CONCENTRATION, EXPORT EARNINGS, AND THE TERMS OF TRADE

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ABSTRACT

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by Michael Richard Edgmand

There appears to be a widespread feeling among government officials in underdeveloped countries that traditional exports, mainly primary products, should not be expanded. Instead, they believe investment should be channelled to other areas, usually in some form of industrialization, either to create new exports or to reduce imports. Although there are undoubtedly a variety of reasons for this feeling, only two are discussed. First, it is held that there is a tendency toward secular deterioration of the commodity terms of trade of underdeveloped countries. Such a deterioration is presumed to indicate a welfare loss or, at best, an unequal distribution of the gains from international trade. As a consequence, officials in underdeveloped countries appear reluctant to allocate resources to the export sector.

Second, officials in underdeveloped countries are reluctant to allocate resources to traditional export industries because it is said that concentration on a narrow range of products leads to greater year-to-year fluctuations in export earnings. Such fluctuations may lead to instability of national income, a mis-allocation of resources, and balance of payments problems. Hence, if exports are to be increased, the expansion should be in new rather than existing product lines.

If these views persist and are unfounded, they could lead to a mis-allocation of resources; therefore, it is of importance to consider the following questions. First, has there been a deterioration of the commodity terms of trade of the underdeveloped countries in the post-war period? Second, is diversification of exports likely to stabilize export earnings?

To test the hypothesis that the commodity terms of trade of underdeveloped (developed) countries inevitably decline (improve), the commodity terms of trade of the countries involved were computed using export and import price indices published by the United Nations. After calculating the terms of trade of the sixty-two countries in the sample, the countries were divided into two groups--developed and underdeveloped--on the basis of the basis of per capita income.

The commodity terms of trade of each group of countries were aggregated into a single index. The aggregate indices reveal no clear trend over the 1948-1964 period for either the twenty countries classified as developed or the forty-two countries classified as underdeveloped.

As an alternative to dividing the countries into developed and underdeveloped groups, the countries were considered individually and the commodity terms of trade of each country examined. In so doing, it was possible to test a hypothesis postulated by Charles P. Kindleberger. According to the hypothesis, movements in the commodity terms of trade are related to the stage of a country's development with the most developed countries expected to experience the most

favorable terms of trade over time and the least developed countries the most unfavorable. However, the results of this study show no significant relationship between the stage of a country's development and movements in its terms of trade. As a consequence, the hypothesis is taken as unproven.

To test the hypothesis that export instability is related to export concentration, measures of export earning instability and the commodity concentration of exports were developed utilizing data published by the International Monetary Fund and the United Nations. Using regression analysis (with the measure of export instability as the dependent variable), a significant relationship was found between export earning instability and commodity concentration of exports. This suggests that diversification of exports should, in general, lead to a reduction in export instability. However, as a practical matter, the results suggest that the amount of stabilization obtained from any given reduction in export concentration is likely to be minor.

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By

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INTRODUCTION

In recent years there has been considerable discussion of the relationship between international trade and economic development. The feeling is widespread among government officials in underdeveloped countries that traditional exports, mainly primary products, should not be expanded but rather investment should be channelled to other areas, usually in some form of industrialization, either to create new exports or to reduce imports. This belief is popular for at least two reasons. First, it is widely held that there is a tendency toward secular deterioration of the terms of trade of underdeveloped countries. Second, the concentration on a narrow range of products for export is said to lead to greater fluctuations in export earnings.

Since the margin for error in development planning is small, it is important to determine, first, whether there has been a secular deterioration of the terms of trade of the underdeveloped countries and, second, whether diversification of exports is likely to provide a greatly increased measure of stability in export earnings. This study will attempt to test these two hypotheses empirically.

The first hypothesis--that the terms of trade of underdeveloped countries inevitably decline--is tested in Chapters I and II. After discussing the various terms of trade concepts and the relationship between economic welfare and the commodity terms of trade, the secular deterioration argument is outlined in Chapter I and its

theoretical and statistical underpinnings critically evaluated. The empirical evidence for the post-war period is presented in Chapter II.[1] The conclusion is that there is little evidence to suggest that the commodity terms of trade of the underdeveloped countries have declined. Post-war trends in the income terms of trade are also examined in Chapter II. Fluctuations in the commodity and income terms of trade are examined in Chapter III.

The second hypothesis--that export earning instability is related to export concentration--is examined in Chapters IV and V. Chapter IV is devoted to a discussion of instability in international trade and contains empirical evidence relating to fluctuations in export earnings in the post-war period. The Chapter also lays the groundwork for the tests found in Chapter V. The conclusion is that instability of export earnings is related to export concentration; hence, export diversification should lead to greater stability of export earnings.

The results and conclusions are summarized in Chapter VI.

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[1]The study is restricted to the post-war years as the pre-war period has been studied rather exhaustively by others.

CHAPTER I

THE TERMS OF TRADE

There are at least seven different concepts of the terms of trade, some of which do not lend themselves to empirical measurement. The most familiar is the commodity or net barter terms of trade which is the ratio of a country's export prices to her import prices relative to some base period. Symbolically, the commodity terms of trade can be defined as

$$T_c = \frac{\frac{e_{P_1}}{e_{P_0}}}{\frac{i_{P_1}}{i_{P_0}}}$$

where e represents exports, i represents imports, P the price index number, 0 the initial year and 1 the given year.[1] A rise in the commodity terms of trade indicates that a larger volume of imports could be obtained, on the basis of price relations only, in exchange for a given volume of exports; therefore, a rise in a country's commodity terms of trade index is usually considered "favorable" to that country. Export and import price indices necessary to compute the commodity terms of trade are available for sixty-two countries for at least part of the post-war period.

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[1]The notation is Jacob Viner's. See his Studies in the Theory of International Trade (New York: Harper and Brothers, 1937), p. 538.

Since countries, particularly the less-developed, are concerned not only with their export-import price ratios but also their "capacity to import," it may be desirable to correct the commodity terms of trade for changes in export volume.[2] A second terms of trade concept, the income terms of trade, is designed for this purpose and can be expressed as

$$T_{c,q} = \frac{\frac{e_{P_1}}{e_{P_0}}}{\frac{i_{P_1}}{i_{P_0}}} \cdot \frac{e_{Q_1}}{e_{Q_0}} = T_c \cdot \frac{e_{Q_1}}{e_{Q_0}}$$ where Q represents a volume

index.[3] A rise in $T_{c,q}$ indicates that a country can obtain a larger volume of imports from the sale of its exports; hence, such a change is deemed "favorable." This "capacity to import" is based on export earnings and should not be confused with total capacity to import which depends not only on exports but also capital flows and other invisible exchange receipts and payments.

In some cases, however, the income terms of trade may be misleading, particularly as a guide to changes in economic welfare. Consider the following examples.[4] First, assume that import prices and quantities are unchanged and the value of exports and imports

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[2]G. S. Dorrance, "The Income Terms of Trade," Review of Economic Studies, XVI (1948-49), 50-56.

[3]Albert H. Imlah uses a "total gain from trade" index in which the quantity of exports is replaced by the quantity of total trade (exports and imports). Imlah, "The Terms of Trade of the United Kingdom, 1798-1913," Journal of Economic History, X (November, 1950), 175-83.

[4]The first example is Gottfried Haberler's. See his A Survey of International Trade Theory (1st ed. rev.; Princeton, New Jersey: Princeton University Press, 1961), p. 27.

remain equal. If export prices fall by ten percent and export quantities increase so as to keep the value of exports constant, the income terms of trade will show no change. Second, assume that export prices remain constant while the volume of exports increases. If import prices increase proportionately , the income terms of trade will not change. In each case, however, the country is worse off than before because for the same volume of imports, it must export more. The commodity terms of trade indicate, correctly, a deterioration in economic welfare while the income terms of trade show no change. Therefore, the income terms of trade concept appears more useful as a measure of "capacity to import" than as a measure of the gain from trade.[5] Data to compute the income terms of trade for at least part of the post-war period are available for fifty-nine countries.

A third concept, the gross barter terms of trade, has been suggested by Frank W. Taussig as being more useful than the commodity terms of trade if there are unilateral transfers in the country's balance of payments.[6] The gross barter terms of trade, a measure of the rate of exchange between the whole of a country's physical imports as compared with the whole of its physical exports, can be

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[5]Ely Devons, "Statistics of United Kingdom Terms of Trade," The Manchester School of Economic and Social Studies, XXII (September, 1954), 268-69. United Nations, Department of Economic Affairs, Economic Commission for Latin America, Economic Survey of Latin America, 1949 (New York, 1951), p. 15.

[6]Frank W. Taussig, International Trade (New York: The MacMillan Company, 1927), pp. 113-14.

denoted as

$$T_q = \frac{\frac{i_{Q_1}}{i_{Q_0}}}{\frac{e_{Q_1}}{e_{Q_0}}} .$$

An increase in the gross barter terms of trade indicates that more imports are received for a given volume of exports; hence, an increase in T_q is usually declared "favorable." If there are no unilateral transfers, exports which are surrendered without compensation, or imports which are received without a corresponding counterpayment, $T_c = T_q$; otherwise, the gross barter and commodity terms of trade will diverge.[7]

As Jacob Viner[8] and Gottfried Haberler[9] have pointed out, the gross barter terms of trade can be misleading because the concept treats as equivalent cases situations which have to be judged separately. For example, a country's gross barter terms of trade may decline because the country is paying reparations or because it exports capital. While the gross barter terms of trade concepts treats both cases equivalently, the impact on the economy is not the same and it is clear that they should be judged separately.[10] For this reason, the gross barter terms of trade concept is seldom used although data in the form of export and import quantity indices are

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[7]Gerald M. Meier, International Trade and Development (New York: Harper and Row, 1963), p. 42.

[8]Viner, op. cit., pp. 562-63.

[9]Haberler, op. cit., p. 27.

[10]Erich Schiff, "Direct Investments, Terms of Trade, and Balance of Payments," Quarterly Journal of Economics, LVI (February, 1952), 310-16.

available to calculate T_q for fifty to sixty countries in the post-war period.

Another concept, the single factoral terms of trade, is designed to take into consideration changes in productivity in the export sector and consists of the commodity terms of trade multiplied by an export productivity index. If F represents a productivity index, the single factoral terms of trade can be written as

$$T_{c,f} = \frac{\frac{e_{P_1}}{e_{P_0}}}{\frac{i_{P_1}}{i_{P_0}}} \cdot \frac{e_{F_1}}{e_{F_0}} = T_c \cdot \frac{e_{F_1}}{e_{F_0}}.$$ [11]

A rise in the single factoral terms of trade indicates that a greater quantity of imports can be obtained per unit of factor input used in the production of exports; hence, a rise in $T_{c,f}$ is considered "favorable." Clearly, the commodity and single factoral terms of trade will diverge if there is technological change in the export sector.

Since productivity changes are likely to be important over time, it would be desirable to compute the single factoral terms of trade; unfortunately, productivity statistics are difficult to obtain. Hence, little use has been made of this concept.[12]

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[11]The notation differs slightly from Viner's in respect to the single and double factoral terms of trade. Viner, op. cit., pp. 559-61.

[12]Ely Devons has compiled the single factoral terms of trade of the United Kingdom for 1935 and 1946 through 1953. Devons, op. cit., pp. 265-68, 273. Robert E. Lipsey has calculated the single factoral terms of trade for United States' agricultural and manufactured products for 1879 and 1889 through 1957. Lipsey, Price and Quantity Trends in the Foreign Trade of the United States (Princeton, New Jersey: Princeton University Press, 1963), pp. 25-30, 465-68.

The double factoral terms of trade is similar to the previous concept except that the double factoral terms of trade takes into consideration changes in productivity in the export sector of foreign countries. Symbolically, the double factoral terms of trade can be represented as

$$T_{c,ff} = \frac{\frac{e_{P_1}}{e_{P_0}}}{\frac{i_{P_1}}{i_{P_0}}} \cdot \frac{\frac{e_{F_1}}{e_{F_0}}}{\frac{i_{F_1}}{i_{F_0}}}.$$

An increase in the double factoral terms of trade indicates that one unit of domestic factors embodied in exports now exchanges for more units of the foreign factors embodied in imports; therefore, such a change is said to be "favorable." The single and double factoral terms of trade will diverge when there is a change in the factor cost of producing imports. However, the double factoral terms of trade have little relevance to the welfare of the importing country since it is concerned with whether it receives more goods per unit of resources engaged in export production, not whether these imports contain more or less foreign inputs than before. Statistically, it would be extremely difficult to compute an import productivity index since most countries import commodities from many countries.

Viner lists two other concepts of the terms of trade--the real cost and utility terms of trade.[13] Both are designed to measure changes in economic welfare by introducing utility functions into the expression. However desirable the real cost and utility terms of trade, they are impossible to calculate since they require knowledge

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[13]Viner, op. cit., pp. 559-60.

of the various utility functions.

In summary, we have noted seven different terms of trade concepts; however, the last two are clearly impossible to calculate. Of the rest, the gross barter and double factoral terms of trade are not particularly useful. The three remaining concepts, the commodity, income, and single factoral terms of trade, appear useful, but the latter is impossible to calculate for a large number of countries because of the lack of productivity data. Since the income terms of trade is mainly a measure of "capacity to import" we are left with only the commodity terms of trade as both a possibly useful theoretical concept for measuring the gain from trade and one that is readily available for a large number of countries. In the next section, the relationship between the commodity terms of trade and the gain from trade is discussed.

All further references to the terms of trade are to the commodity terms of trade unless otherwise stated. We shall return to the income terms of trade briefly at the end of the next chapter since the concept does provide a measure of the country's export-based capacity to import.

The Terms of Trade and Economic Welfare

A change in a country's terms of trade can affect its economic welfare in a number of ways.[14] If a country's terms of trade improve as its domestic output expands, its real income rises faster than output since each unit of exports now exchanges for more imports. An

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[14]It is assumed that changes in economic welfare are reflected in changes in real national income.

improvement in the terms of trade may also release resources from the export for domestic expansion since the same amount of imports can be obtained for fewer exports. Moreover, the government may be able to capture all or part of the gain through taxation or increased profits of governmental marketing boards, thereby making more resources available for economic development. However, should a country's terms of trade deteriorate as its domestic economy expands, a part of the benefit from the expansion is transferred to other countries.[15]

Theoretically, it is possible that the deterioration of the terms of trade may be so great that the gain from the growth in output is more than offset by the loss from the adverse terms of trade. This phenomenon, called immiserizing growth by Jagdish Bhagwati,[16] would arise only if either the growing country faces an inelastic demand schedule for its exports or, at constant relative commodity prices, growth actually reduces the domestic production of importables.[17] Such a situation is unlikely to occur if the country has some flexibility in its structure of output so that resources can move from one sector to another. If the necessary conditions do

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[15]If growth occurs only in the country in question, the presumption is that the country's terms of trade will decline provided that the foreign offer curve is less than infinitely elastic. However, if the country's expansion is ultra-import biased, the country's terms of trade will improve. Meier, op. cit., pp. 46-47.

If growth is also occurring in other countries, there is no such presumption.

[16]Jagdish Bhagwati, "Immiserizing Growth: A Geometrical Note," Review of Economic Studies, XXVI (June, 1958), 201-05.

[17]Neither condition is sufficient. For a mathematical formulation of the necessary conditions, see Jagdish Bhagwati, "International Trade and Economic Expansion," American Economic Review, XLVIII (December, 1958), 949-50.

exist, the country could impose taxes to offset the deterioration of its terms of trade.[18]

So far, it appears that an improvement (a deterioration) in the terms of trade marks a gain (loss) in welfare; however, such is not necessarily the case. It depends on the cause of the change in the terms of trade. An improvement in a country's terms of trade caused by a shift in the foreign offer curve, with the country's own offer curve unchanged, is always favorable provided it doesn't lead to widespread unemployment in the country's export industries.[19] Similarly, a deterioration of the terms of trade caused by a shift in the foreign country's offer curve is clearly unfavorable given the level of employment. However, if the domestic offer curve also changes, it is necessary to consider the cause of this change to determine its impact on economic welfare.

First, as has long been recognized, it is possible for a country to improve its terms of trade by restricting the volume of its trade, assuming that the foreign offer curve is less than infinitely elastic and the improvement is not offset by retaliation of other countries. Up to a certain point,[20] an improvement in the terms of trade will increase welfare; however, after that point, further

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[18]R. A. Mundell, "The Pure Theory of International Trade," American Economic Review, L (March, 1960), 85.

[19]The shift could lead to unemployment if the home country's offer curve were inelastic in the relevant range. Gottfried Haberler, "Terms of Trade and Economic Development," Economic Development for Latin America, ed. Howard Ellis (London: MacMillan and Company, 1963), p. 277.

[20]The point where the foreign offer curve is tangent to the home country's highest indifference curve. James E. Meade, A Geometry of International Trade (London: George Allen and Unwin, Ltd., 1952), p. 76.

increases in welfare will not be forthcoming as the rise in the terms of trade is offset, or more than offset, by a fall in the volume of trade.[21] Thus, an increase in the terms of trade does not necessarily mean an increase in welfare.

Second, a country's offer curve may change because of increased productivity in the export sector. While this may lead to a deterioration in the commodity terms of trade, it does not necessarily imply a reduction in welfare. So long as productivity in the export sector is rising faster than the prices of its exports are falling, the country's real income is increasing despite the deterioration in its terms of trade.[22] Clearly, the single factoral terms of trade concept is more relevant here.

Furthermore, even if productivity is constant in the export sector, a deterioration in the terms of trade is not sufficient evidence of a loss in welfare. If factors are employed in the import-competing sector with lower productivity than in the export sector and export industries expand to absorb more of these factors, the real income of the economy will increase despite the deterioration in the terms of trade.[23]

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[21]Haberler, "Terms of Trade and Economic Development," op. cit., p. 278. For a discussion of the optimum tariff, see Harry G. Johnson, "Optimum Tariffs and Retaliation," International Trade and Economic Growth: Studies in Pure Theory (London: George Allen and Unwin, 1958), pp. 31-61.

[22]The country's gains would have been greater, of course, had the terms of trade not deteriorated.

[23]Robert E. Baldwin, "Secular Movements in the Terms of Trade," American Economic Review, Papers and Proceedings, XLV (May, 1955), 263-64. Theodore Morgan, "The Long-run Terms of Trade Between Agriculture and Manufacturing," Economic Development and Cultural Change, VIII (October, 1959), 17-19.

Finally, it is always possible that the commodity and income terms of trade move in opposite directions. If the foreign offer curve is elastic, or shifts out sufficiently as the country's offer curve shifts, the volume of exports may increase enough to improve the income terms of trade despite a deterioration in the commodity terms of trade. In a country concerned with financing economic development, the income terms of trade may be more relevant than the commodity terms of trade.

From these examples, it is evident that knowledge of the change in the commodity terms of trade is not very useful in itself in drawing conclusions as to the change in economic welfare.[24] It is essential to go beyond the terms of trade to analyze the cause of the change in order to examine the welfare implications.

Trends in the Commodity Terms of Trade: Theoretical Foundation

Despite the uncertain relationship between the commodity terms of trade and economic welfare, various economists have argued that there has been a very uneven distribution of the gains from international trade as evidenced by a secular movement in the terms of trade of certain groups of countries.[25] From the ensuing controversy,

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[24]Hans Staehle, "Some Notes on the Terms of Trade," International Social Science Bulletin, III (Spring, 1951), 33-37.

[25]United Nations, Department of Economic Affairs, Economic Commission for Latin America, The Economic Development of Latin America and its Principal Problems (Lake Success, 1950), pp. 8-14. Hans Singer, "The Distribution of Gains between Investing and Borrowing Countries," American Economic Review, Papers and Proceedings, XL (May, 1950), 473-85. Reprinted in Studies in Economic Development, eds. Bernard Okun and Richard W. Richardson (New York: Holt, Rinehart and Winston, 1961), pp. 170-83. Page references are to the latter. Raul Prebisch, "Commercial Policy in the Underdeveloped

two questions have emerged. First, have the long-run terms of trade moved in favor of the countries that export manufactured goods at the expense of those that export primary products? Second, have the long-run trends in the terms of trade of the underdeveloped countries been unfavorable vis-á-vis the developed countries? Although much of the evidence is applicable to both questions, the problems are not identical since some developed countries, for example, Australia and New Zealand, are net exporters of primary products.[26] The first hypothesis--that the terms of trade of primary producing countries inevitably deteriorate vis-á-vis the industrial countries--is generally referred to as the Singer-Prebisch Thesis. For convenience, the second hypothesis--that the terms of trade of underdeveloped (developed) countries inevitably decline (improve)--will be called the Kindleberger Thesis.

The Singer-Prebisch Thesis

There are two main theoretical explanations of the alleged secular deterioration of the terms of trade of primary producing countries.[27] First, it is asserted that industrial countries are more

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Countries," American Economic Review, Papers and Proceedings, XLIX (May, 1959), 251-73. United Nations, Proceedings of the United Nations Conference on Trade and Development (New York, 1964). United Nations, Report by the Secretary-General of the United Nations Conference on Trade and Development, Towards a New Trade Policy for Development (New York, 1964).

[26]Other developed countries export some primary products and underdeveloped countries export some manufactured goods.

[27]Theodore Morgan provides an excellent summary of other explanations. Morgan, "Trends in Terms of Trade and Their Repercussions on Primary Producers," International Trade Theory in a Developing World, edited by Roy Harrod assisted by Douglas Hague (New York: St Martins' Press, 1963), pp. 55-57, 68-72. It should be noted that this view is contrary to that commonly held by the Classical

monopolistic than primary producing countries. Second, it is argued that there is a disparity in the rates of increase in demand for imports between the industrial and primary producing countries. Each is discussed below.

According to the first argument, restrictive business practices are more common to industrial than primary producing countries; hence, the terms of trade of the industrial (primary producing) countries improve (decline) because of the monopolistic tendencies of the former. However, it is difficult to understand how this explanation can suffice to explain movements in the terms of trade over time unless it is argued that the industrial countries are becoming more monopolistic. Monopolistic practices in the industrial countries could cause the terms of trade index to be more favorable (for the industrial countries) at both the beginning and end of a period than it otherwise would be. But monopoly power would influence the trend in the terms of trade only if the degree of monopoly power changed during that period.[28]

In opposition to the hypothesis, it has been argued that competition in world markets for manufactures is now greater than in the past since more firms and countries are now exporting manufactured

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economists who believed that the operation of diminishing returns in primary production would cause the prices of primary products to rise relative to prices of manufactures. See John M. Keynes restatement of the Classical position in his "Reply to Sir William Beveridge," Economic Journal, (December, 1923), pp. 476-88.

[28]This argument is based on the measure of monopoly power provided by Abba Lerner. Symbolically, the measure is (P - C)/P where P represents price and C represents marginal cost. Lerner, "The Concept of Monopoly and the Measurement of Monopoly Power," Review of Economic Studies, (June, 1934), pp. 157-75.

goods.[29] Moreover, "in minerals production, there may, in fact, be more monopoly than in manufacturing. World production of minerals is typically dominated by a few large firms that attempt to maintain prices. Agriculture is, however, generally competitive at least until governments step in to protect or assist it."[30] However, empirical evidence on monopoly power is not clear.[31]

Even if industrial countries are more monopolistic than primary producing countries, it does not necessarily follow that the terms of trade will turn against the latter. If the rate of technological progress tends to be higher under monopolistic conditions than under pure competition, long run output will expand more rapidly under monopoly than under competition.[32] The faster output grows, all other things equal, the more the terms of trade will deteriorate. Hence, it could be argued that the more monopolistic the country, the more likely its terms of trade will deteriorate.

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[29]Haberler, "Terms of Trade . . .," op. cit., p. 284. Charles P. Kindleberger, "Terms of Trade for Primary Products," National Resources and International Development, ed. Marion Clawson (Baltimore: John Hopkins Press, 1964), pp. 345-46.

[30]M. O. Clement, Richard L. Pfister, and Kenneth J. Rothwell, Theoretical Issues in International Economics (Boston: Houghton Mifflin Company, 1967), p. 165. Government intervention in agriculture may be the rule rather than the exception.

[31]Charles P. Kindleberger, The Terms of Trade: A European Case Study (New York: John Wiley and Sons, 1956), pp. 243-45. Moreover, the United Nations has concluded that it "is not possible to set forth even within broad ranges of approximation the prevalence of restrictive business practices in either national or international trade." United Nations, Economic and Social Council, Restrictive Business Practices (New York, 1953), p. 9.

[32]It has been argued that only those firms which operate on a large scale can afford the research and development necessary to systematically cut costs and introduce new products. Bo Sodersten, A Study of Economic Growth and International Trade (Stockholm: Almqvist and Wiksell, 1964), pp. 164-65.

It is also argued that industrial countries have relied more heavily on the imposition of tariffs than have primary producing countries. In particular, it is argued that the industrial countries have imposed tariffs on a number of foodstuffs and raw materials, primarily food, while the primary producing countries have imposed tariffs on both foodstuffs and manufactured goods. Nevertheless, there is no guarantee that the terms of trade will be affected by the imposition of a tariff; it depends on the elasticity of the offer curve facing the individual country. Moreover, when both parties impose tariffs, the end result depends on the net weight of their commercial policies. Unfortunately, "there seems to be no chance of testing empirically the view that the underdeveloped countries lose on balance from commercial policy."[33] However, as in the previous case, it is difficult to accept this as an explanation of the movement of the terms of trade over time unless it is argued that the industrial countries are becoming increasingly protectionistic.

One final aspect of the first argument relates to technological progress and the distribution of the gains from such progress. Hans Singer and others have argued that, although increases in productivity have been greater in manufacturing than in primary production, prices of the former have increased relative to prices of the latter because of difference in the way in which the benefits of reduced costs have been shared.[34]

Over time, the gains from technological progress can be

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[33]Kindleberger, The Terms of Trade: A European Case Study, op. cit., p. 246.

[34]Singer, op. cit., pp. 174-76.

distributed in either of two ways (or some combination)--to factors of production in the form of higher earnings or to consumers in the form of lower prices. In a closed economy, there will be an increase in real income in either case. But when international trade is considered, the producers and consumers are no longer necessarily in the same country. In fact, it is argued that the gains from increased productivity in industrial countries have generally been reaped in the form of higher wages and profits while such gains in primary producing countries have resulted in lower prices. Thus, the industrial (primary producing) countries obtain, on the basis of price relations alone, increasing (decreasing) amounts of imports from the primary producing (industrial) countries for a given quantity of exports.

While Singer offers no explicit explanation as to why productivity gains are distributed in this fashion, Prebisch believes believes that "the characteristic lack of organization among the workers employed in primary production prevents them from obtaining wage increases comparable to those of the industrial countries (during the upswing of the business cycle) and from maintaining the increases to the same extent (during the downswing)."[35]

In criticism of the argument, it is not clear that trade unions and firms actually exercise sufficient monopoly power to distribute productivity gains through rising money wages and profits rather than falling prices. Moreover, even if labor unions and firms do possess power to maintain or increase prices domestically, world prices need not reflect domestic conditions since a country may find

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[35]United Nations, The Economic Development of Latin America . . ., op. cit., p. 13.

itself priced out of the international market.

The second main argument is based on differences in the income elasticity of demand for manufactured and primary products. It is asserted that as income increases, the demand for manufactured products grows relatively faster than the demand for primary products; hence, there will be a decline in the price of primary products vis-à-vis manufactured products.[36] The differences are attributed to the operation of Engel's law in the case of food and, in the case of raw materials, to technological progress which reduces the amount of raw materials used per unit of output and the development of synthetics and other substitutes.[37]

In regard to foodstuffs, however, it should be noted that while the income elasticity of demand may be quite low in the industrial countries, it is undoubtedly higher in many of the poorer countries.[38]

Moreover, in assessing the impact of synthetics on raw material prices from 1953 to 1962, the United Nations Food and Agricultural Organization (FAO) has tended to minimize their effect. They state:

> The extent to which synthetic competition has contributed to this deterioration in agricultural raw material prices is indeterminate. If, at any time, the output of all synthetic materials had ceased, prices of their natural counterparts would certainly have risen in the short-term.

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[36]Prebisch, op. cit., pp. 251-54. Singer, op. cit., p. 175.

[37]Engel's Law states that the percentage of expenditures on food is a decreasing function of income. Singer, ibid. It is also argued that the primary producing countries face increasing output of primary products in the industrial countries "which has been the result both of domestic policies, in many cases reinforced by protective barriers, as well as a general increase in productivity stemming from technological progress." United Nations, Proceedings . . ., op. cit., p. 6.

[38]Kindleberger, The Terms of Trade: A European Case Study, op. cit., p. 268.

> However, taking into account long-term supply responses, there is no similar assurance that prices would have been higher than they are today if man-made materials had never come into existence. Prices of some major agricultural products not subject to competition from man-made materials (e.g., coffee and cocoa) have declined more rapidly than those of agricultural raw materials.[39]
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> The rapid rate of growth in the over-all elastomer and fibre markets has been reflected in simultaneous increases in world consumption of natural, as well as synthetic, raw materials. The progress of the former has been relatively slow, with the result that the share of natural products in total consumption has fallen sharply. This is attributable partly to competition from synthetics, which has tended to place a ceiling on prices and clouded future prospects with sufficient uncertainty to exert some retarding influence on investment. However, competition from synthetics has been only one, and probably not the most important, of the many factors limiting production in developing countries in the post-war period.[40]

Moreover, as far as the over-all level of demand for raw materials which compete with synthetics is concerned, the future appears favorable, with the possible exception of soap-making materials.[41]

Even if it is granted that the over-all elasticity of demand for primary products is low, it is improbable that all primary producing countries experience the same trend in their terms of trade. This is because most underdeveloped countries export only a narrow range of products and the income elasticity of demand varies from

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[39] United Nations, Proceedings . . ., op. cit., p. 354. "During 1959-1961, world exports of goods competing with synthetics amounted to 24% of the total value of world agricultural trade. More than half (55%) of the total originated in developing countries. The world output of synthetics is heavily concentrated in developed countries," United Nations, Proceedings . . ., op. cit., p. 349.

[40] Ibid., pp. 354-55.

[41] Ibid., p. 355.

commodity to commodity.[42] Under such circumstances, what is significant for a specific primary producing country is not the over-all elasticity of demand for primary products but rather the expansion in demand for its own exports.[43]

Even if the income elasticities of demand for industrial and primary products differ, it is theoretically possible that the terms of trade may turn in favor of the primary producing countries. This is because demand alone does not determine the terms of trade--supply also plays a role. Shifts in the supply curves could offset, or more than offset, the effect of the different income elasticities.

As originally expounded, the two main arguments discussed above are weak. This is not to say, however, that models with realistic assumptions cannot be developed to show that the terms of trade will turn against the primary producing countries. Harry G. Johnson, for example, has developed a model applicable to the problem at hand.[44] Johnson uses a two country model with one country producing mainly manufactured goods and the other producing mainly agricultural products. The income-elasticity of demand for manufactured goods is assumed greater than for the agricultural goods. Johnson then considers two possible patterns of technological change--equal improvement in both sectors and improvement in the manufacturing

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[42] The fact of the matter is that coal, and timber and timber products behave very differently from, say, cotton, fats and oils, and petroleum products." Kindleberger, The Terms of Trade: A European Case Study, op. cit., pp. 265-66.

[43] Meier, op. cit., p. 62.

[44] Harry G. Johnson, "Economic Expansion and International Trade," Manchester School of Economic and Social Studies, XXIII (May, 1955), 95-112. For a more elegant model, see Sodersten, op. cit., pp. 177-81.

sector only. When technological change affects both sectors, the manufacturing country's terms of trade will improve. But when technological change affects only the manufacturing sector, they will probably worsen.[45] Thus, in theory, either result may prevail. Therefore, whether the terms of trade turn against primary producing countries and in favor of industrial countries is, ultimately, an empirical question.

The Kindleberger Thesis

To the extent that most developed countries export mainly manufactured products and most or all underdeveloped countries export chiefly primary products, the arguments discussed above also apply to the Kindleberger hypothesis. However, a theoretical argument cast entirely in terms of developed and underdeveloped countries has been suggested.[46]

As a result of his study of European terms of trade, Charles P. Kindleberger concluded that movements in the terms of trade are related to the stage of a country's development.[47] Hence, movements in the terms of trade should favor the developed countries at the expense of the underdeveloped with the most highly developed countries showing the most favorable terms of trade. According to Kindleberger, the basic reason for the terms of trade to turn against

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[45]Richard E. Caves, Trade and Economic Structure: Models and Methods (Cambridge: Harvard University Press, 1960), p. 160.

[46]Kindleberger, The Terms of Trade: A European Case Study, op. cit., pp. 253-57. Also, "The Terms of Trade and Economic Development," Review of Economics and Statistics, XL (February, 1958), 81-85 and Foreign Trade and the National Economy (New Haven: Yale University Press, 1962), pp. 99-115.

[47]Kindleberger, The Terms of Trade: A European Case Study, ibid.

the underdeveloped countries is their immobility (or inadaptability) of supply in response to changes in supply conditions abroad or in demand.[48]

If, for example, an underdeveloped country experiences a decline in demand for its products, it will be unable to readily reallocate resources away from these sectors; hence, prices fall.[49] Similarly, if world demand for products not produced by the country increases, the country will be unable to shift resources to these sectors in order to take advantage of the increase in price. Moreover, if demand for the country's products increases, the country will find itself faced with increased competition from abroad which limits the possible improvement in its terms of trade. In certain circumstances, the underdeveloped country may be "lucky"[50] and find itself producing a highly profitable commodity with competition limited by the country's natural advantage. In such cases, its terms of trade may improve. In contrast, resources in developed countries are more likely to move in response to price changes.

According to Kindleberger, countries differ in their "capacity to transform" primarily for social reasons.

> The traditional society is engaged in endless repetition. Consumption and production are carried on in the same way from generation to generation. Much production and consumption proceeds on a subsistence basis outside the

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[48] More specifically, it is assumed that supply is more inelastic in underdeveloped than developed countries.

[49] However, to the extent that the commodities are produced elsewhere, firms in other countries may reduce output or actually cease production. Under these circumstances, the tendency for prices to fall would be checked. Kindleberger apparently neglects this possibility.

[50] The term is Kindleberger's.

> market. Change is not absence, but it occurs slowly, and is resisted. Social values dominate economic. The appetite for income is kinked; when social needs are filled, leisure is valued above more goods. Succeeding generations follow in the same occupations, which are determined by social status or caste.
>
> In such a society capacity to transform is limited. . . .[51]
>
> In a transforming society, much has altered. Consumers are interested in increasing real income. Producers specialize and work for the market, exchanging goods against money and money against goods. A higher price leads to more labor, land, and capital being attracted to a given product, and more output. A lower price results in reduced production.[52]

From a theoretical standpoint, Kindleberger's argument is open to several objections. First, it is not clear that inadaptability (adaptability) of supply can be strictly associated with underdeveloped (developed) countries. Some developed countries--for example, Great Britain in recent years--may have less flexibility in adapting to changing conditions than some underdeveloped countries.[53] Moreover, the "luck" element renders Kindleberger's hypothesis indeterminate. With "luck" an underdeveloped country may have improving terms of trade; hence, prediction is impossible. Moreover, as Bo Sodersten has shown, it is not supply elasticities alone which determine the outcome of the terms of trade but rather "the growth rates in the different sectors and the demand developments induced by the economic growth."[54]

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[51] Kindleberger, Foreign Trade and the National Economy, op. cit., p. 100.

[52] Ibid., p. 101.

[53] Kindleberger has recognized this point. Ibid., pp. 102, 109-110.

[54] Sodersten, op. cit., p. 37.

However, even if Kindleberger's hypothesis is open to criticism, it is possible to formulate models which would rationalize the alleged tendency. For example, suppose, in a two-factor model, capital is relatively abundant in developed countries and labor is relatively abundant in underdeveloped countries. Assume, as a consequence, developed countries export capital intensive goods and underdeveloped countries export labor intensive products. If the supply of labor grows more rapidly in underdeveloped countries than the capital stock of developed countries, the terms of trade of the underdeveloped countries will, ceteris paribus, deteriorate. Thus, whether there is any systematic tendency for the terms of trade to turn against the underdeveloped countries is, in the end, an empirical question. Before proceeding, however, it is desirable to review the evidence produced by earlier empirical work.

Trends in the Commodity Terms of Trade: Statistical Foundation

As previously noted, there are really two issues at stake, the terms of trade of industrial and primary producing countries and those of developed and underdeveloped countries. The statistical evidence relating to each is discussed below.

The Singer-Prebisch Thesis

It is claimed that there has been a secular deterioration in the prices of primary products relative to manufactures from the late

1800's to the eve of the Second World War.[55] As proof, the United Nations has offered three different indices all based, in varying degree, on British data.[56] The first of these indices, Series A, relies, for the years 1876 to 1929, on League of Nations data[57] which, in turn, is based on the Sauerback British wholesale price index for primary products, and Werner Schlote's price data from British trade statistics.[58] The rest of Series A, covering the 1930-1938 period, is based on world trade data from the Review of World Trade. Series B, also covering the 1876-1938 period, is based on Schlote's data alone. Series C, covering the years 1913-1948, is the official British Board of Trade Index converted to a 1938 base. All three indices seem to show that the United Kingdom's terms of trade, despite wide fluctuations, improved considerably over the period. From this, it is inferred that the trend was unfavorable to primary producers and the U. K.'s trading partners.

Since there are no overall indices of prices paid and received by the primary producing countries over this period, the British data are appealing. They are available over a long period of time during which the United Kingdom accounted for a substantial proportion of

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[55]United Nations, Department of Economic Affairs, Relative Prices of Exports and Imports of Underdeveloped Countries (Lake Success, 1949), p. 7.

[56]Ibid., pp. 21-25. See Table V, p. 22 for the three indices.

[57]The main author is Folke Hilgerdt. League of Nations, Industrialization and Foreign Trade (Geneva, 1945), pp. 154-57.

[58]Werner Schlote, British Overseas Trade from 1700 to the 1930's, trans. W. O. Henderson and W. H. Chaloner (Oxford: Blackwell, 1952). The price indices for primary products and manufactures constructed by W. A. Lewis also rely heavily on Schlote's data. Lewis, "World Production, Prices, and Trade, 1870-1960," Manchester School of Economic and Social Studies, (May, 1952), pp. 117-18.

world trade, especially during the earlier years. The U. K.'s imports were also largely primary products and her exports predominantly manufactured goods. Despite the attractiveness of the data, many economists have pointed to the weak statistical base underlying the Singer-Prebisch Thesis.[59] First, British data which are available from 1801 to 1953 show the period 1876 to 1938 to be atypical. Concentration on the years from 1801 to 1953 shows no overall trend, but rather marked short and long-term instability.[60]

Second, the British data cited above cannot be used to measure the terms of trade actually experienced by the primary producing countries. In the trade statistics, import prices are reported c.i.f. (inclusive of transportation charges) at British ports of entry while export prices are reported f.o.b. (exclusive of transportation charges) at British ports of exit. Therefore, a change in British import prices need not reflect a change in the prices received by foreign exporters since transportation charges may vary. The price of wheat may fall in Liverpool and rise in Argentina if ocean freight rates fall sufficiently. Similarly, a change in British export prices need not reflect a change in the prices foreign importers pay. Hence, improvement in the British terms of trade doesn't necessarily mean a deterioration of her trading partner's terms of trade; it is possible that both could be improving with

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[59]Moreover, indices constructed by Imlah and Kindleberger do not show as much improvement as Schlote's. Imlah, "The Terms of Trade of the United Kingdom, 1796-1913," Economic Elements in the Pax Britannica (Cambridge: Harvard University Press, 1958), p. 87. Kindleberger, The Terms of Trade: A European Case Study, op. cit., pp. 53ff.

[60]Morgan, "The Long-run Terms of Trade Between Agriculture and Manufacturing," op. cit., pp. 2-4.

falling transportation costs.

Data on ocean freight rates compiled by Douglas C. North and others as well as numerous examples furnished by C. M. Wright show that transportation costs fell dramatically over most of the 1876-1938 time span.[61] As a result, P. T. Ellsworth concludes "that a large proportion, and perhaps all, of the decline in the British price of primary products in the period between 1876 and 1905 can be attributed to the great decline in inward freight rates. . . . Since the price of British manufactured exports fell in this period by 15 percent, the terms of trade of primary countries, [if] f.o.b. prices [were] used for their exports as well as for their imports, may well have moved in their favor."[62] For the 1913 to 1933 period, Ellsworth believes that falling freight rates accounted for some, but not all, of the improvement of the U. K.'s terms of trade.[63] Kindleberger has constructed a rough index of the "Current-Account Terms of Trade" which includes services that seems to confirm Ellsworth's findings.[64]

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[61]Douglas C. North, "Ocean Freight Rates and Economic Development," Journal of Economic History, XVIII (December, 1958), 537-55. C. M. Wright, "Convertibility and Triangular Trade as Safeguards Against Economic Depression," Economic Journal, LXV (September, 1955), 545ff. A. K. Cairncross, Home and Foreign Investment, 1870-1913, (Cambridge, England: Cambridge University Press, 1953), pp. 170-79. Kindleberger, The Terms of Trade: A European Case Study, op. cit., pp. 20-21.

[62]P. T. Ellsworth, "The Terms of Trade Between Primary Producing and Industrial Countries," Inter-American Economic Affairs, X (Summer, 1956), 55-57.

[63]Ibid., pp. 62-63. The terms of trade of primary producers were relatively stable from 1906 to 1912 and improved from 1933 to 1938.

[64]Kindleberger, The Terms of Trade: A European Case Study, op. cit., Chapter 11. It has been suggested that the omission of the prices of services in computing the terms of trade indices has made the terms of trade of underdeveloped countries appear more

Moreover, in regard to the United Kingdom's trading partners, there is no reason to believe that all the primary producing countries experienced the same trend for the period since the economic structure of countries may vary considerably.[65] As demand and supply conditions are unlikely to be identical over time for all primary producing countries, we would expect the prices of some primary products to fall, some to rise, and others to remain constant, even given a general trend in primary product prices. As a consequence, not all primary producing countries need experience declining terms of trade. The same is true for industrial countries.

Indeed, Theodore Morgan presents data for six countries (in addition to the United Kingdom) and concludes, on the basis of the data, that there has been a wide variety of experiences in other countries.[66] Accordingly, he emphasizes the importance of not generalizing from the experience of a single country.

Finally, the terms of trade indices fail to make adequate provision for qualitative improvements in manufactured products and for the introduction of new products.[67] Normally, the quality and efficiency of manufactured products would appear to improve more rapidly than those of primary products. As a consequence, studies of changes

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unfavorable, or less favorable, than they really are. Price data are, of course, much easier to obtain for merchandise than for services. Kindleberger, "Terms of Trade for Primary Products," op. cit., p. 342.

[65] Haberler, "Terms of Trade and Economic Development," op. cit., p. 280.

[66] Morgan, "The Long-run Terms of Trade Between Agriculture and Manufacturing," op. cit., pp. 2-4.

[67] To be sure, these problems are not limited to the indices discussed above.

in the terms of trade between primary producing and manufacturing countries are affected by a systematic bias which makes the change appear less favorable or more unfavorable to the primary producing countries than they really are.[68] Also, one would expect hundreds of new manufactured products to appear over the years while the range of most primary products would remain relatively unchanged. This introduces another systematic bias since the omission of new commodities or their inclusion at relatively small beginning year weights tends to bias a price index upward as new commodities usually fall in price soon after they are introduced.[69]

In other studies, Kindleberger found no clear trend in the terms of trade of primary products vis-à-vis manufactured commodities.[70] "From a review of Kindleberger's data, combined with U. S. price indexes for the period since 1913, Sarah S. Montgomery found signs of improvement rather than deterioration in world terms of trade for primary products. This was especially the case when they were measured in terms of prices within primary producing countries."[71] Robert E. Lipsey concluded in his study of the United States that there seems to be a predominance of improving terms of trade of

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[68]United Nations, Relative Prices of Exports and Imports of Underdeveloped Countries, op. cit., pp. 133-34. A. N. McLeod, "Trade and Investment in Underdeveloped Areas: A Comment," American Economic Review, XLI (June, 1951), p. 414.

[69]Baldwin, op. cit., pp. 267-68.

[70]Kindleberger, The Terms of Trade: A European Case Study, op. cit., p. 263, and "The Terms of Trade and Economic Development," op. cit., pp. 72-85.

[71]Sarah S. Montgomery, "The Terms of Trade of Primary Products and Manufactured Goods in International Trade, 1870-1952," (Unpublished Ph.D. dissertation, University of Wisconsin, 1960), quoted in Lipsey, op. cit., p. 19.

primary products.[72]

More recently, the United Nations has emphasized the deterioration of the terms of trade of primary products from 1950 to 1962.[73] However, the agricultural terms of trade were unusually high during the early fifties; hence, this trend may not reflect a secular movement in the terms of trade.[74] This is confirmed by examining the terms of trade index for agricultural products compiled by the United Nations for the 1920-1938 and 1947-1962 periods.[75] While this series shows wide movements in the terms of trade, there appears to be no secular change.

Because of the availability of the United Nations index, the Singer-Prebisch Thesis is not tested in this study.

The Kindleberger Thesis

Since 1956, there has been a shift in emphasis from the terms of trade of countries which produce primary products and those which produce manufactured goods to the terms of trade of the underdeveloped and developed countries. No doubt one of the reasons for the shift in emphasis has been the lack of statistical evidence to support the argument in terms of manufacturing and primary producing countries. However, there seems to be little statistical evidence

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[72]Lipsey, ibid., pp. 20-23.

[73]United Nations, Proceedings . . ., op. cit., I, 120. United Nations, Towards a New Trade Policy for Development, op. cit., p. 18.

[74]It has also been suggested that the trend may have reversed itself. United Nations, Proceedings . . ., ibid., III, 256. United Nations, Towards A New Trade Policy for Development, ibid., p. 16.

[75]United Nations, Proceedings . . ., ibid., III, 257.

to support the thesis that the terms of trade of the underdeveloped (developed) countries deteriorate (improve) over time either.

As in the previous section, the United Kingdom data are offered as evidence of the secular deterioration of the terms of trade of the underdeveloped countries. As such, the data are inconclusive for the reasons discussed above.

In one of the first empirical studies, K. Martin and F. G. Thackeray present data over the years from 1879 to 1913 for three industrial countries--Germany, the United Kingdom and the United States.[76] Of the three, Germany experienced a decline in her terms of trade and the United States and United Kingdom an increase. However, the U. S. figures were derived from the data of Theodore J. Kreps and if National Bureau of Economic Research (NBER) data were substituted for those of Kreps, the U. S. would show no change.[77] Hence, there is no clear trend for these countries for the 1879-1913 period.

For the interwar period, Martin and Thackeray present data for four countries--Germany, Japan, the United Kingdom, and the United States. Of the four, only Japan showed a deterioration in her terms of trade; the rest showed an improvement. However, "the final year

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[76]Martin and F. G. Thackeray, "The Terms of Trade of Selected Countries, 1879-1938," Bulletin of the Oxford Institute of Statistics, X (November, 1948), 373-98, quoted in Lipsey, op. cit., pp. 12-13.

[77]Theodore J. Kreps, "Import and Export Prices in the United States and the Terms of International Trade, 1880-1914," Quarterly Journal of Economics, XL (August, 1926), 708-20. The NBER data are found in Lipsey, ibid. For a comparison of the two sets of indexes and some explanations of the discrepancies between them, see Chapter 6 of Lipsey's book.

of their study was 1938, almost the peak for terms of trade of industrialized countries. Extension of these data to 1960 would wipe out all the gains since 1920 for the U. S. and the U. K. and all since 1925 (the first year shown) for Germany. The U. K. terms of trade would remain, however, considerably above the 1913 level.[78]

While the study by Martin and Thackeray is inconclusive, Kindleberger believes he has found some evidence supporting a relationship between the terms of trade and the stage of a country's economic development.[79] His study showed that among the European countries the terms of trade of the more developed countries improved the most. Also, by computing the terms of trade of industrial Europe[80] and inverting them, he found that the U. S. had the most favorable terms of trade, and a group consisting of all other countries, mainly underdeveloped, the worst.[81]

Statistically, Lipsey has taken issue with Kindleberger on the relationship between the terms of trade and a country's stage of economic development. According to Lipsey, the U. S. terms of trade did not change substantially from the 1880's to the 1950's. Also, while the terms of trade of industrial Europe improved, almost all of the increase disappears if the data are adjusted so as to exclude the

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[78]Lipsey, ibid., p. 13.

[79]Kindleberger, The Terms of Trade: A European Case Study, op. cit., p. 239. Also, Kindleberger, "The Terms of Trade and Economic Development," op. cit., p. 72.

[80]Industrial Europe is defined as the United Kingdom, Germany, France, Italy, the Netherlands, the Belgian-Luxembourg Economic Union, Sweden, and Switzerland.

[81]Kindleberger, "The Terms of Trade and Economic Development," op. cit., p. 81.

United Kingdom.[82] Moreover, if the U. K. is excluded, the U. S. terms of trade show a decline relative to this group where, according to Kindleberger, the terms of trade of the U. S. should have improved.[83] Finally, we have already noted that an improvement in the terms of trade of one country or group of countries is insufficient evidence to conclude with certainty that the terms of trade of the other countries actually deteriorated.

In a more recent study, Morgan found that, from 1953 to 1960, the underdeveloped countries show some tendency toward a deterioration and the developed countries little or no change in their terms of trade.[84] However, if the 1937-1959 period is considered, the underdeveloped countries show marked improvement in their terms of trade. Morgan uses 1937 as a base, probably because of a lack of data for any other year, to compare the terms of trade with the post-war period; unfortunately, 1937 was a year in which the United States and industrial Europe showed extremely favorable terms of trade.[85] By inference, the underdeveloped countries experienced unfavorable terms of trade in that year. Therefore, it's not surprising that he found that the underdeveloped countries have shown improvement--despite a deterioration from 1953 to 1960--in their terms of trade when compared to 1937.

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[82] Lipsey, op. cit., p. 15.

[83] Ibid., p. 17.

[84] Morgan, "Trends in Terms of Trade and Their Repercussions on Primary Producers," op. cit., p. 61.

[85] See Chart 2. Lipsey, op. cit., p. 14.

In conclusion, there seems to be little statistical evidence in the earlier studies to indicate the terms of trade of underdeveloped (developed) countries inevitably deteriorate (improve).

CHAPTER II

POST-WAR TRENDS IN THE COMMODITY AND INCOME TERMS OF TRADE

Despite the weak statistical foundation, the controversy over the terms of trade of the developed and underdeveloped countries persists as shown in recent proposals to the United Nations to compensate underdeveloped countries for declines in their terms of trade.[1] Therefore, it is of interest to examine the terms of trade of the developed and underdeveloped countries during the 1948 to 1964 period.

The year 1948 was selected as a base because it appeared to be the first "normal" year following World War II. Obviously, some countries had recovered from the War prior to 1948 and others did not recover until after 1948.[2] After inspecting post-war data for exports as well as export and import prices, it was concluded that 1948 was the first "normal" year for most countries. This was based partly on the fact that until 1948 the exports of many of the countries experiencing war damage increased rapidly, indicating recovery from the war. After 1948, the increase was much less rapid. Moreover, prior to 1948, most of the countries experienced wide

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[1] United Nations, Proceedings . . ., op. cit., Vol. I.

[2] Germany and Japan presumably suffered extensive damage during World War II and may have been slow in recovering. Since no terms of trade data are available for these countries prior to 1950, that year is considered the base for the two countries.

fluctuations in their export and import prices. After 1948, the fluctuations were less, again presumably indicating return to more normal international economic relations.[3] Moreover, if 1949 were selected as the base, the time trends of the aggregate terms of trade indices would not be materially affected.[4] At the time the study was undertaken, 1964 was the last year in which data were available for a large number of countries. For some countries, data are not available for the entire period; the exceptions are noted in the tables below.

The procedure essentially involves calculating the terms of trade of each country and aggregating them into single indices for the developed and underdeveloped countries.[5] Fluctuations in the commodity terms of trade will be discussed in the next chapter.

The Data

There are many theoretical and statistical problems involved in

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[3]Other studies have used 1948 as a base. See, for example, Morgan, "Trends in Terms of Trade, and Their Repercussions on Primary Producers," op. cit. Moreover, the International Monetary Fund (IMF), in presenting statistics for the post-war period, often uses 1948 as a base. This, of course, is merely suggestive. See, for example, International Monetary Fund, International Financial Statistics, Supplement to 1965/66 Issues (Washington, 1965), pp. xvi-xix.

[4]Based on evidence provided by Michael Michaely, the terms of trade of most developed countries appear to have been more favorable in 1946 and 1947 than in 1948 and 1949. Hence, exclusion of 1946 and 1947 is more likely to result in the developed countries showing an improvement in their terms of trade for the period as a whole. The evidence is too fragmentary to arrive at any conclusion in regard to the underdeveloped countries. Michael Michaely, Concentration in International Trade (Amsterdam: North-Holland, 1962), pp. 144-67.

[5]This approach brings Morgan's study up to date but the indices are not strictly comparable because of the additional data now available.

deriving export and import price indices; for this reason, the indices are subject to errors which may lead to biased results.

The main theoretical issue is, of course, the "index number problem." Since most economists are familiar with the problem, it is not discussed here in detail.[6] It may be recalled, however, that different weighting procedures give different results. Price indices based on fixed weights (Laspeyres indices) have an upward bias while price indices based on current weights (Paasche indices) are biased downward. This is generally the case but it is not inevitably so. Broadly speaking, the relation holds whenever demand or consumption tends to fall off for commodities which have risen most in price over the period concerned. Some countries use Laspeyres indices, others use Paasche indices, and still others use the so-called Fisher ideal index which is the geometric average of the Laspeyres and Paasche indices.[7] The same procedures are also used to calculate chained indices.[8] Because of different weighting procedures, the terms of trade indices of various countries will not be strictly comparable and the aggregate indices may be biased. Moreover, some of the indices are based on local currencies while others are given in United

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[6]Discussions of the "index number problem" appear in many economic theory textbooks. See, for example, George J. Stigler, The Theory of Price (New York: The MacMillan Company, 1952), pp. 87-91. For a discussion of index numbers in international trade, see R. G. D. Allen, "Index Numbers of Volume and Price," International Trade Statistics, eds. R. G. D. Allen and J. Edward Ely (New York: John Wiley and Sons, 1953), pp. 186-211.

[7]Because the terms of trade are calculated by dividing the export price index by the import price index some of the bias may cancel.

[8]For a discussion of chained indices, see Allen, op. cit., pp. 193-94.

States dollars.

Besides the "index number problem," the reliability of the recorded data on which to base the indices is in itself open to question. Undoubtedly it varies considerably in quality from country to country. Moreover, in almost every case, not all commodities enter directly into the computation of the index. For example, Venezuela's export price and volume indices are based solely on petroleum exports. Fortunately, petroleum accounted for 93.5 percent of total Venezuelan exports during the period under consideration. However, there are many cases in which coverage is not as complete; it may go as low as fifty percent.[9] More complete coverage could easily result in changes in the indices.[10]

Also, as noted previously, changes in the quality of existing products and the introduction of new products at relatively small beginning year weights tends to impart a systematic bias to the price indices which makes the terms of trade of the underdeveloped countries appear less favorable, or more unfavorable, vis-à-vis the developed countries than they really are.

No attempt has been made here to improve the data although a number of countries were excluded from the sample for the reasons discussed above. Construction of an index for even one country

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[9]A discussion of trade coverage for many countries is found in United Nations, Statistical Office, Supplement to the Monthly Bulletin of Statistics, Definitions and Explanatory Notes (New York, 1964), pp. 115-18. The United Nations has made adjustments for incomplete coverage in some instances. For a discussion of other countries, consult the country pages in International Monetary Fund, International Financial Statistics (Washington, various issues).

[10]Hans Staehle, "Some Notes on the Terms of Trade," cited by Baldwin, op. cit., p. 267.

would be a major undertaking, and we are striving for greater generality than in the case of one or a few countries. Therefore, little significance should be attached to minor movements in a country's indices or minor differences between countries. After the empirical evidence has been presented, we shall return to the shortcomings of the data and the possibility of biased results to see how they would affect the conclusions.

The Classification of Countries as Developed or Underdeveloped

The commodity terms of trade of sixty-two countries, based on export and import price indices found in various issues of the United Nations' Yearbook of International Trade Statistics and Monthly Bulletin of Statistics, are presented in Appendix I.[11] In 1958, these countries accounted for approximately eighty-eight percent of world exports and eighty-seven percent of world imports with the world totals excluding Cuba and the Soviet bloc. To test the hypothesis, the countries are divided into two groups--developed and underdeveloped--according to per capita income. In this context, the terms "developed" and "underdeveloped" are restricted to economic status and imply nothing about a country's cultural heritage; they simply refer to "rich" and "poor". Similarly, they take no account of a country's "capacity" to develop.

The division is arbitrary for a number of reasons. First, per

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[11]The terms of trade for each country were derived by dividing the country's export price index by its import price index and multiplying by 100. In each case, 1958 is used as the base for comparison (1958 = 100).

capita income may be an unsatisfactory index of economic development.[12] Moreover, some economists insist that the distribution of income should be considered since the vast majority of a country's population may be living in abject poverty even if average per capita income is relatively high.[13] Even if per capita income is accepted as an index of economic development, the data may be so inadequate as to render international comparisons meaningless.[14] Moreover, the data consist, in most cases, of estimates of per capita gross domestic product rather than per capita income and thus include allowances for depreciation. It could be argued that the latter is the more relevant concept; unfortunately, the only estimates available for a large number of countries relate to the former.

Admittedly, the per capita income concept is an imperfect criterion for dividing countries into developed and underdeveloped groups. However, Irma Adelman and Cynthia Taft Morris have shown

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[12] "National income statistics do not include all of the flows of goods and services in a community. They exclude barter transactions and much of the economic activity represented by home-produced, home-consumed output, and they do not take into account the domestic services of housewives, the services of consumer durables, or the services of social overhead capital. In addition, national income comparisons of this nature cannot reflect adequately any of the non-material contributions of the society to the welfare of its people." Also, the data may conceal large differences in the composition of output. Irma Adelman, Theories of Economic Growth and Development (Stanford, California: Stanford University Press, 1961), p. 2. See also, Simon Kuznets, Six Lectures on Economic Growth (New York: The Free Press of Glencoe, Inc., 1959), pp. 13-19 and Harvey Leibenstein, Economic Backwardness and Economic Growth (New York: John Wiley and Sons, 1957), Ch. 2.

[13] Jacob Viner, International Trade and Economic Development (Oxford: The Clarendon Press, 1953), pp. 125ff.

[14] This is due essentially to inadequacy of the raw data, internal inconsistencies in the national income accounts, international differences in national income accounting concepts and procedures, and distortions created by the use of exchange rates.

that various social and political variables generally associated with different stages of the development process (i.e., extent of literacy) are highly correlated with per capita gross national product.[15] Hence, the variable may serve as a substitute for a more comprehensive measure.

While per capita income data are, at best, rough approximations, the reader should keep in mind that we are interested in dividing the countries into two groups--not estimating small differences in income between countries--and, for this purpose, the data seem adequate.[16] Moreover, as discussed below, the same results are obtained if the countries are classified by real per capita consumption in 1960.

Since per capita income changes over time, it is necessary to stipulate the year upon which the groupings are based. A country might be considered underdeveloped (developed) relative to other countries in one year of the period under consideration but developed (underdeveloped) during another year. For purposes of this study, 1963 was selected as the base. Acceptance of some other base would affect only a few countries and change the results only slightly, if at all.[17]

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[15] Irma Adelman and Cynthia Taft Morris, "A Factor Analysis of the Interrelationship between Social and Political Variables and Per Capita Gross National Product," Quarterly Journal of Economics, LXXIX (November, 1965), 555-78.

[16] Both Adelman and Simon Kuznets conclude that the data are useful. Adelman, Theories of Economic Growth . . ., op. cit., p. 3, and Kuznets, op. cit., pp. 18-19.

[17] For example, if an earlier base were accepted, Israel might be considered underdeveloped. However, trial manipulations of the data suggest that the results would not be altered significantly if Israel were classified as underdeveloped rather than developed.

The developed and underdeveloped countries are listed in Tables 1 and 2, ranked by per capita gross domestic product. With one exception (Venezuela), countries with per capita gross domestic product equal to or greater than $589 are considered developed; those with less than $589, underdeveloped. If Japan ($589) is excluded from the sample, a considerable gap exists in per capita gross domestic product between Ireland ($675) and Cyprus ($547). Ireland is customarily classified as a developed country while Cyprus and Argentina ($544) are traditionally regarded as underdeveloped. While Japan's per capita gross domestic product is closer to that of Cyprus, she is classified as a developed country, partly because of custom[18] and partly for other reasons.[19] However, aggregate (unweighted) terms of trade indices were calculated on the assumption that Japan was an underdeveloped country and comparison of the indices show no significant differences. Similarly, as will be mentioned below, other changes in classification do not appreciably alter the results.

Despite Venezuela's high per capita gross domestic product ($848), she is classified as an underdeveloped country primarily because of her uneven distribution of income. The decision can also be explained by a decline in her per capita gross domestic product of some thirteen per cent from 1958 to 1963 and the fact that she has

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[18] See, for example, the International Monetary Fund's classification. International Monetary Fund, International Financial Statistics, Supplement to 1965/66 Issues, op. cit., p. xiv.

[19] Irma Adelman has suggested that countries be classified as developed or underdeveloped on the basis of growth rates. On this basis, Japan--with a relatively high growth rate--would be considered developed. Adelman, Theories of Economic Growth . . ., op. cit., p. 3.

TABLE 1.--The developed countries, ranked by per capita gross domestic product, 1963[a]

Country	Per Capita Gross Domestic Product at Factor Cost, 1963, in United States Dollars
United States	$2,790
Canada	1,871
Switzerland	1,839
Sweden	1,802
New Zealand	1,617
Australia	1,533
Luxembourg[b]	1,498
Denmark	1,486
Iceland	1,473
Germany, West	1,416
France	1,406
Norway	1,398
United Kingdom	1,361
Belgium[b]	1,318
Finland	1,153
Netherlands	1,080
Israel	961
Austria	928
Italy	776
Ireland	675
Japan	589

[a]Calculated from: United Nations, Department of Economics and Social Affairs, Statistical Office, Yearbook of National Accounts Statistics, 1964 (New York, 1965), pp. 383-86.

[b]The statistics for Belgium and Luxembourg are given separately here; however, for the rest of the study Belgium and Luxembourg are treated as one country.

TABLE 2.--The underdeveloped countries, ranked by per capita gross domestic product, 1963[a]

Country	Per Capita Gross Domestic Product at Factor Cost, 1963, in United States Dollars
Venezuela	$848
Cyprus	547
Argentina	544[b]
South Africa	477
Chile	457[b]
Greece	440
Jamaica	431[c]
Panama	410[c]
Spain	401[c]
Costa Rica	339[c]
Portugal	304
Colombia	298[c]
Mauritius	281
Guatemala	268
Nicaragua	257[d]
Peru	247
El Salvador	245
Malaya	243[c]
Turkey	230
Ghana	209
Honduras	201[c]
Ecuador	182
Iran	169[d]
Brazil	156[b]
Morocco	150[c]
China: Taiwan	146
Rhodesia and Malawi	139
Ceylon	131
Philippines	127[b]
Thailand	101
Sudan	92[c]
Nigeria	89
Cameroon	85[d]

TABLE 2--Continued

Country	Per Capita Gross Domestic Product at Factor Cost, 1963, in United States Dollars
Togo	$ 84[d]
Kenya	82
Pakistan	77[c]
India	76[c]
Indonesia	69[d]
Uganda	69
Tanzania	66
Ethiopia	40[c]
Yugoslavia	not available

[a]Calculated from: United Nations, Department of Economic and Social Affairs, Statistical Office, Yearbook of National Accounts Statistics, 1964 (New York, 1965), pp. 383-92.

[b]Derived by the use of calculated parity rates of exchange rather than official exchange rates. Ibid., pp. 387-92.

[c]Estimate for 1962.

[d]Estimate for 1958.

been traditionally regarded as underdeveloped.[20]

After completing the categorizations, the results were compared to those obtained by the ranking of countries according to estimated levels of real per capita consumption in 1960.[21] While the new ranking contains no obvious breaks, it should be noted that the twenty countries classified as developed above rank as the first twenty countries in terms of new estimates.[22] Venezuela, although ranked 24th, falls considerably below the developed countries on the scale. Yugoslavia, categorized as underdeveloped above despite the lack of per capita gross domestic product data for that country, ranks 27th. Hence, comparison of the two rankings appears to confirm the earlier results.

The Commodity Terms of Trade of the Developed Countries

The commodity terms of trade of the twenty nations classified as developed can be aggregated into a single, unweighted index using either the mean (arithmetic average) or the median.[23] Since the two

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[20] If Irma Adelman's classification system were used, Venezuela would presumably be categorized as underdeveloped. It should be noted that the division of the countries into two groups is inherently arbitrary because the distribution of countries according to per capita gross domestic product is a continuum rather than two distinct groupings. Nevertheless, the current decision seems to conform with custom.

[21] The data are found in Appendix II. They were compiled by use of various non-monetary indicators. Wilfred Beckerman and Robert Bacon, "International Comparisons of Income Levels: A Suggested New Measure," Economic Journal, LXXVI (September, 1966), 519-36.

[22] The order, however, differs but this may be due to the difference in years under consideration. The Spearman rank correlation coefficient for the forty-eight countries common to both series is .97.

[23] The shares of world exports and imports of the countries as a group are found in Tables 3 and 4.

methods give somewhat different results, both have been used. It is also possible to aggregate each country's terms of trade index into a single index using the mode; however, it is inappropriate because of the distribution. As an additional test, a weighted index has been compiled.[24]

The aggregate indices of the commodity terms of trade of the developed countries are presented in Tables 3 and 4 and Figure 1. Movements in all three indices are closely related. However, the unweighted indices reach a low in 1957 while the weighted index reaches a low in 1951. The difference is due to the fact that movements in the terms of trade of the United Kingdom and the United States largely dominate movements in the weighted index and both countries reach a low for the 1948-1964 period in 1951. The indices show sharply declining terms of trade following 1948 and subsequent recovery. However, the terms of trade in each case failed to return to the 1948 level by 1964.

From the Figure, it is clear that little or no trend in the terms of trade exists for the period as a whole regardless of the measure employed.[25] This was confirmed by fitting regression lines to the data. In each case, the regression coefficient was not

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[24]The export and import price indexes were aggregated into single indices using each country's share of exports and imports, respectively, as weights. The aggregate export price index was then divided by the aggregate import price index and multiplied by 100 to arrive at the aggregate commodity terms of trade index.

[25]Moreover, various changes in the classification of the countries as developed do not seem to change the results appreciably. For example, approximately the same results emerge if Iceland, Israel and Japan are omitted from the sample individually, in pairs, or all together.

TABLE 3.--The aggregate (unweighted) commodity terms of trade of the developed countries, 1948-1964

Year	Number of Countries	Share of World Exports[a] (per cent)	Share of World Imports[a] (per cent)	Unweighted Commodity Terms of Trade (Mean)	Unweighted Commodity Terms of Trade (Median)
1948	16	64.6	60.6	110.7	105.1
1949	16	64.4	58.2	106.8	107.2
1950	20	64.4	67.8	102.8	102.3
1951	20	66.4	67.4	101.1	97.1
1952	20	69.2	66.3	99.0	98.7
1953	20	69.3	68.1	101.4	98.5
1954	20	68.7	68.1	101.5	100.0
1955	20	69.2	69.1	101.2	99.5
1956	20	70.8	69.7	99.6	97.4
1957	20	72.1	68.8	98.0	95.3
1958	20	71.7	68.7	100.0	100.0
1959	20	71.9	69.8	102.4	102.0
1960	20	73.2	71.3	101.8	102.0
1961	20	74.1	71.4	102.6	102.8
1962	20	73.9	72.3	103.1	103.3
1963	20	74.1	72.9	105.7	104.1
1964	19	74.9	73.5	107.1	103.0

[a]The world total excludes Cuba and the Soviet bloc.

TABLE 4.--The aggregate (weighted) commodity terms of trade of the developed countries, 1948-1964

Year	Number of Countries	Share of World Exports[a] (per cent)	Share of World Imports[a] (per cent)	Aggregate Export Price Index	Aggregate Import Price Index	Weighted Commodity Terms of Trade
1948	15	57.9	55.1	84.8	77.6	109.2
1949	16	64.4	58.2	83.1	79.9	104.1
1950	20	64.4	67.8	85.8	88.0	98.6
1951	20	66.4	67.4	102.8	111.1	92.6
1952	20	69.2	66.3	100.3	106.9	93.9
1953	20	69.3	68.1	97.5	99.6	97.8
1954	20	68.7	68.1	95.3	98.6	96.7
1955	20	69.2	69.1	95.6	99.6	96.0
1956	20	70.8	69.7	98.7	103.5	95.3
1957	20	72.1	68.8	101.5	105.6	96.1
1958	20	71.7	68.7	100.0	100.0	100.0
1959	20	71.9	69.8	99.9	99.6	100.3
1960	20	73.2	71.3	101.8	99.3	102.5
1961	20	74.1	71.4	101.8	98.7	103.1
1962	20	73.9	72.3	101.9	97.6	104.3
1963	20	74.1	72.9	102.9	98.5	104.5
1964	20	75.0	73.6	104.5	101.2	103.3

[a]The world total excludes Cuba and the Soviet bloc.

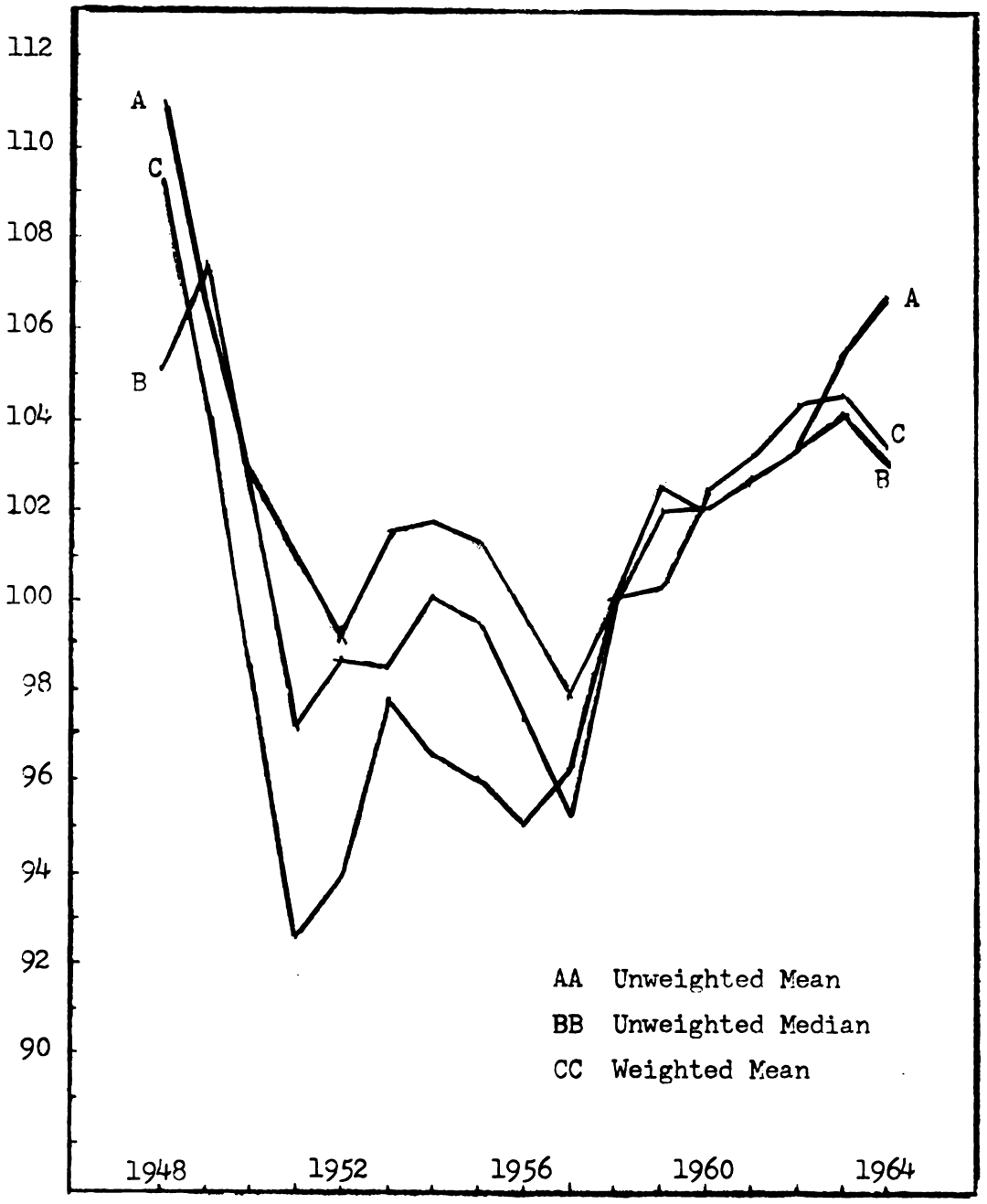

Fig. 1.--The commodity terms of trade of twenty developed countries, 1948-1964: aggregate indices.

significantly different from zero, indicating no trend.[26] Moreover, the results were not materially affected when 1949 was considered as the base. However, when 1950 was considered, the (positive) regression coefficients became highly significant. Hence, if 1950 were selected as the base, the aggregate indices would show that the commodity terms of trade of the developed countries improved. The problem of selecting the base is discussed below.

While the aggregate indices reveal no clear trend, an examination of the individual countries' terms of trade shows considerable diversity of experience. The method used to determine whether a country's commodity terms of trade improved or declined over the period was to plot the terms of trade for each country and fit a least squares line to the data. If the regression coefficient proved to be significantly different from zero, using a two-tailed test, the country's terms of trade were deemed to have improved or declined depending on whether the sign of the coefficient was positive or negative. If the regression coefficient was not significantly different from zero, the least squares technique failed to reveal a trend. The results are shown in Table 5.

Of the twenty countries, thirteen showed no trend in their terms of trade with the level of significance equal to .05.[27] Of the remainder, five were characterized by an improvement in their terms of trade (West Germany, Iceland, Japan, Norway, and the United Kingdom)

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[26] Based on a two-tailed test. The convention followed is to state the result significant if the null hypothesis is rejected at the .05 level and highly significant if it is rejected at the .01 level. Wilfred J. Dixon and Frank J. Massey, Jr., Introduction to Statistical Analysis (New York: McGraw-Hill, 1957), p. 91.

[27] The results are the same if the .10 level is considered.

TABLE 5.--Trends in the commodity terms of trade of twenty developed countries as measured by the least squares technique: 1948-1964

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
Australia	1948-1964	-3.983 (.863)	highly significant	declined
Austria	1948-1964	- .137 (.380)	not significant	none
Belgium-Luxembourg	1948-1964	- .512 (.192)	significant	declined
Canada	1948-1964	.059 (.190	not significant	none
Denmark	1948-1964	.216 (.280)	not significant	none
Finland	1948-1964	.081 (.360)	not significant	none
France	1948-1964	.223 (.316)	not significant	none
Germany, West	1950-1964	2.638 (.222)	highly significant	improved
Iceland	1950-1963	1.822 (.420)	highly significant	improved
Ireland	1948-1964	- .066 (.210)	not significant	none
Israel	1950-1964	.011 (.217)	not significant	none
Italy	1948-1964	- .234 (.230)	not significant	none
Japan	1950-1964	.915 (.308)	significant	improved
Netherlands	1948-1964	- .101 (.194)	not significant	none

TABLE 5--Continued

Country	Period Under Consider-ation	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Com-modity Terms of Trade
New Zealand	1948-1964	- .383 (.633)	not significant	none
Norway	1948-1964	.487 (.134)	highly significant	improved
Sweden	1948-1964	- .033 (.223)	not significant	none
Switzerland	1948-1964	.134 (.221)	not significant	none
United Kingdom	1948-1964	1.129 (.264)	highly significant	improved
United States	1948-1964	.491 (.318)	not significant	none

[a]Based on a two-tailed test. The convention followed is to state the result significant if the null hypothesis is rejected at the .05 level and highly significant if it is rejected at the .01 level. Dixon and Massey, op. cit., p. 91.

and two (Australia and Belgium-Luxembourg) a decline. For three of the countries (West Germany, Iceland, and Japan) which experienced an improvement, the initial year in the series was 1950. If the terms of trade of these countries are similar to those of the other developed countries, use of 1950 as the initial year (rather than 1948) leads to an upward bias. Also, if Iceland and Japan were classified as underdeveloped, only three developed countries would show an improvement in their terms of trade. Hence, twenty-five per cent (or less) of the countries experienced an improvement in their terms of trade as predicted by the hypothesis while ten per cent actually experienced a decline, contrary to the hypothesis.

Even if the results are regarded as supporting the hypothesis, there is reason to believe that the trend may not continue.[28] The terms of trade indices of most developed countries fell off sharply during the first years of the Korean War and the remainder of the period was dominated by a recovery from this decline. Hence, the trends indicated by the least squares technique may reflect short-run adjustments to an abnormal situation rather than long-run movements in the terms of trade.[29] If more recent data compiled by the United Nations are examined, the aggregate terms of trade of the countries classified as developed show no change from 1963 through 1966.[30]

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[28]Despite the evidence, in only eight cases did the average of the last two years in the country's terms of trade index exceed that of the initial two years. See Appendix III.

[29]This would also explain why the least squares technique revealed a trend in the aggregate indices when 1950 was selected as a base but no trend when 1948 or 1949 was selected.

[30]The United Nations index and the indices presented here are not comparable, mainly because of differences in weighting procedures and classification of countries. The United Nations index does,

If the period following the Korean War (1954-1964) is examined, eight of the twenty countries show, on the basis of the least squares technique, improving terms of trade as illustrated in Table 6.[31] Two countries (Australia and Canada) experienced declining terms of trade while the rest exhibited no trend. This is not surprising since the period was characterized by improving terms of trade of the developed countries following post-war lows reached during the Korean conflict. Again, whether these trends will continue or not is subject to speculation. As all of the previous studies have shown, there has been marked short-term instability in the terms of trade; hence, prediction of future movements in the terms of trade based on the 1954-1964 data would seem particularly hazardous.

In conclusion, there appears to be little evidence in the post-war period to support the hypothesis that the commodity terms of trade of the developed countries inevitably improve over time. The aggregate indices for the years 1948 (or 1949) through 1964 show no overall trend and a study of each country's terms of trade for the period shows considerable diversity of experience. If only the 1954-1964 period is considered, there is some evidence to indicate that the terms of trade of the developed countries improved. As noted above, use of the 1954-1964 period to support the hypothesis is hardly justifiable.

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however, offer some evidence on recent movements in the terms of trade. United Nations, Statistical Office, Monthly Bulletin of Statistics (October, 1967), pp. xii-xiii.

[31] They are: Austria, France, West Germany, Iceland, Netherlands, Switzerland, United Kingdom, and the United States. At the .10 level Denmark would be included.

TABLE 6.--Trends in the commodity terms of trade of twenty developed countries as measured by the least squares techniques: 1954-1964

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
Australia	1954-1964	-2.513 (1.079)	significant	declined
Austria	1954-1964	1.436 (.177)	highly significant	improved
Belgium-Luxembourg	1954-1964	.148 (.178)	not significant	none
Canada	1954-1964	- .606 (.207)	significant	declined
Denmark	1954-1964	.543 (.274)	not significant	none
Finland	1954-1964	- .312 (.303)	not significant	none
France	1954-1964	.869 (.143)	highly significant	improved
Germany, West	1954-1964	2.186 (.212)	highly significant	improved
Iceland	1954-1963	2.465 (.572)	highly significant	improved
Ireland	1954-1964	.330 (.396)	not significant	none
Israel	1954-1964	- .089 (.246)	not significant	none
Italy	1954-1964	.606 (.374)	not significant	none
Japan	1954-1964	.922 (.543)	not significant	none
Netherlands	1954-1964	.499 (.115)	highly significant	improved

TABLE 6--Continued

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
New Zealand	1954-1964	- .636 (.945)	not significant	none
Norway	1954-1964	.169 (.141)	not significant	none
Sweden	1954-1964	.148 (.152)	not significant	none
Switzerland	1954-1964	.923 (.237)	highly significant	improved
United Kingdom	1954-1964	1.796 (.267)	highly significant	improved
United States	1954-1964	1.553 (.203)	highly significant	improved

[a]Based on a two-tailed test. The convention followed is to state the result significant if the null hypothesis is rejected at the .05 level and highly significant if it is rejected at the .01 level. Dixon and Massey, op. cit., p. 91.

The Commodity Terms of Trade of the Underdeveloped Countries

As in the case of the developed countries, the commodity terms of trade of the forty-two underdeveloped countries can be aggregated into a single index.[32] The results, shown in Tables 7 and 8 and Figure 2, indicate no overall trend for the post-war period. The unweighted indices reach a peak in 1954 and decline thereafter. The weighted index shows a similar trend except that it reaches a peak in 1952. However, none of the indices reach a point as low as in 1948-1949.

The absence of trend was confirmed by fitting regression lines to the data. When 1948 (or 1949) was selected as the base, the resulting regression coefficients were not significantly different from zero. However, when 1950 was considered, the (negative) regression coefficients became highly significant. Hence, if 1950 were selected as the base, the aggregate indices would show that the commodity terms of trade of the underdeveloped countries declined. The problem of selecting the base, similar to that of the developed countries, is discussed below.

If each country is examined separately, there is evidence of a deterioration of the commodity terms of trade for some of the underdeveloped countries and improvement for others. As before, to determine whether a country's terms of trade improved or deteriorated over the period, the data were plotted on a scatter diagram and a least

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[32] The results are almost identical to those obtained by using a sample of thirty-one countries for which there are data for almost the entire period. Hence, the more general result is presented. The shares of world exports and imports of the countries as a group are found in Tables 7 and 8.

TABLE 7.--The aggregate (unweighted) commodity terms of trade of the underdeveloped countries, 1948-1964

Year	Number of Countries	Share of World Exports[a] (per cent)	Share of World Imports[a] (per cent)	Unweighted Commodity Terms of Trade (Mean)	Unweighted Commodity Terms of Trade (Median)
1948	19	9.7	10.7	88.1	88.0
1949	21	9.1	10.4	87.9	86.7
1950	29	17.3	14.3	108.4	104.4
1951	31	18.0	17.3	111.8	107.8
1952	35	17.6	19.1	103.7	104.9
1953	39	18.7	18.9	103.1	106.1
1954	42	19.3	19.5	114.9	114.3
1955	42	18.9	18.5	111.5	110.3
1956	42	17.9	18.1	109.6	106.9
1957	42	17.4	18.9	104.7	104.3
1958	42	17.1	18.7	100.0	100.0
1959	42	17.5	16.9	99.3	98.5
1960	42	16.5	16.9	98.4	99.0
1961	42	15.9	17.6	96.2	95.3
1962	41	15.3	16.3	95.0	96.8
1963	38	14.9	15.7	98.0	98.7
1964	24	11.6	12.1	99.4	99.0

[a]World total excludes Cuba and the Soviet bloc. For most years, the shares underestimate (by less than one per cent) the actual share. For 1949-1963, Togo's exports and imports are not reported; similarly, Iran's exports and imports are not reported for 1959 and 1960.

TABLE 8.--The aggregate (weighted) commodity terms of trade of the underdeveloped countries, 1948-1964

Year	Number of Countries	Share of World Exports[a] (per cent)	Share of World Imports[a] (per cent)	Aggregate Export Price Index	Aggregate Import Price Index	Weighted Commodity Terms of Trade
1948	19	9.7	10.7	84.0	105.6	79.5
1949	20	9.1	10.4	81.5	100.7	80.9
1950	28	17.3	14.3	97.4	91.1	106.6
1951	30	18.0	17.3	127.8	110.7	115.4
1952	33	17.1	18.6	112.3	112.7	99.7
1953	37	18.3	18.4	104.2	102.0	102.2
1954	41	19.3	19.5	109.0	98.3	110.8
1955	41	18.9	18.5	107.1	97.3	110.1
1956	41	17.9	18.1	105.9	99.1	106.9
1957	41	17.4	18.9	104.7	102.5	102.2
1958	41	17.1	18.7	100.0	100.0	100.0
1959	40	17.5	16.9	99.8	98.2	101.6
1960	40	16.5	16.9	101.6	100.6	101.1
1961	41	15.9	17.6	98.8	102.5	96.4
1962	40	15.3	16.3	96.9	100.9	96.1
1963	37	14.9	15.7	100.2	102.8	97.5
1964	25	12.0	12.5	102.8	104.6	98.3

[a]World total excludes Cuba and the Soviet bloc.

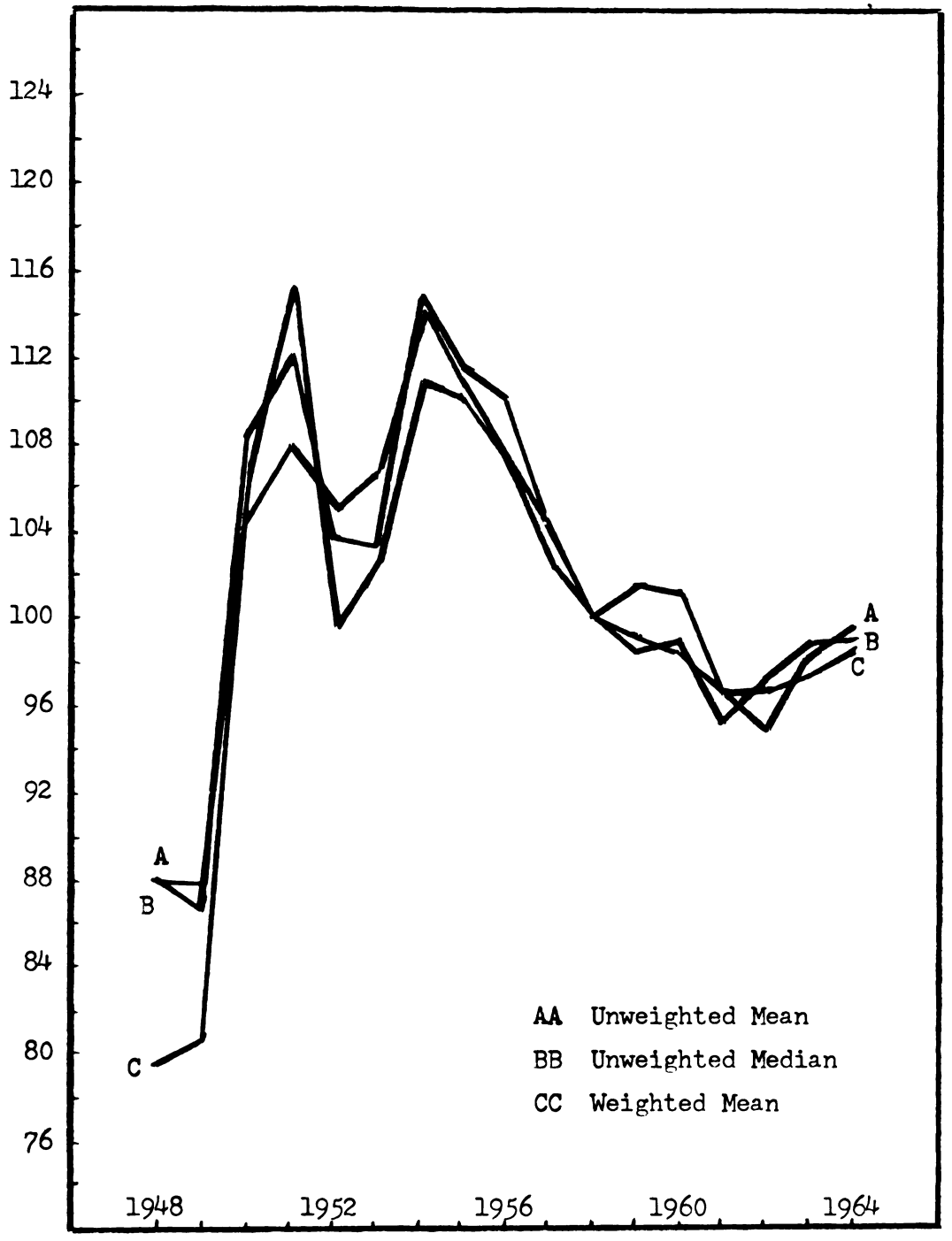

Fig. 2.--The commodity terms of trade of forty-two underdeveloped countries, 1948-1964: aggregate indices.

squares line fitted to the data. If the regression coefficient were significantly different from zero, the terms of trade of the country were said to have improved or declined depending on whether the sign of the coefficient was positive or negative. The results, based on a two-tailed test, are found in Table 9.

Of the thirty-one countries for which there are data for most of the 1948-1964 period, seven experienced a decline in their terms of trade with the level of significance equal to .05.[33] They are: Argentina, Ecuador, Pakistan, Peru, Philippines, South Africa, and Venezuela. It should be noted that there are no data for the first few years of the period for Argentina, Ecuador, Pakistan, Peru, and Venezuela. To the extent that the terms of trade of each is represented by the aggregate indices, omission of the first few years leads to a downward bias. Four countries (Chile, Greece, Iran, and Mauritius) exhibited improvement while the vast majority showed no trend.[34] Moreover, if the average terms of trade of the first two years in each country's terms of trade index are compared with the average of the last two years, only fifteen of the thirty-one countries experienced a decrease.[35] Thus, the 1948-1964 period offers little support to those who argue that the commodity terms of trade inevitably decline.

If 1954 is considered as the base, twenty-one of the forty-two

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[33]The (negative) regression coefficients of Indonesia, Jamaica, Panama, and Spain become significant at the .10 level.

[34]If Iceland and Japan were classified as underdeveloped, the list of underdeveloped countries showing improved terms of trade would increase to six.

[35]See Appendix IV.

TABLE 9.--Trends in the commodity terms of trade of thirty-one underdeveloped countries as measured by the least squares technique: 1948-1964

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
Argentina	1951-1964	-1.571 (.644)	significant	declined
Brazil	1948-1964	1.504 (.898)	not significant	none
Cameroon	1949-1962	.364 (.723)	not significant	none
Ceylon	1948-1964	- .504 (.446)	not significant	none
Chile	1948-1964	1.837 (.645)	significant	improved
Colombia	1948-1964	- .798 (.880)	not significant	none
Costa Rica	1948-1964	-1.421 (.931)	not significant	none
Cyprus	1950-1964	.615 (.575)	not significant	none
Ecuador	1950-1963	-4.011 (.479)	highly significant	declined
Ghana	1948-1963	.025 (.942)	not significant	none
Greece	1951-1964	1.328 (.346)	highly significant	improved
Guatemala	1948-1962	- .955 (1.486)	not significant	none
Honduras	1948-1964	- .237 (.577)	not significant	none
India	1950-1964	.153 (.459)	not significant	none

TABLE 9--Continued

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
Indonesia	1950-1961	-2.246 (1.153)	not significant	none
Iran	1948-1964	1.460 (.534)	significant	improved
Jamaica	1948-1963	- .656 (.345)	not significant	none
Mauritius	1948-1963	3.553 (.353)	highly significant	improved
Nicaragua	1948-1964	- .832 (1.012)	not significant	none
Nigeria	1948-1963	.327 (.441)	not significant	none
Pakistan	1950-1963	-7.961 (1.908)	highly significant	declined
Panama	1948-1964	-1.099 (.557)	not significant	none
Peru	1950-1963	-3.317 (.652)	highly significant	declined
Philippines	1948-1964	-2.009 (.372)	highly significant	declined
Portugal	1948-1964	- .002 (.305)	not significant	none
South Africa	1948-1964	-1.318 (.355)	highly significant	declined
Spain	1948-1964	- .745 (.356)	not significant	none
Togo	1949-1963	- .801 (1.051)	not significant	none

TABLE 9--Continued

Country	Period Under Consider-ation	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Com-modity Terms of Trade
Turkey	1950-1964	- .355 (.705)	not significant	none
Venezuela	1950-1964	-1.170 (.489)	significant	declined
Yugoslavia	1948-1963	- .192 (.360)	not significant	none

[a]Based on a two-tailed test. The convention followed is to state the result significant if the null hypothesis is rejected at the .05 level and highly significant if it is rejected at the .01 level. Dixon and Massey, op. cit., p. 91.

countries show a decline in their terms of trade while seventeen sh no trend.[36] The remaining four exhibited improving terms of trade.[37] Hence, the results obtained by the least squares method for this period appear to support the Kindleberger hypothesis. However, the results may be misleading.

During the first years of the Korean War, the terms of trade of many of the underdeveloped countries improved sharply; the rest of the period was dominated by a decline from the peaks reached during the War. Thus, the indicated trends may reflect short-run adjustments rather than long-run trends. This is suggested by the results obtained for the 1948-1964 period and the apparent stabilization of the terms of trade of the underdeveloped countries in recent years. The indices compiled here show improvement in 1963 and 1964 and the aggregate index compiled by the United Nations for the underdeveloped countries show no change from 1963 through 1966.[38]

The Commodity Terms of Trade and Stages of Economic Development

According to Kindleberger, movements in the commodity terms of

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[36] See Table 10. The countries which exhibited declining commodity terms of trade are: Brazil, Cameroon, Ceylon, Colombia, Costa Rica, Ecuador, El Salvador, Ethiopia, Ghana, Guatemala, Jamaica, Kenya, Nicaragua, Nigeria, Panama, Peru, Philippines, Rhodesia, South Africa, Uganda, and Venezuela. The regression coefficients of the Sudan and India become significant at the .10 level. As a consequence, the Sudan should be added to the list of countries with declining commodity terms of trade and India to the list with improving terms of trade.

[37] They are: Greece, Mauritius, Thailand, and Yugoslavia.

[38] As discussed above, the indices shown here are not strictly comparable to those of the United Nations but the latter do provide some evidence on recent changes in the commodity terms of trade. United Nations, Monthly Bulletin of Statistics, op. cit.

TABLE 10.--Trends in the commodity terms of trade of forty-two underdeveloped countries as measured by the least squares technique: 1954-1964

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
Argentina	1954-1964	- .519 (.774)	not significant	none
Brazil	1954-1964	-3.151 (.674)	highly significant	declined
Cameroon	1954-1962	-2.727 (1.003)	significant	declined
Ceylon	1954-1964	-1.720 (.443)	significant	declined
Chile	1954-1964	.239 (1.234)	not significant	none
China: Taiwan	1954-1964	.331 (.893)	not significant	none
Colombia	1954-1964	-5.216 (.959)	highly significant	declined
Costa Rica	1954-1964	-6.087 (.931)	highly significant	declined
Cyprus	1954-1964	- .917 (.848)	not significant	none
Ecuador	1954-1963	-5.710 (.544)	highly significant	declined
El Salvador	1954-1964	-7.048 (.805)	highly significant	declined
Ethiopia	1954-1962	-4.648 (1.069)	highly significant	declined
Ghana	1954-1963	-4.957 (1.364)	highly significant	declined

TABLE 10--Continued

Country	Period Under Consider-ation	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Com-modity Terms of Trade
Greece	1954-1964	1.411 (.517)	significant	improved
Guatemala	1954-1962	-9.379 (1.470)	highly significant	declined
Honduras	1954-1964	-1.291 (1.216)	not significant	none
India	1954-1964	.933 (.457)	not significant	none
Indonesia	1954-1961	-1.212 (1.600)	not significant	none
Iran	1954-1964	.416 (.920)	not significant	none
Jamaica	1954-1963	-2.085 (.629)	significant	declined
Kenya	1954-1963	-2.974 (.652)	highly significant	declined
Malaya	1954-1964	- .290 (1.398)	not significant	none
Mauritius	1954-1963	3.359 (.818)	highly significant	improved
Morocco	1954-1964	- .234 (.389)	not significant	none
Nicaragua	1954-1964	-5.367 (1.111)	highly significant	declined
Nigeria	1954-1963	-1.780 (.645)	significant	declined

TABLE 10--Continued

Country	Period Under Consideration	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Commodity Terms of Trade
Pakistan	1954-1963	-2.315 (2.164)	not significant	none
Panama	1954-1964	-3.314 (.840)	highly significant	declined
Peru	1954-1963	-2.684 (.826)	significant	declined
Philippines	1954-1964	-1.598 (.396)	highly significant	declined
Portugal	1954-1964	- .172 (.452)	not significant	none
Rhodesia	1954-1963	-5.138 (1.613)	significant	declined
South Africa	1954-1964	-1.175 (.284)	highly significant	declined
Spain	1954-1964	.314 (.417)	not significant	none
Sudan	1954-1963	-1.500 (.724)	not significant	none
Tanzania	1954-1963	- .271 (.736)	not significant	none
Thailand	1954-1964	2.317 (.439)	highly significant	improved
Togo	1954-1963	-3.219 (1.786)	not significant	none
Turkey	1954-1964	- .060 (1.274)	not significant	none

TABLE 10--Continued

Country	Period Under Consider-ation	Regression Coefficient (Standard Error in Parenthesis)	Level of Significance[a]	Trend in the Com-modity Terms of Trade
Uganda	1954-1963	-5.323 (.634)	highly significant	declined
Venezuela	1954-1964	-2.965 (.446)	highly significant	declined
Yugoslavia	1954-1963	.721 (.201)	highly significant	improved

[a]Based on a two-tailed test. The convention followed is to state the result significant if the null hypothesis is rejected at the .05 level and highly significant if it is rejected at the .01 level. Dixon and Massey, op. cit., p. 91.

trade are directly related to the stage of a country's development. Under the hypothesis, the higher the stage of a country's development, the more favorable its terms of trade should be over time. As noted above, if the countries for which data are available for most of the 1948-1964 period are divided into two groups--developed and underdeveloped--there is little or no evidence to support the hypothesis. This test, however, allows for only two stages of development; hence, a more general test is desirable.

To test the hypothesis, the countries which displayed statistically significant trends in their terms of trade are ranked by their regression coefficients (in descending order). If the countries are also ranked by per capita gross domestic product (again in descending order), it is possible to compute the rank correlation coefficient between the two series. If the Kindleberger hypothesis is true, there should be a significant, positive rank ordering.[39]

If the eighteen countries which displayed statistically significant trends in their terms of trade for the 1948-1964 period are ranked by the size of their regression coefficients and by per capita gross domestic product, the Spearman rank correlation is .260 which is not significant at the .05 level.[40] Thus, the result fails to

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[39]For a discussion of the test, see Sidney Siegel, Nonparametric Statistics (New York: McGraw-Hill, 1956), pp. 202-13.

[40]In this section, the tests are all one-tailed tests unless otherwise stated. The regression coefficients of the countries were significant at the .05 level using a two-tailed test. However, if the level of significance is .10, four additional countries (Indonesia, Jamaica, Panama, and Spain) are added to the sample. In this case, the Spearman rank correlation coefficient is .374 which is significant at the .05 level. This result is discussed below.

confirm Kindleberger's hypothesis.[41] A similar result is obtained by ranking (in descending order) the countries by percentage change in their terms of trade from 1948-1949 to 1963-1964 and by per capita gross domestic product.[42] For the fifty countries for which data are available, the Spearman rank correlation coefficient between the two series is .103 which is not significant at the .05 level.

In both cases, however, the result is based on the per capita gross domestic product data presented above and the data consist of estimates not only for 1963 but also for 1958 and 1962.[43] Because of possible inconsistencies in the rankings, alternative data must be considered which refer to a common time period.

If 1958 estimates of per capita gross domestic product are used, the Spearman rank correlation coefficient between this series and a ranking of eighteen countries by their statistically significant regression coefficients for the 1948-1964 period is .193 which is not

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[41] If only the 1954-1964 period is considered, the results confirm the Kindleberger hypothesis. If the countries are ranked by the regression coefficients which are significant at the .05 level using a two-tailed test, the Spearman rank correlation coefficient, based on a sample of thirty-five countries, is .506 which is significant at the .01 level. If the countries are ranked by the regression coefficients which are significant at the .10 level, the Spearman rank correlation coefficient is .430 which is also significant at the .01 level. The latter result is based on a sample of thirty-seven countries.

[42] Strictly speaking, the percentage change is from the initial two years of each country's terms of trade index to the last two years since data are not available for the entire period for a number of countries. See Appendices III and IV.

[43] Moreover, some of the estimates are calculated by the use of parity rates of exchange rather than official exchange rates. United Nations, Yearbook of National Accounts Statistics, 1964, op. cit., pp. 387-92. The data were used to divide the countries into two groups and, because of the gap between per capita gross domestic products of the groups, seemed adequate for that purpose.

significant at the .05 level.[44] Moreover, if the rankings are by 1958 per capita gross domestic product and by percentage changes in terms of trade from 1948-1949 to 1963-1964, the rank correlation coefficient is only .067 which is not significant at the .05 level. The latter is based on a sample of fifty countries. In both cases, the result fails to confirm the hypothesized relationship between the terms of trade and the stage of a country's development.

As discussed earlier, Wilfred Beckerman and Robert Bacon provide estimates of per capita consumption in 1960 for eighty countries.[45] These estimates provide an alternative method of ranking the countries in the sample and also have the advantage that the data refer to a common period.[46]

If the countries which displayed statistically significant trends for the 1948-1964 period are ranked by their regression coefficients and by per capita consumption in 1960, the Spearman rank correlation coefficient, based on a sample of seventeen countries, is .125 which is not significant at the .05 level.[47] Hence, the test

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[44]This is based on a sample of countries whose coefficients were significant at the .05 level using a two-tailed test. If the countries whose coefficients were significant at the .10 level are considered, the resulting rank correlation coefficient for the twenty-two countries is .282 which is also insignificant at the .05 level.

[45]Beckerman and Bacon, op. cit., p. 533.

[46]However, use of the per capita consumption data reduces the size of the sample. For example, there are no per capita consumption data for Jamaica, Panama, or the Philippines.

[47]This is based on the countries whose regression coefficients were significant at the .05 level using a two-tailed test. If the .10 level is considered, the sample is increased to nineteen and the resulting rank correlation coefficient is .281. Despite the increase, the new rank correlation coefficient is not significant at the .05 level.

fails to confirm the Kindleberger hypothesis.[48] The same result is also obtained if the countries are ranked by the percentage change in their terms of trade from 1948-1949 to 1963-1964 and per capita consumption in 1960.[49]

Regardless of the test, the results for the 1948-1964 period all show positive--but non-significant--rank correlations.[50] On this basis, the Kindleberger hypothesis is not confirmed by the evidence presented here.[51]

As discussed above, the shortcomings of the export and import price indices used to compile the terms of trade indices in this study may lead to biased results. For example, it would appear that the quality of manufactured goods improves more rapidly than the quality of primary products and that this difference is not fully

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[48] If, however, the countries which displayed statistically significant (at the .05 level with a two-tailed test) trends in their terms of trade for the 1954-1964 period are ranked by the size of their regression coefficients and by per capita consumption in 1960, the Spearman rank correlation coefficient is .421. This coefficient is significant at the .05 level based on a sample of twenty-six countries. If the same procedure is followed with the twenty-eight countries which displayed statistically significant regression coefficients at the .10 level, the resulting rank correlation coefficient is .373 which is also significant at the .05 level.

[49] The Spearman rank correlation coefficient, based on a sample of forty-one countries, is .373 which is also insignificant at the .05 level.

[50] Except for the case noted in footnote 40 which is based on per capita gross domestic product data which include estimates for several different years. If the countries are ranked by data which refer to a common time period--per capita gross domestic product in 1958 or per capita consumption in 1960--the rank correlations are clearly non-significant. The latter appears to be the only reasonable approach.

[51] On the other hand, if only the 1954-1964 period is considered, the coefficients are all positive and significant. Hence, the evidence for the 1954-1964 period supports the Kindleberger hypothesis. As discussed earlier, selection of the 1954-1964 period may lead to

reflected in the price indices. Hence, to the extent that underdeveloped countries export primary products and developed countries export manufactured goods, the terms of trade of the underdeveloped countries appear more unfavorable vis-à-vis the developed countries than they really are. Similarly, one would expect hundreds of new manufactured products to appear over the years while the number of primary products remains about the same. If this is the case, the terms of trade of the underdeveloped countries would, once again, appear more unfavorable vis-à-vis the developed countries than they really are since the omission of new commodities or their inclusion at relatively small beginning year weights tends to bias a price index upward as new commodities usually fall in price soon after they are introduced. Because these biases make the terms of trade of the underdeveloped countries appear more unfavorable vis-à-vis the developed country than they really are, they strengthen the argument presented here.

In regard to the other shortcomings, the evidence is not clear. For example, it is uncertain whether incomplete coverage makes the terms of trade of the underdeveloped countries appear more favorable vis-à-vis the developed countries or less favorable than they really are. As a consequence, the possibility remains that there is a systematic bias which makes the terms of trade of the underdeveloped countries appear more favorable vis-à-vis the developed countries than they really are. However, the burden of proof is clearly with those who argue that there has been a secular deterioration of the terms of trade of the underdeveloped countries.

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biased results; hence, the hypothesis is taken as unproven.

Comparison with the Pre-War Period

Even if the 1948-1964 period is considered, it must be emphasized that the results cover only a seventeen year span. All earlier studies have been characterized by wide fluctuations in the terms of trade; hence, the results for the post-war period may be atypical when considering secular trends in the commodity terms of trade. Therefore, it is desirable to compare the commodity terms of trade of the post-war period with those of the pre-war period.

By using Morgan's data, it is possible to compare the post-war commodity terms of trade of twenty-six countries with their terms of trade in 1937.[52] The percentage changes in each country's terms of trade from 1937 to 1963-1964 were compiled and are presented in Tables 11 and 12. It was found that in ten of the fifteen countries classified as developed the terms of trade improved from 1937 to 1936-1964. Similarly, when the group mean and median for the developed countries are considered, both show an increase. Thus, it would appear that the results lend support to the Kindleberger hypothesis. However, this is not the case when the underdeveloped countries are considered. Of the eleven underdeveloped countries, seven experienced an increase which is approximately the same percentage as for the developed countries. Moreover, when the underdeveloped countries' group mean and median are considered, both show a greater increase than those of the developed countries. Hence, on this basis,

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[52]Morgan, "Trends in Terms of Trade, . . .," op. cit., pp. 74-75. It must be recalled, however, that the terms of trade of the developed countries were relatively favorable vis-à-vis the underdeveloped countries in 1937. This imparts a bias to the comparison.

TABLE 11.--Percentage change in the commodity terms of trade of fifteen developed countries: 1937 to 1963-1964

Country	Commodity Terms of Trade		Percentage Change
	1937	1963-1964	
Ireland	81.3	105.0	29.2
Japan	87.7[a]	99.5	13.5
West Germany	99.0[b]	109.0	10.1
Switzerland	99.0[c]	107.0	8.1
New Zealand	116.3	125.5	7.9
Belgium	91.7	98.5	7.4
Norway	94.3	101.0	7.1
Sweden	94.3[c]	98.5	4.5
France	101.0[c]	104.5	3.5
United Kingdom	103.1	104.0	.9
Canada	102.0	96.0	- 5.9
Denmark	117.6[c]	104.5	-11.1
Australia	137.0	116.5	-15.0
Italy	122.0	103.0	-15.6
United States	123.5	104.0	-15.8
Mean	104.7	105.1	.4
Median	101.0	104.0	3.0

[a]1934-1936

[b]1936

[c]1938

TABLE 12.--Percentage change in the commodity terms of trade of eleven underdeveloped countries: 1937 to 1963-1964

Country	Commodity Terms of Trade		Percentage Change
	1937	1963-1964	
El Salvador	43.3	75.0	73.2
Colombia	50.0	86.5	73.0
Sudan	68.5[a]	101.5[b]	48.2
Costa Rica	75.8	84.0	10.8
Malaya	88.5[a]	98.0	10.7
Ceylon	85.5[a]	88.0	2.9
India	105.3	108.0	2.6
Honduras	117.6	114.5	- 2.6
Venezuela	74.6	72.0	- 3.5
Philippines	104.2	90.0	-13.6
Turkey	147.1	124.5	-15.4
Mean	87.3	94.7	8.5
Median	85.5	90.0	5.3

[a]1938

[b]1962-1963

the terms of trade of the underdeveloped countries appear to improve more than those of the developed countries. Moreover, of the developed countries, the terms of trade of the United States--the most highly developed country in the world--declined the most, contrary to the Kindleberger hypothesis.

As before, it is desirable to allow for more than two stages of development.[53] To this end, the countries were ranked (in descending order) by percentage increase in their terms of trade and by per capita gross domestic product in 1963. If the Kindleberger hypothesis is correct, there should be a positive, significant rank ordering. However, the Spearman rank correlation coefficient between the two series is -.211, which is clearly non-significant.[54] Thus, comparison with 1937 fails to confirm the Kindleberger hypothesis. If anything, the results show that the terms of trade of the underdeveloped countries in the sample improved more than those of the developed countries.

The Income Terms of Trade

As a measure of a country's export-based capacity to import in the post-war period, the income terms of trade of fifty-nine countries have been calculated for the 1948-1964 period (See Appendix V

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[53] Especially since there are only eleven countries classified as underdeveloped.

[54] If the countries are ranked by per capita consumption in 1960, the Spearman rank correlation coefficient, based on a sample of twenty-two countries, is -.352. The result is not significant at the .10 level using a two-tailed test. It is, however, significant at the .20 level.

for the results).[55] In 1958, these countries accounted for approximately eighty-eight per cent of total world exports.[56] To examine the recent trends, the countries are classified as "developed" or "underdeveloped" using the same scheme discussed earlier in the chapter.[57] As in the case of the commodity terms of trade, the developed and underdeveloped countries' individual indices can be aggregated into a single unweighted index using the mean and median. The results of such an aggregation are shown in Tables 13 and 14 and Figures 3 and 4. Similarly, a weighted index has been compiled and is presented in Table 15 and Figure 5.[58]

The aggregate indices show, unlike those of the commodity terms of trade, clear upward trends for both the developed and underdeveloped countries. This is not unexpected because of the overall expansion of world trade volume, where the volume index appears only in the numerator of the income terms of trade formula.

On an individual basis, the average annual growth rates of each country's capacity to import, as measured by the income terms of trade, are shown in Table 16. In forty-seven of the forty-eight

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[55]The income terms of trade were compiled by multiplying the commodity terms of trade by the export volume index and dividing by 100. The base is 1958 (1958 = 100).

[56]The world total excludes Cuba and the Soviet bloc. See Table 15 for shares on a year by year basis.

[57]Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, West Germany, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom and the United States are classified as developed; the rest are considered underdeveloped.

[58]To compile the index, the individual country's income terms of trade were weighted by the country's share of group exports. This is the same procedure used by Morgan in "Trends in Terms of Trade, . . .," op. cit.

TABLE 13.--The aggregate (unweighted) income terms of trade of the developed countries, 1948-1964

Year	Number of Countries	Mean	Median
1948	16	54.9	50.0
1949	16	61.9	55.4
1950	20	63.4	63.9
1951	20	68.8	68.3
1952	20	66.1	67.4
1953	20	73.7	70.3
1954	20	80.7	78.7
1955	20	85.9	85.5
1956	20	92.2	90.7
1957	20	97.7	96.3
1958	20	100.0	100.0
1959	20	113.8	113.4
1960	20	126.6	123.7
1961	20	136.8	134.1
1962	20	147.9	143.8
1963	20	163.2	155.1
1964	19	175.8	171.4

TABLE 14.--The aggregate (unweighted) income terms of trade of the underdeveloped countries, 1948-1964

Year	Number of Countries	Mean	Median
1948	18	61.0	58.3
1949	20	60.7	56.1
1950	26	75.5	74.8
1951	28	82.0	81.6
1952	32	77.0	76.9
1953	36	86.2	83.5
1954	39	96.6	95.6
1955	39	101.6	97.7
1956	39	102.1	99.0
1957	39	101.8	103.8
1958	39	100.0	100.0
1959	39	109.4	106.8
1960	39	111.4	110.0
1961	39	113.3	107.0
1962	38	121.4	114.8
1963	35	134.8	136.6
1964	22	144.8	138.4

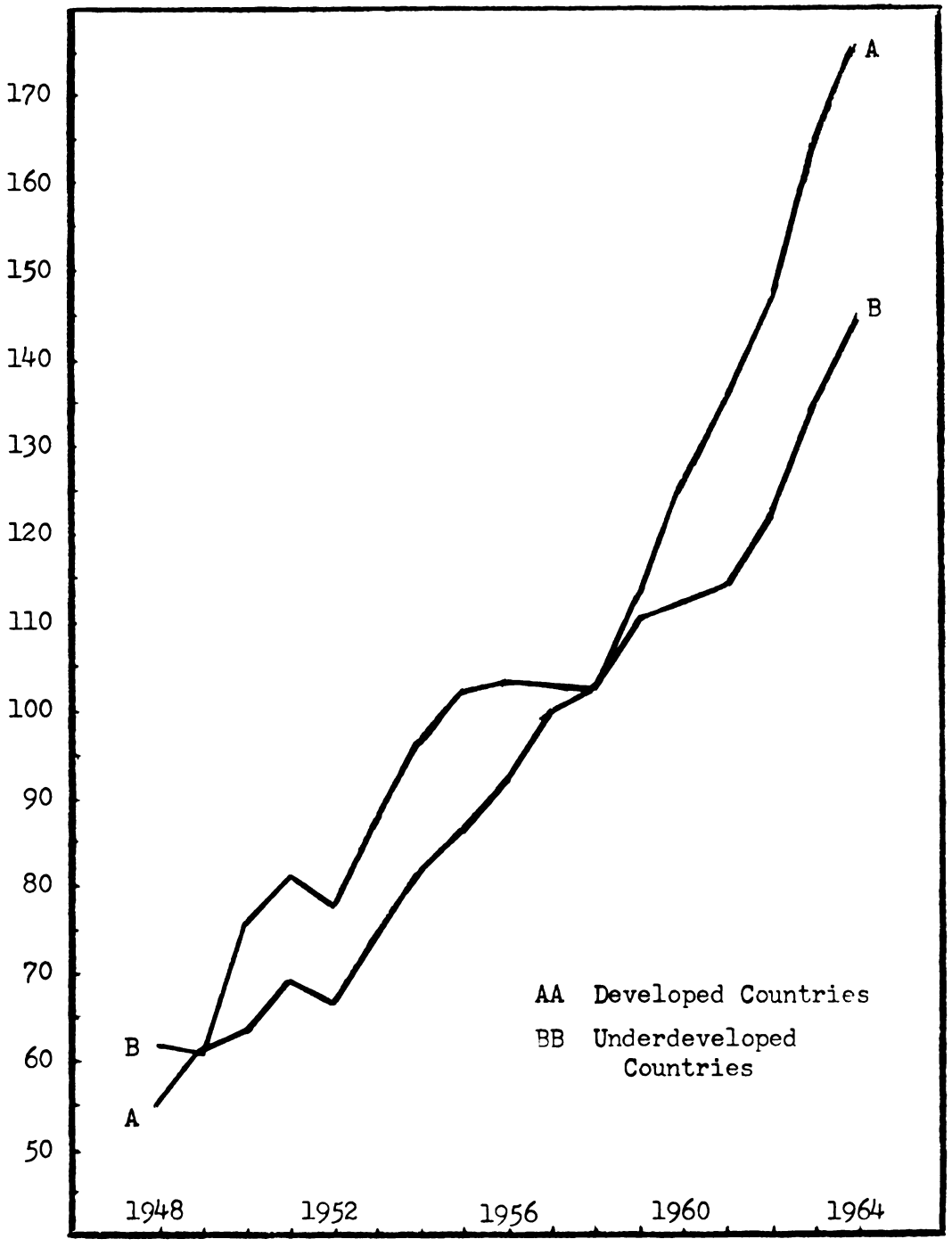

Fig. 3.--The income terms of trade of twenty developed and thirty-nine underdeveloped countries, 1948-1964: aggregate (mean) indices.

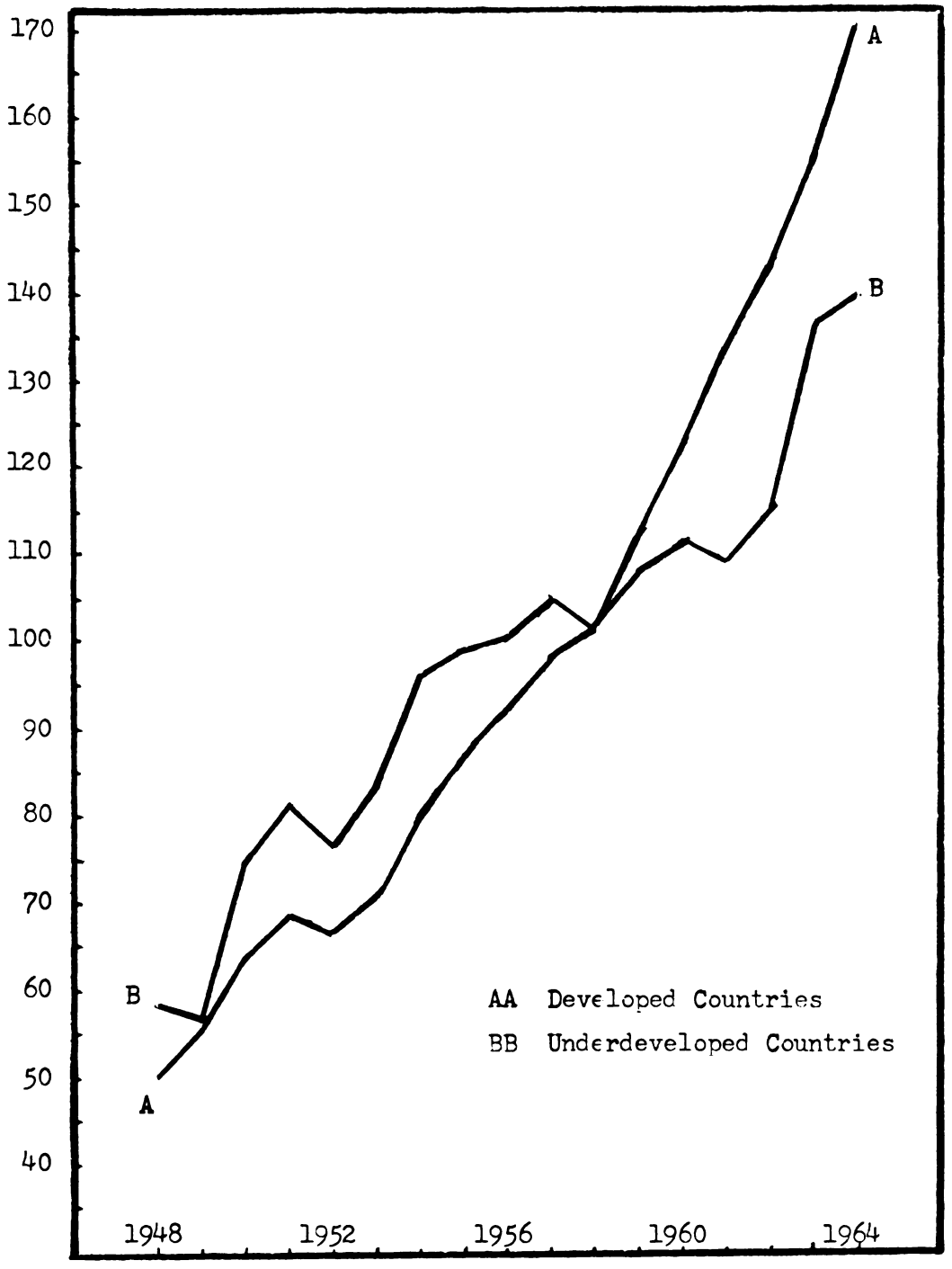

Fig. 4.--The income terms of trade of twenty developed and thirty-nine underdeveloped countries, 1948-1964: aggregate (median) indices.

TABLE 15.--The aggregate (weighted) income terms of trade of the developed and underdeveloped countries, 1948-1964

Year	Developed Countries			Underdeveloped Countries		
	Number of Countries	Share of World Exports[a] (Per Cent)	Weighted Income Terms of Trade	Number of Countries	Share of World Exports[a] (Per Cent)	Weighted Income Terms of Trade
1948	15	57.9	68.4	18	8.6	60.9
1949	16	64.4	72.3	19	8.1	62.3
1950	20	64.4	68.0	25	14.7	84.5
1951	20	66.4	66.1	27	15.9	94.9
1952	20	69.2	70.9	30	15.8	78.9
1953	20	69.3	78.8	34	17.0	87.2
1954	20	68.7	79.9	38	18.2	97.5
1955	20	69.2	84.9	38	17.6	102.8
1956	20	70.8	93.8	38	16.7	104.5
1957	20	72.1	99.8	38	15.9	103.8
1958	20	71.7	100.0	38	15.8	100.0
1959	20	71.9	109.5	38	16.0	111.9
1960	20	73.2	123.9	38	15.2	116.9
1961	20	74.1	132.7	38	14.6	117.9
1962	20	73.9	141.8	37	13.9	123.6
1963	20	74.1	153.4	34	13.6	130.8
1964	20	75.0	170.6	23	10.9	137.7

[a]World total excludes Cuba and the Soviet bloc.

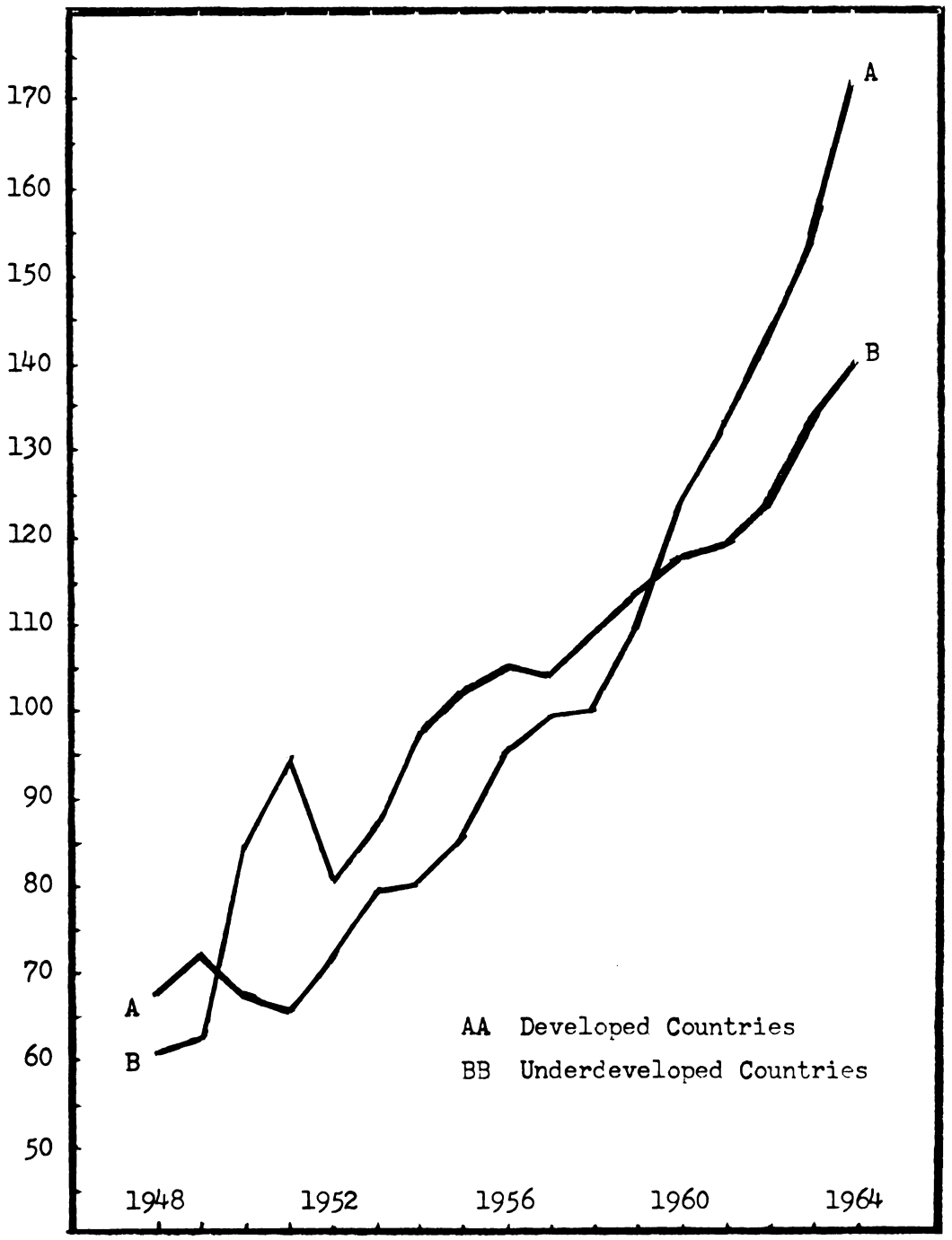

Fig. 5.--The income terms of trade of twenty developed and thirty-nine underdeveloped countries, 1948-1964: aggregate (weighted) indices.

TABLE 16.--Increases in capacity to import of forty-eight countries as measured by changes in the income terms of trade[a], 1948-1964

Country	Per Cent	Country	Per Cent
Israel	16.09	Togo	5.48
Japan	15.68	Spain	5.44
Germany	14.66	Nigeria	5.42
Italy	11.89	Mauritius	5.31
Austria	11.78	Philippines	4.43
Netherlands	9.97	Argentina	4.19
Yugoslavia	8.87	Canada	4.18
Greece	8.85	Venezuela	4.15
France	8.39	Chile	4.10
Denmark	8.19	United Kingdom	3.99
Jamaica	8.19	United States	3.97
Iceland	8.02	Ghana	3.94
Cameroon	7.33	Ecuador	3.67
Switzerland	7.30	Brazil	3.31
Norway	7.22	Guatemala	2.81
Nicaragua	7.13	New Zealand	2.59
Belgium-Luxembourg	6.91	Cyprus	2.46
Finland	6.76	Costa Rica	2.27
Sweden	6.74	India	2.27
Peru	6.31	Australia	1.88
Ireland	6.23	Ceylon	1.55
Portugal	6.10	Colombia	.92
South Africa	6.08	Honduras	.32
Panama	5.99	Indonesia	- .81

[a]The average annual growth rate is calculated by the use of the logarithmic least-square method whereby an exponential function:

$$Z = ae^{bt}, \qquad t = 1, 2, \ldots n$$

is fitted to the income terms of trade over time by simple regression analysis applied to the logarithmic form of the equation. In the equation, Z represents the income terms of trade, a and b constants, t time, and n the total number of years in the series. The average annual rate of change is given by b^*, the regression coefficient.

countries for which there are data for almost the entire 1948-1964 period, the growth rate was positive; the only exception was Indonesia.[59] The average annual increase for all countries in the sample is 6.01 per cent with average annual increases of 8.12 and 4.50 per cent, respectively, for the developed and underdeveloped countries. Thus, it appears that, with some exceptions, the "capacity to import," as measured by the income terms of trade, of the developed countries has increased more rapidly than most of the underdeveloped countries. Based on a one-tailed test, it was found that the average annual terms of the developed countries was significantly greater than that of the underdeveloped countries.[60]

To further test the relationship between percentage changes in export-based capacity to import and stages of economic development, the countries were ranked by percentage changes in their income terms of trade and by per capita gross domestic product in 1963. In this case, the Spearman rank correlation coefficient between the two series is .381. Based on a sample of forty-seven countries, the coefficient is significant at the .01 level using a one-tailed test.[61]

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[59]Indonesia may be a special case for two reasons. First, the period for which data are available, 1950 to 1961, is shorter than that of the other countries. Second, Indonesia's economy has been subject to a number of shocks.

[60]This was at the .05 level. This may be due to a more rapid expansion of world trade in manufactured products.

[61]Approximately the same results are obtained if the countries are ranked by percentage changes in their income terms of trade and by per capita consumption in 1960. The rank correlation coefficient between the two series is .348 which is significant at the .05 level using a one-tailed test. This result is based on a sample of thirty-nine countries.

Hence, disaggregation supports the result obtained above.[62]

In conclusion, it appears the higher the stage of a country's development, the more favorable its income terms of trade over time. Thus, it might be argued that aid to underdeveloped countries be increased in order to assist in their development programs.[63] Nevertheless, such an argument may be misleading for a variety of reasons. First, there is the question of causality. It may be that developed countries are better able to expand their exports (because they are developed) than underdeveloped countries but it is also undoubtedly true that some countries are developed because they have been able to expand their exports. Second, the income terms of trade measure only a country's export-based capacity to import and neglect invisible items and capital flows. Clearly, it is a country's total capacity to import that is relevant; hence, movements in the income terms of trade may be misleading.[64] Third, the concept takes no account of a country's need for foreign exchange. For example, consider a country which deliberately undertakes a program of import substitution. If its resources are devoted to this purpose, the country's income terms of trade may increase less rapidly than other countries. However, because of import substitution, the country may have less need for

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[62]The results are consistent with those obtained by Morgan in "Trends in Terms of Trade and their Repercussions on Primary Producers," op. cit., pp. 65-66.

[63]There are, of course, many other arguments for increasing aid to underdeveloped countries.

[64]For evidence on total capacity to import, see J. Marcus Fleming and Gertrud Lovasy, "Fund Policies and Procedures in Relation to the Compensatory Financing of Commodity Fluctuations," International Monetary Fund Staff Papers (November, 1960), pp. 1-76.

foreign aid than countries whose export-based capacity to import have increased more rapidly.

Summary

Of the seven terms of trade concepts discussed above, only two--the commodity and income--are both useful and easy to calculate with existing data. Hence, we are left with only the commodity and income terms of trade as possible guides to changes in economic welfare and the income terms of trade as a measure of a country's "capacity to import."

While welfare implications are often drawn from movements in the commodity terms of trade, it was noted that the commodity terms of trade are a poor guide to changes in economic welfare. In most cases, it is necessary to examine the causes of the change in the terms of trade in order to assess the impact on economic welfare. In regard to the income terms of trade, this concept is also misleading as a guide to changes in economic welfare and, in certain cases, is even more misleading than the commodity terms of trade. However, because of the present concern with financing economic development, changes in export volume as well as changes in export and import prices are considered.

Despite the uncertain relationship between changes in the commodity terms of trade and changes in economic welfare, economists and politicians have insisted that primary producers and, more recently, underdeveloped countries have suffered a secular deterioration in their commodity terms of trade and some have suggested that the countries should be compensated for the decline. Although the

statistical and theoretical foundations of the argument are extremely weak, the controversy has persisted.

The main contribution of this chapter is to summarize the evidence relating to the argument for the post-war period. On the basis of both the aggregate commodity terms of trade indices of the developed and underdeveloped countries and a consideration of each country's terms of trade, the 1948 to 1964 period offers little evidence to support the hypothesis that the commodity terms of trade of the underdeveloped (developed) countries deteriorate (improve) over time. Similarly, when the developed-underdeveloped dichotomy is abandoned, there appears to be no significant relationship between the stage of a country's development and movements in its terms of trade.

If only the 1954-1964 period is considered, both the aggregate indices and consideration of individual countries appear to support the hypothesis. For example, if regression lines are fitted to the commodity terms of trade as a function of time, many of the developed (underdeveloped) countries show an improvement (a deterioration) in their commodity terms of trade. However, the result may be spurious because the terms of trade of most developed (underdeveloped) countries reached a low (high) during the early 1950's as a result of increased export prices of primary products brought on by the Korean War. Hence, it is uncertain whether the least squares method measured the inevitable deterioration (improvement) of the commodity terms of trade of the underdeveloped (developed) countries or the gradual movement from a period of abnormal highs (lows) brought on by the Korean War. For this reason, it is argued that the relevant time period is from 1948 (or 1949) to 1964. Since the aggregate

indices provided by the United Nations show no change from 1963 through 1966, the argument could presumably be extended through 1966.

Even if the 1948-1964 period is considered, it must be emphasized that the results cover only a seventeen year span. However, when the post-war terms of trade of twenty-six countries were compared to their terms of trade in 1937, it was found that the terms of trade of the underdeveloped countries improved more than those of the developed countries. Thus, there appears to be little evidence to indicate that the terms of trade of underdeveloped countries inevitably decline vis-à-vis the developed countries. Indeed, the diversity of results suggests that each country must be studied individually.[65]

While there is little evidence to support the hypothesis that the commodity terms of trade of the underdeveloped countries deteriorate over time, the income terms of trade of the underdeveloped countries appear to have improved less rapidly than those of the developed countries. The average annual percentage increase for the twenty developed countries is 8.12 while the corresponding percentage for the twenty-eight underdeveloped countries is 4.50. It should be emphasized that the income terms of trade are not a measure of "total capacity to import" which would include foreign aid and other items.

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[65]It is possible to divide the countries into sub-groups--such as the mineral exporting countries--and examine the commodity terms of trade of these groups. However, it is easier to proceed to a consideration of each country.

CHAPTER III

FLUCTUATIONS IN THE COMMODITY AND INCOME TERMS OF TRADE

In the previous chapter, we found that there was little evidence to indicate that the commodity terms of trade of the developed (underdeveloped) countries inevitably improve (decline). On the other hand, we did find that the growth rates of the developed countries' capacity to import, as measured by the income terms of trade, were significantly greater than those of the underdeveloped countries. However, nothing was said of fluctuations in the commodity and income terms of trade.

As fluctuations in the commodity and income terms of trade may have adverse effects on the domestic economy, we shall examine the degree of their instability in this chapter and test to see if underdeveloped countries experience more instability than developed countries.[1] If instability is harmful and underdeveloped countries experience more instability, the problem is presumably worse for underdeveloped countries than for developed countries.

Measures of Instability

Before discussing the various methods of measuring instability,

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[1]The relationship between international economic instability and the domestic economy is discussed in the next chapter. However, it might be noted at this point that instability may lead to fluctuations in national income, a misallocation of resources, and balance of payments problems.

it should be noted that the study is concerned only with year-to-year fluctuations. This is not to deny that fluctuations within-years or over the cycle are not important; indeed, they may be substantial.[2] However, it may be argued that within-year fluctuations are not important provided year-to-year fluctuations are mild. Also, it may be that within-year fluctuations, like seasonal variations, are more easily predicted (and provided for) because of the shorter time horizon. Moreover, there is insufficient data on a monthly or quarterly basis. As for cyclical movements, the post-war period is too short to study fluctuations of this type.[3]

There are a number of methods available to calculate instability. The most common procedure is simply to compute the average year-to-year percentage fluctuation.[4] If I_1 denotes the instability index (average year-to-year fluctuation, per cent), Z the variable in question, t the year, and n the total number of years covered in the series, the index can be represented as

$$I_1 = \frac{100 \sum_{t=2}^{n} \frac{|Z_t - Z_{t-1}|}{Z_{t-1}}}{n - 1} .$$

Although easy to calculate, this method is deficient in that it makes no allowance for trend factors. If the variable in question

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[2] United Nations, Department of Economic Affairs, Instability in Export Markets of Under-Developed Countries (New York, 1952), pp. 15-18, 21-23, 32-35, 44-46.

[3] The United Nations study contains data on cyclical movements in international trade for the 1901-1950 period. Ibid.

[4] The method was used, for example, by Michael Michaely to measure fluctuations in export and import prices and the commodity terms of trade. Michaely, op. cit., pp. 68-70.

has risen (or fallen) continuously over time, the index will show strong "fluctuations" even if there have been no fluctuations at all. For example, consider a country whose income terms of trade were 10, 20, 30, and 40 in successive years. Using this method, the index would show an average annual fluctuation of sixty-one per cent while graphically there is only a linear trend with no fluctuations at all. Because of the strong upward trend in the income terms of trade (and other variables) of many countries, use of such an index would seriously overstate the degree of instability. However, countries with strong upward trends in their income terms of trade (or other variables) would show greater "instability" than other countries; hence, this method of computing instability is not used.[5]

The United Nations has suggested another index which is quite similar to the first.[6] In it, the year-to-year differences in the variable in question are divided by the larger of the two values, Z_t and Z_{t-1} rather than always dividing by Z_{t-1} as in the previous index. Symbolically, the instability index (average year-to-year fluctuation, per cent), denoted as I_2, can be represented as:

$$I_2 = \frac{100 \sum_{t=2}^{n} \frac{|Z_t - Z_{t-1}|}{\max (Z_t, Z_{t-1})}}{n - 1} .$$

This procedure has the advantage of making a crude correction for trend factors. Using the second approach, the measured average

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[5]Michaely justified the use of this method on the grounds that there is little or no trend in export and import prices and the commodity terms of trade. Ibid., p. 69.

[6]For a discussion of the United Nations method, see United Nations, Instability in Export Markets of Underdeveloped Countries, op. cit., pp. 77-79.

year-to-year "fluctuation" of the income terms of trade in our previous example would be 34.3 per cent.[7] Since the method has been widely used, makes some allowance for trend factors, and is easily interpreted, I have used this procedure as well as two others to calculate instability indices for the countries in question.

To correct for trend, I have used methods suggested by Benton F. Massell.[8] To calculate the instability index, I_3, a linear regression line is fitted to the variable in question, $\underline{Z}$, expressed as a function of time, $\underline{t}$, and the residuals, $\underline{u}$, obtained by subtracting the estimated values of the variable in each year from the actual value. In each case, the absolute value of the differences between u_t and u_{t-1} are obtained and divided by the larger of Z_t and Z_{t-1} to obtain the trend-corrected year-to-year fluctuation, w_t, of export earnings. The year-to-year fluctuations are then summed, divided by the n-1 observations and multiplied by 100 to obtain the trend-corrected average year-to-year fluctuation of export earnings in percentage terms. Symbolically, the instability index, I_3, can be expressed as:

$$I_3 = \frac{100 \sum_{t=2}^{n} w_t}{n - 1} \qquad \text{where } w_t = \frac{|u_t - u_{t-1}|}{\max (Z_t, Z_{t-1})} .$$

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[7] For the same set of data, I_1 will always be greater than, or equal to, I_2. The I_1 index ranges from zero to plus infinity while the I_2 index ranges from zero to 100.

[8] Benton F. Massell, "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis," American Economic Review, LIV (March, 1964), 47-63.

This measure assumes, of course, that the trend can most appropriately be approximately by a linear function of time.[9]

Another equally satisfactory measure of instability--called the normalized standard error of the estimate by Massell--is obtained by dividing the standard error of the estimate by the mean of the observations. This measure, like the previous one, is a pure number and is independent of the overall level and rate of growth of the variable. It can be written as

$$I_4 = \frac{\sqrt{\frac{\sum_{t=1}^{n} u_t^2}{n-2}}}{\bar{Z}}$$

where $\bar{Z}$ is the mean of the observations.

While both measures, I_3 and I_4, are obtained by fitting a linear regression line to the variable as a function of time, they are conceptually different. The instability index I_3 is more a measure of the year-to-year change in a country's export earnings while I_4 is largely a measure of the variation of the series as a whole around the trend line. Although both measures are affected by the appropriateness of fitting a linear trend line to a particular country's export earnings, I_4 would be more affected by a poor fit than I_3. Because the two measures give somewhat different results, both are subsequently used. However, only I_2 and I_3 are considered in this chapter since it deals solely with year-to-year fluctuations.

Numerous other indices of instability have been suggested. In his study, International Economic Instability, Joseph D. Coppock

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[9] An exponential trend was also fitted to the data, but, in general, the linear trend provided a better fit.

uses what he calls the log variance method.[10] If $\underline{V}$ denotes the logarithmic variance of the series and $\underline{m}$ the arithmetic mean of the difference between the logs of Z_{t-1} and Z_t, Z_t and Z_{t+1}, and so forth, the measure can be written as:

$$V_{log} = \frac{\sum_{t=2}^{n} \left(\log \frac{Z_t}{Z_{t-1}} - m \right)^2}{n - 1}$$ where the instability index, I_5, is equal to the antilog of the square root of V_{log}. As a measure of instability, Coppock chose this method over I_3 because it "was less laborious and lent itself to machine methods."[11] Because of ready availability of computer time, I have used the other methods instead of Coppock's log variance method.

Coppock discusses still another index which is obtained by fitting a linear regression line to the variable in question as a function of time and then dividing the absolute value of the residual (i.e., the absolute value of the difference between the estimated value and the actual value) by the estimated value for each year.[12] The resulting percentages are then summed and the result divided by the number of years in the period under consideration to yield what Coppock calls the average-percentage-deviation-from-trend index. Symbolically, the instability index, I_6, can be represented as

$$I_6 = \frac{100 \sum_{t=1}^{n} \frac{\left| Z_t - (B_0 + B_1 t) \right|}{B_0 + B_1 t}}{n}$$ where $B_0 + B_1 t$ represents the

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[10] Joseph D. Coppock, International Economic Instability (New York: McGraw-Hill, 1962), pp. 23-24.

[11] Ibid., p. 23.

[12] Ibid., p. 24.

estimated value of export earnings in each year. However, this index is a measure of instability about the trend, not a measure of average year-to-year fluctuations and possesses no real advantages over I_3 and I_4 as instability indices; hence, I have not used this method.

While the methods of measurement differ substantially, Coppock has shown that three of the methods give similar results.[13] In his study, Coppock computed instability indices of export earnings of eighty-three countries during the 1947-1958 period using the United Nations method (I_2), the log variance method (I_5), and the average-percentage-deviation-from-trend method (I_6). He found that the simple correlation coefficient between the instability indices calculated by the United Nations and log variance methods was .89 which is the same as the simple correlation coefficient between the instability indices calculated by the log variance and average-percentage-deviation-from-trend method. Hence, we should expect the different measures to give somewhat similar results, at least in the absence of trends.[14]

In calculating the instability indices, the period under consideration is from 1948 to 1964. As in Chapter I, the year 1948 was selected as a base because it appeared to be the first "normal" year following World War II. At the time the study was undertaken, 1964 was the last year for which data were available for a large number of countries. Therefore, in calculating the average year-to-year fluctuations, the first and last changes are from 1948 to 1949 and from

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[13] Ibid., p. 25.

[14] This was generally the case in this study. However, in certain instances, the result hinged on the choice of the instability index.

1963 to 1964, respectively. The data consist of the indices considered in the previous chapter. As noted earlier, data are not available for the entire period for some countries; the exceptions are noted in the tables.

The Commodity Terms of Trade

After calculating the average year-to-year fluctuation of the commodity terms of trade using both the I_2 and I_3 measures, it was found that they were almost identical.[15] Hence, only the I_2 series is reported in Table 17. The series ranges from 15.1 per cent (Ghana) to 1.8 per cent (Netherlands) with an average of 5.8 per cent for the forty-five countries.[16] With a number of exceptions, the commodity terms of trade appear to fluctuate more in underdeveloped than in developed countries.

To test whether the commodity terms of trade of underdeveloped countries fluctuate more than those of the developed countries, the countries are divided into two groups along the same lines discussed in Chapter I.[17] Using this classification scheme, it is found that the mean of the average year-to-year fluctuation, I_2, of the commodity terms of trade for the twenty developed countries is 4.1 per cent while the mean for the twenty-five countries classified as

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[15]The simple correlation coefficient between I_2 and I_3 is .99 for the commodity terms of trade.

[16]The standard deviation is 2.6 per cent.

[17]The developed group, as in Chapter II, includes Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, West Germany, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom, and the United States. The rest are considered underdeveloped.

TABLE 17.--Instability of export prices, import prices, and the commodity terms of trade in a sample of forty-five countries, 1948-1964

Country	Average Year-to-Year Fluctuation of Export Prices, Per Cent I_2	Average Year-to-Year Fluctuation of Import Prices, Per Cent I_2	Average Year-to-Year Fluctuation of the Commodity Terms of Trade, Per Cent I_2
Argentina[a]	6.2	5.4	7.1
Australia	9.4	3.2	7.9
Austria	6.9	7.9	6.9
Belgium-Luxembourg	5.2	3.9	2.9
Brazil	9.2	8.2	10.9
Canada	2.6	3.6	2.5
Ceylon	7.2	5.6	8.6
Chile	8.2	4.5	8.6
Colombia	8.2	2.2	8.1
Costa Rica	7.8	2.3	7.8
Cyprus[b]	8.0	4.7	6.1
Denmark	2.9	4.7	4.5
Ecuador[c]	5.3	2.9	6.1
Finland	8.8	7.9	6.6
France	5.8	6.7	4.0
West Germany[b]	2.9	4.8	3.0
Ghana[d]	15.7	4.1	15.1
Greece[a]	7.5	5.4	4.9
Guatemala[e]	10.2	2.1	9.7
Honduras	6.0	2.5	7.1
Iceland[c]	1.6	5.5	5.5
India[b]	6.1	5.6	5.7
Ireland	3.3	3.9	4.0
Israel[b]	3.9	4.9	3.4
Italy	4.7	5.6	3.3
Jamaica[d]	5.1	5.0	5.8
Japan[b]	5.3	6.5	4.0
Mauritius[d]	6.2	4.3	6.5
Netherlands	3.3	4.3	1.8
New Zealand	8.6	4.0	8.8
Nicaragua	9.2	2.3	9.3
Nigeria	7.3	4.6	5.5
Norway	4.6	4.7	2.9
Panama	5.8	2.3	7.5
Peru[c]	7.3	3.1	7.1
Philippines	7.6	3.4	6.8
Portugal	4.7	4.3	3.9
South Africa	5.7	3.9	4.5
Spain	5.0	5.8	5.6

TABLE 17--Continued

Country	Average Year-to-Year Fluctuation of Export Prices, Per Cent I_2	Average Year-to-Year Fluctuation of Import Prices, Per Cent I_2	Average Year-to-Year Fluctuation of the Commodity Terms of Trade, Per Cent I_2
Sweden	5.4	4.4	3.7
Switzerland	2.4	4.0	2.9
United Kingdom	3.0	4.7	3.3
United States	2.3	3.9	3.2
Venezuela[b]	1.9	3.6	4.6
Yugoslavia[d]	7.4	4.8	5.1

[a]1951-1964.

[b]1950-1964.

[c]1950-1963.

[d]1948-1963.

[e]1948-1962.

underdeveloped is 7.1 per cent, a difference of three percentage points. This difference is significant at the .01 level using a one-tailed test. Hence, the commodity terms of trade of the underdeveloped countries appear to fluctuate more than the terms of trade of the developed countries.

This result is confirmed by ranking (in descending order) the countries by per capita gross domestic product and by fluctuations in the commodity terms of trade and calculating the Spearman rank correlation coefficient. If 1963 per capita gross domestic product data are used, the Spearman rank correlation coefficient is -.50 for a sample of thirty-eight countries. This is significant at the .01 level using a one-tailed test. The same results are obtained if the countries are ranked by per capita gross domestic product in 1958 or by per capita consumption in 1960.[18]

As the commodity terms of trade consists of the ratio of export to import prices, fluctuations in the terms of trade must be the result of fluctuations in export and/or import prices. Hence, it is of interest to examine fluctuations in the two series in order to determine the main source of instability in the commodity terms of trade.

After calculating both I_2 and I_3 for the two series, it was found that the measures are almost identical; hence, only I_2 is

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[18]The coefficients are -.47 and -.45, respectively, which are both significant at the .01 level using a one-tailed test. The former is based on a sample of forty-four countries and the latter on a sample of thirty-eight countries.

presented in Table 17.[19] This lends support to Michaely's claim that "where a trend may be discerned it seems, from casual observation, to be mild, in comparison with the genuine price fluctuations."[20]

The results indicate that export prices fluctuate more than import prices. The mean of the average year-to-year fluctuation, I_2, of export prices is 6.0 per cent while the mean of the average annual fluctuation, I_2, of import prices is 4.5 per cent. Fluctuations in the export price series range from 15.7 per cent (Ghana) to 1.6 per cent (Iceland) while fluctuations in the import price series range from 8.2 per cent (Brazil) to 2.1 per cent (Guatemala).[21] On an individual basis, fluctuations in export prices exceeded those of import prices in twenty-eight of the forty-five countries. This may be because countries tend to specialize in exports and generalize in imports.

As discussed above, the mean of average annual fluctuations, I_2, of the commodity terms of trade is 5.8 per cent. If export prices fluctuate 6.0 per cent per year and import prices 4.5 per cent, this means that some--but not all--of the instability in export and import prices is offsetting to provide for greater stability in the commodity terms of trade.

If the countries are divided into developed and underdeveloped groups, it is found that the terms of the average year-to-year

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[19]The simple correlation coefficient between I_2 and I_3 is .99 for export prices and .98 for import prices.

[20]Michaely, op. cit., p. 69.

[21]The standard deviations for the export and import price indices are 2.7 and 1.5 per cent, respectively. Thus, it appears there is less variability from country to country in import prices than in export prices.

fluctuation, I_2, of export prices for the twenty developed countries is 4.6 per cent while the corresponding mean for the underdeveloped countries is 7.2 per cent, a difference of 2.6 percentage points. Using a one-tailed test, this difference is significant at the .01 level. This result is confirmed by ranking the countries by per capita gross domestic product in 1963 and by fluctuations in export prices and calculating the Spearman rank correlation coefficient. In this case, the coefficient is -.43 (for a sample of thirty-eight countries) which is significant at the .01 level using a one-tailed test. The result is also confirmed if the countries are ranked by per capita gross domestic product in 1958 (-.62) or by per capita consumption in 1960 (-.47). The former is based on a sample of forty-four countries and the latter on a sample of thirty-eight countries. Thus, it appears that export prices tend to fluctuate more in underdeveloped countries than in developed countries. This could be due to differences in the degree of specialization in exports between countries or to specialization in different types of products. The hypotheses are discussed at length in the next chapter.

The mean of the average year-to-year fluctuation, I_2, of import prices for the twenty developed countries is 5.0 per cent while the average for the underdeveloped countries is 4.1 per cent, a difference of nine-tenths of one per cent. Using a one-tailed test, this difference is significant at the .05 level. Hence, it appears that import prices fluctuate more in developed countries than in underdeveloped countries.[22] However, rank correlations between per capita

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[22]This could be explained if fluctuations in the demand for imports by developed countries have a greater impact on world prices than do fluctuations in the demand for imports by underdeveloped

gross domestic product and fluctuations in import prices fail to reveal such a relationship. If 1963 per capita gross domestic product is used, the coefficient is .04 for a sample of thirty-eight countries. This is insignificant at the .10 level using a one-tailed test. Similarly, if 1958 per capita gross domestic product and 1960 per capita consumption are considered, the rank correlation coefficients are .10 and -.06, respectively, which are both insignificant. The former is based on a sample of forty-four countries and the latter on a sample of thirty-eight countries. Hence, we conclude that fluctuations in import prices do not vary systematically with stages of a country's development.

Thus, the observed differences in stability in the commodity terms of trade of the developed and underdeveloped countries are apparently due largely to differences in the stability of export rather than import prices.

The Income Terms of Trade

Because the income terms of trade of most countries under consideration have exhibited strong upward trends, the two measures of instability, I_2 and I_3, diverge considerably. Therefore, both have been included in Table 18. The results indicate that the mean of the average year-to-year fluctuation, I_2, of the income terms of trade for the forty-five countries is 10.5 per cent while the mean of the

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countries. In this connection, it should be noted that import prices generally fluctuate more than export prices in developed countries. On an individual basis, this is the case in fifteen of the twenty countries. However, it may simply be that developed countries import commodities which fluctuate more than commodities imported by underdeveloped countries.

TABLE 18.--Two measures of instability of the income terms of trade in a sample of forty-five countries, 1948-1964

Country	Average Year-to-Year Fluctuation, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation, Per Cent I_3
Argentina[a]	14.5	14.8
Australia	15.5	15.1
Austria	11.0	5.9
Belgium-Luxembourg	8.2	7.2
Brazil	10.1	10.0
Canada	6.5	6.3
Ceylon	11.1	11.0
Chile	10.7	10.5
Colombia	9.5	9.5
Costa Rica	9.5	9.1
Cyprus[b]	7.8	7.4
Denmark	8.8	5.2
Ecuador[c]	10.6	10.6
Finland	11.5	10.1
France	10.9	6.5
West Germany[b]	14.0	3.7
Ghana[d]	9.1	11.0
Greece[a]	10.7	6.3
Guatemala[e]	7.7	8.1
Honduras	9.0	9.0
Iceland[c]	11.8	9.0
India[b]	7.8	7.6
Ireland	10.1	8.4
Israel[b]	15.0	14.7
Italy	12.8	9.4
Jamaica[d]	11.3	10.9
Japan[b]	14.2	10.0
Mauritius[d]	15.8	13.8
Netherlands	10.7	4.5
New Zealand	8.2	8.0
Nicaragua	17.2	16.6
Nigeria[d]	8.6	6.9
Norway	9.3	7.1
Panama	13.4	13.3
Peru[c]	9.3	8.5
Philippines	9.5	8.3
Portugal	10.6	9.4
South Africa	8.9	6.8
Spain	10.7	9.8

TABLE 18--Continued

Country	Average Year-to-Year Fluctuation, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation, Per Cent I_3
Sweden	8.8	5.1
Switzerland	7.7	3.8
United Kingdom	5.3	3.2
United States	8.1	7.1
Venezuela[b]	5.2	4.9
Yugoslavia[d]	16.0	16.0

[a]1951-1964.

[b]1950-1964.

[c]1950-1963.

[d]1948-1963.

[e]1948-1962.

trend-corrected average annual fluctuation, I_3, is 8.9 per cent.[23] The I_2 series ranges from a high of 17.2 per cent (Nicaragua) to a low of 5.2 per cent (Venezuela) while the I_3 series ranges from 16.6 per cent (Nicaragua) to 3.2 per cent (United Kingdom).

To test whether the income terms of trade fluctuate more violently in underdeveloped than in developed countries, the countries are classified into two groups using the same classification scheme as in the previous section. After dividing the forty-five countries into the two groups, it is found that the mean of the average year-to-year fluctuation, I_2, of the income terms of trade of the twenty developed countries is 10.4 per cent and the mean of the underdeveloped countries is 10.6 per cent, a difference of only two-tenths of one per cent. Using a one-tailed test, the difference is not significant at the .10 level. The same result is obtained by compiling Spearman rank correlation coefficients between rankings by per capita gross domestic product (consumption) and fluctuations in the income terms of trade. If per capita gross domestic product in 1963 is considered, the resulting rank correlation coefficient is .06. Based on a sample of thirty-eight countries, the coefficient is insignificant at the .10 level using a one-tailed test. If per capita gross domestic product in 1958 and per capita consumption in 1960 are considered, the coefficients are -.08 and -.13, respectively. The former is based on a sample of forty-four countries and the latter on a sample of thirty-eight countries. Both are insignificant at the .10 level using a one-tailed test.

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[23] The simple correlation coefficient between I_2 and I_3 is .76. The standard deviations of the two series are 2.8 and 3.3 per cent, respectively, for I_2 and I_3.

If the trend-corrected series, I_3, is used, the means are 7.5 and 10.0 per cent, respectively, for the developed and underdeveloped countries; this is a difference of some 2.5 percentage points and is significant at the .01 level using a one-tailed test. The relationship is confirmed by compiling Spearman trank correlation coefficients between per capita gross domestic product (consumption) and fluctuations in the income terms of trade. The Spearman rank correlation coefficient between per capita gross domestic product in 1963 and fluctuations in the income terms of trade is -.37. Based on a sample of thirty-eight countries, the coefficient is significant at the .01 level using a one-tailed test. If per capita gross domestic product in 1958 and per capita consumption in 1960 are considered, the correlation coefficients are -.46 and -.48, respectively. With samples of size forty-four (for the former) and thirty-eight (for the latter), both are significant at the .01 level using a one-tailed test.

The main reason for the greater differential in the I_3 series is, of course, the strong upward trend in the income terms of trade in the developed countries. Since the developed countries can more or less count on the continued upward trend in their exports, the relevant comparison involves the trend-corrected series; hence, we conclude that the income terms of trade of the underdeveloped countries fluctuate more violently than the income terms of trade of the developed countries.

As shown earlier, the income terms of trade are calculated by multiplying the commodity terms of trade of each country by the country's export volume index. Hence, fluctuations in export volume may offset fluctuations in the commodity terms of trade to provide for

greater stability in the income terms of trade. Since the income terms of trade (10.5 and 8.9 per cent, respectively, for I_2 and I_3) fluctuate more widely than the commodity terms of trade (5.8 per cent) regardless of the method used to compute the indices, it appears that fluctuations in export volume intensify rather than offset fluctuations in the commodity terms of trade.[24]

Conclusion

In this chapter, it was found that the commodity and income terms of trade fluctuate more for underdeveloped countries than for developed countries. If, as generally assumed, instability is harmful, this means the instability problem is worse for underdeveloped countries. However, Alasdair I. MacBean has recently questioned the assumption that the present degree of international instability is harmful.[25] If he is correct, the results shown here are not particularly meaningful. Because of certain methodological problems, much of MacBean's statistical evidence is questionable.[26] Nevertheless, it is no longer clear that international instability is harmful.[27]

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[24]This is true for both the developed and underdeveloped countries. Fluctuations in export volume will be discussed in the next chapter.

[25]Alasdair I. MacBean, Export Instability and Economic Development (Cambridge: Harvard University Press, 1966).

[26]On this point, see A. Maizels, Review of Export Instability and Economic Development, by Alasdair I. MacBean, American Economic Review, LVIII (June, 1968), 575-80.

[27]The author plans to investigate this question in the future.

CHAPTER IV

INSTABILITY OF EXPORT EARNINGS

The second hypothesis to be tested in this thesis concerns the instability of export earnings and one proposed solution--export diversification. Specifically, is diversification of exports (in both the product and geographical sense) likely to provide a greatly increased measure of stability in export earnings? If so, a country may wish to embark on a purposeful program of export diversification in order to stabilize its export earnings. If not, the country may wish to pursue other approaches to stabilization or concentrate on alleviating the effects of instability.

To test the hypothesis empirically, several measures are needed. The first is a measure of instability of export earnings. Using measures developed in the previous chapter, the degree of instability of export earnings is calculated for seventy-eight countries in this chapter. The second measure, that of export diversification, is developed in the following chapter where the two measures are brought together and several hypotheses concerning instability of export earnings and export diversification are tested using regression analysis.

Instability and Its Effects

Before proceeding to the empirical analysis, however, it is desirable to discuss the relationship between international

instability and the domestic economy and offer several reasons why underdeveloped countries may be expected to experience more instability than developed countries.

Instability of export earnings may affect the domestic economy in a variety of ways. For example, fluctuations in exports may lead to instability in the domestic economy through the foreign trade multiplier.[1] Variations in export earnings have a direct impact on producers' incomes and, as a consequence, affect their expenditures on consumption and investment. As their expenditures change, repercussions will spread throughout the economy to produce additional changes in the level of national income (unless offset by fiscal and/or monetary policy).[2] Changes in the total value of exports may also affect the domestic supply of money so as to produce changes in national income.[3] Variations in export proceeds may cause fluctuations in prices, employment, and real wages for the same reasons.

Along with fluctuations in the level of national income, fluctuations in export earnings and prices may have undesirable social and political effects through changes in the distribution of income, especially in underdeveloped countries. For example, a sudden increase in the export earnings of an important crop may appear to redistribute income in an arbitrary manner. One group of farmers is enriched while domestic prices may rise to make other groups worse

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[1]For a formal analysis, see Charles P. Kindleberger, International Economics (3rd ed.; Homewood, Illinois: Richard D. Irwin, 1963), pp. 177-99.

[2]The impact will depend, in part, on the size of the export sector relative to the rest of the economy.

[3]Henry C. Wallich, Monetary Problems of an Export Economy (Cambridge: Harvard University Press, 1950), pp. 206-09.

off. Similarly, a sudden drop in earnings can create very serious tensions, particularly in societies where existing tensions are already high. This may be especially true in countries where race or tribal connections determine occupations or people live at or near subsistence levels.

Along with the impact on national income and its distribution, variations in export earnings may affect the allocation of resources. If instability creates uncertainty, investors may be deterred from specializing in export industries which yield the highest returns because they do not wish or cannot afford to take the risks involved in such enterprise.[4] If this occurs, the country will suffer loss of income (even if full employment is maintained) and foreign exchange. Hence, instability may prevent an optimum allocation of resources.

In addition to the allocation effect, instability may reduce the rate of investment because it introduces uncertainty into the investment process. First, instability increases the difficulty of estimating returns on investment and, second, it introduces the possibility of foreign-exchange problems which would impede the importation of necessary capital goods or raw materials at a given time. "In addition, the existence of these risks may make the suppliers of capital and credit charge higher interest rates and impose more stringent conditions."[5] Under these circumstances, the immediate

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[4] Moreover, Benjamin Higgins has argued that the "repercussions may be felt through the government budget because of the close tie between revenues" and export earnings of underdeveloped countries. Benjamin Higgins, Economic Development: Principles, Problems, and Policies (New York: W. W. Norton and Company, 1959), p. 557. Because of uncertainty, government planning for development will become more difficult.

[5] MacBean, op. cit., p. 29.

effect would probably to be reduce investment and national income and, in the long run, impede the country's rate of growth.

Apart from these effects, severe export instability will tend to produce temporary belance of payments problems in countries which are short of international reserves.[6] Such instability would be particularly harmful to underdeveloped countries because of their lack of reserves and the possibility that luxury imports or non-necessities have already been cut out of their imports. Under these circumstances, any drop in export earnings of foreign exchange is likely to cut into capital good and raw material imports. Moreover, recurring balance of payments problems may lower confidence in the maintenance of existing exchange rates and lead to flights of capital.

Thus, instability seems to be harmful and, in certain instances, it appears to be more harmful to underdeveloped than to developed countries. In this regard, certain other considerations are also important. First, underdeveloped countries may be subject to greater instability than developed countries. Second, the export sector of underdeveloped countries is alleged to be of greater quantitative importance--relative to the rest of the economy--than the export sector of developed countries.[7] Finally, underdeveloped countries

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[6]To the extent that countries borrow to even out their capacity to import over booms and slumps, the problem is mitigated. Instability in the system may cause balance of payments difficulties which lead to import restrictions and declining world trade. However, the general solution may be to increase the liquidity of the system rather than to reduce instability. Since we are concerned with individual countries and the possibility of stabilizing their export earnings through export diversification, we need not be concerned with the system as a whole.

[7]Henry C. Wallich, "Underdeveloped Countries and the International Monetary Mechanism," Money, Trade, and Growth (New York: MacMillan, 1951), pp. 15-16. Higgins, op. cit., pp. 555-57.

are said to lack the techniques and facilities necessary for effective countercyclical monetary and fiscal policies.[8] In addition to providing measures of export instability, the main purpose of this chapter is to test the validity of the first hypothesis. The other hypotheses deserve consideration but are beyond the scope of this study.[9]

Causes of Instability

Any number of explanations could be offered to account for greater instability in underdeveloped countries. One possibility is, of course, that instability is related to export concentration. From casual observation, it appears that the exports of most underdeveloped countries are concentrated heavily in one or a few commodities while exports of the developed countries are more evenly distributed over a wide range of commodities; hence, fluctuations in a country's export earnings may be directly related to export concentration.

On an *a priori* basis the hypothesis is appealing since if a country's exports consist primarily of one good, any change in the export earnings of that good constitutes about the same change in the country's export earnings as a whole. The larger the number of goods exported by the country or the more evenly resources are divided among the goods produced for export--or, in short, the lower the degree of commodity concentration of a country's exports--the more

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[8] MacBean, *op. cit.*, p. 26. Higgins, *ibid.*, p. 557.

[9] MacBean argues the second hypothesis is not supported by the evidence. *Ibid.*, p. 58.

likely it is that changes in export earnings of individual exports will tend to offset each other, thereby stabilizing the country's export earnings as a whole. Of course, the ultimate source of international economic instability lies in those factors which affect demand and supply, not export concentration per se.

A second hypothesis which purports to explain the greater instability of export earnings in underdeveloped countries relates to the concentration of exports by geographical region. For example, if a country ships the bulk of its exports to one market, it would, of course, be highly sensitive to changes originating in that market whereas countries exporting to a wide variety of markets would not be particularly sensitive to changes in any one market. Under this hypothesis, the exports of underdeveloped countries would presumably be more highly concentrated in the geographical sense of the terms than exports of developed countries. This seems plausible as "most underdeveloped countries sell the greater part of their exports to the United States, the United Kingdom, or France."[10] If the hypothesis is correct, countries may wish to diversify their exports geographically.

A third hypothesis relates to the type of product which a country exports. Under this hypothesis, fluctuations in export earnings may result from the export of primary products as opposed to industrial products, since the exports of primary goods may fluctuate more violently than exports of industrial goods or, alternatively, the earning time paths of primary products may be more intercorrelated than those of industrial goods or industrial goods and primary

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[10] Ibid., p. 25.

products.

It has been generally accepted that the prices of primary products fluctuate more than prices of most manufactured goods.[11] A major reason for this lies in the short-run inelasticity of both supply and demand in relation to prices of primary products as compared with prices of manufactured goods.[12] On the supply side, there is a lack of short-term response to price changes because of the lengthy period required to bring about a significant increase or decrease in production in such major crops as coffee, cocoa, tea, and rubber. Moreover, even in cases where crops are planted and harvested within the same year, the decision to plant must take place many months before harvest time. In each case, a new level of prices can affect only future plantings.

In regard to most metals and minerals, the price-elasticity of output is likely to be low also.[13] In such industries, the major costs appear to be fixed and mines are likely to continue in operation so long as prices are covering variable costs. If variable costs are low, prices may have to fall considerably before operations cease. This tendency is reinforced by the fact that closure and subsequent reopening of many mining operations involve substantial costs. Conversely, when demand increases, output may increase

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[11] Ibid., p. 23. Also, Haberler, "Terms of Trade and Economic Development," op. cit., p. 289.

[12] Henry C. Wallich, "Stabilization of Proceeds from Raw Materials Exports," Economic Development for Latin America, op. cit., p. 349.

[13] MacBean, op. cit., p. 23. At this point, it is convenient to follow MacBean's convention of distinguishing between elasticity of output and elasticity of supply.

but many underground mines operate shift systems which limit their ability to vary labor inputs.

Hence, with both agricultural and mining products, it seems likely that the response of output to changes in prices should be low compared with output elasticities of manufactured goods.

> It is true that the supply elasticity of commodity exports may be greater than the output elasticity, because exporters' stocks, domestic demand, and even, in some cases, imports for re-export may respond to price incentives, but the additional flexibility from these is generally likely to be small. Few underdeveloped countries hold large stocks of exportable commodities; such stockpiling is often barred by technical difficulties and expense. Domestic consumption of exportable commodities is also, in general, minute. Importing for re-export in quantities great enough to affect elasticities significantly is rarely possible for underdeveloped countries.[14]

On the demand side, there appears to be evidence to indicate that response to changes in the prices of most food and raw materials is slight. The price elasticities of demand for food and beverages are commonly accepted as low.[15] Moreover, the demand for many raw materials is derived from the demand for final products and their costs form only a small part of the cost of such products. Under these circumstances, even a substantial change in the prices of raw materials will not be reflected in changes in the prices of the finished products.[16] Hence, the price elasticities of demand for raw materials are likely to be low.

If supply elasticities are low, fluctuations in demand resulting from changes in tastes, industrial activity, speculation, and the

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[14] Ibid.

[15] Ibid. Also, Wallich, "Stabilization . . .," op. cit., p. 349.

[16] MacBean, ibid.

like, will induce large fluctuations in export prices and earnings. If the price elasticities of demand are low, changes in supply caused by the weather or any other factor will result in sharp movements in export prices. Export earnings will also fluctuate but the change in export prices will tend to be offset somewhat by the change in export volume.

> Given the further factor that both supply and demand for most commodities are characteristically unstable, a high degree of price instability is inevitable. For both food and agricultural raw materials it is evident that output variations are very likely because of the normal hazards of farming.[17] In most underdeveloped countries these hazards are aggravated by lack of technique or resources for flood control and lack of pesticides and fertilizers which have helped to reduce output variability of agriculture in richer and more developed agricultural systems. In addition, some current changes in output may be related to price conditions of several years earlier. Tree crops such as coffee and cocoa exemplify this form of instability. While minerals are less subject to output variability, demand for them tends to be more closely related to cycles in industrial activity and speculation and can fluctuate widely.[18]

"In brief, low price elasticities combined with uncontrolled variability in demand, supply, or both provide an entirely credible explanation for sharp instability in both prices and proceeds of primary products."[19] Since, on the average, primary products form a greater proportion of exports in underdeveloped countries than they do in developed countries, this may account for greater instability of export earnings in the former. If this hypothesis is correct, the underdeveloped countries may wish to reduce their dependence on the export of primary products in order to stabilize their export earnings.

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[17] For an elaboration, see Higgins, op. cit., pp. 545-57.

[18] MacBean, op. cit., p. 25.

[19] Ibid.

The Empirical Evidence

As before, the study is concerned with only year-to-year fluctuations, and in calculating the instability indices, the period under consideration is from 1948 to 1964. As in the previous chapters, the years 1948 and 1964 were selected because 1948 appeared to be the first "normal" year following World War II and 1964 was the last year for which data were available for a large number of countries at the time the study was undertaken. Therefore, in calculating the average year-to-year fluctuations, the first and last changes are from 1948 and from 1963 to 1964, respectively. For some countries, data are not available for the entire period; the exceptions are noted in the tables. The methods used to calculate the instability indices are the same as in the previous chapter.

Data to calculate instability indices of export earnings are available for a large number of countries. I have selected seventy-eight which, in 1964, accounted for 94.5 per cent of total world exports excluding Cuba, Indonesia, and the Sino-Soviet area.[20] The remaining countries were excluded mainly because of lack of data or because territorial or other changes made the existing data inconsistent. Also, a few countries, such as South Korea, were excluded because they experienced severe disruptions to their economy and it seemed desirable to omit the most obvious cases.

Data, in United States dollars, for these countries are found in the Supplement to 1965/66 Issues of International Financial Statistics

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[20] Coppock included eighty-three countries; the main difference in coverage is that he included the Sino-Soviet area, Cuba, and Indonesia. Coppock, op. cit., pp. 158-60.

published by the International Monetary Fund.[21] The data refer to merchandise trade only because of the scarcity of data on trade in services; however, in most countries, merchandise trade is of overwhelming importance. Dollar figures are used since we are concerned in part with fluctuations in a country's ability to finance imports and this suggests use of a commonly accepted international currency.[22] Also, countries which have devalued (or revalued) their currencies show sharp discontinuities in their exports when recorded in domestic currencies which are not so apparent when recorded in dollars. Under such circumstances, dollar figures would provide a better measure of actual fluctuations of exports than the domestic currency. Hence, it seems desirable to use dollar figures in cases where exchange rates have varied. Finally, dollar figures are used because we wish to relate the instability indices to other indices which are based on dollar figures.

Even assuming that the basic data are reasonably accurate--which is not always the case--the use of dollar figures increases the possibility of errors since the official exchange rate used to convert exports to dollar terms may diverge considerably from the free exchange rate. Nevertheless, to measure fluctuations in a country's export earnings in relation to that country's economic development and its balance of payments, use of dollar figures seems to be the logical choice.

The results, shown in Table 19, indicate that export earnings

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[21] International Monetary Fund, International Financial Statistics, Supplement to 1965/66 Issues (Washington, 1965), pp. xvi-xix.

[22] In other contexts, use of domestic currencies may be more appropriate.

TABLE 19.--Three measures of instability of export earnings in a sample of seventy-eight countries, 1948-1964

Country	Average Year-to-Year Fluctuation of Export Earnings, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation of Export Earnings, Per Cent I_3	Normalized Standard Error of the Estimate I_4
Iran	23.4	20.3	.387
Liberia[a]	21.4	22.6	.204
Sudan	18.3	19.2	.207
Norway	18.1	9.4	.105
Japan	17.8	9.9	.158
Uruguay	17.2	17.1	.224
Israel[b]	16.8	19.0	.275
Yugoslavia	16.4	14.1	.236
Nicaragua	16.0	13.2	.201
Iraq[c]	15.6	10.6	.131
Malaya	15.5	15.2	.210
China: Taiwan	15.4	13.4	.327
Bolivia	15.3	15.6	.204
Mauritius	15.1	14.6	.175
Barbados	14.2	13.8	.154
Germany, West[c]	13.4	4.8	.057
Finland	13.1	12.6	.131
Iceland	13.0	12.3	.176
Hong Kong	12.9	12.3	.216
Argentina	12.9	12.8	.204
Guadeloupe	12.7	12.3	.109
Panama	12.5	11.6	.242
Pakistan	12.5	13.2	.224
Turkey	12.4	11.8	.142
Dominican Republic	12.4	12.2	.104
Ethiopia	12.4	12.7	.134
Tanzania	12.4	11.4	.136
Cameroon[d]	12.3	10.9	.118
Austria	12.0	5.5	.050
Ecuador	12.0	12.5	.118
Thailand	11.9	10.6	.132
Italy	11.8	9.8	.195
Peru	11.8	10.1	.172
Philippines	11.8	10.9	.116
Australia	11.7	11.2	.131
Cyprus	11.5	10.8	.136
Angola	11.5	9.9	.132
Reunion	11.4	11.0	.126
Burma	11.3	11.2	.120

TABLE 19--Continued

Country	Average Year-to-Year Fluctuation of Export Earnings, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation of Export Earnings, Per Cent I_3	Normalized Standard Error of the Estimate I_4
Greece	11.3	7.3	.106
Uganda[e]	11.2	11.8	.160
Martinique	11.1	9.7	.127
Chile	11.0	11.0	.109
Tunisia	10.9	10.3	.153
Jamaica	10.7	10.9	.106
Kenya[e]	10.4	7.5	.102
France	10.4	7.5	.092
El Salvador	10.2	7.8	.119
United Arab Republic	10.1	10.1	.139
Netherlands	10.0	4.5	.077
Nigeria	10.0	8.9	.090
Portugal	10.0	9.3	.128
Costa Rica	9.9	8.5	.103
Brazil	9.8	9.5	.121
Sweden	9.8	8.3	.109
Colombia	9.5	9.2	.197
Honduras	9.5	9.7	.109
Ghana	9.5	9.1	.094
Belgium-Luxembourg	9.4	9.9	.116
Mexico	9.1	7.7	.098
India	9.1	8.6	.114
United States	9.0	9.0	.089
Ireland	8.9	7.2	.104
Trinidad	8.4	6.7	.107
Saudi Arabia[c]	8.3	4.9	.074
Denmark	8.2	4.5	.079
Mozambique	8.1	8.3	.101
New Zealand	8.0	7.6	.083
Ceylon	7.7	7.4	.077
Guatemala	7.6	6.6	.106
Spain	7.5	8.0	.156
N. Antilles	7.5	7.3	.177
South Africa	7.4	6.2	.066
Switzerland	7.3	4.4	.081
Canada[e]	7.0	5.8	.076
Morocco	6.7	5.8	.080

TABLE 19--Continued

Country	Average Year-to-Year Fluctuation of Export Earnings, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation of Export Earnings, Per Cent I_3	Normalized Standard Error of the Estimate I_4
Venezuela	6.5	5.0	.150
United Kingdom	5.4	4.0	.043

[a]1948-1963.

[b]1948 estimated.

[c]1950-1964.

[d]Data refer to East Cameroon only.

[e]1949-1964.

fluctuated considerably during the period under consideration.[23] However, the results vary somewhat depending on the method used to calculate the indices. If the United Nations method is used, the mean (unweighted arithmetic average) of the average year-to-year fluctuations, I_2, of export earnings is 11.6 per cent while if the trend-corrected method is employed, the mean of the average year-to year fluctuations, I_3, is 10.2 per cent. As an additional measure of instability, the Table contains the normalized standard error of the estimate, I_4, for each of the countries; however, since this index is largely a measure of the variation of the series as a whole around the trend line rather than year-to-year fluctuations, the discussion in this chapter is limited to I_2 and I_3.[24]

Since we have two measures of the average annual fluctuation of export earnings, which measure is relevant when the two diverge? Generally speaking, the two indices will diverge if there is a strong upward trend in the export earnings of the country in question. Typically, the developed countries have experienced strong upward trends in their export earnings; hence, use of the United Nations method would be somewhat misleading since it provides only a crude correction for such trends. Moreover, as the developed countries are

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[23] However, there is considerable diversity of experience. The I_2 series ranges from a high of 23.4 per cent (Iran) to a low of 5.4 per cent (United Kingdom) while the I_3 series ranges from 22.6 per cent (Liberia) to 4.0 per cent (United Kingdom). The standard deviations for the two series are 3.4 and 3.7 per cent, respectively. The simple correlation coefficient between the two series is .84.

[24] The mean of the normalized standard error of the estimates is .139 or, in percentage terms, 13.9 per cent. The standard deviation is .062 or, in percentage terms, 6.2 per cent. The simple correlation coefficient between I_2 and I_4 is .68 while the coefficient between I_3 and I_4 is .76.

assured, more or less, of a continuing upward trend in their export earnings, they are likely to be concerned only with fluctuations in their export earnings about that trend, thus, the relevant measure is the trend-corrected index, I_3. Similarly, some underdeveloped countries have experienced strong upward trends in their export earnings; therefore, the relevant measure for these countries is the trend-corrected index, I_3. However, in either case, the United Nations method may provide a better index of instability if the trend cannot easily be approximately by a straight line.[25] For those countries which did not experience a trend in their export earnings, either measure would presumably be acceptable.

In regard to earlier studies, Coppock found considerably more instability in export earnings than indicated above. Using the log variance method, he found the mean of the average year-to-year fluctuation of export earnings to be 21.8 per cent. As noted earlier, the countries under consideration are not the same in both studies. However, the discrepancy remains even if the means are obtained for the countries common to both samples. The log variance mean for the fifty-nine countries is 21.3 per cent while the means for I_2 and I_3 are 11.7 and 10.2 per cent, respectively, for the same countries.

The difference in results could be attributed to a number of

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[25] To compute an index of instability, MacBean uses the average percentage deviation of export earnings from their five-year moving average (centered on the mid-year). He believes this is a better measure of instability when no simple linear trend exists. Since I obtained "good" fits assuming a linear trend, I did not use MacBean's method. The latter has the disadvantage of losing two years from the beginning and end of the time series and is also less convenient for computer calculation. MacBean, op. cit., p. 34.

factors, including, of course, differences in the method of computation.[26] However, the main reason why Coppock found more instability in export earnings than reported here is because the period he studied was largely dominated by the recovery from World War II and the Korean War. As noted earlier, Coppock's study covers the 1946-1958 period while the present study spans the 1948-1964 period. Since many countries were recovering from the War in 1946, 1947, and 1948, their export earnings increased substantially during those years, and if 1946 and 1947 are included in the computation of the indices, it is obvious that the indices will show greater instability than if the two years are omitted. The Korean War may also have unduly influenced Coppock's indices because of the short time span under consideration.[27]

To test whether export earnings fluctuate more in underdeveloped than in developed countries, the seventy-eight countries are divided into two groups using the same classification scheme as in Chapter II.[28] As such, the scheme is subject to the shortcomings previously listed.

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[26]In Coppock's study, export earnings are often recorded in the domestic currency of the country under consideration while all export earning data in this study are in the U. S. dollars. This difference probably adds to the discrepancy.

[27]It may be, of course, that the degree of international economic instability is declining. Any number of reasons could be offered for such a decline.

[28]The following countries are considered developed throughout the remainder of the study: Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, W. Germany, Iceland, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom, and the United States. The following countries, not considered in Chapter II, are classified as underdeveloped: Angola, Barbados, Bolivia, Burma, Dominican Republic, Guadeloupe, Iran, Liberia, Libya, Martinique, Mexico, Mozambique, Reunion, Saudi Arabia, Trinidad and Tobago, Tunisia, United Arab Republic, and Uruguay.

The means of the average year-to-year fluctuation of export earnings of the twenty countries classified as developed are 11.0 and 8.4 per cent, respectively, for I_2 and I_3 while the corresponding means for the fifty-eight countries categorized as underdeveloped are 11.7 and 10.9. If the I_2 means are considered, the difference is only seven-tenths of a per cent which is not significant at the .10 level.[29] However, if the trend-corrected means are considered, the difference is 2.5 percentage points which is significant at the .01 level.

The difference between the I_2 and I_3 series is accounted for by the strong upward trend in export earnings for the developed countries during the post-war period. Germany, for example, exhibited a strong upward trend in its export earnings. Her average year-to-year fluctuation, I_2, of export earnings, is 13.4 per cent; however, when corrected for trend, the average fluctuation, I_3, is only 4.8 per cent. As a rule, the countries classified as underdeveloped did not show such a strong upward trend in their export earnings.

Since the developed countries, for the most part, can count on a continued upward trend in their export earnings, the instability about this trend, measured by I_3, is more important than the average year-to-year fluctuation, I_2, which is not corrected for trend. In the case of the underdeveloped countries, either I_2 or I_3 is considerably greater than I_3 for the developed countries. Hence, export earnings tend to fluctuate more in underdeveloped countries than in

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[29] Based on a one-tailed test. The tests which follow are one-tailed tests unless otherwise stated.

developed countries with, of course, some exceptions.[30]

As an additional test, the countries were ranked (in descending order) by per capita gross domestic product (consumption) and by fluctuations in export earnings. The Spearman rank correlation coefficient between the 1958 per capita gross domestic product series and the I_2 series is -.195. Based on a sample of seventy-four countries, the coefficient is barely significant at the .05 level. On the other hand, if the I_3 series is considered, the coefficient is -.344 which is highly significant. Approximately the same results follow if 1963 per capita gross domestic product and 1960 per capita consumption are considered. Based on a sample of fifty-seven countries, the coefficient between the per capita gross domestic product series and the I_2 series is -.210 which is significant at the .10 level but not at the .05 level. When the I_3 series is considered, the coefficient increases to -.415 which is significant at the .01 level. The coefficient between the per capita consumption series and the I_2 series is -.264. Based on a sample of fifty-six countries, the coefficient is significant at the .05 level. However, if the I_3 series is considered, the coefficient is -.460 which is, once again, significant at the .01 level.

Sources of Export Earning Instability

Fluctuations in export earnings may be due to fluctuations in

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[30]Alasdair I. MacBean reached the same conclusion on the basis of Coppock's data. MacBean, "Causes of Excessive Fluctuations in Export Proceeds of Underdeveloped Countries," Oxford University Institute of Economics and Statistics Bulletin, XXVI (November, 1964), 325. See also, MacBean, op. cit., p. 36.

export prices, export volume, or some combination of the two. Therefore, it is of some interest to countries considering various policies to stabilize export earnings to know the major source of instability. Unfortunately, no conclusive results can be reached in regard to this question partly because of the nature of the data. In order to compute instability indices for export prices and volume, it is necessary to use the export price and volume indices as reported in various publications of the United Nations and the International Monetary Fund. As such, the indices are subject to all the shortcomings listed above. The most important shortcoming, however, is that the price and volume indices are largely based on domestic currencies while export earnings are measured in U. S. dollars; hence, the instability indices for export prices, volume, and export earnings are not really comparable. For this reason, we can only make some tentative suggestions about the stability of export prices and volume in regard to export earnings.

Data in the form of price and volume indices are available to calculate instability indices for export price and volume for forty-five countries.[31] In 1964, these countries accounted for 86.2 per cent of world exports, where the world total excludes Cuba, Indonesia, and the Sino-Soviet area.

Export price instability was discussed in the previous chapter; however, the instability index, I_2, is included in Table 20 for convenience.[32] The export volume instability indices, I_2 and I_3, are

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[31]The sample is limited by the availability of export price and volume data.

[32]Since the I_2 and I_3 indices are almost identical, only I_2 is presented.

TABLE 20.--Instability of export prices and volume in a sample of forty-five countries, 1948-1964

Country	Average Year-to-Year Fluctuation of Export Prices, Per Cent I_2	Average Year-to-Year Fluctuation of Export Volume, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation of Export Volume, Per Cent I_3
Argentina[a]	6.2	13.1	12.4
Australia	9.4	8.4	7.7
Austria	6.9	12.2	6.7
Belgium-Luxembourg	5.2	8.6	5.0
Brazil	9.2	9.9	10.0
Canada	2.6	5.6	5.0
Ceylon	7.2	4.1	3.5
Chile	8.2	7.0	6.7
Colombia	8.2	6.7	6.9
Costa Rica	7.8	9.1	9.3
Cyprus[b]	8.0	5.9	5.4
Denmark	2.9	9.4	3.8
Ecuador[c]	5.3	10.2	8.5
Finland	8.8	9.5	6.9
France	5.8	12.2	7.8
Germany, West[b]	2.9	11.2	6.5
Ghana[d]	15.7	10.2	9.5
Greece[a]	7.5	8.3	5.2
Guatemala[e]	10.2	6.6	6.1
Honduras	6.0	7.5	7.4
Iceland[c]	1.6	11.0	9.7
India[b]	6.1	6.1	5.6
Ireland	3.3	9.3	7.7
Israel[b]	3.9	15.0	13.9
Italy	4.7	12.5	9.2
Jamaica[d]	5.1	8.6	8.0
Japan	5.3	12.2	10.0
Mauritius[d]	6.2	13.2	13.0
Netherlands	3.3	11.1	4.3
New Zealand	8.6	5.7	5.3
Nicaragua	9.2	15.1	14.7
Nigeria[d]	7.3	7.1	6.2
Norway	4.6	8.0	6.4
Panama	5.8	11.2	11.6
Peru[c]	7.3	8.4	6.7
Philippines	7.6	9.0	6.4
Portugal	4.7	8.6	7.0

TABLE 20--Continued

Country	Average Year-to-Year Fluctuation of Export Prices, Per Cent I_2	Average Year-to-Year Fluctuation of Export Volume, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation of Export Volume, Per Cent I_3
South Africa	5.7	7.1	4.4
Spain	5.0	9.4	10.5
Sweden	5.4	8.5	4.4
Switzerland	2.4	7.5	4.4
United Kingdom	3.0	4.6	3.4
United States	2.3	7.4	3.4
Venezuela[b]	1.9	6.2	3.7
Yugoslavia[d]	7.4	13.3	13.4

[a]1951-1964.

[b]1950-1964.

[c]1950-1963.

[d]1948-1963.

[e]1948-1962.

also presented in Table 20.[33]

The results indicate that, regardless of the measure employed, export volume appears to fluctuate more than export prices.[34] The mean of the average year-to-year fluctuation, I_2, of export prices is 6.0 per cent while the means of the average annual fluctuation of export volume are 9.2 and 7.5 per cent, respectively, for I_2 and I_3. This implies that the main source of instability of export earnings is export volume.[35] This is the conclusion reached by the United Nations.[36]

Although export volume appears to fluctuate more than export prices, we cannot conclude with certainty that approaches designed to stabilize export volume will be more successful in stabilizing export

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[33]The simple correlation coefficient between I_2 and I_3 is .80. Fluctuations in export volume range from 15.1 per cent (Nicaragua) to 4.1 per cent (Ceylon) in the I_2 series and 14.7 per cent (Nicaragua) to 3.4 per cent (United Kingdom) in the I_3 series. The standard deviations for the two series are 2.7 and 2.6 per cent, respectively.

[34]This is consistent with results obtained by MacBean and the United Nations. MacBean, Export Instability . . ., op. cit., p. 46. United Nations, Instability in Export Markets of Underdeveloped Countries (New York, 1952).

[35]While, on the average, fluctuations in export volume tend to exceed fluctuations in export prices, there are a number of exceptions when each country is considered individually. If the I_2 series of export prices and volume are considered, fluctuations in export prices exceeded those of export volume in nine (or twenty per cent) of the forty-five countries. If the I_2 series of export prices is compared with the I_3 series of export volume, it is apparent that fluctuations in export prices exceeded those in export volume in eighteen (or forty per cent) of the forty-five countries. Since the trend-corrected series is the relevant index in most instances, it is evident that there are many exceptions to the rule.

[36]United Nations, Instability in Export Markets . . ., op. cit., p. 57. However, Wallich has argued that price fluctuations may be the main source of export earning instability. Wallich, "Stabilization . . .," op. cit., pp. 345-46.

earnings than those designed to stabilize export prices. It may very well be that fluctuations in export volume and export earnings would be minimized by stabilizing export prices.[37] To determine whether a country or group of countries should prusue a policy designed to stabilize export volume or export prices is beyond the scope of this study. We are studying the stability of export earnings in regard to one solution--export diversification. By diversifying exports, it is hoped that fluctuations in export prices (and volume) of individual products will cancel out to provide for greater stability of export earnings.

As given above, the means of the average annual fluctuation in export earnings are 11.6 and 10.2 per cent, respectively, for I_2 and I_3. If export prices fluctuate 6.0 per cent annually and export volume fluctuates 9.2 or 7.5 per cent depending on whether I_2 or I_3 is used as a measure, it appears that some of the instability in export prices and volume cancel out to provide for greater stability in export earnings. This implies that fluctuations in export earnings are due primarily to fluctuations in supply rather than demand.[38]

If the forty-five countries are divided into developed and underdeveloped groups, export prices fluctuate 4.6 per cent in the former and 7.2 per cent in the latter. As we have seen, the difference, 2.6 percentage points, is significant at the .01 level. The means of the average year-to-year fluctuation of export volume of the developed

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[37]For example, if current changes in volume are related to price changes in previous periods, stabilization of prices may be the best approach.

[38]Some of the instability may, of course, be due to fluctuations in demand.

countries are 9.5 and 6.8 per cent, respectively, for I_2 and I_3. For the underdeveloped countries, the corresponding means are 8.9 and 8.1 per cent. If the I_2 means are considered, the difference is not significant at the .10 level using a one-tailed test.[39] However, if the I_3 measure is considered, the difference is significant at the same level.[40] As before, the relevant measure involves the I_3 index. Hence, we conclude that both export prices and volume fluctuate more in underdeveloped countries than in developed countries.

If fluctuations in export earnings, prices, and volume of the developed and underdeveloped countries are compared, the results show greater instability in the underdeveloped countries but shed little light on the source of instability in export earnings. For the developed countries, the percentages are 8.4 for export earnings, 4.6 for export prices, and 6.8 for volume.[41] For the underdeveloped countries, the corresponding percentages are 10.9, 7.1, and 8.1.

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[39] Spearman rank correlation coefficients compiled between the I_2 series and series based on per capita gross domestic product in 1958, per capita gross domestic product in 1963, and per capita consumption in 1960 were all found to be insignificant at the .05 level using a one-tailed test.

[40] If the countries are ranked by per capita gross domestic product, the resulting rank correlation coefficients generally support the hypothesized relationship. The Spearman rank correlation coefficient between the I_3 series and the series based on per capita gross domestic product in 1958 is -.354. Based on a sample of forty-four countries, the coefficient is significant at the .05 level using a one-tailed test. The same result is obtained if the countries are ranked by per capita consumption in 1960. However, if the countries are ranked by per capita gross domestic product in 1963, the rank correlation coefficient is only -.222 which is not significant. However, the sample size has declined from forty-four to thirty-eight and this may account for the difference.

[41] Because of the trend factor, the trend-corrected measure, I_3, is used in regard to export earnings and volume.

Summary

Fluctuations in export earnings affect the domestic economy in at least three important ways. Fluctuations in export earnings may generate fluctuations in national income and employment. They may discourage investment in the export sector and result in a misallocation of resources. Finally, fluctuations in export earnings may cause balance of payments problems. As a consequence, instability may be harmful.[42]

In this regard, it was argued that underdeveloped countries may be subject to greater instability than the developed countries because their exports are more highly concentrated--in both the commodity and geographical sense of the term--or because their exports consist primarily of agricultural products which are inherently unstable. The main conclusions in regard to international instability are summarized below.

In the case of export earnings, the means of the average year-to-year fluctuations (for a sample of seventy-eight countries) are 11.6 and 10.2 per cent, respectively, for I_2 and I_3.[43] Apparently fluctuations in export volume account for most of the instability since export volume (9.2 and 7.5 per cent, respectively, for I_2 and I_3) fluctuate more than export prices (6.0 per cent).[44]

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[42] As we have seen, MacBean has recently questioned the assumption that instability is harmful. In addition, see Sydney Caine, "Instability of Primary Product Prices--a Protest and a Proposal," Economic Journal (September, 1954), pp. 610-14 and Wallich, "Stabilization . . .," op. cit., pp. 347-48.

[43] For a summary of the results, including the commodity and income terms of trade, see Table 21.

[44] These percentages are based on a sample of forty-five countries.

TABLE 21.--A summary of instability in international trade, 1948-1964

	Total Number of Countries	Mean of the Average Annual Fluctuation, Per Cent I_2	Mean of the Trend Corrected Average Annual Fluctuation, Per Cent I_3	Developed Countries			Underdeveloped Countries		
				Number of Countries	I_2	I_3	Number of Countries	I_2	I_3
Export Earnings	78	11.6	10.2	20	11.0	8.4	58	11.7	10.9
Export Prices	45	6.0	5.9	20	4.6	4.5	25	7.2	7.1
Import Prices	45	4.5	4.4	20	5.0	4.9	25	4.1	4.1
Export Volume	45	9.2	7.5	20	9.5	6.7	25	8.9	8.1
Import Volume	41	10.4	8.8	20	10.1	8.0	21	10.7	9.6
Commodity Terms of Trade	45	5.8	5.7	20	4.1	4.2	25	7.1	7.0
Income Terms of Trade	45	10.5	8.9	20	10.4	7.5	25	10.6	10.0

By dividing the seventy-eight countries into groups it was found that the export earnings of underdeveloped countries (11.7 and 10.9 per cent, respectively, for I_2 and I_3) fluctuated more than the earnings of developed countries (11.0 and 8.4 per cent, respectively, for I_2 and I_3), especially if the trend-corrected measure, I_3, is considered. Differences in the relative stability of export earnings between the developed and underdeveloped countries may be attributable to export concentration or to differences in the composition of exports.

After dividing the forty-five countries for which data are available into two groups, it was found that export prices tended to fluctuate more in underdeveloped countries (7.2 per cent) than in developed countries (4.6 per cent). Similarly, export volume appeared to fluctuate more in underdeveloped countries (8.9 and 8.1 per cent, respectively, for I_2 and I_3) than in developed countries (9.5 and 6.7 per cent, respectively, for I_2 and I_3), but only if the data are corrected for trend.[45] These results are also consistent with the hypotheses offered above.

As we saw above, export volume appeared to fluctuate more than export prices. This is true also of import volume and import prices. The means of the average year-to-year fluctuations of import volume for a sample of forty-one countries are 10.4 and 8.8 per cent, respectively, for I_2 and I_3 as compared to 4.5 per cent for import prices (based on a sample of forty-five countries).

As in the case of export volume, import volume evidently

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[45] This case illustrates clearly how the relative degree of instability between the developed and underdeveloped countries is affected by the choice of measure.

fluctuated more in underdeveloped countries (10.7 and 9.6 per cent, respectively, for I_2 and I_3) than developed countries (10.1 and 8.0 per cent, respectively, for I_2 and I_3). However, this is not the case in considering fluctuations in import prices; the import prices of the developed countries (5.0 per cent) appeared to fluctuate more than import prices of the underdeveloped countries (4.1 per cent). Because of the small difference between the two means--less than nine-tenths of a percentage point--not much importance is attached to the result. However, this result is not necessarily inconsistent with the hypotheses offered above because there is much less variation among countries in regard to the degree of commodity or geographic concentration of imports than in regard to the degree of commodity or geographic concentration of exports.[46] On this basis, one would expect less variability between countries in regard to import price stability. Similarly, if countries "generalize" in imports, they are likely to import both agricultural and non-agricultural products; hence, there may be less variability between countries in regard to import price fluctuations on this basis.[47]

In regard to the commodity terms of trade, part of the fluctuation of export (6.0 per cent) and import prices (4.5 per cent) apparently cancels out to provide for greater stability in the commodity terms of trade (5.8 per cent). Since the commodity terms of trade are calculated by dividing the export price index by the import

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[46] Michaely, op. cit., pp. 13, 21.

[47] Also, the result can be explained if one assumes that fluctuations in the demand for imports on the part of developed countries affect world prices more than fluctuations in the demand for imports by the underdeveloped countries.

price index, data to calculate instability indices of the commodity terms of trade are available for the same forty-five countries discussed under the section on export and import prices. The commodity terms of trade fluctuated more in underdeveloped countries (7.1 per cent) than in developed countries (4.1 per cent) by three percentage points.

The income terms of trade fluctuated more than the commodity terms of trade. The means of the average year-to-year fluctuation of the income terms of trade for the forty-five countries just discussed are 10.5 and 8.9 per cent, respectively, for I_2 and I_3. Therefore, it can be concluded that fluctuations in export volume tend to accentuate fluctuations in the commodity terms of trade, thus providing for greater instability in the income terms of trade. Also, it appears that the income terms of trade fluctuate more in underdeveloped countries (10.6 and 10.0 per cent, respectively, for I_2 and I_3) than in developed countries (10.4 and 7.5 per cent for the corresponding percentages), particularly if the trend-corrected series, I_3, is used. However, there are a number of important exceptions.

A number of conclusions can be drawn from this chapter. First, the recorded degree of international economic instability depends, to some extent, upon the method of measurement. In almost all cases, use of the United Nations method produced results showing greater instability in international trade than if the trend-corrected method were used. Use of Michaely's method would have resulted in measures showing even greater instability. Where the two measures differed considerably, the relevant comparison involved the trend-corrected series.

Second, fluctuations in export earnings are considerable for

some countries; such instability may be harmful.

Third, in all but one case--import prices--fluctuations in international trade tended to be greater for underdeveloped countries than for developed countries. If instability is harmful, this means the problem is worse for underdeveloped countries than developed countries.

Any number of explanations could be offered to explain the greater instability for underdeveloped countries. However, the results obtained above are consistent with the three hypotheses offered at the beginning of the chapter. Hence, they warrant further investigation. Before proceeding, however, let us note one important point.

We have found that the stability of export earnings varied considerably from country to country.[48] Since the export earnings of some countries--such as the United Kingdom--appear quite stable, these countries may not be interested in export diversification (or any other scheme) to promote greater export earning stability.[49] For countries--such as Iran--which have experienced considerable instability in their export earnings, such policies may be quite attractive.

However, the degree of export earning instability is only one factor which a country must consider before deciding whether to pursue a program of export diversification or, for that matter, any

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[48]We will discuss the International Textile Agreement and other obstructions to free trade below.

[49]These countries may be more interested in increasing their export earnings. Since their export earnings are already relatively stable, the countries may experience an increase in instability if they export commodities which are relatively unstable.

program designed to reduce export earning instability. For example, it is possible that stability may be purchased only by a reduction in the present value of future export earnings. In the limiting case a country could reduce its instability to zero by eliminating exports completely. Hence, any domestic policy designed to stabilize export earnings must be examined to determine its impact on the present value of future export earnings as well as the stability of those earnings. It may be that the present value of the future export earning stream for a particular country will be maximized with the present degree of instability. Hence, that country would not wish to embark on a program of export diversification; instead, it may wish to concentrate on alleviating the effects of instability. Therefore, whether any particular country wishes to embark on a program of export diversification depends on that country's individual situation. No doubt some countries find the instability problem to be of little importance; nevertheless, other countries are undoubtedly interested in stabilizing their export earnings in order to prevent recurring balance of payments problems and to facilitate their economic development. Therefore, it is important that we determine whether diversification of exports leads to greater stability in export earnings, and whether there seems to be "some" degree of diversification necessary to achieve a given level of instability.

CHAPTER V

EXPORT CONCENTRATION AND FLUCTUATIONS IN EXPORT EARNINGS

Since we are testing whether instability of export earnings is related to the concentration of exports, we need some measure of export concentration. In regard to commodity concentration, this measure should show a smaller number if a country divides its resources more evenly among existing exports, or, given existing exports, produces an additional product for export, or some combination. In this sense, diversification of a country's exports can be considered as a program designed to reduce its commodity concentration. In regard to geographic concentration, the measure should show a smaller value if a country divides its exports more evenly among its trading partners, or, given the existing pattern of trade, produces exports which are sent to new markets, or some combination. In this sense, diversification of a country's exports can be considered as a program designed to reduce its dependence on individual markets.[1]

One commonly used measure is the so-called Hirschman index, written $C = \sqrt{\Sigma(X_i/X)^2}$, where C denotes the concentration index or ratio, X_i the value of exports of commodity i in some specified year, and X the value of all exports in the same year.[2] Thus, for example,

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[1]The discussion below is in terms of commodity concentration but the same remarks apply to geographic concentration.

[2]Albert C. Hirschman, "The Paternity of an Index," American Economic Review, LIV (September, 1964), 761-62. Hirschman's bibliography

if a country exports only a single commodity the concentration index, C, is numerically equal to one.[3] If a country exports additional products, the concentration ratio will be reduced.[4] Similarly, if a country producing a given number of products for export divides its resources more evenly among those products, the ratio will be reduced.[5] The concentration ratio will also be reduced if an additional product is produced for export and resources are re-allocated among existing exports provided that:

$$0 < \Sigma d_i \leq P_i' \leq P_i \leq 1, \text{ for all } i,$$

where P_i equals the proportion of the economy's resources initially devoted to the production for export of commodity i, P_i' equals the proportion after a new commodity has been added, and d_i equals $P_i - P_i'$.[6]

To make the last condition more explicit, let's consider two cases. In each, assume the country under consideration initially exports four commodities and that each commodity earns twenty-five dollars in foreign exchange. According to our formula, the

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provides references to use of the index in international trade. The standard reference to economic concentration is: Gideon Rosenbluth, "Measures of Concentration," Business Concentration and Price Policy (Princeton: Princeton University Press, 1955), pp. 57-94.

[3]Suppose Country Y exports only one commodity. In this case, $X_1 = X$; hence, C is equal to one.

[4]Suppose, for example, Country Y exports two commodities and commodity A earns twenty-five dollars in foreign exchange and commodity B earns seventy-five dollars. In this case, C is equal to .791.

[5]Suppose Country Y divides its resources more evenly among its two export commodities. Assume, as a result, the export earnings of A increases from twenty-five dollars to fifty dollars and the earnings of B falls from seventy-five to fifty dollars. In this instance, C declines from .791 to .707.

[6]Massell, op. cit., p. 52.

concentration ratio is .5. Assume, however, that during the succeeding year the country exports a fifth product that earns, like the other four, twenty-five dollars in foreign exchange; hence, total exports amount to 125 dollars. With the addition of the fifth commodity with the value of other exports unchanged, the concentration ratio is reduced to .447. In this case, the addition of another commodity for export has reduced the concentration ratio. Note that the condition $0 < \Sigma\, d_i \leq P_i' \leq P_i \leq 1$, for all $\underline{i}$ has been fulfilled since $\underline{P_i}$ (the proportion of the economy's resources initially devoted to the production for export of commodity $\underline{i}$) equals one-fourth, $\underline{P_i}'$ (the proportion after a new commodity has been added) equals one-fifth and the sum of the differences between P_i and P_i' equals one-fifth.

In the second case, however, suppose that with the addition of an extra commodity for export, the export earnings of the original four commodities are changed from twenty-five dollars each to ten, twenty, twenty, and fifty dollars, respectively. With the addition of the fifth commodity with export earnings of twenty-five dollars and the change in export earnings of the four original commodities, the concentration ratio is now .508. In this case, the addition of a new commodity for export fails to result in a reduction in the concentration ratio because the change is more than offset by an increase in concentration of the original commodities produced for export. In other words, our condition

$$0 < \Sigma\, d_i \leq P_i' \leq P_i \leq 1, \text{ for all } i$$

has not been fulfilled since P_i' exceeds P_i for one of the

commodities. Thus, an additional commodity produced for export will reduce the concentration ratio only if the change is not offset, or more than offset, by an increase in concentration of existing exports.

Since the concentration ratio depends, in part, upon the number of commodities a country exports, the index is sensitive to the commodity classification scheme employed. In general, the more finely the commodities are divided, the lower the concentration ratio. This creates some problems; for example, a country whose exports are highly diversified but fall within a single large group may have a higher concentration ratio than another country which is virtually a one-crop economy but produces some products in a different group. Similarly, the classification scheme may be inappropriate. For example, if industrial products are classified more finely than agricultural commodities, primary producing countries will be biased toward greater concentration. For these reasons, it seems desirable to use several classification schemes.

The United Nations published commodity trade statistics at a number of levels of aggregation. The most general consists of ten sections (the one-digit code) which is divided into 56 divisions (the two-digit code), 177 groups (the three-digit code), and 1312 items (the five-digit code).[7] I have used the one- and three-digit statistics for 1963 as published in the United Nations' Commodity Trade Statistics, Series D. Although it is desirable to disaggregate further, the necessary data are not available for a large number of countries. For convenience, the Hirschman index of commodity

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[7]United Nations, Standard International Trade Classification, Revised (New York, 1961), p. vi.

concentration based on the one-digit classification scheme will be referred to as C_1 and the same index based on the three-digit scheme will be referred to as C_2.

Previous studies were based on statistics published in the United Nations', Yearbook of International Trade Statistics; however, in recent years, the Yearbook has omitted many commodities at the three-digit level which are included in the Commodity Trade Statistics series. Hence, the latter was used. The data are in U. S. dollars rather than in the currencies of the countries under consideration; however, the concentration indexes are pure numbers. The year 1963 was selected because it was the last year for which Commodity Trade Statistics data were available when the study was made.

While the Hirschman index is apparently the best available, I have used one additional measure of export concentration.[8] This measure, denoted by C_3, is simply the share of total exports accounted for by the three leading exports of the country under consideration. According to this index, the larger (smaller) the share, the more (less) concentrated a particular country's exports are.

The disadvantages of such an index are obvious. The three leading exports may be equal in value or differ considerably; yet the index will show the same degree of concentration. The remaining commodities may be many or few, equal in value or quite unequal, and the index would show the same degree of concentration. Moreover, to decide on any certain number of commodities such as three is

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[8]Linda Lee Graham, "An Analysis of an Index of International Trade Concentration," (unpublished master's thesis, Cklahoma State University, 1965), p. 49.

arbitrary. Nevertheless, the measure has been widely used.[9] I have included the index because it is relatively easy to calculate and it is desirable to compare the results obtained by using C_1 and C_2 with those obtained by using C_3. However, C_3 has been calculated using only the three-digit data.

The results for a sample of thirty-three countries are shown in Table 22.[10] The values of C_2 appear in Column 2 of the Table and range from .961 (N. Antilles) to .143 (France). As expected, the countries classified as underdeveloped, with some exceptions, tend to have higher ratios than those classified as developed. If the countries are ranked by 1963 per capita gross domestic product, the Spearman rank correlation coefficient between this series and the C_2 series is -.402. Based on a sample of thirty-one countries, the coefficient is significant at the .05 level using a one-tailed test. Hence, there appears to be a significant (inverse) relationship between the stage of a country's development and its concentration of exports by commodity.[11] The values of C_1 appear in Column 3 and tend to be appreciably larger than C_2 because of the difference in aggregation. The C_1 values range from .985 (N. Antilles) to .413 (Netherlands). The values of C_3 appear in Column 4 and range from .990

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[9] For example, Coppock, op. cit., p. 103.

[10] In 1963, the thirty-three countries accounted for 79.8 per cent of world exports and 80.9 per cent of world imports. In each case, the world total excludes Cuba, Indonesia, and the Sino-Soviet area. The sample includes thirteen countries categorized as underdeveloped in the earlier chapters.

[11] This is also the case if the countries are ranked by C_1 or by C_3. If ranked by C_1, the Spearman rank correlation coefficient is -.400. If ranked by C_3, the coefficient is -.382. Both are significant at the .05 level using a one-tailed test. In each case, the sample consists of thirty-one countries.

TABLE 22.--Three measures of export concentration by commodity in a sample of thirty-three countries, 1963

Country	C_2	C_1	C_3
N. Antilles	.961	.985	.990
Ghana	.761	.797	.888
Iceland	.692	.849	.907
Sudan	.637	.898	.872
Malaya	.573	.676	.809
New Zealand	.471	.680	.765
Greece	.454	.540	.648
Pakistan	.437	.672	.639
Nigeria	.424	.600	.613
Australia	.419	.589	.554
Israel	.415	.609	.603
Hong Kong	.400	.667	.559
Finland	.389	.584	.626
China: Taiwan	.358	.618	.434
Turkey	.352	.547	.569
Ireland	.331	.660	.419
Spain	.241	.458	.320
Sweden	.226	.521	.297
Switzerland	.220	.475	.282
Canada	.213	.470	.294
Portugal	.212	.487	.263
Norway	.211	.472	.271
Denmark	.201	.561	.266
W. Germany	.196	.544	.263
United Kingdom	.180	.531	.217
Italy	.176	.443	.204
Japan	.176	.533	.186
Yugoslavia	.169	.426	.211
Austria	.166	.512	.202
Belgium-Luxembourg	.160	.551	.174
United States	.153	.450	.176
Netherlands	.148	.413	.161
France	.143	.434	.164

(N. Antilles) to .161 (Netherlands). The simple correlation coefficient between C_1 and C_2 is .92 while the correlation coefficient between C_1 and C_3 is .88. The simple correlation coefficient between C_2 and C_3 is .96.

To test whether export concentration has declined over time, I have presented in Table 23 concentration ratios obtained by Michaely (based on 1954 exports) and by Massell (based on 1959 exports) as well as my own (based on 1963 exports).[12] In order to compare the results, I have included in the Table only concentration ratios of countries common to at least two of the studies. A summary of the results is found in Table 24.

From 1954 to 1959, nineteen of the twenty-seven countries in which comparison is possible experienced a reduction in export concentration while the other eight showed an increase in concentration. This would suggest a general--but not universal--trend toward a decline in export concentration.[13] However, there may have been some changes in the countries' methods of reporting the data which would lead to a change in the concentration ratios even if the structure of exports had not changed.[14] For example, if exports are reported in greater detail in subsequent years, the concentration ratios in those years will be lower even if the structure of exports has not changed. Moreover, some of the change may be due to differences in

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[12]Michaely computed C at the three-digit level only.

[13]If these countries are classified as developed or underdeveloped using the earlier classification system, nine of fourteen developed countries experienced a decline in concentration while ten of thirteen underdeveloped countries showed a similar movement.

[14]Massell, op. cit., pp. 54-55.

TABLE 23.--A comparison of export concentration by commodity in 1954, 1959, and 1963

Country	C_2[a] (1954)	C_2[b] (1959)	C_2[c] (1963)	C_1[b] (1959)	C_1[c] (1963)
N. Antilles	.937		.961		
Ghana	.835	.704	.761	.733	.797
Iceland	.803	.715	.692	.780	.849
Malaya	.498[d]	.697	.573	.784	.676
New Zealand		.449	.471	.691	.680
Greece	.462		.454		
Nigeria	.493	.439	.424	.646	.600
Australia	.508	.427	.419	.608	.589
Hong Kong	.206		.400		
Finland	.381	.373	.389	.590	.584
Turkey	.397		.352		
Ireland	.383	.365	.331	.533	.660
Spain	.314		.241		
Sweden	.281	.252	.226	.522	.521
Canada	.249	.227	.213	.489	.470
Portugal	.247	.237	.212	.453	.487
Norway	.255	.233	.211	.493	.472
Denmark	.271		.201		
W. Germany	.223		.196		
United Kingdom	.192	.195	.180	.521	.531
Italy	.205	.207	.176	.429	.443
Japan	.248	.215	.176	.527	.533
Yugoslavia	.214		.169		
Austria	.277	.242	.166	.529	.512
Belgium-Luxembourg	.255	.264	.160	.600	.551
United States	.188	.160	.153	.431	.450
Netherlands	.169	.170	.148	.420	.413
France	.180	.214	.143	.448	.434
Mauritius	.988	.991			
Trinidad and Tobago	.727	.810			
Colombia	.840	.780			
Panama	.628	.740			
Burma	.744	.691			
United Arab Republic	.842	.685			

TABLE 23--(Continued)

Country	C_2[a] (1954)	C_2[b] (1959)	C_2[c] (1963)	C_1[b] (1959)	C_1[c] (1963)
Brazil	.612	.568			
Thailand	.683	.490			
Argentina	.306	.303			

[a]From Michael Michaely, Concentration in International Trade (Amsterdam: North-Holland Publishing Company, 1962), pp. 11-12.

[b]From Benton F. Massell, "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis," American Economic Review, LIV (March, 1964), 53.

[c]From Table 22.

[d]Michaely's figure includes Singapore.

TABLE 24.--A comparison of export concentration by commodity in 1954, 1959, and 1963: summary[a]

Number of Countries	Period Under Consideration	Level of Aggregation	Increase in Concentration	Decrease in Concentration
27[b]	1954 - 1959	3 - digit	8	19
20	1959 - 1963	3 - digit	3	17
26[b]	1954 - 1963	3 - digit	3	23
20	1959 - 1963	1 - digit	8	12

[a]Compiled from Table 23.

[b]Excludes Malaya.

processing the published data.

If the concentration ratios for 1959 and 1963 are compared (at the three-digit level), it appears that export concentration declined in seventeen of the twenty countries for which comparison is possible.[15] This would indicate--subject to the shortcomings discussed above--that export concentration declined from 1959 to 1963 with few exceptions. However, during this period, the Standard International Classification system was revised and the three-digit level classification was changed to include 177 groups rather than the 150 previously included. Hence, we would expect a reduction in the concentration ratios because of the greater disaggregation even if the structure of exports had not changed. This is substantiated if the one-digit classification--which was not changed--is examined. At the one-digit level, only twelve countries experienced a decrease in their export concentration ratios while eight showed an increase.[16]

If the 1954 and 1963 concentration ratios are compared, twenty-three of the twenty-six countries exhibited a decline in their concentration ratios and three showed an increase.[17] This would indicate that export concentration for both developed and underdeveloped countries has declined over time but because of the biases previously discussed, the results are not conclusive.

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[15]Of the three countries which experienced an increase, two--Finland and New Zealand--are classified as developed and one--Ghana--is considered underdeveloped. Of the twenty countries in this group, sixteen are classified as developed and four as underdeveloped.

[16]Ten of the sixteen developed countries experienced a decline while two of the four underdeveloped countries showed a decline.

[17]Of the seventeen developed countries, one--Finland--experienced an increase. Of the nine underdeveloped countries, two--Hong Kong and N. Antilles--exhibited an increase.

Export Instability and Commodity Concentration: Empirical Results[18]

To estimate the relationship between instability and concentration of exports, regression analysis was used, with I_2, I_3, and I_4, alternatively, as dependent variables, and C_1, C_2, and C_3 as independent variables. The regression equations are written:

(1) $I_2 = a_{i0} + a_{ic}C_i$

(2) $I_3 = a_{i0} + a_{ic}C_i$

(3) $I_4 = a_{i0} + a_{ic}C_i$

where i = 1, 2, 3. In each case the sample consisted of thirty-three countries.

The estimated regression coefficients for C_1, C_2, and C_3 are presented in Table 25 along with the standard errors in parentheses beneath their respective coefficients.

In regard to equation (1) where the dependent variable consists of an instability index, I_2, which provides only a crude correction for trend, none of the coefficients are significant at the .05 level using a one-tailed test. On this basis, we would reject the hypothesized relationship between export instability and export concentration.

However, in equation (2) where the dependent variable consists

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[18]Additional independent variables to take into account geographic concentration and the type of product are introduced in the following sections. Methodologically, it might be better to proceed directly to those regression equations in order to examine the net relationship between export instability and commodity concentration. Nevertheless, I believe it is instructive to examine the simple relationship first and then introduce additional explanatory variables.

TABLE 25.--The relationship between export instability and export commodity concentration

Equation Number in the Text	Dependent Variable	Independent Variables: Regression Coefficients (standard errors in parentheses)			Coefficient of Determination[a]	F-Ratio[b]
		C_1	C_2	C_3	R^2	
(1)	I_2	.028 (.045)			.013	.392
(1)'	I_2		.014 (.031)		.007	.207
(1)"	I_2			.019 (.024)	.020	.637
(2)	I_3	.106 (.047)			.142	5.127
(2)'	I_3		.074 (.032)		.145	5.257
(2)"	I_3			.070 (.024)	.219	8.697
(3)	I_4	.154 (.084)			.098	3.378
(3)'	I_4		.111 (.057)		.107	3.735
(3)"	I_4			.089 (.045)	.115	4.039

[a]The coefficient of determination is the proportion of the total variance of the dependent variable which is "explained" by the regression.

[b]The F ratio is given by: $F = R^2(n-k-1)/(1-R^2)k$, where n is the number of observations in the sample and k is the number of independent variables. The only value of F significant at the .99 level is for equation (2)". The values of F for equations (2) and (2)' are significant at the .95 level while those of equations (3), (3)', and (3)" are significant at the .90 level.

of an instability index, I_3, which provides a correction for trend, the coefficients are significant at the .05 level and one (using C_3 as the independent variable) is significant at the .01 level. Hence, on this basis, we would accept the hypothesis that export instability and concentration are related. Thus, the evidence is conflicting.

In view of earlier analysis, this result should not be too surprising. In Chapter IV, we found that fluctuations in export earnings in underdeveloped countries were significantly greater than those in developed countries but only if we used the I_3 indices. If the I_2 indices were used, the difference was not significant. Since most underdeveloped (developed) countries show high (low) export concentration ratios, use of the I_3 indices would be more likely to produce a positive relationship between export instability and concentration than the I_2 indices. In such cases, the relevant comparison would involve the trend-corrected series, I_3, for the reasons given above.

In regard to equation (3) where the dependent variable, I_4, consists of an instability index formed by dividing the standard error of the estimate by the mean of the observations, none of the coefficients are significant at the .05 level but all are significant at the .10 level using a one-tailed test.

Since the result is at variance with several of the earlier studies, it is useful to compare these studies with the present study.

Michaely's chief concern, in this regard, was the relationship between export price (and volume) and commodity concentration. On the basis of a thirty-six country sample, Michaely found evidence to indicate that a relationship exists but it is weaker than he expected

on an *a priori* basis.[19] The rank correlation coefficient between the export price instability series and the commodity concentration series is .404 which is significant at practically any desired level. On this basis, he concluded that it "appears that although commodity concentration is a participating factor in determining the strength of price fluctuations of exports of a country, it is far from being the sole determinant, and may even appear from the evidence not to be a major factor."[20]

He found an even weaker relationship between export volume instability and commodity concentration.[21] Based on a sample of thirty-six countries, the rank correlation coefficient between the two series is .374. Since his conclusions are based on rank correlation coefficients and export *price* (and *volume*) instability rather than instability of export *earnings*, direct comparison with the results of this thesis is not possible.

Coppock's study of international economic instability is much broader than the present study; however, Chapters 5 and 6 of his book are concerned with explaining the instability of export earnings, and he includes among his independent variables several different measures of export commodity concentration. Coppock found correlation coefficients ranging from .02 to .11 for samples of between 66 and 79 countries for the relationship between his index of instability (based on the log variance method) and four different measures of export concentration. This is in contrast to correlation

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[19] Michaely, *op. cit.*, p. 72.

[20] *Ibid.*, p. 73.

[21] *Ibid.*, p. 100.

coefficients of from .31 to .47 obtained in regard to the trend corrected measures of instability in this study. On this basis, he concluded that there is no important relationship between instability of export earnings and the concentration of exports by commodity.[22] A number of reasons could, of course, account for the differences in results but, it should be noted, Coppock's results are suspect. First, his instability indices are based on the log variance method and, as a result, may fail to eliminate the trend factor. This is suggested by the correlation coefficients obtained in this study between the United Nations index, I_2, which provides only for a crude adjustment for trend, and the three concentration indices. These range from .08 to .14 and are much closer to Coppock's results than those obtained here by using the trend-corrected indices, I_3 and I_4. As argued earlier, the relevant measure would appear to be the trend-corrected series. Second, Coppock considers the 1946 to 1958 period and, as discussed earlier, this period is characterized by only a few years which can be considered "normal." Third, he includes in this sample the Soviet bloc countries. On an *a priori* basis, I would expect the exports of these countries to be both stable and concentrated; hence, exclusion of these countries would increase the correlation between instability of export earnings and export concentration by commodity. In the present study, it seems more appropriate to exclude the Soviet bloc countries.[23]

In a more recently published study, Alasdair I. MacBean reached

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[22] Coppock, *op. cit.*, p. 103.

[23] Coppock's indices are based on domestic currencies of the countries involved for the most part while the present indices are based on a common currency. However, it is not clear whether this difference affects the result.

the same conclusion as Coppock in regard to the relationship between instability of export earnings and concentration.[24] On the basis of low correlation coefficients between indices of export earning instability and a commodity concentration index, MacBean concluded that commodity concentration has "very little or no effect on the stability of export earnings."[25] One of the instability indices consisted of Coppock's data for selected countries with the Soviet bloc countries excluded. The other index was derived from data from various issues of the International Monetary Fund's International Financial Statistics and consisted of the average percentage deviation of the dollar value of export proceeds from their five-year moving averages centered on the mid-year and covering the 1948-1958 period. The concentration index consisted of Michaely's export commodity concentration ratios for 1954. In each case, a sample of thirty-seven countries was considered.

No direct comparison of results is possible since MacBean did not publish his correlation coefficients. However, to the extent that his conclusions are based on Coppock's data, they are subject to some of the reservations discussed above. Moreover, even though MacBean's index corrects for these criticisms, it means that the measures of export instability and concentration are now inconsistent, i.e. the former is based on dollar data while the latter is based, for the most part, on other than dollar data.

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[24] MacBean, "Causes of Excessive Fluctuations in Export Proceeds of Underdeveloped Countries," op. cit., pp. 323-41. See his book also, op. cit., Chapter 2.

[25] MacBean, "Causes of Excessive Fluctuations in Export Proceeds of Underdeveloped Countries," ibid., p. 329.

Massell reached the same conclusion as Coppock and MacBean although on the basis of regression analysis. Massell's two instability indices (I_3 and I_4 in our notation) for the thirty-six countries in the sample covered the 1948-1959 period while his two concentration ratios (C_1 and C_2 in our notation) were based on, for the most part, 1959 data.[26] In each case, the data were usually in the currency of the country considered. The resulting regression coefficients between his two measures of export instability and his two measures of export concentration are not significant.[27]

In regard to Massell's study, the difference in results may be attributed to a number of factors. First, the studies differ as to periods covered and countries considered. Nevertheless, if a relationship between export instability and concentration does exist, it should be evident in both studies as they employ the same methodology. A second possibility is that changes that have occurred in the Standard International Trade Classification at the 3-digit level now reveal a relationship which was previously obscured at the higher degree of aggregation. While this is possible, it would not explain the results obtained by using the indices calculated on the basis of the 1-digit level data which were not subject to revision. Third, the difference in results may be attributable to the data used. Massell's data were typically in the currency of the countries considered while the data used in the present study are in dollar terms. On an a priori basis, it is not clear what impact using different

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[26] Where 1959 data were unavailable or incomplete, 1958 data were used.

[27] Massell, op. cit., p. 56.

data has upon the results; however, for the purpose of this study, the relevant comparison would appear to involve the use of an internationally acceptable currency such as the dollar.

Despite the difference in results, the policy implications are not changed drastically because the coefficients are quite small.[28] Consider equation (2) with independent variable C_2 (the Hirschman index using 3-digit data):

$$(2) \quad I_3 = a_{20} + a_{2c}C_2$$

$$I_3 = .071 + .074C_2$$

Suppose we recall our earlier example of a country exporting four commodities, each earning twenty-five dollars in foreign exchange. We saw the concentration ratio to be equal to .5. By substituting .5 into equation (2), the instability index becomes .108 or 10.8 per cent per year. If the economy chooses to stabilize its export earnings through diversification of its exports and succeeds in exporting a fifth product which also earns twenty-five dollars in foreign exchange (with the export earnings of the other four exports unchanged), the new concentration ratio will be .447. Substituting the ratio into equation (2), the new instability index is .104 or 10.4 per cent per year, a reduction of only four-tenths of one per cent. In view of the major effort required to expand exports by twenty-five per cent, the measure could hardly be justified on the basis of stabilizing export earnings alone. Similar calculations

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[28] The parameter estimates found in Table 28 are presumably more reliable since they are based on the net relationship between export earning instability and commodity concentration. However, the differences are very small. Compare, for example, the coefficients in equations (2)' and (6)'.

based on equation (2) using C_3 as the independent variable show a greater reduction in instability, but the shortcomings of C_3 as a measure of export concentration caution against its use.

One interesting result of the regression analysis (which includes the results which follow) has to do with the relative size of the parameter estimates when C_1 and C_2 are used as independent variables. In every case, the coefficient is greater when C_1 (the Hirschman index based on 1-digit data) is used as an independent variable than when C_2 (the Hirschman index based on 3-digit data) is used. This implies that countries will be more successful in stabilizing their export earnings if their new exports are from a new section than if their new exports are from an existing section.

To clarify, let us return to our example. Previously, we saw a reduction in C_2 from .5 to .447 lead to a reduction in I_3 of only four-tenths of a per cent. We did not specify whether the new commodity (defined at the 3-digit level) was a new commodity from the standpoint of the 1-digit classification scheme. In practice, of course, new commodities (at the 3-digit level) fall in both categories. Suppose, however, the data in the example now reflect commodities from the standpoint of the 1-digit classification scheme. If this is the case, we must consider equation (2) with independent variable C_1:

$$(2) \quad I_3 = a_{10} + a_{1c}C_1$$

$$I_3 = .034 + .106C_1$$

If, by exporting a fifth commodity, the export concentration ratio is reduced from .5 to .447, then export instability is reduced from 8.7 per cent to 8.1 per cent, a reduction of six-tenths of a per cent.

Hence, if a country is considering reducing its export instability by diversification, it should consider exports which fall into new sections.

What is the economic explanation behind this result? Basically, it follows from the fact that movements in export prices, volume and earnings are intercorrelated. Since commodities at the 3-digit level are presumably grouped at the 1-digit level according to common characteristics or origins, movements in export prices, volume, and earnings are presumably more intercorrelated for commodities within a given 1-digit section than for commodities between 1-digit sections. Hence, countries should seek to export commodities from new sections rather than from existing sections.[29]

Before introducing additional explanatory variables, it should be noted that the results obtained above probably underestimate the actual relationship between instability and export concentration. This is due, in part, to one of the shortcomings of the concentration measures.[30] The concentration ratios employed do not take into consideration cross-elasticities between the various goods exported by the country under consideration.[31] Finland, for example, exports many wood and closely related products even though her exports do not appear to be highly concentrated. Since these products are so closely related one would expect these exports to fluctuate together and

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[29] While the benefits (in terms of reduced export earning instability) are greater, the cost is also likely to be greater.

[30] This, of course, is not limited to the concentration measures employed here.

[31] The problem is circumvented in part by considering data at different levels of aggregation.

in about the same intensity rather than in an offsetting fashion and this is substantiated to a degree by the relatively high degree of export earning instability exhibited by Finland in the post-war period. Hence, use of the present measures of concentration tends to obscure the relationship between export instability and concentration of exports. While it is impossible to assess the importance of this factor, it is safe to conclude that the estimates obtained above are under-estimates, at least on this basis.

Aside from the concentration indices, there may be intercorrelation of prices (and export earnings), as demonstrated in the Korean War boom and subsequent decline. This intercorrelation is probably one important reason for the low parameter estimates obtained in the regression analysis. If the prices (and export earnings) of most commodities move in the same direction most of the time, diversification will have little or no effect on export earning instability.

Export Instability and Export Concentration: Commodity and Geographic

It may be that instability of export earnings is related not only to commodity concentration but also geographic concentration. Thus, it may be hypothesized that the greater the geographic concentration of a country's exports, the greater the instability of that country's exports, all other things equal. Hence, a country whose exports are destined principally for only one or two countries would be termed highly concentrated; diversification would involve seeking a greater variety of markets or spreading exports more evenly over existing markets.

To measure the geographical concentration, G, of exports, the Hirschman index is utilized:

$$G = \sqrt{\Sigma(Y_i/Y)^2}$$

where Y_i denotes the value of exports to country i in some specified year and Y the value of total exports in the same year, in this case, 1963. The results for the thirty-three countries in the sample are shown in Table 26.

As a rule, developed (underdeveloped) countries appear to have low (high) concentration ratios, although there are some exceptions. However, if the countries are ranked by per capita gross domestic product in 1963 and by geographic concentration, the resulting Spearman rank correlation coefficient is only -.103. For a sample of thirty-one countries, the coefficient is not significant at the .10 level using a one-tailed test. Hence, there appears to be no significant relationship between the stage of a country's development and its geographical concentration of exports.

Also presented in Table 26 are the geographic concentration ratios calculated by Michaely and Massell for 1954 and 1959, respectively. Unlike the commodity concentration case, there seems to be little evidence of a decline in geographic concentration over time.[32] Of the twenty-seven countries for which comparison is possible for 1954 and 1959 only ten experienced a decline in their ratios.[33] Of the twenty countries for which comparison is possible for 1959 and

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[32] The results are summarized in Table 27

[33] Of the fifteen countries categorized as developed, four--Australia, Canada, Finland, and Ireland--experienced a decline. Of the twelve underdeveloped countries, six--Burma, Colombia, Ghana, Nigeria, Thailand, and Trinidad and Tobago--showed a decline.

TABLE 26.--A comparison of geographic concentration of exports in 1954, 1959, and 1963

Country	G^a (1954)	G^b (1959)	G (1963)
Panama	.955	.967	
Ireland	.897	.814	.776
Colombia	.798	.705	
Mauritius	.776	.847	
Nigeria	.740	.571	.449
Canada	.639	.601	.585
Trinidad and Tobago	.500	.461	
Ghana	.479	.393	.336
Burma	.476	.330	
Thailand	.435	.324	
Denmark	.418		.331
Brazil	.415	.465	
Australia	.412	.387	.307
Greece	.341		.311
Finland	.340	.336	.317
N. Antilles	.336		.373
Argentina	.321	.340	
Austria	.318	.352	.336
Yugoslavia	.313		.284
Spain	.295		.280
Belgium-Luxembourg	.294	.328	.351
Turkey	.293		.300
Iceland	.291	.322	.320
Sweden	.284	.291	.268
Norway	.280	.321	.306
Hong Kong	.276		.359
United States	.275	.292	.249
Portugal	.274	.285	.268
Netherlands	.270	.334	.335
Malaya[c]	.260	.347	.320
United Arab Republic	.260	.264	
Japan	.240	.354	.303
France	.218	.280	.250
Italy	.211	.270	.259
Germany	.210		.238
United Kingdom	.187	.212	.180
China: Taiwan			.391
Israel			.274

TABLE 26--Continued

Country	G^a (1954)	G^b (1959)	G (1963)
New Zealand		.619	.517
Pakistan			.234
Sudan			.262
Switzerland			.255

[a]From Michael Michaely, Concentration in International Trade (Amsterdam: North-Holland Publishing Company, 1962), pp. 19-20.

[b]From Benton F. Massell, "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis," American Economic Review, LIV (March, 1964), 53.

[c]Michaely's figure includes Singapore.

TABLE 27.--A comparison of geographic concentration of exports in 1954, 1959, and 1963: summary[a]

Number of Countries	Period Under Consideration	Increase in Concentration	Decrease in Concentration
27[b]	1954 - 1959	17	10
20	1959 - 1963	2	18
26[b]	1954 - 1963	12	14

[a]Compiled from Table 26.

[b]Excludes Malaya.

1963, eighteen experienced a decline.[34] However, only fourteen of the twenty-six countries (roughly half) show a decrease in their geographic concentration ratios from 1954 to 1963. If the countries are classified as developed or underdeveloped, relatively more (six of nine) underdeveloped countries show a decline than did developed countries (eight of seventeen). This is not surprising since most developed countries already had relatively low geographic concentration ratios in 1954.

To test the relationship between export instability and geographic concentration, the following regression equations were used:

$$(4)\quad I_3 = b_{10} + b_{1g}G$$

$$(5)\quad I_4 = b_{20} + b_{2g}G$$

The estimated regression coefficients are presented in Table 28. Neither estimate is significant at the .05 level with a one-tailed test.[35]

To test the net relationship between commodity and geographic concentration and export instability, the new variable, G, was added to equations (2) and (3) to form the following regression equations:

$$(6)\quad I_3 = d_{i0} + d_{ic}C_i + d_{ig}G$$

$$(7)\quad I_4 = d_{i0} + d_{ic}C_i + d_{ig}G$$

where $i = 1, 2, 3$. The estimated regression coefficients are

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[34] The two countries--Belgium-Luxembourg and Netherlands--which showed an increase are among the sixteen classified as developed. All four underdeveloped countries--Ghana, Malaya, Nigeria, and Portugal--experienced a decline.

[35] The same result was obtained using I_2 (the United Nations index) as the dependent variable in the regression equation.

presented in Table 28.[36] In each case, the coefficient of the commodity concentration variable, C, is significant at the .05 level using a one-tailed test. On the other hand, the coefficients of the geographic concentration ratio, G, are not significant using the same test. However, the value of the coefficient of determination, R^2, indicates that a greater proportion of the variation in I is explained by adding G as an independent variable although most of the variation remains unexplained.

At first glance, the absence of a relationship between export instability and the geographic concentration of exports is somewhat surprising since a country which exports to one or a few markets is likely to be at the mercy of fluctuations in those markets while a country which exports to a large number of markets may find that fluctuations in those markets cancel out. However, it is possible that countries whose exports are highly concentrated geographically may have bilateral commodity agreements or some other arrangement which smooths out the fluctuations in export earnings. This will be discussed in more detail below.

It must be recalled also that some markets (in the geographical sense) are much more stable than others. Hence, a country which sends the bulk of her exports to a single market may be characterized by greater export earning stability than a country which sends her exports to a variety of markets. For example, many countries send the bulk of their exports to the United States. Since the U. S. has made significant progress in stabilizing her economy since World War

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[36] The simple correlation coefficient between G and C_2 is .142 while the correlation coefficient between G and C_1 is .186. The simple correlation coefficient between G and C_3 is .156.

TABLE 28.--The relationship between export instability and export concentration: commodity and geographic

Equation Number in the Text	Dependent Variable	Independent Variables: Regression Coefficients (Standard errors in parentheses)				Coefficient of Determination[a]	F-Ratio[b]
		C_1	C_2	C_3	G	R^2	
(4)	I_3				-.054 (.061)	.025	.777
(5)	I_4				-.067 (.108)	.012	.385
(6)	I_3	.118 (.047)			-.081 (.058)	.195	3.635
(6)'	I_3		.079 (.032)		-.074 (.057)	.190	3.526
(6)"	I_3			.076 (.024)	-.081 (.054)	.273	5.633
(7)	I_4	.170 (.085)			-.106 (.105)	.128	2.199
(7)'	I_4		.119 (.058)		-.097 (.104)	.133	2.297
(7)"	I_4			.096 (.045)	-.101 (.103)	.143	2.497

[a]The coefficient of determination is the proportion of the total variance of the dependent variable which is "explained" by the regression.

[b]The F ratio is given by: $F = R^2(n-k-1)/(1-R^2)k$, where n is the number of observations in the sample and k is the number of independent variables. The values of F for equations (6), (6)', and (6)" are significant at the .95 level while the value of F for equation (7)" is significant at the .90 level. The value of F for equation (6)" is significant at the .99 level also.

II, the export earnings of these countries may exhibit greater stability than countries which export to a variety of markets, some of which are unstable. Hence, it may not be a question of the number of markets but rather the stability of the market or markets.

This result differs somewhat from that obtained by MacBean and Massell. In several--but not all--instances, they found a significant relationship between export instability and geographic concentration. However, in each case, the sign of the coefficient was negative.[37] Regardless of whether the coefficient is zero or negative, export diversification (in the geographical sense of the term) cannot, in general, be expected to contribute to the stabilization of export earnings.

Export Instability and Primary Products

As an alternative hypothesis, fluctuations in export earnings may result from the export of primary products as opposed to industrial goods, not from export concentration. This could be the case if exports of primary goods fluctuate more violently than exports of industrial goods or if the earning time paths of primary products are more intercorrelated than those of industrial goods or industrial goods and primary products.

To measure the extent of a country's concentration on primary products, the ratio, P, of primary-product exports to total exports is used where primary products are defined as SITC Groups 0 to 4. This variable, which can be called the primary-product ratio, was computed for the thirty-three countries in the sample and is shown

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[37] MacBean, Export Instability . . ., op. cit., p. 45. Massell, op. cit., p. 57.

in Table 29 along with the 1959 ratios compiled by Massell. As is evident from the table, most of the countries with high (low) ratios are underdeveloped (developed) countries. If the countries are ranked by per capita gross domestic product in 1963 and by P, the Spearman rank correlation coefficient between the two series is -.362. Based on a sample of thirty-one countries, the coefficient is significant at the .05 level using a one-tailed test. Hence, there appears to be a significant (inverse) relationship between the stage of a country's development and the ratio of the country's primary product exports to its total exports. Of course, this does not necessarily imply a causal relationship.

About two-thirds (thirteen) of the twenty countries common to both studies experienced a decline in their ratios from 1959 to 1963 indicating that in relative terms, the countries in the sample are becoming less dependent on the export of primary products. Three of the four countries classified as underdeveloped experienced a decline while ten of the sixteen developed countries showed a decline. However, the United States experienced a slight increase.

To test the relationship between export instability and exports of primary products, the following regression equations were used:

$$(8)\quad I_3 = e_{10} + e_{1p}P$$

$$(9)\quad I_4 = e_{10} + e_{1p}P$$

$$(10)\quad I_3 = f_{i0} + f_{ic}C_i + f_{ip}P$$

$$(11)\quad I_4 = f_{i0} + f_{ic}C_i + f_{ip}P$$

$$(12)\quad I_3 = h_{10} + h_{1g}G + h_{1p}P$$

$$(13)\quad I = h_{10} + h_{1g}G + h_{1p}P$$

TABLE 29.--The ratio of primary-product exports to total exports: 1959 and 1963

Country	P^a (1959)	P (1963)
Sudan		.999
Netherlands Antilles		.991
Ghana	.911	.989
Iceland	.998	.982
Turkey		.966
New Zealand	.968	.965
Nigeria	.982	.920
Greece		.904
Australia	.875	.847
Pakistan		.739
Ireland	.686	.701
Malaya	.845	.700
Spain		.671
China: Taiwan		.611
Denmark		.594
Canada	.547	.556
Yugoslavia		.465
Netherlands	.469	.443
Finland	.495	.430
Portugal	.540	.409
Israel		.374
Norway	.402	.349
United States	.337	.342
Sweden	.372	.310
France	.248	.271
Italy	.305	.230
Austria	.279	.225
Belgium-Luxembourg	.165	.187
United Kingdom	.132	.142
Germany		.105
Japan	.120	.092
Switzerland		.079
Hong Kong		.077

[a]From Benton F. Massell, "Export Concentration and Fluctuations in Export Earnings: A Cross-Section Analysis," American Economic Review, LIV (March, 1964), 53.

$$(14)\quad I_3 = j_{i0} + j_{ic}C_i + j_{ig}G + j_{ip}P$$

$$(15)\quad I_4 = j_{i0} + j_{ic}C_i + j_{ig}G + j_{ip}P$$

where i = 1, 2, 3. The estimated regression coefficients are presented in Table 30.

In equations (8) and (9), the regression coefficients are not significant at the .05 level using a one-tailed test. Hence, there appears to be no simple relationship between export instability and the primary product ratio.

If G is introduced as an additional variable, the P coefficient becomes significant in equation (12); however, if the F distribution is utilized as an overall test of the regression, the value of F is not significant at the .10 level. As a consequence, the result can be disregarded. In equation (13), the P coefficient is insignificant at the .05 level. The G coefficient is insignificant in both equations (12) and (13).

If C is introduced as an additional variable, the coefficients of the P variable remain insignificant in equations (10), (11), (14), and (15) although some of the coefficients of the C variable are significant at the .05 level. Furthermore, although the value of the coefficient of determination, R^2, increases as P is added as an independent variable, the increase is small.[38] This means that although a greater proportion of the variation in I is explained by adding P as an independent variable, P is not an important explanatory variable. This will be discussed in more detail below.

Since we expected a positive relationship between export

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[38] Compare, for example, the R^2s for equations (6), (6)', and (6)" in Table 28 with those of equations (14), (14)', and (14)" in Table 30.

TABLE 30.--The relationship between export instability and export concentration including the ratio of primary to total exports

Equation Number in the Text	Dependent Variable	Independent Variables: Regression Coefficients (standard errors in parentheses)					Coefficient of Determination[a]	F-Ratio[b]
		C_1	C_2	C_3	G	P	R^2	
(8)	I_3					.033 (.021)	.071	2.365
(9)	I_4					.035 (.038)	.026	.837
(10)	I_3	.097 (.061)				.007 (.026)	.144	2.516
(10)'	I_3		.079 (.049)			-.004 (.031)	.146	2.556
(10)"	I_3			.099 (.038)		-.030 (.031)	.243	4.819
(11)	I_4	.170 (.109)				-.011 (.047)	.100	1.666
(11)'	I_4		.156 (.086)			-.039 (.055)	.122	2.088
(11)"	I_4			.142 (.071)		-.055 (.058)	.141	2.471
(12)	I_3				-.092 (.062)	.043 (.022)	.135	2.341
(13)	I_4				-.109 (.113)	.047 (.040)	.055	.879
(14)	I_3	.096 (.059)			-.091 (.060)	.017 (.027)	.206	2.509
(14)'	I_3		.070 (.049)		-.079 (.061)	.009 (.032)	.192	2.302
(14)"	I_3			.092 (.038)	-.071 (.058)	-.018 (.032)	.281	3.770

TABLE 30--Continued

Equation Number in the Text	Dependent Variable	Independent Variables: Regression Coefficients (standard errors in parentheses) C_1	C_2	C_3	G	P	Coefficient of Determination[a] R^2	F-Ratio[b]
(15)	I_4	.169 (.109)			-.106 (.110)	.001 (.049)	.128	1.417
(15)'	I_4		.147 (.088)		-.082 (.111)	-.025 (.058	.138	1.553
(15)"	I_4			.134 (.072)	-.078 (.110)	-.078 (.061)	.156	1.788

[a]The coefficient of determination is the proportion of the total variance of the dependent variable which is "explained" by the regression.

[b]The F ratio is given by: $F = R^2(n-k-1)/(1-R^2)k$, where n is the number of observations in the sample and k is the number of independent variables. The only values of F significant at the .95 level are those for equations (10)" and (14)". The values of F for equations (10), (10)', (11)", and (14), and (14)' are significant at the .90 level.

instability and the ratio of primary exports to total exports, the results require some explanation. As in the case of geographical concentration, it may be that fluctuations in primary product exports have been modified by various policy measures. During the period from 1948 to 1964, several special multilateral or bilateral arrangements have been in force. For example, the International Tin Agreement went into effect in 1956. However, according to MacBean, the Agreement was ineffective, at least initially, against year-to-year fluctuations.[39] Similarly, the Commonwealth Sugar Agreements and U. S. import quotas probably moderated fluctuations in sugar prices and proceeds for a large part of the market but at the expense of destabilizing the residual free market. However, even after the International Sugar Agreement of 1953, sugar prices fluctuated considerably.

Most of the arrangement have been aimed at supporting prices rather than moderating fluctuations.[40] This is also true of the International Wheat Agreement which has been one of the more successful commodity agreements. However, some moderation of fluctuations may have resulted from the arrangements.

In addition to formal arrangements, some prices may have been steadied by tacit producers' arrangements, for example, in copper and aluminum.[41] Also, government intervention may have served to dampen fluctuations of primary product exports. If fluctuations in

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[39] MacBean, Export Instability . . ., op. cit., p. 49. The same is true of the agreement between coffee exporters which went into effect in 1957.

[40] For more detail, see MacBean, ibid., Chapter 12.

[41] Ibid., p. 49.

primary exports have been dampened by such arrangements, the results obtained in the regression analysis are to be expected.

At this point, it must be emphasized that the important distinction is not between primary and manufactured goods per se. Instead, the crucial distinctions lie in the variability of demand and supply and in the price-elasticities of demand and supply. According to MacBean, these factors vary much more among primary products and among manufactures than they do between the two classes of goods.[42] If this is true, stability of a country's export earning stream depends on the type of product exported, not necessarily the ratio of primary products to total exports.

These results differ from those obtained by Massell.[43] In both studies, a simple regression of I against P fails to be significant; however, Massell found the coefficients of P to be significant in equations (12) and (13) at the .05 level using a one-tailed test while this is not the case in the present study, with the exception noted above. As a practical matter, the difference in results is small since Massell concludes "that P explains only a small part of the variation among countries in export instability."[44]

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[42] Ibid., pp. 39-41. See Michaely, op. cit., pp. 79-82.

[43] The results obtained here do not differ from the verbal explanation given by MacBean. However, if equation (2) in MacBean's book (p. 45) is examined, it is found that P is significant at the .05 level. This is based on a one-tailed test with a sample of thirty-seven countries. This result may be discounted because it is based on Coppock's instability indices which cover only the 1946-1958 period and are subject to the shortcomings discussed above.

[44] According to Massell, "An increase in P by 20 percentage points, given the value of G, is associated with a 1 per cent rise in either I or I*" where I and I* are equivalent to I_3 and I_4, respectively, in the present study. Massell, op. cit., p. 60.

As we saw earlier, the value of the coefficient of determination, R^2, for each equation increases as P is introduced into the regression equation. Ordinarily, this means that a greater proportion of the variation in I is explained; however, if R^2 is adjusted to take into consideration the degrees of freedom, the explanatory power of the equations is actually reduced.[45] Therefore, P can be dropped as an explanatory variable. This is probably due to multicollinearity between C and P.[46]

If P is dropped as an explanatory variable, we note that the C coefficient is significant at the .05 level using a one-tailed test in equations (6), (6)', (6)", (7), (7)', and (7)". On this basis, we conclude that there is a significant, positive relationship between export earning instability and commodity concentration. However, as we noted earlier, the size of the regression coefficients are relatively small, indicating that considerable diversification must take place in order to achieve any given reduction in export earning instability.

On the basis of the F-ratios, C_3 appears to provide the best "explanation" of export earning instability.[47] Even so, the independent variable "explains" only twenty-two per cent of the variation in export earning instability between countries. This suggests

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[45] That is, for all equations which contain C.

[46] The simple correlation coefficients between C and P range from .62 to .78. These are much higher than those between C and G or between G and P (.315). For a discussion of multicollinearity, see J. Johnston, Econometric Methods (New York: McGraw-Hill, 1963), pp. 201-07. Massell makes the same point. Massell, op. cit., p. 60.

[47] This is in equation (2)" with I_3 as the independent variable. The only other regression significant at the .99 level is (6)" with C_3 and G as independent variables and I_3 as the dependent variable.

that the main sources of export earning instability lie elsewhere. This is not too surprising since the ultimate sources of instability must be the factors which affect demand and supply, not the factors discussed here.[48]

Conclusion

Unlike earlier studies, the results obtained here indicate a positive relationship between export instability and commodity concentration of exports. Hence, diversification of exports, should, in general, lead to a reduction in export instability. Nevertheless, as a practical matter, the amount of stabilization obtained from any given reduction in export concentration is likely to be minor although such a policy may well be quite effective in certain individual situations.

In the case of geographic concentration, there appears to be no relationship between export instability and whether a country ships the bulk of its exports to one, few, or many markets. Hence, diversification of exports in a geographical sense is unlikely to lead to any significant reduction in export instability.

Similarly, there seems to be no relationship between export instability and the ratio of a country's exports of primary products to its total exports. Countries which export industrial goods appear to share the same instability problem as those which export primary products. Nevertheless, the primary producing countries have a problem with instability since these countries generally have more highly

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[48] MacBean argues that each country is a special case. MacBean, Export Instability . . ., op. cit., p. 52.

concentrated exports. However, the "solution" to their instability problem appears to be found in export diversification and not necessarily in "industrialization" and the subsequent export of non-primary products.

CHAPTER VI

SUMMARY AND CONCLUSIONS

As discussed in the Introduction, there appears to be a widespread feeling among government officials in underdeveloped countries that traditional exports, mainly primary products, should not be expanded. Instead, they believe investment should be channelled to other areas, usually in some form of industrialization, either to create new exports or to reduce imports. Although there are undoubtedly a variety of reasons for this feeling, only two are discussed here. First, it is widely held that there is a tendency toward secular deterioration of the commodity terms of trade of underdeveloped countries.[1] Such a deterioration is presumed to indicate a welfare loss or, at best, an unequal distribution of the gains from international trade. As a consequence, officials in underdeveloped countries appear reluctant to allocate resources to the export sector so as to increase exports.[2]

Second, officials in underdeveloped countries are reluctant to allocate resources to traditional export industries because it is said that concentration on a narrow range of products leads to

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[1] There are, of course, a number of arguments which purport to explain why the commodity terms of trade of the underdeveloped countries may be expected to decline over time.

[2] It has been suggested that underdeveloped countries be compensated for a deterioration in their commodity terms of trade.

greater year-to-year fluctuation in export earnings. Such fluctuations may lead to instability of national income, a mis-allocation of resources, and balance of payments problems. Hence, if exports are to be increased, the expansion should be in new rather than existing product lines.

If these views persist and are unfounded, they could lead to a mis-allocation of resources; therefore, it is of importance to consider the following questions. First, has there been a secular deterioration of the commodity terms of trade of the underdeveloped countries in the post-war period? Second, is diversification of exports likely to stabilize export earnings?

The Terms of Trade Hypothesis

As Bo Sodersten has shown, movements in the terms of trade depend on the growth rates of the export and import-competing sectors, on the marginal propensity to consume exports and imports, and on the supply and demand elasticities with respect to changes in the relative price structure.[3] For example, consider a two country model where Country 1 has its growth largely confined to its export sector and Country 2 expands mostly in import-competing lines of production. Assuming demand conditions the same, Country 1 will experience deteriorating terms of trade. How much the country's terms of trade will decline depends on her ability to shift resources and adapt demand in response to changes in the relative price structure. The greater the degree of adaptability (as measured by supply and demand elasticities), the smaller the change in the terms will be.

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[3]Sodersten, op. cit., p. 16.

In such cases, demand conditions play an important role. Suppose that demand for Country 2's exports is growing more rapidly than demand for Country 1's exports. If we assume that growth is neutral, i.e., the weighted growth rate is the same in both the export and import sectors in the two countries (and between countries), the terms of trade will go against Country 1. On the other hand, if Country 1 has a lower growth rate of exports than Country 2, the terms of trade of Country 1 may improve.

Sympathetically interpreted, the core of the argument by Singer, Prebisch, and others is that growth in underdeveloped countries is largely confined to the export sector, that the demand for exports from underdeveloped countries is growing less rapidly than the demand for exports from developed countries, and the degree of adaptability in underdeveloped countries is low.[4] If in the real world it is found that the values for the respective growth rates, elasticities, and propensities are close to those (implicitly) postulated by Singer and Prebisch, the underdeveloped countries will experience a long-run deterioration in their terms of trade.[5]

To test the hypothesis that the commodity terms of trade of

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[4]As we have seen, their arguments are loosely formulated and include, for example, theories about the effects of market forms and labor unions on the terms of trade. As Sodersten has shown, "there is no need for deep and impenetrable theories, nor do we have to resort to theories of conspiracy among the rich; a careful application of established neo-classical theory will do." Ibid., p. 181.

[5]If underdeveloped countries are plagued by such a deterioration, they may remedy the situation by changing the three restrictions. That is, they may seek to make growth less export-biased and try to increase the adaptability of their economic systems. However, the countries can do little about the slow growth of foreign demand for their exports although representatives of underdeveloped countries have urged that their exports be given trade preferences.

underdeveloped (developed) countries inevitably decline (improve), the commodity terms of trade of the countries involved were computed using existing export and import price indices published by the United Nations.[6] After calculating the terms of trade of the sixty-two countries in the sample, the countries were divided into two groups--developed and underdeveloped--on the basis of per capita income. Although the division was arbitrary, trial manipulations of the data did not materially affect the results.

The commodity terms of trade of each group of countries were aggregated into single indices using, in turn, the unweighted mean and median and weighted mean of each group. The aggregate indices reveal no clear trend over the 1948-1964 period for either the twenty countries classified as developed or for the forty-two countries classified as underdeveloped although the terms of trade of the underdeveloped countries decline after 1954. However, they never reach a point as low as in 1948-1949 and actually increase once again in 1963 and 1964.

If individual countries within each group are examined, it is true that the terms of trade of some underdeveloped countries have declined; however, the terms of trade of others have improved. Similarly, while the terms of trade of some developed countries have improved, the terms of trade of a number of developed countries have declined. Thus, there seems to be no uniform trend among the

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[6]No attempt was made to improve the data although a number of countries were excluded from the sample because of inadequacies in the data. If the data are biased, however, some evidence suggests that elimination of the bias would strengthen rather than weaken the conclusion.

underdeveloped and developed countries over the 1948-1964 period.[7]

If only the 1954-1964 period is examined, both the aggregate indices and an examination of individual countries within each group tent to confirm the hypothesis. However, many of the underdeveloped countries' terms of trade reached a peak during the Korean War and declined thereafter; hence, it is uncertain whether the recorded trends were a measure of the alleged secular deterioration of the commodity terms of trade or a more or less natural adjustment following the Korean War.

In view of the results obtained here and in the studies cited in Chapter I there is little evidence to suggest that the commodity terms of trade of underdeveloped countries inevitably decline. Indeed, there is much more diversity of experience than can be accounted for by such a hypothesis.

As an alternative to dividing the countries into developed and underdeveloped groups, the countries were considered individually and the commodity terms of trade of each country examined. In so doing, it was possible to test a hypothesis postulated by Charles P. Kindleberger. According to the hypothesis, movements in the commodity terms of trade are related to the stage of a country's development with the most developed countries expected to experience the most favorable terms of trade over time and the least developed countries the most unfavorable.[8]

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[7]This is substantiated by examining the percentage changes in the terms of trade of twenty-six countries from 1937 to 1963-64. Since the aggregate indices provided by the United Nations show no change from 1963 through 1966, the argument could presumably be extended through 1966.

[8]In the terms of trade controversy, Kindleberger has singled out

To allow for more than two stages of development, the countries which displayed statistically significant trends in their terms of trade over the 1948-1964 period were ranked by their regression coefficients and by per capita gross domestic product in, alternatively, 1958 and 1963. Spearman rank correlation coefficients were calculated between the series; however, in each case the coefficient is not significant. Thus, there appears to be no significant relationship between the stage of a country's development and movements in its terms of trade.[9] However, if only the 1954-1964 period is considered, the rank correlation coefficients are significant indicating a positive relationship between the stage of a country's development and movements in its terms of trade.[10] However, as discussed earlier, use of the 1954-1964 period may lead to biased results; hence, the hypothesis is taken as unproven.

Although the Kindleberger hypothesis is not confirmed by the

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as the most important feature the ability of a country to transform and adapt itself. Adaptability (or flexibility) is important; the more flexible the structure of an economy, the easier it is to shift out of lines where price declines are not offset by productivity increases into lines where demand and price developments are more favorable. However, Kindleberger seems to be thinking only in terms of the flexibility of supply; flexibility of demand is also important. If the degree of adaptability on either the supply or the demand side is great enough, small adjustments in the terms of trade suffice to induce the economy to reach a new equilibrium with only small changes in the terms of trade. Under Kindleberger's hypothesis, the higher the stage of a country's development, the more adaptable supply will be.

[9]The countries were also ranked by percentage increase in their terms of trade over the 1948-1964 period and by per capita consumption in 1960. The resulting Spearman rank correlation coefficient was insignificant as were rank correlation coefficients between these and the other series.

[10]The same result is obtained if the countries are ranked in the manner described in the previous footnote.

evidence presented here, adaptability of supply (and/or demand) may be highly correlated with the stage of a country's development. This could be the case if other factors dominate differences in adaptability between countries to cause movements in the terms of trade opposite of those expected on the basis of differences in adaptability alone.

The results obtained by considering each country individually confirm the earlier results. As a consequence, the 1948-1964 period appears to offer little or no support to those who argue that the commodity terms of trade of underdeveloped countries inevitably deteriorate vis-à-vis the developed countries. Therefore, the recommendation that traditional exports should not be expanded but rather investment be allocated to other areas to create new exports or to reduce the country's dependence on foreign trade is not well founded. There may, of course, be other considerations to vindicate such a policy.[11]

This argument should not be construed to imply that underdeveloped countries do not have to consider export and import prices in planning for economic development. Obviously, they must do so. It implies only that there is nothing inevitable about the movements of export and import prices of countries classified by stage of development. In other words, it depends on individual situations and, as a result, the problem is similar to that of a firm which is contemplating expanding its output and must consider the impact of this change on the price it receives for its product.

A more relevant concept for countries concerned with financing

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[11] One example is the "infant-industry" case.

their economic development may be the income terms of trade since the concept provides a measure of a country's export-based capacity to import. To test whether the export-biased capacity to import of underdeveloped countries has grown as rapidly as that of developed countries, the income terms of trade of forty-eight countries were calculated for the 1948-1964 period. By dividing the countries into two groups, it was found that the average annual growth rate of the income terms of trade of the developed countries was significantly greater than that of the underdeveloped countries.

Despite this result, no obvious policy conclusions flow from it. For example, countries which pursue policies of import substitution will generally find that their income terms of trade improve slowly over time. However, it cannot be concluded that aid to these countries should be increased because these countries will presumably have less "need" to import goods from abroad. Moreover, the income terms of trade concept relates only to a country's export-based capacity to import, not to total capacity to import which includes foreign aid and other items.

The Export Concentration Hypothesis

The second hypothesis--that export earning instability is related to export concentration--was examined in Chapters III, IV, and V.[12] Chapters III and IV were devoted primarily to an examination

[12] As we have seen, the second hypothesis is related to the first. For example, diversification of exports, undertaken in order to stabilize export earnings, will ordinarily have an impact on the future stream of export earnings. However, little is known about the relationship between instability and trend. At any rate, the relationship would appear to vary from country to country.

of instability in international trade over the 1948-1964 period with several important conclusions. First, the recorded degree of international economic instability depends to a large extent upon the method of measurement. In almost all cases, use of a method which made only a crude correction for trends produced results showing greater instability in international trade than if the trend-corrected method was used. Presumably, the relevant measure would be the series compiled by use of the trend-corrected method. Second, in all but one case--import prices--fluctuations in international trade tended to be significantly greater in underdeveloped than in developed countries. The other cases included fluctuations in export earnings, export prices and volume, import volume, and the commodity and income terms of trade. Third, fluctuations in export earnings may be harmful. They may generate fluctuations in national income and employment, discourage investment in the export sector (resulting in a mis-allocation of resources), and cause balance of payments problems. If instability is harmful, the underdeveloped countries are presumably in a more difficult position because they are subject to more instability than developed countries.

Any number of explanations could be offered to account for the greater instability of underdeveloped countries. One possibility is, of course, that instability is related to export concentration. It appears that the exports of most underdeveloped countries are concentrated heavily in one or a few commodities while exports of the developed countries are more evenly distributed over a wide range of commodities; hence, fluctuations in a country's export earnings may be directly related to export concentration. If so, underdeveloped

countries may succeed in stabilizing their export earnings by diversifying their exports. If not, other approaches to the instability problem are necessary.

On an a priori basis the hypothesis seems plausible since if a country's exports consist primarily of one good, any change in the export earnings of that good constitutes about the same change in the country's export earnings as a whole. The larger the number of goods exported by the country or the more evenly resources are divided among the goods produced for export--or, in short, the lower the degree of commodity concentration of a country's exports--the more likely it is that changes in export earnings of individual exports will tend to offset each other, thereby stabilizing the country's export earnings as a whole. Of course, the ultimate source of international economic instability lies in those factors which affect demand and supply, not export concentration per se.

The relationship between instability of export earnings and concentration of exports by commodity was tested in Chapter V by using regression analysis with the instability indices developed in Chapter IV as the dependent variable and several measures of concentration (based on United Nations data for 1963) as the independent variable. The conclusion, based on a sample of thirty-three countries, is that there is a significant (positive) relationship between instability of export earnings and export concentration by commodity; hence, diversification of exports should, in general, lead to a reduction in export instability. Nevertheless, the size of the coefficients indicate that the amount of stabilization obtained from any given reduction in export concentration is likely to be small although such

a policy may be quite effective for certain countries.

Several other hypotheses relating to the instability of export earnings were tested in Chapter V. First, is there any relationship between instability of a country's export earnings and concentration of exports by geographical regions? Second, is there any relationship between instability of a country's export earnings and the ratio of a country's exports of primary products to its total exports? On an a priori basis, these hypotheses seem plausible. In the former, if a country ships the bulk of its exports to one market, it would, of course, be highly sensitive to changes originating in that market whereas countries exporting to a wide variety of markets would not be particularly sensitive to changes originating in any one market. In the latter, fluctuations in export earnings may result from the export of primary products as opposed to industrial products, since the exports of primary goods may fluctuate more violently than exports of industrial goods or, alternatively, the earning time paths of primary products may be more intercorrelated than those of industrial goods or industrial goods and primary products.

Both hypotheses were tested in Chapter V using regression analysis. The results, based on a sample of thirty-three countries, indicate that there is no significant relationship between instability of export earnings and either concentration of exports by geographical region or the export of primary products. This result, which is consistent with earlier studies, indicates that, in general, diversification of exports in a geographical sense is unlikely to lead to any significant reduction in export instability although such a policy might be effective in certain individual cases.

Similarly, countries which export industrial goods appear to share the same instability problem as those which export primary products; hence, policies designed to export industrial goods in place of primary products will fail to provide a significant reduction in instability of export earnings. Nevertheless, it should be noted that primary producing countries do have a problem with instability since these countries generally have more highly concentrated exports. However, the solution is diversification, not necessarily industrialization.

APPENDICES

APPENDIX I

THE COMMODITY TERMS OF TRADE OF SIXTY-TWO COUNTRIES DURING THE POST-WAR PERIOD[a]

COUNTRY	PERIOD COVERED	THE COMMODITY TERMS OF TRADE, 1958 = 100																
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Argentina	1951-1964	---	---	---	137	110	123	119	114	99	92	100	110	111	108	101	102	108
Australia	1948-1964	140	141	186	183	139	155	142	126	125	128	100	106	103	103	104	116	117
Austria	1948-1964	117	116	104	97	104	89	91	97	97	95	100	102	102	106	105	104	108
Belgium-Luxembourg	1948-1964	109	109	98	105	107	96	94	97	100	100	100	98	100	97	98	98	99
Brazil	1948-1964	37	45	79	79	76	84	113	100	95	98	100	92	86	83	71	73	89
Cameroon	1949-1962	---	74	80	95	78	81	110	101	85	86	100	96	89	81	80	---	---
Canada	1948-1964	97	98	95	94	106	104	101	103	104	101	100	104	103	101	99	96	96
Ceylon	1948-1964	103	89	114	108	84	86	103	112	104	94	100	102	102	94	98	89	87
Chile	1948-1964	89	87	97	105	115	126	115	129	146	112	100	112	121	115	122	129	129
China: Taiwan	1952-1964	---	---	---	---	109	106	103	106	105	112	100	97	90	95	94	114	119
Colombia	1948-1964	74	83	100	101	105	113	137	119	117	118	100	85	87	83	79	80	93
Costa Rica	1948-1964	80	86	113	113	109	116	138	124	132	120	100	90	85	81	82	82	86
Cyprus	1950-1964	---	---	88	92	99	103	112	115	127	100	100	98	99	101	111	103	111
Denmark	1948-1964	106	112	99	87	95	98	102	100	100	94	100	106	103	101	104	104	105
Ecuador	1950-1963	---	---	130	117	116	117	134	111	111	106	100	100	91	83	79	75	---
El Salvador	1952-1964	---	---	---	---	112	111	141	125	120	119	100	86	83	78	71	72	78
Ethiopia	1953-1962	---	---	---	---	---	104	125	94	111	106	100	92	94	80	77	---	---
Finland	1948-1964	105	93	82	113	109	93	101	108	103	97	100	99	99	100	98	100	103
France	1948-1964	114	106	93	86	93	101	96	99	98	95	100	100	101	103	103	104	105
Germany, West	1950-1964	---	---	72	72	83	91	91	91	92	93	100	102	102	106	110	109	109
Ghana	1948-1963	64	52	71	77	71	76	112	97	76	71	100	91	78	61	57	60	--

APPENDIX I--Continued

COUNTRY	PERIOD COVERED	THE COMMODITY TERMS OF TRADE, 1958 = 100																
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Greece	1951-1964	---	---	---	93	86	85	88	95	98	94	100	92	92	95	98	112	107
Guatemala	1948-1962	74	82	112	118	118	118	143	131	144	129	100	82	85	81	81	---	---
Honduras	1948-1964	91	107	111	103	116	112	117	121	120	110	100	90	88	87	106	113	116
Iceland	1950-1963	---	---	102	87	87	93	97	100	97	94	100	102	99	110	118	119	---
India	1950-1964	---	---	107	125	102	97	105	104	104	94	100	108	111	112	113	109	107
Indonesia	1950-1961	---	---	145	148	108	107	114	128	113	116	100	130	109	108	---	---	---
Iran	1948-1964	84	74	68	65	58	67	72	74	97	101	100	94	90	88	85	85	85
Ireland	1948-1964	103	108	105	98	99	108	104	104	94	93	100	106	102	100	101	102	108
Israel	1950-1964	---	---	103	92	89	94	97	96	96	95	100	93	91	94	96	98	96
Italy	1948-1964	107	107	111	102	98	102	104	99	94	92	100	99	104	102	103	104	102
Jamaica	1948-1963	97	100	104	101	97	106	109	106	99	110	100	96	95	91	83	98	---
Japan	1950-1964	---	---	88	93	91	100	100	92	91	88	100	105	106	104	104	102	97
Kenya[b]	1954-1963	---	---	---	---	---	---	126	125	110	104	100	103	100	105	98	95	---
Malaya[c]	1952-1964	---	---	---	---	99	76	81	128	115	105	100	122	126	106	106	98	98
Mauritius	1948-1963	76	77	75	71	82	88	98	95	103	103	100	107	117	109	112	138	---
Morocco	1953-1964	---	---	---	---	---	87	92	94	97	95	100	92	97	96	93	99	86
Netherlands	1948-1964	112	109	102	97	98	100	100	101	100	98	100	103	102	103	103	104	104
New Zealand	1948-1964	104	111	142	141	105	124	128	128	123	117	100	118	112	106	110	121	130
Nicaragua[d]	1948-1964	75	80	100	126	116	116	147	124	128	116	100	89	90	85	85	89	97
Nigeria	1948-1963	84	87	92	102	100	98	117	105	97	96	100	107	103	96	92	92	---
Norway	1948-1964	95	96	90	101	99	94	100	102	100	98	100	103	102	102	102	100	102
Pakistan	1950-1963	---	---	219	231	193	137	150	137	121	117	100	97	114	155	113	109	---
Panama[e]	1948-1964	88	106	117	105	102	106	126	118	113	103	100	96	84	81	94	96	94
Peru	1950-1963	---	---	131	154	124	113	118	117	124	120	100	96	100	97	98	105	---
Philippines	1948-1964	133	114	122	114	92	117	110	101	100	98	100	106	103	92	92	90	90
Portugal	1948-1964	91	97	104	111	113	105	105	110	102	79	100	99	100	98	96	104	110
Rhodesia[f]	1952-1963	---	---	---	---	122	131	128	162	148	115	100	114	113	105	103	103	---
South Africa	1948-1964	104	108	128	129	112	118	108	107	109	109	100	102	99	99	99	96	102

APPENDIX I--Continued

COUNTRY	PERIOD COVERED	THE COMMODITY TERMS OF TRADE, 1958 = 100																
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Spain	1948-1964	110	127	113	112	96	102	106	98	100	98	100	101	100	97	107	110	100
Sudan	1953-1963	---	---	---	---	---	93	118	108	117	105	100	97	106	109	108	95	---
Sweden	1948-1964	104	94	90	111	104	99	98	99	98	96	100	100	101	102	99	99	98
Switzerland	1948-1964	99	107	111	97	99	101	101	100	96	95	100	101	101	103	105	106	108
Tanzania[g]	1954-1963	---	---	---	---	---	---	117	119	109	107	100	106	106	106	113	118	---
Thailand	1953-1964	---	---	---	---	---	79	81	96	97	95	100	107	109	104	109	110	108
Togo	1949-1963	---	72	103	115	101	116	145	110	84	86	100	102	95	91	84	97	---
Turkey	1950-1964	---	---	130	133	117	118	126	120	132	135	100	99	119	133	123	134	115
Uganda[h]	1954-1963	---	---	---	---	---	---	124	111	104	107	100	87	76	79	82	75	---
United Kingdom	1948-1964	96	96	90	80	85	90	91	89	90	94	100	100	102	104	106	105	103
United States	1948-1964	108	106	94	86	90	94	91	92	93	95	100	101	101	105	106	105	103
Venezuela[i]	1950-1964	---	---	95	83	85	93	99	98	94	100	100	91	88	87	78	73	71
Yugoslavia	1948-1963	118	98	95	100	107	88	93	96	100	97	100	99	101	100	102	100	---

[a]Calculated from: United Nations, Yearbook of International Trade Statistics (New York, various issues), United Nations, Monthly Bulletin of Statistics (New York, various issues), and International Monetary Fund, International Financial Statistics (Washington, D. C., various issues).

[b]Imports, c.i.f. transaction values, excluding port landing charges; exports, f.o.b. transaction values at the port of exit from Kenya, Tanganyika or Uganda, except for gold and silver (valued at gross amount realized on their sale overseas) and diamonds (valued as assesssd on the London market). Goods imported from abroad into any of the three countries mentioned above and then transferred to another are counted as imports of the country to which they are transferred but are valued c.i.f. first port of entry into the three countries.

[c]The data apply only to Malaya comprising the eleven States formerly known as the Federation of Malaya.

[d]Import price index is for United States exports to Nicaragua only. United States exports to Nicaragua amounted to 58.7 per cent of total Nicaraguan imports for the 1948-1963 period.

[e]Import price index is for United States exports to Panama only. United States exports to Panama amounted to 57.3 per cent of total Panamanian imports for the 1948-1963 period.

[f]Former Federation of Rhodesia and Nyasaland which was dissolved on December 31, 1963.

[g]The data apply only to Tanganyika. See footnote b.

[h]See footnote b.

[i]The export price and volume indices are based entirely on Petroleum exports. From 1950 to 1963, petroleum accounted for 93.5 per cent of total Venezuelan exports.

APPENDIX II

ESTIMATED LEVELS OF "REAL" CONSUMPTION PER HEAD IN 1960[a]

(UNITED KINGDOM = 100)

Country	Index	Rank	Country	Index	Rank
United States	140	1	Chile	27	26
Sweden	125	2	Yugoslavia	22	27
Canada	108	3	Cyprus	21	28
Australia	106	4	Greece	21	29
United Kingdom	100	5	Brazil	20	30
Switzerland	96	6	Colombia	20	31
New Zealand	95	7	Fed. of Rhodesia	18	32
Denmark	87	8	Malaya	18	33
West Germany	86	9	Mauritius	16	34
Norway	83	10	Turkey	16	35
France	75	11	Peru	13	36
Belgium	74	12	Morocco	13	37
Netherlands	73	13	Taiwan	12	38
Finland	67	14	Iran	12	39
Austria	66	15	Ceylon	9	40
Italy	53	16	Ecuador	8	41
Iceland	48	17	Ghana	8	42
Ireland	47	18	Thailand	6	43
Japan	46	19	India	5	44
Israel	45	20	Nigeria	4	45
South Africa	42	21	Indonesia	4	46
Argentina	39	22	Pakistan	4	47
Spain	34	23	Sudan	2	48
Venezuela	31	24	Ethiopia	1	49
Portugal	28	25			

[a]From: Wilfred Beckerman and Robert Bacon, "International Comparisons of Income Levels: A Suggested New Measure," Economic Journal, LXXVI (September, 1966), 533.

APPENDIX III

A COMPARISON OF THE COMMODITY TERMS OF TRADE OF TWENTY DEVELOPED COUNTRIES IN 1948-1949 AND 1963-1964

Despite the evidence of improving terms of trade in some of the countries over the 1948-1964 period, in only eight did the average of the last two years in the terms of trade index exceed that of the initial two years. In three countries there was virtually no change, while in the other nine countries, the average of the last two years was less than the average of the first two years. The results, shown in Table 31 below, are derived by calculating the average for the first and last two years in each country's index and then dividing the difference between the two by the average of the first two years. A plus (minus) sign indicates an increase (a decline) in the country's commodity terms of trade.

TABLE 31.--Percentage change in the commodity terms of trade of twenty developed countries: 1948-1949 to 1963-1964

Country	Per Cent	Country	Per Cent
Germany, West	+51.4	Sweden	- .5
Iceland	+25.4	Canada	- 1.5
New Zealand	+16.7	United States	- 2.8
Japan	+ 9.9	Italy	- 3.7
United Kingdom	+ 8.3	Denmark	- 4.1
Norway	+ 5.8	France	- 5.0
Switzerland	+ 3.9	Netherlands	- 5.9
Finland	+ 2.5	Austria	- 9.0
Ireland	- .5	Belgium-Luxembourg	- 9.6
Israel	- .5	Australia	-17.1

At first glance, the results obtained by the least squares technique and by comparing the average of the first and last two years in each country's index seems inconsistent. However, the indices of most of the developed countries fell off sharply during the first years of the Korean War and the remainder of the period was dominated by a recovery from this sharp decline. Consequently, the least squares technique indicates an improvement in the terms of trade of a number of countries while a comparison of the first and last two years in each index shows that a majority of the countries did not regain their earlier levels.

The results obtained by comparing the average for the first and last two years in each country's terms of trade index are largely dependent on the choice of the period under consideration. For example, if the first two years of each index occurred during the Korean War, more countries would have registered an improvement in their terms of trade when compared to the last two years. Hence, this approach may be inappropriate under the circumstances. The results do, however, suggest that the least squares technique may also be inappropriate.

APPENDIX IV

A COMPARISON OF THE COMMODITY TERMS OF TRADE OF THIRTY-ONE UNDERDEVELOPED COUNTRIES IN 1948-1949 AND 1963-1964

To a certain extent, the trends indicated by the least squares method may be misleading. If the averages for the first and last years in each index are compared, only fifteen countries out of thirty-one actually had lower average terms of trade in the last two years of the period under consideration. The change in the commodity terms of trade, obtained in the same manner as for the developed countries in Appendix III, is shown in Table 32 below. A minus (plus) sign indicates a decline (an increase) in the country's commodity terms of trade.

TABLE 32.--Percentage change in the commodity terms of trade of thirty-one underdeveloped countries: 1948-1949 to 1963-1964

Country	Per Cent	Country	Per Cent
Pakistan	-50.7	Ghana	+ .9
Ecuador	-37.7	Costa Rica	+ 1.2
Peru	-28.8	Guatemala	+ 3.8
Philippines	-27.1	Cameroon	+ 4.5
Indonesia	-25.9	Togo	+ 4.6
Venezuela	-19.1	Nigeria	+ 7.6
Argentina	-15.0	Iran	+ 7.6
Spain	-11.4	Colombia	+10.2
Ceylon	- 8.3	Portugal	+13.8
Jamaica	- 8.1	Honduras	+15.7
India	- 6.9	Cyprus	+18.9
South Africa	- 6.6	Nicaragua	+20.0

TABLE 32--Continued

Country	Per Cent	Country	Per Cent
Yugoslavia	- 6.5	Greece	+22.3
Turkey	- 5.3	Chile	+46.6
Panama	- 2.1	Mauritius	+46.6
		Brazil	+97.6

The reason for the divergence between the results obtained by the least squares technique and by comparing the average of the first and last two years in each country's terms of trade index is similar to that of the developed countries. During the first years of the Korean War, the terms of trade of many of the underdeveloped countries improved sharply; the rest of the period was dominated by a decline from the peaks reached during the War. Hence, use of the least squares technique indicates that many of the countries experienced declining terms of trade for the period as a whole. In many cases, however, the terms of trade never reached a point as low as in the initial two years of each index.

APPENDIX V

THE INCOME TERMS OF TRADE OF FIFTY-NINE COUNTRIES DURING THE POST-WAR PERIOD[a]

COUNTRY	PERIOD COVERED	THE INCOME TERMS OF TRADE, 1958 = 100																
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Argentina	1951-1964	---	---	---	100	54	102	107	89	85	85	100	112	114	101	134	141	140
Australia	1948-1964	100	112	158	146	100	142	129	114	123	144	100	126	120	143	145	177	187
Austria	1948-1964	25	30	41	42	44	51	63	75	88	100	100	109	123	138	145	153	168
Belgium-Luxembourg	1948-1964	56	61	60	75	72	70	75	90	100	98	100	111	124	126	142	158	183
Brazil	1948-1964	50	55	84	90	71	88	102	104	108	102	100	113	105	110	87	99	106
Cameroon	1949-1962	---	41	43	56	46	59	75	79	63	69	100	104	96	96	101	---	---
Canada	1948-1964	74	70	68	75	94	91	85	94	103	101	100	107	111	118	120	128	149
Ceylon	1948-1964	83	72	102	97	77	91	100	114	100	89	100	100	105	101	113	98	104
Chile	1948-1964	88	78	84	98	112	109	106	131	144	114	100	130	126	129	141	180	179
China: Taiwan	1952-1964	---	---	---	---	62	90	61	77	74	91	100	91	84	90	98	137	208
Colombia	1948-1964	66	77	89	99	104	136	152	131	117	112	100	102	99	90	95	95	114
Costa Rica	1948-1964	56	57	74	74	86	94	106	100	80	94	100	82	86	84	96	91	95
Cyprus	1950-1964	---	---	76	85	95	93	108	112	127	107	100	107	107	101	117	126	125
Denmark	1948-1964	36	49	57	58	60	69	78	83	83	87	100	114	119	122	134	147	163
Ecuador	1950-1963	---	---	65	60	83	77	104	94	95	104	100	110	111	91	101	110	---
El Salvador	1952-1964	---	---	---	---	76	78	92	96	96	118	100	101	102	101	115	128	145
Ethiopia	1953-1962	---	---	---	---	---	108	125	95	99	108	100	94	119	103	95	---	---
Finland	1948-1964	47	56	56	98	84	70	88	103	95	98	100	113	131	139	143	149	164
France	1948-1964	40	55	64	68	64	74	81	96	85	91	100	120	141	152	154	168	183
Germany, West	1950-1964	---	---	22	30	38	46	57	65	77	88	100	114	131	145	154	169	187
Ghana	1948-1963	58	55	79	78	70	81	110	93	83	86	100	109	110	107	105	104	---

APPENDIX V--Continued

COUNTRY	PERIOD COVERED	THE INCOME TERMS OF TRADE, 1958 = 100																
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Greece	1951-1964	---	---	---	39	46	57	65	77	77	87	100	89	90	101	115	133	137
Guatemala	1948-1962	67	66	88	85	96	100	112	113	129	118	100	98	107	104	103	---	---
Honduras	1948-1964	87	105	95	97	101	104	82	86	109	97	100	91	83	86	101	107	114
Iceland	1950-1963	---	---	51	61	52	63	79	80	94	87	100	97	105	114	146	158	---
India	1950-1964	---	---	103	120	91	89	99	109	105	104	100	115	112	118	126	138	145
Indonesia	1950-1961	---	---	120	145	108	107	117	127	118	127	100	121	107	118	---	---	---
Ireland	1948-1964	49	63	70	63	78	94	94	86	83	95	100	102	116	136	131	147	165
Israel	1950-1964	---	---	35	37	34	52	73	69	79	94	100	130	161	187	222	272	280
Italy	1948-1964	37	42	54	57	49	54	61	68	77	88	100	122	154	180	202	217	246
Jamaica	1948-1963	40	45	50	51	45	70	81	82	90	114	100	97	118	121	111	137	---
Japan	1950-1964	---	---	27	34	36	41	54	66	78	84	100	126	147	154	185	202	237
Kenya[b]	1954-1963	---	---	---	---	---	---	74	90	97	86	100	112	115	126	120	140	---
Malaya[c]	1952-1964	---	---	---	---	91	69	76	128	118	110	100	133	155	141	144	143	143
Mauritius	1948-1963	56	63	51	68	74	80	91	86	105	115	100	105	68	109	114	156	--
Morocco	1953-1964	---	---	---	---	---	76	83	97	95	91	100	98	109	99	102	110	106
Netherlands	1948-1964	27	39	51	54	60	68	78	86	88	90	100	115	131	135	144	155	176
New Zealand	1948-1964	85	93	115	102	99	106	109	114	115	110	100	128	120	117	125	146	162
Nicaragua[d]	1948-1964	29	29	48	63	75	79	103	134	101	115	100	101	77	73	103	121	151
Nigeria	1948-1963	56	68	75	78	81	89	111	99	102	97	100	129	121	135	137	141	---
Norway	1948-1964	49	52	64	80	72	70	86	90	100	99	100	118	125	133	140	155	182
Panama[e]	1948-1964	63	75	72	64	60	71	96	109	99	110	100	104	82	89	139	199	207
Peru	1950-1963	---	---	79	93	85	84	95	101	117	116	100	109	147	166	179	181	---
Philippines	1948-1964	59	54	74	78	70	83	87	87	99	90	100	105	109	95	104	126	129
Portugal	1948-1964	51	53	75	92	82	79	95	105	97	95	100	104	112	116	133	154	196
Rhodesia[f]	1952-1963	---	---	---	---	81	101	119	137	142	119	100	143	153	147	149	153	---
South Africa	1948-1964	49	51	68	76	66	75	86	98	106	112	100	115	116	124	128	128	136
Spain	1948-1964	70	82	97	109	82	101	103	95	96	95	100	112	168	164	169	168	208
Sudan	1953-1963	---	---	---	---	---	101	99	124	164	110	100	165	141	150	186	174	--

APPENDIX V--Continued

COUNTRY	PERIOD COVERED	THE INCOME TERMS OF TRADE, 1958 = 100																
		1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964
Sweden	1948-1964	52	54	64	82	68	72	78	83	90	96	100	108	123	131	138	150	165
Switzerland	1948-1964	51	55	63	68	66	75	79	86	91	97	100	113	125	133	145	156	171
Tanzania[g]	1954-1963	---	---	---	---	---	---	82	86	106	93	100	110	126	118	128	144	---
Thailand	1953-1964	---	---	---	---	---	72	71	99	106	114	100	119	134	152	155	160	204
Togo	1949-1963	---	38	71	106	76	113	176	147	83	82	100	143	119	156	133	136	---
Uganda[h]	1954-1963	---	---	---	---	---	---	87	92	86	101	100	91	86	83	84	99	---
United Kingdom	1948-1964	69	76	81	72	71	78	84	85	92	96	100	103	111	116	120	126	128
United States	1948-1964	82	83	65	75	81	88	83	85	102	110	100	99	113	118	124	131	145
Venezuela[i]	1950-1964	---	---	57	56	60	64	73	82	90	106	100	95	97	97	95	91	93
Yugoslavia	1948-1963	72	49	44	40	58	43	58	57	76	86	100	108	130	129	154	169	---

[a]Calculated from: United Nations, Yearbook of International Trade Statistics (New York, various issues), United Nations, Monthly Bulletin of Statistics (New York, various issues), and International Monetary Fund, International Financial Statistics (Washington, D. C., various issues).

[b]Imports, c.i.f. transaction values, excluding port landing charges; exports, f.o.b. transaction values at the port of exit from Kenya, Tanganyika or Uganda, except for gold and silver (valued at gross amount realized on their sale overseas) and diamonds (valued as assessed on the London market). Goods imported from abroad into any of the three countries mentioned above and then transferred to another are counted as imports of the country to which they are transferred but are valued c.i.f. first port of entry into the three countries.

[c]The data apply only to Malaya comprising the eleven States formerly known as the Federation of Malaya.

[d]Import price index is for United States exports to Nicaragua only. United States exports to Nicaragua amounted to 58.7 per cent of total Nicaraguan imports for the 1948-1963 period.

[e]Import price index is for United States exports to Panama only. United States exports to Panama amounted to 57.3 per cent of total Panamanian imports for the 1948-1963 period.

[f]Former Federation of Rhodesia and Nyasaland which was dissolved on December 31, 1963.

[g]The data apply only to Tanganyika. See footnote b.

[h]See footnote b.

[i]The export price and volume indices are based entirely on Petroleum exports. From 1950 to 1963, petroleum accounted for 93.5 per cent of total Venezuelan exports.

APPENDIX VI

INSTABILITY OF IMPORT VOLUME

Data in the form of import volume indices are available for forty-one countries accounting for 85.2 per cent of world imports.[1] The results, shown in Table 33 below, indicate that there is considerable instability in the import volume series at least in comparison with the import price series. The mean of the average year-to-year fluctuation, I_2, of import volume is 10.4 per cent while the mean of the trend-corrected average fluctuation, I_3, is 8.8 per cent.[2] The I_2 series ranges from 16.4 per cent (Australia) to 5.6 per cent (United Kingdom) and the I_3 series ranges from 15.8 per cent (Argentina) to 3.9 per cent (Costa Rica).

As in the case of export prices and volume, it appears that import volume fluctuates more than import prices (4.7 per cent) in the forty-one countries for which comparison is possible regardless of the method of measurement employed. On an individual basis, fluctuations, I_2, in import volume exceed those of import prices in every country; if the data are corrected for trend, fluctuations in import volume exceed those of import prices in every country except one--Norway.

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[1] The world total excludes Cuba, Indonesia, and the Sino-Soviet area.

[2] The simple correlation coefficient between the two series is .87. The standard deviation is 2.8 per cent for both series.

TABLE 33.--Two measures of instability of import volume in a sample of forty-one countries, 1948-1964

Country	Average Year-to-Year Fluctuation, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation, Per Cent I_3
Argentina[a]	15.9	15.8
Australia	16.4	13.2
Austria	11.0	9.6
Belgium-Luxembourg	7.4	5.5
Brazil	11.5	11.5
Canada	7.1	5.7
Ceylon	8.8	8.2
Chile	12.7	10.6
Colombia	11.8	11.7
Costa Rica	7.1	3.9
Cyprus[b]	10.2	8.3
Denmark	10.1	7.9
Finland	13.1	11.0
France	7.5	7.2
W. Germany[b]	11.6	6.4
Ghana[c]	11.8	11.2
Greece[a]	11.0	7.5
Iceland[d]	11.1	8.0
India[b]	13.8	12.3
Ireland	7.8	7.2
Israel[b]	7.7	7.3
Italy	11.8	9.6
Jamaica[c]	7.9	6.7
Japan[b]	15.9	11.6
Mauritius[c]	6.6	6.0
Netherlands	11.1	7.9
New Zealand	12.8	11.6
Nicaragua	12.0	11.0
Nigeria[c]	10.7	7.3
Norway	7.5	4.4
Panama	6.9	6.3
Peru[d]	14.4	12.0
Philippines	11.8	11.7
Portugal	7.3	6.8
South Africa	10.1	9.8
Spain	11.5	14.0
Sweden	8.6	6.5
Switzerland	11.2	9.1

TABLE 33--Continued

Country	Average Year-to-Year Fluctuation, Per Cent I_2	Trend-Corrected Average Year-to-Year Fluctuation, Per Cent I_3
United Kingdom	5.6	4.7
United States	6.8	5.9
Yugoslavia[c]	10.5	9.9

[a]1951-1964 [b]1950-1964 [c]1948-1963 [d]1950-1963

By dividing the forty-one countries into developed and underdeveloped groups, it is found that import volume fluctuated more in underdeveloped countries than in developed countries.[3] For the developed countries, the mean of the average year-to-year fluctuation, I_2, of import volume is 10.1 per cent while the corresponding mean for the underdeveloped countries is 10.7, a difference of six-tenths of a per cent. If the trend-corrected measure, I_3, is used, the mean for the developed countries is 8.0 per cent while the mean for the underdeveloped countries is 9.6 per cent, a difference of 1.6 percentage points. In the first case, the difference is not significant at the .05 level using a one-tailed test. The greater

[3]If the countries are ranked by per capita gross domestic product and by fluctuations in import volume, the relationship is, for the most part, substantiated. The Spearman rank correlation coefficient between the 1958 per capita gross domestic product series and the I_2 series is -.293 and between the former and the I_3 series is -.355. Based on a sample of forty countries, the coefficients are significant at the .05 level using a one-tailed test. The same results are obtained by ranking the countries by per capita consumption in 1960. However, if the countries are ranked by per capita gross domestic product in 1963, the rank correlation coefficients are not significantly different from zero at the .05 level using a one-tailed test. However, the sample size has declined from forty to thirty-four and this may account for the difference in results.

differential between the I_3 means is accounted for by the strong upward trend of import volume in developed countries; as before, the relevant comparison involves the trend-corrected measure. The greater instability in import volume in the underdeveloped countries may be the result of the greater instability in the income terms of trade of the underdeveloped countries.

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