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The Trade Gap: Concepts and Problems

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I

In recent years, there has been much discussion of the so-called trade gap between the import requirements and export earnings of developing countries. It has often been argued that, as a result of the operation of various factors, there is a tendency towards the widening of this gap in the present-day international economy. The following factors are said to contribute to the trade gap:

(1) on the side of the developed countries:<sup>1</sup> the rising share of services in the gross national product, the shift towards industries with lower material content, low income and price elasticities for food, economizing in the use of raw materials, displacement of natural raw materials by synthetic substitutes, agricultural protectionism, and trade barriers against the imports of labor-intensive manufactured goods originating in less developed areas;

(2) on the side of the developing countries: the need for capital equipment for raising rates of growth of national income experienced in the past, imbalances between population growth and food production, and adverse developments in the agriculture of countries bent upon industrialization.

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<sup>1</sup>For purposes of the present paper, the countries of North America, Western Europe, Oceania, and Japan are classified as developed, while Latin America, Africa, the Middle East, and the non-Communist countries of Asia, excepting Japan, (for short, Southeast Asia) are regarded as less developed. The countries of the Soviet bloc constitute a group by themselves.

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It has further been suggested that, given the expected increase in the trade gap under present institutional arrangements, the developed countries should be called upon (a) to remove existing trade restrictions that hinder the flow of imports from less developed areas and, (b) to provide capital funds in the form of private investments and foreign aid to fill the gap that remains. Another approach starts out with an estimate of the investment needs and the availability of savings in the developing areas and derives the need for foreign capital as the difference between these figures.

The "trade gap" and the "capital requirements" approaches thus provide alternative ways of arriving at an estimate of the foreign capital needs of developing countries.<sup>1</sup> In the following, we shall briefly survey existing estimates with a subsequent discussion of the difficulties inherent in estimation.

## II

In the postwar period, long-range projections on future U.S. import demand for primary products were first made in the Report of the President's Materials Policy Commission (the Paley Report) [7]. The Report provides forecasts for the early seventies with regard to the importation of fuels and raw materials of strategic importance in quantity terms. Subsequently, these estimates have been extended by Henry G. Aubrey to cover several tropical goods and agricultural raw materials, and have been supplemented by forecasts on future price trends [1]. For Canada, similar projections have been prepared by the Royal Commission on Canada's Economic Prospects [9].

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<sup>1</sup>Excepting for service items in the balance-of-payments, the two approaches should give identical results since, definitionally, the import surplus is given as the difference between aggregate expenditure and income and thus equals the difference between domestic investment and savings (net foreign investment). In symbols,  $M - X = E - Y = I - S = I_f$ , where  $M$  = imports,  $X$  = exports,  $E$  = aggregate expenditure,  $Y$  = income,  $I$  = investment,  $S$  = saving, and  $I_f$  = net capital inflow.

In the mid-fifties, GATT [4,5] and the U.N. Economic Commission for Europe [10] projected imports of primary products into the United States, Canada, and the countries of the OEEC for 1975, under the assumption that prices prevailing in the base period (1953-55 in the first case, and 1954-56 in the second) would pertain to the period of projection. The ECE estimates have later been extrapolated to 1980 but without a revision of the underlying forecasts [11]. These forecasts served as a basis for projections of the future export earnings of Latin America [15] and the ECAFE region [13], too. The U.N. Economic Commission for Asia and the Far East also estimated Japan's future imports of primary products.

In 1962, FAO prepared projections on the supply of, and the demand for, the principal agricultural commodities in all areas of the world for 1970 [3], while the United Nations presented tentative estimates concerning the future demand for several minerals and metals on a world-wide basis [12]. Also in 1962, the GATT updated its earlier estimate on the demand for the products of developing countries, including this time North America, Western Europe, Japan, Oceania, and the Union of South Africa among the importing areas [6]. Whereas the above-mentioned forecasts of FAO and the United Nations have been given in quantity terms, the GATT provides estimates in value terms assuming that the average prices observed in the years 1956-60 would prevail in 1975, the date of forecast chosen.

Estimates on the import requirements of developing countries are few and far between. Of interest are the projections prepared for Latin America [15] and the ECAFE countries [14], and the recent estimates of ECE [11] and GATT [6]. The latter provides a comparison of the expected export earnings and import requirements of developing regions on an area-by-area basis.

The most recent, and most ambitious, study employing the capital requirements approach is that of P. N. Rosenstein-Rodan [8]. An estimate of the rate of growth of GNP is provided here for the developing countries taken individually, based on the absorptive capacity of each. Subsequently, the need for foreign capital is calculated by assuming a capital-output ratio of 3 for all areas excepting Argentina, Brazil, Chile, and Peru, and forecasting marginal saving-ratios for individual countries.

### III

As to the applicability of the various projections in appraising the future export earnings of the less developed countries, note that the Paley Report underestimated the growth-potentialities of the American economy and gave insufficient consideration to the possibility of substitution against various nonferrous metals. The ECE and GATT also assumed an overly low growth rate for Western Europe in the original forecasts and the estimates had the further drawback of being based on relationships observed in the immediate postwar period. The former of these shortcomings was remedied in subsequent revisions of the projections, but not the latter.

In 1962, the FAO made a commendable effort to estimate the future demand for, and supply of, the main agricultural products on the basis of information provided by time-series data and international comparisons, assuming that prices observed in the period 1957-59 would prevail at the target-date of the forecast. One could quarrel with some of the estimates made for individual commodities but, for present purposes, the main

shortcomings of the study lie in limitations of its scope and in the assumption of constant prices.

As regards the scope of the FAO study, we note that this excludes wine, tobacco, bananas, fish, and several other commodities, which account for about 20 per cent of the receipts developing countries derive from the sale of agricultural products. Also, for the commodities included in the projections, net export (import) figures rather than a trade-matrix is given. Since temperate-zone foods originate also in developed regions (especially North America and Oceania), and a substantial proportion of these exports reaches the less developed countries through noncommercial channels (mainly the P.L. 480 program of the United States), estimates on the net trade of various areas do not indicate prospective trade flows. Correspondingly, information provided by the FAO is hardly sufficient to estimate the exports of most temperate-zone foods, cotton, and wool from less developed areas, although such estimates can be made for tropical beverages, sugar, jute, and natural rubber--comprising about 30 per cent of agricultural exports.

Further problems relate to the assumption of constant prices in the projections. On the one hand, the effects of an increase in the volume of trade on export earnings will be enhanced or moderated by price changes; on the other, changes in prices will affect the quantities demanded. As regards the first point, we note that the fall in prices experienced over the last decade cancelled out about one-third of the gain developing countries made in expanding their agricultural exports [27]. The prices of agricultural

products have fallen further in recent years for the bulk of commodities, and there is little likelihood that prices would return to the 1957-59 level.<sup>1</sup> Note also that the FAO study deals with the possible impact of varying prices on consumption only in the case of cocoa, although the price elasticity of demand is high in the case of agricultural raw materials, too, where prices bear influence on the substitution between natural and synthetic materials.

The United Nations projections of demand for minerals and metals are of a tentative character and have been prepared on a world-wide basis without indicating future consumption in individual areas. The estimates, therefore, are hardly amenable for forecasting future imports, although the supply forecasts in preparation will increase their usefulness to some extent. Given the fact that developing countries derive about 40 per cent of their export receipts from the sale of minerals and metals, this situation is not conducive to preparing reliable estimates on future export earnings.<sup>2</sup>

Finally, the GATT study provides a highly aggregative estimate of export earnings which does not give adequate consideration to changes in income elasticities over time or the implications of alternative policies for the domestic supply of agricultural products in the developed countries. Further, the GATT forecast is given in terms of 1956-60 prices and, although reference is made to the 13 per cent fall in the relative price of primary products experienced between 1956-60 and 1961, the relationship between price changes and quantities traded is not explored.

<sup>1</sup>The export price-index of tropical beverages fell by 16 per cent between 1957-59 and 1960 and a further 6 per cent between 1960 and 1961, and some decreases have taken place in the prices of most other agricultural commodities, too.

<sup>2</sup>Within the mineral and metal category, petroleum and petroleum products account for over two-thirds of the total.

## IV

In forecasting the import-requirements of the developing countries, GATT accepted an estimate of ECLA with regard to Latin America and derived a forecast of the import needs of Southeast Asia and Africa (including the non-petroleum producing countries of the Middle East) by way of analogy. Comparing these figures with the estimated export-earnings of the regions in question, a trade-gap of \$0.8 billion is derived for Latin America, \$8.0 billion for Southeast Asia, and about \$5-8 billion for Africa.<sup>1</sup> Of this trade deficit, non-commercial imports under P.L. 480 and other programs would finance \$0.3 billion in Latin America, \$1.5 billion in Asia, and \$0.6 billion in Africa, the remainder to be provided by increased exports of manufactures to developed countries and in the form of capital inflow other than the shipping of surplus food.

These forecasts can be compared to the capital needs of developing countries as estimated by Rosenstein-Rodan by use of the "capital requirements" approach. Rosenstein-Rodan expects annual capital imports in the years 1971-76 to amount to \$1.0 billion in Latin America, \$2.3 billion in Southeast Asia, and \$0.9 billion in Africa (including again the non-petroleum producing countries of the Middle East).<sup>2</sup>

We have seen above that, under proper definitions, the "trade gap" and the "capital requirements" approach should give identical results as regards the need for foreign capital. Yet, the estimates differ

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<sup>1</sup>The corresponding figure for these areas taken together is \$24 billion in the ECE estimates for 1980.

<sup>2</sup>Interestingly, Rosenstein-Rodan also sees the need for capital imports in Iran, Iraq, and Saudi Arabia which would supposedly show an export-surplus under the trade-gap approach.

to a considerable degree, the exception being Latin America. And the latter result should not give cause for comfort either since the GATT projection of import requirements in Latin America is apparently based on/misapprehension: instead of using a figure reflecting import needs, GATT adopts an estimate of the U.N. Economic Commission for Latin America on foreign-exchange earnings expected to be available for extra-area imports which has been derived from a forecast of increasing export surplus for Latin America as against the import surplus foreseen by GATT. The export surplus envisaged by ECLA (\$2.8 to 4.2 billion in 1975) is designed to pay for a net outflow of capital, and for interest and repatriated foreign earnings [6, p. 129, 15, pp. 67-69].

It would appear therefore that the similarity in the two estimates of capital needs in Latin America is largely coincidental. As regards the estimates for the other two areas, one may suggest that part of the discrepancy could be conceivably explained by reference to the different assumptions made with respect to prospective increases in the gross national product. While the GATT study assumes an approximately 5 per cent growth rate for Latin America and Asia, and 4.5 per cent for Africa, Rosenstein-Rodan calculates with 4.3 per cent for Latin America and Asia, and 3.2 per cent for Africa. But import requirements are only loosely connected with the rate of growth of GNP in the GATT study and, given the high marginal saving-ratio assumed by Rosenstein-Rodan, only a relatively small part of the difference in estimated foreign capital-requirements would be explained by this factor. And although the GATT forecast should be corrected for potential increases in the exports of

manufactured goods originating in the less developed countries, this would hardly offset the drain on export earnings due to service items--chiefly repatriated earnings and interest on foreign loans.

It should further be noted that the forecasts arrived at by the use of the two approaches not only give different results for the terminal year, but also indicate differing trends in capital inflow. Whereas the GATT estimate implies that the trade-gap would be increasing over time, the annual foreign capital requirements estimated by Rodenstein-Rodan for the period 1961-66 would be lower than the 1959-60 figure with a slight rise between 1961-66 and 1967-71 and a decline afterwards.<sup>1</sup> The large discrepancies in the estimates and the differing trends shown by the two forecasts, then, lead us to question their reliability.

The GATT study provides a highly aggregated estimate which is based on some broad assumptions on the export side and mainly on analogy on the import side, and is, therefore, subject to large errors. The possibility of error is especially great in regard to the assumed import requirements of developing countries. The size of the possible error can be indicated if we consider that ECAFE forecast imports of capital goods to reach \$22.4 billion by 1980 [14, p. 57] as compared to \$10.5 billion assumed by GATT for 1975.

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<sup>1</sup>In making comparisons, we have corrected the figures supplied by Rosenstein-Rodan to conform to the definition of foreign investment as being the difference between domestic investment and saving.

Neither is the Rosenstein-Rodan forecast free of error, although the author believes that the margin of error may not exceed  $\pm 25$  per cent. Actually, the range of possible error appears to be substantially larger, considering that a 5 per cent change in capital-output and saving ratios can increase (or reduce) the calculated external capital-requirement by over one-half.<sup>1</sup> The error-possibilities of the estimates are further indicated by contrasting the capital inflow of \$14 billion estimated by ECAFE for Southeast Asia in 1980 with Rosenstein-Rodan's forecast of an annual inflow of \$1.3 - 2.3 billion for the same region in 1971-76 [14, p. 56 and 8, p. 137].

## v

The error-possibilities and inconsistencies shown with regard to existing forecasts indicate that these can be of little usefulness for policy-making purposes. There appears to be need, therefore, for improvements in projection methods and for a systematic effort in fore-

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<sup>1</sup>The increase of the capital-output ratio from 3 to 3.15 would raise the annual external requirement for the period 1961-66 from \$5.7 billion to \$7.3 billion, and a 5 per cent reduction of the assumed saving ratio by a further \$1.3 billion.

casting. But one should also realize that, despite potential improvements in methodology, major sources of uncertainty remain. In the following, we shall examine the error-possibilities associated with the projection of the trade-gap, with separate consideration given to problems related to the estimation of the export earnings and the import requirements of less developed areas.

The future export earnings of the developing countries can be estimated as import demand on the part of importing areas. With respect to these imports, different problems arise in connection with trade in primary products and in manufacturing goods. While economic relationships observed in past periods can often provide an indication of future trends in the demand for primary products, these will be of little use in the case of manufactured goods, since the less developed countries have only recently become exporters of manufactures. In 1960, primary products accounted for about 90 per cent of their export earnings and manufactured goods for the remaining 10 per cent.

As regards import demand for primary products, we consider first the relatively simple case of commodities which (a) are produced exclusively in the less developed countries, (b) are objects of final consumption and (c) do not have close substitutes. For this group of products, comprising coffee, tea, and some tropical spices, future consumption (imports) can be estimated by inquiring into the effects of prospective changes in incomes and prices on per capita consumption, with appropriate

corrections made for population growth. For this purpose, it is necessary (1) to establish a relationship between per capita consumption, incomes, and prices for past periods; (2) to apply these relationships to the period of projection; and (3) to forecast the values taken by the so-called independent variables: income levels, prices, and population.

In establishing relationships between consumption, incomes, and prices for past periods, we can rely on time-series data, international comparisons, or budget statistics. As to the use of time-series statistics, changes in tastes, social customs, and income distribution that have taken place during the war well-nigh limit us to postwar observations and we also have to exclude data for the immediate postwar-years from the investigation. At the same time, in most instances, the availability of information on consumption, changes in inventories, and time-lags do not permit the use of quarterly data. Thus, we are restricted to 9-10 observations--hardly enough to provide estimates which the statistician would consider acceptable.

We may also relate intercountry differences in consumption to differences in incomes and prices, by assuming that "one country's past is another's future," e.g., Englishmen or Frenchmen will adopt the U.S. consumption pattern when they reach the present level of U.S. incomes. The validity of this proposition hinges on the assumption that intercountry differences in tastes and social customs are negligible, which may hold true with regard to some commodities (and some countries) but not for others. It will not be applicable in the case of tea or spices, for example, since tea consumption in Britain or the use of spices in French cooking has little to do with comparative income levels. Note further that the per capita consumption of butter is considerably lower in the United States than in most countries of Western/  
Europe

although past experience would suggest that butter consumption increases with rising income.

Caution is advised with regard to the use of budget data, too. Budget studies for the time of the survey provide information on the consumption of families at different income levels. In applying budget data to the entire population it is assumed that changes in the consumption pattern of the population, in response to increases in average per capita incomes, will conform to the relationship between consumption and incomes shown for families included in the survey. The usefulness of budget estimates for present purposes is, however, impaired by the fact that these often give information on expenditure for individual commodities rather than quantities bought and, further, statistical problems arise in applying family data to national aggregates.

Given the problems of estimation associated with using time-series data, international comparisons, and budget statistics to indicate relationships between incomes, prices, and consumption for past periods, the combined use of these methods appears advisable. The forecaster, then, has to evaluate the evidence provided by <sup>these</sup> / sources of information so as to derive the appropriate relationships, <sup>procedure</sup> which/necessarily involves some degree of arbitrariness. Further problems relate to the applicability of these relationships in forecasting.

In most instances, a great variety of statistical formulations relating per capita consumption to incomes and prices give an adequate "fit," but the further one extrapolates beyond the range of observation, the greater the difference becomes. Thus although purely statistical criteria

may not indicate whether, for example, we can expect constant or declining income elasticities over the period of projection, the choice among alternative statistical formulations will greatly influence the results. The judgment of the forecaster is necessary to make such a choice and this evidently involves the possibility of error. By and large, we can say that the error of forecasting increases with the length of the period of projection.

In projecting consumption (imports), it is further necessary to estimate future values taken by the independent variables of the forecasts: incomes, prices, and population. The estimation of future population requires projecting birth rates, death rates, and migration; among these, uncertainties are associated primarily with the forecast of fertility rates and migration. Forecasting the growth of GNP involves a larger margin of error, however. Although labor-force estimates can be derived from population projections, capital formation, the productivity of labor and capital, and technological improvements cannot be foreseen with confidence. Note also that the factors enumerated above determine "aggregate supply" while economic growth is also affected by demand factors, such as the expansion of exports which, in turn, depends on prospective changes in comparative costs.

Further difficulties relate to the estimation of future changes in prices. Whereas we can assume a unilateral causation between incomes and import demand, prices and quantities are, in fact, interdependent. Thus, in order to arrive at an estimate of equilibrium prices, consideration should be given to the reaction of demand and supply to price-changes.

At the same time, information on the responsiveness of supply to prices is rarely available.

These general conclusions should be supplemented with further observations in the case of final commodities that have domestic substitutes and/or are produced domestically in the developed countries. Various types of fruits (e.g., bananas, pineapple and tropical nuts provide examples for the first, temperate-zone foods for the second, while the choice between butter and margarine combines elements of both. If substitution relationships are of importance, it would be necessary to simultaneously estimate demand, supply, and prices of the related commodities, which can be conceivably carried out for past periods but will require heroic assumptions if applied to the future. As regards the domestic production of temperate zone foodstuffs in the developed countries, national policies play an important role. The share of domestic and foreign sugar in U.S. consumption is regulated by quotas, for example, and in the United States as well as in Western Europe a variety of measures are used to bolster agricultural incomes and to ensure domestic (and foreign) markets for home produce. In such instances, domestic supply becomes a policy variable, and the forecaster will have to make certain assumptions about agricultural policies to be followed during the period of projection. Since the developing countries are marginal suppliers of most foodstuffs that can be produced in temperate climate, a small error in the estimation of domestic supply will be magnified in the import forecasts.

The third group of primary products includes agricultural and non-agricultural commodities that are not objects of final consumption. Some

of these (e.g., cotton, wool) are used chiefly in producing final goods, while others find their main uses in the manufacturing of intermediate goods (e.g., metal ores) which, in turn, can be utilized in producing consumer and investment goods. Finally, fuels enter at all stages of production. For purposes of projection we may relate the demand for these commodities to the activities of the consuming industries or to changes in some aggregate variable such as gross national product or industrial production.

The statistical difficulties of the first procedure are obvious: it requires the estimation of input-coefficients and the projection of activity levels in all consuming sectors. On the other hand, the application of the second method presupposes the continuation of past trends in economic activities and in technological progress, although changes in industrial structure and in input coefficients, as well as substitution possibilities, should be allowed for in making projections.

Substitution relationships have considerably influenced demand for raw materials over the last decade and are expected to remain significant in the future. From the point of view of the developing countries, especial importance attaches to substitution between natural and synthetic materials, e.g., natural rubber and fibers vs. synthetics, metals vs. plastics, etc. Substitution among raw materials depends on changes in technology as well as on the responsiveness of demand and supply to changes in the relative prices of substitute materials. In regard to rubber, for example, the introduction of stereo polymers and prospective improvements in the manufacturing of ethylene-propylene rubber will have important effects in determining future patterns of industrial uses. At the same time, natural

rubber can regain some ground lost to synthetics if its price falls sufficiently (substitution is possible in various applications as well as in mixing natural rubber with synthetics).

These considerations indicate some of the error-possibilities of forecasting import demand for raw materials since technological changes can be hardly foreseen for a period of 10-15 years and uncertainty attaches to prospective price-changes, too. Further problems relate to the estimation of domestic production of raw materials and fuels in the developing countries, the rate of scrapping, and the location of various phases of the production of metals.

The developed countries often provide protection to the domestic production of raw materials and fuels through the application of taxes, subsidies, and quotas. A system of taxes and subsidies is used in most countries of Western Europe, for example, to assist coal against the onslaught of oil, while the United States relies on quotas to protect the domestic mining of oil, zinc, and lead. Given the impact of these policies on oil imports, uncertainties surrounding prospective changes in national energy policies are of especial importance here.

Mention should also be made of scrapping as a source of supply of metals. This can be estimated with a small margin of error for long-established metals but error-possibilities are larger in regard to aluminum, the use of which has greatly increased in recent decades. Finally, we should note that from the point of view of the export earnings of developing countries it is of importance in what form metals are imported by developed countries (ores, concentrates, unwrought or wrought metal).

It has been shown that projections on the primary-product exports of developing areas to developed countries involve a considerable margin of error. As regards the exports of manufactured goods, it is questionable whether meaningful forecasts can be prepared at all.

Three factors will determine the exports of manufactured goods from less developed countries, each of which is subject to a large degree of uncertainty. First, the expansion of capacity in these countries is greatly influenced by economic policies and although these policies may be reflected in long-term plans, changes in the plans and discrepancies between planning and realization are not infrequent. Second, the possibilities for developing countries of exporting manufactures to developed economies will depend on their comparative-cost position which, in turn, is subject to change as a result of trends in costs and prices and variations in exchange rates. Last but not least, developed countries often protect their industries from encroachment by low-wage producers. Cotton goods is an example for the recent past, and the threat of imports of manufactured goods in larger quantities may elicit formal and informal measures of a protective nature in regard to other industries, too.

No mention has been made so far of imports of primary products into the countries of the Soviet bloc and of intertrade among developing regions. Although this trade has been relatively unimportant in the past (the share of exports of primary products to other developing areas and to the Soviet bloc accounted for 11.2 and 6.2 per cent of the export earnings of the less developed countries in 1960), it may well increase in the future. At the same time,

there is no adequate basis for reaching conclusions in regard to prospective changes in Soviet import-policies. Also, exchange restrictions in many developing countries reduce the value of estimates on their future imports of primary products from other developing areas.

## VII

Turning to the prospective import-requirements of the developing countries, we note that these will depend chiefly on their prospective growth performance and the policy of import-substitution<sup>to be</sup> followed. The interconnection between economic growth, import-substitution, and the expected expansion of exports should be noted here. Given the pattern of final demand at higher income levels, an acceleration of economic growth will require a rapid expansion of exports and/or a policy aimed at import substitution. It is necessary to make explicit, therefore, what measures are to be applied for attaining the desired growth rate. Thus, both the rate of growth of GNP and that of imports becomes a policy variable and we can hardly use the scant information available for the fifties on / <sup>past</sup> relationships between incomes and imports for purposes of projection.

More reliance can be based on estimates provided in national plans although the usefulness of plans for purposes of long-term forecasting is impaired by the fact that these are often prepared for relatively short periods and often include unrealistic targets. Use can also be made of international comparisons, although structural differences in individual national economies reduce the applicability of these comparisons for forecasting. Finally, it should be noted that the import requirements of a

geographical region will be also affected by the success--or failure--of plans made for economic integration.

We can conclude that while the export earnings developing countries derive from the sale of primary products to developed economies can be forecast with some degree of confidence, the future exports of manufactured goods, exports to the Soviet bloc and to other underdeveloped countries, as well as the prospective import-requirements of the developing countries can be indicated under various assumptions but in the present state of our knowledge reliable forecasts cannot be prepared.

It should be further emphasized that although considerable improvements are possible as compared to existing estimates of the trade-gap, the results will greatly depend on the assumptions chosen. It is necessary, therefore, to prepare forecasts under alternative assumptions and, for the sake of improving the projections, there is need for a systematic and continuing effort in forecasting which would take account of the interrelationships of economic variables and would build on estimates prepared for individual regions in a unified methodological framework.

April, 1963.

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