relationship between export instability and economic growth was recognized by Kenen and Voivodas but they did not go far enough in their treatment of the problem.¹⁷

The most systematic studies are perhaps those carried out by Glezakos and Voivodas. Glezakos used the estimating equation

$$Y_g = f(X_1, X_d) \quad (7)$$

where Y_g is the growth rate of the real per capita income and X_d the growth rate of export proceeds. The study was an attempt to test the third version of the hypothesis, as Glezakos believed that 'most of the effects on economic development that have been attributed to export instability stem from the impact of export instability on import capacity'.¹⁸ No derivational procedure for the estimating equation was shown but equation (7) is logically consistent with the hypothesis to be tested.

If a Harrod-Domar framework is adopted then the basic growth equation is given by $Y_g = 1/k \cdot Q$. Q is then made to vary positively with the capital imports to total income ratio, $Q_t = b_1 MK_t / Y_t$, and MK_t / Y_t to vary positively with X_d and negatively with X_1 , $MK_t / Y_t = b_2 X_d - b_3 X_1$. The estimating equation will then work out to be

$$Y_g = - (b_1 b_3 / k) X_1 + (b_1 b_2 / k) X_d \quad (7.i)$$

which, when presented in a general form, is the same as equation (7).

Another way in which Glezakos' study is different from those carried out by MacBean and Kenen and Voivodas is in the care with which Glezakos selected his sample of countries. In order to ensure that he was testing the third version of the argument against export instability, Glezakos included only those LDCs whose import capacity depended on their export proceeds. This procedure excluded countries such as Taiwan or Mauritius where large inflows of foreign funds through aid or tourism played an important part in financing investment programmes. Their inclusion would make a mockery of the structural model, $MK_t / Y_t = b_2 X_d - b_3 X_1$, which was crucial in the derivation of the estimating equation (7). When enough of such countries are included, the absence of any statistically significant negative relationship between Y_g and X_1 may not mean that export instability has not been detrimental to the economic growth of LDCs in general.

Glezakos' procedure in sample-selection is an important step in the empirical verification process because of the use of only one estimating equation in establishing the relationship between Y_g and X_1 . The estimating equations (1), (4a) and (7) are fundamentally the same in postulating that Y_g is a function of X_1 . Yet equations (1) and (7) are supposed to be used for testing the third version of the argument against instability and equation (4a) for testing the first version. The fundamental premises of the two versions of the argument against export instability are entirely different but the use of basically the same estimating equation makes nonsense of the theoretical distinction. It would thus seem that MacBean should have selected only those LDCs whose import capacity had depended on their export proceeds

and Kenen and Voivodas only those LDCs which had exhibited a high degree of export instability and inflation.

In his recent study Voivodas was interested in the effects of export instability on the imports of capital goods.¹⁹ He set out therefore, like MacBean and Glezakos before him, to test the third version of the argument against instability but included in his analysis the effects of foreign capital inflows as well.²⁰ Voivodas started out with an explicit Harrod-Domar framework:

$$Y_g = (1/k)(I_t/Y_t) \quad (8)$$

where k is the incremental capital-output ratio and I_t/Y_t the domestic investment expenditure to GDP ratio in the year t . I_t/Y_t was then made to vary positively with the capital goods imports to income ratio (MK_t/Y_t) and inversely with the variance of it, which was used as a proxy for export instability.

$$I_t/Y_t = b_1(MK_t/Y_t) - c(\text{var } MK_t/Y_t) \quad (9)$$

MK_t/Y_t itself was assumed to be a positive function of the exports to GDP ratio (X_t/Y_t) and the foreign capital inflow to GDP ratio (F_t/Y_t).

$$MK_t/Y_t = b_2(X_t/Y_t) + b_3(F_t/Y_t) \quad (10)$$

The variance of MK_t divided by Y_t was then given by

$$\text{var } MK_t/Y_t = b_2^2(\text{var } X_t/Y_t) + b_3^2(\text{var } F_t/Y_t) + 2b_2b_3(\text{cov } [X_t, F_t]/Y_t) \quad (11)$$

The estimating equation used, obtained through a series of substitutions, was:

$$\begin{aligned} Y_g &= (b_1b_2/k)(X_t/Y_t) + (b_1b_3/k)(F_t/Y_t) \\ &- (cb_2^2/k)(\text{var } X_t/Y_t) - (cb_3^2/k)(\text{var } F_t/Y_t) \quad (12) \\ &- (2b_2b_3c/k)(\text{cov}[X_t, F_t]/Y_t) \end{aligned}$$

This estimating equation has therefore been systematically derived, with each step of the derivational procedure shown. Unfortunately the derivation is not quite consistent with the hypothesis that the author intended to verify. The third version of the hypothesis sees export instability as being responsible for an unpredictable supply of MK which creates in turn bottlenecks at crucial points in the implementation of the investment programmes of LDCs which depend heavily on MK . It would be more appropriate, if the logic of the argument were to be followed, to write equation (9) as:

$$I_t/Y_t = b_1(MK_t/Y_t) \quad (9a)$$

and equation (10) as

$$MK_t/Y_t = b_2(X_t/Y_t) - c_1(\text{var } X_t/Y_t) + b_3(F_t/Y_t) - c_2(\text{var } F_t/Y_t) \quad (10a)$$

The substitution of equations (9a) and (IOa) into equation (8) will produce the following estimating equation:

$$Y_g = (b_1 b_2 / K)(X_t / Y_t) + (b_1 b_3 / K)(F_t / Y_t) - (b_1 c_1 / K)(\text{var } X_t / Y_t) - (b_1 c_2 / K)(\text{var } F_t / Y_t) \quad (12a)$$

which is different from equation (12) in not having a covariance term as an independent variable. This difference is an important one as it rids the estimating equation of a variable which has no distinct economic meaning *vis à vis* the instability issue, but which may capture some of the effects which are meant to be recorded by the two instability terms. That is to say, what is important are the separate influences of export instability and foreign capital inflow instability (as measured by their respective variances), and not their *joint* instability (when account must be taken of their covariance as well).

The same criticism can be made of the presence of the covariance term in another estimating equation used by Voivodas:

$$Y_g = f[(dX_t / Y_t), (dF_t / Y_t), (\text{var } X_t / Y_t), (\text{var } F_t / Y_t), (\text{cov } (X_t, F_t) / Y_t)] \quad (13)$$

This equation was obtained in the same way as equation (12), the only difference being the substitution of dX_t / Y_t and dF_t / Y_t for X_t / Y_t and F_t / Y_t respectively in equation (10). If the more appropriate functional relationship for MK_t / Y_t :

$$MK_t / Y_t = f[(dX_t / Y_t), (\text{var } X_t / Y_t), (dF_t / Y_t), (\text{var } F_t / Y_t)] \quad (10b)$$

had been used, then the substitution of equations (9a) and (10b) into equation (8) would have produced the following estimating equation:

$$Y_g = f[(dX_t / Y_t), (dF_t / Y_t), (\text{var } X_t / Y_t), (\text{var } F_t / Y_t)] \quad (13a)$$

IV

In this section an attempt is made to re-run only Voivodas's equations (12) and (13) and to compare the results obtained with those from the use of our specifications of the relationship between growth and instability as given by equations (12a) and (13a). The equations were estimated using data from a sample of 29 less developed countries (LDCs) and 6 primary producing developed countries (PDCs) for the same period, 1956-1968, as that covered by Voivodas, as well as for 1956-1973 in order to incorporate more recent changes.²¹

The procedures adopted for deriving the variables used for the analysis were the same as those used by Voivodas. The Y_g for each country for each of the two periods was derived from the regression, $\log Y_t = a + b(t) + u_t$ where Y is the GDP at constant prices. Export

receipts (X) and foreign capital inflow (F) were deflated by the import price index to denote purchasing power and then divided by Y to obtain the average X/Y and F/Y for the two periods. The regressions, $X = a + b(t) + c_t$ and $F = a' + b'(t) + c'_t$, were run to obtain dX and dF respectively and these were divided by the mean of Y to obtain dX/Y and dF/Y. The standard errors of estimate of the regression were used as the instability indices of X and F and these were again divided by the mean of Y to produce (var X/Y) and (var F/Y). The covariance was measured according to the formula $\text{cov}(X, F) = S_x \cdot S_f \cdot R_{xf}$ where S stands for standard deviation and R for the coefficient of correlation and $(\text{cov}[X, F])/Y$ was obtained by dividing the covariance term by the mean of Y.

The results of the analysis for 1956-1968 and 1956-1973 are presented in Tables I and 2 respectively. It can be seen that the values of the F-ratio for all of the four equations estimated for 1956-1973 (Table 2) are not statistically significant, showing that export instability was an unimportant issue for the economic growth of the sample of countries over the longer period. A somewhat different picture emerged from the analysis on the shorter period, 1956-1968. The first interesting observation that can be made from Table I is that the estimating equations (13) and (13a) produced far better results than the estimating equations (12) and (12a). The respective R²s are 0.307, 0.223, -0.043 and -0.023 while the respective F-ratios are 4.018, 3.435, 0.719 and 0.801, showing that the overall regression functions obtained by using equations (12) and (12a) are not statistically significant. These results suggest that the formulation of the relationship between economic growth and export receipts and foreign capital inflow should be presented in terms of *changes* in the levels of export receipts and foreign capital inflow and not in terms of the level of exports receipts and foreign capital inflow *per se*. The second important finding is that a change in the availability of foreign capital inflow is a more significant constraint to greater economic growth than a change in the availability of export proceeds.

TABLE I
Cross-sectional Regressions Explaining Growth Rate of Real GDP (Y_g) 1956-68

Independent variables	Estimating Equations			
	12	12a	13	13a
Constant	2.612 (8.153)*	2.603 (8.207)*	2.219 (10.182)*	2.441 (11.972)*
X/Y	-2.030 (-1.163)	-1.565 (-0.986)		
F/Y	1.519 (0.384)	2.609 (0.730)		
dX/Y			23.342 (1.342)	18.953 (1.036)
dF/Y			35.144 (2.534)*	27.715 (1.947)**
var X/Y	3.639 (0.285)	0.350 (0.030)	-13.466 (-1.166)	-19.636 (-1.856)**
var F/Y	-5.370 (-0.362)	-9.800 (-0.745)	7.867 (0.954)	4.105 (0.481)
cov [X, F]/Y	-0.068 (-0.671)		-0.163 (-2.160)**	
R ²	-0.043	-0.023	0.307	0.223
F-ratio	0.719	0.801	4.018*	3.435**

Note: Numbers in parentheses are t values; * and ** denote significance at the 0.01 and 0.05 levels respectively.

TABLE 2

Cross-sectional Regressions Explaining Growth Rate of Real GDP (Y_g) 1956-73

Independent variables	Estimating Equations			
	12	12a	13	13a
Constant	2.355 (6.999)*	2.396 (7.430)*	2.094 (9.458)*	2.168 (11.370)*
X/Y	-1.866 (-1.009)	-1.774 (-0.976)		
F/Y	-0.535 (-0.135)	-0.131 (-0.034)		
dX/Y			-7.778 (-0.436)	-8.090 (-0.458)
dF/Y			42.507 (2.270)**	41.427 (2.241)**
var X/Y	9.200 (1.488)***	6.833 (1.721)**	7.334 (1.107)	4.684 (0.885)
var F/Y	4.747 (0.528)	4.050 (0.461)	1.861 (0.317)	1.942 (0.333)
cov [X, F]/Y	-0.020 (-0.504)		-0.024 (-0.677)	
\bar{R}^2	-0.006	0.019	0.143	0.158
F-ratio	0.958	1.163	2.134	2.600

Note: Numbers in parentheses are t values; *, ** and *** denote significance at the 0.01, 0.05 and 0.10 per cent levels respectively.

The third interesting observation that can be made from Table 1, and the most important one for our purpose, is the support for the contention that the presence of the covariance term in the estimating equation may affect either of the values of the regression coefficients of the instability variables, (var X/Y) and (var F/Y). The regression coefficient of (cov. [X, F]/Y) in equation (13) is negative and statistically significant but it is difficult to interpret this result within the given theoretical framework. At the same time it can be seen that the regression coefficients of (var X/Y) and (var F/Y) are not statistically significant, suggesting that instability is not an issue in promoting greater economic growth. However, when the covariance term is dropped from the analysis, as in the estimation of equation (13a), the regression coefficient of (var X/Y), which is negative in sign, becomes statistically different from zero at the 0.05 per cent level of confidence, suggesting that export instability is detrimental to economic growth. What apparently happens when equation (13) is used is the capture by the covariance term of some of the effects of instability which were intended to be recorded by the export instability variable (var X/Y). The removal of the covariance term, when equation (13a) is used, alters the result from one where export instability is not an issue in economic growth to one where it is.

V

What overall conclusions can be reached about the empirical verification of the general hypothesis that export instability is a serious issue in development planning for a large number of LDCs?

Firstly, there has been an unfortunate failure to recognize that the general hypothesis has to be broken into three distinct but related parts and that these parts have to be tested sequentially. In the rush to test the popular contention that export instability is detrimental to economic growth there was a tendency to concentrate on the third part of the general hypothesis, viz that economic in-stability *per se* is bad for growth, with little thought being

given to the first two, viz that LDCs have abnormally high degrees of export instability and that such instability leads to economic instability. An important result of this is the selection of samples of LDCs without the use of any criterion and the unthinking acceptance of the assumption that export instability is automatically transmitted to the rest of the economy. In both cases this has led to the use of samples of LDCs which leave much to be desired. It has also led to considerable doubt being cast on the results obtained on the relationship between economic instability per se and economic growth.

The second conclusion is that the third part of the general hypothesis has not been properly tested in spite of all the attention it has received. Some of the estimating equations used for establishing the relationship between export instability and economic growth have not been derived systematically or analytically and they bear little relationship to the theoretical arguments against export instability.

A careful examination of the a priori arguments against export instability shows that they can be divided conveniently into three types. It is probably fair to say that the version of the argument which concentrates on the effects of the neglect of other important developmental problems cannot be tested, in view of the extremely indirect sequences of causation and the difficulty of quantifying the variables involved. It is certainly not a coincidence that none of the existing studies has been concerned with this version of the hypothesis.

The version of the argument which highlights the inflation, business miscalculations and speculation that export instability brings is also extremely difficult to verify. Variables such as business miscalculation and speculation can hardly be quantified and the line of causation is also very circuitous.

The version of the hypothesis which sees export instability as resulting in the discontinuous flow of imported capital goods, which in turn lowers investment and economic growth, is the most analytically manageable. It is therefore not surprising that most of the existing cross-sectional studies have concentrated on it. Of all these studies the recent one by Voivodas is the only one in which the estimating equation has been derived systematically, but even here the specification of the relationship between instability and growth leaves something to be desired. Our analysis shows that the results obtained with a theoretically sound formulation are quite different from those obtained by using a theoretically weak one. The former shows that instability is detrimental to growth, while the latter shows that it is not.

All of the criticisms made of the existing cross-sectional studies on the relationship between instability and growth suggest that the empirical verification of any hypothesis must be preceded by a careful study of the a priori arguments. It is all too easy to mistake spurious relationships for the truth.

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1. I. MacBean, *Export Instability and Economic Development*, (London, Allen and Unwin, 1966), and K. A. M. Ariff, *Export Trade and the Malayan Economy: An Inquiry into the Economic Implications of Export Instability*, (Kuala Lumpur, Faculty of Economics and Administration Monographs on Malaysian Economic Development, 1972).
2. P. B. Kenen, and C. S. Voivodas, 'Export Instability and Economic Growth', *Kybllos*, vol. 25, fasc. 4, 1972.
3. Glezakos, 'Export Instability and Economic Growth: A Statistical Verification', *Economic Development and Cultural Change*, (July, 1973).
4. S. Voivodas, 'The Effect of Foreign Exchange Instability on Growth', *Review of Economics and Statistics*, (August, 1974).
5. David Lim, 'Export Instability and Economic Development: The Example of West Malaysia', *Oxford Economic Papers*, (March, 1974).
6. If export instability is transmitted to the rest of the economy, this would be reflected by a high degree of instability in the GNP, which we have called 'economic instability' for short.
7. J C. Leith has shown empirically that 'the conclusion one draws regarding a change in instability can depend on one's definition of instability and hence the index employed', in 'The Decline in World Export Instability: A Comment'. *Bulletin of the Oxford University Institute of Economics and Statistics* (August, 1970), pp. 268-9. See also K. Kubota, *A Note on Instability Indices* (New York, UNCTAD, 1968), mimeo.
8. Glezakos, *op. cit.*, p. 672
9. See the review of MacBean's book in *The American Economic Review*, (June, 1968) by A. Maizels.
10. The exception is MacBean who went into the issue in some detail.
11. See Lim, *op. cit.*, for a discussion on this for the West Malaysian economy.
12. We are only concerned about the effects of instability in export proceeds on economic growth. The effects of price instability on the growth of a country's export sector and therefore its economy are not considered.
13. See G. Myrdal, *An International Economy*, (London, Harper and Row, 1956), pp. 238-253, for a more detailed discussion of the a priori arguments against economic instability.
14. See Lim, *op. cit.*, for a fuller discussion of this point.
15. MacBean, *op. cit.*, pp. 111-112 and 123-124
16. Kenen and Voivodas, *op. cit.*, pp. 799-801.
17. *Ibid.*, p. 798.
18. Glezakos, *op. cit.*, p. 673.
19. Voivodas, *op. cit.*, p. 410.
20. Voivodas did not name the 31 LDCs and 6 primary producing countries that he included in his sample and there was no indication that he adopted the sample selection procedure used by Glezakos to ensure that his empirical verification was consistent with the hypothesis he wanted to test. However, it could be said in Voivodas' defence that he was interested in the effects of both exports proceeds and foreign capital inflow instability on growth so that there was really no need to include only those countries where a significant relationship existed between import capacity and export earnings.

21. It would have been useful to have a sample that was the same as that used by Voivodas but this was not possible. Voivodas used 31 LDCs and G PDCs in his sample but unfortunately did not name them, and his death in 1974 precluded any correspondence on the matter. Our sample consists of those LDCs and PDCs listed in the United Nations Yearbook of National Accounts Statistics and the International Monetary Fund International Financial Statistics for which the data requirement for the study can be satisfied. The G PDCs included in our study are Australia, Finland, Iceland, Ireland, Turkey and New Zealand. The 29 LDCs are Argentina, Bolivia, Burma, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Ghana, Greece, Guatemala, Honduras, India, Iran, Iraq, Israel, Mexico, Morocco, Nicaragua, Nigeria, Panama, Philippines, Portugal, Sri Lanka, South Korea, Sudan, Thailand and Venezuela.