# XXIX. COMPUTER STUDY OF THE DYNAMICS OF A NATIONAL ECONOMY[*]

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## RESEARCH OBJECTIVES

The objectives of this study are twofold: (a) to explore the feasibility of using the technique of digital-computer simulation for studying problems of economic dynamics on the macro-economic scale and (b) to gain some new insight into the inter-actions of different mechanisms in the economic system which have previously had to be analyzed separately.

The economic problem that is being studied is the initiation of growth in an underdeveloped economy — a problem involving dynamic complexities beyond the scope of conventional economic analysis. This problem is being studied with the aid of about a hundred alternative "histories" of a simulated underdeveloped country. The histories were generated on the IBM 704 computer, Computation Center, M.I.T. They show the different outcomes for a given economic system subjected to different developmental investment programs, foreign trade policies, and measures to control inflation. In addition, some of the histories show the different behavior that would result from particular policies if different values were assumed for some of the coefficients in the system.

The economic-system model is based on the economy of India. It is a dynamic multisectoral macro-economic model with flexible prices, consumers' budgeting behavior, capital formation, and other significant features not previously combined in one formulation. Since these economic characteristics entail a considerable amount of complexity, as well as mathematical nonlinearities and time lags, machine simulation is the only feasible means of investigation. The formulation was made in terms of the DYNAMO code, developed in the School of Industrial Management. A completely detailed description of the model, a discussion of the economic problems, and the applicability of the simulation technique, have been presented in a working paper of the Center for International Studies, M.I.T. (publication no. C/60-10).

The technical feasibility of simulating such a model as this one was demonstrated in June 1960, when the "histories" referred to above were generated on the IBM 704. Following that, computer outputs in the form of plotted points were connected by lines to make graphs, and scales and labels were added. The current phase of the program includes the time-consuming procedure of studying and comparing the various graphs and some of the tabulated data, interpreting them in terms of economic theory, perhaps inferring some general conclusions, and ultimately making some judgment on the value of this technique for economic research. Two graduate students, B. Tencer and R. W. Gillespie, are continuing their work on Ph.D. theses that will be a part of this interpretation and analysis. Additional analysis is being made by the author and will be included as an over-all final report in a forthcoming book.

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