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Commodity Export Instability and Growth in the Latin American Economies

In recent years Latin American has been a major participant in Third World demands for changes in international economic relations. The ensuing debates between the developing nations and the industrialized states have placed high priority on the regulation of international commodity markets. Consequently, when the first concrete proposals for the establishment of a new international economic order were adopted at the Fourth Session of the UNCTAD, the centerpiece of these proposals was the resolution on the Integrated Program on Commodities (UNCTAD, 1976; 1977a).

The central theme of the integrated program has become "to achieve stable conditions in commodity trade, including avoidance of excessive price fluctuations" (UNCTAD, 1976:3). The operational means designated for the stabilization of commodity markets is the "establishment of pricing arrangements, in particular negotiated price

I am indebted to Frank Orlando for helping to develop the analytic technique for the measurement of instability utilized in this chapter. The chapter also benefited from valuable comments on an earlier version by a number of persons, including John C. Elac, Jorge Espinosa Carranza, Walter C. Labys, and Robert C. Vogel. Computer work for the statistical results was undertaken by Nadine Lopez Callejas. The views expressed herein are those of the author and do not necessarily reflect those of the Inter-American Development Bank.

ranges" (UNCTAD, 1976:4); these arrangements would operate through supply management, principally in the form of commodity stockpiling or through production controls and export quotas. Since the fall of 1976, the developing and industrialized countries have engaged in a series of negotiations for regulating the international markets of up to eighteen commodities; twelve of which are among Latin America's principal exports (Table 9–1).[1] Although the UNCTAD proposal for the establishment of a common fund to serve as the main financial source of individual commodity stocking agreements has encountered some resistance, the key issue remains commodity price stabilization arrangements.

The focus of the integrated program on commodity price stabilization poses a number of issues for Latin America. First is a question of fact; that is, have Latin America's commodity exports been subject to unstable market conditions from a long-term perspective? Second, where export fluctuations have been severe, what have been their consequences on the economic development of the countries? Third, have commodity prices, rather than quantities, been the significant component affecting unstable behavior in export earnings? Finally, to the extent that export stability is a desired objective of the Latin American countries, can export instability be remedied or foreign exchange earnings be improved through international commodity arrangements as proposed by the integrated program? The importance of these questions has been underscored in the statement by Harry Johnson (1976:332 and 1977:248) on the need to "concentrate on the issue of why commodity prices fluctuate as much as they do, how far and in what respect such fluctuations have the undeniable adverse development effects that UNCTAD lore—and earlier popular beliefs about the development problem—invariably and sweepingly attribute to them, and what if anything can be done to mitigate the fluctuations by tackling the basic causes rather than the symptoms."

This chapter will examine these issues from the point of view of Latin America.[2] It begins by considering the relationship between economic development and export instability and also evaluates the empirical techniques used to measure this relationship. The next part assesses the degree of instability in Latin America's export earnings caused by the regionally significant commodities included in the integrated program and considers the responsiveness of earnings to fluctuations in both export price and volume. The final section deals with the feasibility of international commodity price stabilization arrangements for stabilizing or improving the region's export proceeds. The principal conclusion of this chapter is that neither the degree, the origins, nor the consequences of instability are phenomena common

among the Latin American countries but rather are uniquely circumscribed by the particular characteristics of each country and international commodity market. These last two factors determine whether or not a specific country is likely to benefit from global price stabilization schemes for their exports.

NATIONAL EXPORT INSTABILITY

Export instability has been a traditional preoccupation for Latin America because of the dependence of most countries on a relatively few primary commodity exports. To the extent that the markets for these products are unstable, their effect on overall export earnings may constitute a deterrent to national economic growth. The degree of fluctuations in export earnings and the impact on economic development are essential to the understanding of Latin America's support of international commodity stabilization agreements. This section addresses these two issues.

Consequences of Instability

Since most Latin American economies are strongly oriented toward foreign trade, export instability can more readily influence their overall economic performance. It is argued that unstable export receipts induce domestic instability and hinder economic development. When there is limited borrowing capacity and low reserves of foreign exchange, fluctuations in export receipts will cause variations in imports of capital goods. Because of the openness of the economies, these fluctuations in turn, can bring about sharp alterations in the level of investment, output, and employment. Sudden shortfalls in export earnings may retard growth in domestic sectors, whereas sharp increases in export earnings can cause inflationary pressure on the economy. The unreliable nature of these earnings hampers implementation and follow-up of projects that depend on projected levels of foreign exchange earnings and also can create discontinuities in the domestic economic policies of government development programs. Finally, export price volatility will increase uncertainty in investment planning and produce greater risks in investment financing and, thus, higher costs for fixed capital formation.[3]

However, assertions regarding the adverse effects of export instability on the economic growth of primary exporting countries have been questioned by MacBean (1966) on the basis of empirical evidence. His study assessed the relationship between export instability and a number of indicators of economic activity in a cross-section of countries. It concluded that export instability in developing countries, in

Table 9–1. Latin America: Contribution of Principal Commodity Exports to Each Country's Total Value of Merchandise Exports, 1970–1974 Average (Percentages)

	Regionally Significant Non-fuel Exports[a]												
	In UNCTAD List										*Others*		
	"Core" Products					*Other Products*							
Country	*Coffee*	*Sugar*	*Copper*	*Cotton*	*Cocoa*	*Beef*	*Iron Ore*	*Soy-beans*	*Bananas*	*Bauxite*	*Maize*	*Fish-meal*	*Sub-total*
Argentina	—	2.3	—	0.3	—	13.3	—	—	—	—	14.3	0.1	30.3
Barbados	—	31.4	—	—	—	—	—	—	—	—	—	—	31.4
Bolivia	1.6	2.4	—	3.1	—	0.4	—	—	—	—	—	—	7.5
Brazil	20.2	10.5	—	3.3	3.3	2.2	5.9	9.5	0.3	—	1.3	—	56.5
Chile	—	—	69.9	—	—	—	4.6	—	—	—	—	1.6	76.1
Colombia	51.6	3.2	—	3.9	0.1	2.2	—	—	1.7	—	—	—	62.7
Costa Rica	28.5	5.4	—	0.1	1.5	8.8	—	—	26.9	—	—	—	71.2
Dominican Rep.	9.3	48.0	—	—	6.3	1.7	—	—	0.3	4.2	—	—	69.8
Ecuador	11.0	3.7	—	—	7.6	—	—	—	20.1	—	—	—	42.4
El Salvador	42.2	5.7	—	10.9	—	0.7	—	—	—	—	0.4	—	59.9
Guatemala	32.5	5.6	—	10.8	0.1	4.8	—	—	4.4	—	—	—	58.2
Guyana	—	36.1	—	—	—	—	—	—	—	43.5	—	—	79.6
Haiti	37.3	5.5	—	—	3.6	1.8	—	—	—	8.0	—	—	56.2
Honduras	15.9	0.8	—	0.6	—	7.4	—	—	36.5	—	0.2	—	61.4
Jamaica	0.4	11.0	—	—	0.5	—	—	—	3.6	68.1	—	—	83.6
Mexico	5.8	6.0	0.7	6.5	0.4	2.0	—	—	—	—	0.4	—	21.8
Nicaragua	14.7	4.9	—	26.8	—	12.7	—	—	1.1	—	0.3	—	60.5
Panama	1.4	7.7	—	—	—	1.4	—	—	44.7	—	—	1.1	56.3
Paraguay	1.9	0.5	—	7.0	—	10.7	—	9.1	—	—	0.1	—	29.3
Peru	4.2	7.7	19.1	5.1	—	—	5.9	—	—	—	—	19.5	61.5
Trin. & Tobago	0.2	3.4	—	—	0.4	—	—	—	—	—	—	—	4.0
Uruguay	—	—	—	—	—	35.7	—	—	—	—	—	—	35.7
Venezuela	0.3	0.2	—	—	0.2	—	3.2	—	—	—	—	—	3.9
Latin America	9.6	5.5	5.3	2.4	1.1	3.2	2.5	2.1	1.7	1.7	1.9	1.1	38.1

Source: National statistical offices.

[a]The criterion used to define the main primary commodity exports of the region has been those products which during 1970–74 represented an average of at least 1% of the total value of Latin America's merchandise exports.

Table 9–1 (Continued)

[a]The criterion used to define the main primary commodity exports of the region has been those products which during 1970–74 represented an average of at least 1% of the total value of Latin America's merchandise exports.

Table 9–1. (Continued)

	Other Nationally Significant Non-fuel Exports[b]							
	UNCTAD		*Others*					
	"Core" Others							
Country	*Tin*	*Lumber*	*Prepared Meat*	*Shell-fish*	*Wool*	*Sub-total*	*Total Main Commod. Exports*	*Total Merch. Exports*
Argentina	—	—	4.9	—	2.1	7.0	37.3	100.0
Barbados	—	—	—	1.6	—	1.6	33.2	100.0
Bolivia	41.3	—	—	—	—	41.3	48.8	100.0
Brazil	0.2	1.6	1.1	0.6	0.3	3.8	60.3	100.0
Chile	—	0.5	—	0.3	0.2	1.0	77.1	100.0
Colombia	—	0.2	—	0.8	—	1.0	63.7	100.0
Costa Rica	—	—	0.1	0.6	—	0.7	71.9	100.0
Dominican Rep.	—	—	—	—	—	—	69.8	100.0
Ecuador	—	—	—	1.7	—	1.7	44.1	100.0
El Salvador	—	—	—	2.2	—	2.2	61.4	100.0
Guatemala	—	0.6	0.5	0.7	—	1.8	60.0	100.0
Guyana	—	—	—	2.9	—	2.9	82.5	100.0
Haiti	—	—	—	—	—	—	56.2	100.0
Honduras	—	13.4	—	1.2	—	14.6	76.0	100.0
Jamaica	—	—	—	—	—	—	83.6	100.0
Mexico	—	—	—	4.0	—	4.0	25.8	100.0
Nicaragua	—	1.9	—	3.0	—	4.9	65.4	100.0
Panama	—	—	—	10.2	—	10.2	66.5	100.0
Paraguay	—	—	12.0	—	—	12.0	41.3	100.0
Peru	—	—	—	—	—	—	61.5	100.0
Trin. & Tobago	—	—	—	—	—	—	4.0	100.0
Uruguay	—	—	—	—	14.8	14.8	50.5	100.0
Venezuela	—	—	—	0.2	—	0.2	4.1	100.0
Latin America	0.6	0.5	0.9	0.8	0.5	3.3	41.4	100.0

[b]Nationally significant products have been defined as those products which during 1970–74 accounted for an average of at least 10% of a country's total value of merchandise exports.

general, has not led to such detrimental effects on the growth of their economies as had been traditionally supposed. Later works of Kenen and Voivodas (1972) and Knudsen and Parnes (1975) corroborated these results. Nevertheless, there has also been much skepticism expressed over the empirical validity of these studies. Maizels (1968), for example, has disputed the statistical interpretation of MacBean; Voivodas (1974) showed the results to be sensitive to the manner in which the equations are formulated; and more recently, Lim (1976) has pointed to the failure of empirical works in this field to provide a theoretical framework for analyzing the relationship between export instability and economic growth.

More conclusive evidence has been found on the significance of export growth as a determinant of economic expansion in developing nations. Hence, Glezakos (1973) tested the effect of export instability on the growth rate of exports and the effect of the growth rate of exports on real per capita income. The results of this more indirect approach tended to support the traditional view that export instability may inhibit the economic growth of developing countries. Nonetheless, even these results do not seem necessarily valid for Latin America on the basis of the cross-national approach used by Glezakos. Although Massell, Pearson, and Finch (1972) have verified the importance of export growth to economic development in Latin America, export instability and growth (for the region's commodities included in the integrated program) have not been found to be significantly related for the twenty-three countries of the region during the 1960–1975 period.[4] These findings are not surprising. Various factors influence the growth rate of exports of the Latin American countries. Because of their structural differences, these may include the highly divergent internal policies among the countries, as well as the geographic destination of the products and conditions in the world markets. Moreover, high levels of instability have often resulted from discontinuities related to domestic expansionary export programs instead of unstable external markets (de Vries, 1977).

Cross-country analysis therefore does not provide a methodologically feasible manner of empirically resolving the issue of the effects of export instability. Its intrinsic limitation, as pointed out by Maizels (1968), presupposes similar domestic economic responses to export disturbances. To the extent that export responses differ, cross-section regression analysis fails to provide a significant relation between unstable export proceeds and economic growth, even though individual country responses may nonetheless be significant. It would therefore seem more valid empirically to test the experiences of each country separately.

This approach has been attempted recently by Rangarajan and Sundararajan (1976). They based their investigation on the use of export-income and export-investment multipliers calculated from aggregate country models. Although export fluctuations invariably increase instability of income, their findings show that the investment and income growth responses of countries to fluctuations in their export earnings vary considerably. For example, of the eleven countries examined, only five achieved an improved income growth rate when export instability declined; four of these were Latin American countries (Argentina, Chile, Colombia, and Mexico). However, in the fifth Latin American country included in the sample (Brazil) the reverse occurred; the average growth rate of income declined with increased export stability. Thus, even though their results cannot be considered conclusive because of the simplicity of the model employed, it does point to the need to examine the domestic impact of export instability on each Latin American country by considering its economic structure, openness, and adjustment response to short-run changes in foreign exchange earnings.

Magnitude of Instability

An equally controversial but closely related issue has been the degree of export fluctuations in the developing countries. This argument has been couched principally in terms of whether the degree of instability in developing countries exceeds that in developed countries. Coppock (1962; 1977), MacBean (1966), and Lawson (1974) found that the experiences of these two groups have not been significantly different. Conflicting results have, however, been reported by Massell (1970), Naya (1973), Glezakos (1973), Mathieson and McKinnon (1974), Knudsen and Parnes (1975), Stein (1977), and Sheehey (1977), all of whom found that developing countries do suffer from more instability than developed countries.[5]

Our primary concern in this chapter is to focus more narrowly on individual country export fluctuations, and specifically with reference to those commodities currently included in the integrated program.[6] As in the analysis of the effects of instability on development, it seems reasonable to presuppose that the degree of instability in Latin America for these commodities would not be accurately revealed by cross-country statistical comparisons. Instead, given the considerable differences in national behavior within the region, comparisons between country experiences in these commodity exports is likely to be more fruitful. Furthermore, it is useful to compare the extent of national export instability in the commodities included in the integrated program with that of the remaining exports not covered by the pro-

gram. In conjunction with an appreciation of the commodities' contribution to total foreign exchange earnings, it may then be possible to decipher more readily Latin America's interest in the integrated program negotiations.

Export instability is defined as sizeable, short-term movements of exports from their growth trend.[7] In its measurement, the norm most widely adopted for defining the trend has been the arithmetic or geometric growth of exports.[8] These functional forms are given by $X_t = a_0 + a_1 t + u_{1t}$ and $\log X_t = b_0 + b_1 t + u_{2t}$ respectively, where u_t is the unexplained variance. The trend coefficient, T, which is interpreted as the average annual growth rate of the export series, is equal to $(a_1/\bar{X})*100$ in the linear function, where $\bar{X}$ denotes the mean of the X variable, and to $b_1 * 100$ in the semilog function.

The index of instability, I, may then be defined as the normalized standard error of estimate for the given functional form, that is, the standard error of estimate divided by the arithmetic mean of the observations of the dependent variable.[9] However, since the dependent variable, X, is defined differently in the linear and semilog functions, their standard errors cannot be directly compared. For this reason, comparative instability indices in the past have been derived by imposing the same functional form to the series in a sample, even though an alternative form of the equation may have been preferred (Knudsen and Parnes, 1975:9).

This difficulty can be overcome, however, by a simple transformation of the dependent variable. The linear and semilog functional forms may be compared if the dependent variables have been previously divided by the geometric mean of the series.[10] By transforming and reestimating the equations in this manner, we derive the normalized "transformed" standard error of estimate and our new instability index becomes

$$I' = \frac{\sqrt{\frac{1}{n}\sum_{t=1}^{n} u_t'^2}}{\bar{X}'} * 100$$

where $\bar{X}'$ is the arithmetic mean of the transformed dependent variable. In this way, comparative instability indices may be calculated using either the linear or semilog functional form, depending on which equation provides the best fit.[11]

These calculations are presented in Table 9–2 (column 1) for Latin America's export earnings from the regionally significant commodities currently included in the integrated program. The results show a wide dispersion of average year-to-year fluctuations among the countries.

Table 9–2. Latin America: Instability Indices and Growth Trends of Regionally Significant Exports in Integrated Program and of Other Exports, 1960–1975

Country	*Exports of Integrated Program Commodities*[a]			*Other Exports*[b]	
	Instability Index (I')	*Trend Coefficient*	*Col(1) ÷ Col(2)*	*Instability Index (I')*	*Trend Coefficient*
Argentina	27.7	6.1	4.5	18.2	7.4
Barbados	22.3	4.0	5.6	14.4	11.6
Bolivia	15.6	27.5	0.6	14.3	13.6
Brazil	15.5	10.1	1.5	20.2	17.5
Chile	23.7	10.1	2.3	19.7	12.3
Colombia	15.4	5.6	2.8	24.7	13.4
Costa Rica	8.8	9.9	0.9	14.9	17.4
Dominican Republic	28.4	9.3	3.1	33.3	10.6
Ecuador	14.2	8.6	1.6	36.9	14.1
El Salvador	19.1	6.5	2.9	11.9	14.0
Guatemala	15.1	8.4	1.8	8.5	6.8
Guyana	12.1	10.3	1.2	24.1	6.0
Haiti	17.0	1.6	10.6	23.7	7.1
Honduras	14.9	7.0	2.1	15.7	12.3
Jamaica	17.4	9.3	1.8	33.6	7.9
Mexico	16.5	4.2	3.9	13.1	10.6
Nicaragua	11.1	10.7	1.0	9.1	14.2
Panama	14.1	12.2	1.2	31.0	10.5
Paraguay	27.4	22.8	1.2	13.4	9.5
Peru	10.9	5.4	2.0	12.8	9.0
Trinidad and Tobago	28.4	5.1	5.6	26.2	9.8
Uruguay	24.8	12.2	2.0	20.9	3.8
Venezuela	20.5	7.1	2.9	30.0	7.3

Source: Details of the regressions used to calculate instability and trend rates are available from the author on request. Data for the individual commodity export from national statistical offices; that for total merchandise exports from IMF (1977).

[a]Includes products of regional significance included in the Integrated Program as defined in Table 9–1.

[b]Refers to total national merchandise exports less regionally significant products included in the Integrated Program.

The indices of instability range from 8.8 to 28.4, with the frequency distribution skewed to the higher range. In the upper quartile are the Dominican Republic, Trinidad and Tobago, Argentina, Paraguay, Uruguay, and Chile. If consideration is given to the share of the product in total exports as well, it may be seen from Tables 9–1 and 9–2 that the countries for whom these products have accounted for over half of total export proceeds and for whom the index of instability has exceeded the median level of the region are the Dominican Republic, Chile, El Salvador, Jamaica, and Haiti. It is also apparent from Table 9–1 that the largest absolute fluctuations of earnings have occurred where the major export crops are sugar (Dominican Republic, Trinidad and Tobago, Paraguay, and Barbados), beef (Argentina and Uruguay), and copper (Chile). The fact that the countries with the lowest levels of instability depend on exports of one or more of these products suggests that either fluctuations in these markets were moderated by offsetting or more stable movements in other exports of this group of commodities, or volume and price movements of the products have tended to compensate one another.

However, absolute indices of instability conceal different patterns of growth for countries. A country with unstable growth caused by rapidly rising exports would be in a preferred position to one in which earnings fluctuated around a moderate growth trend. Similarly, a country with a given level of instability around a high growth trend would be better off than another with the same level of instability around a much slower growth rate. Column 3 of Table 9–2 indicates the different comparative circumstances that emerge among countries when the instability index is considered within the context of the export growth trend. Whereas Haiti and Mexico have had near average absolute levels of instability for countries in the region, they have ranked among the more severe cases of instability in relation to their comparatively slow growth rates in these exports. In contrast, whereas Paraguay has had one of the highest absolute levels of export fluctuations in the region, its instability has been primarily the result of the rapid growth of its soybean exports during the period.

It is also important to take into account the fact that export instability in Latin America has not been caused solely by fluctuations of products included in the integrated program. Instability in the receipts from other exports may have an equally detrimental effect on some of the economies of the region. In fact, a comparison of earnings fluctuations of all other commodity exports (Table 9–2, column 4) with those of products included in the integrated program reveals that instability of other exports has been higher in over half the countries. Eleven countries have had fluctuation indices in the integrated program com-

modities that were larger than those in their other exports, but twelve countries have had lower fluctuations. Nonetheless, among those in the first group, earnings fluctuations for the integrated program products were still at least 50 percent higher than for the other commodity exports of five of the countries—Barbados, Guatemala, El Salvador, Argentina, and Paraguay.

Thus, on the basis of the evidence presented so far, it appears that export instability has been a justifiable preoccupation for several Latin American countries. Nevertheless, the national concern is still dependent upon the nature of the variation of these export products. Criteria for the evaluation of this instability may include its comparative absolute levels, the importance of the products to total foreign exchange receipts, its context in the trend growth rates, and its comparison to that of other commodity exports.

Furthermore, whereas export instability has up to now been characterized in terms of earnings fluctuations for selected primary products, the integrated program focuses more specifically on their price volatility. Much attention has been given to the unstable price behavior of the markets for primary commodities. However, Table 9–3 shows that for many of the Latin American countries instability of export earnings has also been caused by volume fluctuations. Indeed, quantum fluctuations have been over one-fifth larger than price fluctuations in eight of the countries, and fluctuation indices of quantum have been roughly equal (± 10 percent) to price fluctuations in four of the countries. Quantum fluctuations may or may not be related to unstable price movements in the commodity export markets. The question remains, therefore, whether the stabilization of prices would also mitigate volume fluctuations and lead to greater and more stable earnings. This issue is treated in the following section.

COMMODITY EXPORT STABILITY

By itself, price stabilization for primary commodities may be desirable for the Latin American countries as a means of reducing the risk of investment planning. Moreover, producers may support greater price stability because it could raise the long-run demand for a product by not inducing risk-averse manufacturers to switch to more price-stable synthetic inputs or by creating permanent shifts in consumer preferences for other food or beverage substitutes during periods of otherwise temporary high prices. Beyond the possible direct benefits, however, it is also important to consider the impact of price stabilization on export earnings, the latter being of a greater concern to the Latin American countries.

Table 9–3. Latin America: Earnings, Price, and Volume Instability of Regionally Significant Commodity Exports in Integrated Program, 1960–1975

	Instability Index (I')		
Country	*Earnings*	*Price*[a]	*Quantities*[b]
Argentina	27.7	19.1	27.0
Barbados	22.3	23.9	15.6
Bolivia	15.6	23.7	33.7
Brazil	15.5	15.8	9.0
Chile	23.7	16.0	16.5
Colombia	15.4	12.6	7.0
Costa Rica	8.8	7.2	8.7
Dominican Republic	28.4	16.6	13.2
Ecuador	14.2	9.6	13.1
El Salvador	19.1	9.9	7.4
Guatemala	15.1	11.6	9.0
Guyana	12.1	17.6	15.8
Haiti	17.0	18.4	13.3
Honduras	14.9	10.1	16.5
Jamaica	17.4	24.6	11.0
Mexico	16.5	10.8	10.8
Nicaragua	11.1	8.1	9.9
Panama	14.1	10.2	10.6
Paraguay	27.4	24.0	46.6
Peru	10.9	11.8	6.9
Trinidad and Tobago	28.4	25.1	12.5
Uruguay	24.8	17.6	25.3
Venezuela	20.5	18.3	13.9

Source: Details of the regressions used to calculate instability and trend rates are available from the author on request. Data from national statistical offices.

[a]Calculated from the Paasche export price index of the products (1960 = 100).

[b]Calculated from the Laspeyres export quantum index of the products (1960 = 100).

The emphasis of the integrated program on mitigating price, rather than earnings, fluctuations is based on the recognition that market intervention mechanisms in commodity agreements are administratively more feasible for the regulation of prices than they are for regulating earnings.[12] Realizing that revenue stabilization is more desirable than price stability to developing countries, UNCTAD has advocated the expansion of existing compensatory financing facilities as a complementary measure to commodity agreements since price and earnings stabilization may be irreconcilable goals for the export markets of individual countries.[13] Yet the central feature of the integrated program remains the negotiation of international commodity price stabilization agreements, rather than compensatory financing systems. Stockpiling arrangements, which for the "core" products are to

be supported financially by a common fund, have been promoted as the key regulatory mechanism for the selected commodity markets since this control system generally introduces fewer distortions in the operation of the markets than do other mechanisms. However, additional regulatory measures, principally export quotas, have also been advanced to operate in conjunction with buffer stocks for the "core" products;[14] other intervention measures have been recommended for the more perishable products. Nonetheless, insofar as the effect on export earnings is concerned, there is theoretically a basic economic (though not administrative) similarity in control instruments that maintain prices within a given range by regulating supplies entering the market.[15]

Impact of Price Stabilization on Export Earnings

The more fundamental issue of commodity market intervention for producers is the impact that price stabilization has on both the overall level and the degree of instability of export earnings. Under a buffer stock arrangement, it can be demonstrated that this impact on the overall level depends on the source of the market disruption and on the degree depends on the price elasticities of supply and demand. Consider, for example, a market described by the linear demand and supply relation[16]

$$Q_d = a_0 - a_1 P + u \qquad a_1 \geq 0$$
$$Q_s = b_0 + b_1 P + v \qquad b_1 \geq 0$$

where Q_d = demand, Q_s = supply, P = price, a_0, a_1, b_0, b_1 = deterministic constants, and u, v denote stochastic disturbance terms.

In equilibrium, $Q_d = Q_s$, the price will be

$$P = \frac{a_0 - b_0}{a_1 + b_1} + \frac{u - v}{a_1 + b_1}$$

and the export earnings will equal

$$\begin{aligned} R = PQ_s = \left(\frac{1}{a_1 + b_1}\right)^2 & \{b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 \\ & + [2(a_0 - b_0)b_1 + b_0(a_1 + b_1) + (a_1 + b_1)v](u - v) \\ & + (a_0 - b_0)(a_1 + b_1)v + b_1(u - v)^2\} \end{aligned}$$

For demand-induced disruptions, in which shifts of u and $-u$ take place, the export earnings in the first period at price P_1 (Figure 9–1) are

$$R_{t-1} = \left(\frac{1}{a_1 + b_1}\right)^2 \{b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 + [2(a_0 - b_0)b_1 + b_0(a_1 + b_1)]u + b_1u^2\}$$

and in the second period at P_2 are

$$R_t = \left(\frac{1}{a_1 + b_1}\right)^2 \{b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 - [2(a_0 - b_0)b_1 + b_0(a_1 + b_1)]u + b_1u^2\}$$

This produces average export earnings of

$$\left(\frac{1}{a_1 + b_1}\right)^2 [b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 + b_1u^2]$$

and an average deviation of

$$\left(\frac{1}{a_1 + b_1}\right)^2 \{[2(a_0 - b_0)b_1 + b_0(a_1 + b_1)]u\}$$

For supply-induced disruptions, in which shifts of v and $-v$ occur, the export earnings in the first period at price P_1 are

$$R_{t-1} = \left(\frac{1}{a_1 + b_1}\right)^2 \{b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 - [2(a_0 - b_0)b_1 + b_0(a_1 + b_1) + (a_1 + b_1)v]v + (a_0 - b_0)(a_1 + b_1)v + b_1v^2\}$$

and in the second period at P_2 are

$$R_t = \left(\frac{1}{a_1 + b_1}\right)^2 \{b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 + [2(a_0 - b_0)b_1 + b_0(a_1 + b_1) - (a_1 + b_1)v]v - (a_0 - b_0)(a_1 + b_1)v + b_1v^2\}$$

This results in an average export earnings equal to

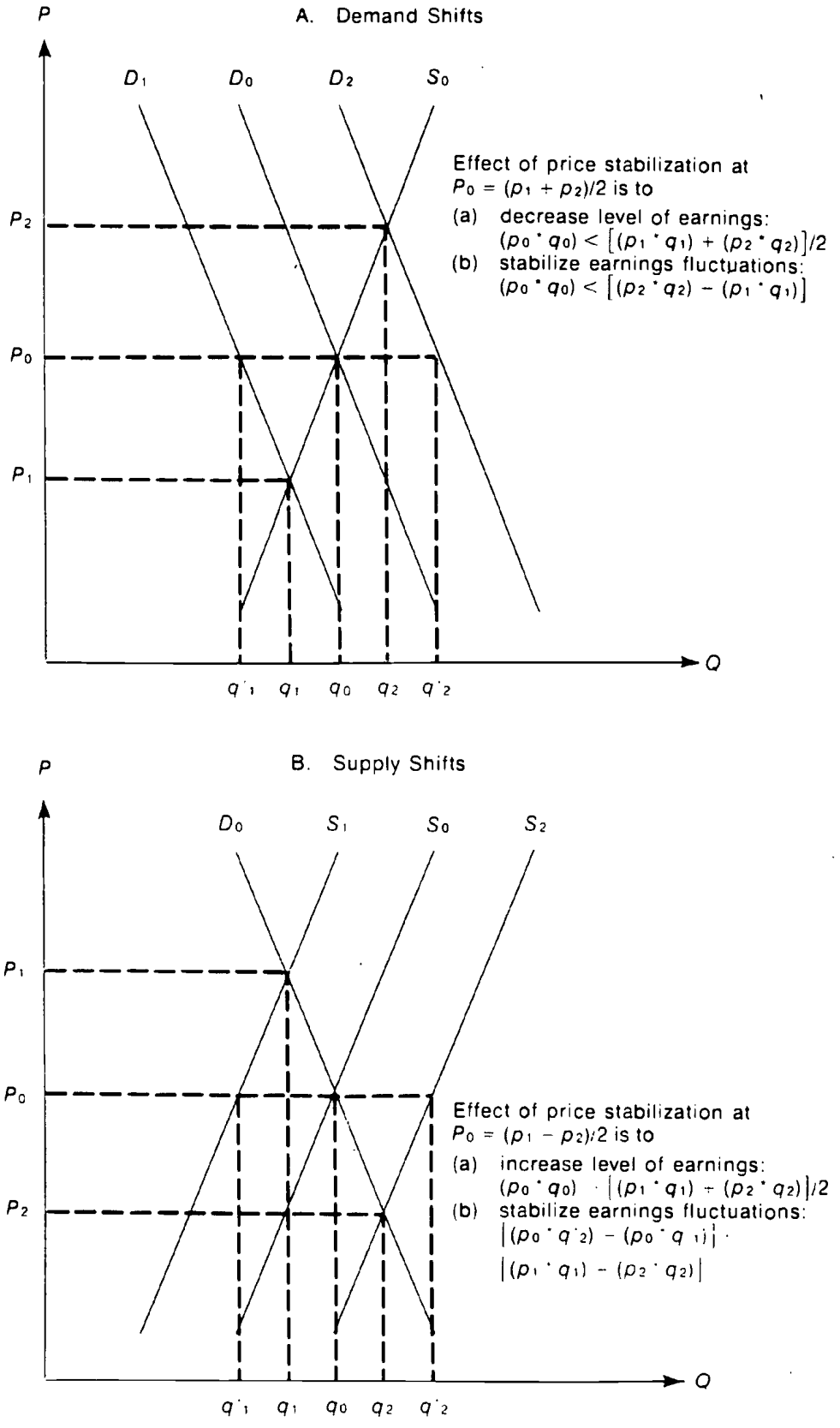

FIGURE 9-1. Impact of Price Stabilization on Export Earnings Under Price-Inelastic Supply and Demand Conditions

$$\left(\frac{1}{a_1 + b_1}\right)^2 [b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1 - (a_1 + b_1)v^2 + b_1 v^2]$$

and an average deviation of

$$\left(\frac{1}{a_1 + b_1}\right)^2 [a_0(a_1 - b_1) - 2b_0 a_1]v$$

Under a buffer stock scheme, the price would be maintained at the level needed to equate the nonstochastic components of demand and supply[17]

$$P_0 = \frac{a_0 - b_0}{a_1 + b_1}$$

maintained by the authorities trading from their stock[18]

$$x = v - u$$

When disruptions to the market are brought on by demand shifts, the quantity supplied under a buffer stock scheme would be

$$Q_s = \frac{b_0(a_1 + b_1) + (a_0 - b_0)b_1}{a_1 + b_1}$$

such that average revenue equals

$$P_0 Q_s = \left(\frac{1}{a_1 + b_1}\right)^2 [b_0(a_0 - b_0)(a_1 + b_1) + (a_0 - b_0)^2 b_1]$$

Consequently, price stabilization would reduce average export earnings by[19]

$$\left[\frac{b_1}{(a_1 + b_1)^2} u^2\right]$$

although earnings fluctuations would decline by

$$\left[\frac{2a_0 b_1 + b_0(a_1 - b_1)}{(a_1 + b_1)^2} u\right]$$

On the other hand, when disruptions to the market are caused by supply shifts, the export earnings under a buffer stock scheme in the first period would be

$$P_0Q_{t-1} = \left(\frac{1}{a_1 + b_1}\right)^2 [b_0(a_0 - b_0)(a_1 + b_1) + b_1(a_0 - b_0)^2 + (a_0 - b_0)(a_1 + b_1)v]$$

and in the second period would equal

$$P_0Q_t = \left(\frac{1}{a_1 + b_1}\right)^2 [b_0(a_0 - b_0)(a_1 + b_1) + b_1(a_0 - b_0)^2 - (a_0 - b_0)(a_1 + b_1)v]$$

Price stabilization would therefore increase average export earnings by

$$\left[\frac{a_1}{(a_1 + b_1)^2}v^2\right]$$

and fluctuations of export receipts in a stabilized market

$$\left(\frac{a_0 - b_0}{a_1 + b_1}v\right)$$

would be lower than that in a nonregulated market

$$\left[\frac{a_0(a_1 - b_1) - 2b_0a_1}{(a_1 + b_1)^2}v\right]$$

if supply and demand were sufficiently price inelastic.[20]

Sources of Export Instability

Agricultural market instability, especially for foods, has been principally associated with supply disruptions from natural phenomena (such as weather and disease conditions) and from internal actions taken by governments in price and investment policies. On the other hand, instability in the mineral markets and in some agricultural raw material markets have been mainly related to fluctuations in the level of economic activity of the industrialized countries. Disruptions of both types are aggravated by the high geographic concentration in these product markets,[21] and therefore changes within one of the major exporting or importing countries have a more pronounced effect on

those price adjustments needed to balance total supply and demand. This effect is especially serious if preferential trading arrangements or other obstacles to free trade prevent the geographic markets from acting as substitutes for one another.

One way of empirically identifying the source of export instability that has been used by the IBRD (1968) and by Brook, Grilli, and Waelbroeck (1977) consists of regressing trend deviations in the volume exported against price deviations. Since prices and quantities move in similar directions in demand-induced disturbances, a significant positive coefficient would imply that demand shifts were the main cause of instability; conversely, a significant negative coefficient would indicate that supply shifts had been the dominant cause.

Such results are reported in Table 9–4 for both Latin America and the world markets for the regionally significant commodity exports included in the integrated program. For world markets, the results verify the hypothesis of supply related causes for instability in three food products—coffee, cocoa, and bananas. The empirical work of Brook, Grilli, and Waelbroeck (1977) supports these findings. The calculations for iron ore and bauxite also indicate that instability in the two markets for these products has been mainly the result of supply disruptions, which is consistent with the findings of Behrman (1978).[22] Only in the case of copper have demand changes been the major cause of instability in the world market. Of the remaining four products (sugar, cotton, beef, and soybeans), the regression results were inconclusive, suggesting that in those markets both supply and demand shifts have been important.

The results show that on the world market the effect of price stabilization schemes on coffee, cocoa, bananas, iron ore, and bauxite would be to increase aggregate producer earnings; however, in copper the effect would be to lower earnings. Although Behrman's results support these conclusions, his findings indicate that fluctuations in aggregate earnings would be significantly reduced only in cocoa and copper, whereas they would remain about the same in an unrestricted market in coffee, bauxite, and iron ore. In the remaining four products, where no clearly dominant source of instability emerged over the period reviewed, the effect of a price stabilization scheme on aggregate producer earnings cannot be determined from the past behavior of the markets.

For the Latin American countries the pattern is more ambiguous, especially in world markets not dominated by demand-originating disruptions. The significance of supply disruptions in such markets reflects the export experiences of the major producers. Latin American

examples include Brazil in coffee, the Central American countries in bananas, and Jamaica in bauxite. In turn, shortages or surpluses in the markets resulting from supply shifts by the major producers have tended to be transmitted to the smaller producers in the form of demand-shift disruptions; this may be observed by the experiences of some of the region's coffee exporters.

Implications for Latin America

What can be inferred from these results about the effects of stabilization schemes on Latin America's export earnings? The principal lesson is that an analysis of the sources of instability at the world market level can be misleading when determining whether a country in Latin America is likely to benefit or not from price stabilization. At best, aggregated analysis of the sources of disruptions is useful when demand shifts dominate a market since they tend to affect all producing countries similarly. For example, in copper the principal source of disturbances for the Latin American exporters has also been attributed to demand shifts. In such instances, the effect of price stabilization on the export earnings of the Latin American producers would also be uniform. The results of Behrman and Tinakorn in Chapter 10 attempt to quantify the region's revenue effects in this commodity. Their simulated buffer stock program for copper shows that Chile and Peru's annual export earnings in copper during 1963–1975 would have fallen by 3.4 and 4.8 percent, respectively, below the level that was otherwise achieved.

In contrast, since supply-induced market instability is generally ascribed to independent output fluctuations of major producers, a price stabilization scheme that responded to supply changes in the market would have a direct effect only on the source of the disturbance. This effect would be to raise the level of earnings of the country but to lower its earnings fluctuations if demand and supply were sufficiently price inelastic. For those Latin American countries responding to external supply-induced market surplus or deficit conditions, the extent of the impact of price stabilization measures would be determined by demand-shift disturbances. Hence, the impact on national export earnings from supply-induced market disturbances cannot be directly ascertained from the effect of price stabilization on aggregate producer earnings.

Moreover, because global price stabilization schemes are unresponsive to domestic output disruptions in countries accounting for a small share of the world markets, they are limited in their capacity to mitigate export fluctuations or to improve the level of foreign exchange earnings in many Latin American countries. Given the relatively high

Table 9–4. Latin America: Principal Sources of Export Quantum Fluctuations of Regionally Significant Commodity Exports in Integrated Program, 1960–1975[a]

A. "Core" Products

Coffee		*Sugar*		*Copper*		*Cotton*		*Cocoa*	
Brazil	SS	Barbados	S/D	Chile	DD	El Salvador	DD1	Domin. Rep.	S/D
Colombia	S/D	Brazil	SS	Peru	DD	Guatemala	S/D	Ecuador	S/D
Costa Rica	S/D	Costa Rica	SS			Mexico	SS		
Domin. Rep.	DD	Domin. Rep.	SS			Nicaragua	S/D		
Ecuador	S/D	El Salvador	S/D			Paraguay	DD1		
El Salvador	DD	Guatemala	DD2			Peru	S/D		
Guatemala	DD1	Guyana	DD2						
Haiti	S/D	Haiti	S/D						
Honduras	DD2	Jamaica	DD1						
Mexico	DD	Mexico	SS						
Nicaragua	S/D	Panama	S/D						
		Peru	SS						
World	SS	*World*	S/D	*World*	DD	*World*	S/D	*World*	SS

B. Other Products

Beef		*Iron Ore*		*Soybeans*		*Bananas*		*Bauxite*	
Argentina	SS	Brazil	DD	Brazil	DD	Costa Rica	SS	Guyana	S/D
Costa Rica	SS	Peru	SS	Paraguay	DD	Ecuador	S/D	Haiti	SS
Honduras	SS					Honduras	SS	Jamaica	SS
Nicaragua	SS					Panama	SS		
Paraguay	DD								
Uruguay	SS								
World	S/D	*World*	SS	*World*	S/D	*World*	SS	*World*	SS

Source: Details of the fitted equations are available from the author on request.

[a]Calculated for countries in which the commodity is at least 5 percent significant to total merchandise exports, as described in Table 9–1.

Note: SS—Supply shifts dominant.
DD—Demand shifts dominant. DD1 and DD2 indicate prices lagged one and two years, respectively.
S/D—Both supply and demand changes important.
The dominant source of quantum fluctuations over the period has been inferred by the sign of the coefficient when quantum deviations from trend were regressed against the product's world unit export price deviations from trend. A statistical significant positive coefficient implies that demand changes (DD) have been the dominant source of instability; a significant negative coefficient indicates that supply shifts (SS) have dominated; an insignificant coefficient suggests that both supply and demand changes (S/D) have been important sources of instability. The test for the significance of the coefficient was at the 90 percent level.

degree of supply-associated instability that has characterized the exports of products covered in the integrated program, other remedial measures might be necessary either within the scope of the program or through domestic stabilization policies in the countries themselves.

Thus, although price stabilization schemes may reduce foreign exchange fluctuations, the impact on the level of export earnings is more varied. Under conditions that generally typify Latin America's primary commodity exports, price stabilization in demand-induced disruptions would probably reduce earnings below what they would otherwise be without market intervention. In supply-induced disruptions, price stabilization would benefit only the major exporter(s); it would reduce the revenues of the smaller producers since shortages from the major supplier(s) would be transmitted to them in the form of changes in demand for their exports. On the other hand, importing countries actually derive greater benefit from these schemes than heretofore realized. Kaldor (1976) has suggested that primary commodity price increases are passed on to final products and have a deflationary impact on the effective demand for industrialized countries' goods. Since market imperfections in these countries prevent declines in prices of basic products from having a symmetrically downward effect on final products, any significant change in primary commodity prices eventually has a dampening effect on industrial activity.[23] Furthermore, Behrman (1978) has demonstrated that over a simulated ten-year period the revenue gains from the reduction of inflationary pressure on consuming countries are greater than the earnings to producers as a whole. One, therefore, wonders whether there has been a *volte-face* in the roles at the UNCTAD negotiations. On the one hand, Latin America and other developing countries are becoming frustrated by the failure to complete the preparatory phase on individual commodities as set forth in the conference resolution 93(IV) and to reach any conclusive results on the fundamentals of a common fund;[24] but on the other, there has been speculation that at least for some of the industrialized countries this "setback" is seen as part of their overall bargaining posture, and thus perhaps a diplomatic "success."

CONCLUSIONS

This chapter has examined the rationale for the high priority that Latin America, in conjunction with other Third World nations, has placed on comprehensive commodity market arrangements in attempting to establish a new international economic order. The issue has been approached from three distinct but related dimensions for the re-

gionally significant commodities currently included in the integrated program. The first is whether export instability has been a serious problem in Latin America; the second is the validity of empirical techniques for measuring the consequences of instability; and the third is the efficacy of international agreements for mitigating fluctuations and improving export earnings in the Latin American countries.

On the basis of evidence for the last decade and a half, it appears that the experiences of many of the countries in the region constitute justification for participatory interest in market stabilization schemes for their products in the integrated program. The range of instability has been dramatic but the significance to each country will depend on the criteria used to evaluate these fluctuations. Notwithstanding the absence of an established norm for interpreting instability indices, it is apparent that especially severe export fluctuations have been recorded by countries heavily dependent on export earnings from sugar, copper, and beef, most notably Argentina, Chile, Uruguay, Haiti, and the Dominican Republic.

Important potential gains may consequently be derived by a number of countries in Latin America from international agreements because of the disruptive effects that could otherwise hinder their economic development progress. Empirical evidence has thus far failed to verify the degree to which export instability adversely affects economic growth. This shortcoming has little, if any, relation to the actual nature of the transmission process. Instead, the inability of applied economics to resolve this problem has been attributed primarily to the methodologically defective approach used in testing the hypothesis, which presupposes similar economic responses by all countries to export instability. There is little doubt that export instability can produce serious disruptions in the growth of an economy. Nevertheless, a more systematic case-by-case approach in Latin America will be needed to reveal the national interests in supporting greater export stability.

Yet it is questionable whether a solution to the problems confronting developing countries' exports can be found in comprehensive commodity arrangements as proposed by UNCTAD. The issue focuses on whether it is economically profitable to a sufficient number of countries in Latin America to induce them to exert their political force on the integrated program. Theoretically, depending on the conditions under which price fluctuations take place, the stated goal of price stabilization may or may not be compatible with the more substantive aims of stabilizing and improving export earnings of the Latin American countries.

Empirically, the analysis of those conditions in Latin America's

exports indicates (i) that price stabilization would generally not have an adverse effect on earnings instability in the international commodity markets and in most instances would reduce fluctuations; (ii) that if the copper market continues to be primarily subject to fluctuations on the demand side, buffer stock policies would have an adverse effect on the Latin American exporters' foreign exchange proceeds; (iii) that the apparent gains in total export earnings from a buffer stock arrangement for commodities that have responded primarily to changes in world supply conditions accrue to the major producer, but would reduce the amount of foreign exchange earnings of the other exporters because of the concurrent effects on changes occurring in their foreign demand; and (iv) that international commodity price stabilization schemes are unresponsive to export supply fluctuations in the medium- and small-level commodity producing countries of Latin America.

The policy implication is that the benefits from international price stabilization schemes need to be examined separately by each country on the basis of the severity of fluctuations in exports, the potentially disruptive consequences on the economy, and the primary source of the disturbance in the export market. At the regional level, the possible adverse revenue effects of commodity agreements on a fairly large number of countries in Latin America suggests the need for complementary measures in the integrated program that would enable the expansion of compensatory financing facilities to those nations.

NOTES

1. See Lord (1976) for a statistical analysis of the region's export markets for these products.

2. A good analysis of the broader economic issues confronting the developing and industrialized countries in the integrated program negotiations is provided by Michalopoulos and Perez (1977). Comprehensive reviews of the historical development of these issues are contained in Erb and Fisher (1977) and in Vastine (1977); see also Corea (1977), David (1977: 34–41), Fiallo (1977), Fishlow et al. (1978), Grubel (1977: 289–94), MacBean and Balasubramanyam (1976: 158–88), MacLaren (1977), Maizels (1976), Malmgren (1976), and Rangarajan (1978).

3. At the microlevel, Thoburn (1977) has found that this latter effect can induce developing countries to favor capital-intensive techniques for primary commodities, since they are viable at a wider range of prices than are labor-intensive methods of production.

4. The results of the regression were as follows:

$$T_r = 9.75 - 0.04\, I_r^{\prime}$$
$$(.19)$$

$$R^2 = .002 \quad \text{D.W.} = 2.14 \quad \text{S.E.} = 5.98$$

where T is the trend growth of exports in the integrated program commodities, I'_e is their index of instability, and the figure in parentheses is the t-statistic. The variables are defined more specifically below.

5. Beyond generalized comparisons of aggregative magnitudes of instability in low per capita income countries with those in high per capita income countries, there have been attempts to identify specific country characteristics associated with greater or lesser instability. Erb and Schiavo-Campo (1969) found that the economic size of a country (as measured by the gross domestic product and as a proxy of structural economic differences among countries) to be inversely related to instability in the less developed economies. In a similar vein, Mathieson and McKinnon (1974) concluded that openness, measured as the ratio of exports to gross national product, was negatively correlated with instability and thus implied that relatively greater trade of developing countries with advanced countries has had a stabilizing impact on their exports. However, geographic diversification of exports was not found to reduce instability in the investigations of Michaely (1962), Coppock (1962), Massell (1964; 1970), and MacBean (1966). On the other hand, Massell (1970), Knudsen and Parnes (1975), and Stoutar's (1977) findings tend to support the contention that product concentration increases export instability, although this has been questioned by O'Brien (1972) and Katrak (1973). Another interesting finding by Coppock (1962) and Askari and Weil (1974) is that instability in developing countries is a more serious problem with respect to exports of manufactured goods than that for primary commodity exports. Thus, while empirical work in this field has cast doubt on generalizations concerning instability in primary exporting countries, there has been evidence uncovered on patterns in instability associated with developing countries' structural characteristics.

6. Kingston (1973) provides data on total export fluctuations in the Latin American countries for the 1948–1965 period.

7. This definition has been applied equally to price, volume, and earnings fluctuations of exports.

8. Another method has been to measure deviations from a moving average within the period covered. (For a synopsis of indices of export instability used in previous studies, see Knudsen and Parnes (1975: 9–13)). However, the IBRD (1968: 37) study on export fluctuations has noted that preference is usually given to the least-squares method for analyzing fluctuations over a long-term period and to the moving average method in dealing with fluctuations of a relatively short-term nature. For this reason, the former norm has been adopted, given the orientation of the integrated program toward seeking long-term improvements in market conditions for exports of developing countries and the present concern over export instability in the Latin American countries over the past fifteen years.

9. Alternatively, the index has been defined by some researchers as the normalized square of the residuals from the fitted trend. However, this implies the heuristic assumption that larger deviations contribute proportionately more to uncertainty.

10. See Rao and Miller (1971: 107–111).

11. Instability indices are interpreted as follows: a low index implies that year to year changes in exports did not depart much from the trend taken as

the norm; conversely, a high index implies that there were substantial deviations from the trend. Nevertheless, it should be emphasized that such an index is limited by what Sundram (1967) depicts as the average for the period, which thereby conceals differences in the frequency and the regularity of export fluctuations. These could be in the form of short-term fluctuations throughout the period, a sharp peak or trough in an otherwise fairly stable growth, or cyclical movements around the trend.

12. Nevertheless, the difficulty of defining the trend growth rate around which a central agency would monitor price deviations continues to be of important concern in the literature on international commodity arrangements, as exemplified in the writings of Donges (1977: 241–44) and Hoffmeyer (1976). This has, however, been a more general problem related to informational inefficiency of long-run changes in commodity market prices (Smith, 1978).

13. At present, the two major compensatory financing mechanisms are those of the International Monetary Fund (IMF) and the STABEX system established under the Lomé Convention in 1975 for the European Economic Community's present and former possessions. In Latin America, the latter system covers Barbados, Jamaica, and Trinidad and Tobago. See Erb (1977) for a critical discussion of these two mechanisms within the new international economic order deliberations; Goreaux (1977) for an analysis of the IMF mechanisms; Wall (1976) and Alting von Geusau (1977) for an examination of the STABEX system in the context of the developing countries' aspirations for international trade reform; and de Vries (1975) for a general analysis of alternative compensatory financing schemes.

14. The new International Sugar Agreement (negotiated October 17, 1977, for the 1978–1982 period) makes use of export quotas as well as a buffer stock to defend the negotiated price range (UNCTAD, 1977d). Similarly, the present International Cocoa Agreement (effective 1976–1979) relies on the interaction of export quotas and a buffer stock mechanism. In the current deliberations on the other "core" products of regional importance to Latin America, a supplementary control mechanism in the form of export quotas has been proposed in addition to buffer stocks for copper (UNCTAD, 1977b) but not, however, for cotton (UNCTAD, 1977c).

15. See Brown (1975) for a thorough treatment of the variety of national and international mechanisms that have been devised to moderate export fluctuations and French-Davis M. (1968) for a specific analysis of the effects of an export quota system.

16. The nonlinear form of the model is presented in the works of Turnovsky (1978), Sarris and Taylor (1978), and Just, Lutz, Schmitz, and Turnovsky (1977). Extensions of this model have been undertaken by Turnovsky (1974; 1978) for price uncertainty, where supply decisions are based on "adaptive" and "rational" price expectations rather than actual market prices; by Sarris and Taylor and by Just, Lutz, Schmitz, and Turnovsky (1977) for markets with trade barriers; by Hueth and Schmitz (1972) for intermediate and final product trade; by McKinnon (1967) and Hallwood (1977) on the role of private futures markets for price stabilization authorities; and by Newbery and Stiglitz

(1977) for the impact of complete versus partial price stabilization on export earnings.

17. Because of the linearity of the function, this implies that the price would be maintained at the mean of the nonregulated market prices, which for the present case would be $P_0 = (P_1 + P_2)/2$.

18. Note that the expected value of the buffer stock, $E(x)$, is equal to zero.

19. This result was first proven by Grubel (1964) and Snape and Yamey (1963).

20. In all the regionally significant commodity exports included in the integrated program, the extensive survey of available elasticity estimates by Labys and Hunkeler (1974) indicates that supply and demand are price inelastic. Several factors contribute to the price inelastic nature of these products. Supplies tend to respond slowly to price changes as a result of capacity constraints on output expansion, lagged production response to demand changes, low or policy determined minimum levels of inventory holdings, and various institutional rigidities such as credit availabilities; on the demand side, the products mainly for direct human consumption are little affected by price variations over a fairly wide range, while consumption of products that serve as industrial raw materials, insofar as they represent a fairly low proportion of the final product's value, also tend to be unaffected by price changes over a fairly large range. The result is that relatively small changes in the quantity of supply and demand create sizeable increases or decreases in prices, while large price changes induce little response in the quantity of output or consumption, especially in the short run.

21. During the first half of this decade, the concentration ratio of the five leading exporters of these products ranged from 0.51 to 0.97, while that of the five principal importers ranged from 0.41 to 0.79. See Lord (1976).

22. Brook, Grilli, and Waelbroeck, however, found instability in the world bauxite market to be mainly due to demand shifts. This contradiction may be explained by the inclusion of more recent years in the present sample. During 1974–1975, significant structural changes took place among major bauxite producers and resulted in a major downward shift in world supplies.

23. This hypothesis closely resembles that elaborated by Raul Prebisch, who argued that cyclical swings aggravate the terms of trade deterioration of developing countries because wages and prices in the industrialized countries parallel primary commodity price movements during an upswing, causing inflationary pressure. On the other hand, they resist downward movements in a depression as a result of their monopolistic market structures in comparison to more flexible prices and wages in the primary producing sector of developing countries where workers are not unionized. The hypothesis has currently been popularized as the "ratchet-effect" (Cooper and Lawrence, 1975), and its validity has been attacked by Finger and DeRosa (1978) on the grounds that empirical support for downward inflexibility of prices of final products is unsubstantiated.

24. See IDB (1978: 24–31) for a review of the UNCTAD negotiations on the integrated program up to the scheduled ending of the preparatory meetings in February 1978.

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