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SOME COMMENTS ON TRADE PROJECTIONS FOR DEVELOPING ASIAN COUNTRIES

A Background Paper

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## SOME COMMENTS ON TRADE PROJECTIONS FOR DEVELOPING ASIAN COUNTRIES\*

### I

In recent years, much effort by various institutions and individual scholars has been devoted to an assessment of trade prospects and needs in developing countries. With the increasing recognition of economic planning requirements in accelerating economic growth, the need for careful appraisal of trade prospects becomes more and more important in formulating and modifying economic policies. Furthermore, a reasonable assessment of the gap between the resources required and the supply available to these countries to achieve a given target rate of growth might serve to enhance regional as well as international cooperation.

Trade projections, like many other economic projections, are extremely difficult to make because of the subjective judgment and considerable margin of error involved. At the outset, then, some of the problems inherent in estimating trade may briefly be mentioned. The assessment of export and import requirements and other external receipts necessitates a knowledge of economic variables such as income, consumption, and population, and a given or changed set of structural parameters, such as propensities, elasticities, and growth rates. Since economic development will be accompanied by planned as well as unexpected structural and

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\*This paper has been prepared as background material. Detailed findings of the various projection studies are not given, and the paper is too brief to fully credit the important contributions made by these studies. For detailed results, refer to the original sources, some of which are cited in the footnotes. These and other related sources are also given in the bibliography at the end of the paper.

institutional changes, future shifts in and interactions among structural parameters are difficult to quantify and predict, and assumed propensities and elasticities are not likely to remain constant. Even if expected alterations in a given set of parameters are incorporated in a projection, there is likely to be a considerable margin of error, owing to changing domestic and economic environments. With accelerated growth, the trade-income relationship will be modified through policy measures. A proper formulation of policy measures demands some understanding of an optimum trade-income relationship, and this, too, differs from country to country and will change over time.

## II

One of the primary objectives of trade projections is to ascertain the external finance required to achieve a given target rate of growth. If sufficient external financing seems unobtainable, adjustments will be called for. However, some of these, such as reductions of investment and imports, may have income-reducing effects and may not be acceptable. Since the particular type and degree of adjustments depend on the size of the projected need for external finance, which, in turn, will be influenced by the sources of difficulties and bottlenecks in a given country, it is important to identify these problems. In the accounting sense, the savings gap ( $I - S$ ) will always be matched by the import gap ( $M - X$ ). But on the ex ante level, the two gaps are not necessarily the same. The growth of a given country may be more constrained by one gap than by the other, and the adjustments themselves differ accordingly. The required amount of external finance will therefore vary according to

which gap predominates for a given country. In estimating the total foreign exchange of a given country, the larger of the two gaps will thus be the better basis.

In the past, foreign aid requirements have usually been based on the savings gap. The pioneering work by Rosenstein-Rodan is a typical example.<sup>1</sup> In recent years, however, estimates of the need for external resources for developing regions (projected by the United Nations, ECE, for example), have been based on the total foreign exchange gap.<sup>2</sup> It is argued that filling the gap between the domestic savings and the desired level of investment alone will not be sufficient to meet the total foreign exchange requirements in accelerating growth for many developing countries.<sup>3</sup> This shift in emphasis seems appropriate from the standpoint of most developing Asian countries.

### III

Aside from identification of the gap, the procedure adopted in arriving at a given projection will influence the magnitude of future exports, import requirements, and external resource needs of a given country or region. The methods that have been used by institutions such as the United Nations and ECE are primarily based on extrapolation,

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<sup>1</sup>P. N. Rosenstein-Rodan, "International Aid for Underdeveloped Countries," Review of Economics and Statistics, Vol. 43 (May 1961).

<sup>2</sup>Economic Commission for Europe, Economic Survey of Europe, 1960, Chap. 5. GATT, International Trade, 1961. United Nations, World Economic Survey, 1962.

<sup>3</sup>United Nations, World Economic Survey, 1964, p. 16.

assuming a higher target growth rate of GNP and per capita income. In recent work, ECAFE and the Institute of Asian Economic Affairs of Japan (IAEA) have adopted a more comprehensive approach than that of the United Nations and ECE.<sup>4</sup> In particular, these studies use macro models to project such variables as income and consumption, and trade projections are incorporated as a part of the total long-term economic projections. However, even here, the export projection itself is arrived at mainly by extrapolation.

Each of these studies employs two relatively simple macro models, a few characteristics of which are cited below. In the IAEA study, both models are based on the Harrod-Domar production function for gross domestic product, in which income is treated as a function of accumulated capital, a parameter of which is the reciprocal of the marginal capital-output ratio. In model I,<sup>4</sup> growth rates of imports and exports are exogenously determined, but in model II the growth rate of imports is treated as a function of income and trade balance.

In model I of the ECAFE study, similarly, the Harrod-Domar production function is used, but in model II the level of investment is treated as the planner's variable, depending on the desired level of trade balance. In both models, while exports are determined exogenously, imports are regarded as a function of income (imports are divided into four separate components: investment goods, raw materials, consumption goods, and service).

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<sup>4</sup>ECAFE, Review of Long-Term Macro-Economic Projections for Selected Countries in the ECAFE Region, Sept. 18, 1964. The Institute of Asian Economic Affairs (Japan), Long-Term Economic Projections for the Developing Asian Countries, 1961-1970, July 1964.

The IAEA study is very comprehensive in scope, covering not only aggregate economic projections, including sectoral estimates, but also commodity projections of developing Asian countries.

A model approach is not necessarily superior to extrapolation for projection purposes. The model may not be a good one! But to the extent that the total economic system is considered in the model, there is likely to be more accurate assessment of the relationship between trade and other economic variables. Further, the interdependence of economic variables can be specifically incorporated by introducing intended changes and adjustments in economic parameters. For example, when models are used, income itself is endogenously determined, and it, in turn, sets the amount of imports. Of course, one may always question the use of the same model for all countries since the economic structure, potential, and problems of each country will be different.

Table 1 demonstrates the results of various projection studies.<sup>5</sup> The table reflects different coverage of periods, countries, assumptions, and procedural techniques.<sup>6</sup> It is interesting to note that, depending on the assumptions and projection methods, the trade-income relationship is shown to be raised or lowered.

To better assess the possible range, the results of the ECE and IAEA projections are extended to the year 1980, using ECAFE's base period figures given in Table 2. It is clear how different each is although

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<sup>5</sup>A few other projection studies are also available, such as those made by GATT and UN cited in Footnote 2, and FAO Agricultural Commodities Projections for 1970 (Rome, 1962). However, the results are not included, either because the coverage of the commodities is not complete or because the ECAFE countries are not singled out.

<sup>6</sup>Each projection is based on the constant base year price.

TABLE 1

RESULTS OF TRADE PROJECTIONS FOR DEVELOPING ECAFE COUNTRIES  
By ECAFE, Institute of Asian Economic Affairs, and ECE  
(in billion dollars)

	Period	Base Year			Projected Year			Population (million)	Per Capita Income
		GNP	Exports	Imports	GNP	Exports	Imports		
1.ECAFE	1960-80	61.09	5.78	7.33					
	I				167.63	12.63	21.87		
	II				156.24	15.66	20.25		
Annual Growth Rate % (compounded)									
	I				4.84	4.01	5.62	2.21	
	II				4.48	5.11	5.21	2.21	
2.IAEA	1960-70	61.51	5.85	7.35	92.73	9.24	11.41		
Annual Growth Rate % (compounded)					4.12	4.68	4.50	2.33	
3.ECE	1958-80	55.	6.9	8.7	170.0	17.9	22.6	1,170	
Annual Growth Rate % (compounded)					5.2	4.43	4.43	2.2	

## 1. ECAFE

Source: ECAFE, Review of Long-Term Macro-Economic Projections for Selected Countries in the ECAFE Region, Sept. 18, 1964.

## Notes:

a. Countries include the geographical coverage of the ECAFE, except Australia, Japan, Mainland China, N. Korea, Mongolia, N. Viet Nam, and Western Samoa.

b. Results of both I and II are based on the use of model II. Figures for I are obtained by increasing by 11.2% the figures for the following 10 countries: Burma, Ceylon, Taiwan, India, Indonesia, S. Korea, Malaya, Pakistan, the Philippines, and Thailand. This percentage is based on the relative population figures for these 10 countries and excluded countries. Figures for II are obtained by adjusting the divergency between intra-regional exports and imports with the consistency parameter (pp. 138-41).

(Table 1 - continued)

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2. IAEA

Source: The Institute of Asian Economic Affairs, Long-Term Economic Projections for the Developing Asian Countries, 1961-70, July 1964.

Notes:

- a. Countries included are Burma, Ceylon, Taiwan, India, Indonesia, S. Korea, Malaya, Pakistan, the Philippines, and Thailand.
- b. The Institute's study is very comprehensive in scope, covering both aggregate projections, including sectoral estimates, and commodity projections of these countries. For the foreign trade sector, which is woven into the aggregate economic projection, both exports and imports are exogenously determined. But in one of the two models, imports are treated as an endogenous variable.

3. ECE

Source: ECE, Economic Survey of Europe, in 1960, Chap. v.

Notes:

- a. The scope of this study is basically limited to trade projection only.
- b. Countries included are those of the developing ECAFE countries.

the order of magnitude in the trade gap is relatively comparable, with the exception of ECAFE I. When each individual country is considered,

TABLE 2  
PROJECTIONS OF DEVELOPING ECAFE COUNTRIES' TRADE GAP IN 1980  
(in \$ million)

		GNP (1)	Exports (2)	Imports (3)	Trade Gap (3 - 2)
ECAFE	I	167.6	12.7	21.9	- 9.2
	II	156.2	15.7	20.3	- 4.6
IAEA		145.6	14.4	17.7	- 3.3
ECE		179.4	13.7	17.4	- 3.7

Source: Table 1.

Note: The initial figures for ECAFE (1960) are used for the other two for comparability.

the difference in projected figures is likely to be even greater, which suggests the need for additional inquiry and research effort.

#### IV

We now turn to a more detailed survey of the ECAFE export projection, including points relevant to it which are discussed in other projections.<sup>7</sup>

All export projection studies utilize similar methods. The exports of a given commodity for a given country are usually assumed to be a function of the importing country's income. Hence, once a few structural parameters

<sup>7</sup>ECAFE, Economic Bulletin for Asia and the Far East (Dec. 1963). The trade figures given in this study and in the long-term economic projections previously cited show considerable difference although the periods covered are the same. The extent to which these two studies are related is not clear.

such as income and population growth rates and income elasticity of import demand are postulated or estimated, the base period exports can easily be projected to the terminal period.

In most of the trade projection studies, the import functions are not specified. But since these projections usually assume a constant income elasticity of import demand, this elasticity multiplied by the growth rate of income will yield the growth rate of imports of the importing country, which is assumed to reflect export growth as well. Such a procedure implies a single exponential import demand function, the value of the exponent being the income elasticity of imports.<sup>8</sup>

<sup>8</sup>In the IAEA study, such an import function is specified, and two other simple functions with varying elasticities are considered. The particular trade projection which is entered into the aggregate economic projection employs the "world trade multiplier" method originally used by W. Beckerman in "World Trade Multiplier and the Stability of World Trade, 1938-1953," *Econometrica* (July 1956). By this method, world trade flows including service (of twenty-eight countries or regions) are expressed in terms of the Leontief type input-output matrix. That is, a given country's total exports are divided into exports to each of the other countries. Those exports are in turn entered as imports of the latter (f.o.b. value). More specifically, the exports of the  $i$ th country ( $X_i$ ) are as follows:

$$X_i = \sum_{j=1}^n X_{ij} + e_i A$$

$X_{ij}$  refers to  $i$ th exports to  $j$ th country or  $j$ th imports from  $i$ th country. There are twenty-four countries ( $j = 1, \dots, 24$ ,  $n = 24$ ) which are treated as endogenous sectors, consisting of Asian countries (including Japan and Mainland China), Communist countries, Latin America, Africa, Oceania, and the Middle East. (A) refers to total imports of the four regions, North America, U.K., EEC, and Other European Countries. These regions are considered exogenous sectors which demand exogenous imports (analogous to the final demand sector in the Leontief input-output model).  $e_i$  is the proportion of the exogenous sector's imports from  $i$ th country to the former's total imports. Assuming fixed import coefficients for each of the endogenous sectors ( $X_{ij}/X_j = m_{ij}$ , analogous to the technical coefficient in the input-output model), the following relationship in general matrix form can be derived:

$$X = (I - M)^{-1} e A$$

$I$  is a unit matrix,  $M$  the matrix of  $m_{ij}$ , and  $(I - M)^{-1}$  the inverted

Twelve commodities and 15 developing Asian countries are considered in the ECAFE export projection for 1980 (base year = 1960). The commodities are natural rubber, crude petroleum and petroleum products, tea, vegetable oils (including copra, coconut oil, groundnut oil, and oil seeds), rice, raw jute and jute goods, sugar, tin metal and tin-in-concentrates, wood and lumber, raw cotton, cotton fabrics, and tobacco.<sup>9</sup> The countries are Brunei, Burma, Cambodia, Ceylon, China (Taiwan), India, Indonesia, Iran, Malaya (including Singapore), North Borneo, Pakistan, the Philippines, Sarawak, Thailand, and South Viet Nam.

The importing regions are divided into North America, Western Europe, Japan, Eastern Europe, the developing ECAFE region (excluding Mainland China), and Others (the U.S.S.R., Mainland China, Africa, the Middle East, Oceania, and Latin America).

The specified commodities are said to cover 70% of total exports of these countries (85% of total primary exports, but only 20% of manufactured exports). The structural parameters used in the projection are largely those from the FAO study, and partly those from the ECE study and resulting from the ECAFE's own estimates.

According to this study, the projected exports for 1980 range from a low of \$6.7 billion to a high of \$9.5 billion (based on \$4.5 billion in

matrix. The exogenous sector's imports for the projected period (1970) from the endogenous sectors are estimated from income elasticity for total imports. Separate elasticities, one for Asia and the other for the world, are used. The trade projections (exports and imports) of Asian countries are basically made by multiplying the inverted matrix with the exogenous imports. This is an interesting approach, but treating such an important trading country as Japan as endogenous would tend to result in an underestimate of the trade figure for Asian countries.

<sup>9</sup>An essentially similar commodity coverage (with a few additional items) is used in one of the trade projections of the IAEA study.

1960). The annual growth rate of exports therefore varies from 2% to 4% which is considerably lower than the rates given in ECAFE's long-term economic projection (4.01% and 5.11%).

The position of each country in total projected exports is also shown in the study, but was computed on the basis of the export share of commodities held by the country during the initial period. As the export share is not likely to remain constant, the postulation for individual countries will be subject to a considerable margin of error, even assuming reasonable accuracy of the total projection. Furthermore, as expected, the proportion the 12 commodities selected has in the total exports of each country varies substantially, ranging from 95% (for Brunei and North Borneo) to 63% and 48% (for the Federation of Malaya and Singapore, and India, respectively).

In addition to positing a constant share for individual countries, the study initially assumes that the regional export share of individual commodities to importing regions is also constant. This is later modified for a number of commodities. In particular, the alternative export projection postulates declining world export shares for rice, tea, sugar, tin, and jute; and increasing shares for raw cotton, cotton textiles, wood and lumber, and tobacco. On such a basis, the projected exports are larger than those arrived at under the constant share assumption.<sup>10</sup>

While the base year share of individual countries, as well as the base

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<sup>10</sup>The total export position of the region, including the products not considered in the analysis, is also postulated with three alternative assumptions. These assumptions are (1) the excluded items (primary and manufactured goods, taken separately) will increase at the same rate as those considered; (2) manufactured exports will increase at the same rate as that of GNP; and (3) manufactured exports will triple.

year world export share of the region, is expected to alter in the future, the direction and the magnitude of the changes will vary from country to country, for many and different reasons. It is difficult to assess these shifts without more research into the factors affecting domestic production, as well as those determining external conditions.

In relating the prospects for exports to the income of the importing regions, a very high elasticity of exportable supply is assumed inherently, but this is an unrealistic assumption for many exportable goods. The decreasing world export share of the region in the past implies that not only income but price elasticities of demand and supply should also be investigated.<sup>11</sup> In addition, there might be an over-estimation of the export prospects projected in terms of constant price, if the terms of trade move against the primary producing countries.

In sum, an important contribution has been made by ECAFE and other institutions in their attempt to appraise the trade prospects of the developing Asian countries. A number of useful findings are presented in these studies, especially on the prospects for individual commodities. But many aspects, such as the particular procedures adopted and the assumptions made, require careful scrutiny. Depending on the assumptions, the projected figures can be raised or lowered, which is apparent from the different results obtained in all of these studies. The ECAFE study states very appropriately that the study is no substitute for further and more detailed work which should be done by the individual countries themselves.

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<sup>11</sup>It should be noted that considerable research on the direction of future supply conditions of various commodities is reported in the study made by the IAEA. The procedure adopted is, however, essentially a type of macro-analysis which estimates the supply surplus as a residual between the total output and total consumption of each of the selected commodities in constant price.

## BIBLIOGRAPHY

- Avramovic, D. G. R. and Gulhati. Debt Servicing Problems of Low Income Countries. Baltimore: The Johns Hopkins Press, 1960.
- Balassa, Bela A. Trade Prospects for Developing Countries. Homewood, Ill.: R. D. Irwin, 1964.
- Chenery, H. B. "Comparative Advantage and Development Policy," American Economic Review, Vol. 51 (March 1961), pp. 18-51.
- \_\_\_\_\_. "Patterns of Industrial Growth," American Economic Review, Vol. 50 (Sept. 1960), pp. 624-54.
- Cooper, R. A Note on Foreign Assistance and the Capital Requirements for Development. Santa Monica: The Rand Corp., 1965.
- Deutsch, K. W. and Eckstein, A. "National Industrialization and the Declining Share of the International Economic Sector," World Politics, Vol. 13 (Jan. 1961), pp. 267-99.
- Dorrance, G. S. "The Effect of Inflation on Economic Development," IMF Staff Papers, Vol. 10 (March 1963), pp. 1-47.
- Food and Agriculture Organization. "Agricultural Commodities: Projections for 1970," Document E/CN 13/48, CCP 63/5, Special Supplement to FAO Commodity Review, 1962, Rome, 1962.
- General Agreement on Tariffs and Trade, Special Group on Trade in Tropical Products. Trends in International Trade, Geneva, Annual (See especially 1961 issue).
- Institute of Asian Economic Affairs. Long-Term Economic Projections For the Developing Asian Countries, 1961-1970. Tokyo, Japan, July 1964. Also abridged edition in English.
- Kravis, I. B. and Davenport, M. W. S. "The Political Arithmetic of International Burden Sharing," Journal of Political Economy, Vol. 71 (Aug. 1963), pp. 309-330.
- Maizels, A. "Effects of Industrialization on Exports of Primary-Producing Countries," Kyklos, Vol. 14 (1961), pp. 18-46.
- \_\_\_\_\_. Industrial Growth and World Trade: World Trends in Production, Consumption and Trade in Manufactures, National Institute of Economic Research, Cambridge Univ. Press, 1963.
- Morgan T. "The Long-Run Terms of Trade Between Agriculture and Manufacturing," Economic Development and Cultural Change, Vol. 8 (Oct. 1959), pp. 1-23.

Ohlin, G. Reappraisals of Foreign Aid Policy. Paris:OECD Development Center, Dec. 1964.

Patel, S. J. "Export Prospects and Economic Growth: India," Economic Journal, Vol. 69 (Sept. 1959), pp. 490-506.

Pincus, J. A. "The Cost of Foreign Aid," Review of Economics and Statistics, Vol. 45 (Nov. 1963).

\_\_\_\_\_. Economic Aid and International Cost Sharing. A Rand Corporation Research Study. Baltimore: The Johns Hopkins Press, 1965.

Prebisch, R. "Commercial Policy in Underdeveloped Countries," American Economic Review Papers and Proceedings, Vol. 49 (May 1959), pp. 251-69.

Raj, J. N. and Sen, A. K. "Alternative Patterns of Export Growth Under Conditions of Stagnant Export Earnings," Oxford Economic Papers, Vol. 13 (Feb. 1961), pp. 43-52.

Rosenstein-Rodan, P. N. "International Aid for Underdeveloped Countries," Review of Economics and Statistics, Vol. 43 (May 1961), pp. 107-38.

Seers, D. "A Theory of Inflation and Growth in Underdeveloped Economies Based on the Experience of Latin America," Oxford Economic Papers, Vol. 14 (June 1962), pp. 173-95.

Swerling, B. C. "Some Interrelationships Between Agricultural Trade and Economic Development," Kyklos, Vol. 14 (1961), pp. 364-95.

United Nations. The Capital Development Needs of the Less Developed Countries, 1962.

\_\_\_\_\_. International Compensation for Fluctuations in Commodity Trade. New York, Oct. 1961.

\_\_\_\_\_. International Flow of Long-Term Capital and Official Donations, 1959-1961, New York, 1963.

\_\_\_\_\_. Trade and Development, Proceedings of the U.N. Conference on Trade and Development. Geneva, 23 March - 16 June 1964. 8 vols.

\_\_\_\_\_. World Economic Survey. Annual (See especially 1962 issue).

\_\_\_\_\_, ECAFE. Economic Bulletin for Asia and the Far East. Quarterly (See esp. Vol. XIV, No. 3, Dec. 1963).

\_\_\_\_\_. Review of Long-Term Macro-Economic Projections for Selected Countries in the ECAFE Region. Document C/CN. 11/CAEP. 2/L.4 Add. 1. Sept. 18, 1964.

\_\_\_\_\_, Economic Commission for Europe (ECE). Economic Survey of Europe. Annual (See esp. 1960 issue).

Note: For a more extensive list of references, see listing in Pincus, Economic Aid and International Cost Sharing.