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Foreign Aid and the Two Gap Theory of Economic Development: A Case of India

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INTRODUCTION

Recently economists have witnessed the emergence of a new variable in the theory of economic development: foreign aid. But this concept is as old as the history of economic development. The 'classical' view of foreign aid has been that it suppliments domestic saving. This view follows naturally from the Harrod - Domar theory of growth. Harrod - Domar theory implies that if all the parameters are fixed, the maximum rate of growth will be determined by one of the two equations corresponding to supply and demand for capital and labour. Harrod's 'natural' and 'warranted' rate of growth follows respectively from the labour and capital determined solution. In this model, growth is limited only by the inability of saving to finance investment. The inflow of external resource, which can loosely be termed "foreign aid", therefore can play the role of increasing resources available for domestic saving.

MACRO-ECONOMIC GROUNDWORK

With the purpose to study the effects of foreign capital inflow in the process of economic development within an aggregated macro-economic boundary, quite widely tested 'two gap' model of Chenery and Bruno (1962) was formulated to explain the phenomenon of trade limited growth. The extension of the groundwork of this model was worked out by Chenery and Strout (1966) followed by a series of case studies based on this model by Mckinnon (1964), Adelman and Chenery (1966), Fei and Ranis (1968), UNCTAD report (1968), Bruton (1969), and Cochrane (1972). All these works have developed a remarkable clear rationale of economic activity as an development alternative, where the foreign aid acts as a separate factor in the modern theory of development.

It is also interesting to note yet another recent confusion in this regard by D. Lal (1976), where he has his own reservations over the assumptions of Chenery and Strout. To Lal, these 'may hold true for some economies in the short-term, it is unlikely that they may hold true in medium or long - term. In our mind, perhaps, Lal overlooked that the 'concept of phase' is the core of Chenery and Strout's system analysis, where the presumption of a given sequence is not a necessary condition.

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Moreover, Chenery and Strout called the whole process to be a 'transformation' to 'sustained growth' which means their assumption will not be rigid and will hold true in the initial phase I (short-term) and will gradually change over from phase II to phase III (medium and long- term).

Chenery and Strout has made an implicit assumption in the two gap theory that both investment and import are necessary for production and make the assumption clear and state, "We postulate a minimum import level required to sustain a given level of G.N.P. ....."

PROPOSITION AND METHODOLOGY

For the empirical verification we have selected India as a case study. Through a series of Five Year Plans, India has consciously initiated to develop its economy. In the process of her development the country has been facing adverse balance of payments with imports far in excess of exports. As an essential to domestic output, the import of 'investment and maintenance' goods have the highest priority. If the two gap theory provides a proper explanation of the development process, we would expect a priori that the underlying aggregate production in India is of type given below:

$$Qt = f(Kdt, Mt) \quad \ldots\ldots (1)$$

where,

Q denotes out put
Kd denotes domestic capital
M denotes imports related to out put and
t = time subscript

Labour, being in abundance in India, is not a restrictive factor. It has therefore not been considered in the production function.

Greatest significance was attached to investment in Harrod-Domar production function. Thus, to them:

$$Qt = f(It\ dt) \quad \ldots\ldots (2)$$

Where, I denotes investment

To estimate the function in (1) we have used the time series data for the period 1975/76 to 1984/85 on the three variables i.e. Q_t, K_{dt} and M_t (These data are described in detail in the Appendix). Briefly Q_t relates to 'national income', K_{dt} to 'reproducible tangible wealth' estimated by the formulation of:

$$K_t = I + (1-\delta)\, K\frac{5}{t-1} \quad \ldots\ldots (3)$$

And M_t to Imports of capital and maintenance goods' (In this study investment and intermediate goods).

Giving the functional form (1) a Cobb Douglas form and assuming that it is a behavioristic relation (including a stochastic term with regular properties) we have estimated the function for above data.

ANALYSIS OF DATA

Linear Regression Equation : $Q_t = B_0 + B1_t X_{kt} + B_2 X_{Mt}$

The estimated value is :

$$Q_t = 94.3849 + 0.2842\ X_{kt} + 0.0496\ X_{Mt} \ldots\ldots (4)$$

Standard Error = (11.9324) (0.1176) (0.0434)

$R^2 = 0.93$, DW = 1.77

The above parameter estimate do confirm our hypothesis statistically as well as with the help of partial regression residual plot (see equ. 4). The R^2 is quite high which statistically proves the significance of both the K_t and M_t. At the same time when we include POL items (Petroleum oil and Lubricants) in our import's data, we find negative value of the factor imports. The estimated parameter value is:

$$Q_t = 75.0021 + 0.2944\ X_{kt} - 0.0262\ X_{Mt} \ldots\ldots\ldots\ldots (5)$$

Standard Error = (14.2648) (0.1366) (0.0387)

$R^2 = 0.92$, DW = 1.68

The above estimates also depict the significance of both the variables as the total correlation coefficient is high and the coefficients of K_t and M_t are statistically significant. These variables have also been estimated at 1980/81 prices and the parameters estimated are:

$$Qt = 53.432 + 0.643\ K_t - 0.169\ M_t$$

Standard Error (9.839) (0.277) (0.208) $R^2 = 0.92$ DW = 1.31

Total Correlation coefficient is highly significant. The partial regression residual plot also shows the significance of the variants (5).

For the comparative study of the above results with the Harrod-Domar hypothesis, we also estimate a variant of the Harrod-Domar production function which is:

$$Q_t = 83.5940 + 0.3033\ X_{It} \ldots\ldots (6)$$

Standard Error = (6.2733) (0.0222)

$R^2 = 0.91$, DW = 1.42

Comparing (4), (5) and (6) one finds that inclusion of variable M improves the results, therefore, M can be considered as a separate variable.

An argument can be made on the ground that variable k includes imports of capital goods (i.e. part of M), therefore, a critic might raise that the two variable M and K are not really independent (regarding the estimate in 4), thereby invalidating one of the important assumptions implied in the Gauss-Markov theorem. One could thus, raise the objection on its validity and could argue that the above estimates are not best so that significance tests cannot be applied to these estimates. But this objection does not hold good, if one goes deeper into the argument. Firstly, this objection ignores the magnitudes involved. Because on a rough basis, capital estimates would be approximately fifteen to twenty times greater than the investment estimates and, therefore, imports of capital goods would enter the capital stock estimates in a complicated and non-linear way. Thus the assumption that independent variables are independent in a statistical sense, implied in the Gauss - Markov theorem, is borne out by the above results. The inclusion of M not only appears significant but also adds to the total coefficient.

Moreover, it can also be pointed out here that for 'domestic capital', the variable capital can be considered as a 'proxy' and therefore, the above function can be interpreted as a decision function, decision being substitution of 'domestic capital' for imports. On the other hand, dual role of import as a complementary to and substitute for domestic capital is quite obvious. Both these relationships are implied in the equation (4). The inclusion of capital imports in the estimation of capital data takes into account the complementary nature of imports and, on the other hand, treatment of M as a separate independent variable satisfies the substitutional function.

CONCLUSION

Now, we can infer that the two gap theory is based on production function where capital and imports are the major inputs. The crucial assumtion of the two gap theory of economic development is also empirically proved when we find (as we have tested this production function) that imports do form an independent variable and have a dual function, complementary to and substitute for domestic capital.

SELECTED REFERENCES

Chenery, H.B. and Bruno, M. (1962), "Development Alternatives in an Open Economy: The Case of Israel." *Economic Journal* 72, 1962, pp. 79-103.

Chenery, H.B. and Strout, A. (1966), "Foreign Assistance and Economic Development," *American Economic Review* 56, pp. 679-733.

Jorgensen, D.W. (1965), "Anticipation and Investment Behaviour," *Brookings Quarterly Econometric Model and United States,* Rand McNally and Co., Chicago, p. 51.

Lal, Deepak, (1976), "The Evaluation of Capital Inflow," Paper, presented at the conference on *Financing and Appraisal of Investment Projects*, (TUSLAD), (IBMS), Istanbul, Turkey.

Reserve Bank of India (1963), "Estimates of Tangible Wealth in India" *Reserve Bank of India Bulletin,* January, pp. 8-19, Bombay.

APPENDIX

The data used in this paper relate to output, input and capital stock. All data have been converted into 1970/71 prices and expressed in index number with 1970/71 = 100. These are described below:

Output : Output defined as 'National Income at Factor Cost at 1970 71 Prices'.
Import : Import relates to 'import of capital and maintenance goods. This variable is composed of the following categories of import:

Transport equipment, Electric machinery, Other machinery, Non-ferrous metals, Chemicals, Iron and Steel, Raw cotton and, Petroleum oil and Lubricants.

Capital Stock : The Reserve Bank of India has estimated Tangible Wealth for India in 1960/61 (RBI, 1963). Two concepts of tangible wealth have been used: firstly total tangible wealth, and secondly, reproducible tangible wealth. The relationship between these two concepts is given as:

Total tangible wealth = reproducible tangible wealth + value of land. In this analysis estimates for reproducible tangible wealth have been used. We have information on K_t for two years, 1950 and 1960. Using the investment data for the intervening years in the technique suggested by Jorgensen, namely, $K_t = I_t + (1-\delta) K_{t-1}$. We have estimated the reproducible tangible wealth for all the years and converted it at 1970/71 prices. The value of δ was estimated at 0.0107. The investment data refer to 'net investment' at 1970/71 prices and have been taken from 'National Accounts Statistics'. C.S.O. Publication, Govt. of India, New Delhi.

Table 1

National Income, Capital Stocks and Imports of India

(Rs in crores at 1970 71 Prices)

Year	National Income	Capital Stock	Imports
1975/76	40,274	46,611	2,107
1976/77	40,429	48,134	1,867
1977/78	44,046	51,228	2,213
1978/79	46,533	51,823	2,803
1979/80	44,136	61,398	3,494
1980/81	47,496	73,441	4,474
1981/82	49,935	81,223	4,228
1982/83	51,119	84,326	5,079
1983/84	55,100	93,372	6,021
1984/85	57,014	1,01,151	6,811

Source: National Accounts Statistics, 1970, C.S.O., Government of India. Estimate of tangible Wealth in India, 1963, RBI, India.

BOOK REVIEW

Kyoko Inoue (1992): Industrial Development Policy of India, Institute of Developing Economies, Tokyo, pp. 163. Price not mentioned.

The book under review consists of five chapters : the initial formulation of industrial policy of India; evolution of industrial policy; industrial policy as the means to enhance social justice; the 1980s - the era of liberalization; and industrial development policy at the state level a case study of Karnataka.

With the globalization of economy many developing countries of the world are encountering with the pressing policy questions pertaining to economic development. Liberalization measures consisting of privatization, debureaucratization, deregulation, and decentralization have become buzzwords in the literature of development. But the question is: can all these policies bear the scope for generalized development praxis ? Or, are these policies merely yet clearly reflect the lack of other suitable choices ? The book under review critically analyses India's hitherto industrial development policy.

Although the book makes a factual appraisal of various policy measures undertaken by various governments so far, the ideological position taken by the author is invariably a liberal one. This is evident from the unravelling of various contradictions by the author - between deregulation and strict licencing, social justice and market forces, statism and privatization, pragmatism and ideology, and nationalization and liberalization. The author cogently puts, "emphasis on political goal like social justice has distorted India's industrial development policy, not because the goal itself was wrong but because the government was concerned primarily with achieving direct results" (P.140).

The author strongly views that India's industrial policies in particular and economic policies in general were largely determined by political rationality rather than purely economic considerations; which is true indeed. Each successive regime from Nehru to Rajiv viewed economic policy an instrument for increasing mass political support and, therefore, failed to pursue rational industrial policy, notwithstanding their occasional clamors for liberalization. The new era of aggressive economic liberalization began with the Rao government in the ninenty-nineties yet his position as a minority government, fear of negative consequences of this policy on small-scale industries and backward regions, and the possibility of conflict with the state governments have been putting an unintended stress on the elan of vital liberalization.

As the focus is still on the removal of poverty, the excessive concentration of power in the hands of a few business class has been viewed by the Indian leaders as evil bolstering the author's belief that India's liberalization measures initiated up to the eighties was half-hearted. The author herself prescribes what it all mean. She argues "Liberalization in an industrial economy has to mean: liberalization of investment including foreign capital investment, liberalization of trade, especially import trade, liberalization of technology usage including foreign technology, and especially in the Indian context, liberalization of the production system" (P.58).

Judging by the yardstick of these criteria set by the author one feels that the various plan periods have produced a plethora of policy debates on industrial development including a host of commissions promulgating numerous acts but the requisite political will for the implementation of hard policy was lacking in this soft-state just to use Myrdal's lexicon. The consequence has been; either wrong implementation of right policy or non-implementation of right policy. The author invokes the second reason first indicating that the strategic option open to each government in the given situation was muddle-about; increased the scope of policy debates but made *numerous compromises at crucial stages in the policy-making process*. To say, politics prevailed over economics in the name of common good.

The regular classification of industries increased the role of bureaucracy and political involvement in decision-making (P.19). creating serious distortion in the economy by eliminating competition. This distortion, the author argues, was partly offset by *allowing exceptions* and partly by *formulating ad hoc supplementary rules*, especially where incompatibility existed between the need for policy reforms and the reality of the economy. Commonality, rather than disjuncture, between the centre and state's policy subsists as the former makes the guideline and policy framework for the latter. The case study of Karnataka well substantiates the point, even establishing the validity between general and particular nature of scientific research.

The analysis of the industrial development policy in India, however ends up with a grim note: "the spurt to liberalization was confined to limited areas; its effects failed to spread to the entire economy, and this increased disillusionment with the government" (P. 105). The substance of analysis is parsimonious in the sense that the book does not uses any ambiguous concepts bearing the mark of controversy and poses no difficulty to understand. It is plain, yet bold. The author, for example, says: "The government seemed to have tried arming itself with vagueness to keept its political position safe on various matters." (P. 46). Presentation of adequate tables, appendices, bibliography and index adds richness to the academic quality of the book. Given India's problem complexities, the structure of its class, and the aspiration of its mass, a systematic analysis of India's industrial policy is definitely an uphill task which the author of this book has scholarly dealt with. This book is a solid contribution in the industrial development policy of India.

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