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Exports of non-fuel primary products

Jere R. Behrman*

Introduction

The major macroeconomic goals of the Latin American countries relate to: (1) growth, (2) distribution, (3) short-run stability regarding employment, inflation and the balance-of-payments position, and (4) the international situation. Latin American analysts and policy-makers have long been preoccupied about the impact on the attainment of these goals of fluctuations and trends in international non-fuel primary commodity markets. It is not surprising, therefore, that Latin Americans have given considerable (although not unanimous) support to the call for the revision of conditions in international non-fuel primary markets that is the foremost demand of the developing countries in their quest for a "New International Economic Order".[1]

Although non-fuel primary products have accounted for a steadily declining share of total Latin American exports during the post-war era, they still represent a major source of foreign exchange for the region. In the first half of this decade, for example, they accounted for over 40% of total regional merchandise exports and over half of the individual country merchandise exports for three-quarters of the 24 countries that are included in table 1 (in descending order of dependence on such commodities for export revenues, these 18 countries are: Jamaica, Chile, Cuba, Honduras, Dominican Republic, Costa Rica, Guyana, Haiti, Peru, Guatemala, Colombia, Nicaragua, Uruguay, Brazil, Panama, El Salvador, Bolivia and Ecuador). Thus, both for the region as a whole and for many of the individual countries, non-fuel primary exports will continue to be important sources of foreign exchange during the 1980s whatever changes occur in the world economy.

The framework for recent and ongoing exploration of changes in the international non-fuel primary commodity markets was established by the proposal and resolution adopted at UNCTAD IV (Nairobi, 1976).[2] The original proposal focuses on 10 core commodities, five of which are important from the point of view of Latin America in the sense that they account for at least 1% of total regional merchandise export value (coffee, sugar, copper, cotton and cocoa), and one of which (tin) provides half of the merchandise export value of Bolivia. Together these six core commodities accounted for 24% of Latin American merchandise export earnings in the first half of the 1970s. Eight other commodities also were mentioned, four of which (beef, iron ore, bananas, bauxite) each accounted for at least 1% of the region's merchandise export earnings, while the eight commodities together

*Chairman, Department of Economics, University of Pennsylvania.

[1] For recent analyses of the New International Economic Order see the references to this subject in: Bhagwati, Jagdish, N., ed., *The New International Economic Order: The North-South Debate*, Cambridge, Mass.: The MIT Press, 1977; Cline, William R., ed., *Proposals for a New International Economic Order: An Economic Analysis of Effects on Rich and Poor Countries*, Washington, Praeger and Overseas Development Council, 1979; Erb, Guy F. and Bart S. Fisher, "U.S. Commodity Policy: What Response to Third World Initiatives?", *Law and Policy in International Business*, Washington D.C., 9:2, pp. 479-513, 1977; Fishlow, Albert, *et al.*, *Rich and Poor Nations in the World Economy*, New York: McGraw-Hill Book Company, 1978; Grubel, Herbert G., "The Case Against the New International Economic Order", *Weltwirtschaftliches Archiv*, Tübingen 54:4, pp. 284-307, 1977; Kreinin, Mordechai E., and J. M. Finger, "A New International Economic Order: A Critical Survey of its Issues", *Journal of World Trade Law*, Twickenham, England, September/October 1976, and Vastine, Robert J., "United States International Commodity Policy" *Law and Policy in International Business*, 9:2, pp. 401-77, 1977.

[2] United Nations Conference on Trade and Development (UNCTAD), "An Integrated Commodity Programme", Geneva, 1976 and "Resolution Adopted by the Conference: Integrated Programme for Commodities", Geneva, TD/RES/93, (IV), 1976.

Table 1

PERCENTAGE CONTRIBUTION OF MAIN NON-FUEL PRIMARY EXPORTS TO LATIN AMERICAN MERCHANDISE EXPORTS, 1970-1975[a]

Country	UNCTAD Core							UNCTAD Others[b]						Other regionally significant[c]			Other nationally sig.[d]		Total main commodity exports	Instability indices[e]		
	Coffee	Sugar	Cooper	Cotton	Cocoa	Tin	Subtotal	Beef and prepared meat	Iron ore	Bananas	Bauxite	Wood	Subtotal	Soybeans[b]	Maize	Fish meat	Shellfish	Lumber[b]		Prices	Quantities	Earnings
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Argentina							0	24				4	28						28	19	27	28
Barbados		35					35						0				2		37	24	16	22
Bolivia	2^f	2^f	3^f			50	57						0						57	24	34	16
Brazil	24	7^f		5	2		38	3^f	6				9	10	1	1	1	2	61	16	9	18
Chile			73				73		5				5			2		1	81	16	17	24
Colombia	52^f	3^f		4^f			59	2^f		2^f			4				1		64	13	7	15
Costa Rica	27	5^f			2^f		34	9^f		27^f			34				1		69	7	9	9
Cuba^g		75					75						0						75	...	...	...
Dominican Republic	8	52		5			65	2^f			4		6						71	17	13	28
Ecuador	11	4^f		8			23			28			28				2		53	10	13	14
El Salvador	38	6^f		12			56	1^f					1				2		59	10	7	19
Guatemala	31	8		11			50	6^f		6			11				1	1	65	12	9	15
Guyana		35					35				30		30				3		68	18	16	12
Haiti	39	8			4^f		51	2^f			13		15						66	18	13	17
Honduras	16	1^f		1^f			18	7^f		34			41				1	13	73	10	17	15
Jamaica		13			1^f		14			3	68^f		71						85	25	11	17
Mexico	5	6	1^f	7			19	2^f					2		4				25	11	11	17
Nicaragua	14	6		26			46	12		1^f			13						64	8	10	11
Panama	1^f	9					10	1^f		39			40			1	3	2	61	10	11	14
Paraguay	2^f	1^f		7			10	28					28	9			10		38	24	47	27
Peru	4	8	23	5			40		6				6			20			66	12	7	11
Trinidad and Tobago		5					5						0						5	25	13	28
Uruguay							0	36				27	63						63	18	25	25
Venezuela										4^f									4	18	14	21
Latin America	8	7	5	2	1	1	24	4^f	3^f	2^f	2^f	1^f	12	2	2	1	1	1	43			

[a]From Behrman, *International Commodity Agreements:...*, *op. cit.*, except in the case of items for which notes c, d and f are relevant, which are from Lord, *op. cit.*

[b]In the original UNCTAD proposal soybeans and lumber were not included, but they are included with the other commodities in later documents.

[c]"Regionally significant" means commodities that accounted for at least 1% of Latin American merchandise exports in 1970-1974 (the period on which these columns are based).

[d]"Nationally significant" means commodities that accounted for at least 10% of some Latin American country's merchandise export value for 1970-1974 (the period on which these columns are based).

[e]Defined as 100 times the variance from the trend for 1960-1976 relative to the arithmetic mean, where the dependent variable was first transformed by dividing the geometric mean of its series to make comparable linear and semi-log functions. A Paasche index is used for prices and a Laspeyres index is used for quantities. Based on coffee, sugar, copper, cotton, cocoa, beef, iron ore, bananas, bauxite, and soybeans. Source is Lord, *op. cit.*

[f]1970-1974.

[g]No data are given for Cuba in Lord, *op. cit.*

accounted for 10% of total Latin American merchandise export value. The emphasis in the proposal and resolution is on price stabilization for the core commodities through international buffer stock agreements, although there are also a number of phrases that suggest the possibility of increasing the secular trend of prices.

The UNCTAD proposal is called an integrated feature in it is the establishment of a Common Fund, primarily to provide financing for the core commodity agreements and secondarily to conduct "second window" lending operations for commodities not amenable to stockpiling, for product diversification, etc. The Common Fund would also pool and reduce risks, have more bargaining power in international capital markets than would a set of individual capital markets for the same commodities, and require smaller total financing than the aggregate of a set of individual funds because of differences of phasing of cycles across commodity markets. The original proposed magnitude of the Common Fund was US$ 6 billion.

Negotiations over the details of the Common Fund have continued for several years. The "Group of 77" developing countries sought a Fund with paid-up capital from direct assessments of about US$ 2 billion, to be supplemented by borrowing approximately US$ 4 billion on capital markets, and they advocated that about one-quarter of the total would be used for "second window" operations. The "Group B" or industrial countries, in contrast, advocated financing by deposits from the individual international commodity agreements instead of direct assessments, and opposed "second window" operations.

A breakthrough occurred at the March 1979 UNCTAD negotiating session with the resolution of the two major controversial issues: (1) as regards the basic capital structure,

agreement was reached that US$ 400 million would be raised by direct assessment (about two-thirds of which would be from Group B countries) and that other financing (amounting to one-third of the agreements' prospective financial requirements) would come from contributions by the producing and consuming country governments in each individual international commodity agreement; (2) as regards the second window, it was agreed to establish such operations with funding of US$ 370 million, but without any transfers allowed from the first window (the United States maintained its opposition to participating in the second window, but no longer opposed the voluntary participation of other Group B countries). More than a hundred countries agreed in the plenary of the session to a document that resolved these issues and referred further negotiations and the drafting of the articles of the Common Fund to an Interim Committee. Although some difficult issues remain (e.g., the distribution of voting rights), Common Fund negotiations may well be successfully concluded within a year or so. Subsequently, ratification by national legislatures will be required.

Consideration of the UNCTAD Integrated Commodity Programme has dominated recent discussions of future changes in international non-fuel primary commodity markets. Moreover, after the March 1979 UNCTAD negotiating session there appears to be a significant probability that some variant of the UNCTAD programme will be implemented. Therefore the rest of this paper focuses on the implications of the UNCTAD proposal for Latin America. Section I explores the primary question of "first window" price stabilization of the core commodities, section II more briefly considers the implications of attempting to alter the secular price trends, and section III summarizes the results.

I

Non-fuel primary commodity price stabilization

The UNCTAD Programme emphasized the stabilization of prices of the core commodities through international buffer stock operations. In order of the commodities' importance in export earnings for Latin America, the average annual absolute value percentage deviations from the trends of these prices over the period 1963-1972 were 17 for coffee, 33 for sugar, 22 for copper, 8 for cotton, 23 for cocoa and 8 for tin.[3] For all but cotton and tin these fluctuations were relatively large. The specific implications of these price fluctuations for each country, of course, depend on the exact composition of its exports. The price instability indices in column 20 of table 1 suggest that among Latin American countries in recent decades Jamaica, Peru, Paraguay, Barbados and Bolivia have experienced particularly large fluctuations in the prices of their commodity exports included in the UNCTAD programme. Such large variations in prices may make private or public planning much more difficult. They may also contribute to fluctuations in earnings if they are not offset by changes in volume of production. Because of differential variations in such volume, however, the Latin American countries with the greatest instability in export earnings from these same commodities differ somewhat from the above list, their order being Argentina, Dominican Republic, Trinidad and Tobago, Paraguay, Uruguay, Chile, Barbados, and Venezuela (column 22 of table 1). For many purposes the effect of such fluctuations in earnings may be more important than that of price fluctuations, although it is the latter towards which the UNCTAD programme is directed (this topic will be dealt with again below).

A number of questions arise about the UNCTAD programme. What are the magni-

tudes that are involved in its operation? What are the implications for developing countries in general and for Latin America in particular? What are the implications for the developed economies? How does this programme compare with alternative policies?

These questions will be explored in this section primarily through the use of simulations of international buffer stock activities with simple econometric models of the relevant international markets. These models capture the time pattern of simultaneous and lagged responses in supply, current demand and private inventory demand relations for each of the relevant commodity markets, and the parameters used in them are those most consistent with observed behavioural and technological responses.[4] Before turning to the insights gained from these simulations, however, it is useful to indicate some reasons why the simple *a priori* theorizing and simple correlations that are often used for such analysis may be inadequate.

1. *Limitations of a priori and correlation analysis of commodity markets.*

Much of the analysis of international commodity markets is based on simple supply and

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[3]Behrman, Jere R., *International Commodity Agreements: An Evaluation of the UNCTAD Integrated Commodity Programme.* Washington: Overseas Development Council, 1977.

[4]For further details concerning these models and their use for commodity market simulations, see Behrman, *International Commodity Agreements: ... op. cit.*; Behrman, "The UNCTAD Integrated Commodity Program: An Evaluation", in F.G. Adams and S. Klein, eds., *Stabilizing World Commodity Markets: Analysis, Practice and Policy*, Lexington, Mass.: Heath-Lexington Publishing Company, 1978; Jere R. Behrman, and Pranee Tinakorn, "Evaluating Integrated Schemes for Commodity Market Stabilization" in F. Gerard Adams and Jere R. Behrman, eds., *Econometric Modeling of World Commodity Policy*, Lexington, Mass.: Heath-Lexington Publishing Company, 1978, and "The UNCTAD Integrated Program: Earnings Stabilization Through Buffer Stocks for Latin America's Commodities", in W. Labys, M. Ishaq Nadiri, and José Núñez del Arco, eds., *Commodity Markets and Latin American Development: A Modeling Approach*, Cambridge: Ballinger Publishing Company and NBER, 1979.

demand models or bivariate correlations. However, such analysis may be quite misleading in respects that frequently do not seem to be recognized. For this reason, simulations of macroeconometric models will be used in the analysis below.

One problem with many of the analyses is that the results are sensitive to the assumed forms of the supply and demand functions. For example, Johnson[5] argues that "elementary economics" demonstrates the incompetence of UNCTAD economists, since they did not recognize the trade-off between prices and earnings stabilization, yet Johnson's own analysis of this trade-off depends upon his particular assumptions of linear price-elasticity curves and additive shifts, without any empirical testing. With alternative assumptions —some of which seem theoretically and empirically at least as warranted as his— very different results are obtained![6]

Another example is provided by Lord's[7] recent empirical analysis of the supply versus demand causes of fluctuations in Latin American commodity exports. By looking at the sign of the correlation between retrended quantities and prices, he claims to identify whether the underlying shifts were primarily in supply (negative correlations) or in demand (positive correlations).[8] But Porter[9] proves that such a test is valid only if the supply and demand price elasticities are equal,[10] and it seems very

unlikely that such elasticities are anywhere near equal for most of the country-commodity combinations that Lord considers. The market shares of Latin American countries for the six UNCTAD core commodities of interest to them are generally relatively small, the only values higher than 10% being for Bolivia (tin), Brazil (coffee and cocoa), Chile (copper) and Colombia (coffee). Thus, the demand price elasticities facing the individual countries are very high, often approaching infinity, but Lord's analysis is appropriate only if the country supply elasticities are equally high: an assumption that does not seem to be based on empirical facts. Therefore, once again his conclusions seem to be quite suspect because they are not based on relevant assumptions regarding the underlying structure (in this case the elasticities) of the markets.[11]

Yet another problem affecting much of the simple theoretical and empirical analysis is that all adjustments are assumed to be instantaneous, so that fairly long-run price equilibria are reached immediately. Both Johnson and Lord are among the multitude of analysts who make this simplifying assumption. In the real world, however, there are considerable lags because of the time required for adjustment of production, consumption and investment processes and for the creation of expectations, and such lags may substantially alter the outcomes compared with those implied by analyses that ignore such factors, as the textbook "explosive cobweb" model demonstrates.

The models used for the simulations reported below differ from the Johnson-Lord type of analysis in that decisions regarding a number of critical questions (e.g., magnitude of elasticities, additive versus multiplicative

[5]Harry G. Johnson, "Commodities: Less Developed Countries' Demands and Developed Countries' Response", in Bhagwati, op. cit.

[6]See Berhman, *International Commodity Agreements:...*, op. cit.

[7]Montague, J. Lord, "The UNCTAD Integrated Program: Export Stabilization and Economic Growth in Latin America", in Labys, Nadiri and Núñez, op. cit.

[8]There is a long tradition of making some inferences by this method dating back at least to United Nations, *Instability in Export Markets of Under-Developed Countries*, ST/ECA/15, 1952. Another, more recent, example is Ezriel M. Brook, Enzo R. Grilli and Jean Wallbroeck, "Commodity Price Stabilization and the Developing World", Washington: IBRD, Bank Staff Working Paper No. 262, 1977.

[9]Richard Porter, "On Placing the Blame for Primary Product Instability", *International Economic Review*, Philadelphia, Pa., 11:1, pp. 175-178, 1970.

[10]To see that elasticities must matter, consider the case in which one of the two curves is stabile and infinitely

elastic (thereby fixing the equilibrium price) and the other curve has less than infinite elasticity and shifts considerably. Even though by assumption the instability arises from the movements in the latter curve, the Lord method will give a zero correlation between pairs and quantities and atribute the instability equally to shifts in both curves.

[11]If demand elasticities are bigger than the supply elasticities, as is probably generally the case for the country-commodity combinations that Lord considers, then this method is biased towards incorrectly attributing the relative responsibility for shifts to the supply side. See Porter, op. cit., for an explicit demonstration of this bias.

shifts, pattern of lags) were made in order to ensure the highest consistency possible with the historical data from these markets. It is true that the use of these models still involves a number of important assumptions,[12] but they provide a much better basis for this analysis than the frequently encountered studies involving much stronger critical assumptions, of the types noted above.

2. *Magnitudes involved in buffer stock operations.*

The UNCTAD Integrated Commodity Programme has been simulated over a thirteen-year period under the assumption that the buffer stock operators have sufficient financial and commodity reserves to keep price fluctuations within 15% of the secular trends that actually prevailed in the 1950-1975 period (see discussion at start of section II below). The simulation was conducted over a relatively long period so that the ongoing behaviour of the agreement can be considered under a variety of external conditions regarding world economic activity, etc.

Table 2 summarizes the simulated activity of the buffer stocks and the impact of this activity on producers' revenues over the thirteen-year period.[13] For each of the six commodities of interest to Latin America it gives the number of buffer stock purchases and sales; the longest continuous period of buffer stock activity without buying and without selling; the present discounted value of buffer stock activity with and without inclusion of the value of final stocks; the mean percentage changes due to the buffer stock price stabilization programme in prices, quantities supplied and producers' revenues; the present discounted

value of additional producers' revenues due to the institution of the Integrated Commodity Programme; and an index of the extent of revenue stabilization which occurs because of the Programme.[14]

The simulations indicate that for three of the six core commodities of interest to the region the buffer stock must begin with initial stocks in order always to be able to defend the price ceiling. If there were not such initial stocks for sugar, copper and tin, the buffer stock authorities would not always be able to defend the ceilings in the initial years because to do so would require greater quantities of commodities than they would have purchased at an earlier time in efforts to defend the floors.

After establishing their initial position, in the subsequent thirteen years of simulated buffer stock operation the buffer stocks intervene in the market 42 out of 78 possible times, or slightly more than half of the years, on average, for each commodity (columns 1 and 2 of table 2). Such activity is somewhat more frequent for sugar and somewhat less frequent for tin than for the other four commodities. Despite this frequency of intervention in the market, there would be long periods when the buffer stocks would not intervene on one side of the market. Columns 3 and 4 of table 2 show the longest continuous period in years of buffer stock activity without buying or without selling, respectively. The longest period without buying ranges from three years for cocoa to thirteen years for cotton and tin, with an average of 9.7 years, while the longest period without selling ranges from two years for sugar to ten years for tin, with an average of 5.3 years. These long periods without intervening on one side of the market suggest that it might be quite difficult to be sure that the target prices around which the buffer stocks are attempting to stabilize are related to long-run equilibrium values. These long periods also imply that if international commodity agree-

[12]See Behrman, *International Commodity Agreements:...*, *op. cit.*, and "The UNCTAD Integrated Commodity program...", *op. cit.*, and Behrman and Tinakorn, "Evaluating Integrated Schemes...", *op. cit.*, for further discussion of this question.

[13]For much more detailed discussion of these results see Behrman, *International Commodity Agreements:...*, *op. cit.*, and "The UNCTAD Integrated Commodity Program...", *op. cit.*, and Behrman and Tinakorn, "Evaluating Integrated Schemes...", *op. cit.*, and "The UNCTAD Integrated Program...", *op. cit.*

[14]This index is the ratio of the standard deviation of real revenues with the price stabilization programme to the standard deviation of real revenues without the stabilization programme. A value of less than 1 thus indicates that revenues are more stable with the programme than without it.

Table 2

SUMMARY OF BASIC INTERNATIONAL BUFFER STOCK COMMODITY PROGRAMME SIMULATIONS FOR SIX UNCTAD CORE
COMMODITIES OF IMPORTANCE TO LATIN AMERICA, OVER 13 YEARS

UNCTAD core commodities of interest to Latin America	Number of buffer stock interventions		Longest continuous period (in years) of buffer stock activity		Value of buffer stock activity[b]		Mean percentage changes[c] due to price stabilization in:			Value of additional producer revenue[b,c]	Revenue stabilization index[d]
	Purchases[a]	Sales	Without buying	Without selling	Excluding final stock	Including final stock	Price	Quantity supplied	Producers revenues		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Coffee	2	5	9	4	−494	−413	1.5	1.0	2.4	1 734	0.71
Cocoa	6	1	3	6	−667	−70	4.2	2.9	6.7	334	0.24
Sugar	11	1	12	2	−13 877	−6 309	23.1	2.2	23.6	10 609	0.22
Cotton	9	0	13	4	−3 735	−643	3.7	2.4	6.1	8 241	0.51
Copper	3	5	8	6	−508	382	0.8	−0.2	0.6[e]	−188[e]	0.94
Tin	1	1	13	10	30	30	−0.2	−0.0	−0.2	−21	1.00
Average[f]	5.3	2.2	9.7	5.3	−19 251[f]	−7 023[f]	5.5	1.4	6.5	20 709[f]	0.60

[a] Including initial purchases in the case of sugar, copper and tin.
[b] These values are present discounted values using a 5% real discount rate and are in millions of constant 1975 dollars.
[c] The comparisons are with identical simulations, except that no buffer stock activity is assumed.
[d] This is the ratio of the standard deviation in real revenues with price stabilization to that without price stabilization.
[e] The present discounted value is negative even though the mean percentage change in producers' revenues is positive, because of negative values early in the simulation period.
[f] Total for columns 5, 6 and 10.

ments are in effect only for the five-year period suggested by the Havana Charter, in many cases activity might be quite concentrated on one side of the market. Such considerations suggest that it might be desirable to have buffer stock agreements with longer lives than has generally been proposed.

Another interesting aspect of the simulated buffer stock interventions is that purchases are more than twice as frequent as are sales for the six commodities combined. The prevalence of purchases for cocoa, sugar and cotton much more than offsets the weight of sales for coffee and copper (columns 1 and 2 of table 2), and this overall asymmetry between purchases and sales occurs despite the fact that the buffer stocks are stabilizing around the long-run secular trends that actually occurred. The frequency of intervention on one side or the other of the market is not a very good indication of whether or not the target secular price trend is above or below the long-run equilibrium path, except possibly in extreme cases or with a very large number of years of operation.

Another important point about the simulated operation of these buffer stocks is that the magnitude of financing becomes fairly large after several years, even though there are significant advantages from pooling finances across these six core commodities. For example, the sum of purchases minus sales indicates that, on the average, a total of about US$ 1 billion per year would be expended. For half of the commodities, moreover, the maximum financing needs would occur in the first five years of operation. Therefore, in about six years the buffer stocks would exhaust the US$ 6 billion fund originally mentioned in the UNCTAD proposal, even if only these six of the ten core commodities were included and even if no second window operations were conducted. This occurs despite the gain of about 21% obtained by pooling across commodities so that sales of one commodity offset purchases of other commodities.[15] The large access to

financing required despite such pooling may make it necessary —at least politically— to establish such a programme initially on a shorter-term basis than the considerations in the previous paragraph would indicate are desirable. However, one important caveat should be made here. The model for sugar seems much less satisfactory than those for the other commodities,[16] and sugar plays a very big role in these estimates. If sugar is excluded the average required access to funding drops 70% to less than US$ 350 million per year, with a 43% gain from pooling. This level of financing would be possible for a number of years with funding of the order of magnitude proposed by UNCTAD, even if allowance is made for the four core commodities not of particular interest to Latin America and for some second window operations.

What are the net cost of this buffer stock activity after adjustments for storage, transactions, deterioration, interest, and buying-selling differentials? The answer depends largely on the value placed on the final stocks and on whether or not the simulations for sugar are reliable. For all six core commodities the present discounted value of operating the UNCTAD programme for 13 years is —7.0 billion 1975 dollars if final stocks are valued at actual prices prevailing the year after the simulations, and —19.3 billion 1975 dollars if final stocks are valued at zero (columns 5 and 6 of table 2). The most realistic estimate presumably is somewhere between these two numbers, since if all of the stocks were sold after the last year of the simulation, prices would fall considerably, but not to zero. If sugar is excluded the two analogous values are —0.7 and —5.4 billion 1975 dollars. The range is still negative and may imply fairly large costs, but is of the order of magnitude that has been discussed in the UNCTAD negotiations (and the upper limit of this range increases only to —0.9

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[15]This calculation of the gains from pooling depends upon the assumption that capital markets are not perfect and that individual countries participating in the international commodity agreements could not do such pooling on

their own. See Behrman, Jere R. and Pranee Tinakorn, "The Simulated Potential Gains of Pooling International Buffer Stock Financing Across the UNCTAD Core Commodities", Philadelphia: University of Pennsylvania, Report for the U.S. Treasury, 1977, for further discussion of these issues.

[16]See Behrman and Tinakorn. "Evaluating Integrated Schemes..", *op. cit.*

billion 1975 dollars if the other four core commodities are added).

Where do such considerations about the simulated operation of the UNCTAD Integrated Commodity Programme leave us? They suggest some reservations. There would be start-up problems in about half of the agreements in that the price ceilings could not be defended due to inadequate prior purchases, and such events would strain the patience of consuming participants. It would be difficult to know whether or not the target price paths were close to the long-run equilibrium paths from the frequency or pattern of market interventions by the buffer stocks. Even if the target price paths were identical with the long-run equilibrium price paths, moreover, considerable finances might be involved. If the target price paths exceed the equilibrium price paths by much, furthermore, the required financing could become enormous (see section 3 below). At the cost of reducing the price stability around the long-run trends, however, the target price paths could be adjusted in line with buffer stock accumulations to ensure that financial requirements did not explode.[17]

On the other hand, the simulations suggest that price stabilization for the core commodities of interest to Latin America (or for all the core commodities) is feasible over a number of years with total financing not too much greater than the amounts mentioned in the negotiations. If the estimates for sugar are misleading because of inadequacies in the underlying model, if sugar were excluded, or if a flexible target price path reduced the financial requirements for sugar, the order of magnitude of the financing required would be within the limits discussed at the negotiating sessions.

But these comments refer only to the feasibility and direct costs of operating the UNCTAD Integrated Commodity Programme. The benefits and costs from the point of view of the developing and developed countries must now be considered.

[17]See Behrman and Tinakorn, "Evaluating Integrated Schemes...", *op. cit.* The simulations there suggest that the use of variable target price paths (or variable price bands) adjusted for actual stock accumulations can substantially reduce the financial costs.

3. *Implications of the UNCTAD Programme for developing countries in general and for those in Latin America in particular*

The six core commodities of interest to Latin America are produced and exported primarily by developing countries. At the start of this decade such countries accounted for virtually all of the world production and exports of coffee and cocoa, almost a third of production and over two-thirds of exports of sugar, about 40% of production and 54% of exports of copper, about a third of production and almost two-thirds of exports of cotton, and about three-quarters of production and a slightly higher proportion of exports of tin. The developing countries as a group import and consume a significant, although much smaller, proportion of these goods. Thus, at the start of the decade they accounted for 12 to 20% of world imports of sugar, cotton and tin, although only 4 to 6% of world imports of coffee, cocoa, and copper. The producer-exporter role is stressed here because that is the more important one in the aggregate, but the reader should keep in mind that for a few developing countries the consumer-importer role is significant, particularly for sugar, cotton and tin.

Of course for developing country producers and consumers (as well as for both groups elsewhere) there are some potential gains from the price stabilization itself to the extent that risks are diminished or costs related to price fluctuations in production or in use are adjusted. Such gains have the interesting feature of being shared across the market. For example, if they exist on the production side, price stabilization is likely to lead to increased supplies from which users will benefit, while if they exist on the users' side, price stabilization is likely to lead to increased demand from which suppliers will benefit. Unfortunately, empirical estimates of the magnitude of such gains are not available, but they should not be ignored, since some analysts argue that they may be substantial.

Now let us consider the impact on producers' revenues of the operation of the buffer stock programmes. It is useful to break down revenue between the quantities supplied and the price received.

As regards the quantity supplied, the simulations indicate initial periods of no response for cocoa, coffee and copper. These initial periods of four or five years of no supply response reflect the relatively long lead times required to bring newly-planted trees or expanded mine capacity into operation. Subsequently, however, fairly large supply responses are induced, at least for the agricultural products, with increases of over 11% for cocoa and sugar, over 6% for cotton, and over 3% for coffee. Changes of these magnitudes imply that it may be quite misleading to consider the impact of international commodity agreements within a framework which assumes no supply responses. In fact, in some respects the existence of supply responses with long lags may make stabilization more difficult. For example, the simulation for cocoa indicates a fairly large supply increase eight to ten years after the beginning of the programme in response to the much higher price received for cocoa because of the simulated buffer stock programme in the third and fourth year, *not* in response to the simulated current market conditions.

Except in the case of tin, the simulated buffer stock programme has much larger percentage effects on prices than on quantities supplied.[18] For the other five core commodities of interest, in almost every year the price is affected either upwards or downwards. The price is changed in many years in which no buffer stock activity occurs because of the dynamic impact of past buffer stock purchases or sales. Under the particular assumptions of these simulations, the average price increase is 23.1% for sugar (see column 9 of table 2).[19] For cocoa and cotton the average annual increases are respectively 4.2% and 3.7%. For coffee the increase is 1.5%, while for the two minerals it is less than 1% in absolute value. It is interesting to note, however, that in every case except tin

the price stabilization programme leads in some years to prices higher than would otherwise exist, while in other years it leads to prices lower than those which would prevail without it.

Altered dynamic price paths induce changes both in supply, as noted above, and in demand, and the combination of the impact on prices and on quantities results in changes in producers' revenues. In some cases, the movements in prices and quantities reinforce each other, while in other cases they are opposing. The total effects are fairly significant revenue gains for agricultural commodities and much smaller revenue losses for the two minerals (columns 9 and 10 of table 2). For sugar the estimated annual average revenue gain is 23.6%, which implies a present discounted value of additional producers' revenues of over US$ 10 billion. For the other three agricultural commodities the average annual percentage revenue gains range from 2.4 for coffee to 6.7 for cocoa. The total 6.1% average annual revenue gain for cotton, however, implies a present discounted value of total producers' revenue gains of the order of US$ 8 billion over the simulation period. Across all six commodities, the total simulated present discounted value of additional producers' revenues is somewhat over US$ 20 billion. This gain is fairly substantial, with most of it accruing to sugar and cotton producers and, to a lesser extent, to coffee producers.

On the other hand, there are simulated small losses for the two mineral products. Of course, these results are conditional on the particular assumptions underlying these simulations, and they might change with different assumptions, but it well might be the case that under any set of assumptions for a particular time period there would be some losers among the producers (such as the minerals in this case) as well as some gainers. This possibility may make it quite difficult to hold together an integrated arrangement.

These comments refer to what happens to the *level* of revenues. But some critics of the UNCTAD programme have claimed that under reasonable assumptions increases in revenues will be accompanied by decreases in their

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[18]Tin may be an exception because the International Tin Agreement and United States Government tin stockpile activities apparently kept prices fairly stabile during the sample period. See Smith, Gordon W. and George R. Schink, "The International Tin Agreement: A reassessment", *The Economic Journal*, New York, No. 86, pp. 715-28, 1976.

[19]But it should be remembered that there is some question about the sugar model.

stability. For example, Johnson[20] makes this argument. However, as indicated above, the question of whether or not there is a trade-off between the level and the stability of revenues cannot be settled *a priori*. It depends upon the elasticities of the underlying curves and the natures of shifts in those curves, and is thus basically an empirical issue. The results in the last column of table 2 indicate that only for copper is there evidence of a trade-off between the stability and the level of revenues. In thecase of copper, the price stabilization programme stabilizes revenues slightly, but with the result of a somewhat lower present discounted value. For the four agricultural commodities, revenues are increased fairly substantially, while revenue instabilities are re-

[20]Johnson, *op. cit.*

duced significantly. For tin there is a slight reduction in revenues with almost no change in stability. At least for the agricultural commodities, then, Johnson's strong warning about the trade-off between the level and stability of revenues does not seem warranted.

Up to this point, the simulated impact of the UNCTAD Integrated Commodity Programme on the revenues of all producers has been discussed. Now, let us turn to its effect on the Latin American producers. Table 3 gives the present discounted values of real revenue changes which would accrue to each of the major Latin American producing countries in respect of each of the six UNCTAD core commodities, the total present discounted additional value for each major Latin American producing country, and the ratio of that total value to the average export value over the period 1970-1975.

Table 3

PRESENTE   DISCOUNTED VALUES OF GAINS ACCRUING TO LATIN AMERICAN PRODUCERS FROM SIMULATED UNCTAD COMMODITY PROGRAMMES OVER THE PERIOD 1963-1975[a]

Countries	Present discounted values (PDV) of additional revenues to producers (millions of 1975 dollars)							Ratio of PDV of additional producer revenues to average annual export value in 1970-1975 (percentage)
	Coffee	Cocoa	Sugar	Cotton	Copper	Tin	Total	
Argentina				82			82	3
Bolivia						−3	−3	−1
Brazil	312	40	743	412			1 507	28
Chile					−23		−23	−2
Colombia	243	3		82			328	29
Costa Rica	52						52	16
Cuba			849				849	55
Dominican Republic		7	424				431	97
Ecuador		13					13	2
El Salvador	87						87	28
Guatemala	69						69	17
Jamaica			106				106	22
Mexico	69	3	424	247	−2		741	33
Peru			212	82	−8		286	26
Venezuela		3					3	0
Total	832	70	2 758	907	−32	−3	4 532	16

[a]Calculated by distributing the simulated present discounted values of additional revenues to producers in column 10 of table 2 by each Latin American country's share in world production. For the last column the total export values are from United Nations figures (1976), with the OECD deflator used to convert into millions of 1975 dollars.

The present discounted values of gains to producers in an individual country depend upon the total present discounted value of additional producer revenues (column 10 of table 2) and the country's share in world supply. These simulated gains are gross gains that do not include any contributions to the financing of the buffer stock operations (columns 4 and 5 of table 2). If the producing countries contributed half of the net cost of buffer stock operations the aggregate producer net gains would be from 17 to 46% lower, depending on the evaluation of final buffer stocks held at the end of 1975. In order not to become too complex because of alternative schemes for distributing the net costs of buffer stock operations among producers and consumers and the question of how to value the final stocks, the present analysis is focussed on gross producer gains without subtracting their contributions to the buffer stock operations. The present discounted value of gains net of contributions to the costs of buffer stock operations would of course be lower than this, with the amount of the reduction depending on the exact assumptions about the funding arrangements and the evaluation of final stocks.

The largest simulated gainers in absolute terms are the sugar and cotton producers (because of the large simulated overall gains for those producers in table 2) and the coffee producers (because of the moderate overall simulated gain in table 2 and the large Latin American share in world production). The gains for the other three commodities are much smaller, and they are actually negative for the two minerals.

In absolute terms, then, the big simulated gainers among Latin American countries include Brazil (1,507 million 1965 dollars), Cuba (849 million), Mexico (741 million), the Dominican Republic (431 million), Colombia (328 million), Peru (286 million) and Jamaica (106 million). Smaller gainers include Argentina and the Central American countries. Bolivia and Chile are small losers. The total present discounted value of these revenue gains to Latin American producers is about 4.5 billion 1975 dollars.

To put these amounts in perspective, it is useful to consider them as percentages of the average annual value of exports in 1970-1975 (the last column in table 3). In these terms, they range from —2% to +97%. The big relative gainers are the Dominican Republic, with almost a year's export value (97%), and Cuba, with over a half a year (55%). Mexico, Colombia, Brazil, El Salvador, Peru and Jamaica all gain from one-fifth to one-third of a year's export value. For Latin America as a whole the estimate is a gain of about one-sixth (16%) of an average year's export value.

Are such gains for Latin America small or large? The answer depends upon the point of comparison. A total of 4.5 billion 1975 dollars is not so small as to be irrelevant. On the other hand, to obtain it requires operation of the buffer stock programme for a fairly long period of time. It is small, moreover, in comparison to the transfers of roughly US$ 65 billion per year brought about by the OPEC petroleum price increases, and furthermore, some of the poorer Latin American countries (e.g., Bolivia and Paraguay) would not benefit from such a programme.

Finally, let us return to the macroeconomic goals of the Latin American economies that are listed in the first paragraph of this paper. What are the implications of the simulations for the attainment of these goals? To consider this question it is useful to separate the impact of increased levels of earnings from that due to the reduction of fluctuations.

The impact of increasing the levels of earnings is almost certainly positive in regard to many of the macroeconomic goals. Moreover, in economies in which foreign exchange availability is an important constraint or in which unutilized capacity exists, the indirect effects transmitted through government expenditure, the money supply, import availabilities and the signalling functions of the commodity-producing sector may be much more important than the direct effects. The author is also engaged in an extensive project to evaluate the interactions between world commodity markets and goal attainment in developing countries, with case examples including coffee and copper in Brazil, Central America and Chile,[21] and the tentative results of this project suggest that

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[21] Some preliminary results are given in F. G. Adams,

the impact of increased primary commodity export earnings, as magnified by the indirect channels noted above, may be quite considerable:

(1) The growth impact is likely to be positive in the commodity-producing sector and in the economy as a whole due to relaxation of the foreign exchange constraint, increased savings and investment, and fuller capacity utilization.

(2) The distributional effects may be regressive because the direct beneficiaries (e.g., the owners of factors used in the sector of commodity production) and those who benefit from the wage signalling effect (e.g., those in organized or government sectors) are likely to be in the middle or upper parts of the income distribution scale. The impact of induced inflation on distribution is likely to reinforce this tendency. Offsetting considerations are the progressive impact of increased employment (or employment in the modern sector) and of some induced increased government expenditures on human capital, housing, and welfare. Whether the regressive or progressive tendencies dominate depends upon the exact structure existing in a particular country and the weight put on various parts of the income distribution scale, but the often substantial overall employment effects may make the net impact progressive in many cases.

(3) The short-run stability effects may be quite substantial because of the magnification through the indirect channels and the considerable time period required for adjustments to long-run equilibria. As noted above, overall employment and capacity utilization increases are likely to be large. Although additional imports will be induced with part of the extra foreign exchange, not all of it will be so used, so the balance of current international payments generally improves. Given the passive nature of most monetary systems in Latin America, the raised level of foreign exchange reserves, fur-

ther augmented by reduced government deficits (due to increased tax revenues from the commodity sector and the rest of the economy) will cause an expansion in the money supply. Only part of the larger money supply will be absorbed by greater economic activity, so prices will also rise.

(4) The international position of the economy will almost certainly be improved by the additional foreign exchange and the lessening of the foreign exchange constraint. In many cases positive capital inflows may be induced by expectations of ongoing greater economic activity. The only offsetting consideration might be greater dependence on the international system if this situation could not be reversed easily, but at least in principle policies could be directed towards keeping such risks minimal.

The impact of increased export earnings from primary commodities on goal attainment in Latin American economies is therefore relatively straightforward, fairly considerable, and likely to be mostly positive. The effects of reduced fluctuations in primary commodity prices or in related export earnings, however, are much more ambiguous, and the large but unsatisfactory literature on this subject finds conflicting results.[22] The ongoing study on integrated commodity and developing country models to which reference was made above provides the best tool available to date to explore such effects.[23] These models incorporate lagged responses, permanent versus transitory responses, and non-linearities (but, as noted above, not direct responses to variances) that might result in principle from different degrees of fluctuations. The experiments conducted to date, however, underline the lack of empirical support for the widely suggested

Jere R. Behrman and R. Roldan. "Measuring the Impact of Primary Commodity Fluctuations on Economic Development: Coffee and Brazil", *American Economic Review*, Nashville, Tenn., pp. 164-169, May 1979. The final results will be forthcoming in a series of books written or edited by Adams and myself.

[22]Lord and Manger review this literature and note that most of it depends upon extraordinary assumptions about the similarity of adjustment structures and the degree of exchange rate disequilibrium across the countries. See Lord, *op. cit.*, and Manger, John, "A Review of the Literature on Causes, Effects and Other Aspects of Export Instability", Philadelphia: WEFA (mimeo), 1979.

[23]Earlier macro studies have focussed on only one country or have used questionable model specifications (e.g., demand-determined Keynesian models without supply factors.)

hypothetical effects of fluctuations in international markets on goal attainment in Latin American economies. Depending on the structure of the individual economies, reduction of such variations may or may not aid in the pursuit of each of the four macroeconomic goals that are discussed above. The study in question, however, indicates that the total impact generally is not large.

4. *Implications of the UNCTAD Programme for developed countries*

The developed countries as a group are primarily importers and consumers of the six core commodities of interest to Latin America. At the start of this decade they accounted for the following percentages of world imports: coffee (90), copper (87), tin (81), cocoa (78), sugar (65) and cotton (51). They enter into the production and exporting side to a smaller extent, but still accounted for over 40% of world copper production and exports, over 20% of world sugar and cotton production and exports, and 16% of world tin exports.[24] The followings paragraphs, however, are focussed on the impact of the Programme on the developed countries in their primary role as importers and consumers of the UNCTAD core commodities. To the extent that they play a secondary role as producers and exporters, of course, the effects are similar to those emphasized above for the developing countries.

Once again, stabilization of the individual commodity prices may in itself have a positive effect on consumers and producers for the same reasons discussed above for the developing countries. Likewise, such effects are likely to be transferred across markets to the other participants, although the empirical magnitudes are not known.

The mayor direct costs of obtaining more stable prices and other possible benefits noted below are the generally higher prices for the relevant commodities (column 7 of table 2) and the developed countries' share of running the UNCTAD Integrated Commodity Programme.

Most of the additional producers' revenues noted above come from the developed countries through these channels. Another possible cost is the development of a new entity in international primary commodity markets that may have significant market power and that probably will be less responsive to the developed countries' interests than to those of the developing countries.

In addition to the possible direct benefits due to stabilization of particular primary commodity prices, there are at least two further major possible indirect macroeconomic benefits for the developed economies:

First, the more stable export earnings of the developing economies are largely transformed into more stable effective import demands, thus leading to more stable demand for exports from the developed world, with consequent anticyclical benefits.

Second, the gains from the reduction of inflationary pressures may be significant. Imported inflationary shocks from rising commodity prices (as in the 1972-1974 commodity boom) may provoke macroeconomic policies that depress economic activity in the developed countries. Because of non-competitive pricing by industrial firms using commodity inputs directly or using their prices as a signal and because of macro policy-making, output losses attributable to rising commodity prices might not be offset by equivalent gains due to falling commodity prices. Thus commodity price stabilization may lead to a real macroeconomic gain for developed countries. It has been calculated by the author that the gain in this respect (in terms of prevented unemployment and product loss) brought about by the UNCTAD programme operating for a decade could be of the order of a present discounted value of US$ 15 billion for the United States alone.[25]

In an increasingly interdependent world, of course, both of these effects would have some secondary benefits for producers by stabilizing demands that they face and the prices that they must pay for imports from the

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[24]See Behrman, Jere R., *International Commodity Agreements:...*, op. cit.

[25]See Berhman, Jere R., *International Commodity Agreements:...*, op. cit.

developed countries. The more important aspect of these benefits from the point of view of the developing countries, however, is that they may make co-operation in the UNCTAD programme desirable from the point of view of the developed countries.

5. *Alternatives to the UNCTAD programme*

Two international policy alternatives to such buffer stock agreements have received considerable attention: the formation of producers' cartels by the developing countries, and expanded compensatory finance for shortfalls in export revenues of the IMF or STABEX type.

The OPEC experience raised in many people's minds the possibility of the developing country producers of other commodities forming similar cartels of their own to stabilize and probably to increase commodity prices. In addition to OPEC there have been a number of such efforts that have been successful for a while in raising primary commodity prices.

However, an examination of the characteristic associated with the products involved in OPEC and other successful efforts leads to the conclusion that developing country efforts to cartelize the UNCTAD core commodity markets are unlikely to be successful. The producer countries have too little market power, or production is diversified among too many countries with too diferent cost structures, or there are too great substitution possibilities. Only with the institutional and financial aid of the developed countries is there likely to be much possibility of a reorganization of these markets along the lines desired by the producers.

Compensatory finance facilities for shortfalls in the developing countries' export proceeds have recently expanded considerably. They present some advantages over inter-national commodity agreements: they refer to all export earnings, not only those from selected products; they do not interfere as directly with market signals, although elsewhere I question whether international commodity markets work as well as is often suggested by those who are concerned about tampering with the markets;[26] and they explicitly favour low-income countries, as may be desirable for global income distribution reasons, rather than the countries that produce specific commodities.

They also have some relative disadvantages, however: they do not permit the reaping of any micro gains by producers and consumers from the stabilization of primary product prices; they do not generate the potential macroeconomic gains from the reduction of inflationary pressures that are discussed above, and the existing facilities of this type, moreover, are centered in institutions that are characterized by some as being too conservative and too oriented towards the interests of the developed countries. Finally, from the point of view of most of Latin America, their orientation towards favouring low-income countries makes them less relevant (although in principle this could be changed).

The developed countries have emphasized the advantages of compensatory financing and have greatly favoured its expansion rather than the establishment of international buffer stocks, while the developing countries have viewed it as a supplementary measure rather than a substitute for the UNCTAD programme. Probably underlying both views, in addition to the pros and cons outlined here, are questions relating to changing the secular trends of prices for non-fuel primary products.

[26]See Behrman, Jere R., *International Commodity Agreements:..., op. cit.*

II

Changing non-fuel primary commodity price trends

Over the 1950-1975 period the secular trends in the deflated prices of the six UNCTAD core commodities of interest to Latin America were −3.5% per year for coffe, −2.4% for cocoa, −3.8% for cotton, and insignificantly different from zero for sugar, copper, and tin.[27] Prior to UNCTAD IV there was considerable advocacy by the developing countries of "indexation" (i.e., tying commodity price movements to changes in the prices of the goods imported by the developing countries). Opposition to indexation from the developed countries, however, was very strong. Consequently, in the UNCTAD IV proposal and resolution no mention is made of indexation *per se*, although a number of references hint at such an effort. Since the possibility of changes in the secular price trends probably underlies both the strong advocacy of some developing countries and the opposition of some developed countries in regard to the UNCTAD programme, a brief consideration of the implications of indexation (as one special case of so altering the price trends) may be useful here.

In Behrman and Tinakorn[28] the effects of indexation of all ten UNCTAD core commodities to the 1963 price levels for a 13-year period are explored. The results suggest that such an option is not likely to be politically feasible for all ten core commodities, nor for the six of interest to Latin America. Buffer stock interventions are required in every year, and for most commodities usually only on one side of the market, while the present discounted value of the buffer stock activities involved would be large: US$ 142 billion for all ten core commodities, US$ 70 billion if sugar is excluded, US$ 93 billion for the core commodities of interest to Latin America, and US$ 21 billion for the core commodities of interest to Latin America, excluding sugar.[29] The amount of financial backing required would be of a similar order of magnitude. Therefore scepticism seems warranted about the feasibility of getting consuming countries to agree to or to allow changing the secular trends for long by anything like as much as would be required for indexation. Since the market characteristics do not seem to allow for successful indexation by the developing country producers alone, it may be concluded that indexation probably is not feasible.

UNCTAD-type buffer stock agreements probably could alter the price trends in an upward direction by a lesser amount for a while, and to do so might result in significant gains for the developing producing nations. However, it would also lessen the anti-inflationary benefit and increase the cost to the consuming developed nations, so that their co-operation, which seems essential for effective international organization of these markets, would probably be withdrawn if they perceived that there was a significant effort to alter the underlying secular price trends.

[27] *Ibid.*

[28] Berhman, Jere R. and Tinakorn, Pranee, "Indexation of International Commodity Prices Through International Buffer Stock Operations", *Journal of Policy Modeling*, 1, pp. 113-134, 1979.

[29] The implications of excluding sugar are indicated because of the doubts about the underlying model that are mentioned above and that are discussed in Behrman and Tinakorn, "Evaluating Integrated Schemes...", *op. cit.*

III

Conclusions

UNCTAD-type international non-fuel primary commodity price stabilization agreements are not an easy solution. They require the co-operation of countries with some competing interests, and the possibility that they may alter the secular price movements is difficult to monitor. Under any particular circumstances some developing country producers may lose due to their operation, and the global benefits may not be particularly progressive.

Even so, such arrangements do present some possibilities for real gains by some Latin American producers and by the United States and other developed economies. Alternative strategies to alter these markets would not confer all of the same benefits (although they might have other additional advantages). Therefore some efforts to explore the possible joint advantages of UNCTAD-like program-mes seem warranted.