Instability of Agricultural Exports: World Markets, Developing and Developed Countries*

I. Introduction

In the economic literature on trade and growth, the proposition is often advanced that exports from developing countries are generally more unstable than exports from industrial countries, and that such instability is a major obstacle to economic development.[1] This stream of the literature, mostly concerned with the causes[2] of export instability and its impact on the national economies of developing countries, is paralleled by another stream focussed on the world markets for primary commodities,[3] on their quantity/price relationships and on the feasibility and effects of stabilization agreements.[4] Having recently shown that the above proposition is well supported by empirical results, the purpose of the present study is to extend the

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* This article has been written while the author was Economist in the Commodities & Trade Division of the Food and Agriculture Organization of the United Nations: his views do not necessarily reflect those of the Organization. This is his second study on the subject of export instability; for a full section on methodology and a complete bibliography, see: Elio Lancieri, "Export Instability and Economic Development: 'A Reappraisal'", in this *Review*, June 1978.

[1] Among early works, see Coppock 1962, Massel 1964, Macbean 1966; more recent contributions are Lawson 1974, Knudsen and Parnes 1975; for a brief survey article, see Stein 1977.

[2] Mostly indicated in the literature as: 1) low price elasticity of demand and supply; 2) low income elasticity of demand; 3) sudden variations in supply for natural causes like droughts, floods, etc.; 4) strong variations in industrial countries' demand for raw materials, following their economic cycles; 5) concentration of a country's exports in one or few commodities and in one or few markets.

[3] See United Nations 1952, United Nations 1959, FAO 1965, IMF-IBRD 1969.

[4] See United Nations 1961, Massel 1969, Hueth and Schmitz 1972, Brook, Grilli and Waelbroeck 1978.

analysis to a detailed consideration of instability of *agricultural* exports, which are such a large part of total exports from developing countries[5] and seem to be particularly prone to fluctuations of various kinds.[6]

Fluctuations in agricultural exports were first investigated by United Nations in 1952, by analyzing export values, quantities and unit values of 18 primary products exported by 47 developing countries over 1901-1950.[7] The analysis, which included the measurement of three different types of export fluctuations[8], showed that export earnings, in most cases, experienced greater fluctuations than either export quantities or unit values. Later, in another study by United Nations,[9] annual fluctuations of world exports were examined, net of trend, over 1920-38 and 1948-57. This study, covering 21 agricultural commodities, showed that instability of export values had declined in the second period, remaining greater than that of quantities or unit values in both periods. Thirdly, in an IMF-IBRD study covering primary commodities exported by developing countries over the period 1953-65,[10] fluctuation indices (net of trend) for 21 agricultural products indicated again that the most pronounced instability is in earnings.

Most studies of agricultural export fluctuations have been, in fact, either highly aggregative or very selective in terms of commodity or country coverage. For example, while FAO publishes trade data on more than 120 agricultural commodities, previous analyses have focussed on a maximum of only 21 products. The results are, therefore, not necessarily indicative of the extent of export fluctuations in the world markets for agricultural commodities. Moreover, some agri-

[5] In 1966-68 there were still 83 developing countries obtaining from agriculture 50% or more of their export earnings (see later, table 5).

[6] Apparently, all factors of instability indicated (note 2) apply to agricultural exports.

[7] "Instability in Export Markets of Underdeveloped Countries 1901-1950", UNITED NATIONS, New York, 1952.

[8] That is: a) *long term fluctuations*, defined as the deviations from a seven-year moving average, which is also considered the long-term trend; b) *cyclical fluctuations*, defined as average variations, net of the long-term trend, between the peak and the trough of the cycle; c) *year-to-year fluctuations*, defined as variations between one year and another, without taking into account the trend.

[9] "World Economic Survey 1958, Chap. I: Trends and Fluctuations in World Trade of Primary Commodities", UNITED NATIONS, New York 1959.

[10] IMF-IBRD Joint Staff Study, "The Problem of Stabilization of Prices of Primary Products", Washington, D.C. 1969.

cultural exports, which account for a minimal share of world trade and are, therefore, neglected in most analyses, are in fact of vital importance to individual exporting countries. For example, exports of sheep and goats make up only 0.3 percent of world agricultural exports but form as much as 40 percent of Somalia's export earnings; bovine cattle accounts for 2.5 percent of world agricultural exports but for 45 percent of Lesotho's export earnings and for 33 percent of those of Upper Volta. In fact, little or no attention has been paid to the instability of exports of single agricultural commodities from individual developing countries, which is often much higher than the instability of world markets. Therefore, to obtain a full picture of agricultural export instability, the analysis is here conducted at four different levels of aggregation, adopting the same methodology of the previous study already mentioned,[11] and using a common time period. First, world exports of 90 agricultural commodities, covering more than 95 percent of world agricultural trade, are examined with regard to export values, quantities and unit values. Secondly, exports of the main commodities from developing and developed countries are analysed separately. Thirdly, the total agricultural exports of 24 individual developed countries are examined and their fluctuations are compared with those of the 83 developing countries obtaining 50 percent or more of their export earnings from agricultural commodities. Finally, the composition of agricultural exports of the 83 developing countries and the instability of their main export commodities are analysed. Comparisons of the instability of agricultural exports with that of total merchandise exports are also made, in order to ascertain whether agricultural exports are more unstable, as argued by some economists. The relationships between the instability of world markets and that of individual country exports are then examined, for the same commodities. Tests are made of the possible effects of agricultural export instability on the developing countries' economies, and the results are compared with those of similar tests conducted for total exports.

[11] E. LANCIERI, *op. cit.*, pages 140, 141 where export instability is defined as the residual annual variability, after correcting for trend, of export earnings, quantities and unit values. Instability indices are given by the average of annual percentage differences between observed data and calculated trend data, disregarding the signs of the differences and expressing them as percentages of the trend data. As detailed trade figures are available from FAO from 1960 onwards, and considering that high inflation since the early 1970's invalidates any trend analysis, the observation period chosen is 1961-72.

II. Instability of World Markets for Agricultural Commodities

Levels of Instability and Comparisons with Previous Results

Instability indices for 1961-72 of world export values, quantities and unit values are reported in table 1 for 90 agricultural commodities.[12] Comparisons with previous results from the UN study of 1959, the only ones referring to world totals, reveal a substantial decline of instability between 1920-38 and 1948-57 on one side, and 1961-72 on the other. Average (unweighted) fluctuations of export values of 21 commodities analysed in both studies are reduced in the latter period by half, to 8 percent a year;[13] 19 of the 21 commodities show a decrease in their instability, comparing 1961-72 with 1948-57. Both quantities and unit values contribute to the fall, the average instability index for quantities decreasing from 10 to 6 percent and that for unit values from 12 to 7 percent. These results are not surprising, considering that the great depression of the thirties is included in the first period, and the Korean War in the second one. When exceptional disturbances are purposedly eliminated, however, as in the UN study covering long-term fluctuations during 1901-1950,[14] average instability is in the order of 5-6 percent, and, though not strictly comparable, is much closer to the indices obtained for 1961-72.

On the basis of weighted averages, instability of the 90 commodities over 1961-72 is the same as that of the 21 commodities: i.e. the average index for export values is 8 percent. It would seem that expanding the analysis to such a large number of products has not changed the overall picture. However, what happens is that in weighted averages those commodities which are important in world agricultural trade (e.g. coffee, cocoa), and which in most cases are less subject to fluctuations than minor commodities, swamp the higher instability of the latter by their larger weights. This can be

[12] Commodities selected fall under the following S.I.T.C. categories: 001, 01, 02, 04, 05, 06, 07, 11, 12, 22, 23, 26, 42.

[13] For simplicity, the ± notation before instability indices, which follows from their definition and is reported in the tables, is omitted in the text.

[14] Cf. note 7 and 8.

TABLE 1

WORLD EXPORTS OF AGRICULTURAL COMMODITIES: INSTABILITY INDICES FOR VALUES, QUANTITIES AND UNIT VALUES 1961-1972, AVERAGE EXPORT VALUES IN 1969-1971 AND THE SHARE OF DEVELOPING COUNTRIES

Commodity	Indices of Instability			Average Export Values 1969-1971	
	Values	Quantities	Unit Values	World	Share of Developing Countries in Total
Agricultural Raw Materials	..... ± per cent			million $	%
Abaca	15.4	9.7	11.7	15	98
Sisal agave	15.1	3.5	15.3	71	96
Silk	13.6	7.9	7.4	102	38
Jute	13.0	16.2	9.2	197	95
Wool greasy	8.5	2.4	8.4	1,137	10
Flax tow waste	8.5	5.8	7.1	76	2
Natural rubber	7.8	3.5	5.5	1,110	98
Wool degreased	6.1	4.6	7.0	293	19
Cotton raw	5.0	2.4	4.1	2,461	65
Average weighted[1] indices	± 7.1	± 3.4	± 5.9	5,462	58
Tropical products					
Cocoa paste cake	16.6	9.4	12.2	40	78
Cocoa butter	13.9	8.8	13.7	206	47
Coconuts desic	13.6	7.2	7.2	36	98
Coconuts	11.3	7.7	8.3	3	87
Cocoa powder	10.6	9.1	14.7	37	6
Vanilla	9.7	9.9	8.2	16	93
Pepper	9.2	9.4	14.3	97	99
Dates	8.6	8.5	5.6	41	76
Cocoa beans	8.0	4.7	12.2	803	98
Pimento	7.5	4.4	5.9	29	48
Bananas	5.4	1.9	4.1	526	86
Coffee	4.6	3.3	7.0	2,758	97
Tea	3.0	1.9	3.0	674	81
Average weighted[1] indices	± 5.4	± 3.7	± 7.5	5,265	91
Cereals					
Rye	31.6	32.6	4.0	43	2
Cereals n.e.s.	19.5	20.1	3.1	323	36
Oats	14.3	14.5	4.7	74	10
Barley	11.4	15.7	7.4	542	4
Rice	9.1	5.7	8.3	1,176	40
Maize	8.7	7.4	3.6	1,752	28
Wheat & flour	7.1	7.2	2.3	3,509	4
Bran	4.7	5.2	3.4	156	46
Average weighted[1] indices	± 8.8	± 8.3	± 4.0	7,570	18

TABLE 1
(cont. ed)

WORLD EXPORTS OF AGRICULTURAL COMMODITIES: INSTABILITY INDICES FOR VALUES, QUANTITIES AND UNIT VALUES 1961-1972, AVERAGE EXPORT VALUES IN 1969-1971 AND THE SHARE OF DEVELOPING COUNTRIES

Commodity	Indices of Instability			Average Export Values 1969-1971	
	Values	Quantities	Unit Values	World	Share of Developing Countries in Total
Dairy products, meat and live animals	..... ± per cent			million $	%
Swine	16.1	9.5	9.2	215	0
Eggs in shell	12.9	14.3	4.7	223	6
Meat of horses	10.3	8.9	6.2	59	75
Butter	8.9	6.2	9.8	679	1
Bovine cattle	8.9	4.2	7.8	982	20
Meat of swine	8.1	9.0	5.3	667	0
Milk dry	7.1	6.6	11.0	568	1
Meat bovine fresh	6.8	6.6	6.5	1,863	28
Meat of sheep	5.7	2.6	4.8	382	7
Poultry fresh	5.6	4.7	3.1	341	0
Cheese and curd	4.4	1.5	4.5	759	2
Sheep and goats	4.3	2.7	2.4	131	53
Milk condensed	4.1	3.5	2.8	225	4
Canned meat n.e.s.	3.5	2.6	3.5	927	23
Average weighted[1] indices	± 7.0	± 5.4	± 6.3	8,021	15
Fruits and vegetables					
Hops	9.0	4.6	6.0	62	0
Pears	7.6	5.7	5.9	90	11
Beans, peas, lentils	7.1	11.2	6.3	302	42
Other citrus fruit	7.1	4.4	7.4	63	15
Apples	5.8	4.1	3.9	356	16
Lemons and limes	5.6	3.4	8.9	133	11
Raisins	5.5	5.0	5.4	131	31
Grapes	5.3	6.5	4.0	177	12
Tomatoes fresh	3.9	2.0	4.5	268	28
Oranges, tang., clem.	3.5	4.3	3.9	562	32
Average weighted[1] indices	± 5.3	± 5.2	± 5.0	2,144	25
Wine, tobacco, sugar and honey					
Sugar refined	27.2	6.9	25.6	588	25
Natural honey	12.4	6.1	8.9	40	30
Sugar raw centrifugal	12.8	5.5	13.6	1,871	85
Wine of fresh grapes	9.1	10.2	5.0	959	15
Tobacco unmanufactured	4.6	3.6	2.1	1,276	32
Average weighted[1] indices	±11.3	± 6.1	±10.1	4,774	48

TABLE 1
(cont. ed)

WORLD EXPORTS OF AGRICULTURAL COMMODITIES: INSTABILITY INDICES FOR VALUES, QUANTITIES AND UNIT VALUES 1961-1972, AVERAGE EXPORT VALUES IN 1969-1971 AND THE SHARE OF DEVELOPING COUNTRIES

Commodity	Indices of Instability			Average Export Values 1969-1971	
	Values	Quantities	Unit Values	World	Share of Developing Countries in Total
Oils, oilseeds and oilcakes	..... ± per cent			million $	%
Cottonseed oil	27.3	24.9	6.2	69	26
Sunflower cake	25.9	27.2	4.2	45	66
Sunflower seed	22.2	23.7	4.2	66	2
Sunflower oil	21.8	33.0	10.0	218	5
Soybean oil	20.7	19.3	9.9	290	2
Rape mustard	19.3	23.6	11.1	56	5
Palm oil	17.9	11.0	10.6	204	95
Olive oil	16.1	17.2	7.1	192	26
Palm nut kernels	15.4	9.5	8.3	65	99
Copra cake	15.3	6.2	12.3	27	87
Linseed oil	14.0	10.7	6.7	53	68
Tung oil	13.4	11.2	17.7	16	62
Castor oil seed	13.0	13.6	6.5	16	77
Castor oil	12.5	12.4	13.5	53	89
Cottonseed cake	12.3	9.0	5.4	78	96
Rape mustard seed	11.7	9.0	5.1	181	12
Rapeseed cake	11.6	8.9	6.7	18	16
Coconut oil	11.5	8.4	8.0	172	86
Cottonseed	11.1	12.6	6.5	32	79
Linseed	11.1	11.4	3.9	75	3
Palm kernel oil	11.0	5.6	8.4	51	67
Linseed cake	10.8	12.7	5.0	48	76
Groundnut cake	10.6	7.7	3.7	116	96
Oilseed cake n.e.s.	10.5	9.7	3.8	52	43
Palm kernel cake	8.5	7.0	7.6	18	55
Copra	8.2	7.7	7.4	174	99
Groundnut oil	7.4	10.1	6.3	135	75
Soybean cake	7.3	6.2	3.9	503	10
Total groundnuts	7.1	12.5	6.7	228	78
Soybeans	6.1	4.1	4.6	1,211	3
Sesame seed	5.6	4.4	4.5	52	99
Average weighted[1] indices	±11.3	±10.6	± 6.3	4,513	35
Agerage weighted indices for all 90 commodities	± 8.0	± 6.2	± 6.4	Total 37,748	39

Source of data: FAO Trade Yearbook, various issues.

[1] Weights for each commodity are given by the average total value of exports in 1969-1971.

illustrated by comparing the weighted average of the 90 commodities (8 percent, for export values), with the unweighted average, which is 11 percent. A similar effect is observed by ranking the 90 commodities in descending order of their export values. The 20 most important commodities[15], which account for 72 percent of world agricultural trade, experienced an average (unweighted) fluctuation in values of only 7 percent. In contrast, the average fluctuation for the remaining 70, relatively minor, commodities was 12 percent.

"Price"/Quantity Instability vs. Value Instability: the Commodity Groups

Earlier studies had indicated that it is mostly in earnings, rather than in quantities or "prices", that export instability is to be found. Here, the weighted averages for the 90 commodities — 6.4 percent for unit values and 6.2 percent for quantities vs. 8.0 percent for export values — confirm this result, and, except for tropical products (where fluctuations of unit values are higher than for export values), the same broad conclusion holds true also for the commodity groups defined in table 1. Among these, products where the share of developing countries in world trade is highest (between 48 and 90 percent) — i, e. tropical products, wine-tobacco-sugar and raw materials — appear rather stable in their quantities, with a high instability of prices. These groups, however, differ substantially as regards instability of export earnings: the wine-tobacco-sugar group shows a high level of instability (11 percent), raw materials a medium level (7 percent), and tropical products a rather low level (5 percent).

The Most Unstable Commodities

Results for the 20 commodities with the most unstable export values have been examined separately. For these commodities[16], it is evident that instability is essentially a phenomenon affecting export

[15] Wheat and flour, coffee, cotton, sugar raw, beef and veal, maize, tobacco, soybeans, rice, wool greasy, natural rubber, bovine cattle, wine, canned meat, cocoa, cheese, butter, tea, pigmeat.

[16] Rye, cottonseed oil, sugar refined, sunflower-cake, -seed and -oil, soybean oil, cereals n.e.s., rape mustard, palm oil, cocoa paste cake, swine, olive oil, abaca, palm nut kernels ,copra cake, sisal, oats, linseed oil, cocoa butter.

earnings: while the value fluctuations range from 14 percent to 32 percent, only ten of these commodities have instability indices of at least 14 percent for their quantities, and only three have fluctuations as large as this for their unit values. The 20 products represent only 8 percent of total agricultural exports, which reconfirms that minor commodities are the most unstable. No concentration of exports from developing countries is apparent among the 20 commodities: only 8 are predominantly exported by developing countries. More than half of the 20 products are part of the group of vegetable oils, oilseeds and oilcakes. One reason for the extreme instability of this group might be the high substitutability among products in consumption, and therefore in imports, for the preparation of mixed feeds, and the consequent high quantity instability of exports of each product.

III. Instability of Agricultural Commodity Exports from Developing and Developed Countries

Developing and Developed Countries, as Groups. Instability indices have been computed separately for developing and developed countries for the actual values, unit values and quantities exported by each group. Results for the 20 commodities which are the most important to the developing countries, and account for 82 percent of their total agricultural exports, are reported in table 2; for the 25 commodities which cover 80 percent of the developed countries' agricultural exports, in table 3. Comparing with table 1, instability of agricultural exports from developing countries is similar to that of total world agricultural trade.

The average (weighted) instability of export values is the same, 8 percent a year, the fluctuation of unit values is marginally greater than that of world unit values (index of 7 percent as compared to 6 percent). By contrast, fluctuations of agricultural exports from developed countries are greater: the average (weighted) index for values is 10 percent, and there is also a greater instability of quantities. Such a difference could not be attributed to the smaller commodity coverage of the two averages used here, as compared to the larger commodity analysis made earlier. On the one hand, the two averages cover already more than 80 percent of total agricultural exports and, statistically, they could be substantially modified only by adding

TABLE 2

THE TWENTY MOST IMPORTANT COMMODITIES AMONG DEVELOPING COUNTRIES AGRICULTURAL EXPORTS: AVERAGE VALUE OF EXPORTS 1969-1971 AND INSTABILITY INDICES 1961-1972

Commodity	Value of Exports from Developing Countries in 1969-1971	Share in total Agricultural Exports from Developing Countries	Indices of Instability 1961-1972		
			Values	Quantities	Unit values
	million $	%	..... ± per cent		
1. Coffee	2,677	17.8	4.6	3.3	7.0
2. Cotton raw	1,610	10.7	3.8	6.0	4.1
3. Sugar raw	1,594	10.6	11.2	7.3	11.9
4. Rubber natural	1,088	7.2	7.8	3.5	5.5
5. Cocoa	794	5.3	8.0	4.7	12.2
Total	7,763	52.0	6.6*	4.9*	7.7*
6. Tea	549	3.7	3.8	2.1	3.3
7. Beef & veal	519	3.5	14.2	13.3	10.6
8. Maize	485	3.2	15.2	13.0	4.9
9. Rice	478	3.2	11.8	9.4	13.0
10. Bananas	453	3.0	4.1	2.3	3.9
Total	10,247	68.0	7.4*	5.6*	7.6*
11. Tobacco unmanufactured	404	2.7	6.8	5.4	3.7
12. Canned meat n.e.s.	215	1.4	6.9	9.8	8.1
13. Bovine cattle	205	1.4	4.5	5.8	2.7
14. Palm oil	193	1.3	17.9	11.0	10.6
15. Jute	189	1.3	13.0	16.2	9.2
Total	11,453	76.3	7.6*	6.0*	7.4*
16. Groundnuts	178	1.2	9.3	14.9	6.6
17. Oranges	178	1.2	7.3	5.4	3.3
18. Copra	174	1.2	8.2	7.7	7.4
19. Wheat and flour	151	1.0	32.9	37.4	6.3
20. Coconut oil	148	1.0	14.6	8.3	8.7
Total	12,282	81.9	± 8.0*	± 6.5*	± 7.4*

* Cumulative average weighted indices of instability.

TABLE 3

THE TWENTY - FIVE MOST IMPORTANT COMMODITIES AMONG DEVELOPED COUNTRIES AGRICULTURAL EXPORTS: AVERAGE VALUE OF EXPORTS 1969-1971 AND INSTABILITY INDICES 1961-1972

Commodity	Value of Exports from Developed Countries in 1969-1971	Share in total Agric. Exports of Developed Countries	Indices of Instability 1961-1972		
			Values	Quantities	Unit values
	million $	%	..... ± per cent		
1. Wheat and flour	2,785	13.3	9.8	8.9	2.1
2. Meat bovine fresh	1,233	5.9	5.8	10.0	3.9
3. Maize	1,181	5.6	10.7	10.0	3.9
4. Soybeans	1,126	5.4	6.1	4.5	4.8
5. Wool greasy	1,008	4.8	9.4	2.3	9.1
Total	7,333	35.0	±8.6*	±6.8*	±4.1*
6. Tobacco unmanufactured	742	3.6	5.7	4.8	1.7
7. Cheese and curd	715	3.4	4.6	1.6	4.5
8. Wine of fresh grapes	670	3.2	9.9	10.7	2.9
9. Bovine cattle	608	2.9	14.6	6.5	8.9
10. Meat of swine	607	2.9	10.8	12.2	5.2
Total	10,675	51.0	±8.7*	±6.9*	±4.2*
11. Butter	601	2.9	11.4	7.1	9.9
12. Milk dry	556	2.7	7.1	6.6	11.0
13. Canned meat n.e.s.	554	2.7	4.3	2.5	2.4
14. Rice	525	2.5	10.2	5.5	5.5
15. Cotton raw	485	2.3	17.0	13.1	8.2
Total	13,396	64.1	±8.9*	±6.9*	±4.9*
16. Barley	475	2.3	13.1	16.9	7.8
17. Soybean cake	449	2.2	8.1	7.1	3.9
18. Oranges, tangerines	369	1.8	5.1	7.3	5.2
19. Meat of sheep fresh	334	1.6	6.2	3.2	5.3
20. Meat dried, st., sm.	329	1.6	5.1	1.5	4.7
Total	15,352	73.6	±8.8*	±7.4*	±5.0*
21. Soybean oil	282	1.4	20.7	19.3	9.9
22. Sugar refined	257	1.2	39.4	17.8	22.3
23. Meat of poultry	254	1.2	5.8	5.4	3.5
24. Apples	234	1.1	9.5	7.0	4.5
25. Sugar raw centrifugal	221	1.1	18.6	11.2	19.3
Total	16,600	79.6	±9.6*	±7.4*	±5.5*

* Cumulative weighted average indices of instability.

TABLE 4

COUNTRY CONCENTRATION OF EXPORTS OF 11 MAIN STABLE COMMODITIES EXPORTED BY DEVELOPING COUNTRIES

Commodity	Total Exports from Developing Countries in 1969-1971	Index of Instab. of Values	1st Exporter Country and its Share in 1969-1971		2nd Exporter Country and its Share in 1969-1971		3rd Exporter Country and its Share in 1969-1971		Share of three Main Exporter Countries	4th Exporter Country and its Share in 1969-1971		5th Exporter Country and its Share in 1969-1971		6th Exporter Country and its Share in 1969-1971		Share of six Main Exporter Countries
	million $	± percent		%		%		%	%		%		%		%	%
Coffee	2,677	4.6	Brazil	31	Colombia	15	Ivory Coast	5	51	Angola	5	Uganda	5	El Salvador	4	65
Cotton raw	1,610	3.8	Egypt	22	Sudan	11	Brazil	10	43	Turkey	10	Mexico	9	Pakistan	5	67
Rubber natural	1,088	7.8	W. Malaysia	51	Indonesia	22	Thailand	10	83	Sri Lanka	6	Liberia	3	Nigeria	2	94
Cocoa	794	8.0	Ghana	29	Nigeria	23	Ivory Coast	12	64	Brazil	10	Cameroon	7	Ecuador	3	84
Tea	549	3.8	Sri Lanka	34	India	34	Bangladesh	8	76	Kenya	7	Indonesia	3	Uganda	2	88
Bananas	453	4.1	Ecuador	22	Honduras	18	Panama	13	53	Costa Rica	13	Colombia	4	Martinique	4	74
Tobacco unmanuf.	404	6.8	Turkey	20	India	12	Rhodesia	11	43	Brazil	8	Pakistan	7	Malawi	6	64
Canned meat	215	6.9	Argentina	61	Brazil	14	Colombia	5	80	Botswana	4	Kenya	3	Tanzania	3	90
Bovine cattle	205	4.5	Mexico	36	Colombia	17	Argentina	11	64	Brazil	10	Mali	7	Niger	5	86
Oranges	178	7.3	Morocco	42	Algeria	16	Egypt	10	68	Cyprus	7	Lebanon	4	Tunisia	3	82
Copra	174	8.2	Philippines	55	Indonesia	12	Papua N.G.	9	76	Mozambique	4	N. Hebrides	3	Br. Solomons	2	85
Total and Averages (unweighted)	8,347	± 6.0		37		17		10	64		8		5		4	80

widely different results; on the other, it was previously shown that, besides the first 20 major commodities, the remaining minor commodities are generally much more unstable, and their inclusion in the averages could only push them upwards. The fact is that, at the world market level, agricultural exports from developing countries are concentrated in few stable commodities, while agricultural exports from developed are not. Five commodities only, with an average instability of values of 7 percent a year, account already for 52 percent of total agricultural exports from developing countries; for developed countries 10 commodities are needed to cover 51 percent of total exports and the average instability of values of these is 9 percent.

The Country Concentration of Stable Agricultural Exports. For the 11 "stable" commodities[17] of table 2 — covering 56 percent of agricultural exports from developing countries, and showing fluctuations of 8 percent a year or less — country concentration of exports (table 4) is rather high: for 7 commodities — rubber, cocoa, tea, canned meat, bovine cattle, oranges, copra — more than 60 percent of total exports is accounted for by three exporter countries only, between 80 and 94 percent by six countries. Moreover, for rubber, canned meat and copra, between 50 and 60 percent of total exports is accounted for by a single exporter. Some large developing countries, then, which are major exporters of many commodities, end up having a particularly large share of stable agricultural trade. This is the case for *Brazil:* coffee (31 percent of total value of exports of the commodity from developing countries), canned meat (14 percent), bovine cattle (10 percent), cotton (10 percent), cocoa (10 percent), tobacco (8 percent); *Colombia:* bovine cattle (17 percent), coffee (15 percent); *Indonesia:* rubber (22 percent), tea (13 percent), copra (12 percent).

[17] Coffee, cotton, rubber, cocoa, tea, bananas, tobacco, canned meat, bovine cattle, oranges, copra.

IV. Instability of Total Agricultural and Commodity Exports from Individual Countries

Instability of Agricultural Exports at Country Level. Instability indices 1961-72 have been computed for total agricultural exports of 83 individual developing countries (table 5), which in 1966-68[18] were obtaining 50 percent or more of their total merchandise export earnings from agricultural exports, and of 24 developed countries[19]. Also, for 55 developing countries showing high concentration of exports in one main agricultural commodity, a separate instability index has been computed for that commodity.

Therefore, for the time period analyzed, two questions, which have always received much attention in the literature, can now be answered: 1) are agricultural exports (from individual countries) generally more unstable than other exports? and 2) are agricultural exports from developing countries more unstable than from developed? With regard to the second question, developing countries show on average a slightly higher instability than developed, 12 percent as compared to 11 percent, and both averages (unweighted) are very much in line with the instability of world markets: 11 percent for the 90 commodities. The first question, then, can be answered by comparing data from this study with the results from a previous work[20] where instability during 1961-72 of total exports of 123 individual developing countries was analyzed. To ensure full comparability, for 70 developing countries[21] included in both studies, an average instability index has been computed for total exports (12.0 percent) and for agricultural exports (11.6 percent). These results indicate clearly, for the time period considered, that agricultural exports from developing countries *are not* more unstable than total exports. What is remarkable is that exports from developing countries, whether agricultural or not, exhibit the same level of instability, around 12 percent a year. The latter figure also corresponds to the average for total exports of the 123 developing countries, which include many countries with small or non-existent agricultural exports. For agricultural exports, however, notwithstanding the similarity of averages, strong differences are to be noted between developing countries and developed in the range and distribution of the indices. While for developing countries the range is 4-60 percent, for the 24 developed countries it is 3-24 percent, with only six of the developed countries showing indices of 12 percent or more.

[18] A three-year average over 1966-1968 has been chosen here because it represents the middle point of the observation period 1961-1972.

[19] Space limitations have not allowed to publish all the statistical tables relating to this study. This material, however, is available on request by writing to the author, by this *Review*.

[20] E. LANCIERI, *op. cit.*, page 145.

[21] The sample had to be reduced because results for total exports were not available for the following countries already included in table 5: Tonga, East Timor, St. Lucia, Comores, Bhutan, Grenada, Seychelles, Namibia, St. Kitts, Dominica, Equatorial Guinea, Turkey, St. Vincent.

Instability of Main-Commodity Exports from Individual Countries. The 55 country-commodity instability indices of table 5 strongly indicate that export concentration in one main commodity makes for an increased instability. With the largest range observed so far, that is 4-74 percent, these indices exibit an average (unweighted) of 16 percent, that is 50 percent more than the indices referring to total agricultural exports from developing countries. What happens is that many agricultural commodities, though stable on the world market, show high fluctuations in those exports from countries relying on one commodity only. This is so, for example, in coffee, which has an instability of 5 percent on the world market, but goes up, on average, to 12 percent for the 15 countries where coffee is the main export commodity.

The same goes for other commodities. For bananas, instability indices of the 7 highly dependent exporting countries range between 4 percent and 68 percent, with an average of 24 percent, in contrast with a world market average of only 5 percent; for cotton, indices of the 5 highly dependent exporting countries are on average 15 percent against a world index of 5 percent.

Hypotheses on the Effects of Export Instability. Having ascertained the existence of high levels of instability in the agricultural exports of developing countries, a number of questions on their likely effects emerge. Is the economic growth of developing countries hindered, or is it in particular the growth of their agricultural income? Or, considering that export earnings are often used to finance industrial investment, is it instead non-agricultural income that is affected? Are such phenomena more pronounced in countries where exports are concentrated in one commodity only?

TABLE 5

DEVELOPING COUNTRIES* RANKED ACCORDING TO THE INDICES OF INSTABILITY OF THE VALUE OF THEIR AGRICULTURAL EXPORTS OVER 1961-1972
(million US dollars f.o.b., at current prices)

Country	Index of Instability of Agricul. Exports 1961-1972	Share of Agricul. in total Export Earnings from Goods: Average 1966-1968	Main Export Commodity and Share in each Country's Total Export Earnings. Average 1966-1968		Index of Value Instability of Main Export Commodity over 1961-1972
	± %	%		%	± %
1. Lao	59.7	100			
2. Cambodia	45.5	97	Rice	48	73.7
3. Tonga	22.7	100	Bananas	43	67.6
4. New Hebrides	22.6	58	Copra	50	26.9
5. Viet-Nam Rep.	22.5	100	Rubber	80	24.1
6. Yemen Arab.	21.3	68	Coffee	41	13.2
7. Rwanda	18.3	60	Coffee	56	23.8
8. Burundi	17.8	100	Coffee	100	22.0
9. Benin	17.7	80			
10. East Timor	17.5	100	Coffee	80	19.4
11. St. Lucia	17.5	100	Bananas	100	23.9
12. Burma	17.2	71	Rice	57	18.6
13. Comoros	16.6	61	Vanilla	40	24.7
14. Fiji Islands	16.5	73	Sugar Raw[1]	57	19.5
15. Bhutan	16.2	62			
16. West. Samoa	15.9	100	Copra	45	16.4
17. Dominican Rep.	15.8	88	Sugar Raw[1]	60	19.7
18. Senegal	15.8	81	Groundnuts[2]	40	18.8
19. Grenada	15.5	82			
20. Mali	15.5	100			
21. Seychelles	15.2	100			
22. Panama	15.1	65	Bananas	45	18.8
23. Cuba	14.9	89	Sugar Raw[1]	80	17.8
24. Togo	14.0	54			
25. Mauritius	13.6	96	Sugar Raw[1]	90	13.2
26. Nepal	13.5	100			
27. Syrian Arab. Rep.	13.4	85	Cotton Raw	44	10.1
28. Martinique	13.0	95	Bananas	60	23.8
29. Botswana	12.6	100			
30. Namibia	11.8	100			
31. St. Kitts	11.6	100			
32. Nicaragua	11.5	82	Cotton Raw	40	26.6
33. Honduras	11.5	78	Bananas	48	14.3
34. Barbados	11.0	61	Sugar Raw[1]	50	11.3
35. Paraguay	11.0	86			
36. Sao Tome & Princ.	11.0	100			
37. Niger	10.7	100	Groundnuts[3]	68	17.7
38. Somalia	10.6	100	Sheep & Goats	40	13.3
39. Upper Volta	10.6	100	Bovine Cattle	33	14.1
40. Lesotho	10.5	100	Bovine Cattle	45	11.2
41. Belize	10.5	70	Sugar Raw[1]	40	9.0
42. Sudan	9.6	100	Cotton Raw	56	15.0
43. Ghana	9.6	70	Cocoa Beans	56	10.5
44. Dominica	9.1	100			
45. Haiti	9.1	72	Coffee	47	14.2

TABLE 5 (cont.ed)

DEVELOPING COUNTRIES* RANKED ACCORDING TO THE INDICES OF INSTABILITY OF THE VALUE OF THEIR AGRICULTURAL EXPORTS OVER 1961-1972
(million US dollars f.o.b., at current prices)

Country	Index of Instability of Agricul. Exports 1961-1972	Share of Agricul. in total Export Earnings from Goods: Average 1966-1968	Main Export Commodity and Share in each Country's Total Export Earnings. Average 1966-1968		Index of Value Instability of Main Export Commodity over 1961-1972
	± %	%		%	± %
46. Falkland	8.8	100	Wool Greasy	90	10.0
47. Ethiopia	8.7	93	Coffee	58	10.3
48. Tanzania	8.5	74			
49. Bangladesh	8.5	72	Jute	32	5.6
50. Uganda	8.4	82	Coffee	46	11.2
51. Afghanistan	8.3	86			
52. Brazil	8.2	79	Coffee	43	6.4
53. Indonesia	8.2	55			
54. Gambia	8.1	84	Groundnuts[4]	90	22.8
55. Cyprus	8.1	55			
56. Colombia	8.0	85	Coffee	70	8.6
57. Kenya	7.7	59			
58. Eq. Guinea	7.7	65	Cocoa Beans	50	12.8
59. Cent. Afric. Rep.	7.6	52			
60. West Malaysia	7.5	52	Natural Rubber	42	8.4
61. Nigeria	7.4	60			
62. Malawi	7.4	91	Tobacco	35	12.0
63. Argentina	7.1	90			
64. Egypt	7.1	70	Cotton Raw	50	10.1
65. El Salvador	7.0	68	Coffee	46	7.2
66. Ivory Coast	6.9	66	Coffee	36	9.2
67. Guatemala	6.9	77	Coffee	36	9.8
68. Thailand	6.9	76	Rice	30	17.5
69. Chad	6.6	100	Cotton Raw	78	12.1
70. Reunion	6.5	87	Sugar Raw[1]	80	6.5
71. Mexico	6.5	56			
72. Papua New Guinea	6.5	71			
73. Turkey	6.4	88			
74. Cameroon	6.4	74			
75. Uruguay	6.3	71			
76. Costa Rica	5.7	80	Coffee	35	6.5
77. Angola	5.6	65	Coffee	47	10.7
78. Mozambique	5.2	77			
79. Madagascar	5.2	89	Coffee	32	6.3
80. St. Vincent	5.1	83	Bananas	75	18.7
81. Guadeloupe	5.1	94	Sugar Raw[1]	50	9.5
82. Ecuador	4.7	96	Bananas	50	4.0
83. Sri Lanka	4.0	96	Tea	60	5.0
Averages (non weighted)	± 12.0	82		54	± 16.3

* Countries have been included which in 1966-1968, central years of the observation period, were obtaining from agriculture 50 percent or more of their total earnings from exports of goods.

[1] Including sugar refined in raw; instability indices refer to raw sugar only, which is the predominant part, to allow comparison with the world market.

[2] Instability index and trend rate of growth refer only to groundnut oil, which predominates among Senegal's groundnut exports.

[3] Includes groundnuts shelled and unshelled, groundnut-cake and oil.

[4] Instability index and trend rate of growth refer only to groundnuts shelled and unshelled, which predominate among the country's groundnut exports.

To examine these questions a number of correlations have been carried out: specifically, agricultural export instability of developing countries, as indicated by the indices 1961-72, has been correlated with the countries' 1) growth rates of GDP, over the same period, 2) growth rates of agricultural GDP and 3) growth rates of non-agricultural GDP. Using Spearman's rank correlation coefficients, the following results have been obtained:

TABLE 6

SPEARMAN'S RANK CORRELATION COEFFICIENTS

Instability Indices of Total Agricultural Exports[1] 1961-72 and	Coefficients
— GDP growth rates	$S = -0.59^{***}$ (−4.90)
— Agricultural GDP growth rates	$S = -0.31^{***}$ (−2.54)
— Non-agricultural GDP growth rates	$S = -0.44^{***}$ (−3.68)
Instability Indices of Main-Commodity Exports from Individual Countries[2] over 1961-72 and	
— GDP growth rates	$S = -0.58^{***}$ (−3.92)

(t-values in parentheses)

*** = significant at 1% level.

[1] For lack of data, the sample size is here reduced from the 83 countries of table 5 to 70 countries, by excluding:

New Hebrides, St. Lucia, Dominican Rep., Panama, Togo, Syria, Botswana, Equatorial Guinea, Central African Empire, Chad, Uruguay, Madagascar, St. Vincent.

[2] Countries are here ranked in descending order of the instability indices of their main-commodity; the sample includes 46 countries, i.e. all those countries of the 70 which exhibit high concentration of exports in one commodity (table 5).

The large and significant coefficients here obtained support the hypothesis that, in the developing countries, instability of agricultural exports is an obstacle to economic growth, and that the more agricultural exports fluctuate, the less is the expansion of national income.

Though agricultural exports obviously represent only one part of export earnings, their impact on economic growth seems not only relevant but also much stronger than that of total exports. Previous

correlations[22] between total exports instability and GDP growth rates (over 1961-72 as well) had yielded for 101 developing countries a coefficient of

$$S = -0.33^{***}, \quad (-3.29)$$

that is about half the coefficient obtained here for agricultural exports. The importance of agricultural exports seems also confirmed by the high coefficient obtained in the correlation with the instability indices for main-commodity exports, which represent an even smaller part of total export earnings.

With regard to the question whether export instability affects agricultural GDP more than non-agricultural GDP, comparison of the respective coefficients obtained seems to support the hypothesis that agricultural export earnings are directed more to investment in other sectors than back in agriculture. Both coefficients, however, remain definitely lower than the coefficient for *growth of total GDP*. This somewhat puzzling result would indicate the existence of strong interactions between the two sectors and of an overall impact of export instability on economic growth, and would warrant further research, mostly on the relationships of exports with investment.

V. Summary and conclusions

Research work on export instability, previously conducted by the author on total exports of 149 developing and developed countries, has been extended here to agricultural exports, over the same time period. Examination of the literature has revealed a general lack of empirical results, with a maximum coverage of 21 commodities and very little comparative analysis of agricultural exports of individual countries. To obtain, therefore, a complete picture of the instability of agricultural trade at all levels, also with regard to export quantities and unit values, instability indices have computed for 1961-72 for: 1) world total exports of 90 commodities; 2) principal commodity exports of the groups of developing and developed countries separately; 3) total agricultural exports of 83 developing countries and 24

[22] E. LANCIERI, *op. cit.*, page 147.

developed; 4) main commodity exports of 55 developing countries having a high export concentration in one commodity.

This enquiry has shown, first of all, that agricultural exports from developing countries do have a high degree of instability, and that such instability is particularly harmful to the countries' economic growth. Though instability of agricultural exports is the same as for total exports from developing countries (average fluctuations of 12 percent a year), the negative relationship with the growth rates of GDP is for agricultural exports much stronger. At country level, the major reason for instability is the concentration of exports: 55 countries, in fact, depend for more than half of their export earnings only on the exports of one main commodity, and instability of these turns out to be much higher than for total agricultural exports (average fluctuations of 16 percent a year, as compared to 12 percent). That here lies the core of agricultural export instability is confirmed by the strong negative relationship also found between the instability of these main-commodity exports and the countries' growth rates of GDP.

Secondly, the enquiry has shown that instability of agricultural exports from developing countries is not, as argued by many, higher than from developed. The latter, in fact, show average fluctuations which are only marginally lower (11 percent a year) as compared to the developing countries. For the developed countries, instead, a remarkable contrast arises with the very low instability of their total exports, showing average fluctuations of only 5 percent a year.

Finally, it became evident that instability of agricultural commodity exports at world market level (average fluctuations of 11 percent a year) is very much in line with individual countries' results, which is statistically consistent[23]. Also, a relationship between instability and size was found, in the world market as at country level: the smaller the size of exports (in value), the higher the degree of instability and vice versa.

Now, two major questions arise which need to be answered: why in world trade are agricultural exports so unstable — both when coming from developing and developed countries — and why total

[23] Developing countries and developed, together, account for a very high percentage, close to the total, of world agricultural exports. Statistically, it is to be expected that different disaggregations of the same total show in the end very similar fluctuation levels.

exports from developing countries are highly unstable as well, in sharp contrast to total exports from developed? Apparently, agricultural products are subject to long-term factors restricting demand. The share in world trade has been declining since the early fifties — the short-lived Korean War boom — and the prospects for expanding demand for both food and raw materials are limited. According to Engel's well known "Law", as income rises expenditure on food tends to become a smaller proportion of total expenditure, and consequently, the overall income elasticity of food exports is generally low, though there are exceptions. Often, this is also the case with exported raw materials. As modern industrial production expands, technological improvements induce a relative economy in the use of raw materials, which are already subject to increasing competition from synthetic substitutes. Most agricultural products also have low price elasticities of supply and demand, and the combination of all these factors generates the high levels of export instability which have been ascertained.

These mechanisms are well known, but their working in recent years has also been supported by some additional elements, which are worth mentioning. There are at least three directions in which a substantial expansion of world demand for agricultural products would have taken place, unless it had been curbed. First, a large number of developing countries, with fast-rising populations and food consumption chronically below nutritional requirements, have not been able to satisfy their food demand, for lack of financial resources on the one hand, and sometimes for too much emphasis on industrialization programmes on the other. Secondly, in centrally planned countries the demand for tropical products, which has there an immense potential, has been restricted by very rigid import controls. Finally, exports of temperate foodstuffs from developing countries, which might have benefitted from large markets and high elasticities for some products in the developed countries, have been checked severely. Highly protectionist policies were pursued by industrial countries to protect their domestic agricultural sectors. The Common Agricultural Policy in the EEC, and the system of import quotas in the United States are only two cases in point. At world level, it becomes clear that national policies and trade control measures have played a substantial role in making the "well-known mechanisms" work. Though they appear correct from the point of view of economic theory, these mechanisms are not always valid *per*

se, and applicable to every part of the world market. Different levels of income and market development in the various countries of the world, and different specializations of agricultural produce, might often allow to overcome the rigid prescriptions of low price and income elasticities. In the absence of import controls, in most countries there is a certain level of income — coupled with a certain consumption pattern of agricultural products — beneath which the mechanisms do not even start to work. It seems also that these patterns and levels vary from country to country, and that many countries in the world have not yet attained their own.

The illustration just made of the reasons which may make agricultural exports unstable does not help to answer the second of the questions posed before: why total exports from developing countries are also so unstable. It does not help because, conceivably, total exports are substantially different from agricultural exports, since they include manufactures and other different products which might have a contrasting behaviour vis-à-vis instability[24]. Logically, if the hypothesis is accepted that agricultural exports are unstable because they are agricultural, it follows that total exports from developed countries are not unstable because they are not agricultural, and consequently that a different explanation should be found for the high instability of total exports from developing countries. The fact that agricultural exports from developed countries are also unstable should lead to the exclusion of the country origin of exports as the major reason for instability. Therefore, either non-agricultural exports from developing countries are affected by some other cause, or these exports share with agricultural exports certain basic features leading to instability. It is this second hypothesis which appears more convincing, though it needs to be made more explicit.

With the passing of time and the diffusion of scientific progress, in economic terms the borderlines between agricultural products and industrial products have become less and less clear-cut, with the former undergoing more processing than in the past, and the latter including, under the same label, products with increasingly different

[24] The sample of 123 developing countries used in measuring instability of total exports includes 70 countries for which agricultural exports represent at least 50 percent of their total export earnings, and another 53 countries where agricultural exports represent smaller shares of export earnings down to zero. The instability of total exports of these 53 countries is well in line with the rest of the sample, as it is 11.6 percent a year.

degrees of technological sophistication. An international movement is also at work to transfer to the developing countries the productions which are at the bottom of the technological scale, and which account already for the major part of the non-agricultural exports of the developing countries. Nowadays, the possession and application of advanced technology has become more than before a crucial and dividing element of international trade. As Hans Singer and Javed Ansari have put it:

"The realisation that the concentration of technical progress of a specific kind within richer countries is the basic determinant of the uneven distribution of gains from trade and investment, leads to the further realisation that *simple manufactured products of the type capable of production in developing countries share many of the characteristics which were attributed to primary commodities as against manufactured goods*. The real line of division in the present day seems to lie, not between primary commodities and manufactured goods, but between primary commodities plus simple manufactured goods on the one hand, and the sophisticated new products — especially (but not exclusively) intermediate goods, including new equipment, as well as know-how and management — on the other hand."[25]

Therefore, the tentative hypothesis is here suggested that non-agricultural exports from developing countries have the same high level of instability of agricultural exports mainly because they also have a low degree of technological sophistication. To support this claim empirically and find precise relationships between such degree and export instability would not be easy, and would imply the choice of a suitable measure of the degree of technological sophistication. *Prima facie,* the value added of export products seems the most feasible indicator. The limits posed to this research work, however, do not allow to go further except for drawing some general conclusions.

It has been shown that, contrary to traditional arguments of the literature, agricultural exports from developing countries have very little quantity instability and that apparently, as for manufactured exports, the major obstacles to their expansion are more man-made

[25] Hans W. Singer, Javed A. Ansari, "Rich and Poor Countries", Allen & Unwin, London, 1977, page 39.

than descending from economic "laws". Therefore, in the current highly dynamic context of the world economy, where per capita income has been growing in 1950-1975 by 3 percent a year in the developing countries, by 4-5 percent in the developed[26], it becomes clear that exports from developing countries are predominantly affected by problems of demand, and that national and international trade policies and regulations play a crucial role in this respect. The conviction needs, therefore, to be diffused that if it is mainly on the demand side that the causes of export instability are to be found, it is principally in the realm of policies and regulations that these causes could be removed.

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[26] Cf. *World Bank Development Report*, 1978.