

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY
Batch 52

1. SUBJECT CLASSIFICATION	A. PRIMARY	TEMPORARY
	B. SECONDARY	

2. TITLE AND SUBTITLE
The relation of foreign trade and economic growth

3. AUTHOR(S)
Hooley, Richard

4. DOCUMENT DATE 1969	5. NUMBER OF PAGES 106p.	6. ARC NUMBER ARC
--------------------------	-----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
NPA

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)
(In Working paper M-9493)

9. ABSTRACT
(ECONOMICS R & D)
(DEVELOPMENT R & D)

10. CONTROL NUMBER PN-AAD-244	11. PRICE OF DOCUMENT
----------------------------------	-----------------------

12. DESCRIPTORS	13. PROJECT NUMBER
	14. CONTRACT NUMBER CSD-753 Res.
	15. TYPE OF DOCUMENT

CSD-753 Res.
PN-AAD-244

THE RELATION OF FOREIGN TRADE AND ECONOMIC GROWTH

by

Richard Hooley

N-9493
February, 1969

THE RELATION OF FOREIGN TRADE AND ECONOMIC GROWTH

I. THE PROBLEM: GROWTH STIMULI AND GROWTH SEQUENCES	1
II. EARLY THEORIES	7
A. Classical Writers	7
B. Neo-Classical Writers	23
III. MODERN DEVELOPMENTS IN THE THEORY OF TRADE AND GROWTH	25
A. Macro-Models	26
B. Transmission of Markets	34
C. Vent for Surplus	41
D. Transfers of Capital	55
E. Transfer of Technical Knowledge	67
F. Dualism and Other Partial Theories	76
IV. SUMMARY AND CONCLUSION	88
APPENDIX: AN OPEN DUALISTIC MODEL	A1

I. THE PROBLEM: GROWTH STIMULI AND GROWTH SEQUENCES

Economists have been interested in the relationship of foreign trade to economic growth since the earliest days of the science. Smith, Ricardo and Malthus all considered this relationship from a number of different aspects. The attention bestowed by later economists on this question continues in an intermittent fashion, but has not been attended with conspicuous success. At the present time there is still no general agreement as to the nature of the relation.

In terms of quantity, the volume of literature on this question is truly enormous. For convenience, it is useful to view it as composed of (a) theoretical models of trade and growth--including under this heading both "partial" and "macro-type" models of a deductive character, (b) historical studies, and (c) empirical studies of a quantitative character. This paper will be primarily concerned with a review of the literature falling under category (a). However, some aspects of historical studies such as those of Berril,¹ Hughes² and

¹Kenneth Berril, "International Trade and the Rate of Economic Growth," The Economic History Review (Second Series, April, 1960).

²J. R. T. Hughes, "Foreign Trade and Balanced Growth: The Historical Framework," Papers and Proceedings, American Economic Association (May, 1959).

Kindleberger³ will be mentioned when they touch directly on hypotheses suggested by theory. The same is true of the empirical work of authors such as Chenery⁴ and Emery.⁵ The reason for giving primary emphasis to a review of theoretical literature is that until we can formulate a reasonably clear idea of plausible relationships between trade and growth on an abstract level, the significance of empirical results is very difficult to evaluate.

Even if one limits attention to deductive type models of trade and growth, the quantity of existing literature is still overwhelming. However, a very large part of this literature only appears to deal directly with the question at issue here--i.e. with specific ways in which foreign trade impinges on the rate of growth of output of a developing country which is a partner in trade.⁶

³ Charles Kindleberger, "Foreign Trade and Economic Growth: Lessons from Britain and France, 1850-1913," The Economic History Review (December 1960).

⁴ Hollis Chenery, "Pattern of Industrial Growth," American Economic Review (September, 1960).

⁵ Robert F. Emery, "The Relation of Exports and Economic Growth," Kyklos, XX (No. 2, 1967).

⁶ There are times when one prefers to substitute "growth of per capita output" for the phrase "growth of output," but it does not seem advisable to place excessive restriction on the scope of the inquiry at this point.

The crux of our problem here is to actually deal with the question that is to look for ways in which growth impulses are transmitted to the trading country through the foreign sector. One can be even more specific. These "impulses" may take a variety of forms--e.g., changes in demand, changes in production methods, changes in the structure of prices and changes in factor utilization, etc. We are interested, for example, not in what changes take place in the structure of prices of the developing country as a result of trade (a large part of the literature focuses on this), but on how these price changes affect the rate of growth.

It is not enough to note that a trading country will have certain structural features different from a non-trading economy. Obviously an open system will be different in structure from a closed one. The important question is how are these peculiarities in structure translated into unique growth sequences? In other words, how does the existence of foreign trade facilitate (or fail to facilitate) the transmission of growth impulses? Other matters, such as how a foreign sector arises, in what ways trade is financed, what goods are traded and so on, are only of peripheral interest to this paper until they can be shown to have a direct bearing on the questions posed above. That is to say, these other considerations must help us to conceive of trade activity as a vector affecting the rate of growth of output.

A common approach to the relation between foreign trade and development uses as its point of departure international trade theory.⁷ The idea of this approach is to show how the (static) theory of comparative costs can be utilized to explain certain growth situations within the context of foreign trade expansion. The persistence of this way of proceeding needs an explanation, in view of the fact that it is not clear how a theory of statics can help elucidate a dynamic growth sequence. First, the theory of trade is a highly developed part of a larger body of theory, and this makes it apparently easy to apply other static concepts to development phenomena as well. This "advantage" of a wide variety of theoretical tools is more apparent than real since the tools of traditional equilibrium theory are not well suited to the problem at hand.

Perhaps a more attractive feature of trade theory is its ability to provide guides for development policy. It cannot be denied that practical guidelines for development policy in an open economy can be obtained by application of the principle of comparative advantage.

⁷ See Gerald M. Meier, International Trade and Development (New York: Harper and Row, 1963).

Nevertheless, however valuable this may be in policy formation, it does not answer the main question at issue in this paper, which concerns itself with the nature of the relationship between trade and economic growth. Furthermore, it will be shown that the classicists approached the question of trade and development in a variety of ways. Only one of these approaches was from the standpoint of the principle of comparative advantage. At other times, they emphasized entirely different aspects of the relation - e.g., the effect of trade on capital formation, on expanding markets, on the level of employment, on the transfer of technology, and so on. In fact, one of the interesting results of this survey shows that most of the "modern" approaches to this question have their origin in the work of the classical writers. Of this entire school, the work of Adam Smith suggests itself precisely because his analysis emphasizes the dynamic elements in the trade-growth relation, not using a system in equilibrium as a point of departure.

This paper will survey the work of the classicists first. The most promising approaches to the trade-development problem will then be identified and contemporary literature bearing on these approaches will then be surveyed. Each contribution will be critically examined with the intention of drawing out its contribution to the general question at hand.

This survey cannot be exhaustive. The sampling of works is more in the nature of attempts to outline the main roads of current thinking. Moreover, since most of the writing in this field consists of fragments of analysis rather than finished pieces of theory, no neat "synthesis" can even be hoped for at this stage. What can be attempted, however, is to gain an overview of current thinking, see how it is related to past work, and perhaps obtain some suggestions of hypotheses for testing--or at least some hints of the directions to push--empirical work in order to obtain useful results.

To make a critical review of the kind being proposed here requires some idea of the important facets of the trade-growth relationship to use as a framework of analysis. For this purpose, a two sector open dualistic model is presented in the appendix to this paper.⁸ Some readers may want to turn to the appendix first in order to familiarize themselves with the analytical perspective of the author.

⁸With Forrest E. Cookson as co-author.

II. EARLY THEORIES

A. CLASSICAL WRITERS

It is well known that the classical writers were intimately concerned with the question of economic growth. Their concern with the effects of international trade on the growth process is, however, less appreciated. To be sure, the theory of comparative costs as developed by Ricardo and further refined by Mill is widely acknowledged to be their chief contribution to trade theory. Many writers have linked indissolubly the classical approach to trade to this one (static) doctrine however, they have gone on hastily to conclude that they had little to offer with respect to the question of the dynamic connection between trade and growth.⁹ However, it will be shown that the classicists took a number of approaches to the matter of trade and development and that, moreover, their work foreshadows most of the truly seminal modern approaches, at least in a rough way. The reason why this is often not fully grasped is that the early writers seldom dealt with the effects of trade on growth in a direct way and at no point in their work is there a section devoted to summarizing what might be called "the classical approach" to this question. Rather, they deal with the effect of trade

⁹ See Joseph E. Haring, "Dynamic Trade Theory and Growth in Poor Countries," Kyklos, XVI (Fasc. 3, 1963) and Hollis Chenery, "Comparative Advantage and Development Policy," in Surveys of Economic Theory II, (New York: St. Martins Press, 1965) pp. 126-27, for two examples of this view.

on growth as a kind of side issue to the main topic of growth itself. and consequently, their views appear in various places and present the reader with a somewhat disjointed appearance at first sight.

Let us begin by summarizing the main ideas of the classicists on this topic.

1. The Effect of Markets. Adam Smith held that the expansion of markets tended to bring about increased specialization, and that this in turn led to an increased demand for machinery and increased productivity of labor. For example,

The discovery of America...by opening a new and inexhaustible market to all the commodities of Europe...gave occasion to new divisions of labor and improvements of arts, which, in the narrow circle of ancient commerce, could never have taken place for want of a market to take off the greater part of their produce. The production powers of labor were improved, and its produce increased in all the different countries of Europe, and together with it the real ¹⁰revenue and wealth of the inhabitants.

In the above passage Smith left it ambiguous as to whether increased labor productivity was due primarily to labor or capital. However, inferences drawn from later classical writers, particularly Ricardo,

¹⁰ Adam Smith, An Inquiry into the Nature and Causes of The Wealth of Nations (New York: Modern Library, 1937), p. 416.

suggest that capital is the important factor. In this interpretation, the effect of trade on growth is to widen profit margins, which in turn directly raises productivity. The effects of innovation and increases in labor skills are given a secondary emphasis.

2. Vent for Surplus. Smith made no general assumption to the effect of full employment. In a number of places he consistently seems to have assumed underemployment. This is clear in the above passage when he refers to...the want of a market to take off the greater part of their produce.¹¹ It is not entirely clear whether he was thinking of underemployment of one or more factors of production. He specifically stated that capital tended to be unemployed. For example:

This continual increase of the rude and manufactured produce of those landed nations would in due time create a greater capital than could, with the ordinary rate of profit, be employed either in agriculture or in manufactures. The surplus of this capital would naturally turn itself to foreign trade and be employed in exporting, to foreign countries, such parts of the rude and manufactured produce of its own country, as exceeded the demand of the home market.¹²

¹¹ Ibid.

¹² Ibid., p. 636. It can be noted at this point that for consistency, this view of Smith requires the added assumption of fixed factor proportions. This is discussed more fully below.

In the view of Smith, foreign trade makes possible the employment of productive factors which would otherwise remain idle. When the employment of these factors becomes possible as a result of trade, the income of the society must be increased i.e., growth of real income takes place.

Malthus followed Smith on this point. He saw the effect of foreign trade to "immediately increase the value of...profits, without a proportionate diminution elsewhere." The increase in profits "...furnishes both the power and the will to employ more laborers" and other productive factors.¹³ In short, Malthus was emphasizing the effect of foreign trade in increasing effective demand, and through it, raising the level of output and capital formation. This idea was rejected by some other classicists. Ricardo denied that there was any direct causal relation between foreign trade and the rate of profit. Consequently, this could not affect the rate of accumulation or the level of output.¹⁴ Of course, this follows, from his assumption of full employment. What foreign trade does accomplish, however, is to bring about a reallocation of capital in favor of those industries where the country had a competitive advantage.

¹³ Thomas R. Malthus, Principles of Political Economy (New York: Augustus M. Kelley, 1964), p. 396ff. Italics his.

¹⁴ David Ricardo, The Principles of Political Economy and Taxation (London: J. M. Dent and Sons, 1911), pp. 77-80.

Mill joined Ricardo in denying validity to the vent-for-surplus idea, and for the same reasons.

3. Domestic Terms-of-Trade. Ricardo let foreign trade affect capital accumulation through the domestic terms-of-trade. In a key passage he states:

It has been my endeavor to show...that the rate of profits can never be increased but by a fall in wages, and that there can be no permanent fall of wages but in consequence of a fall of the necessaries on which wages are expended. If, therefore, by the extension of foreign trade, or by improvements in machinery the food and necessaries of the laborer can be brought to market,¹⁵ at a reduced price, profits will rise.

Ricardo is arguing here that foreign trade will increase real output by increasing the rate of capital accumulation if profits rise and wages decline as a result of importation of cheaper food and similar wage goods. This is obviously a domestic terms-of-trade argument, and Ricardo is the first of the classicists to recognize its importance.

4. Transmission of Technical Knowledge. Classical writers believed that foreign trade tended to stimulate innovation through the transmission of technical knowledge. Adam Smith referred to this in

¹⁵Ibid, p. 80.

a variety of places, but in one passage, while discussing the growth of the Chinese Empire, he becomes unusually explicit.

"The home market of China is, perhaps, in extent, not much inferior to the market of all the different countries of Europe put together. A more extensive foreign trade, however, which to this great home market added the foreign market of all the rest of the world; especially if any considerable part of this trade was carried on in Chinese ships; could scarce fail to increase very much the manufactures of China, and to improve very much the production powers of its manufacturing industry. By a more extensive navigation the Chinese would naturally learn the art of using and constructing themselves all the different machines made use of in other countries, as well as all the other improvements of art and industry which are practiced in all the different parts of the world. Upon their present plan they have little opportunity of improving themselves by the example of any other nation..."¹⁶

He goes on to argue that similar policies followed by the Indians have had the same results. Note that Smith specifies that foreign trade must be carried on in Chinese ships. He did not feel that the 'productivity' gains from trade could be obtained by use of a foreign nation's merchant marine.¹⁷

¹⁶ Adam Smith, op. cit., p. 645.

¹⁷ Ibid, p. 646.

Mill took a slightly broader view. He felt that foreign trade was the principle vehicle through which knowledge, both technical and otherwise, could be transferred from one society to another. He emphasized the value

...of placing human beings in contact with persons dissimilar to themselves, and with modes of thought and action unlike those with which they are familiar. Commerce is ...the principle source of this contact... Such communication has always been, and is peculiarly in the present age, one of the primary sources of progress.¹⁸

5. Demonstration Effect. Neither Smith nor Ricardo considered what effect foreign trade might have on the structures of domestic demand. However, Mill considers this explicitly in an unusual passage.

A people may be in a quiescent, indolent uncultivated state, with all their tastes either fully satisfied or entirely underdeveloped, and they may fail to put forth the whole of their productive energies for want of any sufficient object of desire. The opening of foreign trade, by making them acquainted with new objects, or tempting them by the easier acquisition of things which they had not previously thought attainable, sometimes works a sort of industrial revolution in a country whose resources were previously underdeveloped for want of energy and ambition in the people: inducing... [them] to work harder for the gratification of their new tastes, and even to save, and

¹⁸ John Stuart Mill, Principles of Political Economy, (New York: Augustus M. Kelley, 1961), p. 581.

accumulate capital, for the still more complete satisfaction of those tastes at a future time.

The shift in tastes to which Mill is referring could conceivably cause shifts in the demand schedules of all consumer goods, and therefore in the demand for capital goods and in the supply of savings as well. If this happens on a widespread scale, then foreign trade would indeed have an important impact on the structure of domestic demand in a country recently opened to foreign trade.

6. Transmission of Capital. Classical economists discussed the nature of short-term capital flows. This analysis, developed by Ricardo and Mill, assumes the existence of a gold standard. When the price of foreign exchange in the capital exporting country rises to the gold export point, gold flows from the lending to the borrowing country. This causes the price level in the lending country to fall, and that in the borrowing country to rise. This change in the relative price levels causes commodity exports of the lending country to rise and its imports to fall. This adjustment creates an export surplus on the trade account, and when the amount of this surplus equals the amount of lending, the exchange rate returns to equilibrium and the gold flow ceases.²⁰

¹⁹ Ibid, p. 581.

²⁰ Mill, op. cit., pp. 627-28.

Although they worked out a polished theory of short-term capital transfers, the classicists were never able to construct a really satisfactory theory of long-term capital transfers. Adam Smith, for example, held the rather curious view that trade would stimulate capital accumulation, but that the excess of capital not employed in domestic agriculture or manufactures, would all be employed in foreign commerce. For example, he states that

The extent of the home trade and of the capital which can be employed in it, is necessarily limited by the value of the surplus produce of all those distant places within the country which have occasion to exchange their respective productions with one another. That of the foreign trade of consumption by the value of the surplus produce of the whole country... That of the carrying, by the value of the surplus produce of all the different countries in the world. Its possible extent, therefore, is in a manner infinite in comparison of that of the other two, and is capable of absorbing the greatest capitals (my italics).²¹

In other words, Smith assumes that the slope of the investment demand function in foreign trade is virtually horizontal, and therefore its elasticity with respect to rate of return is infinite.²²

²¹Smith, op. cit., p. 354.

²²One can see here the origin of the Marxian theory of long term capital flows.

Ricardo took it as self evident that there can be no long-term private international capital transfers on any substantial scale. The "fancied or real insecurity of capital, when not under the immediate control of its owner," together with the distaste each man has to immigrate to other countries are the reasons he gives for this view.²³ Both Smith and Ricardo limited themselves to a discussion of the role of capital flows into foreign trade. But for Ricardo, the constraint is the institutional blocks to international mobility and not the horizontal slope of the demand for capital in foreign commerce.

Mill followed Ricardo in assuming private capital immobile between countries. However, he felt required by institutional developments to soften the Ricardian assumption of absolute immobility. He admitted that "capital is becoming more and more cosmopolitan" because there is "so much greater similarity of manners and institutions than formerly," at least among countries of the Western hemisphere. He held that capital will not emigrate "to countries still barbarous, or, like Russia or Turkey, only beginning to be civilized...unless under the inducement of a very great extra profit."²⁴

At the time Mill was writing, Western colonization was near its zenith. As is well known, colonization resulted in very substantial capital flows between the colony and the mother country. Mill held that

²³Ricardo, op. cit., p. 83.

²⁴Mill, op. cit., p. 573.

colonial areas "are hardly to be looked upon as countries...but more properly as outlying agricultural or manufacturing establishments belonging to a larger community." In the West Indies, for example, "...all the capital employed is English capital; almost all the industry is carried on for English uses." Hence the trade with these colonies "more resembles the traffic between town and country, and is amenable to the principles of the home trade!"²⁵ He points out these capital flows benefit the mother country by raising the rate of profit and supplying them with cheap food and other raw materials. It will benefit the colonies as well as the mother country to the extent that the productivity of factors is increased through emigration.²⁶

Mill's views on factor immobility are thus shown to be a substantial departure from Ricardo's. Mill admits such a large number of exceptions--highly civilized countries, quasi-civilized countries and colonies. However, with regard to a theory of private long-term capital flows, we are left with the simple assertion that where the differential in factor rates of return is sufficiently great, transfers will take place. Of the early economists it was only Marx who followed up the implications of Smith's analysis of the effects of foreign trade. Marx held that trade provided a market for the surplus output of developed countries, and gave them a temporary reprieve from stagnation. It did this by providing outlets for (long-term) capital flows to underdeveloped countries. The

²⁵ Ibid., pp. 685-86.

²⁶ Ibid., pp. 970-71.

importance of dominating foreign markets is equally important to the mature economies because it is through this means that the maximum surplus value is extracted from the colonial trade.²⁷

7. Slope of the Curve. Some classicists, like Ricardo and Mill, worked through their analysis on the assumption, not always explicit, of constant costs in non-agriculture. Smith, however, recognizes that industry may be subject to declining costs, and he uses this to explain long-term price declines in a number of manufacturing industries.²⁸ This idea is obviously important because it opens up a whole new set of possibilities whereby trade can affect both the tempo and the direction of domestic industrial growth. Indeed, it was not until Marshall that the significance of the concept was fully recognized.

8. Theory of Comparative Costs. This is the part of classical trade theory most widely known. It is concerned with explaining the magnitude and distribution of the gains arising out of foreign trade. This approach begins by assuming that the supply of productive factors and all production functions are given, and that full employment obtains throughout the trading economies. It then proceeds to analyze the pattern of production that emerges with the introduction of foreign trade. Under

²⁷ Karl Marx, Capital (New York: Modern Library, 1939).

²⁸ Smith, op. cit., pp. 242ff.

this theory, each country specializes in producing and exporting those goods in which it has a comparative advantage and in importing those goods in which it has a comparative disadvantage. The essence of this analysis is simply that when a country is opened to foreign trade, it shifts resources along a given production possibilities curve, selecting that point on the curve at which output is at an optimum. That point is defined as the tangent of the production possibilities curve with the country's indifference curve, the latter reflecting the country's demand curve for resources. In this way, the benefits of free trade are available to all participants in trade; i.e., free trade maximizes welfare in the sense that more of each commodity is produced than under any alternative arrangement. The manner in which the gains from trade are distributed among the trading partners is considered as the problem of the determination of the trade ratios. In general, the terms of trade are determined by the character of the offer curves of the two countries. As shown by Mill, and later by Marshall, the character of the offer curve is determined by the volume and elasticity of demand in the respective countries.²⁹

9. Summary of the Classical Views on Trade and Development.

Classical economics is an outstanding example of a dynamic, aggregative theory of growth. In elaborating this theory, classical writers gave attention to the influence of foreign trade on growth. This influence

²⁹Mill, op. cit., Ch. 17 and 18.

was seen as affecting trade in a variety of ways--by providing an expanding market, by providing a vent for surplus, by altering the domestic terms of trade between agriculture and industry, and so on.

However, the classical growth theory is essentially an analysis of the process by which a portion of the economic 'surplus' is devoted to capital formation.

Its analysis of the influence of trade on growth reflects this. Much of their analysis views the effects of trade as being transmitted through their effects on the rate of capital formation. For example, when Ricardo points out that foreign trade may alter the domestic terms of trade, the significance of this rests in the effect on the wage rate and, through this, on the rate of profits which, in turn, determines the level of capital formation and the level of income. In a similar way, it is possible to show that many of the classical 'approaches', which have been outlined above, tend to focus, either explicitly or implicitly, on the transmission of growth impulses from foreign trade to other economic variables through their effects on the rate of capital formation.

The classicists had a sophisticated theory of short-run international capital transfers. They did not, however, develop a satisfactory explanation of long-run transfers. This omission is the more unusual when we consider the emphasis that the classicists put on the role of capital in development. There are two apparent reasons for

this. First, some writers, like Ricardo, simply assumed that institutional obstacles to the free international flow of capital (and other productive factors) was so severe that a serious analysis of long-term capital flows was effectively precluded. Second, at the time the classicists were writing (beginning of the 19th century), the specialization among countries in the production of machinery and other capital goods had not yet made itself so clear.³⁰ Consequently the long-term capital transfers necessary to finance a trade of this type were also beyond their purview.³¹ In other words, commodity trade can take the place of trade in productive factors.

There is one final element in early classical thought on this relationship: its cumulative nature. Smith's remarks clearly suggest that the effects of trade on development are part of a multi-faceted interacting process. The sequence might be something like the following: an economy is opened to an expanding foreign market; output increases, unit costs fall and capital accumulation proceeds apace. Capital flows out into foreign commerce, and, together with the improved competitive

³⁰ The development of this specialization among countries has been documented with precision by Folke Hilgerdt. See his Industrialization and Foreign Trade (Geneva, League of Nations, 1945).

³¹ Clearly, a group of problems associated with exclusive dependence on imported machinery and modern technology, such as the problem of factor proportions, likewise received no attention. See Richard S. Eckaus, "Factor Proportions in Underdeveloped Areas," American Economic Review. (September, 1955).

position of industry, opens additional markets. Then the process is ready to repeat itself. The same cumulative character is apparent in the work of Marx and, to a much lesser extent, in the work of Malthus.³² It is, however, in the work of Ricardo and Mill that this cumulative element becomes all but lost. This peculiar shift in the direction of classical thought is much strengthened by a corollary development: the construction of the theory of comparative costs. The popularity of this theory is easy to understand. Its intellectual appeal rests upon the precision with which it deals with the subject matter of international trade. But because the theory is essentially static in nature, the price of this precision was the dynamic element in the trade-development relationship which was present in early thought.

³² Malthus sees the complexity of these relationships, but implicitly he deals primarily with the short-run. This necessarily softens some of the dynamic elements in the analysis.

B. NEO-CLASSICAL WRITERS

For close to a century, economics was dominated by the neoclassical school. These writers tended, as a body, to carry forward the classical approach with some minor modifications of substance and emphasis. Much of their writing on the subject of trade is conducted in static terms, reflecting their interest in the theory of comparative costs. However, they do discuss the relationship of trade and growth. Here their emphasis continues to be on the capital forming process, but with several distinguishing features. The tight connection between capital formation and population growth, which is implicit in the classicists' writings, is now broken. Hence, capital growth, which results not only in output growth but also in growth of output per capita, now becomes the main object of attention. Second, the role of the (real) rate of interest becomes important, perhaps we could say decisive, in the growth process. The rate of investment is inversely related with the rate of interest, so that a low interest rate is a necessary condition for rapid capital accumulation and the "capital deepening" that is associated with rapid per capita growth.³³ Trade helps to bring this about partly by increasing the sources of capital investment through international transfers, and partly by facilitating the transfer of technical knowledge--innovation--which further stimulates capital formation. Marshall also

³³ John B. Clark, The Distribution of Wealth. (New York: Macmillan, 1898).

adds that contact with modern economic institutions, which sometimes occur through foreign trade, tends to increase the alternatives to immediate consumption open to a person, thereby reducing the rate of time discount and increasing the volume of household saving.³⁴

The neoclassicists did not represent any important advance over the classicists in their theory of international capital flows. They did recognize, however, that long-term flows take place regularly between developed and underdeveloped countries, and they portrayed this in the form of a 'stage theory.'³⁵ In the early stages of development, a country is likely to be a net importer of long-term capital. As the country develops further, its net debtor position increases at first because of mounting interest charges. But gradually, as capital imports raise productivity and output, capital imports are reduced and the country passes into the later stages where it first becomes a young creditor, and still later a mature creditor. Thus, the country starts out as a net debtor and ultimately arrives at a position where it is a net creditor on the long-term capital account. Generally, the neoclassicists see this capital movement as financed through gold flows and international price adjustment, working through the balance of payments.

³⁴ Alfred Marshall, Principles of Economics, (New York: Macmillan, 1948), pp. 226ff.

³⁵ Knut Wicksell, Lectures on Political Economy II (London: Routledge and Kegan Paul, 1956), pp. 91 passim.

The neo-Classical view of development is highly aggregative. Hence the view of this school on the relationship of trade and growth are necessarily limited to consideration of those effects which impinge more or less on all sectors of the economy uniformly. Finally the neo-Classical approach treats development as a gradual process and lacks the cumulative element in the trade-growth process present in early classical writers.

III. MODERN DEVELOPMENTS IN THE THEORY OF TRADE AND GROWTH

Modern writers have been much concerned with further development of the pure theory of international trade. This theory continues to build on the twin achievements of classical theory--Ricardo's theory of comparative costs supplemented by Mills reciprocal--demand explanation of the terms of trade. More recently, the dominating developments in trade theory have been the elaboration of the Heckscher-Ohlin trade model,³⁶ which explain the structure of a country's trade in terms of its factor endowments, and the Stolper-Samuelson theorem,³⁷ which is concerned with sectoral income distribution effects of the imposition of tariffs. A large body of literature has grown up on these topics,

³⁶Bert Ohlin, *Interregional and International Trade* (Cambridge: Harvard University Press, 1935).

³⁷Wolfgang Stolper and Paul A. Samuelson, "Protection and Real Wages" in *Readings in the Theory of International Trade*, Ed. by Howard Ellis and Lloyd A. Metzler (Philadelphia: Blakiston, 1949).

including attempts to derive empirical verification, taking in the so-called Leontief paradox.³⁸

There is no doubt that the pure theory of international trade has been a considerable intellectual achievement. However, to the extent that it continues to interest itself exclusively with questions about the magnitude and distribution of the gains from trade, it is not relevant from the standpoint of this paper. Moreover, there are excellent surveys of recent trends in the pure trade theory literature by Haberler,³⁹ Caves⁴⁰ and Bhagwati.⁴¹

A. MACRO-MODELS

A recent development in trade theory has been the construction of models to show the effect of growth on trade. These models generally take the sources of growth--i.e. capital formation, population increase, technical progress--as autonomous, and proceed to investigate their effects on the volume of trade, the terms of trade, the trade-income ratio and so forth. Obviously, there are numerous possibilities. For example, if growth occurs in the supply of factors of production, and provided that

³⁸ Wassily Leontief, "An International Comparison of Factor Costs and Factor Use," American Economic Review (June, 1964).

³⁹ Gohfried Haberler, A Survey of International Trade Theory (Princeton: International Finance Section, Princeton University, 1961).

⁴⁰ Richard Caves, Trade and Economic Structure (Cambridge: Harvard University Press, 1960).

⁴¹ J. Bhagwati, "The Pure Theory of International Trade," in Surveys of Economic Theory (New York: St. Martins Press, 1965).

factor proportions remain unchanged in both trading countries, a situation emerges which can be easily represented by an outward shifting of the production possibilities curve. In this case, there is no change in the composition of trade.

Of course, the more common case is that growth in factor supplies results in changes in factor proportions. For example, an increase in labor supply relative to capital will result in a change in comparative costs of labor and capital. This sort of change, which Johnson speaks of as labor intensive (or "export biased," following Hicks), is distinguished by the relatively faster growth in capital supply which is treated as synonymous with "import biased." Innovations and changes in labor productivity are treated similarly; i.e., by classifying them into labor and capital intensive, respectively, and neutral.

Changes in consumption that occur as a result of changes in output can be handled in a similar way. If tastes remain unchanged after an increase in income, commodity prices will also be unaffected as will be the pattern of trade. But this is not likely; the income elasticity of different commodities is not identical. A common assumption is that the income elasticity of imports is greater than one while that for exports is less than one. This is the case of bias against exports. Reversing these elasticity coefficients gives the opposite result.⁴²

⁴²The basic model for this type of analysis can be found in Harry G. Johnson, International Trade and Economic Growth (London: Union University Books, 1958), ch. 3.

This literature is interesting, as far as it goes, because at least it recognizes that the results of trade theory are contingent upon assumptions about growth. The main body of this theory, however, does not concern itself with the effects of trade upon growth, or of the complex interactions whereby this "induced growth" in turn has repercussions on trade. For this reason, it represents a train of thought which will not be pursued further in this paper.⁴³

Recently there have been a scattering of essentially dynamic models put forth in the form of attempts to come to grips with one or more facets of the interaction of trade and growth. In an early article (1953), Johnson extended a Harrod-Domar type model to a two-country situation with international trade. Assuming that the rate of growth of the demand for exports is dependent upon the rate of growth of income in the other country, he asks what growth rate is required in the other country to maintain full employment? Under very restrictive assumptions, he is able to deal with the effects of changes in the terms of trade, in the exchange rates and with capital flows, as they are related to growth.⁴⁴

⁴³A general discussion of these models and a good bibliography of the vast literature can be found in Gerald M. Meier, International Trade and Development (New York: Harper and Row, 1963).

⁴⁴Harry Johnson, "Equilibrium Growth in an International Economy," in International Trade and Economic Growth (London: Union University Books, 1958).

A more ambitious, more complete model of trade and growth has been developed by Verdoorn. He begins by assuming a production function with fixed coefficients. He then focuses on the growth rates of real income, capital stock, labor, imports and exports. His model is dynamic because he considers the behavior of these variables over time. Equilibrium requires that the factor markets be cleared and that external accounts be in balance. He then investigates the possibility of stable values for these variables if all these conditions are met. For example, if the rate of saving is given and the terms of trade are constant, only one rate of growth of the labor force (and population) is consistent with full employment growth.⁴⁵ The general idea behind Verdoorn's theorizing is as important as it is straightforward. Fixed production coefficients directly relate the growth of output with the growth of each productive factor. A satisfactory growth path poses narrow restrictions on the growth of trade, and on changes in the terms of trade. Moreover, by using the simplifying assumption of fixed coefficients, it is possible to predict the effect at important points of the system by setting one or more of these parameters at arbitrary values.

Hans Brems has presented a model which has some similarities to those just described. He has a two-country system in which there is international trade in capital goods only. Total demand in each country

⁴⁵P. J. Verdoorn, "Complementarity and Long-Range Projections," Econometrica (October, 1956).

obviously arises, therefore, from consumer goods demand, demand for locally produced capital goods and finally, for foreign-produced capital goods. Brems develops a system of 52 equations which is solved to obtain two difference equations. He is intent on showing that there exists a large number of "good roots," such that the two countries settle down to similar growth rates, with corollary implications for the saving rates, and size of the two countries in terms of output.⁴⁶

A model developed by Bensusan-Butt tries to assess the main effects of trade on development, focusing on capital formation. It is a two-country many-commodity model, and each commodity can be made by two processes--one requiring only labor and the other a modern, capital-intensive process. Labor and services are immobile between countries, but goods and capital can shift, and 'transportation' costs are very small. An 'autonomous event' sets off capital formation in country A, and production begins in the industry where the marginal productivity of capital is highest. As capital formation proceeds in this industry, workers are driven out, the price of the commodity begins to fall, and the value of the marginal product of capital must also fall. This creates a comparative advantage for country A in this good; so international trade begins. Handicraft workers in the same industry in country B

⁴⁶Hans Brems, "The Foreign Trade Accelerator and the International Transmission of Growth," Econometrica (July, 1956).

are also driven out, moving to other industries where their marginal product is greatest. The goods from these industries are then used for foreign trade. As this sequence is repeated, Country B becomes increasingly specialized in labor-intensive industries and Country A in capitalistic industries. However, real income is rising in both countries, and presumably saving is also. Investment may begin to take place in Country B; capital transfers from A to B are also possible. Bensusan-Butt seems to assume that real income will remain higher in A than B throughout the process because capital formation began earlier there. A number of final equilibria can be conjectured for this model simply by altering assumptions slightly. While the author refers to it as "toy economics," it is at least a clear statement of one view of the process whereby trade and capital formation interact.⁴⁷

As Bhagwati⁴⁸ points out, trade in capital goods is a subject which has long been neglected by international trade theory. Recently, however, several models have been presented which explicitly reorganize the possibility of capital goods being produced and traded.⁴⁹ Along this line, a model of Baldwin⁵⁰ analyses the factors determining whether trade in capital goods will take place, and on what terms. Furthermore,

⁴⁷D. M. Bensusan-Butt, "A Model of Trade and Accumulation," American Economic Review (September, 1954).

⁴⁸J. Bhagwati, "The Pure Theory of International Trade: A Survey." Surveys of Economic Theory (New York: St. Martins Press, 1965), pp. 206ff.

⁴⁹Some of the more interesting ones are mentioned in ibid., p. 207.

⁵⁰Robert Baldwin, "The Role of Capital Goods Trade in the Theory of International Trade," American Economic Review (September, 1966).

his model also recognizes the impact of capital goods trade on the development process. Capital accumulation causes the capital importing country's production possibilities curve to shift outward, with obvious implications for the volume of saving and continued growth. While Baldwin's model is undoubtedly quite simple and in many ways unrealistic, the main point which it makes is quite important from the standpoint of this paper; i.e., that trade models in which capital formation occurs and in which capital goods trade takes place should replace the existing standard trade models in which commodity exchange is limited to consumption goods.

Another recent attempt to narrow the gap between trade theory and capital formation is that of Linder.⁵¹ He emphasizes the dynamic role of trade in terms of its multiplicative (leverage) effects on production capacity. By making capital goods available to the developing country, trade makes possible higher rates of investment there, which in turn lead to higher rates of saving and income growth. The problem, as Linder sees it, is that developing countries are required to import most of their capital goods for use in production processes where the proportions are fixed. This imposes a growing foreign exchange requirement as a result of higher levels of domestic investment. Meanwhile, an export maximum

⁵¹S. B. Linder, Trade and Trade Policy for Development (New York: Frederick A. Praeger, 1967).

exists, primarily owing to a lack of foreign demand for the principal exports of developing countries. The contribution of Linder is his focus on the role of trade in facilitating capital imports, and therefore capital formation. While he has tried to develop this idea on an analytical level, it seems that important prices of his analytical framework are left unspecified, and the plausibility of some of his initial assumptions (e.g. that advanced countries need to import only primary commodities)⁵² not easily verified by the existing empirical material.

This short description of dynamic models of trade and growth has not tried to be exhaustive. A more complete survey would include some discussion of Baldwin's model of the dynamics of capital and labor movements into nearby developing areas,⁵³ North's analysis of the impact of trade on regional income and investment,⁵⁴ and the model of trade and capital accumulation imbedded in the work of Lewis.⁵⁵ These models,

⁵²Ibid., p. 31.

⁵³Robert Baldwin, "Pattern of Development in Nearby Settled Regions," Manchester School. (May, 1956).

⁵⁴Douglas C. North, "Location Theory and Regional Economic Growth," Journal of Economic History. (June, 1955).

⁵⁵Arthur Lewis, "Economic Development with Unlimited Supplies of Labor," Manchester School. (May, 1954), and his "Unlimited Labor: Further Notes," Manchester School (January, 1958).

while interesting from the point of view of this paper because their authors actually try to deal with the interrelationships involved between trade and growth, are obviously of limited usefulness. One authority considers the efforts so far in this direction to be no more than "a few fumbling steps."⁵⁶ The problem of constructing a general model of trade and growth without having previously constructed successful partial models, is simply overwhelming. It is for this reason that the remainder of this paper will be devoted to some of the more promising approaches to a particular aspect of the trade-growth relationship. In the discussion, we will be especially interested: (1) in a clear statement of the basic relationships expressed or implied, (2) to point out what are the limitations such as ambiguities, apparent inconsistencies, etc. in each position and, (3) whether there are any empirical data which confirm or deny the theory.

B. TRANSMISSION OF MARKETS

We have already seen how Adam Smith viewed the role of international trade as a stimulant to development through its effect on market expansion of the domestic economy. The effects of market expansion in his view are twofold: the total volume of output and input

⁵⁶ Gottfried Haberler, A Survey of International Trade Theory (Princeton: Princeton University Press, 1961), p. 58.

is increased and productivity of one or more individual inputs is increased as well.

Nurkse was the first of the modern writers to apply and develop further this basic idea of Smith's. He held the view that in recent years the prospects for development through trade have become increasingly unfavorable because of a fundamental change in the economic atmosphere which took place from the nineteenth to the twentieth century.⁵⁷ In the earlier period the growth of the dominant economy, Great Britain, tended to transmit itself to the peripheral countries through more than proportional expansion in the demand for crude materials and foodstuffs. This, Nurkse argues, has changed. The United States is now the dominant industrial economy and is far less dependent on foreign sources of supply than Britain. In addition, substantial economies in the industrial uses of primary materials, the increased development of synthetics, and the shift of production towards heavy industries i.e., those with a small raw materials input, have tended to dampen the growth of demand for the exports of underdeveloped countries. He quotes a study by T. W. Schultz which shows that during the first half of the twentieth century the demand for primary products in the United States shifted annually an average of 2 1/2 per cent--a rate only a little more than that country's population growth.

⁵⁷ Ragnar Nurkse, Patterns of Trade and Development (Stockholm: Blumquist and Wiksell, 1959), p. 24.

One needs to add that the supply of productive factors in the underdeveloped countries is growing, a fact about which Nurkse was quite conscious. His argument then comes down to the conclusion that there is a deficiency of demand in these countries--as long as export demand is growing slower than factor supplies.

The bare bones of Nurkse's approach can be summarized in terms of characteristics of the demand for exports. Let the export demand for a particular primary commodity be written:

$$(1) \quad Q_D = \alpha_0 + \alpha_1 Y_M - \alpha_2 p$$

where Q_D is the quantity of a primary export demanded, Y_M is income in the importing (developed) country, p is the price of the commodity in question, and α_0 and α_1 are constants. Nurkse's argument can be reduced to the argument that income elasticity of the primary commodity is small. This is practically the same as saying that α_1 is small.⁵⁸ Obviously, if α_1 is sufficiently small, even large increases of Y_M will produce small increases in Q_D . Also implicit in this argument of Nurkse's is the assumption that the coefficient α_2 is very small. Otherwise, a minimal decline in price would have the effect of bringing about a large expansion of demand.

⁵⁸ Income elasticity of demand is given by

$$E = \frac{\partial Q_D}{\partial Y_M} \frac{Y_M}{Q_D} \quad \text{Only if } \frac{Y_M}{Q_D} = 1 \text{ would the coefficient } \alpha_1 \text{ have the}$$

same meaning as that attached to it in the text.

The question concerning the rate of growth of the demand for primary products becomes more important when it is recognized, Nurkse notes that factor supplies are actually expanding.⁵⁹ These considerations led him to conclude that the failure of primary exports to expand with sufficient speed produces unemployment among labor, capital and other productive factors. Actually, although Nurkse was either unaware of it or simply neglected to bring it out, this conclusion requires some important assumptions about the production conditions in primary producing countries,⁶⁰ which may not always be fulfilled. What Nurkse's analysis really does point up is that a deficiency of demand for the productive resources of a country may arise and persist in spite of the presence of international trade. The reasons for this deficiency are connected partly

⁵⁹ He called attention to the "entirely unrealistic" assumption of Ricardo who stated that factor supplies are fixed in supply. Nurkse, op. cit., pp. 34-35.

⁶⁰ Suppose, for example, that the elasticity with respect to world income of a particular primary commodity is designated as E_i . In order to deduce implications about the demand for productive factors used in the production of that commodity, we need to know its production function. Suppose that is given as $Q_i = N^\gamma K^{1-\gamma}$, a Cobb-Douglas function with N and K the labor and capital inputs. The rate of increase in the demand for labor, for, example, following a one per cent increase in world income, will be $E_i \gamma$, and for capital $E_i (1-\gamma)$. Now, if the natural rates of increase of labor and capital are N^* and K^* , then Nurkse's conclusion about unemployment assumes that $E_i \gamma < N^*$ and $E_i (1-\gamma) < K^*$. Both these conclusion depend, obviously, upon the values assigned to a number of variables and the assumption of specific conditions on the production function.

with the slow growth of income in the advanced country, and partly with the peculiar nature of productive relationships in the primary producing countries.⁶¹

Seers⁶² has presented a model that focuses on demand conditions as the primary variable explaining differences in growth rates among countries. He looks at an 'economy' comprising two countries that trade with each other--one a producer of primary goods, the other of manufactured goods. Expenditure curves for each of the commodities traded are given by the expression

$$X_i = \alpha_i + \beta_i Y$$

where X and Y refer to expenditure on the particular commodity and aggregate income of the economy, respectively, and α and β are coefficients. Necessities are defined as all those goods where α is positive: that is to say, they have a low income elasticity. Luxuries are goods where α is negative. He further assumes that the primary-product content of each commodity is constant--(i.e. the ratio of primary product inputs to output). Let this be denoted π . Then the income of the primary producers is

$$Z = \pi_1 (\alpha_1 + \beta_1 Y) + \pi_2 (\alpha_2 + \beta_2 Y) + \dots$$

⁶¹This latter point is considered later in a separate section.

⁶²Dudley Seers, "Comparative Rates of Growth in the World Economy," Economic Journal (March, 1962).

and the share of primary producers in total income is

$$\frac{Z}{Y} = \frac{1}{X} \Sigma \pi \alpha + \Sigma \pi \beta$$

It is easy to see that if (as in the case of primary products demand) α is positive and β is less than one, the fraction $\frac{Z}{Y}$, which is the primary producers share in income, must be declining.⁶³

Using this framework, Seers goes on to note that if population is growing more rapidly in the primary producing country, then there is reason to assert that disparities between income growth rates will be still greater when stated in per capita terms. Furthermore, he argues that the ratio of primary goods to final output (π) is probably slowly declining over time also as a result of development of synthetics, etc-- as Nurkse has pointed out. This sharpens further the disparity between rates of growth of income in the developed and underdeveloped countries. There is a possibility that changes in the terms of trade favorable to the primary producers may offset all or part of these adverse trends. But the data, as Seers sees them, point, if anywhere, in the opposite direction.⁶⁴

⁶³Seers presents a proof of this, which consists of showing that

$$d \frac{Z}{Y} / dt = - \frac{1}{Y^2} \cdot \frac{dY}{dt} \cdot \Sigma \pi \alpha$$

must be negative, because $\Sigma \pi \alpha$ is necessarily positive (because primary products are by definition necessities and, therefore, have positive α).

⁶⁴Seers, op. cit., pp. 65-66.

The analyses of Nurkse and Seers contain numerous points of similarity. Both stress the differences in the character of demand for primary and manufactured goods as being the main cause for the failure of stimuli from international trade to be transmitted with sufficient intensity to underdeveloped areas. Nurkse's emphasis is on obtaining full employment for the factors of production in underdeveloped countries, while Seers' focus is on differences in the rates of growth of income between the two. These differences are more apparent than real. If the rate of growth of productive factors is given in the primary producing country, then the extent of underemployment and the disparities in rates of income growth can be determined from either of these models. Further, both writers introduce statistical evidence to show the reasonableness of their assumptions. Finally, the main policy conclusion is essentially the same for both: that underdeveloped (primary producing) countries must turn to import substitution, and, in the longer run, to export of manufactures in order to participate fully in the growth-stimulant effects latent in international trade.

Not all economists would agree that exports from the underdeveloped economies are governed as closely by the growth of world demand as Nurkse and Seers imply. Some also would take issue on the policy implication that has been drawn--especially with regard to import substitution. Cairncross⁶⁵ has pointed out that when primary producers

⁶⁵ Alec K. Cairncross, "International Trade and Economic Development," Economica (August, 1961).

are in competition with industrialized countries, their share of the market depends on the terms on which they can compete, as well as in the growth of the advanced countries. This simply points up the importance of costs and productive efficiency. This aspect also has relevance to the policy implication with respect to import substitution. Expansion of production and, eventually exports, may be done by expanding either industrial or agricultural output. The real question, given the demand and cost functions for each, which route is more efficient? The Nurkse-Seers argument by-passes this question because these authors do not explicitly consider the supply side effects of the trade-development problem.⁶⁶ It is to some of the literature emphasizing the relationship between foreign trade and growth of production capacity that we now turn.

C. VENT FOR SURPLUS

We have already pointed out that Smith recognized a direct causal link between foreign trade and capital accumulation. This relation has been further developed by Myint⁶⁷ under the name of vent for surplus. Briefly, Myint's approach views growth as the response of an underdeveloped economy to expanding markets where the initial impetus can be traced to opening of the economy to foreign trade.

⁶⁶See footnote 34, p. 24.

⁶⁷Hla Myint, "The Classical Theory of International Trade and the Underdeveloped Countries," Economic Journal. (June, 1958).

Additional supplies of productive factors are combined in essentially traditional ways to achieve higher levels of output.

Myint argues that a number of tropical countries - particularly in Southeast Asia, - were "semi-empty" prior to their being opened to foreign trade with the West. They often had small populations compared to the size of their land and other natural resources. Myint states that when these countries were opened up to trade, this surplus productive capacity provided these countries with a means of increasing exports without the withdrawal of resources from domestic production. The notion of "idle labor" presents a difficulty in some of these countries because, while population was at that time small, there was no evident shortage of other factors. However, Myint argues that the surplus existed because of the absence of good communication and transport. As improvements in communications occurred, however, subsistence households were brought increasingly into contact with the foreign market. Under the influence of monetary incentives, these households began to generate a surplus of output beyond their own requirements which was available for export. This process continued and output expanded until all the lack in the resource base was taken up. At that point, says Myint, the use of resources for export began to compete with their use for domestic production, and a valid basis for a classical approach assuming fixed factor supplies was thereby provided.

The critical point in Myint's model is with regard to the question: why should there be unemployed resources in an isolated economy? Myint answers this question as follows:

...why should a country isolated from international trade have a surplus production capacity? The answer which suggests itself is that, given its random combination of natural resources, techniques of production, tastes and population, such an isolated country is bound to suffer from a certain imbalance or disproportion between its⁶⁸ productive and consumptive capacities.

The important phrase here is the one about a "disproportion between productive and consumptive capacities." Exactly what does it mean? We must remember that traditional trade theory would assume that even in an isolated country there would be an automatic adjustment process operating whereby consumers adjust their expenditures on available goods in such a way as to clear the market; and since entrepreneurs would be doing the same with productive factors, no unemployment could exist. Myint argues, on the contrary, that economic organization in the isolated country precludes such adjustments. He states:

...the economic framework in underdeveloped countries is a much cruder apparatus which can make only rough - and - ready adjustments. In particular, with their meagre technical and

⁶⁸Myint, op. cit., p. 323.

capital resources the underdeveloped countries operate under conditions nearer to those of fixed technical coefficients than of variable technical coefficients. Nor can they make important adjustments through changes in the output of different commodities requiring different proportions of factors because of the inelastic demand both for their domestic production, mainly consisting of basic foodstuffs, and for their exportable commodities, mainly consisting of industrial raw materials,⁶⁹

The net upshot of these special circumstances in which the isolated economy typically finds itself is that the country starts off "with a considerable amount of surplus productive capacity consisting both of unused natural resources and underemployed labor."⁷⁰

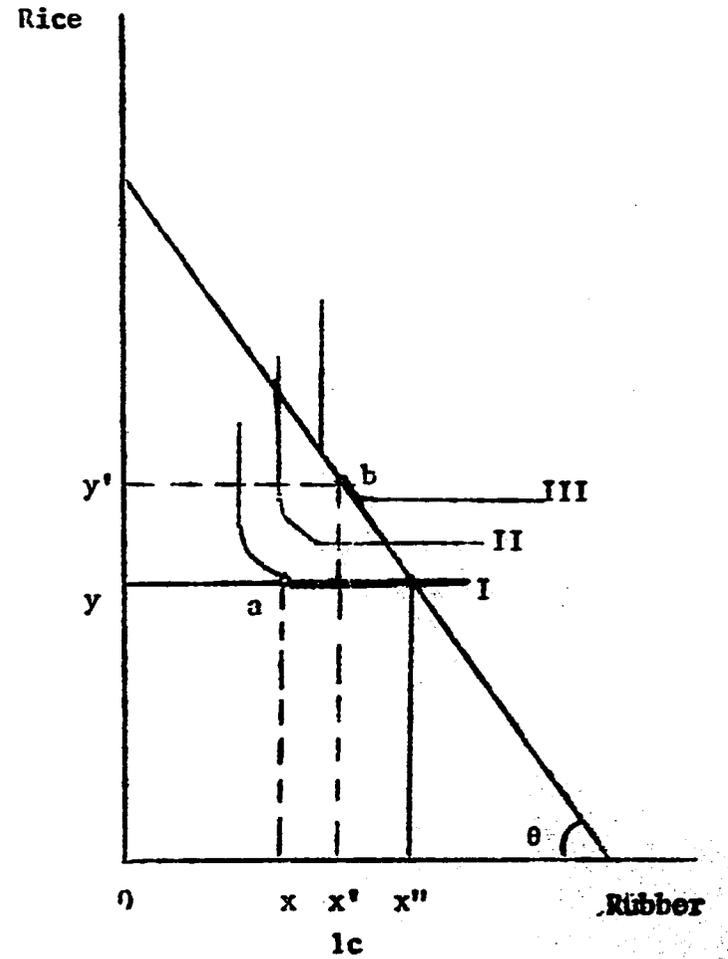
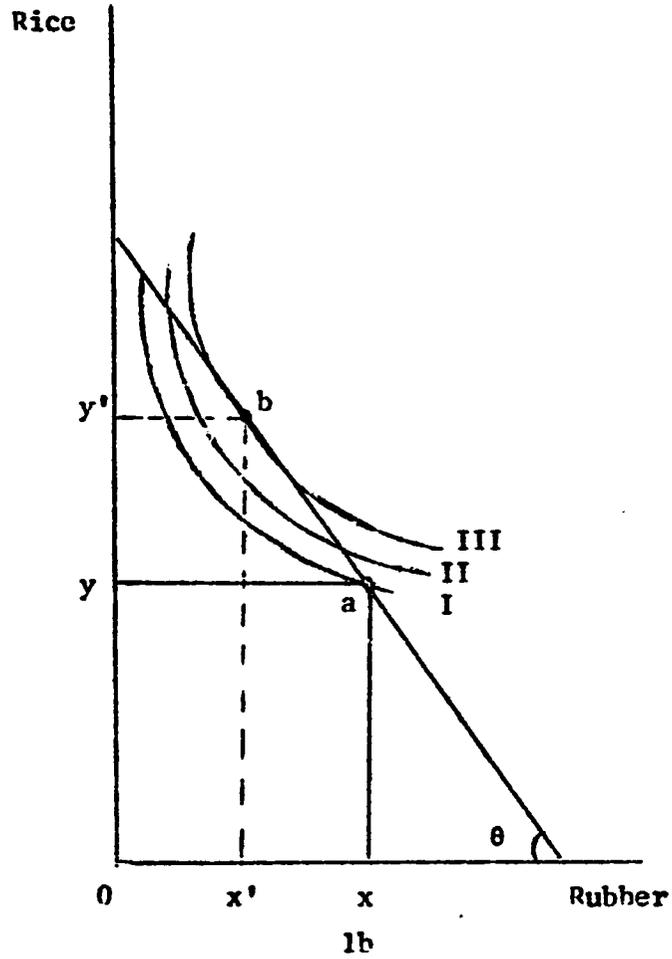
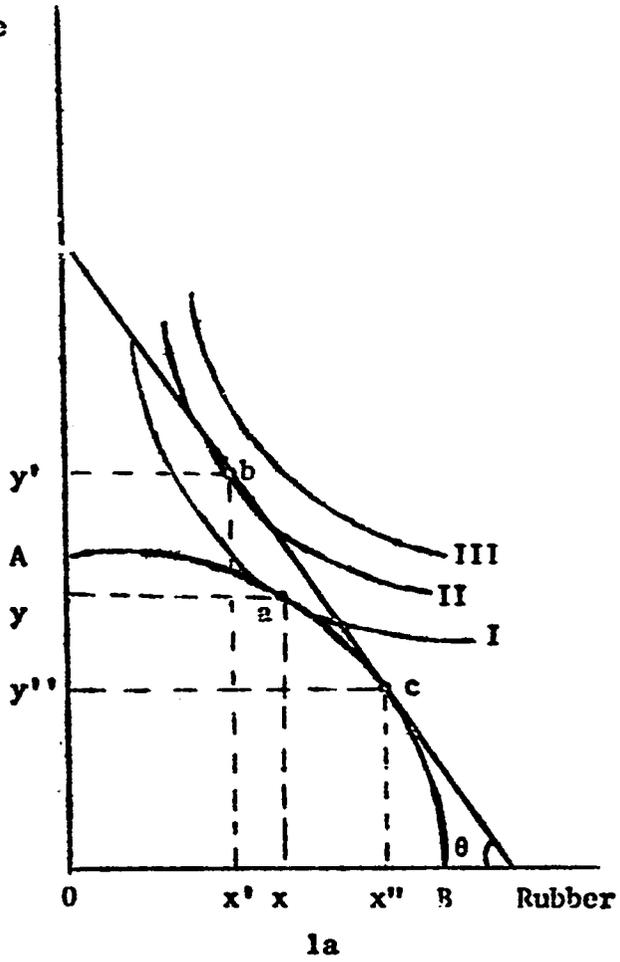
The analytical structure underlying Myint's argument can be considerably clarified with the help of diagrams. Under ordinary conditions, the effects of trade are shown in diagram 1a.⁷¹ The production possibilities curve given by the line AB defines a set of unique output levels of rice and rubber. Before trade, OY of rice and OX of rubber are produced and consumed, as indicated by the point of tangency (a) of the production possibilities curve with indifference curve I. Let this economy now be opened to trade, with the terms of trade indicated by θ . Production can now proceed in changed proportions-- OY' of rice and OX' of rubber. A portion of the rubber (X''-X') will be

⁶⁹ Ibid., p. 326.

⁷⁰ Ibid., p. 333.

⁷¹ I am indebted to Forrest Cookson for suggesting the basic form of the diagrams used in the discussion of this point.

Diagram I



exchanged for rice ($OY'-OY''$) with the result that the economy now consumes OY' of rice and only OX' of rubber. The gain is indicated by the shift from point (a) on indifference curve I to point (b) on indifference Curve II.

Consider next the situation in which we have a rectangular shaped production possibilities curve. This is shown in diagram 1b. A rectangular production possibilities curve of this nature implies (a) that the production functions for rice and rubber are characterized by fixed coefficients and (b) that factors are immobile. That is to say labor, for example, cannot shift from the production of rice to rubber, or vice-versa. Under these conditions, OY of rice and OX of rubber will be produced and consumed, putting consumers on indifference curve I before trade. Let the economy be opened to trade, with terms of trade indicated by θ . Rubber in the amount of $(X-X')$ will be traded off for rice of the amount $(Y'-Y)$, leaving consumers OX' of rubber and OY' of rice. By shifting from point (a) on indifference curve III, consumers improve their welfare. The important point to notice, however, is that there has not been any unemployment at any time either before or after trade. This shows that the most rigid production structure, taken by itself, cannot provide a sufficient condition for a vent-for-surplus model.

Diagram 1c portrays a situation in which both production and structure are rigid. More particularly, production functions for rice and rubber are assumed to be characterized by fixed proportions, and there is complete immobility of factors between the two commodities. In

addition, consumer preferences allow a trade-off between the two commodities over a very restricted range, as indicated by the elbow-shaped indifference curves. With full employment, the quantity OY of rice is produced and OX'' of rubber. However, the consumer indifference curve is tangent to the rectangular production possibilities curve at point (a); hence only OX of rubber will be consumed. The balance--i.e. X''-X--is a measure of the amount of unemployment.

Now assume the society is opened to trade, and let a straight line be drawn through the edge of the production possibilities curve at point (c) to form angle θ measuring the terms of trade. This segment passes through point b on indifference curve III. After introducing trade consumption, becomes OY' of rice and OX' of rubber. Consumers have improved their welfare by moving from point (a) on indifference curve I to point (b) on curve III.

The net upshot of this analysis is that Myint's reformulation of the vent for surplus thesis turns out to require some very restrictive assumptions. First, what he calls the "disproportion between... productive and consumptive capacities" in reality entails the assumption that both the production possibilities curve and the consumer indifference curves are elbow-shaped. Second, these production and indifference curves are tangent at a point where both are horizontal. Third, one must also assume that there is no mobility of labor between sectors. Finally, Myint's assumption about fixed production coefficients does not seem really necessary since the production possibilities curve must take on a

rectangular shape if the assumption about factor immobility between sectors is made.

The assumptions specified above should raise some questions about realism of the theory. For example, is it reasonable to assume complete factor immobility between sectors? Even if this is considered not too unrealistic in the short run, how about the long run? Again, are consumer preferences in subsistence agriculture as rigid as this model supposes them to be? Are there actually large ranges over which no substitution can be made between goods - i.e. even basic agricultural products and foodstuffs?

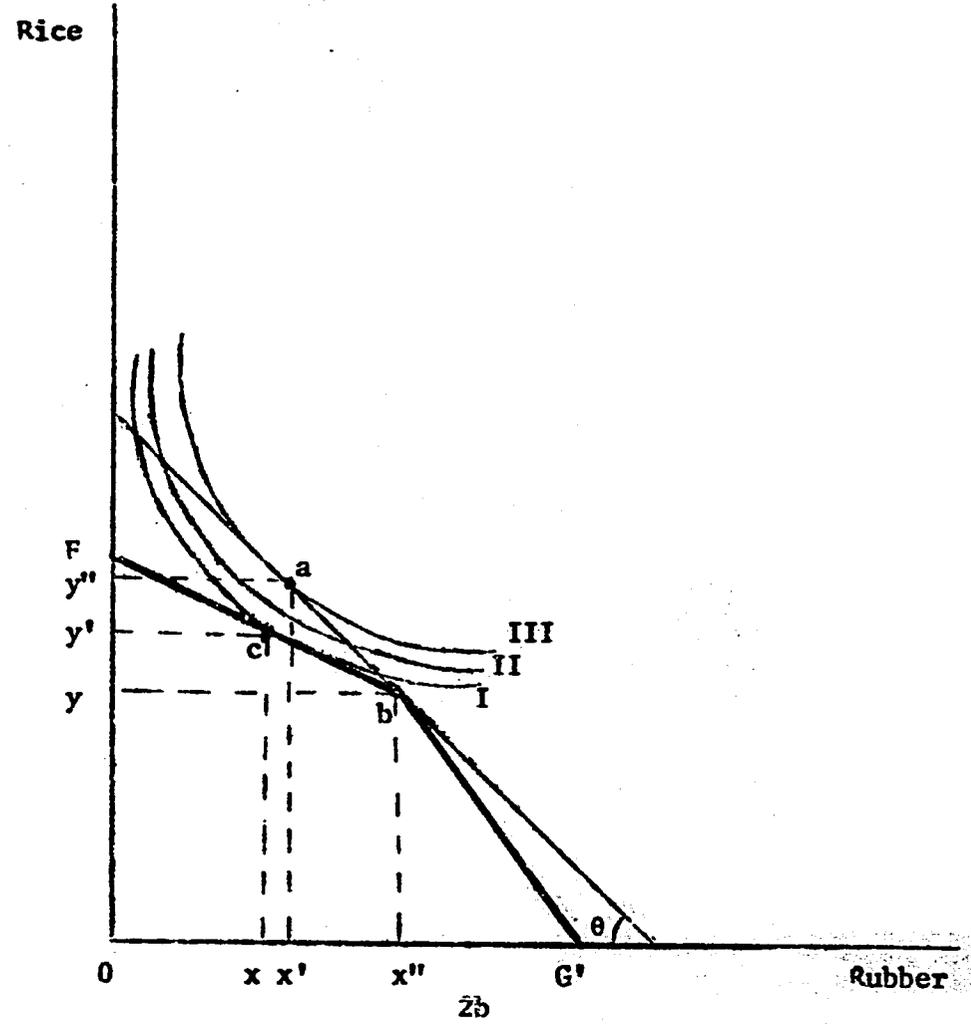
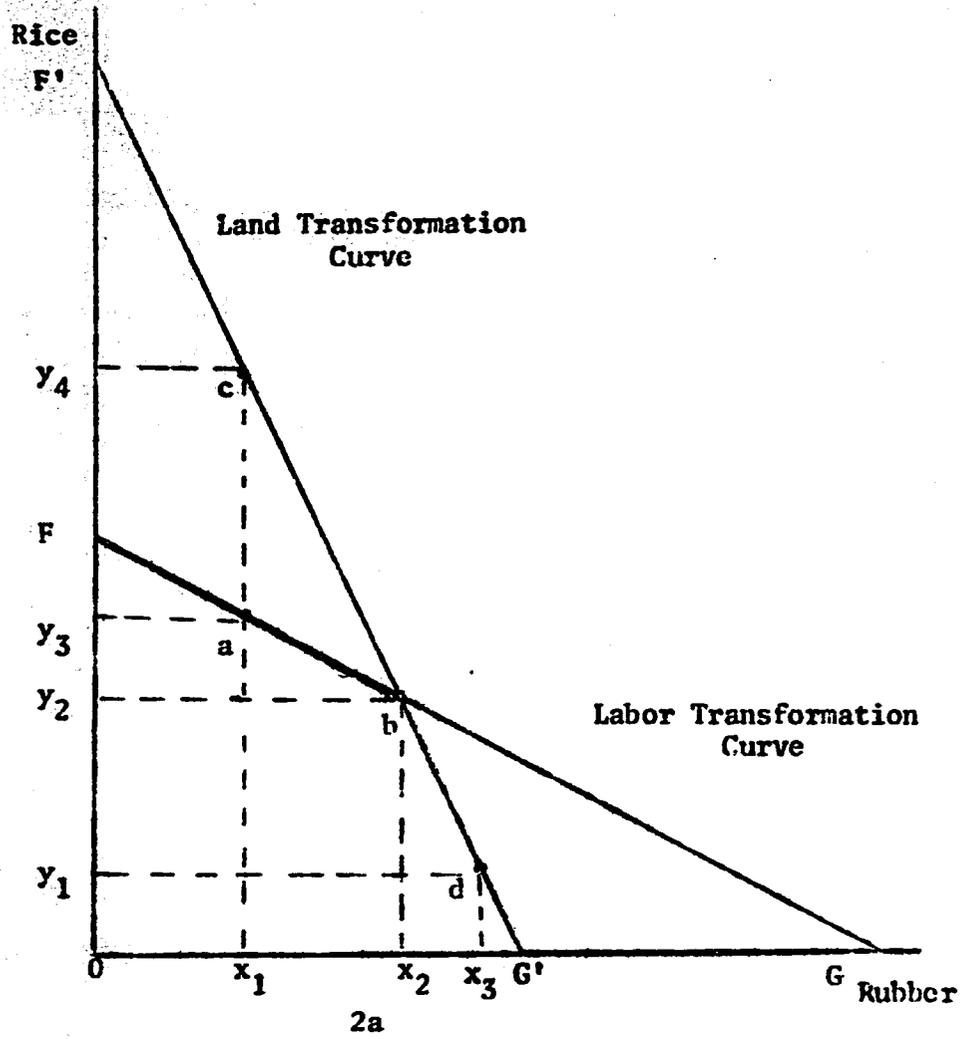
Myint confines his attention to the case in which a vent for surplus arises as a result of unemployment of both land and labor - i.e. of all productive factors. But a vent for surplus thesis can be built on the assumption of unemployment of just one productive factor. The advantage of this other approach is that it requires much less restrictive assumptions, especially about consumer behavior. Suppose that there is a two commodity economy--say rice and rubber--and that production of both commodities is characterized by fixed factor proportions. The various combinations of rice and rubber that can be produced are shown in diagram 2a below. Output of rubber and rice is measured on the X and Y axes, respectively. The varying amounts of rice and rubber that can be

produced with a given quantity of available labor input is shown by the line FG.⁷² That is to say, if most of the available labor is used in the production of rubber, we would be at a point such as point (a) on the transformation curve FG. If labor were shifted from rice to rubber, the output of rice would decline (from OY_3 to OY_2) while that of rubber would increase (from OX_1 to OX_2) as we move from point (a) to point (b). In a similar manner the land transformation curve shows the varying combinations of output of rice and rubber that can be produced as land is shifted from cultivation of one crop to the other. Thus point (c) indicates that an output of OY_4 of rice and OX_1 of rubber will be produced when most land is used for growing rice; while if most land is shifted to rubber, the quantity OY_1 of rice and OX_3 of rubber will be produced, as indicated by point (d).

Not all points on these transformation curves are relevant, however. Because we know that each productive factor is available in some given quantity, only the segments Fb and bG' are relevant. Thus, the actual transformation curve becomes the kinked line FbG'.

⁷²The reason why this transformation curve is a straight line is as follows. Consider L , the land input used in the production of two commodities. By definition, $L = L_1 + L_2$. Suppose that these two commodities (X_1 and X_2) are produced under conditions of fixed factor proportions. Then we have $L = l_1 X_1 + l_2 X_2$, where l_1 and l_2 are the (fixed) production coefficients for land in producing commodities X_1 and X_2 . From this it follows that $X_1 = 1/l_1 (L_1)$ where $1/l_1$ is the slope of the transformation curve.

Diagram 2



In diagram 2b, the transformation curve FbG' is shown as it intersects with consumer preference curves before and after trade. Note that before trade, consumer indifference curve I is tangent to the production possibilities curve at point (c). Point (c), however, is obviously to the left of point (b), and to that extent it reflects an underemployment of land. But let the economy be opened to trade, and the production mix be changed to point (b) on the production possibilities curve. Then full employment becomes possible, and consumers can move from point (c) on indifference Curve I to point (a) on indifference Curve III-- a gain which represents partly an increase in welfare of the traditional type and partly an increase in production due to the utilization of a previously idle factor.

The above explanation, which deals with unemployment of only one factor appears to have important advantages over the approach of Myint which deals with underemployment of all factors of production. It is particularly hard to understand why Myint dismissed this second type of vent for surplus without serious consideration.⁷³ In the first place, vent for surplus based on underemployment of one factor requires only one special assumption, i.e. fixed production coefficients. The version based on underemployment of both factors requires three special assumptions - i.e. elbow-shaped consumption indifference curves, tangency

⁷³Ibid., p. 323.

of the production possibilities curve and the indifference curves at a point outside the tip of the elbow, and perfect immobility of productive factors between crops. Thus, on the criterion of Occam's Razor, the second version is clearly superior. On the grounds of realism, it is also superior; it seems easier to justify fixed factor proportions than it is to justify the many rigid assumptions of Myint's version.

In any event, whichever version of the vent for surplus is adopted, the merit of the thesis comes down to its ability to help explain the rapid expansion of many small economies after being "opened" to trade on the basis of a perspective which emphasizes employment of previously idle productive factors in expanded production for export.

Another way of looking at Myint's model is as a particular case of a more general "vent-for-surplus" theory. This is the position taken by Richard Caves.⁷⁴ He agrees that trade can provide an outlet for the export of products which involve the services of zero-cost productive factors. If the zero-cost productive factor involved is a natural resource, then he calls it a "staple-type" vent-for-surplus; while if the productive factor involved is labor, he terms it an "unlimited labor type" vent-for-surplus. It is worthwhile following

⁷⁴Richard E. Caves, "Vent for Surplus Models of Trade and Growth," in Trade, Growth and the Balance of Payments by R. E. Baldwin et al, (Chicago: Rand McNally & Co., 1964).

through his version of the vent for surplus to get an appreciation of the specific ways in which trade registers its impact on growth.

In his staple version, Caves considers the development of trade between an industrialized country, with a given set of productive factors, fully employed, and an underdeveloped country in which natural resource deposits have been discovered recently. On the assumption that costs of production of this resource are lower in the underdeveloped than in the industrialized country, trade begins: raw resources are traded off for manufactured goods.⁷⁵ At this first stage, trade makes possible an increasingly polarized production pattern. He then introduces Kindleberger's⁷⁶ idea of trade as a "balancing sector"--i.e., trade becomes a device whereby the countries involved can avoid matching the structure of domestic supply with demand and instead concentrate production in that sector which appears most advantageous.

In contrast to Myint, who concentrates on the case of constant costs, Caves introduces increasing returns in the manufacturing sector. When increasing returns become manifest, then the increased polarization of production and consumption flows evident in the initial stage is reversed. Polarization is reduced because as the underdeveloped

⁷⁵ He also assumes throughout that all production functions in both countries utilize identical factor proportions with any given factor-price ratios. Ibid., p. 98.

⁷⁶ Charles P. Kindleberger, Foreign Trade and the National Economy (New Haven: Yale University Press, 1965), Ch. 12.

country's output (income) expands it becomes increasingly likely that some of the manufactured goods can also be produced there. In this way, the production and consumption flows of the underdeveloped area come into increased balance. But the supply of "idle" natural resources is not unlimited and therefore growth begins to slow down. In a similar fashion, Caves analyses the case when labor is the "idle" resource. A growth process, he says, begins for the underdeveloped region when an entrepreneur perceives that some manufactured goods can be produced there more cheaply than in the industrialized region. This process is repeated for other goods, and eventually the underdeveloped area has utilized all of its "idle" labor resources. At that point, its growth and the growth of trade slow down. In both the Myint and Caves models, it is clear how a once-over increase in productivity can take place--either by a change in factor proportions after the economy is opened to trade, or by a shift of the labor force out of the low--into the high--productivity sector.⁷⁷ Caves sees growth of the factor-using type "superimposed upon an underlying steady swell of neo-Classical growth [composed of] an increase in labor proficiency and technical knowledge."⁷⁸ However, these latter aspects of productivity growth are not integrated into his theory, and consequently we are entitled to discount them so far as his version of the vent-for-surplus theory is concerned.

⁷⁷Myint, op. cit., p. 320.

⁷⁸Caves, op. cit., p. 122.

D. TRANSFER OF CAPITAL

According to the classical tradition as embodied in Ricardo and Mill, capital flows between countries are analysed in terms of their effects on the balance of payments. An outflow of gold, for example, would be followed by an increase in exports and decrease in imports equal to the amount of the capital flow. The theory assumes that demand schedules in the trading countries have a high elasticity. Although the classicists generally assumed that capital flows took the form of gold flows, the theory is equally valid in the case of a paper standard, where equilibrium can be achieved in terms of fluctuation of exchange rates. Later writers, notably Marshall⁷⁹ and Wicksell,⁸⁰ following essentially in the same tradition, pointed out the effect that changes in money rates (bank rate) could have on capital flows. A final and important emendation to the traditional theory was suggested early by Bastable,⁸¹ and argued persuasively by Wicksell. It is that capital flows initiate shifts in the demand schedules of the trading partners. What they had in mind was not simply some ultimate transfer of commodities through changes in the barter terms of trade but also, in Wicksell's words,

⁷⁹ Alfred Marshall, Money, Credit and Commerce (London: Macmillan, 1923).

⁸⁰ Knut Wicksell, op. cit., Vol. II, Ch. 3.

⁸¹ As quoted in Carl Iverson, International Capital Movements (New York: Augustus M. Kelley, 1967), pp. 203-04.

"transfer of monetary buying power."⁸² This idea was further developed by Ohlin,⁸³ who emphasized the equilibrating effect of a shift in buying power from the lending to the borrowing country, making gold transfers and price changes unnecessary in the process of capital transfer.

The most important contribution to the theory of trade during the modern period is Mead's The Balance of Payments. He achieved a synthesis of income and price effects, which had previously been dealt with only in isolation. From this treatment, it became clear that the foreign exchange rate, the level of effective demand, and other relevant variables are mutually interdependent.

This very brief survey of classical and post-classical theory of capital flows is intended to make clear several important characteristics of thinking in this area. These are as follows: (1) consideration is limited essentially to short-term capital flows; (2) the attention paid to these flows is always within the context of an equilibrium situation, implicitly smothering growth considerations with capital movements as a mechanism of adjustment in the external accounts; and (3) the assumption of the classicists, but often made implicitly by

⁸² Ibid., p. 248.

⁸³ Bertil Ohlin, Interregional and International Trade (Cambridge: 1933).

modern writers as well, that capital movements are autonomous--i.e. that there is no connection between capital movements and economic activity in general.⁸⁴ The net upshot of this type of approach is that the role of capital flows in growth and development is not given serious consideration.

Nurkse⁸⁵ has remarked that economic theory tends inevitably to lag behind the actual course of events, but that in the field of international capital movements, this lag has been unusually great. According to Kuznets, capital outflows for the major western countries averaged between \$0.5 and \$1.0 billion per year for the period 1874-1914, in 1913 prices.⁸⁶ Foreign capital invested abroad during the same period rose by about 64 per cent per decade--significantly faster than output as a whole. Consequently, the proportion of the stock of foreign capital to the national income of either debtor or creditor nations rose significantly also. During the inter-war period, of course, flows of international capital diminished precipitously. The decade of the 1950's, however, displayed an increase in flows, the average volume per year

⁸⁴For example, Viner says, "I see no a priori grounds for expecting to find a significant correlation...between fluctuation in the export of capital by particular countries and fluctuations in their general level of business activity." Jacob Viner, Studies in the Theory of International Trade (New York: Harper Bros, 1937), p. 435.

⁸⁵Ragnar Nurkse, Problems of Capital Formation in Underdeveloped Areas (London: Baisel Blackwell, 1953), p. 120.

⁸⁶Simon Kuznets, Modern Economic Growth (New Haven: Yale University Press, 1966), pp. 321ff.

amounting to about \$2 billion in 1951-55 and about \$3 billion in 1956-61, in 1913 prices. In contrast to the 19th century flows, which were mostly private capital, these have been about half accounted for by government transfers. Thus, the absolute volume of international capital flows (in 1913 prices) after 1950 has probably been the same as during the latter part of the 19th century--which is to say that on any relative measure they have declined in importance.

These capital flows have made significant contribution to capital formation in developing countries. For the larger countries, like the U. S., foreign capital financed at least about a tenth of domestic capital formation. But for smaller countries, such as Canada, Australia and Norway, the proportion was sometimes as high as one-fourth to one-half of domestic investment. Finally, it should be noted that the share of private foreign capital flows received by truly underdeveloped countries (i.e. those outside of Europe, North America, and Australia) has generally been less than one-half the total flow, although in recent years their share in total flows (public and private) has been about three-fourths.⁸⁶

As has been made clear, it is not possible to find a theory which can give a satisfactory explanation of these international transfers. However, there have been some attempts to consider this subject on an analytical level. These attempts essentially consist of a number of pieces

⁸⁶ Kuznets, op. cit., pp. 323-24.

of fragmentary analysis. We will consider some of the more important of these pieces, classifying them into two broad groups for convenience of discussion: causes of capital transfers and effects of capital transfers.

A common way of explaining long-term international capital flows is in terms of interest differentials between countries.⁸⁷ As Arndt has pointed out, however, it makes a difference whether one is considering differences in the interest rate or the marginal efficiency of investment; the former can explain international portfolio investment while the latter is a necessary condition for direct investment flows.⁸⁸

Recently, concern with interest or profit rate differentials as an explanation of international capital movements has all but disappeared from view. A recent edition of Samuelson's well-known text⁸⁹ makes only one passing reference to profit-rate differentials. The "new view" emphasized the importance of "other factors" in determining the magnitude and direction of capital flows. These "other factors"

⁸⁷Gottfried Haberler, The Theory of International Trade (New York: Macmillan Company, 1937), p. 5.

⁸⁸H. Arndt, "A Suggestion for Simplifying the Theory of International Capital Movements," Economica Internazionale (August, 1954).

⁸⁹See, for example, Paul A. Samuelson, Economics (6th ed.; New York: McGraw-Hill, 1964), pp. 652ff.

essentially consist of a list of ad hoc considerations such as nationalism, tariff levels, tax assessments, imperfections in the capital market, exchange control policies, etc.⁹⁰ The effect of these considerations is to blur the sharpness of the neo-Classical view without being able to make the theory any more reflective of reality.

The classical view of capital movements is that they are essentially autonomous with respect to economic activity, and that they therefore lead (in the National Bureau sense) both domestic activity and trade. The latter respond to these autonomous flows by appropriate gold flows and monetary adjustments. It has been argued by Nurkse and more recently by Williamson⁹¹ that at least in the case of the United States the process is reversed: domestic economic activity leads capital flows, increasing domestic activity for goods and money, and thereby for imports and capital inflows. Williamson's argument seems to rest on the view that years of rapid growth produce larger demands for investment capital which are satisfied by an increase in the volume of net capital imports (for decrease in volume of net capital exports). This view has recently been

⁹⁰ Charles Kindleberger, Foreign Trade and the National Economy (New Haven: Yale University Press, 1962), pp. 82-83; and H. Kafka, "Economic Effects of Capital Imports," in Capital Movements and Economic Development, ed. by John Adler and Paul Kuznets (New York: St. Martins Press, 1967).

⁹¹ R. Nurkse, op. cit., p. 124; Jeffrey Williamson, "Dollar Scarcity and Surplus in Historical Perspective," American Economic Review, (May, 1963); and "Real Growth, Monetary Disturbances and the Transfer Process, The United States, 1879-1900," Southern Economic Journal, (January, 1963).

challenged by Tanner and Bonomo⁹² who claim that the empirical evidence from U. S. data does not support Williamson if collinearity is removed by proper adjustment for cyclical factors.

One possible interpretation of this matter is that there are three possible hypotheses concerning the relationship of capital movements to other economic variables. First, capital movements may be autonomous. Second, capital movements may take place in response to changes in the trade balance, as emphasized by the Keynesian approach. Third, both capital movements and trade movements may be governed by other causes, which produce concurrent fluctuations in both.

The effect of changes in demand on capital movements has been investigated by Nurkse in a little known but interesting essay.⁹³ Assuming that labor is immobile and that trade is limited to consumption goods only, a shift in consumer taste which decreases the demand for goods of country A while increasing it for goods of country B will turn the barter term of trade in favor of B. In country A, production of export goods is less profitable and in B it is more profitable; hence output will contract in A and expand in B. Correspondingly, the returns to productive factors will fall in A and rise in B, inducing capital movements from A to B. Nurkse points out an interesting side effect: if

⁹²J. E. Tanner and V. Bonomo, "Gold, Capital Flows and Long Livings in American Business Activity," Journal of Political Economy, (February, 1968).

⁹³Ragnar Nurkse, "Ursachen and Wirkungen des Kapitaluwegungen," Zeitschrift Fur Nationalokonomie (1934), summarized in Iverson, op. cit., pp. 129ff.

the transfer of capital to B is accomplished without any change in the supply of other productive factors, capital-deepening will take place in B.

A similar kind of analysis is employed to investigate the impact of shifts in levels of consumer saving (and consumption) on the volume of international trade in capital goods.⁹⁴ Assume three countries: A produces capital goods exclusively; B produces intermediate goods exclusively, and C produces final goods. One-third of the consumer goods produced by C are domestically consumed while two-thirds are traded to B, who in turn trades part of them off to A. Suppose now that the rate of saving increases in C, implying an increase in the demand for investment goods. C's demand for B's goods increases, turning the barter terms of trade in favor of B. Now production is more profitable in B. Interest rates rise in B at the same time that they are falling in C (because of C's increased rate of saving). When the interest disparity is large enough, capital begins flowing from C to B. A similar type of analysis could, of course, show the effects of a shift in the level of consumption in C on investment in C.

Nurkse was aware that the marginal efficiency of investment might respond to changes in technology, as well as changes in aggregate demand. He seems to have proceeded on the assumption that improved methods of production affect primarily one country. He is criticized

⁹⁴ Ibid., pp. 142ff.

on this point by Iversen,⁹⁵ who holds that improvements are likely to affect profit rates in all countries, leaving country differentials more or less unchanged. However, Nurkse might still be right on the assumption that the changed technique has already been in use in an advanced country, but not yet introduced into the less developed one for reasons related to economies of scale or because of a lack of skills in the underdeveloped country's labor force. In any event, if we grant Nurkse this assumption, then the extent of capital flows between countries will depend on (1) the extent to which improvement is capital intensive, and (2) the extent to which the demand for the particular commodity in question is elastic.

The demand for capital may also change in response to alteration in the availability of other factors of production. Adler⁹⁶ has emphasized the importance of availability of other productive factors in determining the absorptive capacity of an economy for capital. Among these necessary "cooperant factors," he includes labor, skills, technical knowledge, and managerial experience. Thomas⁹⁷ attributes a significant portion of the capital outflow from Europe during the nineteenth century to the migration of population to newly settled areas. Migrants took

⁹⁵ Ibid., p. 132.

⁹⁶ John Adler, Absorptive Capacity: The Concept and Its Determinants (Washington: The Brookings Institution, 1965).

⁹⁷ Brian Thomas, "International Capital Movements to 1913," in Adler and Kuznets, op. cit.

capital with them, and they raised the demand for capital in the periphery.

In addition to the points mentioned above, there are a host of institutional factors which influence--at times perhaps decisively--the international flows of capital. Imperfections in the capital markets, changes in the costs of transferring funds, presence of overvalued exchange rates, the existence of government subsidies on particular types of investment in specific countries are just some of these factors.⁹⁸

However, since consideration of these points on an ad hoc basis cannot add anything substantial to the theory of capital flows, the matter will not be pursued further here.

It is obvious that long-term capital movements will ordinarily have an effect on the growth of output in the borrowing country. It is equally clear that output growth in the lending country may also be affected. To determine a priori how income in each country will be affected is, as Iversen points out, entirely impracticable.⁹⁹ The time pattern of effects will be determined by the rate and duration of the initial capital flow and the nature of the repayment schedule.¹⁰⁰ The

⁹⁸ Kafka discusses many of these points in his paper in Adler and Kuznets, op. cit.

⁹⁹ Ibid., p. 161.

¹⁰⁰ For a discussion of the impact of various debt servicing arrangements on long-run growth of borrowing countries, see Dragislav Abramovic et al, Economic Growth and External Debt (Baltimore: The Johns Hopkins Press, 1964).

effects on income distribution are also difficult to assess. In the borrowing country, if we may assume that the capital flows reduce interest rates there and increase the demand for cooperating factors like labor, then income distribution may be more equal. Of course, if the main increase in demand is for a factor already in short supply, say land, then the effect on income distribution may be just the opposite.

The international transfer of capital also implies changes in the structure of production. One might be tempted to presume that after the transfer production in the borrowing country will be more capital intensive and in the lending country less capital intensive. However, to draw such an inference, one would have to assume (1) that the lending country did not obtain the capital transfer from an increase in the rate of saving and (2) that other productive factors were fully employed in the borrowing country.

Capital flows may have important effects on aggregate demand. In the country exporting capital, foreign demand for commodity exports may be increased. Hilgerdt's¹⁰¹ data imply that this may happen not only in the short but also in the long-run. The establishment of manufacturing industries in the importing (underdeveloped) country gives rise to new demands for intermediate goods. These apparently equal or exceed the domestic final demand which formerly constituted the entire demand for

¹⁰¹Hilgerdt, op. cit.

imports in the importing country.¹⁰² Capital flows may also affect aggregate demand through their effects on savings brought about in response to changes in the rates of interest in the lending and borrowing countries.

The above discussion is intended to sketch out only the main considerations relating to the causes and effects of capital movements. It should be abundantly clear that we have no complete theory of capital flows. There is not even general agreement that interest (or profit) rate differentials are important determinants of long-term capital flows between countries. Skepticism on this point may well have been carried too far because the hypothesis taken by itself is virtually a tautology. What would be important to know is how changes in other variables, such as consumption patterns, savings habits, etc. bring about disparities in profit or interest rates which triggers capital movements. At least, we have a few halting suggestions as to the factors involved in such a process.

¹⁰²Hilgerdt shows that this happened on a world-wide basis. There is no assurance, however, that the same phenomena would occur for each capital exporter or importers taken separately.

E. TRANSFER OF TECHNICAL KNOWLEDGE

Until recently little attention was given to the transfer of technology from developed to underdeveloped countries. A major reason for the absence of real interest in this topic is the prevalence of what can be called the "neo-Classical" view of development: that economic growth is considered a function of increases in factor supplies. But as writers like Schultz¹⁰³ and Dennison¹⁰⁴ have emphasized, growth is also dependent on changes in the quality and the manner of organization of productive factors. A logical consequence of this view is, therefore, to place a new emphasis on the phenomenon of technology transfer.

It seems intuitively clear that foreign trade, because it involves commercial contacts between two countries, contains a potential for the transfer of technical knowledge. As we have already seen, Adam Smith felt that trade facilitated a natural diffusion of technical innovation from one country to another. Kuznets holds that the extension and application of technical knowledge is "of the essence in modern economic growth."¹⁰⁵

¹⁰³Theodore W. Schultz, "Investment in Human Capital," American Economic Review (March, 1961).

¹⁰⁴Edward F. Dennison, The Sources of Economic Growth in the United States and the Alternative Before Us. Supplementary Paper No. 13 (New York: Committee on Economic Development, 1962).

¹⁰⁵Kuznets, op. cit., p. 286.

The effect of foreign trade in expanding the application of scientific knowledge is therefore of primary importance from the standpoint of the subject of this paper.

At the outset, it is worthwhile to make clear what is meant by "the application of technical knowledge." It is not synonymous with an increase of productivity or general economic efficiency. As Kendrick¹⁰⁶ and Fabricant¹⁰⁷ have shown, there are many reasons to account for productivity changes which have nothing to do with changes in technology. Economies of scale, changes in the character of consumption, changes in the economic policy of a country, changes in the quality of one or more inputs--all have an effect on productivity, but they do not necessarily involve the application of technical knowledge. For our purposes here, the application of technical knowledge will be viewed as resulting in new combinations of productive factors which are cheaper than the cheapest available before, at a given level of prices.¹⁰⁸

Not long ago the concept of technological transfer was deemed so obvious as not to need any further explanation. More recently, however, economists and others have begun to inquire as to the nature of the process itself: i.e., how does the transfer of knowledge take

¹⁰⁶ John W. Kendrick, Productivity Trends in the United States (Princeton: Princeton University Press, 1961).

¹⁰⁷ Solomon Fabricant, Measuring Technological Change (Washington: The Brookings Institution, 1965).

¹⁰⁸ On this point, see Jan Tinbergen and J. J. Polake, The Dynamics of Business Cycles (Chicago: University of Chicago Press, 1950), pp.27-28.

place? At the outset it is worth noting the observation of Kuznets: that transfer is a potential only of modern technological knowledge which is invariant to persons or institutional forms.¹⁰⁹ Traditional or handicraft technology, on the contrary, is transmitted through persons and reflects the peculiar personal conditions and institutional conditions in which it is born.

Technology can be "borrowed" in either embodied or disembodied form. In the first case, the application of technology comes in the form of the capital goods which are imported. In addition, imitation of technical processes used abroad may be introduced into an underdeveloped country without the importation of physical capital--as, when methods of organization are introduced.

Brooks¹¹⁰ has suggested an interesting distinction between vertical and horizontal transfer. Vertical transfer usually occurs, within a firm, and through it general abstract knowledge is transformed into a particular form capable of being applied to specific concrete problems. This then may be further transformed into "hardware"--i.e. a capital good. Horizontal transfer occurs when scientific information in one context is borrowed by a second firm, which adapts it vertically, if necessary, to meet its own

¹⁰⁹ Kuznets, op. cit., p. 287.

¹¹⁰ Harvey Brooks, "National Science Policy and Technology Transfer," in Summer Myers (ed.), Technology Transfer and Innovation, Proceedings of a conference sponsored by the National Science Foundation and the National Planning Association, pp. 53-63.

needs. Thus horizontal transfer would be the typical case for countries importing capital goods--i.e. "frozen technology." It should be emphasized, however, that in either case, a good deal of intermediate information must also be transferred in abstract form if the "borrowing" is to be really successful. If channels of information are not open, two things can happen to dampen the effectiveness of the transfer process: first, the process of vertical adaption of the technology within the firm can be impeded so that results are not optimum; second, horizontal transfer between the imitating firm and its suppliers may not occur, thus effectively limiting the extent of the impact or the diffusion of the transfer process.

The central question is what stimulates this process of technological borrowing? Presently the factors stimulating innovation in general are at least partly responsible for the transfer of this technology to underdeveloped countries. Schmookler,¹¹¹ who has made an extremely thorough investigation of this question, concludes that the application of technical knowledge is an economic activity. That is to say, it is subject to optimizing-type motivation as are other activities like production and marketing. Therefore, the development of technology--and presumably the borrowing of technology--is stimulated by favorable economic

¹¹¹Jacob Schmookler, Invention and Economic Growth (Cambridge: Harvard University Press, 1966).

condition such as population growth, expansion of markets, capital formation, etc. Also, the products of technology tend to stimulate further invention. Whether these innovations are likely to be "export-biased" or "import-biased" is a question investigated by Hicks.¹¹²

Education is obviously an important determinant in technology transfer because, as pointed out above, even "embodied" transfers require considerable transfer of abstract knowledge to be effective. As Schultz¹¹³ has suggested, one can think of education as simply a kind of investment in men. From this point of view, a minimum rate of capital investment in humans is a necessary condition to achieve satisfactory rates of technology transfer. However, Chamberlain¹¹⁴ argues that this view of education is too narrow and supports the view of vocational education separate from general education. General education, in his view, is concerned with basic attitudes which determine whether or not fundamental institutional changes necessary for adoption of modern technology will transpire.

¹¹²J. L. Hicks, "An Inaugural Lecture," Oxford Economic Press (June, 1953).

¹¹³Theodore W. Schultz, "Capital Formation by Education," Journal of Political Economy (December, 1960).

¹¹⁴Neil W. Chamberlain, "Training and Human Capital," in Daniel Spencer and Alexander Woroniak (eds.), The Transfer of Technology to Developing Countries (New York: Praeger, 1967).

Some further evidence on the importance of educational levels on the rate of diffusion of technology is given by Gellman.¹¹⁵ He points out that "high I.Q. vendors" tend to concentrate on selling to firms with correspondingly high I.Q.'s because selling to low I.Q. buyers is too costly and difficult. Only if the high I.Q. vendor is big enough and if the market stakes are high enough will the low I.Q. market be tackled. He gives as an example of the latter the fact that it took a firm the size of I.B.M. to sell computers to the railroads, and to teach them how to use them. What is true here about diffusion between firms is probably true also among countries. The inference is that small countries with low levels of scientific abilities are particularly likely to fail to reap technological gains potential from trade.¹¹⁶

Some economists have recently tried to construct formal models of the technology transfer process. Kmenta¹¹⁷ employs a simple lag model in which he assumes that the technology in country B is equal to that in country A, L periods before. He then proceeds to analyse the behavior of

¹¹⁵ Haron Gellman, "A Model of the Innovation Process," in Myers (ed.) op. cit.

¹¹⁶ The importance of broad technical competence in the process of diffusion of scientific technology from the U. S. Space Program is emphasized in an interesting study by Richard Rosenbloom, Technology Transfer and Policy (Washington: National Planning Association, 1965).

¹¹⁷ D. L. Spencer and A. Woroniak, op. cit.

the technological gap, assuming that technology in country A increases at a constant rate or, alternatively, is equal to an average of previous investment rate. He also considers a lagged adjustment model in which other change in country B's technology is a fixed fraction, ρ , of the size of the technology gap between the two countries. Kmenta's model is of interest because it brings to bear on the transfer problem some of concepts and techniques which are widely accepted in other areas of economic model building. Clearly, however, this treatment does not get beyond describing the speed of adjustment of the technical gap.

Spencer and Woroniak in a recent paper¹¹⁸ address themselves to explaining the size of the technological gap. Using Japanese data, they test a model in which the output of Japanese export industries is dependent on the volume of world exports, the import of machinery 'embodying' the new technology, and research and development expenditures by that industry. For industries supplying the domestic market, a similar model is constructed, but the import of raw materials related to the new technical process is substituted for the import of capital equipment as an independent variable. Both of these--the import of capital equipment and the raw materials related to it--are considered quantifiable proxies of the borrowing of technology. In general, all of these variables proved

¹¹⁸D. L. Spencer and A. Woroniak, "The Feasibility of Developing Transfer of Technology Function," Washington, D. C. 1967, (mimeographed).

significant, both for domestic and export oriented industries, but the research and development variable was consistently the most significant. The inference to be drawn from these results is that to generate and maintain its 'borrowing' ability, a society must expand considerable resources toward broadening its research effort in general, and toward improving its technical sophistication in particular. If this is done, optimum results from borrowing existing technology which becomes available through other contacts--such as those provided by foreign trade--may be achieved.

This brief survey of the literature dealing with technology transfer shows that the entire subject is just beginning to be investigated. We do now have a few very simple models of technology transfer among firms, and very recently some fledgling efforts have been made in the direction of transfer among countries. Empirical data on the relevant variables with which to undertake quantitative tests of some of these 'intuitive' hypotheses is still relatively unknown.

Yet even at this early stage of work in this area, a few broad inferences stand out as plausible. Trade, as Adam Smith understood, does provide a type of activity highly useful to the communication of knowledge. Further, the expansion of markets consequent upon an expanding foreign trade should provide a major stimulus to inventive activity if the experience of developed countries is any guide. What he did not so clearly see is that foreign trade provides a means of transforming the output of traditional type commodities into modern capital equipment embodying

technical advances. That this latter aspect of trade is especially important to small countries which otherwise could not hope to support a capital goods industry in the early stages of development is well documented in the work of Maizels¹¹⁹ and Hilgerdt.¹²⁰

The idea of Smith that foreign trade could open up a "natural" venue for technological transfer is somewhat at variance with recent writings. Unless conscious efforts are made by the 'borrowing' country, it appears that the application of borrowed technology may be very slow indeed. In the terminology of one writer, "horizontal borrowing" may occur with very little "vertical borrowing" by its suppliers and, in the case of intermediate goods, by users of the final product. Moreover, just getting embodied technology into a position to produce at an optimum point¹²¹ usually will require communication of abstract knowledge. Successful adaptation of borrowed technology has been shown to be associated with high rates of research and development expenditures in the borrowing country. It is also presumably associated with the level of education, the general level of technical skill, sometimes referred to as "human capital formation." All of this is, of course, especially applicable to

¹¹⁹ Alfred Maizels, Industrial Growth and World Trade (Cambridge: Cambridge University Press, 1965)pp. 264ff.

¹²⁰ Folke Hilgerdt, op. cit.

¹²¹ The idea here is that new capital equipment may be utilized so that production is outside the previous technological frontier while at the same time being located on the inside of the new technical frontier.

the case of technological borrowing in reference to non-embodied technology.

In any event, a major conclusion that emerges here is that technological borrowing, while it may be initially stimulated by foreign trade, must be fostered and guided by a central authority if maximum impact is to be achieved. Thus the role of government in coordinating and assisting the borrowing process appears to be necessarily prominent.

F. DUALISM AND OTHER PARTIAL THEORIES

A number of writers maintain that international trade does not stimulate growth in any important way and have put forth theories which attempt to explain why this is so. Some of the significant contributions along this line of thought utilize dualistic models of development to explain how growth impulses are 'deflected' from the traditional sector by the advanced or industrialized sector. Among writers who take this approach to the foreign trade problem are Higgins, Lewis, Myint and Baldwin.

Higgins¹²² was one of the first modern authors to analyse in detail the structure of economic dualism. He pointed out that production conditions in the advanced sector are characterized by intensive use of capital, fixed factor proportions and the presence of technical change. In contrast, production in the traditional (agricultural) sector are

¹²² Benjamin Higgins, Economic Development (New York: W.W. Norton 1959), pp. 325-344.

characterized by intensive use of labor, variable factor proportion and virtually no technological change. This description of the contrast in productive conditions has now become fairly standard in dualistic models, although some authors do not place as much emphasis on fixed technological coefficients as does Higgins.¹²³

These differences in production conditions are reinforced by differences in other aspects of economic institutions and economic behavior. The advanced sector obtains funds from a modern (organized) banking system while the traditional sector relies on an unorganized credit system. The advanced sector generally requires labor of a much higher skill level, and is likely to demand other equally sophisticated intermediate production inputs as well. Some authors, like Higgins, assume the advanced sector is producing primarily for export, while others, like Myint,¹²⁴ consider situations where a large part of the traditional sector's output goes for export, and the 'advanced' sector is essentially a middleman in the transaction. Some authors, like Higgins and Lewis, are

¹²³ For a more thorough treatment of the similarities and differences among authors on this point see my paper "The Concept of Dualism in the Theory of Development," Working Paper M9285, Washington, D. C., National Planning Association, 1968. (mimeographed).

¹²⁴ Hla Myint, The Economics of the Developing Countries (London: Hutchenson University Library, 1964).

concerned with a surplus labor type of economy, while others (Myint, Baldwin) do not consider this assumption necessary. In fact, Myint explicitly assumes a land surplus type economy.¹²⁵

The question concerning the impact of foreign trade on the underdeveloped (indigenous) economy can be more clearly grasped if we recognize that there are at least several related questions: what is the impact of trade on income levels in the domestic economy; what is the impact of trade on technological change; and what is the impact on savings and/or investment.

Lewis¹²⁶ concludes that trade has little or no impact on the domestic economy primarily because of the existence of unlimited surplus labor, which means that any improvement in productivity of the export sector must leave real wage levels, and therefore income levels, of the traditional sector unaffected. Hence all the benefits of improvement in the export industries are passed on to the advanced (importing) country as improvements in its terms of trade.

Myint feels that foreign trade has an impact on the domestic economy in the form of an income spillover. Using the vent for surplus as a point of departure, he points to the expansion of output in the traditional sector which accompanies the expansion of demand for those

¹²⁵ The difference in assumptions among authors reflects in large part the particular countries they have in mind as models of dualism. For example, Indonesia for Higgins; Burma and Malaysia for Myint; Northern Rhodesia for Baldwin.

¹²⁶ Arthur A. Lewis, "Economic Development with Unlimited Supplies of Labor," Agarwala & Singh, op. cit.

crops as a result of opening the economy to trade.¹²⁷ The expansion of output is achieved exclusively by an expansion of employed resources, however, since the traditional sector's technology remains unchanged and there are no increases in productivity of factors. Consequently, per capita income remains unchanged there. Why is there no adoption of more advanced technology by the traditional sector? Myint lists several reasons: the high turnover of labor and the lack of skills, the reluctance of Western enterprises to make the large investments necessary to train skilled labor and his idea of "non-competing groups."¹²⁸

Labor from the traditional sector, according to Myint, is often hired in the plantations and mines of the enclave on a part-time or seasonal basis. In this way, the enclave enterprises obtain much cheaper labor than they would otherwise. However, the 'social cost' is a high labor turnover, which tends to limit the acquisition of skills by the indigenous labor force. It also tends to support the belief of Western entrepreneurs that the natives are not able or willing to acquire skills, which in turn justifies their reluctance to invest heavily in training. Finally, Myint relies also on the notion of non-competing

¹²⁷Hla Myint, "The Classical Theory of International Trade and the Underdeveloped Countries," Economic Journal, (June 1958).

¹²⁸Hla Myint, "The Gain from International Trade and the Backward Countries," Review of Economic Studies, XX (No. 2).

groups--the view that institutional differences between the enclave and the rest of the domestic economy makes communication of any sort, let alone technical information, extremely difficult.

In Higgins'¹²⁹ model, the failure of foreign trade to transmit growth impulses is due primarily to the capital intensive nature of the enclave's production function. Expansion of output for export translates itself into a very small expansion of demand for labor, partly because the coefficient for labor is small, partly because the expansion of export markets is generally small (a la Nurkse) and partly because technological innovations imported into the enclave from abroad are capital-biased. In addition to there being very limited 'income spillover' from any trade-induced increase in production by the enclave, there is also an absence of 'technical spillover' as well. In order to adopt modern technology, the traditional sector would have to radically raise its rate of saving; however, this is precluded on the grounds that per capita income in that sector is too low.

Baldwin's¹³⁰ position is similar to that of Higgins in his emphasis on the central importance of the technical properties of the

¹²⁹ Benjamin Higgins, op. cit.

¹³⁰ Robert Baldwin, Economic Development and Export Growth (Berkeley: University of California Press, 1966).

production function in the export industries in determining whether or not trade will stimulate growth. Where the natural resource endowment distinctly favors export of a commodity which necessarily implies highly capital-intensive processes, and where the small labor force required is of predominantly skilled type so that it may be cheaper, at least, to import labor than train it, the impact on the local labor force will be almost nil. The same factors also account for the absence of a mass market necessary to industrialization. Moreover, the intermediate goods demand generated by export industries will also have much to do with the stimulative effects of foreign trade. In the case of Northern Rhodesia, such demand was limited primarily to roads and electric power: most of the capital equipment was of such a highly technical character that it had to be imported. The difference between Baldwin and the previous writers is that he puts more emphasis on the technical properties of the production processes in use export industries. At the same time, he recognizes that these may differ radically from one case to another. In other words, he sees the possibility of considerable stimulation of the domestic economy by foreign trade in cases where the production conditions in the export industries are favorable, while also admitting that for different export products, the potential stimulative effects of trade may be almost totally absent. Again, while admitting the importance of monopolistic efforts by colonialists to create non-competing groups, he

probably lays less general stress on this point than some other development theorists. Finally, there is nothing in Baldwin's analysis which implies that a deterioration of the terms of trade is either wholly or partly responsible for failure of trade-generated growth stimuli to be transmitted to the domestic economy.

These varying inferences regarding the impact, or its lack, of trade on growth, which have been drawn from the enclave models of different authors, are really not in conflict with one another. What has happened is that different writers have chosen to emphasize one or more special characteristics of dualistic models, and this has led them to emphasize one or two particular implications which help to explain why foreign trade fails to generate sustained growth in the domestic economy.

It can be shown that all these authors' conclusions can be derived from a relatively simple dualistic model. Moreover, in the opinion of this writer, they can be derived with far greater precision, and their interdependence made much clearer by use of a carefully specified, though simple, model. Suppose, for example, that we have a two-sector economy.¹³¹ An enclave producing exclusively for export, uses a capital intensive production process involving capital and labor inputs combined

¹³¹A rigorous presentation of the model on which the text discussion is based is shown in an appendix to this paper.

in fixed proportions.¹³² The export sector processes a crop which can also be used for food (e.g., sugar). The export price of this commodity is determined by international forces of supply and demand. The commodity is initially produced by a traditional agricultural sector which employs a production process involving labor, land, and capital combined in variable proportions. 'Capital' in the subsistence sector is of the traditional type--involving simple hand tools, traditional irrigation works, etc. In other words, subsistence sector capital formation does not depend on foreign trade. Workers in the subsistence sector may either produce food for their own consumption, or they may utilize part of their produce for trade with the export sector, in which case they receive money in exchange. Subsistence sector workers and members of their families may hire themselves out for work in the enclave sector.

Let us suppose that there is an increase in productivity in the enclave sector. Enclave enterprises can now produce more cheaply; consequently, they wish to expand production. They may do so by hiring capital and labor. The added capital comes from invested earnings while additional labor comes from the subsistence sector. It will be forthcoming at the existing wage rate if underemployment exists in agriculture. If we assume that this is so, there will be an increase in income generated

¹³²The assumption of fixed proportion here is made solely for simplifying exposition of the model. Actually it could be dropped without affecting the substance of the conclusion.

in the subsistence sector, equal to the number of additional wage earners who find work in the enclave multiplied by their wage rate. What this magnitude is depends on (a) the labor input coefficient in the production function of the export sector, and (b) the degree to which the productivity improvement is labor-biased. Furthermore, the magnitude of the expansion of export sector output will depend on the international demand elasticity of the commodity in question. The larger the elasticity coefficient, the smaller the decline in price required for any increase in export output, and, therefore, the larger will be profits and investment.

The Lewis-type case can now be seen as a special case wherein the elasticity of demand for exports is exactly unity. Under this assumption, an increase in export output of, say, 5 per cent is followed by a decrease in export prices of 5 per cent. Hence, all the benefits of the innovation are reaped by the foreign country.¹³³

If there is a steady expansion of the export sector because of either technological advance and/or price increases for exports, but at a rate which is insufficient to absorb the increases in subsistence sector labor force (due to population trends), then we have a situation approximating a Higgins case. The export sector expands, the subsistence sector expands (at a slower rate because it is assumed that land is fully used); there is underemployment in agriculture, and the income per capita remains unchanged in the subsistence sector.

¹³³ Actually, the elasticity coefficient should be slightly more than unity in order to provide producers with an incentive to undertake it and the retained earnings with which to finance it.

Partial Theories. There are a number of partial theories attempting to explain why international trade does not lead to growth in underdeveloped countries. Two representatives of this approach will be discussed briefly. I call these theories partial because they tend to seize an intuition concerning a particular ingredient to development for an open economy and expand on it without reference to a general economic model such as the dualistic models just discussed.

One such approach is that of Raoul Prebisch.¹³⁴ In its simplest version, his thesis is that if technical advance is occurring at the same rate in developed and underdeveloped countries, the gain will be secured by the developed country because of labor monopoly there which causes prices in the developed country to be maintained despite the rise in productivity. To the question: why do prices in the underdeveloped country fall, Prebisch answers that world demand for primary products is essentially inelastic. This last element robs the thesis of much of its unique character, however, because as Caves¹³⁵ point out, if one is going to assume inelastic demand schedules of primary products, any number of events in the underdeveloped country can deal a foul blow to that country's terms of trade, and hence to the growth stimulus that trade is

¹³⁴Rzoul Prebisch, The Economic Development of Latin America and Its Principal Problem (Lake Success, New York: United Nations, 1950).

¹³⁵Richard E. Caves, op. cit., p. 261.

supposed to impart. A more important criticism of the Prebisch thesis is the failure to find confirmation in the empirical studies which have been conducted on trends in terms of trade. For example, Morgan¹³⁶ has found no confirmation of this thesis in a study of long-term trends in the terms of trade of a number of developed and underdeveloped countries.

A somewhat different type of explanation of why foreign trade does not stimulate growth in underdeveloped areas has been suggested by Myrdal.¹³⁷ Myrdal views development as a non-equilibrating, unstable, cumulative process which gains momentum as it proceeds. Correspondingly, in those areas in which it does not take hold, development becomes increasingly difficult as a result of contact with the progressing centers of development. To be more specific, he holds that the origin of an industrial center is attributable largely to accident and perhaps some external condition like geography. Once founded, however, the presence of ever increasing internal and external economies create a momentum which carries economic expansion forward.

¹³⁶Theodore Morgan, "The Long-Run Terms of Trade Between Agriculture and Manufacturing," Economic Development and Cultural Change (October, 1959).

¹³⁷Gunnar Myrdal, Economic Theory and Underdeveloped Regions (London: Gerald Duckworth and Co., 1957).

In areas outside this center, however, things develop quite differently. Here, the presence of 'diseconomies' creates a cumulative movement downward as capital and skilled labor are drawn away from the backward area toward the industrial center.

Foreign trade is the link which speeds up this process. Capital can move toward the developed area easier; a net migration of population outwards toward the 'industrial centers' is speeded up which, combined with the accelerated birth rate in the underdeveloped area, leave the latter with an unfavorable age distribution and skill pattern in the population. Handicraft industries are competed out by the arrival of industrial goods from the center. Of course, these 'backwash effects' may be countered by the appearance of 'spread effects'--e.g. by the increased demand by the industrial centers for intermediate products of the underdeveloped region. But Myrdal thinks that in the majority of cases the reverse is far more likely to be the case. From the standpoint of this paper, the important element in Myrdal's thesis is that foreign trade is the primary vehicle for the transmission of these backwash effects.

It is interesting to note that there is some empirical confirmation of the Myrdal thesis. Williamson,¹³⁸ in his investigation of trends in regional income inequality for a number of countries, finds that it is greater in the underdeveloped than in the developed. Moreover, his data also seem to bear out the contention that regional disparities in income are increasing in underdeveloped countries.

¹³⁸J. G. Williamson, "Regional Inequality and the Process of National Development," Economic Development and Cultural Change (July, 1965) Part II.

IV. SUMMARY AND CONCLUSION

In this survey of the literature on the relation between foreign trade and development, I have tried to focus attention on the main approaches. Discussion has kept strictly to the speculative literature and to empirical work insofar as it tends to confirm or deny the validity of the approaches outlined. A large body of literature dealing primarily with commercial trade policy and with the effects of development on the terms of trade has been ignored. In addition, a large body of literature dealing primarily with a description of institutional barriers to the 'spread effects' of foreign trade has also been passed over in silence.

A number of attempts to construct macro dynamic models of growth in an open economy have been reviewed, and the inescapable conclusion is that such attempts have produced feeble results in general, and hardly any significant testable hypotheses in particular.

A more promising attack on the problem is the construction of partial models of the relationship between trade and growth. A number of such partial models have been reviewed, beginning with those that are delineated either explicitly or implicitly in the writings of the classical school. Before summarizing briefly some of these partial models, it may be useful to note that one of the chief characteristics of early classical thinking of this question is its dynamic character. Trade is thought of as affecting growth in a cumulative process where a number of variables interact with one another. This dynamic element is very evident in the

writings of Adam Smith, less so in Malthus, and virtually invisible in Ricardo and Mill. Perhaps this helps to explain why dynamic models constructed today have so far failed to produce much in the way of results. These models usually can be shown to constitute essentially extensions of the static tools of equilibrium theory, at least as far as the relation of trade and growth is concerned.

The promising direction of investigation of the relation between foreign trade and development revolve around a number of partial models or, as they have been most frequently called in this paper, approaches. At the core of each of these approaches lies a basic idea about which the early classical writers had been aware. One such idea is the expansion of markets. Adam Smith pointed to the importance of trade in bringing about an expansion of markets which he viewed as leading to increased specialization and higher labor productivity. This approach has continued to intrigue economists right up to the present time. In recent years, the argument has often been turned upside down: the failure of foreign markets to expand because of inelastic demand schedules, etc. has often been introduced as a reason why trade does not have significant stimulating effects on growth. Holders of this view are really not debating the effectiveness of foreign trade as a transmitter of growth impulses--in fact they are affirming it--but are arguing that there is an absence of stimulative impulses to convey.

Smith considered the impact of trade on growth under the assumption of idle resources; this led him to what is known in current literature as the vent-for-surplus approach. Essentially this approach considers the effects resulting from a trade-induced increase in demand which acts on levels of employment and output (aggregate and per capita).

Early classical writers like Malthus and Smith also considered the effect of trade on capital formation. The main influence was thought to be through the rate of profit which would be increased as a result of increased demand originating in the foreign sector. This idea has been pushed further by modern writers who have pointed out that in addition to the possible effects of trade on consumption and, therefore, indirectly on saving and investment. Furthermore, there is an obvious connection between trade and the import of modern capital equipment which must also be included in any analysis of foreign trade effects on capital accumulation.

Foreign trade obviously can have effects on the domestic price structure. Changes in the domestic terms of trade between agriculture and industry, which figure so importantly in the work of the modern dualistic theorists, was first analysed by Ricardo. He pointed to the implication of changes in the terms of trade for formation of capital and the expansion of the industrial sector. In fact, this was the only connection he was prepared to admit between the pace of domestic economic growth and foreign trade because unlike earlier classical writers he denied the existence of unemployment of productive factors.

The theory of comparative advantage has long been a point of departure for many writers analysing the relationship of trade and growth. The conclusion reached here, however, is that this theory is of little use for analysing the relationship in question. Not only can this theory tell us very little about the mechanism whereby growth impulses are transmitted, but it has a further drawback in that it is probably the most static of the classicists' approaches to our problem. This last point makes it particularly questionable as a point of departure.

The transfer of technology has only begun very recently to assume an important place in the analysis of trade on growth. Early writers were primarily concerned with growth in supplies of productive factors. Where they did consider technological transfer and trade, it was usually in the naive context that there was some natural or automatic tendency for technology to diffuse itself from developed to underdeveloped countries. Two things now seem clear. First, trade facilitates transfer of embodied technology to the extent that it facilitates trade in capital goods. Second, non-embodied technical change, and a large share of the benefits from diffusion of embodied change also, are highly dependent on the extent to which training, research, and development activities are carried on within the underdeveloped (borrowing) country. On the basis of admittedly meager evidence, it nevertheless seems possible to argue the validity of a model that shows technological gaps which will widen significantly between more and less developed countries unless research activities in the underdeveloped countries expand rapidly.

Much has been written on the shape of the cost function in underdeveloped countries. Only recently, however, have efforts been put forth to obtain partial data regarding the existence and extent of internal or external economies of scale in developing countries. There is a fairly widespread belief that economies of scale may be considerable in certain industries. However, the evidence available is as yet too fragmentary to draw firm conclusions. One thing that is clear, however, is that these economies, to the extent they exist, are important in obvious ways for the relationship of trade and development.

Some success has been attained with the use of dualistic models in explaining why growth stimuli operating in the foreign sector may not penetrate the domestic economy. A primary conclusion that can be derived from many of these models is that income spillover from expansion of export activities is often negligible due to the capital intensive nature of production processes there, and because of the peculiar nature of the enclave investment process and the capital-biased productivity effects. The second major problem which these models point to is the tendency for technological change to be confined almost exclusively to the export sector. Its failure to penetrate the traditional sector must be analysed in term of the question of technical transfer, as described previously.

In the discussion of the relation between trade and growth reviewed here, it is noteworthy how little attention is paid to the behavior of prices as an independent factor. I am not referring to the terms of trade--a matter which has received much attention. Reference is rather to the impact of the structure of international prices on the domestic price structure. Especially in small countries, the impact of foreign prices and change in the same must be very great indeed. It would seem that the initial impact of foreign trade on a domestic economy must be primarily, if not exclusively, through prices. Models which attempt to construct relationships between real variables in trade and development without introducing price changes are ignoring a major facet of the process whereby changes in foreign sector demand and supply conditions have their impact on the domestic economy.

APPENDIX

AN OPEN DUALISTIC ECONOMY

Forrest E. Cookson and Richard W. Hooley

List of symbols

- X -- output
 - K -- capital
 - Q -- intermediate product (input)
 - N -- labor
 - λ -- technological change
 - \bar{P} -- profits
 - M -- imports
 - S -- savings
 - L -- land
 - w -- wage rate
 - w_T -- real wage rate
 - P_E -- price of exports
 - P_S -- price of subsistence output
 - Y -- income
- Subscripts E, s, indicate the export and subsistence sectors, respectively
- t -- a subscript to indicate time.
 - σ -- the rate of growth of the population

APPENDIX

AN OPEN DUALISTIC ECONOMY

Assume a one commodity economy where the commodity is produced in one sector, called the subsistence sector, and where it is processed and exported by a second sector, called the export or enclave sector. The export sector buys the unprocessed commodity from the subsistence sector at a fixed price. The enclave produces all those services such as electric power, transportation, warehousing, wharfage, etc. necessary for the accomplishment of exportation. The production conditions of the export sector are characterized by fixed input coefficients. This can be expressed in the following fashion:

$$(1) X_E = q_E Q_E = k_E K_E = n_E N_E e^{\lambda t}$$

where X represents output; Q is an intermediate good; K is capital; N is labor; q, k, and n are the input coefficients of intermediate goods, capital and labor, respectively; λt is a term denoting technological change and the subscript E indicates the export sector. Note that technical change is assumed to be labor-saving.

The enclave sector distributes all its income to its two productive factors as either wages or profits.

That is,

$$(2) \quad p_E X_E - p_S Q_E = V_E + wN_E$$

where p_E is the (export) price per unit of output, p_S is the farm price, wN_E is the wage bill and V_E , therefore, is enclave profits.

Investment in the enclave sector is a function of the rate of profits. For simplicity, we assume here that there is no outside borrowing by the enclave. This can be written

$$\dot{K}_E = h \left[\frac{V_E}{K_E} \right]$$

Furthermore, we assume that all enclave investment is represented by capital equipment which is imported--i.e.,

$$(3) \quad M_E = \dot{K}_E = h \left[\frac{V_E}{K_E} \right]$$

Finally, it is assumed that enclave saving takes only one form--that of investment in capital goods. Therefore, we can write,

$$(4) \quad S_E = \dot{K}_E$$

Production conditions in the subsistence sector are different from those in the enclave. There are three factor inputs instead of two, proportions are variable, and there is no technological change.

This can be described in the following fashion:

$$(5) \quad X_S = f L^\alpha, K_S^\beta, N_S^{(1-\alpha-\beta)}$$

Presumably the agriculturalists are rational and efficient so far as factor employment goes, and, therefore, the usual profit maximization theorems hold so that,

$$(6) \quad w_r = \frac{\partial X_S}{\partial N_S} = [1-\alpha-\beta] \frac{X_S}{N_S} = \frac{w}{P_S}$$

Here w_r is the real wage rate. Now land may or may not be assumed fixed in its supply. Suppose we assume that the supply of land is not fixed, then production conditions in the subsistence sector as described in equations (5) and (6) imply full employment throughout this sector. On the other hand, suppose the supply of land is fixed - in other words all the cultivatable land is under cultivation. Then unemployment is possible in spite of the marginal equilibrium conditions assumed in equation (6). This unusual result is traceable to the special production conditions in the enclave sector (i.e. fixed factor proportions there) and to the unique relationships existing between the two sectors. For the remainder of this paper we will assume that the supply of land is fixed unless otherwise noted. We do this only for convenience of exposition, however, and because our substantive conclusions are easily adjusted for the case where the supply of land is not fixed.

To proceed with the structure of the model, let the price of subsistence sector output be some simple function of the export price, i.e.

$$(7) \quad p_s = j(p_E)$$

Individuals in the subsistence sector can save, and the amount of such saving is proportional to income. The savings function is therefore written,

$$(8) \quad S_s = g_s (wN_s + p_s X_s)$$

where wN_s represents income earned by subsistence sector farmers (or their families) in the enclave, and $p_s X_s$ represents the total income derived from producing the agricultural crop. Furthermore, subsistence households have only one form in which they can invest their savings-- i.e. as improvements to their land or tools. Hence we can write

$$(9) \quad S_s = \dot{K}_s$$

As for the consumption of these households, it may be either in the form of food or imported consumer goods. Presumably their import propensity would depend upon the size of their income as well as the price of imports. This can be written

$$(10) \quad M_s = g_s * [wN_s + X_s, (p_s - p_M)]$$

where M_s represents imports, p_M the price level of imports, and the other variables have the meanings attached to them previously. By p_M we simply mean whether one bolt of textiles costs one or two bags of sugar. Further, p_M is autonomously determined and, for the time being, considered fixed.

To close this system we need general accounting equation. First, total imports consist of capital and consumer goods, namely,

$$(11) \quad M = p_E M_E + p_S M_S$$

and total income consists of the income of both sectors,

$$(12) \quad y = p_E X_E + p_S X_S$$

and, finally, the rate of growth of the labor force is known and can be described as

$$(13) \quad N_E + N_S = N = N_0 e^{\sigma t}$$

that is to say, it is growing at the rate of σ per year.

In order to see under what conditions growth impulses originating in the foreign sector of this dualistic model are not fully transmitted to the subsistence sector, let us begin by assuming an increase in the demand for exports in world markets. If in the previous period, exports were $p_E X_E$. They will now be $p_{E_1} X_{E_1}$, where $p_{E_1} > p_E$ and $X_{E_1} > X_E$.

The increase in output will have to be accompanied by an increase in inputs. In accordance with the production function as given in equation (1), the increase in labor required is $n_E \dot{N}_E e^{\lambda t}$. The increase in capital inputs is $k_E \dot{k}_E$ and of intermediate goods $q_E \dot{Q}_E$. Capital investment of \dot{K}_E is financed out of retained earnings as previously shown in equation (3). The increase in the demand for labor in the export sector depends, aside from increase in investment, on the magnitude of n_E and λ . Now, if n_E is small and λ large, as Higgins and Myint, assume, then it is clear that the increase in the number of workers required in export industries (\dot{N}_E) will be very small indeed. Moreover, if we assume unemployment so that the level of real wages remains unchanged in the face of increased demand for labor, then the increase in the real wage bill $w_R \dot{N}$ --i.e. the part of export income accruing to the subsistence sector--will also be very small because it will be limited to the increased number of workers required in export industries. This is the Higgins model. Myint, on the other hand, assumes a shortage in labor supply. Hence the increase in the money income of the subsistence sector is dependent on wN , and this is greater than the Higgins case by the difference $(\dot{w}_R \dot{N}) - (w_R \dot{N})$, or, in other words, by \dot{w}_R .

The income spillover resulting from expansion of the export sector may be small or large, but this in itself does not determine, by any means, the impact of trade on growth. A great deal depends upon how the subsistence sector reacts to the stimulus. From equation

(7), we know that the price of subsistence sector output is rising. Output of subsistence agriculture will also rise, and there will be demands for additional productive factors in that sector as well. The quantity of additional capital used depends on the saving function (equation 8). Given the savings function, to the extent that incomes rise in this sector, capital accumulation will also rise. In this sector, productive factors are substitutable; so the extent of the increased demand for capital and labor depends on the relative prices of each. In general, ceteris paribus, the smaller the increase in income spillover as a result of the export 'boom', the less chance the real wage rate has of rising, the smaller the increase in savings will be, and for both these reasons, the less likely will be an expansion of subsistence agriculture.

The extreme case on one side is where there is no saving in the subsistence sector and no change in real wages either; this is really the Lewis-Higgins position. The second possibility is that there is a small rise in real wage rates and an increase in income in the subsistence sector, but continued low levels of investment and only a minimal expansion of output per capita in subsistence agriculture; this is the Myint case.

Another aspect of this model, not usually noticed, is the automatic tendency for the increase in exports to be offset by increased imports. In the case of the export sector, the increase in investment means an increase in imports of equipment (equation 3). The same is true

of the subsistence sector, but for a different reason. Subsistence sector households can choose between consuming local produce or imported consumption goods. In general, the higher the price of the former relative to the latter, the more they will choose imported goods (equation 10). Under the production conditions existing in the subsistence sector, an increase in output will inevitably be accompanied by an increase in the subsistence price level. This implies a decline in the relative level of import prices. Therefore, imports of consumer goods for the subsistence sector tend to rise as output expands.

It should be pointed out, perhaps, that very similar conclusions are also yielded by the model when the initiating disturbance is an increase in productivity instead of a rise in export prices. In this case, export prices fall initially (by how much depends upon the elasticity of world demand for exports). The demand for additional labor will be smaller than in the case of a price rise. Whether it will be positive, zero, or negative depends on the exact magnitude of the output rise and the shift in the labor input demand as indicated by $e^{\lambda t}$. In any event, export profits and investment will rise. This will bring about an increase in demand for intermediate input (Q_E), the size of the increase depending on the increase in exports (X_E) and the size of the input coefficient (q_E). This will mean an augmentation in subsistence sector income, at least as long as the increase in intermediate goods demand is not wholly offset by a decline in the income of wages earned in export industries. The net effect of this income spillover on

subsistence sector output, income and imports will depend, as in the previous case, on the saving and import propensities of the subsistence sector.

There are several generalizations which this model makes about the relationship of trade and growth. (1) The extent of income spillover generated by trade activities depends upon the export sector's demand for intermediate goods (q_E), its demand for subsistence labor (w_E), the rate and character of technological change ($e^{\lambda t}$), and the behavior of wage rates. The latter, in turn, depends on population trends ($N_0 e^{\sigma t}$) and the rate of utilization of labor in the subsistence economy ($n_s N_s$). The amount of stimulus transmitted depends on these factors plus the magnitude of the external stimulus itself--and this is essentially dependent on the nature of demand conditions in the world market (a la Nurkse). (2) Given the magnitude of the initial stimulus and the degree of its transmission to the domestic economy, the response of the subsistence sector depends on the character of behavior responses there. In the above model, these are summarized in the savings and investment functions and on the propensity to import. Income spillover may, under certain conditions, be converted into substantial increases in savings, investment, and output, leading to rising output per capita. However, under other conditions, they may be reflected in substantial increases in imports of consumption goods. The thing to emphasize here is that the existence (or lack of) income spillovers is not itself a sufficient condition for explaining the presence (or absence) of growth with trade. It is also necessary to have

certain types of responses--responses which eventuate in higher rates of savings, investment, and subsistence sector output. (3) The importance of technological transfer occurring either as a result of, or at least concurrently with, the expansion of foreign trade should be clear from the behavior of the model. While trade may help bring about income spillover, and while these may initially result in higher rates of subsistence sector saving and investment, it seems clear that with a stagnant technology the gains from a series of such responses must become smaller and eventually diminish toward zero. (4) The model suggests that the introduction of a system of prices is necessary in order to get a clear picture of the process whereby trade impinges on development.