# A NATIONAL BUDGET MODEL FOR ECONOMIC PLANNING*

*By* YOSHIMASA KURABAYASHI

*Lecturer, Institute of Economic Research*

## I. *The General Framework of Economic Planning*

It appears that the guiding principle in current economic policy is shifting from the *laissez faire* to state guidance or control. The latter, whatever it is form and however defined, is based on the conviction that state guidance or control of the economy is essential for stable growth. In addition to growing government control, the share of general government in the economy as a whole is constanly increasing in developed countries. The general government contributes a big share not only of the administrative work but of the general economic activity. As a consequence, the state has been taking deliberate measures to change economic conditions, for it is now aware of its own impotant role in the economy. The process of decision making by the central goverment in its effort to national economic welfare, otherwise social welfare, and the method devised to implement these decidsions are here termed economic planning.

For the analysis of economic planning, it seems necessary to make a distinction between two successive stages in government decision making. These are the *stage of prediction* and the *stage of planning*. Before going into a more detailed investigation of government decision making in these two stages, four categories of variables which produce changes in the economic system are classified according to the terminology developed by J. Tinbergen in his contrubution to the theory of economic policy.[1] His four categories of economic variables are target variables, instrument variables, data variables and irrelevant variables, respectively. Target variables are those variables which the central government considers strategically crucial for the national economic welfare. A certain dergee of favourable current balance in international payment, an employment level, and stable prices may be cited as examples of target variables. Instrument variables are those vari-

*The central portion of this paper is based on the author's previous work published in Japanese: "National Budget Model in Economic Planning", *Keizai Kenkyu*, October 1957, which was an outgrowth of a joint study in the Research Group on the Method of Economic Planning organized by the Economic Planning Agency and headed by Professor Yuzo Yamada at the time the Five Year Plan for Economic Self-support was under preparation. A recent development in Japanese economic planning is the New Long-Range Economic Plan (1961-1970), for which a useful theoretical framework is presented by Professor Kazushi Ohkawa. See his ,"The Use of National Income Accounts for Long-Range Planning in Japan", (mimeographed paper which is to be presented at the 1961 conference of the Intermational Association for Research into Income and Wealth). The author wishes to acknowledge Professor K. Ohkawa's comments on this paper. He is also grateful to Dr. Harry Oshima who has improved his English draft.

[1] In particular, see:J. Tinbergen, *On the Theory of Economic Policy*, 2nd Printing, 1955, Amsterdam; J. Tinbergen, *Economic Policy ,principle and design*, 1956, Amsterdam.

ables which are under the control of the central government. Direct tax rates, the level of government expenditures are examples of instrument variables. Data variables are variables whose changes are regarded as data by the central government. For example, the amount of exports, the price level of competing goods in world market are examples of data variables. Irrelevant variables are those variables which are not strategically relevant for government decision making even though they are important determining factors of the economic system. Consumer's purchases of goods and services, compensation of employees are examples of irrelevant variables. The specific grouping of economic variables under these four categories is relative to the nature of the economic welfare the central gevernment has in mind. An economic variable, say gross capital formation, may be a target variable in one case, but in another case it may belong in the category of irrelevant variables. The logical construction put upon these four categories of economic variables is termed a policy model. What is of primary importance in the construction of policy model is that the central government is clear about which variables are target variables and instrument variables.

Presupposing the existence of a policy model, the central gevernment in the stage of prediction is interested in the movement of target variables resulting from a hypothetical action of instrument variables initiated by the central government. The impact of changes in instrument variables on target variables can be worked out by solving mathematically a policy model for target variables and irrelevant variables in terms of hypothetical instrument variables and expected data variables. If a policy model is a linear system, the necessary condition of solving for target variables and irrelevant variables is that the number independent equations is equal to the number of target variables plus irrelevant variables. The decision making of the central government in this stage is spesified as 'prediction', because the movements of target variables are predicted by the hypothetical changes in instrument variables. Accordingly, the prediction of target variables in this way will be a conditional prediction,[2] since it is conditioned to hypothetical changes in instrument variables and expected movemnet of data variables.

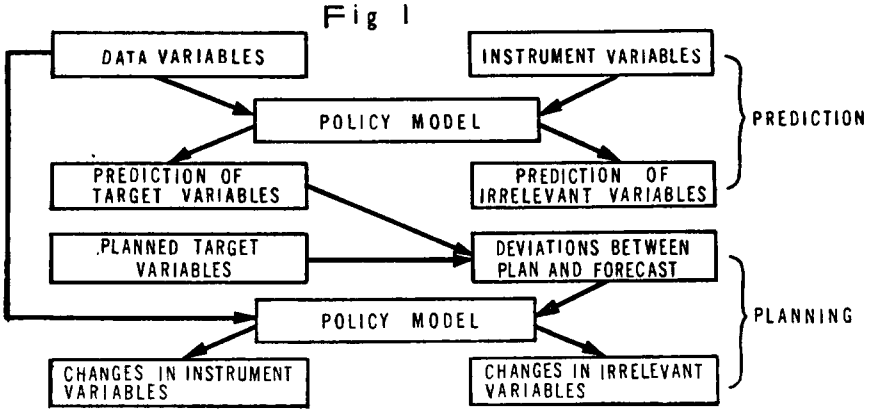
Once the movement of the target variables has been predicted, the central government, in the next stage of decision making, proceeds to make a calculations to determine whether the predicted development of target variables is favourable for national welfare. Here, it is assumed that the central government has a definite measure of national economic welfare, the so called social welfare function, and that according to this measure there existes a set of target variables with fixed values which maximize the national economic welfare. The set of values of target variables fixed so as to maximize the national economic welfare is called a set of optimal values of target variables. Analogous to the fixed target policy in Tinbergen's theory the economic planning considered here is characterized as economic planning with fixed targets, or in short fixed target planning. Fixed target-planning can be contrasted with flexible target planning. The latter is defined as economic planning in which target variables are allowed to move freely so as to maximize the national economic welfare, in which the target variables act as independent variables. In the case of flexible target planning it is necessary to specify the quality of national economic welfare, or in other words to measure the social welfare function of the central government. The

[2] The definition of conditional prediction follows the idea developed by H. Theil in *Economic Forecasts and Policy*, 1958, Amsterdam, ch. II.

fact that the method and data required to derive quantitatively the social welfare function are not satisfactorily developed prevents us from pursuing furhter the idea of flexible target planning[3]. As a general tendency, the optimal values of target variables may not coincide with the predicted values of target variables. If there is any discrepany between the optimal values and predicted values of target variables, the central government will attempts to eliminate this discrepancy by means of instrument variables. The procedure in this government decision making is just the reverse of that in the stage of prediction. To simplify the matters, it is assumed that there exists no discrepancy between the expected values for data variables in the successive stages of government decision making. The movement of instrument variables and irrelevant variables measured either from the hypothetical values or from predicted values are solved in terms of the discrepancy between the optimal values and predicted values of target variables by means of a policy model. The necessary condition for the solituon is that the number of independent equations in a policy model is equal to the number of instrument variables plus irrelevant variables. Consequently, the number of target variables should be equal to that of instrument variables in order that the government action for removing the discrepancy between optimal values and predicted values of target variables may be consistent with the government decision making in the stage of prediction. As this solution for the movement of instrument variables indicates a programme to restore the optimal targets, the government's decision making in this stage may be expressed by the term,"planning".[4]

The logical structure of the guccessive stages of government decision making is represented diagraomatically by (Fig. 1)

Fig 1




[3] Theil has developed the idea of a quadratic form of social welfare function and applied it to the optimal decision making of the central government. See his *Economic Forecast and Policy*, ch VIII. Frisch has tried to derive a social welfare function from interview data in his paper: "Practical Rules for Interview Determination of One-sided and Two-sided Preference Coefficients in Macroeconomic Decision Problems", Memorandum fra Sosialøkonomisk Institutt, Universitetet i Oslo, 25 June 1959. The present author will take up the point in another paper.

[4] The distinction between "prediction" and 'planning' is significant because the central government can adapt itself in the planning stage to a situation which presumably will bring unexpected changes in both data variables and irrelevant variables and will also cause discrepancies in those variables as between predicted and actual values.

## II. *Construction of a National Budget Model*

The following notations are used in the subsequent analysis:

$GNP$ gross national product
$B$ purchases of goods and services from the rest of the world
$GI$ gross domestic capital formation
$C_h$ consumers' expenditure on goods and services
$C_g$ government current expenditure on goods and services
$A$ sales of goods and services to the rest of the world and net factor income from the rest of the world
$W$ compensation of employees
$E$ proprietors' income
$R_h$ income from property accruing to households minus interest on consumer's debt
$R_g$ government income from property and entrepreneurship minus interest on the public debt
$IT$ indirect taxes
$P_c$ depreciation and other operating provisions plus saving of corporations plus direct taxes on corporations
$Z$ subsidies
$DT_c$ direct taxes on corporations
$S_c$ saving of corporations plus depreciation and other oprating provisions
$DT_h$ direct taxes on households
$DY$ disposable income
$F$ current net trusfers from government to households
$S_h$ saving of households
$S_g$ saving of gevernment
$AS$ current surplus from the rest of the world

The national budget model that is discussed below consists of three groups of equations:

(1) the system of national accounts
(2) behaviour equations
(3) target-setting equations.

### II. 1. The system of national accounts

The system of national accounts has not yet been completed in Japan, even though the Economic Planning Agency annually publishes the series of national income and its comonents, in which attempts are also made as far as possible to present constituent parts of national accounts. Without going into the details of measurement, a fully articulated system of national accounts is constructed with the aid of scattered informations on national accounts appearing the *National Income Year Book*, published by Economic Planning Agency.[5]

[5] The procedure followed in the construction of national accounts is briefly mentioned here. Account (1) comes directly from the table, "Kokuminshotoku to Kokumin Keizai Keisan" (National Income and National Economic Accounting). In order to construct account (2), national income at factor cost is converted to GNP in the table, "Bunpai Kokuminshotoku" (National Income as Distributive Shares). Accounts (4) and (5) are derived from the table, "Kiojn Shotoku to sono Shobun" (Personal Income and its Appropriation). Account (6) is based on the table, "Zaisei Shushi" (Government Receipts and Expenditure). Account (8) follows from the table, "Kaigai Shushi" (Receipts and Expenditure in the Rest of the World)". From the accounts (1)—(6) and (8) the account (7) is derived.

All figures appearing in the national accounts are annual figures and refer to the fiscal year.

1) national product and expenditure account

$$GNP+B=GI+C_h+C_g+A \tag{1}$$

2) income formation account

$$W+E+R_h+R_g+IT+P_c=GNP+Z \tag{2}$$

3) appropriation account for corporations

$$DT_c+S_c=P_c \tag{3}$$

4) income redistribution account of households

$$DT_h+DY=W+E+R_h+F \tag{4}$$

5) appropriation account for households

$$C_h+S_h=DY \tag{5}$$

6) appropriation account for government

$$F+Z+C_g+S_g=R_g+DT_c+DT_h+IT \tag{6}$$

7) capital formation account

$$GI+AS=S_c+S_h+S_g \tag{7}$$

8) rest of the world account

$$A=B+AS \tag{8}$$

This system of national accounts is closely related to the system devised by I. Ohlsson in the construction of the national budget of Sweden. It is slightly different from the OEEC's *A Standardized System of National Accounts* (1958 edition).[6] But it is easily seen that a system of national accounts similar to the OEEC's system can be derived from 1)–8) by keeping 1), 6), 7) and 8), and by consolidating 2) with 3), 4) with 5) respectively.

Because of the nature of a fully articulated system of national accounts, the independent relations in the system of national accounts are 7 instead of 8, which is the number of accounting relations in the national accounts.

II. 2. Behaviour equations

As a first approximation to reality, the choice of simple behaviour equations is of fundamental importance for two reasons. First, a national budget model simple in character enables us to discover easily the causes of the deviations between predicted values and actual observation. Second, the causal relationships which determine the development of variables in the national budget are easily revealed in a simple national budget model. Simplicity in behaviour equations implies two things. One refers to the number of explanatory variables. The fewer the the number of explanatory variables in a single equation is, the simpler it becomes. The other relates to the form of the functions. In this connection it is believed that the linear form of functional relation is a good approximation to reality, at least for the explanation of changes is an economic system in the neighbourhood of equilibrium. However, it may be pointed out that the use of simple bahaviour equations prevents the introduction of greater degree of autonomy. As a compromise between the two extremes, i.e. simplicity and autonomy in behaviour equations, it is decided that the following behaviour equations are presented with due consideration to the problem faced in the construction of any model.[7]

1) consumption function

[6] See: I. Ohlsson, *On National Accoungting*, 1953, Stockholm; OEEC, *A Standardized System of National Accounts*, 1958 edition, 1959, Paris.

[7] Relevant variables appearing in the national budget model are expressed in constant prices (1955 =100).

The consumption function is assumed to be a linear, homogeneous function of disposable income:

$$C_h=\alpha DY \tag{9}$$

2) import function

Here, the import function is assumed to be a linear, homogeneous function of GNP:

$$B=\mu GNP \tag{10}$$

3) corporate saving function

Corporate saving is determined by corporate profits. The former is assumed to be a linear, homogeneous function of the latter:

$$S_c=\sigma P_c \tag{11}$$

II. 3. Target-setting and the underlying assumptions

In stead of fixing the values of the targets variables, the target setting equations are introduced into the national budget model. The target setting equations depend upon the target variables in the central government. In the case of Japan's Five Year Plan, the objectives cited in the Five Year Plan are taken, translating them into target setting equations. However, the objectives cited in the Five Year Plan are not concrete enough to be written in the form of equations. The Five Year Plan states that it aims to establish a) the stability of the economiy, b) self-dependent economy and c) the full emplyment. The implications of each of the objectives, particularly the first two, are so pregnant that we are at a loss to find a method of giving them mathematical expressions. So it is simply assumed that both the stability of economy and the full employment are attained with a given level of GNP and that a self-dependent economy will materialize when the current deficits in the balance of payments disappear. The way of target setting does not seem to differ much from the tacit assumptions underlying the Five Year Plan.

The first assumption is shown by equation (12), and the other by equation (13), where GNP* stands for the GNP which fulfils the objectives a) and c). GNP* is assumed to be predetermined by the central government.

$$GNP=GNP^* \tag{12}$$

$$AS=0 \tag{13}$$

An underlying assumption of the Five Year Plan is that no change takes place in the price structure. Therefore we exclude complications arising from changes in relative prices.[8]

Since the Five Year Plan is concerned mainly with prediction, it does not say much about the means by which the Plan is to be realized. Following our terminology, it means that the Five Year Plan does not specify the instrument variables. Without departing too far from the implications of the Five Year Plan, the following variables:

$$DT_c,\ DT_h,\ IT,\ R_g,\ Z,\ F,\ C_g$$

are regarded as predetermined variables. Hence, in the sense that these variables are under the control of the central geovrnment they belong to the category of instrument variables. It should be noted that the government saving is not the case. As the government saving forms a part of the budget balance, however defined, it cannot be regarded as the variable which is under the government's control.

Consequently, equations (1)—(13) determine the twelve endogeneous variables, namely

$$GNP,\ A,\ B,\ AS,\ (W+E+R_h),\ P_c,\ S_c,\ DY,\ C_h,\ S_h,\ S_g,\ GI$$

[8] As a result of the assumption only the GNP deflator is used to derive variables expressed in terms of constant prices.

remembering the fact that the accounting system in 2.1. is fully articulated.

II. 4. The solution of a national budget model

A reduced form, in which the above mentioned twelve variables are solved in terms of the target variables and predetermined variables, is derived from equations (12)—(23)

$$A=\mu GNP^* \tag{14}$$

$$B=\mu GNP^* \tag{15}$$

$$P_c=\frac{1}{1-\sigma}DT_c \tag{16}$$

$$S_c=\frac{\sigma}{1-\sigma}DT_c \tag{17}$$

$$W+E+R_h=(GNP^*+Z)-\left(\frac{1}{1-\sigma}DT_c+R_g+IT\right) \tag{18}$$

$$DY=(GNP^*+Z+F)-\left(\frac{1}{1-\sigma}DT_c+R_g+IT+DT_h\right) \tag{19}$$

$$C_h=\alpha\left[(GNP^*+Z+F)-\left(\frac{1}{1-\sigma}DT_c+R_g+IT+DT_h\right)\right] \tag{20}$$

$$S_h=(1-\alpha)\left[(GNP^*+Z+F)-\left(\frac{1}{1-\sigma}DT_c+R_g+IT+DT_h\right)\right] \tag{21}$$

$$S_g=(R_g+DT_c+DT_h+IT)-(F+Z+C_g) \tag{22}$$

$$GI=(1-\alpha)GNP^*+\frac{\sigma}{1-\sigma}DT_c-\alpha[(Z+F)-(R_g+IT+DT_h)]-C_g \tag{23}$$

## III. *Predicting the Economy in* 1960

III. 1. Estimation of parameters

The national budget model in the preceding section has three parameters which must be determined by statistical data. Without getting involved in the familiar discussions on how to estimate unbiased parameters for an econometric model, three parameters are determined by simply taking the average ratio of $\alpha$, $\mu$ and $\sigma$ between 1951 and 1956.[9] Thus, the three parameters are:

---

[9] As alternatives to behaviour equations (9)—(11), the following forms may be used:

$$C_h=\alpha_0+\alpha_1 DY \tag{9}'$$

$$B=\mu_0+\mu_1 GNP \tag{10}'$$

$$S_c=\sigma_0+\sigma_1 P_c \tag{11}'$$

where $\alpha_0$, $\alpha_1$, $\mu_0$, $\mu_1$, $\sigma_0$, $\sigma_1$, are parameters to be estimated by statistical data. Using the national accounts figures for the period between 1951 and 1955, and the least squares method

$$C_h=-40.5+0.86DY \quad (0.002) \tag{9}''$$

$$B=384.0+0.065GNP \quad (0.041) \tag{10}''$$

$$S_c=-317.9+1.1P_c \quad (0.001) \tag{11}''$$

where the figures in parenthesis stand for the standard error of each estimate adjusted for degrees of freedom.

$$\alpha=0.85 \tag{24}$$
$$\mu=0.12 \tag{25}$$
$$\sigma=0.75 \tag{26}$$

III. 2. Determination of predetermined variables

In order to draw up the 1960 economy in Japan from the national budget model, the predicted (1960's) figures for the predetermined variables must be given. Five Year Plan does not show the components of govermnent current account except the item named 'government purchases'. Since the definition of 'government purchases' is ambiguous in the Five Year Plan, the following is devised. As a target figure, we know the 1960 value of GNP from the Five Year Plan, see equation (12). For each year between 1951 and 1955, the ratio

$$DT_c+DT_h+IT+R_g/GNP$$

is calculated from the data in our national accounts constructed. Taking the average of the ratio of the five years between 1951 and 1955, we get

$$E_x(DT_c+DT_h+LT+R_g/GNP)=0.196$$

where $E_x$ stands for a mathematical expectation. Letting the 1960 value of GNP stand for GNP*, the current revenue of government in 1960 is given by

$$GNP^*\times 0.196$$

The total of the government current account is divided components on the basis of proportions worked out from components in the 1954 government current account. An implication of this method is that the proportions of the various components in the geovrnment account in 1960 will not significantly change from those of 1954. As 1954 is the year when the Five Year Plan was drafted and the Economic Planning Agency did not foresee a big change in the government expenditure pattern for the planning period, the method does not seem to differ much from what the Five Year Plan amounts to.

III. 3. Determination of the target variable

The Five Year Plan gives two alternative values for the target variables. These are (in 1955 constant prices):

(CASE I) $GNP^*=9{,}673.0$ (billion yen)

(CASE II) $GNP^*=11{,}489.0$ (billion yen)

These alternative targets stem from the desire for flexibility in economic planning allowing for a range of potential growth. Corresponding to the two alternatives of GNP values in 1960, we have two sets of predetermined variables for 1960, which are tabulated below.

TABLE I (billion yen)

| | (CASE I) | (CASE II) |
|---|---|---|
| $DT_c$ | 341.2 | 405.3 |
| $DT_h$ | 544.1 | 646.3 |
| $IT$ | 997.2 | 1,184,4 |
| $R_g$ | 13.4 | 15.8 |
| $C_g$ | 1,126.2 | 1,337.6 |
| $Z$ | 20.9 | 24.8 |
| $F$ | 216.1 | 256.8 |

III. 4. Prediction of endogeneous variables

If we insert the values of the parameters, predetermined variables and target variables

into the reduced forms derived in the previous section ( (12)—(23) ), predictions of the twelve variables in 1960 are obtained, which are tabulated in (TABLE II). As the table shows, two alternative predictions result, corresponding to two alternative values of the GNP.

TABLE II

| | CASE I | | CASE II | |
|---|---|---|---|---|
| | Billion yen | % increase from 1955 | Billion yen | % increase from 1955 |
| $P_c$ | 1,364.8 | 121.78 | 1,621.2 | 144.66 |
| $S_c$ | 1,023.6 | 115.49 | 1,215.9 | 137.19 |
| $A$ | 1,160.8 | 110.10 | 1,378.7 | 130.77 |
| $B$ | 1,160.8 | 127.14 | 1,378.7 | 151.01 |
| $W+E+R_h$ | 7,318.5 | 115.40 | 8,881.6 | 140.05 |
| $DY$ | 6,990.5 | 115.59 | 8,492.6 | 140.42 |
| $GI$ | 2,604.9 | 121.12 | 3,122.5 | 145·19 |
| $C_h$ | 5,941.1 | 117.90 | 7,218.2 | 143.23 |
| $S_h$ | 1,048.6 | 104.02 | 1,273.8 | 126.36 |
| $S_g$ | 532.7 | —— | 632.8 | —— |

III. 5. A national budget in 1960

Making use of predictions for 1960, a 1960 national budget which gives ex-ante figures of the economy in ex-post form, is easily derived. This is a form of the so called "the national budget as an 'engineering' forecast".[10]

The national budget shows figures appearing in the Case I above.

*national product and expenditure a/c*

| | | | |
|---|---|---|---|
| $GNP$ | 9,673.0 | $CI$ | 2,064.9 |
| | | $C_h$ | 5,941.9 |
| | | $C_g$ | 1,126.2 |
| | | $A$ | 1,160.8 |
| | | $-B$ | −1,160.8 |

*income formation a/c*

| | | | |
|---|---|---|---|
| $W+E+R_h$ | 7,318.5 | $GNP$ | 9,673.0 |
| $R_g$ | 13.4 | | |
| $IT$ | 997.2 | | |
| $-Z$ | −20.9 | | |
| $P_c$ | 1,364.8 | | |

*appropriation a/c for corporations*

| | | | |
|---|---|---|---|
| $DT_c$ | 341.2 | $P_c$ | 1,364.8 |
| $S_c$ | 1,023.6 | | |

[10] In particular, see: B. Hansen, *The Economic Theory of Fiscal Policy*, 1958 Stockholm, pp 379–380.

*income redistribution a/c of households*

| | | | |
|---|---|---|---|
| $DT_h$ | 544.1 | $W+E+R_h$ | 7,318.5 |
| $DY$ | 6,990.5 | $F$ | 216.1 |

*appropriation a/c for households*

| | | | |
|---|---|---|---|
| $C_h$ | 5,941.9 | $DY$ | 6,990.5 |
| $S_h$ | 1,048.6 | | |

*appropriation a/c for government*

| | | | |
|---|---|---|---|
| $F$ | 216.1 | $R_g$ | 13.4 |
| $Z$ | 20.9 | $DT_c$ | 341.2 |
| $C_g$ | 1,126.2 | $DT_h$ | 544.1 |
| $S_g$ | 532.7 | $IT$ | 997.2 |

*capital formation a/c*

| | | | |
|---|---|---|---|
| $GI$ | 2,604.9 | $S_c$ | 1,023.6 |
| $AS$ | 0 | $S_h$ | 1,048.6 |
| | | $S_g$ | 532.7 |

*rest of the world a/c*

| | | | |
|---|---|---|---|
| $A$ | 1,160.8 | $B$ | 1,160.8 |
| | | $AS$ | 0 |

## IV. *Concluding Remarks*

The foregoing descussion was mainly focussed on the prediction of the 1960 economy. A national budget model was constructed so that the predicted figures could be given in a consistent basis. What is of fundamental importance for a prediction of economy is consistency in the predicted figures. As we have seen in the previous section, a national budget based on a national budget model supplies consistent figures for the economy. Going a step further, a national budget model is employed as a policy model in the planning stage. The specification of instrument variables in the Five Year Plan, which is essiental in the planning stage, appears to be less clear than in the case of target setting. This prevents us from working out empirically the planning stage of the Five Year Plan.

The estimation of parameters in the national budget model is based on a simple and rough method. A more sophisticated approach may be recommended by the econometrician.[11] A shift of weight in manufacturing industry from the cotton textile industry

[11] The two-stage least squares method developed by H. Theil and his followers seems to be a powerful method for the estimation of parameters in the policy model. For an account of the two-stage least squares method, see: H. Theil, *op.cit.*, pp 205-229 and 334-361.

to the chemical and machinary industries, which is gradually taking place in Japan, may shift the import function, and thereby affects the parameter in the import function. Taking into account this kind of structural changes on the economy, a tolerance range may be put into the estimation of parameters in the national budget model. A simple method is to provide a range in the estimates of parameter.

A national budget describes the economy from the macroscopic viewpoint. The breakdown of a prediction by industry levels may be of interest as a complement to the results of prediction. The connection of the input-output model to the national budget model suggests a fruitful approach to this issue. Suppose that the total of the components of final demand in the input-output model is given by the national budget model and that the total of each componont is distributed to each industry so that vectors of the components of final demand may be constructed. The prediction of output by industry is easily calculated from the input-output model. What is of primary importance in the use of input-output model in this manner is the stability of input coefficients and the construction of the vectors of final demand. To the extent that the input coefficients are subject to change the application of the input-output model for prediction purposes may be difficult. In the same way, some arbitrary elements are ineviatbly involved into the construction of the vectors of final demand, unless enough informations are supplied, so that a prediction of outputs by industry level by means of the final demands vectors may be hampered. Accordingly, the acccumulation of the necessary data and information for these purposes is urgent before we begin to apply the input-output model for the prediction.[12]

[12] For a computation of industrial output for 1960 using the national budget model above and an input-output model see: Y. Kurabayashi and K. Imai, "The Five-year Economic Plan and Electric Power Industry", Investigation of the Electric Power Industry in relation to the Structure of Japanese Economy, *Thechnical Report of the Central Reseach Institute of Electric Power Industry*, Jnue 1957, Tokyo.