

WELFARE, OUTPUT, AND MONEY: SOME ASPECTS OF THAILAND'S SECOND NATIONAL ECONOMIC AND SOCIAL DEVELOPMENT PLAN

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Thailand's economic system is not a planned economy. It is not an economy in which economic activity is directed and controlled in accordance with government programs and directives. The Thai economy is overwhelmingly one of private ownership and private enterprise. It is predominantly agricultural, in terms of labor utilization and in terms of its role in the world economy. And it is an open economy, the fate of which is constantly influenced by external factors.

Yet Thailand is now operating under its second six year plan, inaugurated with glowing accounts of successful performance under the first. What is the scope of this plan, and how does it fit into a decentralized private economy of farming and trade?

Thailand's economic plan is really a kind of super-budget for government expenditures related to economic development. It differs from a regular government budget in that it attempts to span a longer time period. So far, indeed, the time horizon has been a bit too long. Government agencies have not been able to program their development expenditures as far as five or six ahead, and the Plan thus shows an unrealistic slowing down of development expenditures in its last years. While formally a criticism of the Plan, this may really be a measure of the need for it, to put pressure on operating agencies to improve their long-run planning. The Plan also differs from a regular budget in that it concentrates attention on only a fraction, and the lesser fraction, of all government expenditures. The criteria of good budgeting are also criteria of a good plan: there should be an effort to evaluate the costs and benefits of different lines of government expenditure and activity, to achieve an optimum scale for total government participation in the economy, and to achieve an optimum allocation of activity within the government sector among all the possible competing forms. Administratively, however, there have been problems of coordination and conflicts of interest between the budget bureau and the planning agency.

For the remainder of the economy, the plan is more of a forecast than a directive. However, analysis of the private sector is essential for the proper evaluation

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of government programs. In particular, government supplied goods and services are crucial inputs to many parts of the private sector, and must be synchronized with the performance of those users. One needs only to mention the importance of transport, electric power, and water-resource control.

It is important to distinguish between the Plan as a self contained economic document and the Plan as one element in the planning process. The distinction has been effectively stated by Sixto Roxas, a leader in the development of planning in the Philippines:

In the past, efforts to establish economic planning in the Philippines were overly obsessed with the writing of economic plans rather than with the establishment of a meaningful planning process... It is normal for economists to be more interested in the internal content of an economic plan than in the planning process as such...

The establishment of a planning process is an exercise of quite a different character. Here the problem is not one of producing an internally consistent and analytically elegant document. The task is to spread a planning habit, establish rational economic calculation as the common norm for decision-making, and have this accepted by those responsible for making decisions. It is a problem of organization and management.

*In designing its strategy, it is more useful to see economic development as a conspiracy that needs organized plotting or as a drama that calls for skilled actors and masterful staging. In selecting techniques, the tested methods of psychological warfare have more to offer than the conceptual tools of growth economics. Even Stephen Potter would be a better manual than Harrod or Domar**

A major objective of Thailand's planning process is to make the various agencies of the government increasingly aware of their potential role in the development process and to increase the coordination of their efforts toward an important common purpose. The need for such coordination is great because Thai government, like Thai society, is "loosely structured." Each government agency or enterprise potentially enjoys a large measure of autonomy. A top official typically has long tenure of office and is not dismissed merely because his organization has not functioned efficiently.

*Sixto K. Roxas, "Lessons from Philippine Experience in Development Planning," *Philippine Economic Journal*, Second Semester, 1965, p. 402.

The tradition of Thai aristocracy and bureaucracy is not authoritarian, in the Prussian or Czarist sense; its inner logic is much more like the British. At the same time it is not primarily oriented toward the performance of services and functions, as American government predominantly is. Thai officials still operate in a world strongly influenced by considerations of status, power, prestige, and observance of traditional patron-client relations. This situation tends to annoy western observers, schooled in a rationalistic approach to government and to economic development. Yet the tradition has helped the Thai people to enjoy a remarkably high degree of personal freedom despite the lack of formal institutional checks on the power of the executive branch of the government.

The loose structuring of government is thus a major challenge to the planning process, and a source of frustration to officials directly involved in that process. The problem is evident in the formal organization of that process. The National Economic Development Board was established in 1959, following recommendations of the World Bank Mission. Its original membership numbered 46, far too large for effective action, and in 1960 an executive committee of 10 was established to provide more detailed and continuous control. In 1965 the membership of the full Board was reduced to its present level of 31; however, all cabinet ministers are considered advisers to the Board and may participate in its meetings. Many do attend, and since decisions are made on the basis of the "sense of the meeting" rather than formal votes, they are potentially influential. The Board is headed by the Prime Minister. The NEDB is, therefore, a committee of the top-level members of the government. By the same token, however, it is not ordinarily a top-priority affiliation for any of these. The prime minister and his top policy associates are more concerned with questions of political power and diplomacy than with technical issues of economic planning and growth, and the quantitative, rationalistic approach to policy is not any more congenial to them than to politicians in most countries. At the same time, heads of operating departments are more concerned with matters internal to their individual departments than with the concerted activity of the government as a whole.

Leadership in the planning process has rested chiefly with the Executive Committee of NEDB, which consists of 13 members. These include *ex officio* the Governor of the Bank of Thailand, the Budget Director, and the head of the Ministry of National Development. The last-named agency was established in 1963 in an effort to improve coordination in the execution of development projects. It is somewhat of a "line" counterpart to the "staff" NEDB. Under its jurisdiction have come such development efforts as highways, irrigation, and electric power.

By contrast, the technical staff of the NEDB, competent and hard-working as most of its members are, does not enjoy any large intrinsic power or influence,

although at least one of its high officials is, by virtue of personality and family connection, politically influential.

In sum, a major function of the planning process is to increase the awareness of the various government agencies of their potential role in economic and social development, and to improve their performance of that role. The success of the planning process in achieving these goals cannot be inferred from the Plan document itself. Indeed, the loose structuring both of government and of the private economy is bound to make the planning process, the plan document, and the administration of plan activities appear untidy and disorderly.

It is, therefore, somewhat unfair to subject the Plan document to close analytical scrutiny, as this conference is doing. In another view, such scrutiny is a proper exercise in sharpening one's analytical tools. Our criticisms may not really produce constructive suggestions for a better plan, but they may help to improve our understanding of economic and social analysis.

Before taking up an admittedly unfair criticism of the Plan document itself, it will be useful to review briefly some background elements of importance. Although Thailand has a tradition, dating back more than a century, of government leadership in social innovation, it also has a tradition of fiscal conservatism. This tradition was rudely breached by World War II. As a result of Japanese expenditures financed by credit from the Bank of Thailand, the Thai price level rose about ten-fold during the war. The principal impact was on the real incomes of government officials and civil servants. Government salaries lagged behind prices, and are still lower, relative to national per capita income, than before 1940. This squeeze has had many effects: increased vulnerability to corruption, a lax attitude toward multiple office-holding, a tendency for officials to seek private income from connections, sometimes predatory, with private business firms, and a general tendency to make government employment attractive through low work loads, short hours, and job security rather than through high pay and performance standards. Another consequence has been the strong anti-inflation stand maintained by the government, and especially the Bank of Thailand, during the last decade. Recent news stories have demonstrated the government's desire to prevent increases in bus fares and pork prices, which affect the articulate civil servant group in the metropolis.

During the immediate post-war years, Thailand's medical and public-health programs underwent a virtual revolution. With the aid of international agencies, effective campaigns were undertaken against malaria, yaws, tuberculosis, and other major health problems. The direct benefits to the physical and mental well-being of the people were great, but an additional consequence was a rapid acceleration of the rate of population growth. Although immigration was virtually stopped, the

rate of population growth speeded up from about 2.5 per cent to nearly 3.5 per cent per year. This meant particularly a vast increase in the number of children, with attendant problems relating to schooling and family incomes.

World War II and the reconstruction efforts contributed to increasing the economic role of the government, through such measures as control of foreign exchange and the monopolization of the rice export trade. In the early 1950s the government first accepted a more pervasive role toward development expenditures and activities. One contributing element was the signing in September, 1950 of the Economic and Technical Cooperation Agreement with the United States, under which a flow of foreign assistance commenced in 1951. Another was the approval in October, 1950, of Thailand's request for a loan from the World Bank, under which expenditures were made for improvements of railways and the Bangkok port, and for the irrigation and power development at Chainat. The developmental emphasis was reflected in the rapid rise in government expenditures, which were in 1953 more than double what they had been in 1950.

Paradoxically, this increased developmental emphasis by government was not reflected in the acceleration of economic growth, but rather by a slow-down. Real GNP, which rose at an average annual rate of about 11 per cent between 1946/8 and 1951/3, increased only 4.7 per cent annually from 1951/3 to 1957/9. Major reasons for the slow-down included the unfavorable international market for Thai exports after 1952 and recurrent bad weather. The political atmosphere was repressive, dominated by the infamous General Phao. Most of the developmental expenditures were of a very long-run sort, including highways, irrigation, and power facilities which took several years to construct. In addition, however, many of the government's developmental ventures were ill-advised.

Following recommendations of the World Bank Mission, the NEDB was established in 1959, and in four months the first Economic Development Plan was hastily produced, covering the period 1961-1966. A more comprehensive plan was produced for the "Second Phase," 1964-66.

The growth rate of the Thai economy during the first plan period has been very high; the latest estimates place real 1967 GNP about fifty per cent larger than that for 1961, representing an annual growth rate of nearly eight per cent per year. For all the difficulties of precise measurement, there can be no doubt that real growth has been substantial and that the benefits have been widespread. Growth is reflected in the increase of real exports, the expansion of output of cement and electric power, the volume of railway shipments, motor vehicle registrations. It is visibly evident in the building of new houses, highways, and commercial buildings, in the growth in the number of business firms, particularly in trade, and by their abundant stocks of goods passing through trade channels.

However, just as it would be a mistake to attribute the economic slowdown of the 1950s to government influence alone, so it would be a mistake to attribute the speed up of the 1960s to the initiation of economic planning. Two major external influences have been the export boom, stimulating higher production and exports of kenaf and maize especially, and the massive inflow of dollars arising from the Viet Nam War. The real challenge to Thai economic policy will come when these stimuli are withdrawn, a process which is already beginning on the export front.

However, if the Thai economy has been lucky, it has also responded constructively to its luck by using its windfall gains as the basis for a very high rate of saving and investment. Again, there can be no doubt that the rate of real capital formation has been high, for its evidence is highly visible. Most equipment is imported, so measurement of that component is relatively certain. Evidence of construction activity is everywhere visible. An open question is to what extent the high rate can be attributed to the plan and policies undertaken relating to it, and to what extent the extensive private investment would have occurred under any relatively benevolent public policy.

To summarize these background elements, they include the problem of civil-service pay and work standards, the continued anti-inflation emphasis, the high rate of population growth and large proportion of children to total population, the unfortunate experience with government-enterprise development efforts in the 1950s, and the strong elements of good luck which have come along at the same time as the first Plan.

Now let us turn to an examination of some aspects of the Plan as an economic document. The basic structure of the Second Plan is relatively simple. The first major concern is to establish a target rate of growth for per capita real income. From this is derived a target for growth of total output. This is in turn translated into sector output targets by various methods. Projections of consumption indicate how the expected levels of personal income would be allocated. Balance of payments considerations throw light on probable growth of export products. And the sectors producing capital or intermediate products must conform to the input requirements of the other sectors and of each other.

In the broad sense, two sorts of questions are here involved: questions of desirability and questions of feasibility. In considering the first, we are in effect judging the plan as a kind of social-welfare function. In the second, we are judging the plan as a production function relating inputs and outputs for the economic system.

Conceptually, a social welfare function considers all possible combinations of output and other relevant variables and ranks them in order of desirability. We cannot expect the Plan document itself to do this, but the planning process itself

should provide for a weighing of alternatives in terms of their desirability. Both value judgments and technical analysis are required, since the economist would like to see the problems posed in terms of benefits versus costs, and the costs are really the benefits of sacrificed alternatives. How much current consumption must be sacrificed for a given increase at some future date is largely a technical question; the relative desirability of current versus future consumption is a value judgment.

Neither the Plan nor the supporting documents spell out very clearly the technical and value judgments involved in choosing the optimum growth rate itself. If growth is good, why is not more growth better than less growth? Why stop with 3 or 4 per cent annual rise in per capita real income?

These questions are not settled by a weighty and probably tedious balancing of costs and benefits. Rather, the planners have been guided more by the question of feasibility. They have chosen their growth target on the basis of projected levels of private logical to consider the costs and benefits of pursuing this objective by trying to control the number of people, as well as by increasing total output. Lack of concern for population policy tends to make a mockery of the proud claim that in the Plan "*special emphasis is placed on social development to assure that the benefits of economic growth result in improved living standards for all groups in the society.*" (p. 1) In particular, the supposed concern for health and education must be viewed with skepticism. Nowhere is consideration given to the costs of remedying health and education deficiencies by strenuous efforts to reduce the birth rate, in contrast to the enormous difficulties bound to be encountered in trying to cope with the present rapid growth in the number of young children.

The Plan document is not completely silent on the subject, but one must read a long way before much is said. At page 279, it is forthrightly stated that "*The rapid population growth will inevitably become a growing social and economic problem in the future. Although the government has not initiated a family planning programme directly, it is necessary to continue study and research in the field of family planning so as to prepare for future action to control population growth if such a policy is deemed desirable by the Government.*" And the subsequent chapter correctly points out that population growth is adding to the educational problem. (p. 303).

In discussing manpower and employment, the Plan matter-of-factly states that "*rapid population growth is resulting in more and more new entrants to the labour market for whom employment must be provided. The surplus manpower must be absorbed in gainful employment . . .*" (p. 77) There are hints of the pressure that population growth is exerting on supplies of arable land and of its contribution to the growing pains of urban areas, especially the metropolis. But there is no forthright analysis, either in the Plan or in the supporting documents, of the relative

costs and benefits of attacking major problems by a vigorous policy to reduce birth rates.

This omission is all the more surprising in view of the evidence that a large proportion of the population, and especially women of child-bearing age, would welcome the opportunity to limit the number of births below present levels. During the past four years, the Ministry of Public Health has established birth control clinics in the Bangkok and provincial hospitals, and in 150 local health centers in four changwads. Patronage is voluntary, and information about the facilities has spread chiefly by word of mouth. The response has been overwhelming. According to a recent feature article in the *Bangkok World*,

*Figures from the country's birth control centers and from shops that dispense control devices show that some 300,000 women are currently practising family planning. But experts point out that this is only 10 per cent of married women in their reproductive years, a 'frightening' figure when compared to the 70 per cent of married women in control group surveys who say they have had enough children and want to start practicing birth control.**

A major difficulty is to reach the rural population, where the economic and health problems of high birth rates are most pressing. Even with full-scale government support, there would still be problems of personnel shortage. Without such support, the program is bound to move slowly.

On the whole, the Plan does not attempt to impose "planners sovereignty" on the choice of final products or on the saving-investment balance. By relying on forecasts of private demand and production, it permits private judgments to determine the composition of output. However, this solicitude for private desires does not extend to family size and population growth.

So much for the Plan as a social-welfare objective. What about its status as a model of the structure of the economy? Here again it is a relatively sloppy blueprint of the input-output structure of the economy, but much of this sloppiness is inherent in the economy itself and is not necessarily a disadvantage either of the Plan or of the economy. The economy possesses much flexibility and elasticity, evident in the development of maize, kenaf, and sorghum production by farmers, and in the growth of private enterprise and private competence in trucking and construction. Greater precision in the Plan's data and analysis might mean greater rigidity in economic policy.

It might be interesting to have a fully detailed Leontief table for the Thai economy, as a way of describing its recent interactions. On paper, such a model

**Bangkok World Sunday Supplement*, May 26, 1968, p. 9.

appears to provide the answers the planners require. If the final bill of goods can be anticipated from demand studies, the input-output matrix can identify the required output targets of the various intermediate-product sectors. Targets for highway investment, electric power production, and irrigation facilities would be mechanically easy to derive.

However, the appropriateness of a Leontief model for the Thai economy is quite limited. Of course the sheer problem of data assembly is formidable. Lack of homogeneity in sectors makes aggregation dangerous. But the real problem lies in the assumption of fixed, linear coefficients of production for the individual sectors. In the Thai economy production in individual sectors is often carried on under very diverse conditions of input mix and technology, so that it is difficult to estimate marginal-product conditions from average-product conditions. Second, the orthodox Leontief assumptions rule out the possibility of systematic input substitutions, whereas in the development process such substitutions are often highly probable and highly desirable. Substitution opportunities among modes of transportation provide an important case study, since public investment plays a big role in relation to highway, rail, and water transport facilities. Optimum public investment decisions in these sectors should face the question of what is the most economical way to provide appropriate amounts of transport services, rather than merely extrapolating ad hoc targets for separate transport agencies based on historical input patterns or individual agency growth rates.

At any rate, the production functions used in Thai Plan analysis do not fully spell out either the intermediate-product requirements of individual sectors, or their use of stocks of land, labor, and capital. Instead, emphasis is on production functions stressing the capital input. As described in *Methodology* (p. 28), investment "requirements" associated with Plan output levels were estimated as follows: "An aggregate Harrod-Domar production function was used, with gross fixed capital formation the single variable and a one year gestation period." By contrast, the long-term projections extending to 1981 used a cumulative investment variable which approximates capital stock.*

Analytically, one-factor production functions such as Harrod-Domar models are inferior to multivariate functions incorporating all inputs. As a practical matter, the multivariate functions may be too difficult to fit, and the planners may still return to a one-factor model. However, it is desirable to think in multivariate terms in order to be more fully aware of the limitations of the one-factors approach. A multivariate analysis reminds us that the marginal productivity of any one input is dependent on the quantity and quality of the other inputs. The interdependence of factor productivities is obvious and important in agriculture, where the yield per

**Ibid.*, pp. 49 ff.

unit of land is dependent on the use of capital, and where the marginal capital-output ratio depends on the fertility of the land. In Plan materials, agricultural output is discussed at one point in terms of land area and average yield, without relating yield to capital input, and at another point in terms of capital input, without concern for the land input.

Use of a multivariate function of the neoclassical type would lead us to expect diminishing returns to the capital input, and give some determinateness to their extent. The Harrod-Domar approach, by contrast, implies a constant marginal capital-output relationship, which the planners have tried to modify *ad hoc*.*

Use of a Harrod-Domar model may imply the existence of a labor-surplus economy, in which labor quantity is not an effective constraint on output. Although there is not much zero-marginal-product labor in the Thai economy, I have no doubt that output in some sectors, notably agriculture and services, could be increased substantially without feeling constraint from labor quantity. The labor-surplus assumption is reflected in the "make-work" emphasis in discussions of manpower and employment.

Since labor quantity is not treated as a determinant of aggregate output, no analytical basis exists for considering the impact on total output of changes in population size, or the implications of different population policies.

Even if labor quantity can be ignored in production functions, it does not follow that a Harrod-Domar model is a reliable guide either to the "necessary" or the "sufficient" capital investment for a given increase in output. Limitations of the one-factor capital-output production function are apparent when one considers the aggregate econometric model described in *Methodology* at pp. 49 ff. Production functions are fitted by linear least-squares for eight sectors of the economy. Agricultural output, the output of wholesale and retail trade, and the output of public and private services are treated as dependent on capital investment in those sectors. However strong the correlations, the analytical basis for this is very shaky. In the trade sector the most important input is the commodity output of the other sectors, particularly agriculture. The intermediate-product emphasis of a Leontief model would be appropriate here. And the capital which is crucial for the trade sector is inventory capital, not fixed capital. Yet inventory capital is swept under the rug in all of the analysis of the Plan. For most services (not housing) the crucial input is labor, with a concern for its quality as well as quantity.

If one examines the implied marginal product of fixed capital in the various sectors, as expressed by the regression coefficients on page 51, the absurd implications are apparent. The marginal product of fixed capital in the trade sector is .78, and

*See *Methodology*, pp. 28-29.

for public services it is .62. These are far and away the highest marginal products on the list. The implication is that trade and public services are the most productive uses for fixed capital in the Thai economy, and that economic welfare would be best served by directing as much capital as possible into those sectors. But in fact the regression coefficients of such equations do not establish that increased capital would be sufficient to produce the indicated increase in output.

The planners are not in fact using models of this sort to allocate capital among sectors, but my comments illustrate analytical weaknesses in the technique even in the uses to which it is being put.

These considerations remind us that the Harrod-Domar approach, like its linear cousin the Leontief model, is not a very good basis for optimization where investment decisions involve comparisons among alternative methods of achieving the same goals. Somewhere there must be an analytical system aimed at ranking "priorities" rather than measuring "requirements". The existence of such problems is recognized, for example, in the following passage from Methodology:

This continuing higher growth of public investment vis-a-vis private investment raised the problem of how large the public program could grow before the growth retarding effects from the competition for scarce resources would nullify the growth stimulating effects of the marginal development projects. (p. 31)

Much of the NEDB's activity has been in evaluating individual project proposals originating with operating agencies, and this has certainly involved some criteria for establishing priorities, at least sufficient to screen out the poorest projects. My criticism should perhaps be directed at the fact that plan documents do not reveal the basis for assessing project priorities, rather than asserting that no such assessment occurs.

In this final section we discuss some financial implications of the Plan, viewed as a macro-economic model. In the Plan and supporting documents, the analysis of macro-economic relationships emphasizes real factors, and particularly the mutual consistency among real investment, consumption, imports, and exports. Concern for the behavior of the money supply and the price level was very evident during the formulation of the Plan, and these concerns occupy a large section in Methodology (pp. 9-18). Here are described the various efforts to forecast the money supply and the inability of the planners to identify the price-level implications of monetary projections. In my view the techniques used for estimating the money supply are conceptually unsatisfactory. They make separate and independent calculations of a number of variables which are in fact functionally interrelated, particularly imports, government revenue, and the private demand for government securities.

Identifying the monetary implications of assumed financial policies is difficult because of the feed-back, or mutual adjustment, among a number of variables. The money supply is influenced by the balance of payments and by borrowing from the Bank of Thailand, but both of the latter are influenced by monetary conditions. Some sort of general equilibrium model is required to embody these interactions. The following represents one possible way of expressing such a model. However, at several points alternative assumptions could plausibly be made, so that a large number of specific models could be developed possessing similar general structure.

The assumptions and definitions underlying the model are expressed in a series of 18 equations. Most of these were fitted by linear least-squares to annual data for 1963-67. Financial series use annual averages of end-of-month data where available. Longer time spans were covered in some regressions, but several of the functions involved shifted in 1962 and more accurate forecasting seems likely if one begins after that year.

The first fundamental assumption is that the public's demand schedules for financial assets are linear functions of money income, as expressed by GNP in current prices. Individual regressions were obtained for demand deposits, time deposits, and currency. A single regression was obtained for the sum of deposits at the Government Savings Bank plus non-bank holdings of government securities. Demand deposits and time deposits are limited to those of commercial banks; they include government deposits at commercial banks as well as privates (non-bank) deposits. Regression equations are as follows:

1. $DD = .0829 \text{ GNP} - 944 \text{ mil.}$
2. $TD = .1733 \text{ GNP} - 7884 \text{ mil.}$
3. $CU = .0838 \text{ GNP} + 747 \text{ mil.}$
4. $GS = .064 \text{ GNP} - 1281 \text{ mil.}$

From a theoretical standpoint, it would be desirable also to make the demand for these assets depend on interest rates and on price-level expectations. However, during the period covered interest rates on government securities and bank deposits have remained virtually unchanged. Changes in the price level have not been very great, and there is no evidence that price expectations have substantially influenced willingness to hold fixed-value assets.

It is assumed that holdings of financial assets and the flow of GNP will adjust to each other so that in equilibrium equations 1 through 4 will be satisfied.

Our second major assumption, based on the behavior of commercial banks over the past decade, is that commercial banks have a set of desired ratios of cash reserves and that they will modify their lending to maintain such ratios. Cash reserves are for this purpose defined as currency plus deposits at the Bank of Thailand. This definition does not coincide with the present legal reserve requirements.

Equation 5 expresses the assumed demand schedule for cash reserves, estimated after adjusting for changes in the definition of deposits in 1962.

$$5. \text{ CBR} = .125 \text{ DD} + .03 \text{ TD} + 141 \text{ mil.}$$

The supply of commercial bank cash reserves is expressed as an identity, derived chiefly from the balance sheet of the Bank of Thailand, as follows:

$$6. \text{ CBR} = \text{FA} - \text{EEF} + \text{BOT} (\text{C} + \text{G}) - \text{BOTM} + \text{coins} - \text{GBOT} - \text{CU}$$

The first two expressions go together. FA represents the annual average foreign assets held by the monetary authorities; EEF represents the portion held by the Exchange Equalization Fund which does not appear in the BOT balance sheet and thus needs to be removed to isolate the portion held by the BOT.

Three major items from the BOT balance sheet are BOT credit to government and to banks ($\text{BOT} (\text{C} + \text{G})$), an asset item which tends to add to bank reserves; BOT capital and miscellaneous accounts (BOTM) and government deposits at BOT (GBOT), both of which are on the liabilities side and thus tend to reduce bank reserves. Currency in circulation (CU) also tends to reduce bank reserves.

We can simplify this equation by taking note of the fact that three of the items are of relatively small policy interest and that their aggregate has tended to increase at a relatively constant rate over time. This is expressed as follows:

$$6.1. \text{ EEF} + \text{BOTM} - \text{coins} = (3,915 \text{ mil.}) (1.075)^{t-1960}$$

This time-trend item has grown at about 7.5 per cent annually since 1960.

Currency can be replaced by its functional equivalent, using equation 3.

Our second general condition for monetary equilibrium is that the supply of commercial bank reserves be equal to the demand. Should banks have excess reserves, they will tend to expand their loans and securities. This will enlarge the demand for reserves by causing deposit liabilities to increase, and is likely to reduce the supply of reserves by causing increase in currency in circulation and possibly decrease in foreign assets.

In addition to the time-trend item, which is taken as given, government deposits at BOT are treated as an exogenous variable. The model would be conceptually tidier if this term were netted against BOT claims against government, but my efforts to do this statistically did not square with the available data on government fiscal policy.

Our third assumption is that the behavior of foreign assets can be analyzed in terms of two broad categories in the balance of international payments. We treat as exogenous the gross inflows of foreign payments arising from exports, and net inflows of capital official transfers, and unclassified government payments. However, outflows for imports and other commercial current account items are treated as a simple linear function of national money income expressed by GNP in current prices.

Equation 7. expresses the propensity to import, defined to include invisible imports, as follows:

$$7. M = .2533 \text{ GNP} - 3771 \text{ mil.}$$

Equation 8 expresses the average stock of foreign assets during the year (FA) as a function of foreign assets at the beginning of the year (FA_0) and the balance of payments flow during the year. This equation was fitted to minimize statistical discrepancy and also to reflect the seasonal pattern of export sales. The balance of payments was divided into three categories: exports (X) and imports (M), each including invisible commercial transactions, and capital and government inflows (Cap). Coefficients of 0.5 were assigned to M and Cap on the assumption that they have no systematic seasonal movement. The residual equation was solved to yield a least-squares regression coefficient for X and a constant term, as follows:

$$8. FA = FA_0 + .61 X + .5 \text{ Cap} - .5 M - 1135 \text{ mil.}$$

The import term can be removed and replaced with its functional equivalent by substituting equation 7. Exports and capital inflow are treated as exogenous. FA_0 is taken as given for the initial period, but in the forecasting model it is estimated iteratively for the end of each year and then inserted for the beginning of the next. FA_1 , foreign assets at the end of the year, is estimated for each year by the following:

$$9. FA_1 = FA_0 + 1.04 (X + \text{Cap} - M), \text{ using values for } M \text{ generated from equation 7.}$$

Our fourth assumption concerns the relationship between fiscal policy, the national debt, and BOT credit to government. Government revenue is treated as a linear function of national money income, as follows:

$$10. GR = .160 \text{ GNP} - 2125 \text{ mil.}$$

The supply of government securities is identified with the size of the national debt, ND, expressed as an annual average of end-of-month figures. The average debt is a function of the debt at the beginning of the year (ND_0) and of the excess of government expenditures (GE) over government revenue during the year. Statistically, this can be expressed as follows:

$$11. ND = ND_0 + .5 (GE - GR) + 100 \text{ mil.}$$

The GR term can be eliminated by substituting its functional equivalent from equation 10. Government expenditure is taken as exogenous. The initial national debt (ND_0) is taken as exogenous for the initial period, but is generated iteratively by the model for subsequent years. This is done by estimating for each year ND_1 , the debt at the end of the year, as follows:

$$12. ND_1 = ND_0 + .89 (GE - GR), \text{ using the values for } GR \text{ estimated by equation 10.}$$

The demand for government securities is the sum of three elements. One consists of the public's demand for securities directly plus its demand for deposits

and bonds issued by the Government Savings Bank, all of which go to finance GSB holdings of government securities. This component of demand is expressed by equation 4 above. The second component of demand arises from commercial banks; their desired holding of securities is expressed as a function of commercial-bank time deposit liabilities, as follows:

$$13. \text{CBS} = .456 \text{TD} - 340 \text{ mil.}$$

This can be converted into an expression in GNP by substituting for time deposits using equation 2

The third component of demand consists of BOT credit to the government. We assume this is a residual; that it adjust to whatever level is required to equate supply and demand. If private demand falls short of supply, BOT will add to its holdings. However, when private demand exceeds supply, BOT will reduce its holdings, as it has predominantly done in recent years.

Note that this treatment of government finance relegates BOT credit to government to an endogenous role. I believe this describes its recent status correctly. However, should the BOT undertake a more independent role, BOT credit to government could be treated as exogenous. Supply-demand equality in government securities would then involve variations in the interest rate rather than in central-bank credit.

An alternative treatment of government finance would involve giving more attention to borrowing from abroad. This has been left implicit in other variables, particularly the capital item in the balance of international payments.

Our fifth, and probably weakest assumption relates commercial bank behavior to gross private domestic investment. We treat investment as an exogenous variable and assume that commercial bank loans adjust to it. The demand for commercial bank loans can be expressed about equally well in terms of the average stock or in terms of the annual change. These produce the following equations:

$$14a. \text{CBL} = 1.105 \text{GPDI} - 2041 \text{ mil.}$$

$$14b. \Delta \text{CBL} = .171 \text{GPDI} - 362 \text{ mil.}$$

We define commercial bank credit as the sum of commercial bank loans plus commercial bank securities, and assume the latter is expressed by equation 13. (This leaves a small quantity of holdings of non-government securities in the loan category). The supply of commercial bank credit (CBC) is almost an identity relating bank assets and bank liabilities, as follows:

$$15. \text{CBC} = .96 (\text{DD} + \text{TD} + \text{BOTB} + \text{CBFB})$$

The demand deposit and time deposit terms can be removed by substituting their functional equivalents from equations 1 and 2. This leaves two components of commercial-bank borrowing, borrowing from BOT (BOTB) and borrowing from foreign banks (CBFB). We treat the latter as exogenous, while assuming that borrowing from BOT will adjust to whatever level equates the supply of bank loans with the demand. This has the effect of relegating BOT loans to banks to an endogenous role, an appropriate characterization for the past. Should BOT exert more direct control, through rationing credit or through aggressive variation in discount rates, the endogenous assumption would be inappropriate.

An alternative specification could treat bank borrowing from abroad as a dependent variable, perhaps determined by interest rates and on demand for bank loans in Thailand.

Stock-flow reconciliation for commercial-bank loans is provided by the following equations:

$$16. \text{CBL} = \text{CBL}_0 + .605 (\Delta \text{CBL})$$

$$17. \text{CBL}_1 = \text{CBL}_0 \Delta \text{CBL}$$

The initial level of CBL is taken as given, but subsequent values are derived by applying these equations iteratively.

By using all the equilibrium conditions mentioned (and using equation 14b rather than 14a), we can reduce the entire system to one equation in the exogenous variables, as follows:

$$\text{GNP} = 1.604 (\text{ND}_0 + \text{FA}_0 - \text{GBOT} - \text{time var.} - \text{CBFB}) + .802 \text{GE} + .802 \text{Cap} + 1.671 \text{CBL}_0 + .978 \text{X} + .172 \text{GPGDI} + 17,803 \text{ mil.}$$

In combination with the individual equations already listed, we can obtain estimates of all the endogenous variables, including currency and demand deposits, imports, and government revenue. The model can thus be used to derive mutually consistent estimates for national money income (GNP in current prices) and the money supply. And it lays out a pattern of adjustment to disturbances originating in the exogenous variables.

In Table 1 we summarize the behavior of the model for the period 1963-1967. This table utilizes revised estimates of national-income components as available in the autumn of 1968. The table compares estimated and actual values for GNP and for the money supply.

Table I

ITERATIVE MODEL OF MONEY AND INCOME, THAILAND, 1963-1967

(millions of baht)

	1963	1964	1965	1966	1967
FA ₀	10,508	(12,032)	(13,991)	(15,552)	(19,001)
ND ₀	8,407	(9,059)	(9,738)	(11,007)	(12,414)
(-) GBOT	-3,358	-3,786	-4,800	-6,360	-7,564
(-) time var.	-4,864	-5,229	-5,621	-6,043	-6,496
(-) CBF _B	-1,548	-1,997	-2,481	-2,716	-3,049
Sum	9,145	10,079	10,827	11,440	14,306
(C 1.604)	14,669	16,167	17,367	18,350	22,946
GE	9,616	10,888	12,713	14,671	16,787
(C. 802)	7,712	8,732	10,196	11,766	13,463
Cap	4,232	3,811	4,325	6,883	6,779
(C. 802)	3,394	3,056	3,469	5,520	5,437
X	10,890	13,696	14,638	16,749	17,604
(C. 978)	10,650	13,395	14,316	16,381	17,217
CBL	7,537	(9,145)	(10,901)	(12,985)	(16,178)
(C 1.671)	12,594	15,281	18,216	21,698	27,033
GPMI	11,518	12,385	14,302	20,791	20,186
(C. 172)	1,981	2,130	2,460	3,576	2,874
Constant	17,803	17,803	17,803	17,803	17,803
Est. GNP	68,803	76,564	83,827	95,094	106,773
Ac. GNP	68.9	73.7	81.3	96.8	105.6
EST CU + DD					
(=.167 GNP - 197)	11,293	12,589	13,802	15,684	17,634
Ac. CU + DD	11,236	12,246	13,296	15,758	17,547

Variables in parentheses are generated by iteration from the model.

Table 2 illustrates how the model might be used as a forecasting device, using initial values for NC, CBL, and FA plus forecasts for exports and capital inflow (including commercial-bank foreign borrowing), for government expenditures, and for private investment. Financial stocks at the beginning of the year are taken as given; however, all of the flow data in the table (even those for 1967) are forecast data. The government expenditure forecasts are a combination of non-development expenditures (Methodology, p. 8) plus development expenditures (Plan, p. 62). Gross private domestic investment is assumed to grow at a rate of 8.7 per cent per year (Plan, p. 6), starting from 1966. Balance of payments forecast data are from Methodology, pp. 39-40, plus the flow of commercial bank borrowing abroad, from *ibid.*, p. 16. The latter source was used for the stock value of commercial bank borrowing from abroad. The average level of government currency and BOT deposits is assumed to decrease by 358 million in 1967 and by 715 million each year thereafter (approximating Plan, p. 63). Our assumptions about the growth of commercial bank loans are not those used in Plan forecasting, but the results are not far apart; our forecast value of 27.2 million for the beginning of 1971 is the same as that forecast by BOT for 1970 (whether average or end-of-year is not specified).

Table 2

Forecast Estimates

	1967	1968	1969	1970	1971
F_0	19,206	(19,467)	(18,502)	(16,881)	(14,497)
ND_0	13,539	(16,503)	(20,289)	(23,474)	(26,615)
GBOT	-6,002	-5,287	-4,572	-3,857	-3,142
time var.	-6,496	-6,983	-7,507	-8,070	-8,675
CBFB	-4,000	-5,000	-6,100	-7,600	-9,600
Subtotal	16,247	18,700	20,612	20,828	19,795
	26,060	29,995	33,062	33,408	31,751
GE	18,700	21,600	22,700	24,000	25,500
	14,997	17,323	18,205	19,248	20,451
Cap	6,531	7,128	7,949	7,856	8,086
	5,238	5,717	6,375	6,301	6,485
X	17,646	18,998	20,356	21,853	23,479
	17,258	18,580	19,908	21,372	22,962
CBL_0	15,073	(17,495)	(20,422)	(23,635)	(27,159)
	25,187	29,234	34,125	39,494	45,383
GPDI	16,277	17,693	19,232	20,905	22,724
	2,800	3,043	3,308	3,596	3,909
Constant	17,803	17,803	17,803	17,803	17,803
Estimated GNP	109,343	121,695	132,786	141,222	148,744
	(105.6 ac)				(130.9)

Our forecasts tell something about the price-level implications of the assumptions. For 1971, the plan forecast is an output worth 130.8 billion baht in 1965 prices (*p.* 51). Comparing this with the 148.7 billion baht of moneyflow demand forecast by our model suggests an implicit price level in 1971 of 113.7 per cent of 1965. This is only a rough approximation of the order of magnitude, since we need more detailed consideration of import and export prices before we get a complete view. However, the forecast is not a highly inflationary one.

The forecast is not nearly so inflationary as the comments in Methodology would indicate. The difference in point of view can be brought out by looking at alternative forecasts of the money supply. If we have done our arithmetic correctly, the money supply can easily be estimated from the forecast values of GNP in our model, using equations 1 and 3. These yield an equation in the following form: $CU + DD = .1667 \text{ GNP} + 197 \text{ million}$. (remembering that the demand deposit figure is for commercial banks only and includes government deposits.) Our forecast data for 1971 imply a money supply, so defined, of about 24.6 billion baht, which corresponds to the "warranted" money supply discussed in Methodology, p. 13. Our model does not yield a forecast money supply of 31.7 billion, the figure arrived at in discussions of the implications of the plan.

The difference reflects the fact that in our model "inflationary" pressures largely dissipate themselves in non-inflationary channels. Excess liquidity is drawn off through many margins of adjustment, of which increase in the price level is only one and typically a relatively small one. The most obvious drain for excess liquidity is imports. Our table of forecasts indicates that foreign assets would decrease steadily from 1968 on, rather than increasing as some monetary forecasts have suggested. A second margin of adjustment is government revenue. As long as expenditures are treated as given, larger rise in moneyflow GNP leads to a decrease in the government deficit, and smaller growth in the public debt. At the same time, rising GNP raises private demand for government securities. Thus rising GNP substantially lowers borrowing from the Bank of Thailand.

This is not merely an analysis of forecasting; this is an important interpretation of Thailand's monetary experience for the last decade or more. What our models suggest is that the Thai economy possesses several important automatic stabilizers, which can best be understood in terms of the monetary system. In particular, the residual role of the BOT in relation to the national debt has taken on this surprising characteristic. Not only has the BOT bought when the supply of securities exceeded private demand; they have sold when the private demand exceeded the supply. Combined with a high income-elasticity of demand for government securities (both direct and through the banking system), this puts a strong brake on inflationary pressures.

To be sure, we may not have measured the functions properly to judge their response to inflationary conditions. Our government revenue function, for instance, is a historical regression derived from situations where real income was rising at about the same rate as money income. Some revenues would not respond to a marginal increment of money income not matched by increased output. (However, on the other side it could be argued that using a linear regression is a conservative measure; if a probably-more-appropriate logarithmic regression were used, the revenue increase would tend to have higher forecast values).

The propensity to import may not be appropriately estimated for a situation in which domestic prices were rising, but one would expect domestic inflation to cause imports to rise more than their forecast values, because substitution effects would be added to income effects. In that case, the stabilizer would become more drastic, not less.

Another important stabilizer would be weakened if government expenditures themselves were a positive function of the price level, or of revenue. Government's price elasticity of demand might be zero; real government purchases might be carried out as planned, and money expenditures rise proportionately with the price level. I doubt that this is likely. Government payroll expenditures will not respond so to price changes, unless serious or prolonged inflation occurs. Government spending may be positively influenced by price changes, but not proportionally.

Inflationary experience might also weaken the demand for government securities, directly, or through decreased willingness of bank depositors to hold liquid savings assets. Inflation would certainly tend to alter the attractiveness of competing stores of value such as real estate. As long as price increases are substantially less than the annual interest rate on savings assets, however, a large flight from fixed-value assets seems unlikely. At least there is no historical basis in Thai experience for anticipating such a development.

Our analysis implies that monetary conditions need to be considered in forecasting the gaps in international trade and payments. Rather than worrying about domestic price increases, the planners may need to give more concern to the international deficits implied by the forecast data. Should policy be altered to increase foreign borrowing, the deficits could vanish, but the inflation would be correspondingly more severe.

As noted in discussion of individual equations, many different assumptions could have been used, resulting in a proliferation of specific models. In particular the treatment of foreign borrowing by government and by commercial banks is not very satisfactory. Commercial bank loans might better have been related to something other than gross private domestic investment, although one hates to leave GPDJ out of the model entirely.

Although the model estimates monetary and price-level implications of the forecasted values of the exogenous variables, it does not provide a full picture of the price level. The Thai economy is strongly affected by international prices. Some export staples, such as rubber and tin, are not consumed domestically to a large degree. The price of rice, however, largely follows the international price even though the bulk of the crop is consumed domestically, and prices of maize, sorghum, cassava, and kenaf affect some domestic consumption, though not as much as rice. International prices of imports such as petroleum, autos, and other consumer goods affect living costs directly, although a substantial portion of imports consists of capital goods whose prices enter into consumer prices only indirectly and after a delay. A full-scale research inquiry into price behavior in Thailand is one of many projects which would be eminently suitable for doctoral research.
