AN INPUT-OUTPUT FORECASTING MODEL OF THE JAPANESE ECONOMY

by

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ABSTRACT

Title of Thesis: An Input-Output Forecasting Model of the Japanese Economy

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The purpose of this study is to build an annual medium term input-output forecasting model for the Japanese economy with sufficient commodity detail. The model forecasts year-by-year for ten years ahead, industry output, employment, investment, inventory change, exports, imports, wage rates, prices, and productivity within the framework of an input-output table. The model is designed as a prototype country model in the International I/O Forecasting System at the University of Maryland.

The main characteristics of the I/O computation is consistency. In this study, the consistency is pursued in three ways. Firstly, as usual in I/O models, consistent output is calculated in the sense of intermediate demand and final demand. Secondly, consistent price is calculated assuming optimal pricing behavior of firms. Thirdly, the consistent relation between output and price is pursued by making the output as a function of prices and by making the price as a function of output.

The technical and behavioral equations are formulated for all the economic variables to be forecasted. The main efforts are made to estimate wage rate equations, labor requirement equations, consumption

equations, price equations, and investment equations. After the structure of the model is described, each chapter will explain the theoretical basis, the mathematical formulation, and the empirical results of each equation. In the last chapter, predictive performance of the model is tested by simulation. Also, the limitations of the model and some possibilities for improvement are discussed in the last chapter.

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CHAPTER I

Introduction

This study presents an annual national econometric model for interindustry forecasting of the Japanese economy. It is built for the purpose of medium--or long-term analysis. Currently, the interdustry forecasting group at the University of Maryland is working on a dynamic world input-output forecasting system in which eleven country models and one central trade model are included. This dissertation is designed to make a prototype country model for the system. The Computer Forecasting Program, called 'FORP'[1], which was developed by this study, will be used as a basic 'housekeeping' program for all country forecasting models in the system. This model is designed as the first of a series of INFORUM models for countries other than the U.S.

Another purpose of the study is to show a possibility of modification of INFORUM type input-output forecasting models. Since the book, 1985: Interindustry Forecasts of the American Economy was published, there has been criticism as well as appreciation.[2] The

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[1]FORP was originally written by Clopper Almon and was debugged, changed, and expanded by the author.

[2]Almon, C. et al. 1985: Interindustry Forecasts of the American Economy. Reviewed by Wigley, K.J. in the Economic Journal, 1975, June, by Anne Carter, JEL, 1975; and by Stiglitz, J.E. in The Brookings Model: Perspective and Recent Developments. ed. by Fromm, G and L.R. Klein. North-Holland Publishing Co. 1975.

main criticisms focus on statistical method and on theoretical structure. This study tries to respond to those criticisms.

This model is based on the U.S. INFORUM (Interindustry Forecasting Project at the University of Maryland) model. As in the U.S. INFORUM model, the basic idea is to forecast, year-by-year for ten years ahead, industry output, employment, investment, prices, and productivity within the framework of an input-output table. However, the present model deviates from the U.S. INFORUM model in several points. It attempts to respond creatively to some of the valid criticisms of the U.S. INFORUM model.

In the international system, country models will be linked to the central trade model[1] through the price mechanism. Therefore, the model should include price model as well as real model which forecasts output. The old version of the INFORUM model forecast relative prices with time trend, and the new version forecasts monthly wholesale prices with lagged rates of labor costs, costs of materials, and output. Neither of these methods could be applied to this model, because we should forecast absolute prices instead of relative prices, and because we do not expect to find enough information to estimate the lag structure with monthly data in Japan or other countries. Accordingly, the optimal pricing theory within input-output framework is employed to forecast annual prices. Labor market conditions, demand pressures, and material costs are considered in the price formation equation. Considering the

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[1]Nyhus, D.E. "The Trade Model of a Dynamic World Input-Output Forecasting System" INFORUM Research Report No. 14.

linkage of the country models to the trade model, the feed-back effect of world price change to domestic price is incorporated in the price model. Openness of the economy is much greater in other countries than in the U.S.A.

The price model in INFORUM is separated from the real model. Price and output are not solved simultaneously year by year, but rather iteratively. Because of the expense of the iterative solution, price and output are solved each year in this model.

A special effort was made to specify the labor market equations. The labor market variables such as wage rate, employment, man-hours per employee, and productivity have three important roles in this model. These are the determination of wage inflation, the substitution for capital, and the determination of potential output. In many countries, wage inflation dominates price inflation. However, it is not generally accepted that the Japanese price inflation was of cost-push type.[1] The prices did not grow up as fast as the wage rates because productivity grew so fast. On the other hand, the nominal wage rates grew fast owing to the rapid growth of productivities. Therefore, an equilibrium wage rate equation was formulated using the marginal productivity principle. The fact that the Japanese economy had enjoyed a full employment until 1973 and the supply of labor had been the major constraint on the economic growth makes the

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[1] Ackley, G and H. Ishi, "Fiscal, Monetary, and Related Policies" in Asia's New Giant ed. by H. Patrick and H. Rasonsky. The Brookings Institution, 1976.

Phillips curve type wage study invalid for the Japanese economy. One of the criticisms on INFORUM model in the literature was that the investment equation and the labor requirement equation were not based on the same production function. If we allow substitution between labor and capital, it is consistent to use the same elasticity of substitution to calculate investment and labor according to the price change. In this model, the labor requirement equation is derived from a C.E.S. production function on which the investment equation is also based. The labor requirement derived from the production function depends on the real wage. There is a significant evidence of the substitution of capital for labor as the real wage increased over time in Japan.

The potential output growth of an economy can be approximated by its productivity growth and its employment growth. In order to avoid the simple projection of the productivity into the future from the historical productivity growth, which might overpredict the productivity owing to the Japanese experience of rapid growth in the past, we employ a Gompertz function which could allow the productivity to slow down in the future as a labor augmenting factor in production function. The exponential function which is used in usual production function tends to overpredict productivity in the future. The man-hours per employee equation is formulated to incorporate the downward trend of working hours in a week in determining the potential output.

In real side of the model, various econometric formulations and techniques are tried in order to get a reasonable model with relatively poor existing data. In a large model like INFORUM, a 'loving care' estimation approach is almost impossible. The so called 'firm-handed' estimation method may be inevitable. However, in this model the author tries to reduce the arbitrary assumptions as much as possible, and to use some 'loving care'. The use of alternative formulation of the investment function is an example. The consumption function is so formulated that complementarity could affect consumption projections. The traditional commodity demand equation which has only its own relative price to the overall consumer price as price variable fails to catch up the cross-price effect in commodity demand. The bias from neglecting the complementality is not negligible.

This report consists of four parts. The first part looks over the structure of the model and the solution procedure. In part two, the equations in the price block of the system will be presented. All the final demand equations and trade equations will be discussed in part three. In part four, simulation with the model will be reported. Possible improvement and extensions of the model will also be suggested in part four.

CHAPTER II

Structure of the Japanese Model

This model consists of over eight hundred regression equations, an input-output coefficient matrix (A), a capital flow coefficient matrix (B), and a government demand distribution matrix (G). The regression equations explain consumer demand, investment activities, exports and imports, labor requirements, wages, manhours per employee, prices, and input-output coefficient changes.

Following the Japanese 1970 I/O table, commodity production is classified into 156 sectors. Private investment activities, labor requirements, and wages are classified into twenty industry groups. Construction activities are classified into eight groups. Prices are formed for the 156 sectors. The distribution of the 156 products is explained in Figure II-1.

In the first section of this chapter, we will see how the equations are related. The procedure used to solve the system will be explained in the second section. In the third section, the formulation of the equations is described.

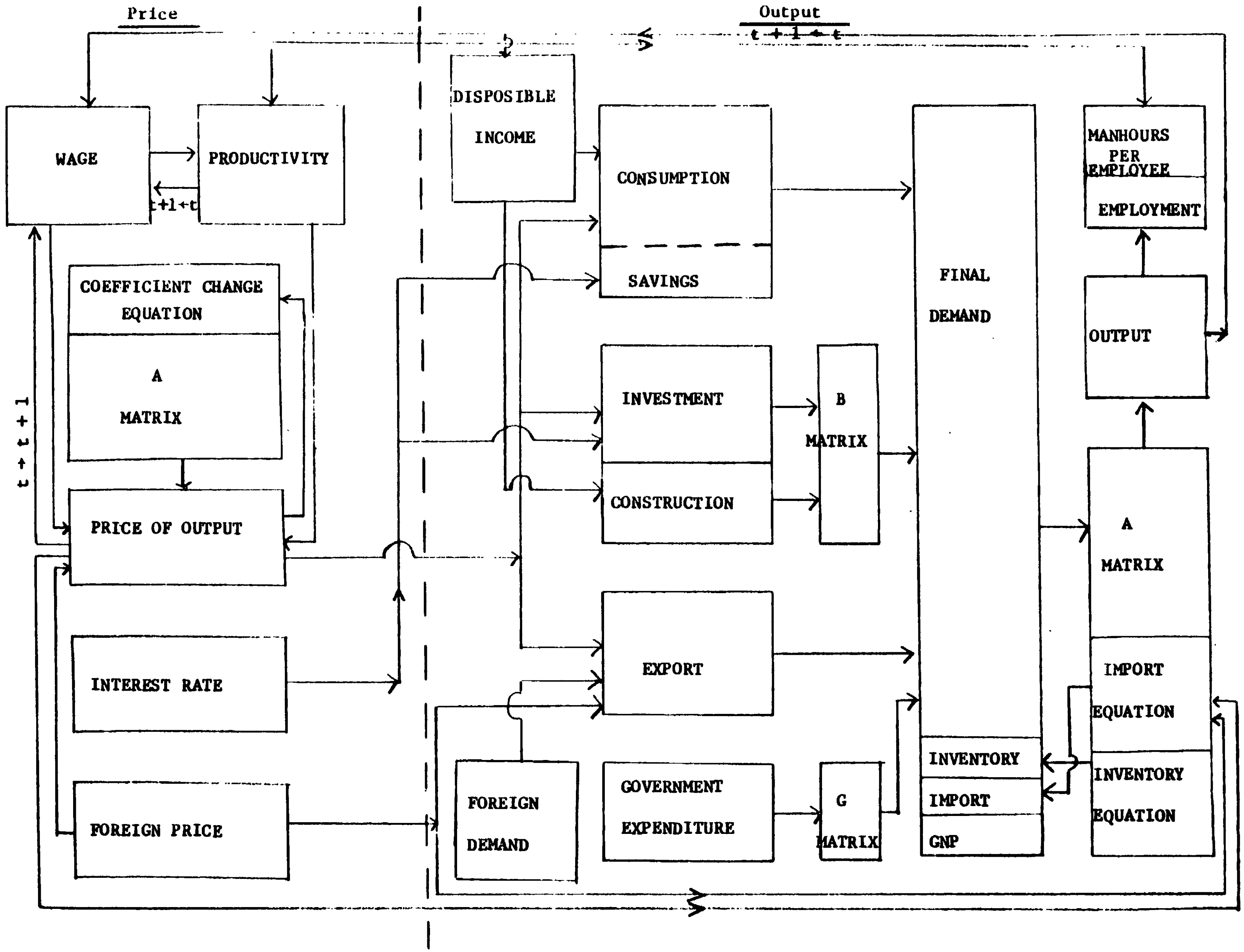
Interrelations of the Equations

As we can see in Figure II-2, the whole system is divided into two big blocks, namely the price determination block on the left and the output determination block on the right. The price block includes wage equations, labor requirement equations, and price equations. The

Figure II-1. Flows of the Products

Buyer / Seller	156 Products Bought for Use in Production	28 Capital Equipment and Construction Purchased	3 Government Categories	4 Other Final Demand Categories			
156 Products Produced and Sold	A-Matrix Sales to Intermediate Use	B-Matrix Sales to Capital Equipment Investment and Construction Investment	G Matrix Sales to Government	Plus Export	Less Import	Inventory Change	Personal Consumption

Figure II-2, St ure of the Model



output block includes consumption, investment, inventory change, import and export, and some other final demand components.

Although the two blocks seem to be separated, they are related through various functional relations. First of all, to get consistent output and price, the same A matrix is used in both blocks. After the coefficient forecast is made by logistic curves and/or by price induced substitution, which will be discussed later, price and output are calculated with that A matrix. Therefore, coefficient changes affect both outputs and prices. The effect of prices on outputs is obvious. The prices forecasted in the price block will be transformed to be used in various final demand equations. For the consumption equation, the output price will be transformed to the relative price with the appropriately weighted consumer price index. For the investment equation, the B matrix is used to get the PDE deflator from output price, and the expected inflation rate is calculated with a distributed lag system. Also, the domestic output price goes to the import and export equations where it is used relative to foreign price. Labor productivity is presumed to determine the potential level of disposable income, which determines consumer demands and some other final demands.

There also exists the effect from output to price. The output from the I/O computation should be interpreted as an equilibrium output reflecting influences of both demand and supply. Therefore, that value cannot enter the price equation directly as a demand measure because we cannot identify output as demand effect or as supply effect. However, in this study the output affects prices through capacity utilization variable or through a proxy for demand measure. The desired output capital ratio and the expected change of output are used to determine the long term trend of the markup ratio in the price equation. Also, the output affects prices through wage equation. In order to increase output, more labor should be employed, which increases demand in the labor market. Instead of using absolute employment change in the wage equation, the change in employment share of a certain industry is used to see the real labor market demand pressure in the sense of competition with other industries.

The equations in the price block are interrelated. First, the wage rate is affected by the previous years' productivity from the labor requirement equation, and by the previous year's consumer price index and output price from the price equations. Labor requirement is affected by the real wage rate. Wage rates, labor requirements, markup ratio, and the A matrix determine the output prices. Also, there is a feedback effect from price to input-output coefficients which is changed when the relative prices change. However, this study does not cover the price-induced-coefficient change.

The structure of the output block is rather simple. The demands are explained by demographic variables, real income, stocks, and price variables. Each equation will be discussed in the following chapters in great detail.

Solution Procedure

As the model consists of two big blocks, it can be solved by a block-recursive type method. As Wald says, an economy is a large recursive system if the time period is very short. In an annual model like this, however, the applicability of the pure recursive system is questionable. Simultaneous determination of the variables in some blocks of the model is inevitable. Therefore, the variables in the model are clustered into a few blocks. The variables within each block are solved simultaneously and the different blocks are solved recursively. The simultaneous solution of the variables within each block should be gotten by the way in which the economy solves, not by the mathematical solution. The economy can use only iterative methods.

Unfortunately, the cost of the iterative solution between price and output is quite large. If we can break the simultaneity between output and price without great loss of information, it is worth trying. The simple way out of the simultaneity problem is through the use of a one period lag. It is generally believed that wage adjustments are sluggish. If all the explanatory variables in the wage rate equation are only lagged variables of the system and other exogenous values, the simultaneity between price and output is broken. As will be seen in the wage rate equation chapter, the Japanese wage rate equations work well with lagged explanatory variables. Historically, their fast growing wage rates were always behind the faster growing productivity increases. Therefore, we can start to solve the wage rate eqauations with only the predetermined varibles.

The solution procedure consists of the following five blocks:

1. $w = f_1\ (z^o)$ — wage rate block

2. $\ell = f_2\ (w,p,z^o)$ — price block

$\alpha = f_3\ (z^o)$

$p = f_4\ (w, \ell\ ,a_{ij}, \alpha\ , z^o)$

$a = f_5\ (p,z^o)$

3. $c = f_6 (p, z^o)$ consumption and export block

$x = f_7 (p, z^o)$

4. $i = f_8 (p, q, z^o)$ Output block

$m = f_9 (p, q, z^o)$

$v = f_{10} (q, z^o)$

$q = f_{11} (i, m, v, c, x, z^o)$

5. $t = f_{12} (q, z^o)$ employment block

$e = f_{13} (q, \ell, t, z^o)$

All the predetermined or exogenous variables are represented by z^o. The symbols are:

w = wage

ℓ = labor requirement

p = price

α = markup

c = consumption

x = export

i = investment

m = import

v = inventory

q = output

a = input-output coefficient

t = monthly manhours per employee

e = employment

The solution procedure starts from the wage block. The wage rate which is calculated in the wage rate block will be given to the price block. The labor requirement and the prices of output are determined in the price block. Once price is given, we can calculate consumption and export. In the output block, output, import, inventory change, and investment are then determined. Using the calculated output, employment is calculated in the employment block.

The variables determined in the previous blocks will be given as exogenous to the current block. The equations of each block should be solved simultaneously. The main simultaneity problems occur in the price block and the output block. Besides the simultaneous determination of the output prices, which can be solved by the Seidel procedure, there is simultaneity between price and labor requirements within the price block. The labor requirement is a function of the real wage which is nominal wage divided by current price. Therefore, an iterative method is necessary to solve this problem. On the first iteration, we start by extrapolating the previous year's price change to be used in the labor requirement equation. If price-induced substitution is allowed in the coefficient change forecast, another big simultaneity occurs between price and the input-output coefficients. In this case, labor requirement, price, and input coefficients should be determined simultaneously; this simultaneous determination can be achieved only by the large iterative method, which is quite expensive computationally.

A more complicated simultaneity problem occurs in the output block. Investment, import, and inventory depend upon the current output. A solution procedure for this kind of problem is found in INFORUM. First, investment is calculated by extrapolating the previous output. With the final demands which were calculated in the previous blocks and with the investment, we solve for the output by the Seidel iterative process. Import and inventory are determined in every iteration using the new value of output. The new output is compared with the previous output and the process is repeated until the new output converges to the previous output. Once the new outputs of all sectors are gotten by the iterative method, we go back to the investment calculation. The new investment is calculated using the current output. Once again, the current investment is used to calculate the final output. Triangulization of the A matrix can speed up the convergence. Triangulization can be done by entering the sectors in decreasing order of the final demand ratio to output. Also, the extrapolation of the previous year's output in the first iteration speeds up the convergence.

The final block of the solution procedure is employment determination. Using the output and the labor requirements which were calculated in the previous blocks, the necessary employment is found using the manhour equation. The income side of the model is not designed in this dissertation. Accordingly, the employment should play a role to determine whether the exogenous assumption about the disposable income is reasonable or not, because employment can represent potential income level. If we have an unreasonable employment projection, the assumption should be revised and all the procedure should be repeated.

Functional Forms of the Equations

1. Wage Rate

$$\underline{\Delta}\ (W_t) = a_1 + a_2\ \underline{\Delta} \left(\frac{L}{\bar{L}} \right)_{t-1} + a_3\ \underline{\Delta} \left(\frac{W}{\bar{W}} \right)_{t-1} + a_4 \underline{\Delta}\ (CPI)_{t-1}$$

$$+ a_5\ (1 - \lambda) \sum_{i=1}^{t-1} \lambda^{i-1}\ \underline{\Delta}\ VAP_{t-i} + a_6\ \lambda^t$$

Here $\underline{\Delta}$ stands for the percentage change. W denotes nominal wage rate, L the employment of an industry, $\bar{L}$ the total employment of the economy. $\bar{W}$ is the average nominal wage rate of the economy and CPI is the consumer price index. VAP stands for the value of average product. The wage rate equation tests the three hypotheses, the equilibrium hypothesis, the disequilibrium hypothesis, and the bargaining power hypothesis.

The equilibrium hypothesis is tested by the variable, VAP, the disequilibrium hypothesis is tested by the variable, employment share ($\frac{L}{\bar{L}}$), and the bargaining power hypothesis by the Consumer Price Index (CPI), and the relative wage rate ($\frac{W}{\bar{W}}$). The value of average product is assumed to affect the wage rate through the distributed lag scheme. The form of the distributed lag is Koyck. The infinite lag tail problem is treated by a special method which will be discussed in Chapter III.

2. Labor Requirement

The labor requirement equation is derived from a C.E.S production function. The C.E.S. production function employed here is subject to constant returns to scale and it has labor augmenting technological change. Gompertz curve, instead of exponential curve which is growing without bound over time, is used to fit the labor augmenting technological change. With the partial adjustment mechanism, the regression equation turned out to be

$$\Delta \text{LN}\left(\frac{E}{Q}\right) + \sigma \, \Delta \text{LN}\left(\frac{w}{P}\right)_t - (1-\mu) \, \Delta \text{LN}\left(\frac{E}{Q}\right)_{t-1}$$

$$= b_1 - b_2 \left(\text{LN}\left(\frac{E}{Q}\right)_t + \text{LN}\left(\frac{w}{P}\right)_t - (1-\mu) \; \text{LN}\left(\frac{E}{Q}\right)_{t-1}\right)$$

Here, E denotes manhours, $\frac{w}{P}$ refers to real wage. σ is elasticity of substitution estimated in investment equation, and μ is the rate of adjustment. μ is estimated by iterative method.

3. Price

A. $P^e_{jt} = \sum_i a_{ij} \left((1-m) P^a_{it} + m P^w_{it}\right) + ULC^N_{jt} \cdot \alpha_{jt}$

B. $\alpha_{jt} = C_1 + C_2 \dfrac{Q^e_t}{K_{t-1}} + C_3 \Delta Q^e_t + C_4 t$

C. $P_{jt} = C_o + (1-\mu) P^e_{jt} + \mu P^a_{j\,t-1}$

where

$i = 1 \ldots\ldots.156$

$j = 1 \ldots\ldots.156$

There are three different notations for prices. P^e stands for the domestic equilibrium price which is calculated by the I/O computation. The normal unit labor cost (ULC^N), and the material costs are used to get the domestic equilibrium prices. The markup ratio is related to the desired output capital ratio $\left(\frac{Q_t^e}{K_{t-1}}\right)$ and to the expected rate of output change (ΔQ_t^e). These variables are explained in the Price Chapter. P^W stands for the world price. Since the large portions of the materials are imported, imported material costs are considered in equilibrium price calculation. The ratio of amount of imports to total domestic use (m) is used as a weight. After the domestic equilibrium price is calculated, the actual output price is gotten through the behavioral relation. In the behavioral relation, the actual prices are related to the equilibrium prices through distributed lag system. Koyck lag scheme is used because we believe that the equilibrium price of the current period has the strongest effect on the actual current price.

4. Personal Consumption Expenditure

$$C_{it} = (d_1 + d_2 \ Y_t + d_3 \ \Delta Y_t + d_4 \ t) \left(\frac{P_{it}}{P_{it}^G}\right)^{\beta_1} \left(\frac{P_{it}^G}{\bar{P}_t}\right)^{\beta_2}$$

Here C_{it} stands for the per capita personal consumption expenditure for commodity i in year t and Y_t is personal disposable income. All commodities are classified into several groups. P_{it}^G refers to the price of the group to which i^{th} commodity belongs. Relative price is decomposed into two price variables;

its own price relative to the group price, and group price relative to the total consumer price index $(\overline{P}_t)$. The decomposition of the relative price is designed to consider the complementarity in the consumer demand within groups.

The demand system must satisfy the budget constraint. In forecasting, the total consumption plus savings must add up to disposable income. In order to solve the adding up problem, we define $\overline{P}_t$ such that

$$\sum_i C_{it} \; (\overline{P}_t) + S_t = Y_t$$

where

$$S_t = s_1 + s_2 \; Y_t^P + s_3 \; Y_t^T + s_4 \; R_t$$

S_t is per capita savings and Y_t^P denotes permanent income, Y_t^T refers to transitory income, and R_t is real interest rate.

5. Investment

The investment equation is derived from the standard C.E.S. production function. The equation has the neo-classical stock adjustment form. The optimal capital stock, K^*, which is derived by equating the rental rate and the marginal product of the capital, is assumed to affect the net investment through a distributed lag.

$$I_t^N = \sum_{i=o}^{\infty} w_i \; \Delta K_{t-i}^*$$

where

$$K^* = c\ R^{-\sigma}\ Q$$

The lag weights, w's, are geometrically declining by the factor λ, after the first two periods. I_t^N denotes the net investment in year t, and Q_t stands for the output in year t, while R_t, σ, K_t, and c refer to the capital cost, the elasticity of substitution, the capital stock, and a constant, respectively. As we can see in the equation, the main burden of the estimation is the lag weights. Since we have infinite tail of lag weights and relatively small number of observations, the equation is transformed into an appropriate form for the estimation purposes.

6. Import and Export

$$M_t = (e_1 + e_2\ U_t) * P^{e_3}$$

$$X_t = (f_1 + f_2\ F_t) * P_t^{f_3}$$

Here M_t and X_t denote merchandise imports and exports at year t. U_t stands for the domestic use of a good at year t, which is defined by output plus imports less exports. F_t is the foreign demand index which is available from the World Trade Model. The last term of each equation is the relative price level (foreign price to domestic price for imports, and domestic price to foreign price for exports). Hence e_3 and f_3 are the respective price elasticities. The form of these equations are borrowed from the INFORUM models.

7. Housing Construction

$$\left(\frac{I}{H}\right)_t = h_1 \left(\frac{Y}{H}\right)_t + h_2 \sum_{i=o}^{t-1} (1-\delta)^i \left(\frac{I}{H}\right)_{t-i} + h_3 (1-\delta)^t$$

This is a partial stock adjustment equation. The Housing Construction expenditure per household (I/H) is assumed to be some fraction of the gap between the desired stock and the actual stock. The desired stock is assumed to be a function of the disposable income per household, Y/H. The actual stock is calculated by the one bucket reservoir system, which will be described in Chapter VIII. The housing expenditure per household is investigated because the decision unit for housing expenditure is the household.

8. Inventory change

$$V_t = \delta (g\ Q_t - VS_t)$$

The Accelerator principle is employed in the inventory change equation. V_t denotes the inventory change at year t, and VS_t the inventory stock. δ is the constant speed of closing the gap between the desired stock and the actual stock. Desired stock is assumed to be proportional to output ($g\ Q_t$).

9. Manhours per Employee

$$MH_t = h_1 + h_2 \Delta Q_t + h_3 T$$

The Manhours per employee (MH) are related to the percentage change in output and to the time trend (T). The Socio-economic factors, captured by the time trend, have a great influence on the manhours per employee.

10. Coefficient Change

$$C_{it} = \frac{a}{1-A\ e^{-abt}}$$

where

$i = 1.........156$

The equation is the INFORUM method of forecasting the Across-the-row coefficient change in which C_{it} is the coefficient of the i^{th} row in year t, a is the asymptote of the logistic growth curve, A is the constant of integration and b is the constant rate of the percentage change of the gap between C_{it} and a. The across-the-row coefficient change method is designed to investigate the coefficient change due to technical change and to product mix change over time.

11. Output Determination

$$Q_i = \sum_{j=1}^{156} a_{ij}\ Q_j + F_i - M_i$$

where

$$F_i = \sum_{j=1}^{20} b_{ij} I_j + \sum_{j=1}^{3} g_{ij} G_j + C_i + V_i + \sum_{j=21}^{28} b_{ij} H_j$$

All the final demand components, namely personal consumption expenditure (C), investment (I), government expenditure (G), construction (H), inventory change (V), imports (M), and exports (X), are combined to calculate output.

CHAPTER III

Wage Rate Equation

Theory

There have been three approaches to wage rate adjustment. These are:

1. Disequilibrium study, which is commonly presented by the Phillip's curve,
2. Equilibrium study, which is based on the marginal productivity principle, and
3. Bargaining power hypotheses.

All of these hypotheses are employed in the formulation of the Japanese industry wage rate equation.

In usual disequilibrium study, the rate of unemployment or the change in the unemployment rate is considered as a measure of disequilibrium. Excess demand in the labor market is measured by the unemployment rate, whether it is an aggregate macro model or an industry level model. Certainly there is no objection to use of the unemployment rate as a measure of excess demand in an aggregate macro study. Its use is questionable, however, in disaggregated models. The extent of disequilibrium of the whole economy does not necessarily indicate its extent in a certain industry. Furthermore, the Japanese statistics of the unemployment rate show not much variation for the past 15 years, although the industrial structure has changed very much.

Therefore, the unemployment rate is not expected to be significant in the industry level wage rate determination. Now, the problem is to find an appropriate proxy for the measure of disequilibrium for each industry. The measure of disequilibrium in an industry should cover not only the flow of labor between the employed and the unemployed, but also the flow of the employed laborers between industries.

When unemployment is not very great, job competition between the employed and the unemployed is weak. Money wage rate will be only weakly affected by the employment level. Furthermore, if there exists excess demand for labor so that labor becomes a constraint on growth, the actual situation in Japan recently, the employers should compete to get the laborers who are already employed. Therefore, unemployment rate could not be a significant variable in the wage equation.

The change in the employment share of each industry over the total employment of the economy is chosen as the proxy for the measure of demand pressure in the labor market. There has been a big change in employment shares of Agriculture, Other services, Metal, and Machinery industries. Those changes are presumed to have been possible only through shifts of labor among industries. Table III-1 compares the employment shares in 1958 and in 1972.

In an equilibrium situation, the marginal productivity principle says that the nominal wage is equal to the value of marginal product. This productivity approach to empirical wage equations was suggested

TABLE III-1. EMPLOYMENT SHARE*

Industry Name	1958	1972
1. Agriculture, Forestry and Fishery	33.15	14.78
2. Mining	1.06	.31
3. Foods and Tobacco	2.19	2.07
4. Textile	4.74	4.39
5. Pulp and paper	0.70	0.74
6. Chemical Products	1.14	1.21
7. Primary Metals	1.17	1.52
8. Metal Products	1.35	2.66
9. Non-electrical Machinery	1.33	2.22
10. Electrical Machinery	1.25	2.66
11. Transportation Equipment	1.16	2.06
12. Miscellaneous Manufacturing	6.12	7.50
13. Construction	5.25	8.45
14. Electricty, Gas and Water Supply	.52	.57
15. Wholesale and Retail Trade	16.91	20.53
16. Real Estate	0.17	0.64
17. Transport and Communication	4.61	6.37
18. Finance and Insurance	1.68	2.28
19. Other Services	15.51	19.06

*Employment share is $\frac{E_i}{TE} * 100$. Where E_i is i^{th} industry employment and TE is total employment.

by Kuh[1] as a criticism of the disequilibrium theory relying on the Phillip's curve.

Based on Kaldor's[2] suggestion, various studies tried to find the role of profits in wage determination. Kaldor argued that the Phillip's empirical results arose from a spurious correlation between unemployment rates and profits.

Nevertheless, the role of profits in wage determination is not directly justifiable from neoclassical theory. There is in neoclassical theory no reaosn why employers increase wages as profits go up. This theoretical gap between profit and wage was bridged by Kuh's productivity approach. As Kuh states, "profit might be a proxy for a more fundamental determinant of wages, the marginal value productivity of labor, according to neoclassical price theory. Profit markup can be written as $MU = \frac{PX}{WM}$ (where PX is value added, W the wage rate, M man-hours). The average value productivity of labor is $\frac{PX}{M}$, and may readily be conceived to be systematically correlated with the marginal value productivity of labor, which is the determinant of labor demand in neoclassical theory."

The value of marginal product is decomposed into two parts, the price of output and the marginal product. Because the marginal

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[1]Kuh, E., "A Productivity Theory of Wage Levels; an Alternative to the Phillip's Curve." The Review of Economic Studies. Vol. XXXIV (4), No. 100 (Oct., 1967).

[2]Kaldor, N., "Economic Growth and the Problem of Inflation," Part II. Economica. Vol. 26 (1959). pp. 287-298.

productivity is not directly observable, we need one more step to get appropriate data for that variable. There are two alternative ways to deal with this problem. Firstly, from the production function which is estimated using various assumptions, we can calculate the marginal productivity of labor.[1] Secondly, rather than resort to a two-stage estimation procedure by first estimating a production function and then a wage rate equation with marginal productivity, average productivity could instead serve as a proxy, since the two are likely to be systematically related over observed ranges of variation.[2]

If the postulated production relation is Cobb-Douglas with neutral technical change, marginal and average productivity differ only by a multiplicative constant. However, a C.E.S. production function is utilized in this study. As we can see in the labor requirement equation derivation, the marginal productivity of labor is some function of the average productivity of labor. In this case, the only thing we should assume is that the elasticity of output with respect to labor is constant within certain ranges of that production function so that the systematical relation between average productivity

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[1]In labor requirement equation estimation, we estimated some parameters of production which make it possible to calculate marginal productivity, even though we did not estimate the production function itself.

[2]Kuh, E., "A Productivity Theory of Wage Levels - An Alternative to the Phillip's Curve." The Review of Economic Studies. Vol. XXXIV (4), No. 100 (Oct., 1967).

and marginal productivity can be approximated by a linear relation.[1] The assumption involved in using average productivity is, therefore, not more critical than those used in estimating production functions.

The price of output and the proxy for marginal productivity could both enter the wage equation as independent variables. But with the small number of observations, in order to save degrees of freedom we generate the proxy for the value of marginal product by multiplying the price of output by the average productivity. So, actually, the formulation implies that the nominal wage is a linear function of the value of average product.

At this point, the price variable in the wage rate equation needs some further explanation. In a multisector model a distinction must be made between the consumer price index and the price of output. The consumer price index as a cost of living index has been commonly used in wage studies. But the implication of these two prices in the wage equation is quite different. The consumer price index is used to get real wages free from money illusion; it relates to the supply

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[1]Elasticity of output in a C.E.S. production function with constant returns to scale is

$$\frac{\partial Q}{\partial L} \cdot \frac{L}{Q} = \frac{1}{\beta^{\rho}} \cdot \alpha_1 \cdot (g(t))^{-\rho} \left(\frac{Q}{L}\right)^{\rho}$$

(see page 45 in this dissertation).
So, if we assume output varies proportionally to employment within a certain observable range of the production function, the elasticity of output is constant.

$$\frac{\partial Q}{\partial L} \cdot \frac{L}{Q} = k \text{ so } \frac{\partial Q}{\partial L} = k\frac{Q}{L}$$

side of the labor product. The price of output is the relevant measure for value of labor productivity, which relates to the demand side. However, there is a statistical problem in disentangling the effects of those prices in the wage equation because the consumer price index is related to the price of output through an identity relation.

So far, we presume that the most important component of steady state wage is labor productivity. The most reasonable interpretation of the labor productivity theory implies a long run wage elasticity with respect to labor productivity of unity. Labor productivity increases in the long run for various reasons, including technical change and education. The money wage adjusts to it, but with a lag. Therefore, there is a time delay in wage adjustment to the equilibrium level. The specific lag structure will be described later in the formal wage equation.

The bargaining hypothesis commonly attributes wage increases to consumer price increases. In this study, both the relative wage rate and the consumer price index are used for the bargaining basis. Only one of them will be used in an industry wage rate equation. If we have the fast growing consumer price index and the value of average product as the independent variables, the forecasts of wage rates of different industries may diverge very much. The Japanese wage differentials between industries have been quite stable, although there has been a slight tendency to narrow interindustry differentials, as

Bluementhal[1] pointed out. Table III-2 shows the trend of wage differentials over time; the standard deviation declines slightly. Therefore, in order to avoid the divergence in wage rate in forecasting, relative wage rate change is preferred to the consumer price index as the basis for bargaining. The negative sign on the coefficient of the relative wage rate will make the wage level of an industry low if the relative wage level of the last year was high.

Wage differentials in the manufacturing sector of an economy at a given time may be attributed to some combination of the following factors: age, sex, education and training, industry, occupation, work status, region, degree of unionization and scale of firm. Wage differentials are determined by social variables as well as economic variables. As time goes on, we could presume that wage differentials move towards a stable equilibrium which depends only on the long term cost of education and training for specific industries and some other stable institutional factors. Therefore, we can hypothesize that laborers are more sensitive to changes of their relative wage position than to simple wage differentials between industries. If the wage structure changed in the previous year so that the relative wage in a certain industry decreased, its trade union is assumed to bargain more strongly. Cost of living, which is represented by the consumer price index is also considered for this hypothesis, but it will be

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[1]Bluementhal, T, "The Effect of Socio-economic Factors on Wage Differentials in Japanese Manufacturing Industries." Economic Studies Quarterly. Vol. XVII, No. 1 (Sept., 1966).

employed only if the relative wage does not work very well. This is because of the statistical difficulty which was mentioned above.

Summarizing all three hypotheses and considering the one-period lag of wage adjustment which was described in Chapter II, we have the formal wage equations following:

$$(1)\ \underline{\Delta}\, W_t = \alpha_o + \alpha_1 \underline{\Delta}\, LS_{t-1} + \alpha_2 \underline{\Delta}\, RW_{t-1} + \alpha_3 \sum_{i=o}^{\infty} w(i)\ \underline{\Delta}\, VAP_{t-1-i} + u_t$$

$$(2)\ \underline{\Delta}\, W_t = \alpha_o + \alpha_1 \underline{\Delta}\, LS_{t-1} + \alpha_2 \underline{\Delta}\, CPI_{t-1} + \alpha_3 \sum_{i=o}^{\infty} w(i)\ \underline{\Delta}\, VAP_{t-1-i} + u_t$$

where

$\underline{\Delta}$ stands for percentage change

W_t = nominal wage level of an industry at time t.

LS = employment share of an industry over total employment

($LS = \frac{L}{\bar{L}}$ where $\bar{L}$ is the total employment of the economy)

RW_t = relative wage of an industry

($RW_t = \frac{W_t}{\bar{W}_t}$, where $\bar{W}$ is average wage of the non-farm industries[1])

$VAP_t = P_t * AP_t$

P_t = output price index

[1] Agricultural wage and wage of Other services are excluded in calculating relative wages because of the differences in the nature of labor between manufacturing industries and agriculture.

TABLE III-2 - RELATIVE WAGES*

Industry Name	1960	1965	1970	1972
1. Mining	1.054	1.019	1.018	0.992
2. Foods and tobacco	0.782	0.838	0.849	0.830
3. Textile	0.558	0.605	0.651	0.648
4. Pulp and paper	0.933	0.960	0.947	0.954
5. Chemical products	1.273	1.182	1.214	1.201
6. Primary Metals	1.323	1.192	1.244	1.194
7. Metal products	0.797	0.863	0.915	0.905
8. Non-electrical machinery	0.977	0.953	1.037	1.034
9. Electrical machinery	0.896	0.834	0.878	0.902
10. Transportation equipment	1.221	1.082	1.066	1.041
11. Miscellaneous manufacturing	0.778	0.827	0.847	0.846
12. Construction	0.791	0.827	0.847	0.846
13. Electricity, gas, water	1.568	1.618	1.502	1.456
14. Wholesale & retail trade	0.926	0.921	0.917	0.929
15. Real estage	1.806	1.223	1.351	1.332
16. Transport & communication	1.112	1.138	1.098	1.109
17. Finance and insurance	1.466	1.404	1.268	1.308
Standard deviation	0.328	0.310	0.214	0.206

*The relative wage is defined by the nominal wage divided by the average wage of the economy.

AP_t = average productivity

$w(i)$ = weights of lag scheme, with $\sum_i w(i) = 1$

u_t = stochastic disturbance term.

The rate of wage adjustment is measured by the percentage change of the nominal wage level. The only difference between equation (1) and (2) is the bargaining variable. The productivity variable with lag system can be considered as the standard productivity change trend which is calculated from a weighted average of past productivity changes. The expected signs are positive for LS, negative for RW, positive for CPI, and positive for VAP.

Empirical Results

In order to estimate the wage adjustment equation, we posit that the lag weight structure w(i) is geometrically declining in i. Using this lag scheme we can rewrite the wage rate equations in the special form[1]:

$$(1)\ \underline{\Delta}\, W_t = \alpha_o + \alpha_1 \underline{\Delta}\, LS_{t-1} + \alpha_2 \underline{\Delta}\, RW_{t-1} + \alpha_3 (1-\lambda) \sum_{i=o}^{\infty} \lambda^i \underline{\Delta}\, VAP_{t-1-i} + u_t$$

$$(2)\ \underline{\Delta}\, W_t = \alpha_o + \alpha_1 \underline{\Delta}\, LS_{t-1} + \alpha_2 \underline{\Delta}\, CPI_{t-1} + \alpha_3 (1-\lambda) \sum_{i=o}^{\infty} \lambda^i \underline{\Delta}\, VAP_{t-1-i} + u_t$$

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[1]In general Koyck lag structure, we do not see the $(1-\lambda)$ factor which appears in the equation above. If we do not multiply by $(1-\lambda)$, the sum of these weights is not equal to unity. In order to see the total effect of a one unit change of the explanatory variable over the whole time period, we have to make the sum of the weights unity.

where λ is the geometrically declining rate of the lag system in a sector.

For the estimation of equations like these, two econometric problems have to be faced. First, the last variable is an infinite sum while we have only a finite amount of data. Second, the equation is nonlinear in the parameters α_3 and λ . The first problem was solved by the following procedure which was originally suggested by Klein[1] and developed by Sargent.[2]

The summation in the last term of the equation can be written as follows:

$$\sum_{i=o}^{t-1} \lambda^i \underline{\Delta} \, VAP_{t-i-1} + \sum_{i=t}^{\infty} \lambda^i \underline{\Delta} \, VAP_{t-i-1}$$

Substituting i = k + t in the second term gives for that term

$$\lambda^t \sum_{k=o}^{\infty} \lambda^k \underline{\Delta} \, VAP_{o-k-1} = \lambda^t \eta_o$$

where

$$\eta_o = \sum_{k=o}^{\infty} \lambda^k \underline{\Delta} \, VAP_{o-k-1}$$

This η_o can be considered as the initial condition of the difference equation.

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[1]Klein, L.R., "The Estimation of Distributed Lags." Econometrica. Vol. 25. (Oct., 1958).

[2]Sargent, T., "Some Evidence on the Small Sample Properties of Distributed Lag Estimations in the Presence of Autocorrelated Disturbances." Review of Economics and Statistics. Vol. XIX. (Feb., 1968).

Substituting into (1') and (2') gives

$$(1')\ \underline{\Delta}W_t = \alpha_o + \alpha_1 \underline{\Delta} LS_{t-1} + \alpha_2 \underline{\Delta} RW_{t-1} + \alpha_3 (1-\lambda) \sum_{i=o}^{t-1} \lambda^i \underline{\Delta} VAP_{t-i-1} + \alpha_3 (1-\lambda) \lambda^t \eta_o$$

$$(2')\ \underline{\Delta}W_t = \alpha_o + \alpha_1 \underline{\Delta} LS_{t-1} + \alpha_2 \underline{\Delta} CPI_{t-1} + \alpha_3 (1-\lambda) \sum_{i=o}^{t-1} \lambda^i \underline{\Delta} VAP_{t-i-1} + \alpha_3 (1-\lambda) \lambda^t \eta_o$$

Considering $(1 - \lambda)\lambda^t$ as a variable we can estimate η_o simultaneously with the other parameters of the equation, so that we can avoid the problem associated with the infinite tail of the lag.[1]

The second problem can be solved easily by employing search procedures suggested by Hildreth and Lu.[2] The Hildreth-Lu scheme searches over λ for that value which minimizes the sum of squared residuals. So, the selected value of λ, the paramters α_o, α_1, α_3 and η_o can be determined. The regression results are shown in Table III-3.

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[1]This kind of equation has an advantage in computation of forecast and also in regression. We do not need to keep the memory of all past history of VAP. Using the relation

$$\underline{\Delta}\overline{VAP}_{t+1} = \lambda(\underline{\Delta}\overline{VAP}_t + \underline{\Delta}\ VAP_{t+1}) \text{ where } \underline{\Delta}\overline{VAP}_t = \sum_{i=1}^{t-1} \lambda^i (\underline{\Delta}\ VAP_{t-i})$$

we only have to remember the previous year's $\underline{\Delta}\ \overline{VAP}$.

[2]Hildreth, C. and J.Y. Lu., "Demand Relations With Autocorrelated Disturbances." Technical Bulletin. Vol. 276. Michigan State University, Agricultural Station (East Lansing, Mich., 1960).

TABLE III-3 - WAGE RATE EQUATION REGRESSION

Industry Name	Constant	ΔRW	Δ CPI	ΔLS	ΔVAP	η_o	λ	R^2	D.W.
1. Agriculture, forestry, fishery	-.003		2.359		.107	-.274	.40	.347	1.659
	(-.029)		(1.868)		(.168)	(-1.141)			
2. Mining	.092			.140	.285	-.423	.45	.524	1.061
	(3.139)			(1.045)	(1.613)	(-1.786)			
3. Foods and tobacco	.126			.635	.281	-.590	.70	.539	1.201
	(1.370)			(1.136)	(.302)	(1.272)			
4. Textile	.131			.539	.197	-.558	.35	.550	.838
	(7.081)			(1.544)	(1.307)	(-3.554)			
5. Pulp and paper	.064	-.144		.686	.661	-.490	.65	.914	2.508
	(4.533)	(-.423)		(3.706)	(6.466)	(-6.404)			
6. Chemical products	.099	-.159			1.364	-.751	.95	.780	1.815
	(.538)	(-.920)			(.929)	(-.193)			
7. Primary metals	.128			.526	.067	-.696	.75	.322	1.214
	(2.859)			(1.004)	(.195)	(-1.779)			
8. Metal products	.113	-.169		.478	.173	-.911	.50	.792	1.760
	(3.606)	(-.476)		(1.386)	(.925)	(-6.148)			
9. Non-electrical machinery	.087		.536		.174	-.700	.20	.574	1.600
	(3.433)		(1.166)		(2.234)	(-3.004)			
10. Electrical machinery	.349	1.021		.033	.641	-8.489	.950	.910	1.672
	(2.830)	(-1.762)		(.690)	(1.025)	(-3.210)			

TABLE III-3 (CONTINUED)

Industry Name	Constant	ΔRW	Δ CPI	Δ LS	Δ VAP	η_o	λ	R^2	D.W.
11. Transportation equipment	.069 (1.653)			.782 (1.421)	.112 (.575)	-.632 (-2.705)	.55	.266	.913
12. Miscellaneous manufacturing	.068 (2.159)	-.782 (-.974)		.689 (1.781)	.501 (2.440)	-.577 (-3.212)	.35	.695	1.138
13. Construction	.061 (1.957)	-.249 (-.634)			.629 (2.747)	-.079 (-.400)	.40	.528	1.740
14. Electricity, gas, and water	.030 (.761)	-.683 (-1.871)			.655 (2.571)	-.077 (-.502)	.60	.680	2.600
15. Wholesale & retail trade	.084 (1.880)	-.199 (-.362)			.299 (1.341)	-.271 (-1.271)	.50	.442	1.189
16. Real estate	.047 (1.245)	-.573 (-2.194)			.830 (2.334)	-443.6 (2.330)	.30	.251	1.686
17. Transport and communication	.070 (3.511)	-.388 (-.663)		.072 (.184)	.531 (4.295)	-.246 (-2.124)	.30	.798	2.651
18. Finance and insurance	.105 (4.287)	-.412 (-.586)		.226 (.450)	.041 (.619)	-.463 (-2.045)	.30	.237	1.201
19. Other services	.107 (3.454)		.332 (.582)					-.058	1.549

As expected, different industries have different kinds of wage rate equations. The bargaining procedure plays a significant role in Electrical machinery and in Electricity, gas, and water supply, in each of which the trade union is presumed to be quite well organized. As mentioned above, the relative wage change is preferred to the consumer price index change as the bargaining variable so that the wage forecasts in the future will not diverge very much between industries. The consumer price index change is substituted when an unexpected sign is encountered in the relative wage coefficient.

The equilibrium hypothesis works better than the disequilibrium. This can be explained by the fact that this is an annual model. In the long period, like a year, some disequilibrium phenomena might be averaged out. Only one sector out of 19 sectors do not have the VAP variable in the equation, although in some sectors that variable is not significantly different from zero. Most of the sectors have a coefficient of VAP which is not close to 1. Accordingly, we can say that the hypothesis of unit elasticity of wage rate with respect to the value of average product is not accepted for the Japanese economy. The geometrically declining rates concentrate around 0.6. Therefore, the mean lag is less than two years, which is quite understandable.

Almost all of the D. W. statistics enter the non-autocorrelated region or the indecisive region. Accordingly, autocorrelation is not a very important problem here. For forecasting, the simple RHO adjustment procedure[1] will be employed for a better forecast.

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[1]Goldberger, A.S. "Blue-Generalized Least Squares Regression Model." Journal of the American Statistical Association. Vol. 57, No. 2, (June, 1962).

Considering the bad performance of wage equations in other big models,[1] the goodness of fit is not discouraging. Other Services has very low $\bar{R}^2$s. In this sector, all variables shows the wrong sign or has very insignificant t-statistics. In order to keep this wage trend consistent with those of the other sectors, wage rates in this sector are simply regressed on the consumer price index. Other industries have $\bar{R}^2$s between 0.5 and 0.75, which is not usually considered a bad fit when we have percentage change as the dependent variable.

As we can see in the table of simulation of the wage rate level, the actual level of the wage rate can be almost exactly reproduced by simulation.[2] The average percentage error[3] and the

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[1]Fromm, G. and P. Taubman. "Policy Simulation With an Econometric Model." The Brookings Institution. 1968. pp. 11. They said, "wages and prices sector is one of the larger contributors of errors in the aggregate results."

[2]The simulated wage level was calculated as follows. In the initial year, we start with the actual wage level. The value of the percentage of wage predicted by the regression estimates is used to calculate wage level in the consecutive years. The R^2 of the simulation was calculated as if the simulated values were the predicted values of the regression. So the R^2 is the ratio of the explained variation of the wage level over the total variation of the actual wage level.

[3]Average percentage error is defined by

$$APW = 100 * \sum_{i}^{T} \frac{\hat{w}_{jt} - w_{jt}}{w_{jt}} / T$$

and root mean squared percentage error is defined by

$$RMSPE = 100 * \sum_{i}^{T} \left(\frac{\hat{w}_{jt} - w_{jt}}{w_{jt}}^{2} / T \right)^{\frac{1}{2}}$$

where $\hat{w}_t$ is the simulated wage level.

root mean squared percentage error are less than 10% for nearly all industries. R^2 is very close to 1. Even bad fit equations, like Other services and Real estate, have a quite high R^2 above 0.95.

TABLE III-4 - SIMULATION OF WAGE RATE LEVEL

Industry Name	Average Absolute Percentage Error	Root Mean Squared Percentage Error	R^2
1. Agriculture, Forestry, Fishing	2.577	3.602	.9954
2. Mining	5.097	6.768	.9823
3. Foods & tobacco manufacturing	3.641	4.815	.9923
4. Textile	5.565	7.661	.9809
5. Pulp and paper	.781	1.058	.9996
6. Chemical products	1.146	1.458	.9990
7. Primary metals	4.811	5.919	.9890
8. Metal products	2.752	3.396	.9952
9. non-electrical machinery	5.177	6.472	.9886
10. Electrical machinery	1.142	1.554	.9989
11. Transportation equipment	8.997	10.744	.9591
12. Miscellaneous manufact.prod.	3.453	4.629	.9911
13. Construction	2.898	3.400	.9949
14. Electricity, gas & water supply	1.720	2.014	.9980
15. Wholesale & retail trade	5.210	6.910	.9793
16. Real estate	9.884	13.543	.9617
17. Transport & communication	1.543	1.957	.9986
18. Finance and insurance	6.968	7.999	.9634
19. Other services	3.041	3.467	.9945

CHAPTER IV

Labor Requirement Equation

Theory

The labor requirement equation is needed for the employment projection and for the unit labor cost calculation, which, in turn, enters into price determination in this model. The chronic scarcity of labor in Japan has been a binding constraint on output growth, and the wage rate increases caused by the excess demand for labor have been the leading factor in the price increases.

The labor requirement is the labor required per unit of output, in other words, the reciprocal of the average productivity of labor. The reason we deal with labor requirement rather than with productivity is simply that it is convenient to have curves which are bounded below by zero rather than curves which grow upward without bound.

The labor requirement in a certain industry, EOQ_j, (standing for 'E over Q') is defined by

$$(1)\quad EOQ_{j,t} = 12 \cdot L_{j,t} \cdot H_{j,t} / Q_{j,t}$$

where

$L_{j,t}$ = employment in j^{th} industry at time t

$H_{j,t}$ = working hours per month in j^{th} industry at time t

$Q_{j,t}$ = annual output of j^{th} industry at time t.

EOQ is simply the manhours required to produce one unit of output.

The labor requirement equation is derived from the production function. For the consistency of the whole model, we employ the C.E.S. production function which is also used in the investment equation derivation.

The C.E.S. production function with constant returns to scale and with labor augmenting technological change is,[1]

$$(2)\quad Q_{j,t} = \beta\,[\alpha_1\,(g(t)\cdot E_{jt})^{-\rho} + \alpha_2\,(K_{j,t})^{-\rho} + \alpha_3\,(M_{j,t})^{-\rho}]^{-\frac{1}{\rho}}$$

where

$E_{j,t} = 12\cdot L_{j,t}\cdot H_{j,t}$, manhours

$K_{j,t}$ = real capital stock

$M_{j,t}$ = intermediate inputs

$g(t)$ = labor augmenting factor

$\rho = \frac{1-\sigma}{\sigma}$

σ = elasticity of substitution

α's = distribution parameters

β = constant.

Usual macro production functions include only capital and labor as inputs. Even some disaggregated studies include only primary

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[1]There is no reason why materials enter the production function in the same form as labor and capital. But the way materials enter equation (2) does not affect our labor requirement equation. So, we just leave it as above to guarantee the linear homogeneity.

factors in the production function because substitutability between materials is doubtful. If we don't include the materials as input, Q_t should be in value added term, and the deflator should be for value added. Unfortunately, the effort to calculate the value added and value added deflator with Japanese data was not successful. Some of the value added prices turned out to be negative when calculated using constant input-output coefficients. However, a production function which includes materials in it may be justified. In a measure of economy-wide production such as GNP, the intermediate inputs have been netted out, so that the production function needs only primary inputs. But for a sectoral production function, with sectoral gross output, intermediate inputs belong in the function. This point was justified by Kendrick,[1] who said:

> "For production analysis it may be useful in some cases to use total gross output estimates and relate them to factor inputs, plus intermediate inputs purchased outside the industry. The reason is that in production decisions management has to weigh alternative combination of all inputs in the light of their relative prices so that the least cost combination may be selected."

The inclusion of intermediate inputs in a C.E.S. production function was utilized by Nordhaus[2] and by Theil and Tilhanus.[3]

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[1]Kendrick, J.W., Postwar Productivity Trends in the U.S. 1948-1969. New York. NBER. 1973. pg 17.

[2]Nordhaus, W.D., "Recent Developments in Price Dynamics," in The Econometrics of Price Determination, Conference sponsored by Board of Governors of the Federal Reserve System and Social Science Research Council., ed. by Otto Eckstein.

[3]Theil, H., and C.B. Tilanus. "The Demand for Production Factors and the Price Sensitivity of Input-Output Predictions," I.E.R. vol. 5, No. 3., September, 1964.

This production function assumes substitutability between factor inputs and intermediate materials. The substitution between factor inputs and intermediate materials is understandable because, for example, if the price of materials increases relative to wages, a firm can employ labor to produce that material instead of buying the expensive material.

The labor requirement can be derived from the marginal productivity condition. The marginal productivity condition for profit maximization with respect to manhour input is

$$(3)\quad \frac{\partial Q_{jt}}{\partial E_{jt}} = \frac{1}{\beta^{\rho}} \alpha_1 (g(t))^{-\rho} \left(\frac{Q_{jt}}{E_{jt}} \right)^{\rho+1} = \frac{W_{jt}}{P_{jt}}$$

where

$\frac{W_{jt}}{P_{jt}}$ = real wage rate of j^{th} industry at time t.

This condition implies perfect competition in the market. But it also can be applied to different degrees of competition with simple modification.[1] Equation (3) holds only in equilibrium situation. In order to distinguish the equilibrium value of $\frac{Q_{jt}}{E_{jt}}$ from the actual value, we express the equilibrium value as $\left(\frac{Q_{jt}}{E_{jt}} \right)^*$.

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[1]Black, S.W., and H.H. Kelejian. "A Macro Model of the U.S. Labor Market." Econometrica. Vol. 38, No. 5 (September, 1970) pg. 721-741. They equate $\frac{\partial Q_{jt}}{\partial E_{jt}}$ to some fraction of real wage, $\gamma \frac{W_{jt}}{P_{jt}}$ where γ stands for the degree of competition. But in this study, this kind of modification is not necessary, because in regression analysis the parameter γ in effect will be included in the constant term, which is a mixture of $\frac{1}{\beta^{\rho}} \alpha_1$ and γ. Therefore, we cannot disentangle γ from the constant term. γ does not affect the other coefficients at all.

One important feature of the production function is the labor augmenting factor. Usual production functions have an exponential augmenting factor because the exponential function is easy to handle. There is no reason why some other functional form cannot be used. Also, if we assumed that labor is augmented exponentially, we would have implicitly answered the critical question of the sustainability of long term growth. The exponential labor augmentation simply means that the labor productivity will grow by the same proportion in the future. This assumption is not reasonable in the Japanese economy. In Japan, labor productivity increased by almost ten percent a year from 1958 to 1972. If we fit this data to the exponential curve, it will predict the same high growth rate in the future. Productivity may slow down in the future. The high growth rate of the past years may have come from transitional factors.[1] Because Japan was a late comer to economic development, it could accelerate its economic growth faster than other countries. After the transitional factors are exhausted, only the sustainable factors will contribute to the growth rate, which will then slow down.

In order to predict slowing-down productivity growth, labor is augmented by the Gompertz curve. The Gompertz curve has the property,

$$(4)\quad \frac{d \log g(t)}{d\, t} = b(a - \log g(t))$$

where a is an assymtotic line, and b is the rate by which the gap

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[1]Patrick, H. and H. Rosovsky. <u>Asia's New Giant</u>. The Brookings Institution. pp 139-141. 1975.

between the assymptotic line and the current value of Log g(t) is closing each period. This functional form guarantees that the productivity will never go up beyond a certain, perhaps very high, level and that, as time goes on, the growth rate slows down.

By taking logarithms of both sides of (3), and solving for $\log(\frac{E}{Q})^*$, we get the following equation without subscripts.

$$(5)\ \log\left(\frac{E}{Q}\right)^* = C - \frac{\rho}{\rho+1}\log(g(t)) - \frac{1}{\rho+1}\log\left(\frac{W}{P}\right)$$

where C is constant.

Recent research has uncovered considerable evidence for a lagged relationship between output and employment. As Kuh[1] pointed out, during a sharp decline in output, output per manhour will decline abruptly because the overhead labor component is not reduced proportionally, even though there might be a proportionate reduction in the production line work forces. This proposition suggests that there could be a distributed lag in the response of employment to output variation. The same proposition can be accepted in our labor requirement determination. As the real wage varies, firms would not adjust the employment over output ratio as rapidly.

We therefore assume that actual $(\frac{E}{Q})$ is adjusted to equilibrium $(\frac{E}{Q})^*$ through a koyck type distributed lag, which we state in proportional

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[1]Kuh, E., "Cyclical and Seasonal Labor Productivity in U.S. Manufacturing." Review of Economics and Statistics. February, 1965.

or in logarithmic form to match the form of the production function;

$$(6)\ \log\left(\frac{E}{Q}\right) = \mu \log\left(\frac{E}{Q}\right)^{*} + (1-\mu)\log\left(\frac{E}{Q}\right)_{-1}$$

where $0 < \mu \leq 1$

Thus, only the fraction μ of the difference between equilibrium $\left(\frac{E}{Q}\right)^{*}$ and last years' $\left(\frac{E}{Q}\right)$ is eliminated in the current period.

Substituting (5) into (6), we get

$$(7)\ \log\left(\frac{E}{Q}\right) = \frac{\mu}{\rho+1} C - \frac{\rho\mu}{\rho+1}\log(g(t)) - \frac{\mu}{\rho+1}\log\left(\frac{W}{P}\right) + (1-\mu)\log\left(\frac{E}{Q}\right)_{-1}$$

Taking the first difference of the both sides with respest to time, we get

$$(8)\ \Delta\log\left(\frac{E}{Q}\right) = -\frac{\rho\mu}{\rho+1}\left(\frac{d\log(g(t))}{dt}\right) - \frac{\mu}{\rho+1}\Delta\log\left(\frac{W}{P}\right) + (1-\mu)\Delta\log\left(\frac{E}{Q}\right)_{-1}$$

Using the characteristic of the Gompertz curve (4), we can rewrite equation (8).

$$(8')\ \Delta\log\left(\frac{E}{Q}\right) = -\frac{\rho\mu}{\rho+1}\left(b\left(a - \log(g(t))\right)\right) - \frac{\mu}{\rho+1}\Delta\log\left(\frac{W}{P}\right) + (1-\mu)\Delta\log\left(\frac{E}{Q}\right)_{-1}$$

Now, we solve (7) for log (g(t)), and substitute into (8'). Then we get the regression equation by arranging terms as follows:

$$(9)\ \Delta\log\left(\frac{E}{Q}\right) + \frac{\mu}{\rho+1}\Delta\log\left(\frac{W}{P}\right) - (1-\mu)\Delta\log\left(\frac{E}{Q}\right)_{-1}$$
$$= C' - b\left(\log\left(\frac{E}{Q}\right) + \frac{\mu}{\rho+1}\log\left(\frac{W}{P}\right) - (1-\mu)\log\left(\frac{E}{Q}\right)_{-1}\right)$$

where

$$C' = -\frac{\rho}{\rho+1} \quad a \;.\; b - \frac{1}{\rho} \log \left(\frac{1}{\beta^{\rho}} \quad \alpha_1\right)$$

If the speed of adjustment, μ , is equal to 1, the lagged EOQ term will disappear in both sides. Without considering the real wage term, the equation says that the percentage change of EOQ is equal to some constant, which could be interpreted as a time trend, minus logarithm of the level of current EOQ multiplied by the rate of closing gap between the assymptotic line and the current EOQ. Therefore, the EOQ will decrease faster when the level of EOQ is high than when EOQ is low. If b is equal of zero, the EOQ will grow up exponentially. This form of the equation includes exponential growth of the EOQ as a special case. The real wage term also affects the change of EOQ through the elasticity of substitution. Unfortunately, we cannot test the statistical significance of real wage in the EOQ determination with equation (9). The author tested the significance of the real wage with the exponential function form which will be shown later. Most of the wage variable show statistical significance in the EOQ equation.

Since we are using the same production function in the investment equation estimation, we can borrow the information of the elasticity of substitution from the investment equation. Even if we know ρ , still we have to know μ to estimate equation (9). We are sure that μ is greater than zero and less than or equal to unity, so we can estimate (9) with different value of μ . All values from zero to one by internal 0.05 were plugged in both sides of the equation and the value which gives the best R^2 is chosen as μ .

Estimation

The regression results are shown in Table IV-1. As equation (4) shows, the sign of b should be positive. All sectors except two have positive b. The two sectors are Food and tobacco and Real estate. For those two sectors, we use a different type of equation which will be described later in this section.

Many sectors have μ closed to unity. Some of these are just unity. The high rate of adjustment is understandable because this model is annual. For those sectors, we could think, the short run variation was washed out, and the actual productivity series reflect the long run productivity movement. Besides the partial adjustment mechanism, the usual way to investigate the disequilibrium effect is to include some disequilibrium variable in the equation. The change of output would be the most convenient disequilibrium variable in this case. When the change of output was included in the regression equation, the sign of b turned out to be negative in many sectors. Because we want slowing down productivity which can be formed by the Gompertz curve with positive b, we give up the disequilibrium variable.

R^2's have been calculated to compare the actual labor requirement series and the predicted labor requirement series. Even though we have some low t statistics on the estimates of parameters, the predicted value of the level of labor requirement is very close to the actual one. All sectors except one have R^2 greater than 0.9. The low t statistics on b implies that the b is not significantly different from zero. However, following our judgment of slowing down productivity, it is decided to stay with the b even if its t statistics is low. The low t statistics might be caused by the low b itself instead of by big standard error of b. For the two sectors which gave wrong sign, a logistic curve method,[1] which also guarantees slowing down productivity, is used. The regression equation is:

$$\Delta \log\frac{E}{Q} = a_1 + a_2 \left(\frac{E}{Q}\right)_{-1} + a_3 \Delta \log Q_t$$

The regression results are:

3. Foods and Tobacco

$$\Delta \log \left(\frac{E}{Q}\right)_t = \underset{(-1.93)}{-0.055} + \underset{(2.21)}{166.95} \left(\frac{E}{Q}\right)_{t-1} - \underset{(-15.46)}{1.11} \Delta \log Q_t$$

$R^2 = 0.9480$

D.W. = 1.655

16. Real Estate

$$\Delta \log \left(\frac{E}{Q}\right)_t = \underset{(3.65)}{0.844} - \underset{(-3.01)}{5887.7} \left(\frac{E}{Q}\right)_{t-1} - \underset{(-5.38)}{2.11} \Delta \log Q_t$$

$R^2 = 0.769$

D.W. = 2.23

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[1]Almon, C. et. al. 1985: Interindustry Forecasts of the American Economy. Lexington Books, pp. 174.

TABLE IV-1. Regression Results of Labor Requirement Equations

Industry Name	Coefficients Constant	Coefficients -b	Rate of Adjustment	Elasticity of Substitution	R^2	RHO
1. Agriculture, Forestry, and Fishery	-.623	-.058	1.0	.155	.9655	.0444
	(-.876)	(-.799)				
2. Mining	-.629	-.102	.95	.346	.9656	.1897
	(-1.731)	(-1.334)				
4. Textiles	-1.028	-.217	1.0	.450	.9429	.3779
	(-.879)	(-.851)				
5. Pulp and Paper	-.544	-.087	1.0	.451	.9487	-.1633
	(-.928)	(-.827)				
6. Chemical products	-.647	-.085	.80	.006	.9701	-.4674
	(-2.866)	(-2.384)				
7. Primary Metals	-.765	-.119	.90	.329	.9495	-.0901
	(-1.513)	(-1.374)				
8. Metal Products	-3.28	-.091	.75	.450	.9525	-.1777
	(-.531)	(-.484)				
9. Non Electrical Machinery	-.315	-.046	1.0	.379	.9361	.1765
	(-.536)	(-.421)				
10. Electrical Machinery	-.559	-.078	.95	.195	.8163	.2463
	(-.702)	(-5.95)				
11. Transportation Equipment	-1.345	-.214	.95	.276	.9686	.1653
	(-2.972)	(-2.774)				
12. Miscellaneous Manufacturing	-.249	-.059	.75	.420	.9920	-.2517
	(-1.176)	(-.977)				

TABLE IV-1. Continued

Industry Name	Coefficients Constant	-b	Rate of Adjustment	Elasticity of Substitution	R^2	RHO
13. Construction	-.804 (-2.360)	-.121 (-2.172)	.95	.100	.9819	-.0979
14. Electricity, Gas, and Water	-.433 (-1.583)	-.069 (-1.365)	.95	.384	.9800	.1814
15. Wholesale and Retail Trade	-.285 (-1.912)	-.039 (-1.338)	.95	.120	.9211	-.3812
17. Transport and Communication	-.266 (-.987)	-.034 (-.750)	.95	.051	.9854	-.0992
18. Finance and Insurance	-.280 (-.623)	-.042 (-.525)	.95	.264	.9391	-.1217
19. Other Services	-.266 (-.711)	-.101 (-.637)	.95	.311	.9878	.0819

Comparison of the Forecasts

If we have the exponentially augmenting technological change of labor in the same C.E.S. production function, we can derive the labor requirement equation as follows:

$$\log\left(\frac{E}{Q}\right)_t = C - \mu\sigma \log\left(\frac{W}{P}\right)_t + \mu(\sigma-1)\lambda \ t + (1-\mu) \log\left(\frac{E}{Q}\right)_{t-1}$$

where

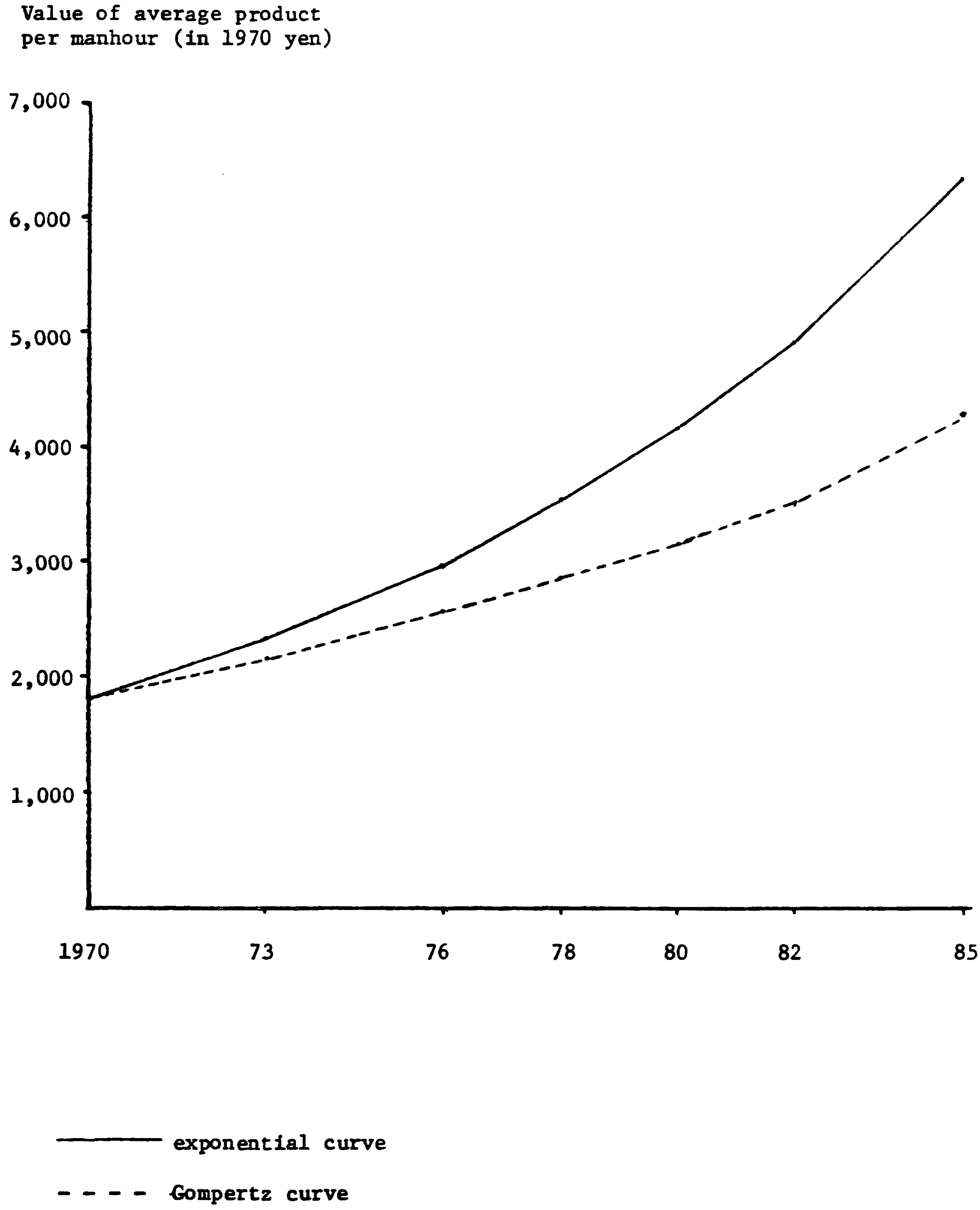
λ = rate of technological change of labor

μ = speed of adjustment

σ = elasticity of substitution

In fact, the estimation of this form of equation is easy to handle, and the estimation results are not much worse than the Compertz curve form. But with the exponential curve form, we are imposing too strict constraint because the exponential curve form is a special case of equation (9). The productivity projections made by the exponential curve and by the Gompertz curve are compared in Figure IV-1. The productivities shown in the figure is the aggregate productivities of the economy, which come from the simulation of the whole model.

Figure IV-1. Comparison of Productivity Forecast



CHAPTER V

Manhours Equation

The labor requirement equation predicts the EOQ, which is the manhours required for production of one unit of output. Accordingly, we cannot forecast the number of the employed directly from the labor requirement, even if we know the output, unless we know the monthly manhours per employee.

The variable E_t should be decomposed into the number employed and manhours per employee. In the short run, the division between employment and manhours has a very important economic meaning.

In basic economic theory, we distinguish fixed cost and variable cost. There are fixed costs involved in hiring a new person, such as hiring and training costs, fringe benefits, and liability for unemployment compensation. The burden of those fixed costs is inversely related to the duration of the new worker's job. On the other hand, increasing working hours brings about lower efficiency and higher costs, because it is assumed that workers are less efficient as working hours are increased. Therefore, there is a trade-off in the short run between hiring a new person and increasing working hours.

In the long run, the significance of the division between number employed and manhours per employee decreases. As the time period is lengthened, fixed cost per employee converges to a certain lower bound.

In Japan, manhours per employee per month in each industry have decreased each year by a small amount. There is not much variation in the data. The trend is much more influenced by social rather than economic factors. However, we can assume that as output increases the manhours per employee go up because industry does not adjust employment as fast as output, therefore, manhours per employee are related to the percentage change in output and to time trend.

$$MH_{jt} = a_o + a_1 \underline{\Delta} Q_{jt} + a_2 t$$

where

MH = man hours per employee

t = time trend

$\underline{\Delta}$ = percentage change

We expect a positive sign on the coefficient of the percentage change of output and a negative one on the time trend coefficient. As expected, each equation has a negative sign on the time trend. Three sectors failed to show a positive sign on output change; that variable was then deleted in those sectors.

As we can see in Table V-1, the fit is close. But for some sectors we have very serious autocorrelation problems. This might suggest misspecification of the equation for those sectors; there could be some omitted variables. However, the only role of the manhour equations in this model is to convert the EOQ to employment by using Q, which is already calculated without the help of the manhour equations. Therefore, it hardly seemed worth while to search for theoretically better manhour equations for those sectors.

TABLE V-1

Regression Results of Manhours per Employee

Industry Name	Coefficients Constant	Time	%Δ Q	R^2	D.W.
2. Mining	188.048 (79.448)	-1.465 (-7.050)	15.074 (0.807)	.788	.937
3. Foods & Tobacco Manufacturing	184.989 (166.135)	-1.921 (-11.764)		.914	1.128
4. Textile	184.657 (200.429)	-1.619 (-11.633)	14.705 (2.225)	.932	1.503
5. Pulp & Paper	189.522 (201.648)	-1.709 (-11.765)	17.835 (2.053)	.958	1.833
6. Chemical Products	173.011 (155.488)	-1.395 (-8.328)	11.055 (1.669)	.916	1.098
7. Primary Metals	187.518 (148.387)	-1.245 (-5.832)	19.905 (2.949)	.873	1.420
8. Metal Products	188.877 (224.851)	-1.554 (-16.937)	22.332 (4.524)	.968	1.666
9. Non-electrical Machinery	188.272 (272.564)	-1.222 (-11.956)	20.423 (6.995)	.961	1.228
10. Electrical Machinery	177.573 (131.693)	-1.492 (-9.417)	13.019 (1.944)	.901	2.556
11. Transportation Equipment	188.680 (184.089)	-1.390 (-9.848)	14.548 (3.136)	.922	1.035
12. Miscellaneous Manufacturing Products	183.766 (122.338)	-1.576 (-11.823)	15.530 (1.357)	.933	1.189

TABLE V-1 (CONTINUED)

Industry Name	Coefficients: Constant	Time	%Δ Q	R^2	D.W.
13. Construction	194.972 (90.364)	-1.542 (-7.033)	23.083 (1.356)	.851	.726
14. Electricity, Gas, & Water Supply	174.335 (125.528)	-1.309 (-6.425)		.756	.854
15. Wholesale & trade	182.510 (156.740)	-1.668 (-11.646)	12.465 (1.719)	.937	1.225
16. Real Estate	172.897 (59.389)	-2.071 (-7.079)	9.053 (.295)	.869	1.979
17. Transport & Communication	184.382 (86.781)	-1.651 (-11.465)	51.409 (2.434)	.939	1.266
18. Finance & Insurance	164.770 (140.127)	-1.635 (-9.484)		.872	.948

CHAPTER VI

Price Equation

Theory

The study of price formation is the most undeveloped area in econometric study. Recently some studies on the aggregate GNP deflator and on disaggregated industry prices have appeared in the economic literature. Earl[1] gives a good summary of these studies.

There is some consensus in these studies. Most try to reflect the long run costs and short run costs and, in some way, excess demand. Unit labor cost and unit material cost are combined with various proxies for excess demand.

For long run forecasting, the cost hypothesis is appropriate. Various models of long run, or equilibrium, pricing were derived by Nordhaus[2] using various forms of the production function. His derivation of the price equation is strictly neoclassical because the condition which he used to get equilibrium price is that marginal revenue equals marginal cost. The derivation procedure is maximization of profits given a certain production function and a demand

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[1] Earl, P., Inflation and the Structure of Industrial Prices, Lexington Books. 1973.

[2] Nordhaus, W.D.,"Recent Development in Price Dynamics," in the Econometrics of Price Determination. Conference, October 30-31, 1970. Washington, D.C., Sponsored by Board of Governors of the Federal Reserve System and Social Research Council.

function. If constant returns to scale are assumed in the production function, the price of a product is a function of its input prices. As mentioned before, Nordhaus has labor, capital, and materials as inputs. In addition to these cost variables, some measures of excess demand enter price equations. In usual empirical studies,[1] the role of excess demand measure is to determine the mark-up of price over unit labor cost.

The basic idea of the price formulation of this dissertation is based on optimal pricing theory, and that theory will be developed within the input-output framework. The price equation formulation consists of four stages:

1. The normal unit labor cost is calculated using the wage rate and the steady-state productivity.
2. The mark-up on the normal unit labor cost (from Step 1) is determined by the estimated behavioral equation in which the mark-up ratio is related to some demand, or capacity utilization measure.
3. The equilibrium price is calculated using the marked-up normal unit labor costs (from Steps 1 and 2) and the input-output table.

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[1]See the O.B.E. model. Hirsch, A.A. "Price Simulations With the O.B.E. Econometric Model," in the Econometrics of Price Determination. ed. by O. Eckstein.

4. The actual price is calculated by a behavioral equation in which the equilibrium price (from Step 3), the lagged price, and the foreign price are explanatory variables.

Now the price determination procedure will be described step by step.

Step 1. Normal Unit Labor Costs

The first stage starts by defining the unit labor cost as follows:

$$(1)\ ULC_j = \frac{W_j \cdot E_j}{Q_j}$$

where

ULC_j = labor cost per unit of output of the j^{th} industry

W_j = nominal wage per hour of the j^{th} industry.

Q_j = output in constant prices of the j^{th} industry.

E_j = manhours in the j^{th} industry.

As we can see in (1), the unit labor cost can be decomposed into two factors, the wage per hour and the recipical of the average labor productivity, which is the labor requirement per unit output.

Normal unit labor cost is utilized instead of actual unit labor cost, for it has been found that the permanent, not transitory productivity movement, is important in price determination.[1] The reason to use the normal unit labor cost is that firms set prices primarily by focusing on steady-state or equilibrium unit labor costs rather than on actual unit labor costs because the costs of changing prices in response to transitory shifts in labor cost are too high. Firms do not hire or fire laborers instantaneously whenever demand rises or falls. Therefore, we have to distinguish between the actual productivity and the normal or equilibrium productivity. This distinction was already made in the labor requirement chapter. It is assumed that changes in wages are considered by producers to be permanent, and these enter immediately into normal unit labor cost. We define the normal unit labor cost,

$$(2)\quad ULC_j^N = W_j \left(\frac{E_j}{Q_j}\right)^*$$

where

$\left(\frac{E_j}{Q_j}\right)^*$ = equilibrium labor requirement or desired ratio of manhours over output.

$\left(\frac{E_j}{Q_j}\right)^*$ is simply the equilibrium value of labor requirement which was derived from the C.E.S. production function in Chapter IV.

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[1]Schultze, C.L. and J.L. Tyron. "Price and Wages," in J. S. Duesenberry, G. Fromm, L.R. Klein, and E. Kuh. eds., The Brookings Quarterly Econometric Model of the United States. Amsterdam, North-Holland, 1965; and Kuh, E., and R.L. Schmalensee, "An Introduction to Applied Macroeconomics. Amsterdam, North-Holland, 1973. pp. 137-151.

Using this equilibrium labor requirement, we can exclude short run variations in unit labor cost due to the failure of employment to adjust to various changes in market conditions. Moving averages of past values of actual unit labor cost have been used in other studies as a proxy for the normal unit labor cost. But Kuh found that the moving average of the actual unit labor cost was inferior to the normal unit labor cost obtained by using steady state labor requirement.[1] As Kuh did, we can calculate the historical equilibrium labor requirement. Noticing that equation (9) in Chapter IV has the current value of labor requirment and the lagged value of this variable, we can solve for the steady state labor requirement as a function of the other variables. For convenience, we repeat equation (9) in Chapter IV.

$$\Delta \log \left(\frac{E}{Q}\right) + \frac{\mu}{\rho + 1} \Delta \log \left(\frac{W}{P}\right) - (1 - \mu) \Delta \log \left(\frac{E}{Q}\right)_{-1}$$

$$= C' - b \left(\log \left(\frac{E}{Q}\right) + \frac{\mu}{\rho + 1} \log \left(\frac{W}{P}\right) - (1 - \mu) \log \left(\frac{E}{Q}\right)_{-1}\right)$$

Step 2. Mark-ups on Normal Labor Cost

The second step is to determine the unit value added index using the normal unit labor cost and the mark-up ratios. If we have a Cobb-Douglas production function, wage and profit shares in

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[1] Kuh, E., and Schmalensee, R.L., An Introduction to Applied Macroeconomics. Amsterdam, North-Holland, 1973. pp. 137-151.

value added are constant over time. In that case, simple constant mark-up ratio can be applied over time. However, the historical evidence does not support the long run constancy of wage and profit share.[1] For the empirical tests of the constancy of the mark-up ratios, the historical mark-up series were calculated. The historical mark-up ratios are the ratios of the unit value added which were obtained using historical value of output and I/O coefficients to the labor compensation per output. Most of the sectors reject the constancy of the mark-up ratio.

In the studies of the GNP deflator determination, demand measures are included in the equation with other cost variables. It is generally assumed that the mark-up over cost is influenced by the ratio of output to capacity, a relation which shows demand pressure in the market. Therefore, we formulate the equation of the unit value added as follows:

$$(4)\quad UVA_t = \alpha_t \cdot ULC_t^N$$

$$(5)\quad \alpha_t = a_0 + a_1 \frac{Q_t^e}{K_{t-1}} + a_2 \underline{\Delta} Q_t^e + a_3 t$$

where

UVA_t = unit value added in current prices

[1]The evidences are found in 1960-1965-1970 Input-Output Tables, published by the Government of Japan, 1975.

K_t = capital stock.

t = time trend.

α_t = mark-up ratio over unit labor cost.

$\underline{\Delta}Q_t^e$ = expected percentage change of output which is defined by a weighted average of the previous years' output changes. More formally,

$$\underline{\Delta}\, Q_t^e = (1 - \lambda) \sum_{i=1}^{\infty} \lambda^i \, \underline{\Delta}\, Q_{t-i}$$

$\underline{\Delta}$ stands for percentage change. The weights are declining geometrically over time.

Q_t^e = expected output at time t which is equal to Q_{t-1} ($\underline{\Delta}Q_t^e$ + 1)

The ratio of the expected output to the capital stock of the previous year is used as a measure of capacity utilization, or of demand pressure. Also, the expected percentage growth rate of output is also included as a proxy for the demand pressure of the market. The current output-capital ratio, or the percentage change of current output could be better demand measures, because they can represent short run variations in the price equation. The simultaneity problem between price and output in the model prevents us from using these. However, the modified output-capital ratio and the expected output change could serve in this model because this model is designed to explain long-term or medium-term economic variations.

Also there is a difficulty in using the current output in the price equation because it cannot be identified as a demand effect or as a supply effect, especially in an annual model. It might be better to project the demand based on the previous year's output rather than to use the current output as a demand measure.

We expect that $\underline{\Delta Q}_t^e$ could pick up the long run demand trend and that Q_t^e/K_{t-1} could represent the desired capacity utilization rate, or desired output-capital ratio. Certainly, these modified variables cannot explain the effect of the short run demand pressure, but we hope that they can explain the long run variations of the mark-up ratios. The time trend is included to pick up the systematic productivity change or product mix change. We expect positive signs on the coefficients of the expected output and the expected change of output. The sign on the time trend can be positive or negative.

Step 3. The Equilibrium Prices.

So far, we have the unit value added. The prices we need in this I/O forecasting model are the prices of output, not of value added. The value added price can be converted into output price using input-output relations. Output price is nothing but unit value added plus input material costs. The input prices which firms pay for the materials are the actual price prevailing in the market. Also, a large part of the materials used in Japan are imported. Therefore, the equilibrium price of output is defined as follows:

$$(6) \quad P_j^e = \sum_i a_{ij} (m_j P_j^w + (1 - m_j) P_j^a) + \alpha_j \cdot ULC_j^N$$

where

P_j^e = calculated equilibrium price

P_j^w = world price

P_j^a = actual domestic price

m_j = import-use level ratio

The input prices inserted in equation (6) is a weighted average of the actual prices and the world prices. As the weight we use the import ratio to domestic use.

The price vector we get from (6) is the equilibrium price vector because it is the dual of the I/O solution, and it is derived from the normal unit labor cost.

By relation (6), Nordhaus' optimal pricing conditions can be fully satisfied. The equilibrium price is just a function of all input prices. Also, this formulation is consistent with the price formulation of Eckstein and Wyss,[1] who include labor, material, and capital costs in their equation and expect that the coefficients are close to the input-output coefficients for those inputs.

Step 4. Actual Price Adjusted to Equilibrium Price

The last stage of the price formulation is to predict the actual price series from the equilibrium price through a behavioral

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[1]Eckstein, O. and D. Wyss. Industry Price Equations in Econometrics of Price Determination. pp 133-165. Conference. October 30-31, 1970. Washington, D.C., Sponsored by Board of Governors of the Federal Reserve System and the Social Science Research Council.

equation. The output prices which exist as data are not the equilibrium prices. Due to various reasons, such as monopolistic power, and cost of adjustments, actual prices adjust to equilibrium price slowly. In order to consider the adjustment procedure, we formulate a behavioral relation between the actual and the equilibrium prices. Owing to the small number of observations, we use the Koyck type lag scheme. This lag system is acceptable because it is generally believed that the current equilibrium price has the largest impact on the actual price and that the lag weights of past years should be going down. The actual price adjustment equation is:

$$(7)\ P^a_{jt} = C_o + \mu P^e_{jt} + (1 - \mu)\ P^a_{j\ t-1}$$

where

μ = speed of adjustment

Equation (7) investigates how the actual price is related to the equilibrium price and the lagged price.[1]

The price model is not completed with equatinons (5), (6), and (7), for these equations do not explain well the price of commodities, a large proportion of which is imported, such as petroleum and iron

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[1]A similar type of regression was done in the Brookings model and FED-MIT-PENN model. See Fisher, F.M., L.R. Klein, and Y. Shinkai. "Price and Output Aggregation in the Brookings Econometric Model," in Econometric Model of the U.S. eds., by Duesenberry, J.D., G. Fromm, L.R. Klein, and E. Kuh. Amsterdam, North-Holland. 1965

Also, see Hymans, S.H., "Price and Price Behavior in Three U.S. Econometric Model's. in Econometrics of Price Determination. pp 309-324.

ore. In these equations the import prices of these goods can affect the prices of the other commodities but not its own domestic prices. For example, although Japan produces only one percent of its petroleum consumption the equations provide no way for the foreign price of the petroleum to directly influence the domestic price. Actually, of course, the price of the petroleum in the domestic market follows the imported prices. In order to consider this point, we include world price as an explanatory variable in equation (7) for the commodities which have relatively large import share.

Summarizing these steps, we have the price model,

$$(8)\quad P^{e}_{jt} = \sum_{i} a_{ij} \left(m_j P^{w}_{jt} + (1 - m_j) P^{a}_{jt}\right) + \alpha_{jt}\, ULC^{N}_{jt}$$

$$(9)\quad \alpha_{jt} = C_1 + C_2 \frac{Q^{e}_{jt}}{K_{j\ t-1}} + C_3 \underline{\Delta} Q^{e}_{jt} + C_4\, t$$

$$(10)\quad P^{a}_{jt} = C_o + \mu_1 P^{e}_{jt} + \mu_2 P^{w}_{jt} + \mu_3 P^{a}_{j\ t-1}$$

In equation (10), we impose restrictions that all μ 's are positive and that the sum of μ's are unity. These restrictions imply that the actual price goes up one percent if the equilibrium price and the world price go up one percent.

This price model should be solved simultaneously. If we substitute equation (10) into equation (8), we can find that the equilibrium price of j^{th} good depends on the equilibrium prices of all other goods. Therefore, the Seidel procedure is employed to solve the equilibrium prices. All other variables in this price model are predetermined except the equilibrium and actual prices. In the first iteration, we plug the previous actual prices into equation (8) to speed up the convergence. The equilibrium prices obtained in the first iteration will be used in equation (10) to get the new actual prices. In the second iteration, the new actual prices are substituted into equation (8). The same procedures are repeated until the newly calculated equilibrium prices converge to those of the previous iteration. .001 is used as the tolerance level.

Empirical Results

In the price system, equations (9) and (10) are to be estimated by regression analysis. In order to estimate equation (9), we need to have the historical series of mark-up ratios. Because we have the wage rate data and the labor requirement data only by twenty sectors, it was decided to have the aggregated mark-up ratio equations by twenty sector order. Aggregated value added rates per unit output by 20 sectors are calculated with the constant input-output table. The historical mark-up ratios are made for the twenty sectors by dividing the value added rates per unit of output by the unit labor compensation rates which are obtained from the wage data and the labor requirement data.

The regression results for equation (9) are shown in Table VI-1. The regression was first done with all four independent variables. Unfortunately, the results were not good at all. Some of the coefficients had wrong signs and many of them were insignificant. From the first regression results, it was realized that there was a serious collinearity problem.

TABLE VI-1

Regression Results of Markup Ratio Equation

Coefficients with t Statistics

Industry Name	Constant	$Q^e/K(-1)$	$\underline{\Delta}\ Q^e$	Time	R^2	D.W.
1. Agriculture, Forestry, Fishery	3.529	1.182	8.656		.684	2.66
	(7.484)	(1.477)	(1.691)			
2. Mining	2.540		2.371	.079	.742	1.38
	(8.711)		(.820)	(3.962)		
3. Foods and Tobacco	3.239		1.000	-.081	.861	1.21
	(33.515)		(1.032)	(7.301)		
4. Textile	.625	.293		-.065	.884	1.22
	(2.863)	(3.412)		(9.172)		
5. Pulp and Paper	3.703		6.176	-.011	.750	.97
	(23.404)		(4.462)	(.827)		
6. Chemical Products	2.012		5.084	-.032	.552	1.66
	(6.901)		(2.855)	(2.697)		
7. Primary Metals	2.261	.055		-.056	.565	1.70
	(4.213)	(.202)		(3.780)		
8. Metal Products	.949	.111		-.069	.822	1.53
	(2.413)	(.953)		(2.013)		
9. Nonelectrical Machinery	1.202	.208		-.016	.607	1.24
	(4.393)	(3.822)		(1.357)		
10. Electrical Machinery	2.096			-.027	.139	1.69
	(19.902)			(1.270)		

TABLE VI-1 (Continued)

Coefficients with t Statistics

Industry Name	Constant	$Q^e/K(-1)$	ΔQ^e	Time	R^2	D.W.
11. Transportation Equipment	2.147 (10.614)		2.302 (2.265)	-.009 (.737)	.393	2.09
12. Miscellaneous Manufacturing	1.202 (6.015)	.198 (2.070)		.003 (.696)	.280	2.49
13. Construction	1.457 (15.797)	.020 (2.682)	.080 (.150)		.401	1.63
14. Electricity, Gas, and Water	2.520 (2.506)	5.278 (1.833)		-.034 (1.500)	.241	1.46
15. Wholesale and Retail trade	-.726 (.652)	1.180 (1.743)		-.054 (.931)	.640	.75
16. Real Estate	12.502 (8.370)	.693 (1.350)		-.033 (.099)	.722	2.10
17. Transport and Communication	.655 (1.743)	.703 (2.197)		-.007 (1.443)	.531	1.70
18. Finance and Insurance	3.190 (51.843)			-.011 (.840)	.066	2.36
19. Other Services	1.633 (71.405)			-.005 (1.310)	.135	1.18

Therefore, stepwise regressions were done to choose the best combination of the independent variables for each sector. Sign of the coefficient, R^2, and t statistics are the criteria used to choose the best equation. Generally, the desired output-capital ratios is more significant than the expected output change. This might suggest that, in this long run model, the output change might not be a good measure for demand pressure. The significant coefficients on the output-capital ratio make more sense from the microeconomic point of view. As the output-capital ratio increases, marginal cost rises. Also, when utilization rates are high, increases in demand can lead to supply bottlenecks, thus raising prices. The time trend is an important variable in some sectors, a fact which might suggest the existence of technological change and product-mix change. Electrical machinery, Finance and insurance, and Other services show bad results of regression. The output-capital ratio and rate of output change had wrong signs. For these sectors, only the time trend is included in the regression. The fits of the regression were not bad except for the three sectors. For a few sectors, autocorrelation is a serious problem. The RHO-adjustment method is employed in forecasting.

Before we estimate equation (10), we must have an equilibrium price series. In order to calculate the equilibrium prices, we need to know the material costs, and the normal unit labor costs. The normal unit labor cost can be found by using the wage rate per manhour and the equilibrium labor requirement per unit of output.[1] As is mentioned above, the wage rate data and labor requirment data are available only by twenty sectors. To calculate the equilibrium prices for 156 sectors, we assume that each industry within each of the twenty sectors has the same variation in wage rate and productivity over time but the level of those can be different. If we multiply equilibrium labor requirement (EOQ*) by the wage rate we get the labor compensation rate per unit output. Also, if we multiply the calculated unit labor compensation rate by the mark-up ratios we will get the rate of value added per unit of output. Noticing that we are using the I/O table which is based on 1970 prices, we can expect that the value added per unit of output in 1970, will be simply 1 minus the column sum of the I/O matrix. If the assumption of the same productivity within each industry category is right, the value added rate should be close to $1 - \sum_i a_{ij}$. As expected, some sectors, by the 156 classification, which are very homogenous within an industry category by the twenty sector classification have very similar value added rates.

In an algebraic form, we can get the normal unit labor cost series as follows:

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[1]For the agricultural sector and other services we have wage rate per month. We do not have the information about manhours for these sectors. But if we use the man-month requirement per unit of output, we get the same unit labor cost.

$$V_{jt} = L_t^{j^d} \cdot W_t^{j^d} \cdot \frac{V_{j\,70}}{L_{70}^{j^d} \; W_{70}^{j^d}}$$

where

$j = 1 \ldots\ldots\ldots 156.$

j^d = 20 order sector in which sector j is a part.

V_{jt} = normal unit labor cost of sector j by 156 classification at time t.

$L_t^{j^d}$ = equilibrium labor requirement of the 20 order sector in which sector j is a part.

$W_t^{j^d}$ = wage of the 20 order sector in which sector j is a part.

When we calculate the unit value added, we also assume that the mark-up ratios of the industries of 156 sector order which belong to the same industry of twenty sector order have the same variations over time.

The material costs are gotten using the actual price series, the world prices, and the input-output table. The world price series are available from the International Trade Model. Because only one A matrix of the base year is available, we use the constant input-output table in equilibrium price calculation. However, we are almost certain that the input-output coefficients are changing over time. The bias caused by assuming constant input-output coefficients could be considered in the behavioral equation.

The equilibrium price series show much variation in different sectors. For example, despite the expectation of a rising price trend, some mining sectors have a downward trend. The downward trend in mining sector prices actually happened because of the rapid fall in the labor requirement rate, even though the nominal wage rate had increased.

The equilibrium price series is expected to be closer to the actual price series for the more competitive industries. In the most competitive industries the equilibrium price should dominate the actual price adjustment, since the industry should not be able to move away from the equilibrium price for any substantial period of time. As the industry becomes less competitive, the importance of equilibrium price should decrease and adjustment becomes slower and more uncertain. This expectation turned out to be correct, because the equilibrium price series in the agricultural sectors and in some other competitive industries are very close to the actual price series.

The estimation of equation (10) was carried out after we got the equilibrium price. The idea behind this regression is to find the empirical relationship that was supposed to exist between the observed prices on the one hand and the computed prices and the lagged values of the observed prices on the other. We hope that the bias in the equilibrium price calculation due to the use of constant input-output coefficient can be corrected through the regression equation. If there exist a structural change over time of the input-output coefficients, it could be picked up by the relation between the observed prices and the computed prices.[1]

In equation (10), the sum of the coefficients, except the constant term, is unity. Also, all of those coefficients should be non-negative. In order to satisfy the constraint that the sum of the coefficients is unity, we use restricted linear regression.[2]

A constant term is included in equation (10) because it could prevent the predicted price from being underestimated. The price tends to be rising over time. Therefore, if we constrain the sum of the coefficient to unity, the predicted price, which is actually a weighted average of the equilibrium price and the lagged actual price, can be always underestimated because the lagged price is usually lower than the current price. However, we expect the constant term to be small.

The regression results of the equation (10) is shown in Table VI-2. As expected, the constant terms are small and generally insignificant. The coefficients on the equilibrium price and the lagged price are positive except a few sectors. If the sign of the coefficient on the lagged price is negative, we assume that the price of the sector adjusts rapidly so that the actual price should be equal to the equilibrium price. The negative coefficient of the equilibrium price,

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[1]The same price autoregression is done in the Brookings model for the same reason. Fisher, F.M., L.R. Klein, and Y. Shinkai. "Price and Outpur Aggregation," in Econometric Model of the United States, eds. by J.S. Duesenberry, et al. Amsterdam, North-Holland, 1965.

[2]Johnston, J. Econometric Method, Second edition. McGraw Hill New York. 1972. pp 155.

TABLE VI-2. PRICE EQUATION REGRESSION

I-O	TITLE	CONST	EQUILIBRIUM PRICE	LAGGED PRICE	WORLD PRICE	YMP/USE	RSQ	D.W	ABSOLUTE % ERROR
1	GRAIN	.020	.318	.682	.000	.069	.922	2.279	4.296
		(.905)	(.903)	(2.060)	(.000)				
2	OTHER CROPS	-.022	.136	.617	.247	.272	.952	1.493	7.026
		(-.558)	(.754)	(2.034)	(1.566)				
3	FRUITS	.006	.339	.661	.000	.138	.915	1.554	6.310
		(.223)	(1.572)	(3.072)	(.000)				
6	LIVE STOCKS,POULTRY	.033	.182	.818	.000	.005	.925	2.691	4.477
		(1.863)	(.817)	(3.671)	(.000)				
8	SERICULTURE	-.067	.475	.525	.000	.022	.871	1.814	11.429
		(-1.180)	(2.189)	(2.471)	(.000)				
9	AGRICULTURAL SERVICES	.030	.105	.895	.000	.000	.957	2.385	3.871
		(1.415)	(.675)	(5.397)	(.000)				
10	FORESTRY	.014	.383	.617	.000	.014	.964	1.558	2.910
		(.856)	(1.674)	(2.634)	(.000)				
11	CHARCOAL & FIREWOOD	.004	.371	.629	.000	.072	.868	2.671	10.176
		(.146)	(2.187)	(3.710)	(.000)				
14	FISHERIES	.008	.494	.506	.000	.042	.963	2.233	3.970
		(.466)	(1.998)	(2.044)	(.000)				
15	WHALING	.029	.331	.669	.000	.069	.696	1.584	8.024
		(1.148)	(1.645)	(3.720)	(.000)				
17	COKING COAL	.022	.009	.973	.057	.707	.656	2.534	3.116
		(.818)	(.220)	(5.706)	(.313)				
20	ORES & CONCENTRATES OF NON-FER	.041	.121	.630	.249	.822	.455	1.847	8.382
		(1.100)	(.378)	(2.364)	(.710)				
22	NATURAL GAS	.058	.423	.577	.000	.325	.192	2.297	5.396
		(2.119)	(2.894)	(3.940)	(.000)				
23	LIME STONE SAND GRAVEL	.021	.157	.843	.000	.024	.732	2.631	5.620
		(1.132)	(1.070)	(5.784)	(.000)				
25	NON-METALIC MINERALS	-.215	.055	.066	.879	.820	.602	2.379	12.740
		(-3.565)	(.097)	(.416)	(1.455)				
26	CARCASSES	.053	.376	.624	.000	.145	.901	2.564	8.287
		(2.749)	(2.987)	(4.960)	(.000)				
27	MEAT PRODUCT	-.023	.632	.368	.000	.011	.523	2.641	15.180
		(-.482)	(2.748)	(1.769)	(.000)				
28	DAIRY PRODUCT	.076	.507	.493	.000	.032	.663	2.140	9.699
		(1.965)	(1.977)	(1.921)	(.000)				
29	VEGETABLE & FRUIT PRESERVED	-.001	.735	.265	.000	.092	.785	1.810	6.738
		(-.051)	(2.805)	(1.042)	(.000)				
30	SEA FOOD PRESERVED	.021	.611	.389	.000	.071	.877	1.762	7.198
		(.859)	(2.569)	(1.639)	(.000)				

TABLE VI-2C(CONTINUED)

I-O	TITLE	CONST	EQUILIBRIUM PRICE	LAGGED PRICE	WORLD PRICE	YMP/USE	RSQ	D.W	ABSOLUTE % ERROR
31	GRAIN MILL PRODUCTS	.060	.444	.556	.000	.005	.772	1.825	5.754
		(2.701)	(2.370)	(2.971)	(.000)				
32	BAKERY PRODUCTS	.072	.052	.948	.000	.014	.872	1.830	8.011
		(1.074)	(.383)	(5.199)	(.000)				
34	OTHER FOOD PREPARED	.041	.729	.271	.000	.024	.897	1.589	3.280
		(3.930)	(4.386)	(1.634)	(.000)				
35	PREPARED FEEDS FOR ANIMAL & PO	.014	.133	.867	.000	.011	.540	2.518	4.252
		(.830)	(.959)	(6.251)	(.000)				
36	ALCOHOLIC BEVERAGES	.002	.127	.873	.000	.010	.788	1.839	3.739
		(1.649)	(.906)	(6.720)	(.000)				
37	SOFT DRINK	.008	.305	.695	.000	.004	.531	2.119	7.549
		(.270)	(1.299)	(2.962)	(.000)				
38	TOBACCO	.023	.408	.592	.000	.005	.971	1.404	1.829
		(3.828)	(3.280)	(4.767)	(.000)				
39	SILK REELING & WASTE SILK SPIN	.047	.317	.683	.000	.137	.896	2.141	7.371
		(2.144)	(2.048)	(4.414)	(.000)				
40	COTTON SPINNING	.006	.525	.475	.000	.020	.796	2.147	2.720
		(.722)	(2.804)	(2.534)	(.000)				
41	WOOLEN & WORSTED YARN	.077	.546	.454	.000	.061	.272	1.662	3.889
		(3.316)	(3.458)	(2.871)	(.000)				
42	LINEN YARN	.118	.881	.119	.000	.035	.305	2.154	8.728
		(2.453)	(2.690)	(.363)	(.000)				
43	SPAN RAYON YARN	.012	.464	.536	.000	.005	-.326	1.792	5.406
		(.440)	(1.552)	(1.792)	(.000)				
44	SYNTHETIC FIBER YARN	-.022	.126	.874	.000	.001	.672	2.028	6.226
		(-.749)	(.887)	(6.141)	(.000)				
45	SILK & RAYON WEAVING	.030	.172	.828	.000	.041	.971	3.555	4.688
		(2.115)	(1.787)	(8.604)	(.000)				
46	COTTON & SPUN RAYON FABRICS WO	.019	.413	.587	.000	.035	.851	1.653	3.423
		(2.003)	(2.429)	(3.448)	(.000)				
47	SYNTHETIC FIBERS WOVEN	-.009	.134	.866	.000	.003	.555	2.850	7.793
		(-.177)	(.767)	(4.942)	(.000)				
48	WOOLEN FABRICS WOVEN & FELTS	-.015	.728	.272	.000	.039	.701	1.940	4.123
		(-.908)	(3.270)	(1.221)	(.000)				
49	LINEN FABRICS WOVEN	-.040	.733	.267	.000	.099	.625	1.969	7.517
		(-.994)	(2.688)	(.979)	(.000)				
51	KNITTED FABRICS	.006	.122	.878	.000	.038	.741	2.389	5.520
		(.156)	(.527)	(3.785)	(.000)				
52	ROPES& FISHING NETS	-.002	.153	.847	.000	.023	.305	2.752	2.965
		(-.177)	(1.278)	(6.849)	(.000)				

TABLE VI-20(CONTINUED)

I-O	TITLE	CONST	EQUILIBRIUM PRICE	LAGGED PRICE	WORLD PRICE	YMP/USE	RSQ	D.W	ABSOLUTE % ERROR
53	OTHER FIBER PRODUCTS	.074	.015	.985	.000	.022	.975	2.742	1.959
		(3.119)	(.000)	(13.107)	(.000)				
54	FOOTWEAR EXCEPT RUBBER MADE	-.004	.491	.509	.000	.014	.897	2.788	5.042
		(-.241)	(3.004)	(3.228)	(.000)				
57	WOOD MILLING	-.022	.963	.037	.000	.056	.937	1.970	4.201
		(-1.041)	(3.028)	(.141)	(.000)				
58	WOODEN PRODUCTS	.017	.271	.729	.000	.005	.953	1.955	2.930
		(.719)	(1.272)	(3.425)	(.000)				
59	FURNITURE WOODEN & METAL	.009	.274	.726	.000	.002	.835	3.139	10.171
		(.249)	(1.491)	(3.947)	(.000)				
60	PULP	.022	.152	.948	.000	.123	.674	3.794	3.050
		(2.635)	(1.754)	(7.555)	(.000)				
61	PAPER	.010	.608	.392	.000	.007	.789	2.104	3.350
		(.992)	(2.017)	(1.686)	(.000)				
62	ARTICLES OF PAPER & PAPERBOARD	.029	.568	.432	.000	.005	.591	1.906	3.909
		(2.174)	(3.505)	(2.671)	(.000)				
63	PRINTING & PUBLISHING	-.036	.479	.521	.000	.014	.727	2.651	11.302
		(-1.446)	(3.677)	(4.002)	(.000)				
65	LEATHER PRODUCTS EX. FOOTWEAR	.021	.121	.979	.000	.033	.821	2.231	8.758
		(.373)	(.517)	(3.752)	(.000)				
66	ARTICLES OF RUBBER	.029	.400	.600	.000	.008	-.083	2.736	5.137
		(1.320)	(2.098)	(3.150)	(.000)				
67	BASIC INORGANIC INDUSTRIAL CHE	.002	.111	.889	.000	.005	.725	2.628	2.143
		(.154)	(1.509)	(12.178)	(.000)				
69	SYNTHETIC DYESTUFF	.078	.173	.517	.310	.203	.428	1.723	3.332
		(1.847)	(.981)	(2.188)	(1.596)				
70	BLASTING POWDER	.070	.706	.294	.000	.144	.381	1.614	6.425
		(2.481)	(3.082)	(1.285)	(.000)				
71	SPUN RAYON	.019	.670	.330	.000	.001	.312	1.817	3.071
		(1.348)	(3.198)	(1.578)	(.000)				
73	PLASTIC	.094	.631	.369	.000	.025	.364	3.292	11.926
		(1.114)	(3.470)	(2.026)	(.000)				
74	CHEMICAL FERTIRIZER	.003	.182	.818	.000	.079	.392	1.758	3.104
		(.156)	(.990)	(4.453)	(.000)				
75	MISCELLANEOUS BASIC CHEMICALS	.004	.205	.795	.000	.086	.767	2.376	3.534
		(.193)	(1.729)	(6.707)	(.000)				
76	VEGETABLE & ANIMAL OIL	.071	.202	.798	.000	.163	-.145	3.084	10.611
		(.890)	(1.005)	(4.208)	(.000)				
77	COATINGS	-.002	.654	.346	.000	.023	.725	2.963	3.676
		(-.124)	(2.769)	(1.468)	(.000)				

TABLE VI-20(CONTINUED)

I-O	TITLE	CONST	EQUILIBRIUM PRICE	LAGGED PRICE	WORLD PRICE	YMP/USE	RSQ	D.W	ABSOLUTE % ERROR
78	MEDICINE	-.005 (-.194)	.341 (1.005)	.659 (3.102)	.000 (.000)	.071	.441	1.931	7.846
81	COAL PRODUCTS	.019 (1.911)	.441 (2.018)	.559 (3.323)	.000 (.000)	.003	.875	1.641	2.800
83	CLAY PRODUCTS FOR BUILDING USE	-.024 (-.736)	.357 (2.053)	.643 (3.702)	.000 (.000)	.003	.687	1.483	11.737
84	GLASSWARE	.049 (1.209)	.255 (1.306)	.745 (3.815)	.000 (.000)	.017	.419	1.407	7.172
85	POTTERY	.040 (2.718)	.001 (.005)	.999 (8.904)	.000 (.000)	.005	.981	1.908	2.099
86	CEMENT	.046 (1.453)	.248 (1.779)	.752 (4.191)	.000 (.000)	.003	.132	1.984	4.174
87	OTHERNON-METALLIC MINERAL PROD	-.015 (-.516)	.389 (1.648)	.611 (2.589)	.000 (.000)	.004	.631	1.901	7.334
88	PIG IRON	-.014 (-.747)	.274 (3.649)	.726 (7.076)	.000 (.000)	.051	.710	2.214	4.957
90	FERROALLOYS	.021 (1.082)	.165 (1.254)	.835 (6.335)	.000 (.000)	.075	-.059	2.911	2.843
91	STEEL INGOT	-.011 (-.877)	.680 (4.400)	.320 (2.067)	.000 (.000)	.001	.734	1.841	4.214
92	HOT-ROLLED PLATES& SHEETS	.027 (1.652)	.453 (3.236)	.547 (3.903)	.000 (.000)	.001	.585	2.435	3.355
93	STEEL PIPE & TUBE	.043 (1.640)	.441 (3.701)	.559 (4.762)	.000 (.000)	.002	.782	3.898	3.941
94	COLD-ROLLED & COATED STEEL PLA	.044 (3.769)	.825 (5.555)	.175 (1.184)	.000 (.000)	.000	.679	2.281	1.312
95	CAST & FORGE IRON	.006 (.130)	.242 (.575)	.758 (1.801)	.000 (.000)	.000	.340	1.969	6.368
96	NONFERROUS METAL INGOTS	-.013 (-.503)	.382 (1.799)	.618 (2.104)	.000 (.000)	.305	.670	1.410	6.598
98	ALUMINUM EXTRUDED PRODUCTS	.122 (2.441)	.678 (3.307)	.322 (1.521)	.000 (.000)	.009	-.606	2.758	11.550
99	OTHER NONFERROUS METAL PRODUCT	.005 (.391)	.546 (2.175)	.454 (1.812)	.000 (.000)	.015	.400	2.003	7.523
100	STRUCTURAL METAL PRODUCTS	.013 (.511)	.503 (3.070)	.497 (3.043)	.000 (.000)	.004	.352	2.319	4.771
101	OTHER METAL PRODUCTS	-.007 (-.277)	.407 (1.486)	.593 (2.169)	.000 (.000)	.010	.607	2.773	5.987
102	POWER GENERATING MACHINARY & B	-.018 (-.800)	.907 (4.296)	.093 (.440)	.000 (.000)	.030	.551	2.247	7.741

TABLE VI-20(CONTINUED)

I-O	TITLE	CONST	EQUILIBRIUM PRICE	LAGGED PRICE	WORLD PRICE	YMP/USE	RSQ	D.W	ABSOLUTE % ERROR
103	MACHINE TOOLS METALWORKING MAC	-.042 (-1.228)	.330 (2.767)	.670 (4.002)	.000 (.000)	.067	.772	3.974	13.562
104	INDUSTRIAL MACHINERY	-.048 (-7.178)	.961 (5.098)	.039 (.232)	.000 (.000)	.037	.823	2.136	3.889
105	GENERAL INDUSTRIAL MACHINERY &	.070 (.830)	.292 (2.964)	.708 (1.317)	.000 (.000)	.041	.141	1.746	9.887
106	OFFICE MACHINERY	.006 (.154)	.349 (1.394)	.651 (2.608)	.000 (.000)	.072	.139	1.596	8.892
107	HOUSEHOLD MACHINERY	.020 (1.446)	.289 (2.417)	.711 (5.948)	.000 (.000)	.011	.623	1.937	2.757
108	PARTS OF MACHINERY	.041 (1.305)	.310 (1.597)	.690 (3.547)	.000 (.000)	.026	.457	2.463	8.115
109	STRONG ELECTRIC MACHINERY	-.070 (-.971)	.829 (4.331)	.171 (.992)	.000 (.000)	.022	.554	2.487	8.635
110	HOUSEHOLD ELECTRICAL MACHINERY	.013 (.418)	.240 (1.557)	.760 (4.919)	.000 (.000)	.009	.503	2.585	5.029
111	OTHER WEAK ELECTRICAL APPLIANC	-.050 (-1.576)	.560 (2.759)	.440 (2.170)	.000 (.000)	.049	.553	1.637	7.298
113	RAILWAY VEHICLES	.020 (.515)	.111 (.783)	.889 (6.741)	.000 (.000)	.002	.854	1.887	7.869
114	PASSENGER MORTOR CAR	.017 (1.257)	.555 (9.804)	.445 (7.951)	.000 (.000)	.005	.924	2.204	2.464
116	MOTORCYCLES & BICYCLES	-.000 (-.008)	.575 (3.201)	.425 (2.769)	.000 (.000)	.000	.288	2.263	2.836
118	OTHER TRANSPORTATION	.022 (1.043)	.602 (4.915)	.398 (3.244)	.000 (.000)	.040	.712	2.011	6.121
119	PRECISION MACHINERY	.032 (3.522)	.750 (3.719)	.250 (1.105)	.000 (.000)	.029	.836	1.537	2.138
120	PHOTOGRAPHIC & OPTICAL INSTRUM	.011 (.688)	.548 (3.402)	.452 (2.609)	.000 (.000)	.064	.894	2.285	5.021
122	OTHER MANUFACTURING GOODS	.145 (1.687)	.708 (2.455)	.292 (1.015)	.000 (.000)	.039	-.114	2.193	15.595
124	CONSTRUCTION NOT FOR RESIDENTI	.027 (3.100)	.087 (.618)	.913 (6.446)	.000 (.000)	.000	.974	2.370	1.668
127	OTHER CONSTRUCTION	.023 (1.238)	.337 (1.437)	.663 (2.833)	.000 (.000)	.000	.970	2.973	4.788
128	ELECTRICITY	.014 (1.739)	.116 (.858)	.884 (5.509)	.000 (.000)	.000	.859	2.281	2.146
129	GAS	.052 (1.728)	.397 (2.029)	.603 (3.087)	.000 (.000)	.000	.744	1.950	11.626

TABLE VI-20(CONTINUED)

I-O	TITLE	CONST	EQUILIBRIUM PRICE	LAGGED PRICE	WORLD PRICE	YMP/USE	RSQ	D.W	ABSOLUTE % ERROR
130	WATER-SUPPLY,SEWERAGE	.004 (2.080)	.013 (.006)	.984 (5.135)	.000 (.000)	.000	.898	2.591	6.649
133	FINANCIAL BUSINESS	.014 (.029)	.483 (2.416)	.517 (2.587)	.000 (.000)	.000	.943	1.981	6.118
134	INSURANCE BUSINESS	.030 (1.248)	.348 (1.843)	.652 (3.457)	.000 (.000)	.000	.929	2.107	6.864
135	REAL ESTATE AGENCY	.023 (1.021)	.285 (1.675)	.715 (4.200)	.000 (.000)	.000	.979	3.164	3.901
136	RENT FOR HOUSE	.010 (.677)	.323 (1.871)	.677 (3.913)	.000 (.000)	.000	.978	3.157	4.123
137	NATIONAL RAILROAD	-.025 (-.932)	.986 (2.694)	.014 (.039)	.000 (.000)	.000	.910	2.078	4.456
138	LOCAL RAILROAD	.007 (.281)	.522 (2.001)	.478 (1.834)	.000 (.000)	.000	.905	2.763	6.525
139	ROAD PASSENGER TRANSPORT	.000 (.005)	.388 (1.995)	.612 (3.149)	.000 (.000)	.000	.895	1.746	5.800
140	ROAD FREIGHT TRANSPORT	.081 (2.008)	.429 (1.566)	.571 (2.084)	.000 (.000)	.000	.700	2.220	8.120
141	ROAD TRANSPORTATION FACILITIES	.052 (1.671)	.049 (.484)	.952 (9.580)	.000 (.000)	.000	.966	2.343	12.149
143	INLAND WATER TRANSPORT	.053 (4.105)	.056 (.321)	.944 (5.414)	.000 (.000)	.000	.935	2.583	4.534
144	AIR TRANSPORT	.014 (1.144)	.100 (1.694)	.900 (15.202)	.000 (.000)	.000	.345	2.904	1.936
145	OTHER TRANSPORT	.071 (2.266)	.404 (2.004)	.596 (2.953)	.000 (.000)	.000	.801	2.010	10.768
146	STORAGE	.026 (2.998)	.807 (2.781)	.193 (.603)	.000 (.000)	.000	.964	1.987	2.751
147	TELECOMMUNICATION	.020 (3.485)	.052 (.875)	.948 (15.794)	.000 (.000)	.000	.956	2.336	1.082
149	EDUCATION	.046 (3.560)	.129 (1.096)	.871 (7.406)	.000 (.000)	.000	.989	2.859	3.301
151	OTHER PUBLIC SERVICES	.057 (3.718)	.018 (.178)	.982 (7.454)	.000 (.000)	.000	.998	2.001	3.346
152	SERVICE FOR BUSINESS ENTERPRIS	.045 (2.650)	.212 (.617)	.788 (2.780)	.000 (.000)	.000	.981	1.538	2.680
153	AMUSEMENT	.040 (2.549)	.271 (.861)	.729 (2.314)	.000 (.000)	.000	.982	1.934	2.882
156	NOT CLASSIFIED	-.015 (-.382)	.509 (2.343)	.491 (2.264)	.000 (.000)	.000	.655	2.297	12.153

which was actually shown up in few sectors, is not theoretically interpretable. However, we assume that those sectors have very slow speed of adjustment of actual price to equilibrium price. We arbitrarily assign 0.1 as the speed of adjustment to those sectors.

As we expected, the equilibrium price has larger weight in determining the actual price than the lagged price for competitive industries. Food industries and some textile and light machinery industries adjust rapidly; some heavy machinery industries and public utility industries, which are more or less monopolistic, adjust very slowly. But the theoretical expectation did not turn out to be right for all sectors. Namely, some food industries like Bakery products and Beverages adjust very slowly. The world price was included in the regression as an independent variable for the sectors whose import-use ratio is greater than 0.2. Generally, the fit of regression is good. A few sectors have very low R^2, but the absolute percentage errors of those sectors are not very large. Generally, the coefficients of equilibrium prices are statistically significant. The autocorrelation problem is not serious. However, the RHO adjustment procedure will be employed in forecasting.

CHAPTER VII

Personal Consumption Expenditure

Introduction

The main component of final demand for output is personal consumption expenditure (PCE) which is 50.4 percent of the GNP in 1970. Therefore, consumption expenditure should be highly important basis in long term interindustry output forecasting. Fortunately, there is not much cyclical variation in consumption expenditure compared to other final demand components such as investment and inventory stock. Ninety-six commodities out of 156 I/O sectors are sold for personal consumption. The PCE equations are estimated for all of those sectors except for a few sectors which will be treated as exogenous.

In the second section, the theory of the PCE equation will be discussed and the justification of the form of the equation will be explained. The empirical results will be presented in the third section. The savings equation will be presented in the fourth section. By definition, sum of consumption expenditure of each sector and savings should be equal to disposable income. But the PCE forecasts with the estimated equation do not automatically guarantee that condition. This is so called "adding up problem," which will be dealth with in the fifth section.

Theory of the Equation

Econometric models could be classified into two broad categories according to the type of consumption function used. One group uses aggregate consumption functions; the Wharton model is an example. The aggregate consumption function predicts total personal consumption expenditure, and total expenditure is allocated to the I/0 sectors by constant proportions over time.

The other group uses a system of demand functions, one for each sector. Certainly, the latter is desirable in an input-output model, because the aggregate function loses a lot of information about individual commodities, like income and price elasticities.

Studies of demand systems could also be classified into two categories. One is the demand system which is derived from a utility function; the system of Stone,[1] Pollak and Wales,[2] Brown and Herin[3] are in this category. Their recent studies have made significant contributions to consumption studies based on micro-economic theory. They use a prespecified aggregate utility function with a budget constraint to determine both the functional form of the demand equation and the interequation restrictions. The other group, which will be called the practical form, consists of those studies with a single equation for each commodity, in which income, relative price and some other variables are explanatory variables. This type of study does

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[1]Stone, R., "Linear Expenditure Systems and Demand Analysis." The Economic Journal, 1954.

[2]Pollak, R., and Wales, T. "Estimations of the Linear Expenditure Systems," Econometrica, 1969.

[3]Brown, M., and Herin, D., "The S Branch Utility Tree; a Generalization of the Linear Expenditure System," Econometrica, 1973.

not use a utility function implicitly or explicitly, and does not investigate cross price elasticities. Houthakker and Taylor[1] and INFORUM[2] had this kind of demand equation system.

The demand system with utility function is theoretically nice. But there is a question about its empirical applicability. The existence of the stable utility function is doubtful for several reasons;[3] those reasons are individual differences in tastes, the sporadic appearence of new commodities, difficulties in statistical treatment of durable goods in a utility function, and nonmarket activities in consumption. Even if there exists a stable utility function for each individual, we may not derive an aggregate demand equation. The Slutzky's equation may not hold with an aggregate demand equation. The Slutzky's equation shows the substitution effect and the income effect. The average of the aggregated substitution effect can be equal to that of a representative person. But the income effect which states a consumer's reaction with respect to purchases of a commodity to changes in his income can't be aggregated to get the average income effect of a representative person because

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[1]Houthakker, H.S., and L.D. Taylor. Consumer Demand in the United States, 1929-1970. Harvard University Press. 1966.

[2]Almon, C. et al. 1985: Interindustry Forecasts of the American Economy. Lexington Books. Lexington, Massachusetts. 1974.

[3]Taubman, P."Consumption Functions for Short Run Models." in the Brookings Model: Perspective and Recent Developments. eds. by Fromm, C and L. Klein. North-Holland Publishing Co. 1975.

of the different income and the different utility function of each individual.[1]

Besides that, it is not practical to apply utility function approach to the demand system with so many sectors. However, the main advantage of utility function approach is that it investigates

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[1]A simple form of the Slutzky's equation of an individual, n, is

$$\frac{\partial q_i^n}{\partial p_j} = \left(\frac{\partial q_i^n}{\partial p_j}\right)_{u\,=\,\text{constant}} - q_i^n \cdot \left(\frac{\partial q_i^n}{\partial y^n}\right)_{p\,=\,\text{constant}}$$

Now suppose that the Slutzky's equation of representative person, T, is

$$\frac{\partial q_i^T}{\partial p_j} = \left(\frac{\partial q_i^T}{\partial p_j}\right) - q_i^T\left(\frac{\partial q_i^T}{\partial y^T}\right)$$

Then,

$$\sum_n \frac{\partial q_i^n}{\partial p_j} - \sum_n q_i^n \frac{\partial q_i^n}{\partial y^n} \neq N \cdot \frac{\partial q_i^T}{\partial p_j} - N\, q_i^T \frac{\partial q_i^T}{\partial y^T}$$

where

N is the number of individuals, because

$$\sum_n q_i^n \frac{\partial q_i^n}{\partial y^n} \neq N\, q_i^T \frac{\partial q_i^T}{\partial y^T}$$

the cross price effect. Usual practical ways of formulating consumption functions fail to capture the complementality between commodities. The "practical form" considers a commodity against all other commodities. The expectation of a negative sign for the relative price coefficient implies that a commodity is more or less a substitute for all other commodities. If we have a detailed disaggregated demand system, this assumption is not reasonable. For instance, if the price of coffee rises, this consumption function predicts that the demand for sugar will rise because the relative price of sugar goes down owing to the increase of consumer price index. This is contrary to basic price theory since coffee and sugar are complements. Even the substitution effect is not well captured by the "practical form." If we classify all commodities into several categories, for some commodities it is more likely that substitution will occur within, rather than among, categories. Here, we try to reformulate the "practical form" of the consumption equation[1] to explain complementality and substitution between and among categories.

The formal regression equation is

$$(1)\ C_{it} = (\alpha_1 + \alpha_2 Y_t + \alpha_3 \Delta Y_t + \alpha_4 t)\left(\frac{P_{it}}{P^G_{it}}\right)^{\beta_1}\left(\frac{P^G_{it}}{\bar{P}_t}\right)^{\beta_2}$$

$$i = 1 \dots\dots\dots 156$$

[1]Almon, C. "The INFORUM Models 1976," INFORUM Research Report No. 15, June 1976.

(2) $\sum_{i}^{156} P_{it}C_{it} + \overline{P}_t S_t \equiv \overline{P}_t Y_t$

where

C_{it} = per capita consumer expenditure on the i^{th} commodity, in 1970 constant prices.

Y_t = per capita disposable income in 1970 constant prices.

t = time trend

P_{it} = price of the i^{th} commodity at time t.

P^G_{it} = average price of the category to which the i^{th} commodity belongs.

$\overline{P}_t$ = overall consumer price index.

S_t = per capita savings.

Equation (1) is the demand equation for a commodity and equation (2) is the budget constraint. Total consumption plus savings should add up to total income. Equation (1) is not linear in the parameters to be estimated. The usual types of the demand equation are linear form in all variables or double log form. These usual forms were rejected because of problems with them. The double log form equation is rejected because it gives a serious adding up problem. The linear form is also rejected because it does not allow interaction between prices and income. Without the interaction we may get unreasonable consumption forecast. Let suppose that the per capita disposable income at year 1 is $1,000, and that a consumer spends $10 on peas. Suppose further that prices do not change in year 2, but that income has doubled and that he spends \$20 on peas. Now, suppose that the price at year 1 is higher so that he spends only \$8 on peas. Also, we suppose this different price remains the same in year 2. Then the linear form of equation will predict a \$18 expenditure on that commodity while the multiplicative form of equation will predict \$16. In other words, the magnitude of the price effect in the linear form is independent of the amount spent on the commodity, an unlikely state of affairs. It seems reasonable to expect that changes of demand due to price change over time are proportional to the size of the income over time. Therefore, equation (1) has a linear form in income variables and mulitplicative form in price variables.

The efforts to deal with complementality is shown by the two relative price variables. The own relative price in the usual "practical forms" of consumption function is decomposed into two parts; the own price relative to the category price, and the category price relative to the overall average price. We expect a negative sign on β_1 if there is substitution within categories, and we expect a negative sign on β_2 if there is substitution among categories. Also, we can say that complementarity prevails where the β_2 is greater than β_1 when all price indices are 100.

Empirical Results

In the regression analysis two items of *a priori* information are used. First, the cross-section income elasticities[1] are used to calculate the coefficient of the income variable. Since the disposable income and the time trend are highly correlated, it is very hard to disentangle the income effect if we use both of these variables in the regression. Even though the concept of cross-section income elasticity is not exactly the same as that of time series income elasticity, it is not unusual to use cross-section information in that case.

Reimbold shows that, in the U.S.A. case, the income coefficient borrowed from cross-section data gives better forecasts than the income coefficient estimated directly from time series data.[2]

The other information available before the estimation is the group price elasticities.[3] Saito estimated commodity demand equations using time series data. Following Saito's classification, all consumption goods are grouped into 21 categories, so that Saito's

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[1]The cross-section elasticities are gotten from '<u>Annual Report on the Family Income and Expenditure Survey</u>', Japanese Government. 1970. This report shows the cross section income elasticities at 1967. Using this information we calculate income coefficient as follows:

$\alpha_2 = \eta_{67} \cdot \frac{C_{67}}{Y_{67}}$ where η_{67} is the a priori income elasticities.

[2]Reimbold, T., "Simulation With a Dynamic Input-Output Forecasting Model." Unpublished Ph.D. dissertation. University of Maryland. 1974.

[3]Saito, M. "A General Equilibrium Price and Outputs in Japan. 1953-1965." In the <u>Workings of Econometric Models</u>. ed. by M. Morishima. Cambridge. 1972.

estimates of price elasticities can be used in this study. However, the Saito's elasticities are not simply plugged into the consumption equations. Because the data Saito used covers only up to 1965, there could be an inconsistency between the *a priori* information and the data we use right now.

We allow the group price elasticity to vary within a certain range which is given by the subjective judgments. A wide range is given if the magnitude of the *a priori* price elasticity of a certain good is large and if the commodities in the group are heterogeneous. The rule of thumb is that, in normal case, we allow the group price elasticity to vary within 50% of the *a priori* elasticity in either side. If commodities within the group are homogeneous, we allow less than 50% and more than 50% for heterogeneous case. In Table VII-1, the *a priori* price elasticities and the given ranges are shown with the Saito's commodity group classification.

The reason why we use the *a priori* information on the group price is that it may prove advantageous to compel β_2 to be the same for all items within a group. If all prices within a group increase proportionally, the composition of expenditures on the group depends only β_2. Therefore, different β_2 within a group will predict different composition of expenditure within a group even if all the relative prices in the group remain the same, which is not theoretically consistent. When all prices within a group change proportionately, income effect might cause a change in the percentage composition of expenditure within the group. But this income effect should be captured by the income term in the equation.

This strict uniformity of β_2 within group may be theoretically consistent only if the group classification is perfect, so that there exists independence between commodity groups. If the commodity groups are not completely separable or not completely independent, the equi-proportionate price rise of all commodities within the group can cause different composition of expenditure within the group because the change of the overall consumer price index owing to the equi-proportionate price rise can affect the consumption in other commodity group which will affect the consumption of the commodity group in which the price rise was originated. If there exists independence, the feedback effect does not change the composition of expenditure in that group because the feedback effect affects the composition only through $\left(\frac{P^G}{\bar{\bar{P}}}\right)^{\beta_2}$ which is same for all commodity in the group. If independence does not exist, the feedback effect affects the composition not only through $\left(\frac{P^G}{\bar{\bar{P}}}\right)^{\beta_2}$ but also through cross elasticities between commodities. Because we are certain that the group classification in this study cannot be perfect, we allow β_2 to vary from the *a priori* information; strict uniformity on the estimates of β_2 in the same group is not imposed. However, the estimates of group price elasticities of the commodities within a same group did not differ very much. In most cases, the group price elasticities of the commodities within a group approach the same limit of the allowed range.

TABLE VII-1. COMMODITY GROUP CLASSIFICATIONS AND PRICE ELASTICITIES

Group Name	Group Price Elasticity	Allowed Range +/-	I/O Sectors
1. Cereals	-.35	.10	2, 4, 31
2. Vegetables	-.77	.35	29, 3
3. Meat, Fish and Dairy	-.77	.35	6, 14, 15, 16, 26, 27, 28, 30
4. Other Food	-.70	.35	32, 33, 34
5. Beverages	-1.80	.50	36, 37
6. Restaurant	-.97	.40	154
7. Fabric*	-1.11	.50	39, 40, 41, 45, 46, 47, 48, 51, 53
8. Garment	-1.11	.50	54, 55, 56
9. Rubber and Leather	-1.11	.50	65, 66
10. Fuel	-.96	.50	11, 17, 22, 81, 128, 129
11. Water	-1.17	.50	130
12. Furniture			58, 59, 100, 101
13. Medical care	-2.53	1.00	78, 79, 150
14. Automotive	-1.40	.70	80, 114, 115, 116

* Fabric, Garment, and Rubber and Leather were not separated in Saito's classification.

TABLE VII-1. CONTINUED

Group Name	Group Price Elasticity	Allowed Range +/-	I/O Sectors
16. Transportation	-1.40	.70	137, 138, 139, 140, 141, 142, 143, 144, 145, 146
17. Paper			61, 62, 63
18. Tobacco	-.47	.20	38
19. Education	-3.82	1.00	149
20. Machinery			104, 106, 107, 110, 111, 119, 120, 121, 122,
21. Services			9, 131, 132, 133, 134, 135, 151, 152, 155
22. No group			10, 13, 85, 87, 136, 153, 156

The efforts to find complementarity in consumer demand is successful in some cases. For instance, we could find the important complementarity in automotive group. The price elasticities of the commodities in the group are:

	β_1	β_2
Petroleum refinery product	-1.67	-1.93
Passenger cars	-1.41	-2.10
Repair of passenger cars	0	-2.10
Motorcycles and bicycles	-1.78	-2.10

β_2 of the three commodities in this group hit the same limit of the given range of β_2. Originally a priori group price elasticity was -1.4. Judging by the magnitude of β_1 and β_2, all commodities in this group show complementarity. Gasoline and Motor cars are surely complements, and our statistical fitting bears out this expectation. Because the β_1 for Repair of passenger cars is zero, the hypothesis that consumers repair an old car if the price of new car is high was rejected. The result says that there is no substitute for the Repair of passenger cars.

The fuel group shows substitutability within a group. The estimated elasticities are:

	β_1	β_2
Cooking coal	-2.95	-0.46
Natural gas	0	-0.46
Coal products	-1.32	-0.46
Electricity	-1.90	-0.56
Gas	-0.44	-0.46

Coking coal, Coal products, and Electricity show strong substitutability. Natural gas shows complementarity, but the consumption of the natural gas in Japan is negligible. β_1 and β_2 of gas are very close to each other.

As you can see in Table VII-2, the interpretation of β_1 and β_2 is not straightforward for some groups. Especially the fabric group and the machinery group show some contradictory results. We suppose that those results are caused by the inappropriate aggregation of groups. The more aggregated groups we have, the more difficult to interpret the results.

Since the equation is non-linear, we cannot estimate the parameters by the ordinary least square method. The non-linear regression algorithm developed by Marquardt[1] is employed. The regression results show that the fit is good enough to produce reasonable forecasts. The incorporation of the two a priori information does not distort the fit very much. Most of the sectors show high autocorrelation. Post regression RHO adjustment is used in forecast.

The Savings Equation

The savings equation in this model has a secondary role. It does not directly affect the determination of final demand and the output of industries. But it is required in solving the adding-up problem in consumption determination.

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[1] Kuester, J.L. and J.H. Mize. Optimization Techniques with Fortran. McGraw-Hill Company. New York. 1973.

TABLE VII-2. REGRESSION RESULTS OF CONSUMPTION FUCNTION

SECTOR	(GROUP)	PI/PUG COEF	(T)	PUG/PUAR COEF	(T)	CONSTAN	YCOEF	(ELAS)	DELTA Y	TIME % 70PCE	RBARSQ	RHO	PCE70
2 OTHER CROPS	(1)	.00	(.00)	-.25	(-.37)	-.0053	.009738	.7	-.002959	.0045	.96	.81	694.
3 FRUITS	(2)	-2.48	(-2.09)	-.42	(-.71)	-.3079	.005373	.7	-.005373	.0056	.98	.56	392.
4 OTHER CROPS FOR INDUSTRI	(1)	.00	(.00)	-.25	(-.22)	.0053	.000031	.7	.000247	-.0114	.93	.13	1.
6 LIVE STOCKS,POULTRY	(3)	.00	(.00)	-1.12	(-3.41)	-.0872	.003833	.7	.002340	.0037	.99	.71	228.
9 AGRICULTURAL SERVICES	(20)	-.55	(-.23)	-1.12	(-.15)	-.0074	.000049	.7	-.000049	.0099	.80	.94	4.
10 FORESTRY	(21)	.00	(.00)	-.42	(-1.08)	.0789	.000159	.2	-.000159	.0085	.95	.20	34.
11 CHARCOAL & FIREWOOD	(10)	.00	(.00)	-.46	(-.36)	.2653	.000106	.2	.002057	-.0330	-1.80	.95	11.
13 HUNTINGS	(21)	.00	(.00)	-.46	(-.48)	-.0089	.000010	.2	.000078	.0137	.93	.67	3.
14 FISHERIES	(3)	.00	(.00)	-.42	(-.33)	-.2345	.004843	.7	-.004843	.0063	.96	.87	344.
15 WHALING	(3)	-.38	(-2.63)	-1.12	(-2.56)	-.0037	.000208	.7	-.000208	.0034	.99	.37	12.
16 INLAND WATER FISHERIES	(3)	.00	(.00)	-.42	(-.09)	.0380	.000811	.7	-.000811	.0014	.83	.60	40.
17 COKING COAL	(10)	-2.95	(-3.81)	-.46	(-.60)	.0028	.000031	.2	.000331	.0071	.94	.09	4.
22 NATURAL GAS	(10)	.00	(.00)	-.46	(-.39)	-.0012	.000009	.5	-.000009	.0100	.91	.88	1.
26 CARCASSES	(3)	-1.10	(-1.50)	-.42	(-.63)	-.4110	.006097	.7	-.003591	.0067	.97	.89	465.
27 MEAT PRODUCT	(3)	-1.37	(-.29)	-.42	(-.08)	-.0844	.001577	.7	-.001577	.0094	.82	.96	129.
28 DAIRY PRODUCT	(3)	-.36	(-.46)	-.42	(-.40)	-.2890	.006051	.7	.010225	.0047	.99	.55	418.
29 VEGETABLE & FRUIT PRESER	(2)	.00	(.00)	-.42	(-.87)	-.1920	.002305	.5	-.002305	.0078	.98	.79	196.
30 SEA FOOD PRESERVED	(3)	.00	(.00)	-.42	(-.46)	-.5797	.006292	.6	-.008292	.0070	.97	.92	641.
31 GRAIN MILL PRODUCTS	(1)	.00	(.00)	-.25	(-.56)	.8005	.015187	.4	-.015187	.0071	.97	.83	1381.
32 BAKERY PRODUCTS	(4)	-1.65	(-1.10)	-.35	(-.43)	-.3613	.006131	.5	-.008131	.0075	.99	.70	705.
33 REFINED SUGAR	(4)	.00	(.00)	-.35	(-.17)	.1204	.001097	.5	.004088	.0008	.85	.85	78.
34 OTHER FOOD PREPARED	(4)	.00	(.00)	-.35	(-.45)	-.2170	.011346	.5	-.011346	.0070	.98	.83	937.
36 ALCOHOLIC BEVERAGES	(5)	.00	(.00)	-2.16	(-2.47)	-.1052	.007672	.5	-.002145	.0072	1.00	.49	691.
37 SOFT DRINK	(5)	-.25	(-.09)	-2.30	(-.91)	-.5410	.002190	.5	-.002190	.0115	.96	.82	261.
38 TOBACCO	(17)	.00	(.00)	-.63	(-1.45)	-.2552	.001181	.1	.005466	.0122	.97	.69	743.
39 SILK REELING & WASTE SIL	(7)	-.39	(-.37)	-1.61	(-.43)	.0046	.000013	1.3	.000034	-.0278	.10	.91	0.
40 COTTON SPINNING	(7)	-1.56	(-1.08)	-1.61	(-2.20)	.0065	.000052	1.3	-.000030	-.0125	.97	.74	1.
41 WOOLEN & WORSTED YARN	(7)	.00	(.00)	-1.38	(-1.15)	.0278	.000285	1.3	-.000054	-.0089	.96	.75	9.
45 SILK & RAYON WEAVING	(7)	.00	(.00)	-1.48	(-.36)	.1296	.007281	1.3	-.007281	-.0000	.95	.52	306.
46 COTTON & SPUN RAYON FABR	(7)	.00	(.00)	-1.61	(-3.25)	.5825	.002832	1.3	.000174	-.0154	.95	.77	89.
47 SYNTHETIC FIBERS WOVEN	(7)	.00	(.00)	-1.61	(-2.08)	.5019	.003385	1.3	-.003385	-.0080	.97	.66	120.
48 WOOLEN FABRICS WOVEN & F	(7)	-1.49	(-1.36)	-1.61	(-1.41)	1.3186	.007250	1.3	.020117	-.0177	.92	.69	230.
51 KNITTED FABRICS	(7)	.00	(.00)	-1.61	(-.98)	1.4848	.014353	1.3	.004396	-.0102	.94	.85	460.

TABLE VII-2(CONTINUED). REGRESSION RESULTS OF CONSUMPTION FUNCTION

SECTOR	(GROUP)	PI/PBC COEF	(T)	PBG/PBAR COEF	(T)	CONSTAN	YCOEF	(ELAS)	DELTA Y % 70PCE	TIME	RBARSQ	RHO	PCE70
53 OTHER FIBER PRODUCTS	(7)	.00	(.00)	-1.61	(-.19)	-.0968	.001448	1.3	.002949	-.0006	.94	.43	67.
54 FOOTWEAR EXCEPT RUBBER M	(8)	.00	(.00)	-.61	(-.73)	.1222	.002727	1.2	-.002727	-.0027	.99	.86	105.
55 WEARING APPAREL	(8)	.00	(.00)	-.61	(-.76)	-.1168	.020574	1.2	-.020574	.0005	.99	.72	902.
56 TEXTILE GARMENTS	(8)	.00	(.00)	-.61	(-.43)	-.0452	.002164	1.2	-.002164	.0017	.98	.60	94.
58 WOODEN PRODUCTS	(12)	.00	(.00)	-.61	(-.54)	-.0296	.000663	1.2	-.000663	.0047	.86	.78	33.
59 FURNITURE WOODEN & METAL	(12)	.00	(.00)	-.61	(-.48)	-.1743	.002849	.9	-.002849	.0060	.87	.80	178.
61 PAPER	(16)	-.26	(-1.09)	-.61	(-.47)	.2366	.000890	1.0	.000633	-.0160	.87	.75	31.
62 ARTICLES OF PAPER & PAPE	(16)	-.27	(-.58)	-.61	(-.57)	.0001	.000520	1.0	-.000520	.0023	.97	.83	26.
63 PRINTING & PUBLISHING	(16)	.00	(.00)	-.61	(-2.73)	.0635	.009948	1.4	-.009948	-.0033	1.00	.65	348.
65 LEATHER PRODUCTS EX. FOO	(9)	.00	(.00)	-1.56	(-2.15)	.4801	.002347	1.3	.006780	-.0199	.95	.73	73.
66 ARTICLES OF RUBBER	(9)	-2.35	(-3.62)	-1.12	(-6.16)	.4412	.002910	1.3	.003713	-.0098	1.00	-.03	112.
78 MEDICINE	(13)	-.57	(-.26)	-1.53	(-1.21)	.0268	.004379	.7	.004024	.0033	.98	.68	288.
79 OTHER CHEMICAL PRODUCTS	(13)	.00	(.00)	-1.53	(-3.19)	-.1493	.004563	.7	.000333	.0052	1.00	-.20	320.
80 PETROLEUM REFINERY PRODU	(14)	-1.67	(-1.49)	-1.93	(-1.75)	-.2224	.004798	1.3	.002148	.0035	.99	-.39	285.
81 COAL PRODUCTS	(10)	-1.32	(-.86)	-.46	(-.33)	-.0050	.000140	.2	-.000140	.0130	.85	.82	23.
85 POTTERY	(21)	.00	(.00)	-.46	(-2.05)	-.0214	.000934	.9	-.000934	.0039	.92	.90	51.
87 OTHERNON-METALLIC MINERA	(21)	.00	(.00)	-.71	(-1.60)	-.0401	.000009	.0	-.000009	.0207	.91	.95	9.
100 STRUCTURAL METAL PRODUCT	(12)	.00	(.00)	-.46	(-.13)	-.3231	.002562	.9	-.002562	.0085	.55	.91	143.
101 OTHER METAL PRODUCTS	(12)	.00	(.00)	-.46	(-.70)	-.0613	.002805	.9	.000882	.0020	.96	.82	156.
104 INDUSTRIAL MACHINERY	(19)	-.20	(-.46)	-.46	(-.78)	.0852	.000358	.9	.000060	-.0093	.90	.40	15.
106 OFFICE MACHINERY	(19)	-1.66	(-.99)	-1.46	(-.62)	-.0069	.000000	.0	-.000000	.0246	.83	.72	1.
107 HOUSEHOLD MACHINERY	(19)	.00	(.00)	-.46	(-.27)	-.0799	.002850	.9	.004689	-.0005	.77	.59	123.
110 HOUSEHOLD ELECTRICAL MAC	(19)	.00	(.00)	-1.46	(-.76)	-2.3058	.009605	.9	-.009605	.0101	.92	.70	785.
111 OTHER WEAK ELECTRICAL AP	(19)	.00	(.00)	-1.46	(-.75)	-.0540	.000213	.9	-.000213	.0104	.92	.70	17.
114 PASSENGER MOTOR CAR	(14)	-1.41	(-1.63)	-2.10	(-2.23)	.0266	.004586	1.3	.011084	-.0014	1.00	.27	226.
115 REPAIR OF PASSENGER MOTO	(14)	.00	(.00)	-2.10	(-.50)	-.8726	.003731	1.3	-.003731	.0098	.91	-.01	214.
116 MOTORCYCLES & BICYCLES	(14)	-1.78	(-.70)	-2.10	(-1.04)	3.3940	.007564	1.3	.066110	-.0967	-.08	.66	108.
119 PRECISION MACHINERY	(19)	-3.86	(-2.20)	-2.10	(-1.43)	-.0234	.000272	1.4	-.000272	.0071	.89	.71	23.
120 PHOTOGRAPHIC & OPTICAL I	(19)	.00	(.00)	-.70	(-.44)	-.1268	.002341	1.4	-.002341	.0043	.86	.93	112.
121 WATCHES & CLOCKS	(19)	-.53	(-1.35)	-.70	(-1.11)	.2062	.004274	1.4	.002303	-.0089	.98	.27	135.
122 OTHER MANUFACTURING GOOD	(19)	-2.10	(-4.53)	-1.95	(-4.17)	.4286	.010906	1.4	-.010906	-.0013	.99	.43	477.
128 ELECTRICITY	(10)	-1.90	(-1.12)	-.56	(-1.98)	-.2192	.003876	.5	-.003876	.0100	.99	.95	400.
129 GAS	(10)	-.44	(-.09)	-.46	(-.62)	.1952	.004535	1.6	-.004509	-.0091	.93	.87	121.

TABLE VII-2(CONTINUED). REGRESSION RESULTS OF CONSUMPTION FUNCTION

SECTOR	(GROUP)	PI/PPC COEF	(T)	PCG/PBAR COEF	(T)	CONSTAN	YCOEF	(ELAS)	DELTA Y	TIME % 70PCE	RBARSQ	RHO	PCE70
130 WATER-SUPPLY,SEWERAGE	(11)	.00	(.00)	-1.67	(-6.90)	-.1260	.001651	.5	.002649	.0074	1.00	.23	152.
131 WHOLESALE TRADE	(20)	-.50	(-.52)	-.67	(-.21)	-2.4760	.041357	1.0	-.041357	.0049	.98	.78	2030.
132 RETAIL TRADE	(20)	.00	(.00)	-.67	(-.56)	-2.3976	.076883	1.0	-.011631	.0018	.99	.20	3778.
133 FINANCIAL BUSINESS	(20)	.00	(.00)	-1.67	(-.32)	-.2936	.013832	1.3	-.013832	.0026	.81	.79	799.
134 INSURANCE BUSINESS	(20)	.00	(.00)	-1.67	(-.34)	-.4295	.015725	1.3	-.015725	.0027	.80	.80	902.
135 REAL ESTATE AGENCY	(20)	.00	(.00)	-1.67	(-.31)	-.0775	.000001	.0	-.000001	.0180	.91	.90	35.
136 RENT FOR HOUSE	(21)	.00	(.00)	-.67	(-3.95)	-3.5667	.084610	1.0	-.057957	.0034	.96	.78	4546.
137 NATIONAL RAILROAD	(15)	.00	(.00)	-.70	(-2.51)	.0388	.009907	1.2	.003781	-.0027	1.00	.13	398.
138 LOCAL RAILROAD	(15)	-.08	(-.26)	-.70	(-1.60)	.0296	.007483	1.2	.003991	-.0029	1.00	.03	301.
139 ROAD PASSENGER TRANSPORT	(15)	.00	(.00)	-.70	(-1.78)	-.1177	.023450	1.2	.009679	-.0023	1.00	.11	938.
140 ROAD FREIGHT TRANSPORT	(15)	.00	(.00)	-.70	(-.28)	-.5726	.003891	1.2	-.003891	.0088	.70	.96	206.
141 ROAD TRANSPORTATION FACI	(15)	.00	(.00)	-.70	(-.34)	-.1411	.000855	1.2	-.000855	.0085	.85	.91	45.
142 SEA TRANSPORT	(15)	-1.29	(-3.01)	-1.55	(-2.03)	-.0008	.000020	1.2	.000038	.0009	.99	.25	1.
143 INLAND WATER TRANSPORT	(15)	-.13	(-.42)	-.70	(-1.64)	.0766	.001945	1.2	-.001435	-.0031	.99	.47	75.
144 AIR TRANSPORT	(15)	-2.87	(-1.28)	-.70	(-.30)	.5456	.002114	1.2	.004598	-.0069	.96	.12	114.
145 OTHER TRANSPORT	(15)	-1.58	(-11.91)	-1.55	(-4.54)	-.0041	.000059	1.2	-.000040	.0038	1.00	.35	3.
146 STORAGE	(15)	-1.24	(-1.87)	-1.50	(-2.67)	.0664	.001353	1.2	.000900	-.0057	.99	.27	50.
147 TELECOMMUNICATION	(15)	-3.84	(-5.17)	-.70	(-.67)	-.1084	.005230	1.4	-.001584	.0004	.97	.37	241.
149 EDUCATION	(18)	.00	(.00)	-2.62	(-2.23)	-.2241	.010031	1.0	.012958	-.0014	.97	.78	424.
150 MEDICAL,HEALTH SERVICE	(13)	-3.24	(-2.78)	-2.80	(-3.97)	-.8809	.039904	1.0	-.039904	.0036	1.00	.40	2103.
151 OTHER PUBLIC SERVICES	(20)	.00	(.00)	-1.53	(-2.34)	.0880	.009066	1.0	.000081	-.0007	.98	.52	392.
152 SERVICE FOR BUSINESS ENT	(20)	-.14	(-.28)	-1.53	(-1.56)	-.0012	.000345	1.0	-.000093	.0004	1.00	.20	16.
153 AMUSEMENT	(21)	.00	(.00)	-1.53	(-1.16)	-.5806	.019606	.7	-.019606	.0084	.78	.96	1306.
154 RESTAURANT	(6)	.00	(.00)	-.57	(-.55)	-1.7331	.018229	.7	-.003301	.0069	.93	.89	1571.
155 OTHER PERSONAL SERVICES	(20)	.00	(.00)	-.57	(-.99)	-1.4777	.022640	.7	-.019533	.0064	.98	.88	1743.
156 NOT CLASSIFIED	(21)	.00	(.00)	-.57	(-1.03)	-.0039	.000098	1.0	-.000098	.0034	.96	.88	5.

Since the savings function is the counterpart of the macro consumption function, macroeconomic considerations are appropriate for it. The permanent income hypothesis has explained consumption as a function of permanent income, which is measured as a weighted average of past income. The determinant of savings in that hypothesis is transitory income, which is the gap between current income and permanent income. Savings is not a decision variable; it is a residual in that hypothesis.

That hypothesis can be valid only if by "consumption" we accept its definition of consumption. The definition includes only consumption of services of consumer goods. It is not what the national accounts measure as consumer expenditure. This concept of pure consumption is not observable and is impossible to quantify. Consumption in the model presented here is not pure consumption of services of consumer goods, but consumer expenditure. The conceptual discrepancy between pure consumption and consumer expenditures is inventory adjustment.[1]

Certainly, the inventory adjustment component in consumer expenditure is related to transitory income. Therefore, if we use only permanent income in the consumer expenditure equation, we will get biased estimates due to the omitted variable.

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[1]Darby, M.R. "Postwar U.S. Consumption, Consumer Expenditures, and Saving." A.E.R. May, 1975. pp 217-222.

Since consumer expenditure is a function of permanent and transitory income, the opposite side of consumer expenditure, savings, is also a function of permenent and transitory income. It is no longer just a residual which is determined only by transitory income.

The formal regression equation is as follows:

$$(1)\ S_t = a_o + a_1 Y_{pt} + a_2 Y_{T\,t} + a_3 R_t$$

where

S_t = saving per capita.

Y_p = permanent income per capita.

Y_T = transitory income per capita.

R_t = real interest rate.

For empirical purposes, permanent income has been computed as

$$(2)\ Y_{pt} = \beta Y_t + (1 - \beta) Y_{p\,t-1}$$

where β is the adjustment coefficient, and Y_t is current income.

Since we do not have an infinite number of observations, we need an estimate of the initial value, Y_{po}. The initial value can be taken from the income trend regression.

$$\text{Log } Y_t = r_1 + r_2 t + u_t$$

then

$$Y_{po} = e^{\hat{r}_1}$$

The adjustment coefficient, β , is chosen by the scanning method. R_t is calculated by substraction of the expected rate of inflation, which is a weighted sum of past inflation using the same weights as in the investment equation,[1] from the nominal interest rate. Transitory income is simply current income minus permanent income.

The regression result is

$$S = -15.5261 + 0.1929\ Y_P + 0.331\ Y_T + 0.701\ R$$
$$(-3.589) \quad (3.777) \quad (3.839) \quad (2.025)$$

$$\bar{R}^2 = 0.992$$
$$D.W. = 1.548$$
$$\beta = 0.15$$

The regression result shows a very stable savings-income relation. All independent variables are significantly different from zero. Both permanent income and transitory income have positive signs, as we expected. The magnitude of the coefficients are quite reasonable. The equation says that the Japanese save about 19% of their permanent income and 33% of their transitory income. The bigger coefficient of transitory income than that of permanent income corresponds to our expectation. As the permanent income hypothesis states, saving is more influenced by transitory income than permanent income. As the real interest rate increases by one percentage point, saving increases by seven hundred yen per person.

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[1] See page 130 of this report.

Adding-up Problem

By definition, consumption plus savings is total disposable income in current prices.

$$(3) \quad \sum_i P_{it} C_{it} + \overline{P}_t S_t \equiv \overline{P}_t \cdot Y_t$$

But parameters estimated without consideration of the constraint do not necessarily satisfy the budget constraint in forecasting. Even in estimation, it is not uncommon to get

$$\sum_i P_{it} \hat{C}_{it} + \overline{P}_t \hat{S}_t \neq \overline{P}_t \ Y_t$$

where $\hat{C}_{it}$ is a predicted value of the estimated consumption equation. This is because

$$P_{it} \hat{C}_{it} = P_{it} \cdot C_{it} + E_{it} \text{ and } E_{it} \neq 0$$

However, in estimation, we minimize the sum of squared residuals. Therefore, we may think that the budget constraint is more or less satisfied. In forecasting, the adding-up problem could be serious. According to the author's experience, the total consumption in 1985 forecasted by double log form equation exceeds the disposable income in 1985 by 30%. The double log form has more serious adding-up problems than the form we are now using. Nonetheless, in order to forecast consistent consumption expenditures, we need an adjustment procedure. In order to forecast consumption, we have to know all the variables in right hand side of the equation. Income, time trend and prices of each sector are known. But the weights which must be used in consumer price index calculation and group price index calculation are not known. Therefore, assuming that composition of weights within group is constant, we can define $\overline{P}$ such that $\overline{P}$ guarantees the budget constraint. More formally,

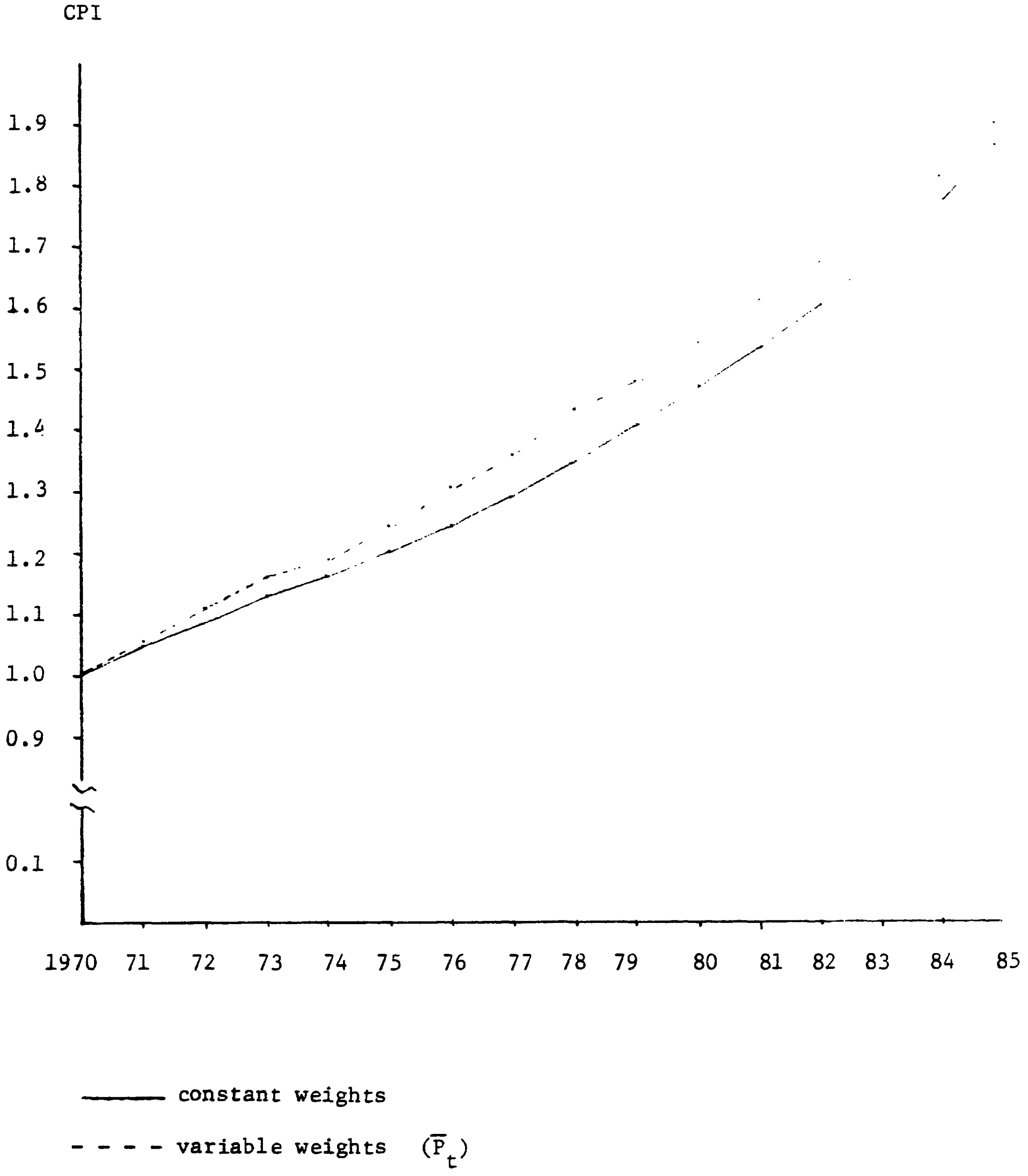
$$(3) \sum_i P_{it} C_{it} (\overline{P}_t) + \overline{P}_t S_t \equiv \overline{P}_t Y_t$$

In order to forecast consumption, the Newton's algorithm is employed. We start to calculate consumption with an initial value of $\overline{P}_t$. Once we get $\hat{C}_{it}$ for all commodities, we calculate the necessary change of $\overline{P}_t$ using the first derivation of total consumption with respect to $\overline{P}_t$. The newly calculated $\overline{P}_t$ is used in the next iteration to get new consumption expenditures. Three or four iterations are enough to satisfy the budget constraint with .001 tolerance level.

Another reason to use a priori information on the group price elasticities is that we solve the adding-up problem through the group price elasticities. When we estimate the consumption equation without the group price information, some of β_2 turned out to be zero. If those are zero, the consumption forecast of those sectors are not affected in the adding-up adjustment procedure.

It is examined whether the calculated $\overline{P}_t$ changes radically. If the calculated $\overline{P}_t$ jumps at the starting year of forecast, it may indicate that there must be an inconsistency between the estimation of consumption and the forecasts of consumption. Fortunately, the calculated $\overline{P}_t$'s show a smooth curve, as it is shown in Figure VII-1. The consumer price index calculated with the constant weights using 1970 PCE is also shown in Figure VII-1.

Figure VII-1 Comparison of CPI's



CHAPTER VIII

INVESTMENT

Introduction

The necessary concommitant of the rapid economic growth in Japan has been an investment rate unusually high compared to other countries. The ratio of investment to total final demand was 34%, which amounted to 26,257 billion yen in 1970. The investment equation is important in the U.S.A. model because investment is very volatile and it is very sensitive to cyclical economic movement. But in the Japanese model, investment is important not only because of its variation but also because of its magnitude.

The Japanese gross fixed capital formation consists of four main components:

1. 20 sectors of private industry investment
2. Housing construction
3. Government business type investment
4. Seven sectors of government social overhead capital formation.

Various theories and estimation results for (1) and (2) will be discussed in the following sections. Two kinds of investment equations are formulated, and housing investment will be treated differently from other industry investment. All types of government capital formation will be given exogenously.

The Theory of the Investment Equations of the Private Sector

Investment behavior has been investigated in two steps: determination of optimal capital stock and speed of adjustment of the gap between actual capital stock and desired capital stock. According to neoclassical investment theory, we can derive the optimal capital stock from the production function with the assumption of firms' profit maximization behavior. Various distributed lag systems have been developed to investigate the speed of adjustment.

A C.E.S. production function is utilized for this model with labor augmenting technological change. Also, constant returns to scale are assumed in the production function. Some other studies, such as Saito's,[1] use the Cobb-Douglas production function and Hicksian neutral technological change in a Japanese econometric model. The restriction of unitary elasticity of substitution, however, is not only unnecessary but too restricted for disaggregated models like this. Hicksian neutral technical change tells how the production function shifts over time. As it was described in the labor requirement chapter, we are interested in the labor productivity change over time. Therefore, we would rather use labor augmenting technological change.

The production function was described in the labor requirement equation. For convenience, we can rewrite the function without explanation of the variables.

$$(1) \quad Q_t = \beta[\alpha_1 K^{-\rho} + \alpha_2 (g(t)L)^{-\rho} + \alpha_3 M^{-\rho}]^{-\frac{1}{\rho}}$$

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[1]Saito, M. "A General Equilibrium Analysis of Prices and Outputs in Japan." 1953-1965. in The Workings of Econometric Models, ed. by M. Morishima. Cambridge, 1972. pp 147-242.

After solving the production function for K, we can get the optimal capital stock by equating the marginal productivity of capital to the rental rate. The expression for the optimal capital stock is:

(2) $K^* = cR^{-\sigma}Q$

where

$c = \frac{\alpha 1^{\rho}}{\beta 1-\sigma}$ which is constant

R = rental rate

Q = output

α = elasticity of substitution

The next step is to determine the speed of adjustment of the actual capital stock to the optimal stock. This step converts capital theory into investment theory. Investment is assumed to be determined by a weighted distributed lag of change of optimal capital stock and by replacement.

(3) $I_t^G = \sum_{i=o}^{\infty} w_i \, \Delta K_{t-i}^* + \delta K_t$

where

I_t^G = gross investment

δ = depreciation rate

w_i = weight of distributed lag

K_t = actual capital stock at time t.

The actual capital stock, depreciation rate and rental rate, will be discussed in later sections. Substracting replacement from gross investment, we get,

$$(4) \quad I_t^N = \sum_{i=o}^{\infty} w_i \, \Delta K_{t-i}^*$$

where I_t^N = net investment.

The Koyck lag system is employed with two assumptions:

1. the sum of the weights is unity.
2. after the first two periods all consecutive weights are declining geometrically, at the rate λ .

More formally, these assumptions can be expressed by

$$(5) \quad I_t^N = w_o \, \Delta K_t^* + w_1 \, \Delta K_{t-1}^* + w_1 \lambda \, \Delta K_{t-2}^* + w_1 \lambda^2 \, \Delta K_{t-3}^*$$

$$+ w_1 \lambda^3 \, \Delta K_{t-4}^* + \ldots\ldots + u_t$$

where

$$w_1 \lambda = w_2$$

$$w_1 \lambda^2 = w_3$$

$$w_1 \lambda^{n-1} = w_n$$

$$\sum_{i=1}^{\infty} w_i = 1$$

u_t = disturbance term.

Equation (5) has an infinite tail. Considering the tail, we can rewrite it without the disturbance term as follows:

$$(5') \quad I_t^N = w_o \, \Delta K_t^* + w_1 \sum_{i=1}^{t-1} \lambda^{i-1} \, \Delta K_{t-i}^* + w_1 \sum_{i=t}^{\infty} \lambda^{i-1} \, \Delta K_{t-i}^*$$

The last term of the equation (5') can be re-expressed as

$$\lambda^{t} \sum_{i=t}^{\infty} w_1 \lambda^{i-1-t} \Delta K^{*}_{t-i} = \lambda^{t} \eta_o$$

Therefore, we could have the regression equation from (5') as follows:

$$(6) \quad I^{N}_{t} = w_o \Delta K^{*}_{t} + w_1 \sum_{i=1}^{t-1} \lambda^{i-1} \Delta K^{*}_{t-i} + \lambda^{t} \eta_o + u_t$$

All parameters, η_o, w_o, w_1, and λ could be estimated by nonlinear iterative method.

Unfortunately, the results of the regression on this equation were not good. Some of the coefficients on the first and second term had a negative sign, which is not reasonably interpretable. We could delete the first term which has negative sign. But the second term cannot be deleted because if it is deleted the last term is also meaningless.

Therefore, the equation is reformulated as follows:

$$\text{Let} \quad \sum_{i=o}^{t-1} \lambda^{i} \Delta K^{*}_{t-i} = X_t$$

$$\text{and} \quad \sum_{i=o}^{t-1} \lambda^{i} \Delta K^{*}_{t-i-1} = X_{t-1}$$

Then the equation (6) can be written as

$$(6') \quad I^{N}_{t} = w_o X_t + (w_1 - w_o\lambda) X_{t-1} + \lambda^{t} \eta_o + u_t$$

The equation (6') allows negative sign on the coefficient of the second term. The negative sign on the second coefficient simply says that the lag weight at period 1 declines more than by the geometric declining factor. For regression and forecast, the independent variable matrix is easily generated by the relation, $X_t = \Delta K_t^* + \lambda X_{t-1}$. Therefore, we can save the computer space by storing only the value of X of the previous year.

The regression equation (6') shows that λ cannot be estimated by the ordinary least square method. One way out of this problem is to use the maximum likelihood method, a non-linear iterative search procedure. We can search for the value of λ, lying between zero and unity which gives the smallest sum of squared residuals.

If we substitute $cK^{-\sigma}Q$ for K^*, we notice that there is another non-linear parameter to be estimated. The estimation procedure is seeking for a combination of λ and σ which gives the maximum likelihood over all possible combinations.

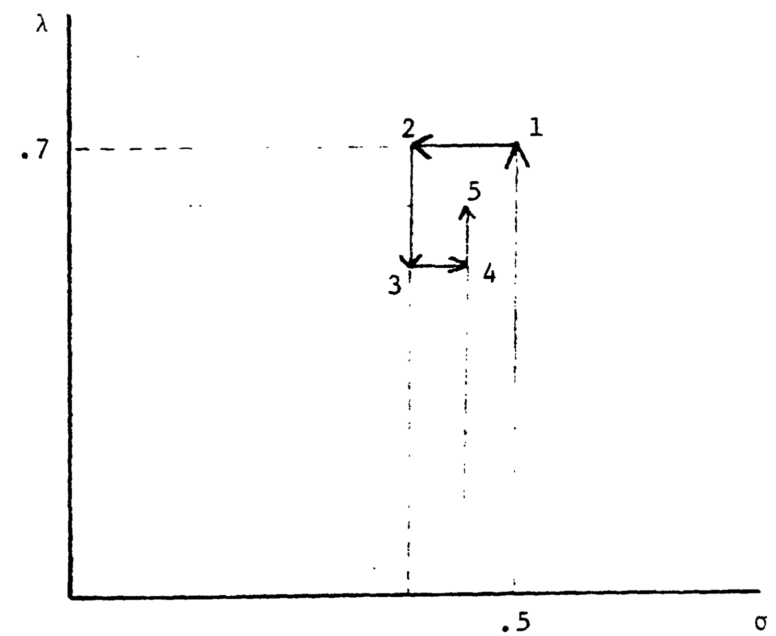

Figure VIII-1. Two Dimensional Searching Procedure

The two dimensional search procedure starts with some fixed elasticity of substitution, for example, with fixed $\hat{\sigma} = 0.5$. We search for the λ which gives the minimum sum of squared residuals. After we get an estimate of λ, we search for the σ with fixed $\hat{\lambda}$. This procedure is continued until λ and σ converge to some value λ^o and σ^o. Actually, those values converge very fast. Three or four iterations are enough to find a stable λ and σ. In the search procedure, σ is assumed to be bounded by zero and 2.

The results of the estimations are shown in Table VIII-1. By all of the standard criteria, the investment hypothesis performs well except for three sectors. For these, an alternative investment formulation which will be described in the next section is tried.

Goodness of fit is high enough to produce a reasonable forecast. Almost all of the sectors have an R^2 greater than 0.95. A few sectors have an R^2 around 0.8. The Durbin-Watson statistics are all satisfactory. For some sectors, we delete the first term in the regression equation (6). In that case, the weight of the current year is zero, and the lag weight begins in the (t-1)st period, declining geometrically. All of the lag weights can be calculated by using the coefficients of the regression equation and the constraint $\Sigma w_i = 1$. All of the distributed lag coefficients are positive. Also, the pattern of the lag seems to be reasonable except for a few sectors which have a very slowly declining lag system. For those sectors, we got unreasonably high λ. Therefore, we constrained λ by 0.9 for those sectors. The estimates of the elasticity of substitution are generally less than unity, which corresponds to the general results of other studies.

TABLE VIII-1. INVESTMENT EQUATION REGRESSION RESULTS

Industry Name	Coef 1	Coef 2	Coef 3	σ	λ	R^2	D.W.
1. Agriculture, Forestry		0.594	19.063	0.115	0.927	0.9581	2.1863
and Fishery		22.799	0.324				
3. Foods and Tobacco	0.164	0.334	159.027	0.650	0.900	0.9118	1.5745
	1.111	2.017	5.811				
4. Textile	0.291	0.059	-48.633	0.450	0.936	0.8895	1.9657
	2.797	0.538	-1.632				
5. Pulp and Paper	0.255	0.382	103.201	0.451	0.612	0.9534	2.5390
	3.296	4.684	3.421				
7. Primary Metals	0.277	0.461	390.068	0.329	0.605	0.9567	1.3444
	4.151	6.464	2.424				
8. Metal Products	0.293	0.360	70.031	0.450	0.681	0.9723	1.5223
	2.851	3.264	3.014				
9. Non-electrical Machinery	0.218	0.082	101.785	0.379	0.718	0.9828	2.5785
	10.743	3.875	5.320				
10. Electrical Machinery	0.180	0.034	491.727	0.195	0.596	0.8784	1.4545
	5.206	0.933	6.349				
11. Transportation Equipment	0.315	0.283	392.528	0.276	0.554	0.8691	1.5834
	1.759	1.462	1.845				
12. Miscellaneous Manufacture		0.791	390.444	0.420	0.675	0.9697	1.3962
		37.372	3.621				
13. Construction		0.093	39.752	0.100	0.900	0.9333	0.8937
		16.688	1.008				

TABLE VIII-1. CONTINUED

Industry Name	Coef 1	Coef 2	Coef 3	σ	λ	R^2	D.W.
14. Electricity, Gas and	1.025	0.457	368.079	0.384	0.845	0.9740	1.7892
Water Supply	3.441	1.324	8.874				
16. Real Estate		0.237	35.424	0.138	0.900	0.9453	1.7199
		19.577	1.214				
17. Transport & Communication	0.415	-0.097	53.196	0.051	0.845	0.9786	1.6377
	3.988	-0.866	1.096				
18. Finance and Insurance	0.003	0.150	120.756	0.264	0.896	0.9022	1.6158
	0.069	2.608	9.775				
19. Other Services	0.068	0.230	146.114	0.311	0.900	0.9680	1.4016
	0.601	1.788	2.369				

Alternative Investment Equation Formulation

The accuracy of capital stock information may affect the performance of the investment equation in the previous section. The dependent variable of that regression equation is net investment, which is derived by subtracting replacement from gross investment. If the capital stock estimation or the depreciation rate estimation is not accurate, the dependent variable can be affected very much, because the dependent variable is made by subtracting the calculated replacement from the gross investment.

Fortunately, the formulation of the previous section performs pretty well except in the following three sectors:

1. Mining
2. Chemical manufacturing, and
3. Wholesale and retail trade.

It can be believed that the capital stock information for those sectors is not accurate. The unreliability of capital stock information and the continuous bad performance of the chemical manufacturing industry equation require another formulation of the investment equation which does not need the capital stock information.

In the alternative formulation of the investment equation, capital stock is going to be estimated in the regression process, rather than using the given historical data of capital stock. The capital stock estimation method, the two bucket reservoir system, will be described in the next section. The idea involved in this new formulation is based on the two bucket reservoir system of capital stock.

Let us say that there was capital stock S_o in the initial year and the ratio of the first class capital stock to the total capital stock in the initial year is a. Then the first class capital stock in year t is,

$$(1)\ S_{1,t} = a\ S_o\ (1-\delta)^t + \sum_{i=o}^{t-1} I_{t-i}\ (1-\delta)^i$$

where δ = depreciation rate.

The first term stands for the remnants from the intital first class capital stock at time t. The second term stands for the increase in capital stock due to the investment I_t since the initial year, some part of which was depreciated by δ each year. The amount of depreciation in the first class capital stock will be added to the second class capital stock.

The second class capital stock in year t can be expressed as follows:

$$(2)\ S_{2,t} = b\ \ S_o\ (1-\delta)^t + t\ a\ S_o\ (1-\delta)^{t-1}\ \delta + \delta \sum_{i=1}^{t-1} i\ (1-\delta)^{i-1}\ I_{t-i}$$

where b = 1 - a.

The first term is the remnant of the second class capital stock of the initial year at time t. The second term is the remaining part of the capital stock which came from the first term of the first class capital stock equation (1). Similarly, the third term is the remaining part of the capital stock which came from the second term of the first capital stock equation.[1]

Now the actual capital stock at year t is the sum of these two bucket capital stocks.

$$S_t = S_{1,t} + S_{2,t}$$

$$= a\ S_o\ (1-\delta)^t + \sum_{i=o}^{t-1} I_{t-i}\ (1-\delta)^i + b\ S_o\ (1-\delta)^t + t\ a\ S_o \delta (1-\delta)^{t-1}$$

$$+ \delta \sum_{i=1}^{t-1} i\ (1-\delta)^{i-1}\ I_{t-i}$$

Rearranging the equation,

$$(3)\ S_t = S_o\ (1-\delta)^t + t\ a\ S_o\ \delta(1-\delta)^{t-1} + \sum_{i=o}^{t-1} I_{t-i}\ (1-\delta)^i$$

$$+ \delta \sum_{i=1}^{t-1} i\ (1-\delta)^{i-1}\ I_{t-i}$$

---

[1]The form of the equation can be explained by the inductive method. That is not a real equation but an identity following definitions in the two bucket reservoir system of capital.

The reason why we have the t factor in the second term may not be clear at first glance. The capital stock which has existed from the initial year was continuously discounted by the factor, $(i - \delta)$, whether it is in the first class bucket or in the second bucket. Intuitively, at time t there have been flows of the initial capital stock from the first class bucket to the second class bucket t times. Whether it came earlier to the second class bucket or later does not affect the form of $S_o\ (i - \delta)$. Because it is depreciated by $(1 - \delta)$ each year whether it was in the first bucket or in the second class bucket. The factor i in the third term can be understood the same way. The newly invested capital stock at time t - i has flowed over to the second class bucket i times and it has depreciated by i - 1 times whether it came to the second class bucket earlier or later.

The optimal capital stock in this formulation has the same form $K^* = cR^{-\sigma}Q$. The new formulation assumes that gross investment at time t is some fraction of the gap between the desired capital stock and the actual capital stock.

$$(4)\quad I_t^G = \beta(K_t^* - S_t)$$

Substituting (3) into (4), and adding a constant term, γ , the alternative formulation looks like

$$(5)\quad I_t^G = \gamma + \beta K_t^* - \beta S_o (1-\delta)^t - \beta S_o\, a\, t\, \delta (1-\delta)^{t-1}$$

$$- \beta \sum_{i=o}^{t-1} (1-\delta)^i I_{t-i}^G - \beta\delta \sum_{i=1}^{t-i} i (1-\delta)^{i-1} I_{t-i}^G$$

After rearranging this equation, we end up with the final regression equation:

$$(6)\quad I_t^G = \gamma + \beta c R_t^{-\alpha} Q_t - \beta S_o V_1 - \beta V_2$$

where

$$V_1 = (1-\delta)^t + a\, t\, \delta(1-\delta)^{t-1}$$

$$V_2 = \sum_{i=o}^{t-1} (1-\delta)^i I_{t-i}^G - \delta \sum_{i=1}^{t-1} i (1-\delta)^{i-1} I_{t-i}^G$$

This equation allows us to indentify γ, β , c, and S_o, from the regression coefficients, with the assumption of an appropriate value for a.[1] σ is gotten by the iterative scanning method. This form of the equation has an advantage in computing the regression and in forecasting. We do not have to store all the historical values of the actual capital stock. The information we have to store is current investment and the value of each term of the equation. Therefore, we can save a lot of computer time and space.

The regression results of the three sectors with the alternative investment formulation are very good. When we apply equation (6') on page 113 to the mining sector we get a very low R^2, 0.28. But with the alternative formulation R^2 is 0.874, despite two insignificant t statistics. The R^2's in the other two sectors are also high, and all coefficients are significantly different from zero. The signs of the coefficients are all correct and the magnitude of the coefficients are all reasonable. Mining has a slow adjustment rate of desired to actual capital stock, while Chemicals and Trade have relatively fast adjustment rates. Also, the autocorrelation problems are not serious.

The regression results of these three sectors are:

Mining

$$I_t^G = 229.2 + 0.19\ DK - 203.1\ V_1 - 0.057\ V_2$$

$$(2.68) \quad (0.33) \quad (-1.69) \quad (-0.24)$$

$$R^2 = 0.874$$

$$D.W. = 1.28$$

---

[1]The value of a will be explained in the capital stock section. "a" can also be estimated in this equation by regression, but it causes loss of another degree of freedom.

rate of adjustment (β) = 0.0566

depreciation rate (δ) = 0.21

$\sigma = 0.346$

Chemical Products

$$I_t^G = 622.9 + 0.334\ DK - 743.4\ V_1 - 0.39\ V_2$$
$$(1.71) \quad (4.20) \quad (-1.96) \quad (-3.49)$$

$R^2 = 0.928$

D.W. = 1.42

$\beta = 0.39$

$\delta = 0.13$

$\sigma = 0.006$

Wholesale and Retail Trade

$$I_t^G = 551.6 + 0.283\ DK - 758.5\ V_1 - 0.311\ V_2$$
$$(1.81) \quad (3.04) \quad (-1.92) \quad (-1.64)$$

$R^2 = 0.992$

D.W. = 1.57

$\beta = 0.31$

$\delta = 0.10$

$\sigma = 0.120$

where

$$DK = R^{-\sigma} Q.$$

$$V_1 = (1-\delta)^t + b\ t\ \delta (1-\delta)^{t-1}$$

$$V_2 = \sum_{i=o}^{t-1} (1-\delta)^i\ I_{t-i}^G - \delta \sum_{i=1}^{t-1} i\ (1-\delta)^{i-1}\ I_{t-i}^G$$

Capital Stock

Even though the historical capital stock data by twenty industries are available, they are re-estimated by the two bucket reservoir system,[1] because we want the capital stock which represents the productive capacity rather than the book value of the stock. Also, for forecasting, we need the depreciation rate for the future, which must be estimated by using the historical capital stock and the replacement data. Once we estimate the depreciation rate, which has a functional form, the capital stock series and gross investment and net investment data should be consistent with that depreciation rate. Therefore, it is inevitable that we must recalculate the capital stock data. Those recalculated capital stock and the depreciation rate were used in the estimation of the investment equations.

The two classes of capital stock are

$$K_{1,t} = K_{1,t-1} + V_t - \delta_t K_{1,t-1}$$

$$K_{2,t} = K_{2,t-1} + \delta_t K_{1,t-1} - \delta_t K_{2,t-1}$$

where

V_t = gross investment

δ_t = depreciation rate.

Total capital stock at time t is

$$K_t = K_{1,t} + K_{2,t}$$

---

[1] Almon, C. et al. 1985: Interindustry Forecasts of the American Economy. Lexington Books, 1974. Lexington, pp 67-71.

Notice that the information we need to calculate the capital stock series is the capital stock of the initial year, the ratio of the first class capital stock to the total capital stock in the initial year, gross investment series, and the depreciation rate. For this information, we rely on the existing capital stock data. We use the capital stock value in 1954 as the initial stock value. The error in the initial year capital stock estimate is not very important, because most of the variation in the data series will be caused by the investment data, which is actually used to generate the capital stock series.

The various ratios of the first class capital stock to the total capital stock in the initial year were tried. 0.6 is chosen as the ratio because it gives the best fit for the depreciation equation which will be described later. If the economy is in equilibrium, the ratio of first class capital stock to total capital stock is 0.5. Considering that in 1954 the Japanese economy was not in an equilibrium situation, the ratio, 0.6 is probably appropriate.

The depreciation rate is calculated by using the historical capital stock and replacement. Gross investment is net increase in capital stock plus replacement. For forecasting purposes, we assume that the depreciation rate is some function of time. The following figure shows an appropriate shape for the depreciation rate in almost all the industries.

Replacement requirements are determined by losses in efficiency of existing durable goods as well as actual physical disappearance or retirement of capital goods.

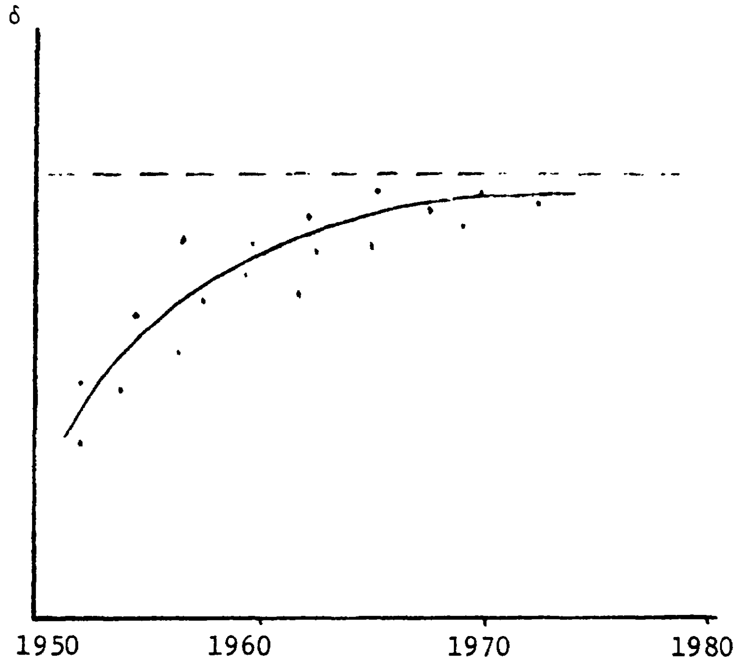

Figure VIII-2 Depreciation Rate Schedule

The Japanese economy has experienced rapid growth which was possible only through a rapid increase in the capital stock. Therefore, we postulate that as the economy grows, the relative efficiency of the old capital stock with its old technology goes down. Hence, the replacement requirement rate is growing until the economy reaches the advanced situation. After that, the depreciation rate remains constant.

For this kind of curve, we could use the following function:

$$\delta_t = v - we^{-ct}$$

where

t = time

δ_t = depreciation rate at time t

c,v,w = constants.

As t increases, the depreciation rate approaches v asymptotically. As c appears in nonlinear form, several iterative regressions were done to pick up the best c. For simplicity 0.1 is chosen as c for all industry depreciation functions. However, a different c for different industries does not improve the regression very much.

v and w are estimated by the ordinary least square method with the known value of c. As expected, the sign of the coefficient turned out to be negative for all sectors but one. In Electricity, gas, and water supply, w is negative. If -w is greater than zero, the curve is downward sloping toward an asymptotic line.

Rental Rate

The rental rate is the same concept as Jorgenson's[1] user cost of capital, except that we assume a no-tax-economy. According to Jorgenson's basic theory, the firm's object is to choose gross investment at all points in time so as to maximize the present discounted value of its net cash inflow. This can be expressed as

$$(1)\ \max_I \int_0^\infty (pQ - wL - qI - pM)e^{-(\delta + r - u)}dt$$

---

[1] Jorgenson, D.W. Capital Theory and Investment Behavior. AER. 53, 1963.

Jorgenson, D.W. Anticipations and Investment Behavior. In J.S. Dusenbery, G. Frown, L.R. Klein, and E. Kuh, eds. The Brookings Quarterly Econometric Model of the United States. Amsterdam, North-Holland.

where

$I = K_1 + K_2$

w = wage rate

p = price of output

q = price of capital goods

r = interest rate

u = expected rate of increase of prices

δ = depreciation rate.

M = materials

The necessary condition for a maximum of (1) with respect to capital is

$$(2) \quad \frac{\partial Q}{\partial I} = \frac{q}{p} (\delta + r - u)$$

Therefore, the rental rate in this investment study is defined by equation (2) following the marginal productivity principle.

Now we need an explanation of each component of the rental rate. Price of output in investment study is usually value added price. As mentioned before, we use price of gross output rather than value added price.[1]

Because we have 156 sector price series for output, we have to aggregate to the twenty sector classification level. The output of each industry by the 156 sector classification is used as the weight

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[1]See Chapter IV. Labor Requirement.

for that industry in determining the price of the output by twenty sector classification.

$$p_i^{20} = \sum_{j \varepsilon n_i} w_{ij} \; p_j^{156}$$

where

$$w_{ij} = \frac{Q_{ij}^{156}}{\sum_j Q_{ij}^{156}}$$

p_i^{20} = price of the i^{th} output by 20 sector classification.

p_j^{156} = price of the j^{th} output by 156 sector classification.

Q_{ij}^{156} = output of the j^{th} industry by 156 sector classification, which belongs to the i^{th} industry by 20 sector classification.

n_i = set of industries belonging to the i^{th} industry by 20 sector classification.

The prices of capital goods are derived by using the B matrix.

$$q_i = \sum_{j=1}^{156} b_{ji} \, p_j^{156}$$

For nominal interest rate, we use the loan rate of commercial banks.[1] The expected inflation rate is taken to be a simple weighted sum of past inflation rates.

$$u = \sum_{i=o}^{3} w_i \, (\Delta p_{t-i} \,/\, p_{t-i-1})$$

---

1. See Appendix 1 for data description.

The weight system employed is

$$w_o = .4, w_1 = .3, w_2 = .2, w_3 = .1$$

The physical depreciation rate is explained in the capital stock section.

Housing Construction

The amount of spending on housing construction is quite high, and the nature of investment in housing is different from other investment, so it is necessary to formulate a separate equation for this sector. Like a usual investment equation, housing investment will be explained by two steps: (1) optimal stock determination and, (2) adjustment of optimal stock to actual stock. The desired housing stock has been explained by an income variable, a relative price variable, and financial market conditions. All of these three variables were tried but only disposable income had the right sign, and it dominated the regression. Relative price and the interest rate showed the wrong sign and were insignificant. Therefore, we simply assume that the desired housing stock is a function of disposable income.

The actual stock is calculated by the INFORUM method:

$$(1)\ S_t = \sum_{i=o}^{t-1} (1 - \delta)^i I_{t-i} + S_o (1 - \delta)^t$$

where

t = time, $t \geq 1$.

S_o = initial stock

δ = depreciation rate

I_t = new housing investment at time t.

For the adjustment procedure, we assume that the housing investment in year t + 1 is some fraction α of the gap between the desired and the actual stock at the end of year t. So, the equation is

$$(2)\ I_{t+1} = \alpha[\beta Y_{t+1} - S_t]$$

where

Y_t = disposable income.

Because the decision unit for housing investment is the household, we divide all the variables by the number of households. Finally, our regression equation is

$$(3)\ \left(\frac{I}{H}\right)_{t+1} = \alpha\left[\beta\left(\frac{Y}{H}\right)_{t+1} - \left(\frac{S}{H}\right)_t\right]$$

Substituting (1) into (3), we get

$$(4)\ \left(\frac{I}{H}\right)_{t+1} = \alpha\left[\beta\left(\frac{Y}{H}\right)_{t+1} - \sum_{i=o}^{t-1}(1-\delta)^i\left(\frac{I}{H}\right)_{t-i} - \left(\frac{S}{H}\right)_o(1-\delta)^t\right]$$

Because δ is unknown, we should estimate this equation with a search procedure over reasonable values of δ. The best regression result is

$$\left(\frac{I}{H}\right)_t = \underset{(5.398)}{.133}\left(\frac{Y}{H}\right)_t - \underset{(.608)}{.015}\sum_{i=o}^{t-1}(1-\delta)^i\left(\frac{I}{H}\right)_{t-i} - \underset{(3.092)}{.052}(1-\delta)^t$$

where

δ = 0.02

R^2 = 0.993

D.W. = 1.164.

Even though it has an insignificant coefficient, all signs are correct and the R^2 is very high. The D.W. statistic indicates the existence of autocorrelation. The RHO adjustment procedure will be performed for autocorrelation correction in forecasting.

Per household housing investment is converted to total housing investment. Due to the high R^2 in the per household regression, the total housing investment shows very good fit.

CHAPTER IX

Trade Equations

As mentioned in the introduction, this model is designed to be linked to the World Trade Model. The connection between the trade model and the national models will be through the trade equations.[1]

A special formulation and estimation technique for the trade equations have been developed by INFORUM, which will be used here. Therefore, the regression results will be presented without going into the motivation back of the equation or into the estimation technique.[2]

The equations for commodity trade are:

(1) Imports

$$M_t = (a + bU_t)\ (P^w_t \ /\ P^d_t)^{\eta}$$

where

M_t = imports of a commodity in year t

U_t = domestic use of a good in year t. Domestic use is defined by use = output - export + import.

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[1]Actually, the import equation is used to connect the trade model and the national models. The export equation is not necessary for the connection because exports are imports from the buyer's point of view. For details, see Nyhus, D.E., "The Trade Model of a Dynamic World Input-Output Forecasting System" INFORUM Research Report No. 14. 1975

[2]For the theory and estimation technique, see Almon, C., et al. Chapter 6.

P^w_t = world price of a good as seen by Japan, as estimated in the trade model.[1]

P^d_t = domestic price of a commodity.

(2) Export

$$X_t = (a + bD_t)\ (P^d_t \ / \ P^w_t)^{\eta}$$

where

X_t = exports of a commodity in year t

D_t = world demand, which is estimated in the trade model in year t.[2]

P^w_t = world export price of a good, as estimated in the trade model.

The regression results are in Tables IX-1 and IX-2. In both of

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[1]In the trade model, the world price of a good as seen by Japan is

$$P^w_{Jt} = \sum_i M_{it}\ P_{it}$$

where

P^w_{Jt} = world price of a good as seen by Japan

M_{it} = share of Japanese import of a good from i^{th} country

P_{it} = domestic price of good in i^{th} country.

[2]In the trade model, world demand is estimated using production index of each country. Production indices of each country is aggregated to make world demand.

import and export equations we expect positive sign on b and negative sign on η . Because of the nonlinearity of the equation, the INFORUM technique to estimate the trade equations require _a priori_ information about the price elasticity with which the estimation procedure starts. The basic idea of the estimation procedure is to choose the parameters which maximize the utility function which depends on the R^2 and the deviation of the price elasticity from the given information of the price elasticity. The information of the price elasticity are borrowed from the U.S.A. trade equation estimation.

In import equation estimation, the estimated price elasticities are not very different from the _a priori_ price elasticity except processed foods, chemical products, industrial machinery, and transportation equipments. Japan does not import those products very much. Because the large proportion of these products are produced domestically with protection, the imported products are not really competitive with the domestic products. Hence, the estimated price elasticities are generally much lower than the a priori elasticities. Generally, estimated export price elasticities are closer to the _a priori_ price elasticities than import price elasticities. The aggregate relative price elasticity of import weighted by 1972 imports is -0.594 and that of export is -2.839. As is generally believed, the Japanese imports are price inelastic since the Japanese imports are mainly raw materials. On the other hand, the Japanese exports are very price elastic. Because the Japanese exports are usually manufactured goods, Japan should compete with other countries for exports. For sectors whose import ratio to domestic use is greater than 0.9, such as Petroleum crude, Iron ore, and Non-metalic minerals, the import equations are not estimated. If these sectors are included in the aggregate price elasticity calculation, the price elasticity of import would be much lower. For those sectors, we calculate import requirement to be used as imputs and final demands. We cannot use the regression equation for those sectors, since with the regression equation we simply regress the imports on the domestic use which is almost equal to the imports. The price elasticities for those sectors should be low because those are non-competitive imports; the alternative to importing them is to not use them, not to produce them domestically.

The coefficient on domestic use, b, should be positive in the import equations. This expectation turned out to be right for most cases, and the coefficients are generally significant. Using the coefficient b, point demand elasticities at 1972 were calculated and shown in the tables. The aggregate demand elasticity of export weighted by 1972 exports are 1.84 and the aggregate demand elasticity of import weighted by 1972 imports is 1.44. For the sectors which have wrong sign on b, we use the time trend equation:

$$\log M_t = a + bt + c \log \frac{P_t^w}{P_t^d}$$

$$\log X_t = a + bt + c \log \frac{P_t^d}{P_t^w}$$

where t is time trend.

The regression results of the sectors which have time trend equations were shown at the end of the Tables IX-1 and IX-2.

R^2 is good enough to produce reasonable forecasts. Generally, R^2 is high for the sectors whose imports or exports are large. Conversely, it is hard to predict the imports or exports of the sectors which have small amount of imports and exports. In the regression tables the standard errors of estimation (SEE) are shown. In order to see how the standard errors could affect the forecast of output and use level, we calculate the percentage of the standard error of export over output and the percentage of the standard error of import over use level. Only five sectors have standard error ratio greater than 5% for import equations and seven sectors for export equations.

Imports and exports of transportation and other services are related to the total amount of imports and exports. The regression results are:

a. Export of transportation

$$X = -67.64 + 0.19\ TX$$
$$(-5.198) \quad (54.980)$$

where

TX = total amount of exports

$\bar{R}^2 = 0.9531$

D.W. = 1.1028

b. Exports of Other Services

$$X = 202.78 + 0.05\ TX$$
$$(6.566) \quad (9.628)$$

$\bar{R}^2 = 0.8843$

D.W. = 0.5739

c. Imports of Transportation

$M = -28.17 + 0.07\ TM$

(-3.417) (31.508)

where TM = total amount of imports

$\bar{R}^2 = 0.9793$

D.W. = 1.2675

d. Imports of Other Services

$M = -115.57 + 0.08\ TM$

(-9.923) (28.547)

$\bar{R}^2 = 0.9748$

D.W. = 1.7447

TABLE IX-1. REGRESSION RESULTS OF IMPORT EQUATION

SECTOR,	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMPORTS
1 GRAIN	-.50	-.50	145.7 (1.84)	.009 (.25)	.105	.362	.264	29.059	1.495	184.
2 OTHER CROPS	-.27	-.27	-811.3 (-6.75)	.795 (10.98)	2.655	.903	.342	49.207	3.008	561.
3 FRUITS	-.27	-.27	-30.6 (-3.25)	.202 (10.01)	1.287	.884	.231	7.410	1.089	118.
4 OTHER CROPS FOR INDUSTRIAL P	-.22	-.22	-346.4 (-3.67)	1.503 (5.83)	3.007	.739	.576	30.196	8.743	180.
6 LIVE STOCKS,POULTRY	-.27	-.27	-2.8 (-1.65)	.009 (4.84)	1.440	.562	.366	1.167	.114	12.
8 SERICULTURE	-.95	-.27	-4.7 (-1.05)	.054 (1.57)	3.264	.595	.482	.459	.364	3.
10 FORESTRY	-.50	-1.00	-5.8 (-1.79)	.028 (4.15)	1.560	.468	.112	.845	.143	11.
12 LOGS	-.60	-1.65	-860.2 (-6.75)	1.257 (9.81)	2.707	.913	.494	34.523	3.181	634.
14 FISHERIES	-1.00	-1.00	-56.4 (-5.26)	.116 (8.38)	1.945	.766	.309	6.459	.645	81.
15 WHALING	.00	-1.00	-.4 (-.42)	.088 (2.69)	1.272	.384	.557	.539	2.452	2.
16 INLAND WATER FISHERIES	-1.00	-1.00	-2.9 (-4.06)	.128 (8.03)	1.749	.823	.398	.400	.763	6.
17 COKING COAL	-1.00	-1.00	-349.9 (-10.13)	1.408 (16.40)	1.992	.955	.518	23.749	4.761	432.
20 ORES & CONCENTRATES OF NON-F	-.22	-.22	-81.1 (-7.59)	1.011 (33.20)	1.189	.990	.725	12.746	2.527	429.
22 NATURAL GAS	-.22	-.22	-6.4 (-8.70)	.574 (15.29)	1.621	.953	.367	.765	2.627	15.
23 LIME STONE SAND GRAVEL	-.22	-.22	1.9 (2.78)	.021 (17.28)	.920	.964	.271	1.072	.103	25.
26 CARCASSES	-.70	-1.63	-14.4 (-1.10)	.168 (7.09)	1.114	.628	.352	14.486	1.725	204.
27 MEAT PRODUCT	.00	-1.63	1.1 (1.67)	.004 (.92)	.480	-.016	.402	.725	.300	3.
28 DAIRY PRODUCT	-2.10	-1.63	-4.1 (-2.34)	.038 (8.64)	1.230	.663	.143	3.908	.680	36.
29 VEGETABLE & FRUIT PRESERVED	-.20	-1.63	18.2 (5.49)	.045 (2.82)	.429	.246	.180	3.905	1.281	39.
30 SEA FOOD PRESERVED	-.50	-1.63	-22.6 (-2.79)	.121 (9.75)	1.249	.875	.639	9.640	1.031	134.

TABLE IX-1(CONTINUED). REGRESSION RESULTS OF IMPORT EQATION

SECTOR,	PRICE ELASTICITY ESTIMATE	A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMPORTS
32 BAKERY PRODUCTS	.00	-1.63	6.9 (.95)	.011 (1.08)	.579	.016	.404	2.672	.299	21.
33 REFINED SUGAR	-.80	-1.63	-39.7 (-2.42)	.367 (8.76)	1.315	.724	.454	11.095	2.458	172.
34 OTHER FOOD PREPARED	-.10	-1.63	-8.8 (-1.62)	.031 (6.63)	1.208	.797	.697	5.072	.311	56.
35 PREPARED FEEDS FOR ANIMAL &	-1.63	-1.63	7.9 (3.08)	.004 (.58)	.217	-.082	.488	2.706	.454	10.
36 ALCOHOLIC BEVERAGES	-.70	-1.63	-3.6 (-1.05)	.012 (3.94)	1.241	.622	.278	2.343	.149	20.
37 SOFT DRINK	-1.50	-1.63	-.2 (-.47)	.007 (3.30)	1.098	.131	.293	.658	.192	3.
38 TOBACCO	-.90	-1.65	2.6 (1.91)	.002 (1.21)	.453	.111	.232	.776	.081	6.
39 SILK REELING & WASTE SILK SP	-1.65	-1.65	-65.2 (-4.04)	.508 (5.61)	2.047	.805	.635	10.395	4.140	91.
40 COTTON SPINNING	-1.65	-1.65	-62.7 (-6.31)	.291 (6.89)	4.414	.871	.251	1.750	.628	20.
41 WOOLEN & WORSTED YARN	-2.40	-1.65	-10.8 (-1.30)	.115 (2.33)	2.100	.337	.605	3.855	2.146	27.
42 LINEN YARN	-3.30	-1.65	-.4 (-.97)	.047 (2.02)	2.472	.394	.498	.244	1.709	1.
44 SYNTHETIC FIBER YARN	.00	-1.65	-.1 (-1.64)	.002 (6.09)	1.187	.783	.677	.146	.038	1.
45 SILK & RAYON WEAVING	-1.65	-1.65	-14.5 (-7.57)	.082 (13.77)	1.694	.972	.137	1.409	.325	27.
47 SYNTHETIC FIBERS WOVEN	-1.65	-1.65	-.3 (-.56)	.007 (4.98)	1.094	.732	.150	.676	.121	5.
48 WOOLEN FABRICS WOVEN & FELTS	-1.65	-1.65	-31.8 (-1.97)	.113 (2.70)	2.803	.422	.420	3.198	.730	17.
49 LINEN FABRICS WOVEN	-1.80	-1.65	-3.9 (-3.13)	.346 (4.30)	4.792	.688	.575	.734	5.194	3.
51 KNITTED FABRICS	-1.65	-1.65	-33.8 (-5.42)	.120 (8.21)	1.798	.839	.692	5.613	.888	48.
53 OTHER FIBER PRODUCTS	-2.00	-2.00	-4.1 (-4.51)	.043 (9.80)	1.511	.912	.161	.788	.276	12.
54 FOOTWEAR EXCEPT RUBBER MADE	-1.65	-1.65	-2.2 (-5.08)	.033 (8.53)	1.622	.870	.511	.529	.300	6.
55 WEARING APPAREL	-1.60	-1.65	3.1 (.81)	.014 (3.40)	.868	.508	-.156	4.488	.300	24.

TABLE IX-1(CONTINUED). REGRESSION RESULTS OF IMPORT EQATION

SECTOR,	PRICE ELASTICITY ESTIMATE	A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMPORTS
56 TEXTILE GARMENTS	-1.65	-1.65	-2.7 (-2.56)	.042 (8.01)	1.303	.876	.132	1.162	.419	12.
57 WOOD MILLING	-3.00	-3.00	-35.3 (-3.90)	.073 (11.46)	1.398	.963	.046	6.040	.353	125.
58 WOODEN PRODUCTS	-3.77	-3.77	-3.1 (-3.99)	.014 (6.63)	1.622	.801	.392	.658	.119	6.
59 FURNITURE WOODEN & METAL	-.60	-3.77	-1.2 (-1.59)	.003 (4.07)	1.348	.658	.442	.756	.057	6.
60 PULP	.00	-1.65	13.8 (1.50)	.097 (4.17)	.791	.621	.620	7.624	1.423	68.
61 PAPER	-1.65	-1.65	-5.9 (-1.66)	.017 (3.53)	1.496	.371	.019	3.336	.311	11.
62 ARTICLES OF PAPER & PAPERBOA	.00	-3.77	-.9 (-1.82)	.005 (10.77)	1.120	.920	.631	.602	.038	10.
63 PRINTING & PUBLISHING	-.80	-3.77	-7.9 (-1.15)	.016 (3.85)	1.334	.531	.748	5.349	.276	27.
64 LEATHER MANUFACTURES & FUR P	-.80	-3.77	-3.7 (-4.28)	.142 (9.02)	1.556	.852	.194	.894	1.208	13.
65 LEATHER PRODUCTS EX. FOOTWEA	-3.00	-3.77	-2.7 (-4.08)	.074 (8.78)	1.506	.901	.091	.554	.517	7.
66 ARTICLES OF RUBBER	.00	-3.77	-2.1 (-1.63)	.014 (5.28)	1.277	.729	.686	1.404	.200	13.
67 BASIC INORGANIC INDUSTRIAL C	-1.65	-1.65	-.8 (-7.35)	.007 (16.05)	1.461	.944	.294	.101	.029	2.
68 BASIC ORGANIC INDUSTRIAL CHE	-.70	-1.65	15.2 (9.54)	.024 (12.60)	.679	.836	.134	2.753	.207	49.
69 SYNTHETIC DYESTUFF	-.10	-1.65	.9 (.48)	.214 (4.82)	.930	.682	-.341	2.114	3.631	21.
70 BLASTING POWDER	-1.50	-1.65	-2.7 (-3.33)	.165 (5.75)	1.718	.684	.237	1.181	3.041	5.
72 MATERIALS OF SYNTHETIC FIBER	.00	-1.65	-.4 (-.68)	.008 (5.74)	1.100	.761	.579	.942	.164	6.
73 PLASTIC	-1.40	-1.65	-.9 (-.54)	.033 (9.09)	1.046	.817	.437	2.011	.343	22.
74 CHEMICAL FERTIRIZER	.00	-1.65	6.0 (1.07)	.067 (2.31)	.710	.303	.716	3.015	1.379	27.
75 MISCELLANEOUS BASIC CHEMICAL	.00	-1.65	-8.0 (-1.16)	.126 (6.17)	1.147	.788	.311	7.863	1.575	84.
76 VEGETABLE & ANIMAL OIL	.00	-1.65	28.8 (5.88)	.039 (2.28)	.489	.295	.688	9.246	1.303	56.

TABLE IX-1(CONTINUED). REGRESSION RESULTS OF IMPORT EQATION

SECTOR,	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMPORTS
77 COATINGS	.00	-1.65	1.2 (1.37)	.017 (3.17)	.766	.474	-.208	1.130	.458	6.
78 MEDICINE	-1.65	-1.65	-6.8 (-1.35)	.081 (12.73)	1.081	.950	.388	5.917	.529	104.
79 OTHER CHEMICAL PRODUCTS	-.20	-1.65	16.9 (1.39)	.148 (8.08)	.894	.840	-.324	13.719	1.419	162.
80 PETROLEUM REFINERY PRODUCTS	-1.65	-1.65	9.6 (.65)	.087 (11.22)	.964	.906	-.160	20.310	.686	306.
81 COAL PRODUCTS	.00	-1.65	.8 (1.07)	.001 (.48)	.403	-.083	.385	1.127	.169	0.
82 MISCELLANEOUS ANTISEPTICIZED	-1.65	-1.65	-.1 (-.55)	.011 (1.44)	1.457	.140	.589	.096	.347	0.
83 CLAY PRODUCTS FOR BUILDING U	.00	-3.77	-.3 (-1.03)	.010 (5.21)	1.189	.723	.608	.253	.118	3.
84 GLASSWARE	.00	-3.77	-.0 (-.02)	.017 (5.64)	1.002	.755	.016	1.344	.265	10.
85 POTTERY	-3.77	-3.77	-.6 (-.74)	.015 (2.88)	1.241	.515	.543	.751	.393	4.
86 CEMENT	-.20	-3.77	-.6 (-5.27)	.005 (15.24)	1.321	.954	.605	.101	.022	2.
87 OTHERNON-METALLIC MINERAL PR	-.20	-3.77	2.4 (3.33)	.002 (2.69)	.560	.397	.498	.833	.052	6.
90 FERROALLOYS	-2.00	-2.00	-3.6 (-1.90)	.075 (5.60)	1.372	.745	-.629	2.532	1.427	10.
91 STEEL INGOT	-2.20	-2.00	-1.0 (-2.17)	.001 (4.43)	1.532	.770	-.591	.405	.017	2.
92 HOT-ROLLED PLATES& SHEETS	-2.00	-2.00	2.7 (.68)	.002 (.90)	.532	-.107	.118	3.958	.230	6.
93 STEEL PIPE & TUBE	-1.60	-2.00	.2 (.63)	.003 (3.26)	.865	.021	-.343	.445	.145	1.
94 COLD-ROLLED & COATED STEEL P	-6.00	-6.00	.6 (7.81)	-.000 (-.60)	-.113	.825	-.234	.087	.006	1.
95 CAST & FORGE IRON	-2.00	-2.00	.0 (.38)	.000 (5.77)	.952	.748	-.086	.038	.003	0.
96 NONFERROUS METAL INGOTS	-.40	-1.65	9.5 (.14)	.392 (5.93)	.983	.744	.587	61.713	4.340	547.
97 COPPER BRASS PRODUCTS	-1.20	-1.65	-2.9 (-4.27)	.024 (8.50)	1.809	.872	.511	.547	.207	3.
98 ALUMINUM EXTRUDED PRODUCTS	-1.65	-1.65	.7 (2.82)	.008 (5.96)	.807	.472	.441	.490	.132	3.

TABLE IX-1(CONTINUED). REGRESSION RESULTS OF IMPORT EQATION

SECTOR,	PRICE ELASTICITY ESTIMATE	A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMPORTS
99 OTHER NONFERROUS METAL PRODU	-.30	-1.65	2.7 (2.83)	.015 (5.63)	.785	.655	.290	1.471	.215	13.
100 STRUCTURAL METAL PRODUCTS	.00	-3.77	2.6 (2.15)	.004 (4.00)	.748	.600	.413	1.792	.081	15.
101 OTHER METAL PRODUCTS	-.20	-3.77	-1.3 (-1.07)	.012 (10.76)	1.070	.918	.008	1.399	.086	24.
102 POWER GENERATING MACHINARY &	-1.05	-1.05	10.9 (1.45)	.022 (1.87)	.632	.130	.230	7.537	.868	30.
103 MACHINE TOOLS METALWORKING M	.00	-1.05	39.0 (.29)	.153 (.81)	.688	-.035	.897	99.220	17.642	52.
104 INDUSTRIAL MACHINERY	-.40	-5.42	40.3 (4.59)	.030 (8.23)	.694	.867	.339	9.871	.325	152.
105 GENERAL INDUSTRIAL MACHINERY	.00	-5.42	25.6 (4.37)	.033 (5.82)	.634	.767	.297	8.741	.646	84.
106 OFFICE MACHINERY	.00	-5.42	6.4 (1.95)	.078 (2.54)	.505	.353	.803	8.400	7.692	40.
107 HOUSEHOLD MACHINERY	-1.20	-5.42	-10.6 (-5.63)	.053 (7.01)	2.645	.808	.253	.885	.273	8.
108 PARTS OF MACHINERY	-.60	-5.42	2.2 (2.04)	.024 (15.80)	.935	.929	.785	2.022	.159	33.
109 STRONG ELECTRIC MACHINERY	.00	-5.42	-1.0 (-.34)	.023 (7.78)	1.035	.856	.698	3.108	.234	32.
110 HOUSEHOLD ELECTRICAL MACHINE	.00	-5.42	.6 (.55)	.010 (10.67)	.968	.919	.481	1.898	.100	27.
111 OTHER WEAK ELECTRICAL APPLIA	.00	-5.42	19.1 (1.61)	.050 (11.66)	.917	.931	.165	16.257	.385	276.
112 SHIPS & BOATS	.00	-3.77	17.2 (1.93)	.004 (.19)	.114	-.107	.016	10.968	2.109	31.
113 RAILWAY VEHICLES	-.80	-3.77	.4 (.40)	.002 (.80)	.656	-.086	.377	.467	.137	2.
114 PASSENGER MORTOR CAR	.00	-3.77	3.1 (1.49)	.007 (8.96)	.902	.888	.447	3.068	.073	42.
116 MOTORCYCLES & BICYCLES	.00	-3.77	.0 (.22)	.000 (.51)	.658	-.080	.841	.089	.030	0.
117 AIRCRAFTS	.00	-3.77	-34.8 (-4.44)	.694 (15.74)	1.238	.961	.372	8.803	3.375	169.
118 OTHER TRANSPORTATION	-.40	-3.77	-.7 (-1.23)	.026 (3.05)	1.334	.442	.029	.933	.799	2.
119 PRECISION MACHINERY	.00	-3.77	.6 (.17)	.113 (7.88)	.985	.859	.509	4.744	1.281	59.

TABLE IX-1(CONTINUED). REGRESSION RESULTS OF IMPORT EQATION

SECTOR,	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMPORTS
120 PHOTOGRAPHIC & OPTICAL INSTR	.00	-3.77	-9.0 (-1.93)	.120 (6.67)	1.267	.813	.261	4.913	1.379	50.
121 WATCHES & CLOCKS	-.40	-3.77	-5.7 (-1.16)	.186 (6.61)	1.154	.796	-.179	5.050	2.212	47.
122 OTHER MANUFACTURING GOODS	.00	-3.77	-19.7 (-1.59)	.064 (7.08)	1.138	.831	.525	21.072	.826	219.

TABLE IX-1(CONTINUED). REGRESSION RESULTS OF IMPORT EQATION

SECTOR	PRICE ELASTICITIES	CONSTANT(A)	TIME(B)	RBARSQ	RHO	SEE	SEE/USE (%)	1972 IMP
11 CHARCOAL & FIREWOOD	.00	-.072 (-.27)	.226 (3.67)	.555	.152	1.8	13.7	3.
31 GRAIN MILL PRODUCTS	-.68	3.220 (.32)	-.178 (-1.02)	.427	.700	1.9	.1	6.
43 SPAN RAYON YARN	-5.44	4.038 (1.14)	.159 (1.52)	.150	.091	2.7	3.0	0.
46 COTTON & SPUN RAYON FABRICS	.00	2.726 (33.20)	.279 (14.82)	.956	.289	1.2	.4	40.
52 ROPES& FISHING NETS	-2.27	2.877 (2.49)	-.043 (-2.21)	.760	-.200	1.1	1.8	2.
71 SPUN RAYON	-3.74	1.104 (.61)	.014 (.17)	.316	-.031	2.0	1.9	0.
88 PIG IRON	-3.03	7.547 (2.60)	.031 (.44)	-.043	.626	1.8	.1	28.

TABLE IX-2. REGRESSION RESULTS OF EXPORT EQUATION

SECTOR,	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXPORTS
1 GRAIN	-.50	-.50	-54.5 (-1.66)	.730 (1.97)	3.255	.207	.300	15.268	.929	1.
10 FORESTRY	-.30	-1.00	-3.6 (-1.16)	.093 (2.69)	1.587	.194	.654	1.200	.242	7.
12 LOGS	-1.65	-1.65	.3 (.55)	.004 (.65)	.587	.091	.636	.283	.051	1.
21 PETROLEUMS CRUDE	-.22	-.22	-8.5 (-2.25)	.100 (2.42)	5.559	.316	.251	1.129	20.968	5.
23 LIME STONE SAND GRAVEL	-.22	-.22	-7.4 (-3.29)	.090 (3.83)	4.924	.593	.120	.386	.048	2.
25 NON-METALIC MINERALS	-.50	-.22	2.0 (.21)	.019 (.19)	.490	.157	.537	1.986	8.633	5.
27 MEAT PRODUCT	-2.20	-1.63	-.7 (-2.90)	.014 (5.46)	1.800	.586	-.255	.171	.086	1.
28 DAIRY PRODUCT	-1.63	-1.63	-6.1 (-4.61)	.096 (6.43)	2.451	.852	.062	.526	.089	4.
31 GRAIN MILL PRODUCTS	-1.63	-1.63	-28.2 (-2.97)	.392 (3.66)	3.022	.559	.382	4.328	.221	11.
32 BAKERY PRODUCTS	-.50	-1.63	-11.5 (-3.63)	.175 (5.06)	2.665	.593	.445	1.025	.117	7.
33 REFINED SUGAR	-1.63	-1.63	-.3 (-.39)	.009 (1.10)	1.421	.190	.215	.350	.096	1.
34 OTHER FOOD PREPARED	-1.63	-1.63	-20.4 (-2.91)	.384 (4.99)	1.996	.740	.433	2.345	.150	22.
35 PREPARED FEEDS FOR ANIMAL &	-.90	-1.63	-2.0 (-3.07)	.040 (5.62)	1.869	.722	-.102	.248	.043	2.
36 ALCOHOLIC BEVERAGES	-1.63	-1.63	-1.7 (-5.03)	.044 (11.73)	1.549	.947	.201	.151	.010	3.
37 SOFT DRINK	-1.63	-1.63	-2.3 (-3.96)	.042 (6.28)	2.097	.550	.518	.308	.098	3.
38 TOBACCO	-1.65	-1.65	-1.0 (-3.14)	.015 (4.37)	2.540	.584	.265	.136	.015	1.
41 WOOLEN & WORSTED YARN	-1.10	-1.65	-36.7 (-4.41)	.633 (7.04)	2.193	.812	.309	2.511	1.266	28.
42 LINEN YARN	-1.65	-1.65	-.6 (-6.89)	.009 (8.69)	3.076	.830	.054	.031	.171	0.
43 SPAN RAYON YARN	-2.20	-1.65	-3.0 (-3.33)	.063 (6.51)	1.770	.944	-.234	.318	.407	5.
44 SYNTHETIC FIBER YARN	-1.65	-1.65	-145.1 (-9.24)	1.826 (10.72)	3.760	.968	-.097	5.183	1.312	71.

TABLE IX-2(CONTINUED). REGRESSION RESULTS OF EXPORT EQUATION

SECTOR.	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXPORTS
47 SYNTHETIC FIBERS WOVEN	-1.00	-1.65	-954.4 (-10.58)	11.838 (12.35)	4.191	.915	.424	29.142	3.254	328.
49 LINEN FABRICS WOVEN	-2.20	-1.65	-1.1 (-1.57)	.024 (3.07)	1.829	.537	.405	.278	1.860	1.
51 KNITTED FABRICS	-1.65	-1.65	-222.6 (-7.65)	3.135 (9.79)	2.732	.839	.387	15.403	2.338	139.
53 OTHER FIBER PRODUCTS	-.60	-2.00	2.8 (.23)	.288 (2.20)	.921	.002	.626	4.717	1.537	46.
54 FOOTWEAR EXCEPT RUBBER MADE	-1.20	-1.65	-5.7 (-1.61)	.108 (2.94)	2.093	.572	.445	.605	.378	5.
56 TEXTILE GARMENTS	-1.65	-1.65	-29.2 (-4.42)	.522 (7.33)	2.059	.688	.338	2.597	.905	30.
58 WOODEN PRODUCTS	-.40	-3.77	8.7 (2.76)	.082 (2.43)	.539	.137	.533	1.706	.365	19.
59 FURNITURE WOODEN & METAL	-.40	-3.77	-18.0 (-3.97)	.282 (5.81)	2.140	.684	.644	2.377	.191	20.
60 PULP	-1.65	-1.65	-3.4 (-2.84)	.051 (3.65)	2.550	.460	.617	.815	.178	3.
61 PAPER	-1.65	-1.65	-27.8 (-4.29)	.653 (8.53)	1.644	.878	.642	4.286	.425	53.
62 ARTICLES OF PAPER & PAPERBOA	-3.77	-3.77	-19.4 (-6.75)	.393 (11.60)	1.832	.941	.737	1.695	.117	26.
63 PRINTING & PUBLISHING	-1.60	-3.77	-10.1 (-7.07)	.254 (15.75)	1.585	.969	.432	.888	.042	16.
64 LEATHER MANUFACTURES & FUR P	-1.60	-3.77	-44.3 (-2.64)	.526 (2.93)	4.966	.450	.440	3.412	4.043	18.
65 LEATHER PRODUCTS EX. FOOTWEA	-.60	-3.77	-11.4 (-2.55)	.287 (5.65)	1.611	.708	.746	2.206	1.876	21.
66 ARTICLES OF RUBBER	-2.60	-3.77	-85.7 (-5.37)	2.031 (11.29)	1.621	.954	-.016	8.837	1.091	152.
67 BASIC INORGANIC INDUSTRIAL C	-1.65	-1.65	-9.4 (-4.51)	.155 (6.35)	2.275	.782	.709	1.276	.428	10.
68 BASIC ORGANIC INDUSTRIAL CHE	-1.65	-1.65	-157.0 (-5.74)	2.361 (7.50)	2.531	.873	.705	15.611	1.198	132.
69 SYNTHETIC DYESTUFF	-1.65	-1.65	-16.6 (-8.64)	.265 (11.85)	2.339	.936	.731	1.044	1.528	14.
70 BLASTING POWDER	-1.65	-1.65	-1.5 (-3.17)	.041 (7.55)	1.499	.901	.392	.239	.525	3.
71 SPUN RAYON	-1.70	-1.65	-13.1 (-1.35)	.464 (4.11)	1.354	.732	.462	5.950	4.429	53.

TABLE IX-2(CONTINUED). REGRESSION RESULTS OF EXPORT EQUATION

SECTOR,	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXPORTS
72 MATERIALS OF SYNTHETIC FIBER	-1.65	-1.65	-203.6 (-8.67)	3.387 (12.29)	2.184	.959	.464	14.740	1.739	205.
73 PLASTIC	-1.65	-1.65	-153.3 (-7.45)	2.438 (10.11)	2.295	.922	.732	13.406	1.977	142.
74 CHEMICAL FERTIRIZER	-1.65	-1.65	-28.8 (-2.26)	.863 (5.76)	1.442	.826	.398	8.342	3.436	87.
75 MISCELLANEOUS BASIC CHEMICAL	-1.65	-1.65	-29.5 (-3.07)	.720 (6.37)	1.607	.840	.592	6.431	1.417	66.
76 VEGETABLE & ANIMAL OIL	-.80	-1.65	2.8 (1.05)	.009 (.31)	.263	.099	.635	1.219	.474	6.
77 COATINGS	-1.65	-1.65	-7.9 (-7.32)	.135 (10.61)	2.142	.934	.473	.665	.279	8.
78 MEDICINE	-1.65	-1.65	-16.0 (-3.46)	.378 (6.94)	1.630	.607	.724	3.065	.268	29.
79 OTHER CHEMICAL PRODUCTS	-1.65	-1.65	-121.3 (-6.76)	2.193 (10.40)	2.036	.945	.508	12.239	1.479	151.
80 PETROLEUM REFINERY PRODUCTS	-1.65	-1.65	-45.9 (-5.30)	.983 (9.66)	1.757	.912	.489	4.740	.165	69.
81 COAL PRODUCTS	.00	-1.65	-3.5 (-3.90)	.056 (5.24)	2.384	.726	.729	.564	.075	4.
82 MISCELLANEOUS ANTISEPTICIZED	-1.65	-1.65	.0 (.46)	.001 (2.95)	.891	.086	.091	.017	.067	0.
83 CLAY PRODUCTS FOR BUILDING U	-1.80	-3.77	-10.0 (-3.86)	.165 (5.66)	2.233	.508	.716	1.511	.665	12.
84 GLASSWARE	-3.77	-3.77	12.8 (3.88)	.141 (3.74)	.552	.991	.078	.902	.171	34.
85 POTTERY	-1.60	-3.77	-5.5 (-.50)	.797 (6.29)	1.068	.282	.685	6.038	2.210	97.
87 OTHERNON-METALLIC MINERAL PR	-1.40	-3.77	-11.5 (-5.41)	.198 (8.14)	2.164	.845	.545	1.185	.085	13.
88 PIG IRON	-3.60	-2.00	-6.4 (-1.56)	.088 (1.89)	3.534	.476	.562	3.189	.211	10.
90 FERROALLOYS	-2.00	-2.00	.5 (.07)	.046 (.61)	.910	.249	.536	3.030	1.297	13.
91 STEEL INGOT	-2.00	-2.00	-2.5 (-1.49)	.039 (2.08)	2.598	.179	.106	.907	.050	1.
92 HOT-ROLLED PLATES& SHEETS	-2.00	-2.00	-823.8 (-3.89)	13.347 (5.55)	2.503	.775	.752	109.405	3.342	753.
93 STEEL PIPE & TUBE	-2.00	-2.00	-300.9 (-3.95)	4.838 (5.68)	2.548	.838	.622	30.132	5.533	248.

TABLE IX-2(CONTINUED). REGRESSION RESULTS OF EXPORT EQUATION

SECTOR,	PRICE ELASTICITY ESTIMATE	PRICE ELASTICITY A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXPORTS
94 COLD-ROLLED & COATED STEEL P	-6.00	-6.00	-359.2 (-2.76)	6.662 (4.51)	2.104	.791	.763	59.762	3.607	453.
95 CAST & FORGE IRON	-2.00	-2.00	-14.6 (-1.87)	.235 (2.68)	2.546	.291	.721	3.349	.236	13.
96 NONFERROUS METAL INGOTS	-1.65	-1.65	-29.7 (-2.57)	.755 (5.90)	1.503	.865	-.172	9.792	1.180	92.
97 COPPER BRASS PRODUCTS	-1.65	-1.65	-24.2 (-3.52)	.433 (5.49)	2.132	.818	-.451	3.587	1.509	25.
98 ALUMINUM EXTRUDED PRODUCTS	-1.65	-1.65	-13.4 (-7.31)	.258 (11.92)	1.918	.942	.408	1.186	.449	17.
99 OTHER NONFERROUS METAL PRODU	-1.65	-1.65	-6.7 (-5.78)	.171 (13.22)	1.505	.989	.319	.702	.149	17.
100 STRUCTURAL METAL PRODUCTS	-4.00	-3.77	-247.4 (-7.40)	3.739 (10.45)	2.504	.957	-.022	11.489	.505	222.
101 OTHER METAL PRODUCTS	-3.60	-3.77	-127.3 (-6.27)	2.558 (11.14)	1.816	.906	.231	13.011	.770	211.
102 POWER GENERATING MACHINARY &	-1.05	-1.05	-112.5 (-4.16)	2.057 (6.19)	2.168	.791	.530	17.916	1.811	144.
103 MACHINE TOOLS METALWORKING M	-2.10	-1.05	-30.0 (-1.33)	.989 (3.58)	1.449	.783	.506	26.513	3.065	90.
104 INDUSTRIAL MACHINERY	-1.20	-5.42	-232.9 (-5.66)	5.125 (10.25)	1.798	.913	.180	26.517	.772	367.
105 GENERAL INDUSTRIAL MACHINERY	-2.00	-5.42	-126.0 (-3.97)	2.505 (6.45)	2.002	.871	.278	21.951	1.408	196.
106 OFFICE MACHINERY	-3.20	-5.42	-96.0 (-4.71)	1.881 (7.28)	1.941	.973	.404	16.770	4.530	252.
107 HOUSEHOLD MACHINERY	-5.42	-5.42	-85.5 (-4.20)	1.520 (6.27)	2.098	.780	.463	13.029	3.887	107.
108 PARTS OF MACHINERY	-5.42	-5.42	73.3 (2.83)	.141 (.45)	.164	.946	-.080	10.428	1.014	147.
109 STRONG ELECTRIC MACHINERY	-1.80	-5.42	-129.9 (-5.38)	2.446 (8.52)	1.987	.870	.144	17.533	1.201	183.
110 HOUSEHOLD ELECTRICAL MACHINE	-5.42	-5.42	-231.7 (-2.57)	8.251 (7.63)	1.340	.974	.250	55.934	2.229	1125.
111 OTHER WEAK ELECTRICAL APPLIA	-2.20	-5.42	-311.0 (-6.62)	5.370 (9.95)	2.069	.874	-.247	40.945	1.098	419.
112 SHIPS & BOATS	-2.00	-3.77	-596.0 (-4.24)	12.761 (7.51)	1.726	.768	.198	107.470	8.357	1027.
114 PASSENGER MORTOR CAR	-3.77	-3.77	-1015.8 (-5.05)	15.923 (6.99)	2.160	.887	.757	138.883	2.837	1328.

TABLE IX-2(CONTINUED). REGRESSION RESULTS OF EXPORT EQUATION

SECTOR,	PRICE ELASTICITY ESTIMATE	A PRIORI	CONST(A)	DEMAND(B)	ELAS OF DEMAND	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXPORTS
116 MOTORCYCLES & BICYCLES	-3.77	-3.77	-146.2 (-3.26)	3.355 (6.11)	1.526	.824	.505	51.871	7.665	425.
117 AIRCRAFTS	-1.80	-3.77	-16.3 (-3.83)	.314 (6.42)	2.112	.685	.138	3.950	3.244	13.
118 OTHER TRANSPORTATION	-4.40	-3.77	-1.2 (-4.51)	.018 (6.12)	2.814	.894	.404	.105	.099	1.
119 PRECISION MACHINERY	-3.77	-3.77	-63.7 (-4.23)	1.084 (6.60)	2.204	.876	.690	6.451	1.572	76.
120 PHOTOGRAPHIC & OPTICAL INSTR	-3.77	-3.77	-157.7 (-9.45)	3.273 (16.75)	1.731	.930	.297	14.803	2.650	271.
121 WATCHES & CLOCKS	-2.60	-3.77	-84.7 (-5.41)	1.340 (7.28)	2.377	.829	.363	11.982	4.602	96.

TABLE IX-2(CONTINUED). REGRESSION RESULTS OF EXPORT EQUATION

SECTOR	PRICE ELASTICITIES	CONSTANT(A)	TIME(B)	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXP
2 OTHER CROPS	-4.18	5.055 (6.85)	.147 (3.04)	.829	-.048	1.2	.1	5.
3 FRUITS	-2.26	3.585 (16.04)	.012 (1.41)	.927	.479	1.1	.2	4.
4 OTHER CROPS FOR INDUSTRIAL P	-.66	2.257 (4.56)	-.043 (-1.38)	.969	.390	1.1	.5	5.
5 CROP FOR FIBER INDUSTRIAL PR	-1.10	-.731 (-.57)	-.258 (-2.73)	.612	.379	2.1	10.4	0.
6 LIVE STOCKS,POULTRY	-4.31	4.590 (3.43)	.057 (1.39)	.754	-.141	1.2	.1	1.
7 LIVE STOCKS,POULTRY FOR FIBE	.00	-1.574 (-9.89)	-.093 (-2.54)	.352	-.177	1.5	397.8	0.
8 SERICULTURE	-2.95	1.902 (1.46)	-.017 (-.17)	.757	.010	1.5	1.1	0.
14 FISHERIES	-2.02	5.400 (6.78)	-.035 (-2.74)	.675	-.019	1.1	.1	39.
15 WHALING	.00	1.314 (29.10)	-.090 (-8.65)	.881	.143	1.1	3.6	4.
16 INLAND WATER FISHERIES	-1.58	-.804 (-1.51)	-.017 (-.59)	.792	.012	1.2	2.1	0.
17 COKING COAL	-.59	-1.442 (-.54)	-.109 (-3.90)	.628	.063	1.3	.9	0.
20 ORES & CONCENTRATES OF NON-F	-.77	-.335 (-.19)	.118 (1.40)	.248	-.367	2.0	2.7	1.
26 CARCASSES	-.26	.170 (.23)	-.053 (-2.77)	.578	.213	1.2	.2	1.
29 VEGETABLE & FRUIT PRESERVED	-2.16	4.729 (10.09)	-.010 (-.93)	.725	.082	1.1	.4	13.
30 SEA FOOD PRESERVED	.00	4.475 (123.65)	-.010 (-1.23)	.049	.133	1.1	.1	115.
39 SILK REELING & WASTE SILK SP	-4.19	4.719 (3.88)	-.230 (-3.38)	.955	-.005	1.4	.8	1.
40 COTTON SPINNING	-3.15	4.907 (2.16)	-.064 (-2.65)	.617	-.061	1.2	.5	7.
45 SILK & RAYON WEAVING	-3.12	6.186 (7.25)	-.063 (-1.60)	.983	-.004	1.1	.3	19.
46 COTTON & SPUN RAYON FABRICS	-.69	5.334 (5.43)	-.098 (-3.33)	.938	.265	1.1	.3	103.
48 WOOLEN FABRICS WOVEN & FELTS	-4.20	7.106 (2.91)	-.026 (-.63)	.215	.634	1.5	.4	10.

TABLE IX-2(CONTINUED). REGRESSION RESULTS OF EXPORT EQUATION

SECTOR	PRICE ELASTICITIES	CONSTANT(A)	TIME(B)	RBARSQ	RHO	SEE	SEE/OUT (%)	1972 EXP
52 ROPES& FISHING NETS	-1.00	3.252 (4.53)	-.022 (-1.69)	.091	.234	1.1	1.4	10.
55 WEARING APPAREL	-1.87	6.739 (3.82)	-.055 (-.92)	.497	.553	1.4	.1	88.
57 WOOD MILLING	-1.87	5.395 (8.20)	-.034 (-1.97)	.931	-.179	1.1	.1	34.
86 CEMENT	-.89	3.913 (5.74)	.005 (.18)	.490	.075	1.1	.2	18.
113 RAILWAY VEHICLES	-1.73	4.681 (3.27)	.001 (.02)	.100	.246	1.5	.5	20.
122 OTHER MANUFACTURING GOODS	-1.61	7.163 (85.01)	.099 (16.80)	.995	-.137	1.0	.0	370.

CHAPTER X

Other Final Demand Components

The four remaining final demand components are inventory change, government consumption expenditure, business consumption expenditure, and special procurement exports. The total government purchases excluding government investment expenditure which was treated in the investment chapter amounts to 6,248 billion yen in 1970. The proportion of the Japanese government spending in total gross national product is 9%, which is much lower than that of U.S.A.. The expenditure for the national defense in the U.S.A. makes the proportion twice as big as that of Japan.

Government spending in many econometric models is taken as exogenous, given from outside the model. The social and political change could affect the government spending which may not be explained by economic variables. However, the exogenous gomernment spending enables model builders to experiment with alternative policies to show the effect. Following this state of art, government spending is assumed to increase at a rate in the forecasts given in this study.

Business consumption expenditures cover expenditures for social relations, reception, etc. which are similar to the consumption expenditure of household. In the Japanese input-output table, these expenses are not treated as a kind of operating expenses necessary for production or as intermediate inputs.[1] Although the amount of business consumption

[1] 1970 Input-Output Tables, Explanatory Report, Government of Japan, March, 1974.

expenditure is not negligible, about 4% of GNP, we could not formulate an equation for this expenditure owing to the lack of time series. Therefore, business consumption expenditure is also taken as exogenous. The amount of special procurement export is very small and also taken as exogenous.

In order to distribute government expenditure, business consumption expenditure, and special procurement export over different input-output sectors, G matrix is made. The data of the distribution of these expenditures over the input-output sectors are available for 1970. The same distribution will be used in forecasting.

Inventory change is treated as endogenous, although it has a very crude form. The inventory change equation will be discussed here.

Inventory Change Investment

In a long-run projection model like INFORUM, the inventory investment equation is much less important than in a macro, cyclical model. Over the long haul, the net demand for output for the purpose of inventory accumulation is a very small proportion of total output.[1] Also, the sensitivity of inventory change to cyclical variation in the short run does not play very much role in the long run. Therefore, the following inventory equation, which is rather simple, will not add very much error in the forecast of the whole model.

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[1]Darling, P.G. and M. C. Lovell. Factors Influencing Investment in Inventories in Econometric Models of the United States. ed. by Duesenberry, Fromm, Klein, and Kuh. pp 133.

The recent econometric studies[1] of inventory behavior employ flexible accelerator concepts. This approach relies upon the assumption that the cost involved in changing the level of stocks leads to only a partial adjustment towards the long run equilibrium. This can be expressed as

$$\Delta V_t = V_t - V_{t-1}$$

$$= \delta(V_t^* - V_{t-1})$$

where

V = actual inventory stock

V^* = desired level of stock

δ = speed of adjustment, which is bounded by 0 and 1.

Since the desired inventory stock is not observable, we need some proxy for it. Some studies use capacity utilization and unfilled orders as proxy variables for desired stocks. But these cannot be used here because they must be calculated somewhere else in the model in order to be used.

For simplicity, we assume that the desired stock of inventory is a portion of the domestic use of the product. Following the INFORUM model, we define domestic use as

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[1]Lovell, M.C. "Buffer Stock, Sales Expenditures and Stability." Econometrica, 1962. Edwin, M., "The Theory of Inventory Decisions." Econometrica, 1957.'

$$DU = Q - \Delta V + IMP$$

where

DU = domestic use

Q = output

IMP = imports

From the assumptions, our equation is

$$\Delta V_t = \delta(aDU_t - V_{t-1}) \quad \text{and}$$

$$V_t = \delta\, aDU_t - (1 - \delta)\, V_{t-1}$$

Using this equation, we could determine the desired ratio between inventory stock and domestic use, and the speed of adjustment. Unfortunately, this equation cannot be estimated because we lack the appropriate time series of inventory stock. The author is forced to fall back on <u>a priori</u> estimates of a and δ.

For forecasting we assume that the 1970 inventory-sales ratio was a desirable one and that 60% of the gap between this year's desired inventory and last year's actual inventory stock will be closed during this year. More precisely, we set a = V (1970)/ DU (1970), and then set inventory change in year t equal to

$$V_t - V_{t-1} = .6\ (aDU_t - V_{t-1})$$

The 60% factor came from examination of the inventory equations in several aggregate models.

The inventory stock data for 1970 are available by 20 sector classification. Therefore, the coefficient is gotten for these 20 sectors and is applied to the input-output sectors which belong to the 20 order sector. More formally,

$$a_i = \sum_{i^d} V^{i^d}(1970) / \sum_{i^d} DU^{i^d}(1970)$$

where

$i = 1 \ldots\ldots\ldots\ldots 156$

i^d = 20 sector order in which sector i is a part.

CHAPTER XI

Coefficient Change

The model is incomplete unless we can forecast the input-output coefficient change. Coefficient change is still an open, important, and challenging question in input-output economics. To hope to advance the state of the art, we would need annual time series on individual coefficients. Since we have no such series, but only series on outputs and final demands, we have to be content for the time being to take account of wide-spread, pervasive coefficient change in a fairly simple fashion. Two reasons for coefficient change are usually mentioned, namely: (1) price induced substitution, and (2) technical change and changes in product mix. In this work, we limit ourselves to the second source of changes and do not consider price-induced change explicitly.

The logistic growth curve, which is specified by a starting point, asymptote, and speed of adjustment, will be used to predict the coefficient changes due to technical change and to changes in product mix. The changes induced by relative price change should be considered separately, because the logistic curve method is valid only if relative price is stable over time.

Logistic Curve Method

This method investigates the coefficient change over time due only to technological change and product mix change. Therefore, the technique implicitly assumes the constancy of relative prices.

The coefficient change over time is expressed as,

$$(1)\quad C_t = \frac{a}{1 + A\ e^{-bat}}$$

where

C_t = coefficient at time t

a = value of the asymptote

b = the constant ratio of the percentage change in C_t to the gap between the asymptote and the current value of the coefficient

t = time trend

In order to apply the ordinary least squares method, equation (1) should be rearranged as:

$$(2)\quad \log\left(\frac{a}{C_t} - 1\right) = \log(A) - bat$$

if $\frac{a}{C_t} > 1$

$$(3)\quad \log\left(1 - \frac{a}{C_t}\right) = \log(-A) - bat$$

if $\frac{a}{C_t} < 1$.

One of these two equations is used for the actual regression, depending on whether the coefficients are rising over time $\left(\frac{a}{C_t} > 1\right)$ or declining $\left(\frac{a}{C_t} < 1\right)$. Although the equation is well specified in the linear form, the dependent variable is not known. Two kinds of problem are involved in the dependent variable. First, we do not have the time series of C_t. Because we want to apply this equation to all coefficients in a row of the A and B matrices, the information of the total intermediate use of commodities and investment use are enough to investigate the variation of C_t across the row. C_t is calculated by the following method:

(4) $U_{it} = (1 - a_{iit}) X_{it} - F^*_{it}$

$i = 1,2,\ldots\ldots\ldots\ldots\ldots, 156$

(5) $V_{it} = \sum_{j=1}^{156} a_{ijo} X_{jt} + \sum_{j=1}^{28} b_{ijo} S_{jt}$

$i = 1,2,\ldots\ldots\ldots\ldots\ldots, 156$

(6) $C_{it} = U_{it} / V_{it}$

$i = 1,2,\ldots\ldots\ldots\ldots\ldots, 156$

Where

U_{it} = the actual intermediate use and the investment use of commodity i

X_{it} = the output of commodity i

F^*_{it} = all final demand of commodity i, less investment

V_{it} = the indicated use, the amount which would have been used if all coefficients remained constant

S_{jt} = the investment of industry j

C_{it} = the indicated coefficient which can be applied across the i^{th} row.

Because we do not have investment data for the 156 sectors, we include investment in the intermediate use and calculate C_{it} which has investment use in it. Then we can apply C_{it} to the A and B matrices.

The second problem with the dependent variable is the unknown a, the asymptote. This problem can be solved by the iterative method. The regression routine starts with an arbitrary value of a, and it searches for the a which gives the best fit.

The empirical results are in Table X-1. The performance of the equation varies over the different sectors. Many sectors show significant coefficient change over time, from which we can conclude that the intermediate demand forecast is as important as final demand in the I/O forecasting model. In general, the higher the adjustment rate, b, the larger the $\bar{R}^2$. The simulation with coefficient change will be discussed in the simulation chapter.

TABLE XI-1 ACROSS THE ROW COEFFICIENT CHANGE REGRESSION

IO #	TITLE	ASYMPTOTE	ADJUSTMENT RATE	GROWTH RATE	CHANGE OF GR RATE	RBARSQ
1	GRAIN	.0077	.0707	-.0628	.0037	.8691
2	OTHER CROPS	.0094	.0972	-.0953	.0084	.2385
3	FRUITS	.0092	.0661	-.0700	.0046	.2687
4	OTHER CROPS FOR INDUSTRIAL PRC	.0089	.0730	-.0676	.0043	.8506
5	CROP FOR FIBER INDUSTRIAL PROC	.0100	.0564	-.0642	.0039	.7560
6	LIVE STOCKS,POULTRY	.0087	.0105	-.0098	.0001	.2711
7	LIVE STOCKS,POULTRY FOR FIBER	.0096	.0505	-.0569	.0031	.5057
8	SERICULTURE	1.4668	.0114	.0049	-.0001	.0762
9	AGRICULTURAL SERVICES	2.3626	.0728	.1062	-.0080	.9015
10	FORESTRY	2.0810	.0126	.0143	-.0002	.3832
11	CHARCOAL & FIREWOOD	.0085	.0830	-.0997	.0091	.6293
12	LOGS	.0093	.0467	-.0443	.0019	.9113
13	HUNTINGS	2.1510	.0278	.0294	-.0009	.7801
14	FISHERIES	.6422	.1323	-.0428	.0050	.9644
17	COKING COAL	.0079	.0688	-.0614	.0036	.9384
18	LIGNITE BRIQUETTES AND LIGNITE	.0055	.0949	-.0998	.0091	.6739
19	IRON ORE& CONCENTRATES	.0088	.0083	-.0086	.0001	-.0031
20	ORES & CONCENTRATES OF NON-FER	.0092	.0033	-.0034	.0000	-.0176
21	PETROLEUMS CRUDE	.0097	.0764	-.0825	.0063	.2989
22	NATURAL GAS	.0092	.0157	-.0147	.0002	.2886
23	LIME STONE SAND GRAVEL	2.3371	.0418	.0547	-.0025	.9243
25	NON-METALIC MINERALS	.0082	.0606	-.0656	.0041	.0522
26	CARCASSES	.3688	.0889	-.0493	.0038	.8833
27	MEAT PRODUCT	.0026	.1307	-.0862	.0069	-.4475
31	GRAIN MILL PRODUCTS	1.8244	.1757	.0595	-.0144	.7403

TABLE XL-1(CONTINUED). ACROSS THE ROW COEFFICIENT CHANGE REGRESSION

IO #	TITLE	ASYMPTOTE	ADJUSTMENT RATE	GROWTH RATE	CHANGE OF GR RATE	RBARSQ
33	REFINED SUGAR	.0044	.0285	-.0126	.0002	.2371
34	OTHER FOOD PREPARED	1.1067	.2097	.0324	-.0060	.6797
35	PREPARED FEEDS FOR ANIMAL & PC	1.3194	.1542	.0306	-.0050	.8603
36	ALCOHOLIC BEVERAGES	.0078	.0557	-.0485	.0023	.7232
39	SILK REELING & WASTE SILK SPIN	1.4492	.0199	.0090	-.0002	.1472
40	COTTON SPINNING	1.3779	.1248	.0422	-.0054	.9696
41	WOOLEN & WORSTED YARN	1.9813	.0078	.0084	-.0001	.0900
42	LINEN YARN	.6524	.2697	-.0313	.0057	.7731
43	SPAN RAYON YARN	1.3056	.1371	.0402	-.0054	.8000
44	SYNTHETIC FIBER YARN	1.4007	.1090	.0500	-.0052	.8056
46	COTTON & SPUN RAYON FABRICS WC	.0875	.1097	-.0957	.0091	.8503
47	SYNTHETIC FIBERS WOVEN	1.6495	.1297	.0873	-.0115	.8949
48	WOOLEN FABRICS WOVEN & FELTS	.0083	.0644	-.0778	.0057	.7362
49	LINEN FABRICS WOVEN	.7067	.1800	-.0337	.0049	.6212
50	YARN & FABRIC DYEING $ FINISHI	.0079	.0275	-.0239	.0006	.5719
52	ROPES& FISHING NETS	1.7756	.0190	.0122	-.0003	.1279
53	OTHER FIBER PRODUCTS	.0095	.0087	-.0093	.0001	.0715
56	TEXTILE GARMENTS	1.3531	.1957	.0301	-.0065	.7960
57	WOOD MILLING	.5179	.0356	-.0118	.0003	.4266
58	WOODEN PRODUCTS	.0091	.0238	-.0215	.0005	.6272
59	FURNITURE WOODEN & METAL	.9785	.1309	-.0136	.0018	.7436
60	PULP	.0087	.0001	-.0001	.0000	.0001
61	PAPER	.0081	.0129	-.0115	.0001	.1894
62	ARTICLES OF PAPER & PAPERBOARD	.9188	.1508	.0129	-.0015	.6194
63	PRINTING & PUBLISHING	.0083	.0084	-.0080	.0001	-.0063

TABLE XI-1(CONTINUED). ACROSS THE ROW COEFFICIENT CHANGE REGRESSION

IO #	TITLE	ASYMPTOTE	ADJUSTMENT RATE	GROWTH RATE	CHANGE OF GR RATE	RBARSQ
64	LEATHER MANUFACTURES & FUR PRC	.0067	.0362	-.0269	.0007	.4045
65	LEATHER PRODUCTS EX. FOOTWEAR	1.2291	.1713	.0334	-.0056	.4457
66	ARTICLES OF RUBBER	.3937	.0329	-.0187	.0006	.8281
67	BASIC INORGANIC INDUSTRIAL CHE	.0091	.0267	-.0238	.0006	.9232
68	BASIC ORGANIC INDUSTRIAL CHEMI	1.2712	.0383	.0250	-.0006	.9429
69	SYNTHETIC DYESTUFF	2.3380	.0685	.0889	-.0069	.9473
70	BLASTING POWDER	1.6879	.0535	.0514	-.0021	.7039
71	SPUN RAYON	.0089	.0377	-.0362	.0013	.5730
72	MATERIALS OF SYNTHETIC FIBER	.9626	.2946	.0321	-.0073	.8811
73	PLASTIC	.0089	.0078	-.0077	.0001	.0294
74	CHEMICAL FERTIRIZER	1.8048	.0437	.0415	-.0016	.9037
75	MISCELLANEOUS BASIC CHEMICALS	1.0317	.0640	.0086	-.0005	.3290
76	VEGETABLE & ANIMAL OIL	1.9000	.0111	.0113	-.0001	.0863
77	COATINGS	1.1769	.1170	.0158	-.0018	.8833
78	MEDICINE	2.0975	.0710	.0831	-.0060	.9581
79	OTHER CHEMICAL PRODUCTS	2.9301	.0249	.0439	-.0014	.4490
80	PETROLEUM REFINERY PRODUCTS	1.0804	.1329	.0143	-.0018	.9185
81	COAL PRODUCTS	1.0857	.1638	.0224	-.0033	.7616
82	MISCELLANEOUS ANTISEPTICIZED P	.2628	.0748	-.0517	.0035	.9051
83	CLAY PRODUCTS FOR BUILDING USE	.8409	.1795	-.0205	.0032	.8492
84	GLASSWARE	1.6878	.0611	.0545	-.0028	.8757
85	POTTERY	1.0651	.2388	.0325	-.0066	.8903
86	CEMENT	.8593	.1278	-.0133	.0015	.6353
87	OTHERNON-METALLIC MINERAL PROD	1.5021	.0354	.0154	-.0006	.1694
88	PIG IRON	3.0358	.0132	.0253	-.0004	.2691

TABLE XI-1(CONTINUED). ACROSS THE ROW COEFFICIENT CHANGE REGRESSION

IO #	TITLE	ASYMPTOTE	ADJUSTMENT RATE	GROWTH RATE	CHANGE OF GR RATE	RBARSQ
90	FERROALLOYS	2.4329	.0240	.0355	-.0009	.5059
91	STEEL INGOT	.0079	.0160	-.0145	.0002	.2111
92	HOT-ROLLED PLATES& SHEETS	.0088	.0075	-.0069	.0000	.1717
93	STEEL PIPE & TUBE	.9270	.0625	.0129	-.0006	.3341
94	COLD-ROLLED & COATED STEEL PLA	.0072	.0137	-.0111	.0001	.1398
95	CAST & FORGE IRON	2.1244	.0121	.0138	-.0002	.4601
96	NONFERROUS METAL INGOTS	.0074	.0358	-.0286	.0008	.6161
97	COPPER BRASS PRODUCTS	.0100	.0449	-.0473	.0022	.6837
98	ALUMINUM EXTRUDED PRODUCTS	1.5506	.0812	.0444	-.0037	.8987
99	OTHER NONFERROUS METAL PRODUCT	.0089	.0062	-.0062	.0000	-.0017
100	STRUCTURAL METAL PRODUCTS	2.1344	.0389	.0467	-.0018	.8466
101	OTHER METAL PRODUCTS	.5749	.0411	-.0122	.0004	.3488
102	POWER GENERATING MACHINARY & B	.6614	.0596	-.0158	.0008	.5510
103	MACHINE TOOLS METALWORKING MAC	.6774	.2140	-.0318	.0050	.8548
104	INDUSTRIAL MACHINERY	.9395	.0745	.0084	-.0005	.4306
105	GENERAL INDUSTRIAL MACHINERY &	1.7428	.0549	.0484	-.0024	.8602
106	OFFICE MACHINERY	2.0609	.0659	.0819	-.0049	.7006
107	HOUSEHOLD MACHINERY	.8093	.2067	-.0280	.0049	.6792
108	PARTS OF MACHINERY	1.7617	.0299	.0285	-.0007	.6205
109	STRONG ELECTRIC MACHINERY	2.0965	.0007	.0007	.0000	.0005
111	OTHER WEAK ELECTRICAL APPLIANC	1.7426	.0048	.0044	.0000	.1595
112	SHIPS & BOATS	2.2652	.1125	.0476	-.0093	.2455
113	RAILWAY VEHICLES	.0076	.0396	-.0393	.0015	.1798
114	PASSENGER MORTOR CAR	1.0368	.1390	.0153	-.0019	.7522
115	REPAIR OF PASSENGER MOTOR CAR	.0087	.0245	-.0229	.0005	.6429

TABLE XI-K(CONTINUED). ACROSS THE ROW COEFFICIENT CHANGE REGRESSION

IO #	TITLE	ASYMPTOTE	ADJUSTMENT RATE	GROWTH RATE	CHANGE OF GR RATE	RBARSQ
116	MOTORCYCLES & BICYCLES	.0035	.1021	-.0535	.0027	.5369
117	AIRCRAFTS	.0059	.0446	-.0320	.0010	.2445
118	OTHER TRANSPORTATION	.7719	.2366	.0276	-.0041	.8731
119	PRECISION MACHINERY	1.8444	.0050	.0042	.0000	.1281
120	PHOTOGRAPHIC & OPTICAL INSTRUM	1.6856	.0017	.0014	.0000	.0022
122	OTHER MANUFACTURING GOODS	1.0453	.3349	.0499	-.0135	.8918
123	HOUSING CONSTRUCTION	1.2726	.0567	.0084	-.0005	.3226
124	CONSTRUCTION NOT FOR RESIDENTI	.0109	.0151	-.0178	.0003	.3700
125	BUILDING REPAIRING	1.0987	.1678	.0215	-.0033	.8613
127	OTHER CONSTRUCTION	.7982	.0117	-.0065	.0001	.1645
128	ELECTRICITY	1.9987	.0067	.0068	.0000	.6178
129	GAS	1.2791	.0718	.0218	-.0015	.2290
130	WATER-SUPPLY,SEWERAGE	1.1036	.2795	.0283	-.0071	.8370
131	WHOLESALE TRADE	1.7894	.0059	.0027	.0000	.0917
132	RETAIL TRADE	1.2719	.1002	.0149	-.0016	.7650
133	FINANCIAL BUSINESS	.0093	.0318	-.0300	.0009	.9402
134	INSURANCE BUSINESS	.0065	.0975	-.0869	.0070	-.4198
135	REAL ESTATE AGENCY	.8721	.1252	-.0147	.0017	.8952
137	NATIONAL RAILROAD	.0089	.0859	-.0804	.0060	.8374
138	LOCAL RAILROAD	.0090	.1014	-.0979	.0088	-.3407
139	ROAD PASSENGER TRANSPORT	.0081	.0768	-.0760	.0054	.3397
140	ROAD FREIGHT TRANSPORT	2.2677	.0647	.0776	-.0058	.9775
141	ROAD TRANSPORTATION FACILITIES	1.9146	.0969	.0867	-.0091	.9869
143	INLAND WATER TRANSPORT	.4804	.0797	-.0388	.0028	.9872
144	AIR TRANSPORT	1.8577	.0661	.0781	-.0039	.5556

TABLE XI-1(CONTINUED). ACROSS THE ROW COEFFICIENT CHANGE REGRESSION

IO #	TITLE	ASYMPTOTE	ADJUSTMENT RATE	GROWTH RATE	CHANGE OF GR RATE	RBARSQ
145	OTHER TRANSPORT	1.0974	.2302	.0357	-.0072	.9223
146	STORAGE	.0103	.0111	-.0116	.0001	.5695
147	TELECOMMUNICATION	.0099	.0250	-.0247	.0006	.9215
151	OTHER PUBLIC SERVICES	.0088	.0603	-.0545	.0028	.9450
152	SERVICE FOR BUSINESS ENTERPRIS	.6687	.0472	-.0132	.0006	.9438
155	OTHER PERSONAL SERVICES	.0096	.0234	-.0235	.0005	.7019

CHAPTER XII

Simulation Test of the Complete Model

This chapter evaluates the predictive performance of the model in so far as is presently possible. We have not estimated all equations with the most recent data, so that some observations would be left for this test. In the base year of the forecast, 1970, all variables have their actual value. The forecasts starts in 1971. The simulation test is done over 1971-1972 because we have the actual data only through 1972. The forecast of the model was made up to 1985. In testing the predictive performance, a number of assumptions are made which will be explained in the next section. After the plans and the assumptions are described, the simulations will be shown.

Plans and Assumptions

The simulation test is planned to answer the following questions:

1. How accurate and reliable are the forecasts generated by all the equations and by the imput-output computations?
2. How does across-the-row coefficient change affect the performance of the model?
3. How sensitive is the forecast of the model to the exogenous assumptions?

For those questions, the simulation is carried out in two steps.

1. The model is simulated.
    a. with constant input-output coefficients.
    b. with variable input-output coefficients forecasted by the across-the-row method.

2. The effects of the exogenous assumptions on long term growth are investigated with the variable input-output coefficient forecasted by the across-the-row method.

The model requires exogenous assumptions on:

1. disposable income,
2. the interest rate,
3. all kinds of government expenditure,
4. the world prices of imported goods and exported goods,
5. the foreign demand for Japanese goods,
6. the growth rate of population, and the growth rate of the number of households.

In order to evaluate the predictive performance of the model, the simulation test is done with all of the actual values of the exogenous variables in 1971 and 1972. The actual world prices are available up to 1972 from the world trade model, and the foreign demand is also generated by the world trade model.

Simulation Test

The simulation errors are shown in three tables. Table XII-1 shows the simulation errors of consumption, imports, and exports for 156 sectors. For output and price, the simulation errors were calculated by 20 sector aggregation level and shown in Table XII-2. Table XII-3 shows the simulation errors of investment, labor requirement, manhours per employee, and employment by 19 sector classification.

It is unfortunate that we cannot test the model by the simulation of output and price in the 156 sector classification. The output data which we have at hand for the 156 sectors were aggregated from census

TABLE XII-1. SIMULATION TEST OF THE FINAL DEMAND COMPONENTS

AVERAGE ABSOLUTE SIMULATION ERRORS IN PERCENTAGE OF OUTPUT OF YEARS 1971-1972

		NO COEFFICIENT CHANGE			LOGISTIC CURVE METHOD		
SEC#	TITLES	CONSUMPTION	IMPORTS	EXPORTS	CONSUMPTION	IMPORTS	EXPORTS
1	GRAIN	.000	.815	.715	.000	.841	.715
2	OTHER CROPS	.524	4.255	.016	.811	10.999	.016
3	FRUITS	5.933	2.644	.034	7.635	2.698	.034
4	OTHER CROPS FOR INDUSTRIAL PRO	.006	36.335	.125	.003	9.720	.125
5	CROP FOR FIBER INDUSTRIAL PROC	.000	32.344	.141	.000	37.700	.141
6	LIVE STOCKS,POULTRY	1.190	.117	.006	1.330	.093	.006
7	LIVE STOCKS,POULTRY FOR FIBER	.000	6.672	34.167	.000	7.081	34.167
8	SERICULTURE	.000	.245	.038	.000	.295	.038
9	AGRICULTURAL SERVICES	.190	.000	.000	.190	.000	.000
10	FORESTRY	.266	.275	.308	.269	.213	.308
11	CHARCOAL & FIREWOOD	6.841	6.175	.000	6.935	6.175	.000
12	LOGS	.000	9.995	.032	.000	9.828	.032
13	HUNTINGS	.557	.000	.000	.569	.000	.000
14	FISHERIES	3.111	.930	.576	3.020	1.018	.576
15	WHALING	3.410	2.568	1.315	3.599	2.696	1.315
16	INLAND WATER FISHERIES	3.906	2.056	.028	3.658	2.123	.028
17	COKING COAL	1.032	30.523	.020	1.008	30.523	.020
18	LIGNITE BRIQUETTES AND LIGNITE	.000	.000	.000	.000	.000	.000
19	IRON ORES CONCENTRATES	.000	6.970	.000	.000	5.471	.000
20	ORES & CONCENTRATES OF NON-FER	.000	6.900	.447	.000	8.589	.447
21	PETROLEUMS CRUDE	.000	11.457	31.766	.000	7.687	31.766
22	NATURAL GAS	.072	2.979	.000	.078	2.657	.000
23	LIME STONE SAND GRAVEL	.259	.471	.045	.259	.322	.045
24	SALT CRUDE	.000	14.856	.000	.000	14.914	.000
25	NON-METALIC MINERALS	.000	30.072	9.357	.000	30.065	9.357
26	CARCASSES	3.530	3.069	.011	3.867	3.204	.011
27	MEAT PRODUCT	.157	.216	.027	2.060	.213	.027
28	DAIRY PRODUCT	.067	.423	.128	.016	.434	.128
29	VEGETABLE & FRUIT PRESERVED	2.077	1.197	.415	1.915	1.189	.415
30	SEA FOOD PRESERVED	3.260	1.025	1.062	3.101	.987	1.062

TABLE XII-1(CONTINUED). SIMULATION TEST OF THE FINAL DEMAND COMPONENTS

AVERAGE ABSOLUTE SIMULATION ERRORS IN PERCENTAGE OF OUTPUT OF YEARS 1971-1972

SEC#	TITLES	NO COEFFICIENT CHANGE CONSUMPTION	IMPORTS	EXPORTS	LOGISTIC CURVE METHOD CONSUMPTION	IMPORTS	EXPORTS
31	GRAIN MILL PRODUCTS	4.977	.079	.162	5.312	.079	.162
32	BAKERY PRODUCTS	.147	[illegible]	.071	.226	.384	.071
33	REFINED SUGAR	.911	5.776	.030	.931	4.509	.030
34	OTHER FOOD PREPARED	4.2[illegible]	.368	.220	4.220	.312	.220
35	PREPARED FEEDS FOR ANIMAL & PO	.000	.333	.021	.000	.331	.021
36	ALCOHOLIC BEVERAGES	.026	.220	.007	.021	.229	.007
37	SOFT DRINK	4.236	.231	.088	4.151	.230	.088
38	TOBACCO	2.327	.072	.012	2.134	.071	.012
39	SILK REELING & WASTE SILK SPIN	.018	6.246	.172	.018	4.326	.172
40	COTTON SPINNING	.061	.358	.219	.061	.335	.219
41	WOOLEN & WORSTED YARN	.423	4.175	.444	.419	3.944	.444
42	LINEN YARN	.000	2.095	.024	.000	1.589	.024
43	SPAN RAYON YARN	.000	.141	.308	.000	.141	.308
44	SYNTHETIC FIBER YARN	.000	.003	1.869	.000	.021	1.869
45	SILK & RAYON WEAVING	17.100	1.179	.629	17.165	1.173	.629
46	COTTON & SPUN RAYON FABRICS WO	.869	1.460	2.463	.847	1.460	2.463
47	SYNTHETIC FIBERS WOVEN	.846	.140	3.973	.858	.180	3.973
48	WOOLEN FABRICS WOVEN & FELTS	8.426	1.471	2.829	8.464	1.327	2.829
49	LINEN FABRICS WOVEN	.000	6.337	.242	.000	3.992	.242
50	YARN & FABRIC DYEING $ FINISHI	.000	.000	.000	.000	.000	.000
51	KNITTED FABRICS	7.810	.906	2.813	7.747	.892	2.813
52	ROPES& FISHING NETS	.000	.211	.749	.000	.211	.749
53	OTHER FIBER PRODUCTS	1.241	.353	2.009	1.222	.323	2.009
54	FOOTWEAR EXCEPT RUBBER MADE	1.783	.194	.347	1.310	.220	.347
55	WEARING APPAREL	1.325	.094	1.274	1.679	.091	1.274
56	TEXTILE GARMENTS	2.895	.182	.892	3.069	.104	.892
57	WOOD MILLING	.000	1.027	.055	.000	.953	.055
58	WOODEN PRODUCTS	1.454	.240	.213	1.443	.243	.213
59	FURNITURE WOODEN & METAL	1.146	.089	.181	1.125	.089	.181
60	PULP	11.864	2.007	.318	11.964	1.902	.318

TABLE XIII-1 (CONTINUED). SIMULATION TEST OF THE FINAL DEMAND COMPONENTS

AVERAGE ABSOLUTE SIMULATION ERRORS IN PERCENTAGE OF OUTPUT OF YEARS 1971-1972

		NO COEFFICIENT CHANGE			LOGISTIC CURVE METHOD		
SEC#	TITLES	CONSUMPTION	IMPORTS	EXPORTS	CONSUMPTION	IMPORTS	EXPORTS
61	PAPER	.159	.219	.380	.162	.221	.380
62	ARTICLES OF PAPER & PAPERBOARD	.037	.095	.099	.084	.081	.099
63	PRINTING & PUBLISHING	1.366	.412	.054	1.787	.394	.054
64	LEATHER MANUFACTURES & FUR PRO	.000	6.079	5.466	.000	5.276	5.466
65	LEATHER PRODUCTS EX. FOOTWEAR	5.598	1.666	3.584	5.641	1.735	3.584
66	ARTICLES OF RUBBER	1.189	.131	1.019	1.230	.136	1.019
67	BASIC INORGANIC INDUSTRIAL CHE	.000	.018	.683	.000	.018	.683
68	BASIC ORGANIC INDUSTRIAL CHEMI	.000	.044	1.973	.000	.233	1.973
69	SYNTHETIC DYESTUFF	.099	4.506	1.554	.099	6.305	1.554
70	BLASTING POWDER	.312	1.204	.305	.312	1.732	.305
71	SPUN RAYON	.000	.010	5.339	.000	.010	5.339
72	MATERIALS OF SYNTHETIC FIBER	.000	.165	3.426	.000	.252	3.426
73	PLASTIC	.000	.236	2.561	.000	.324	2.581
74	CHEMICAL FERTIRIZER	.000	.467	3.861	.000	.513	3.861
75	MISCELLANEOUS BASIC CHEMICALS	.000	2.237	2.163	.000	2.068	2.163
76	VEGETABLE & ANIMAL OIL	.000	2.515	.454	.000	2.533	.454
77	COATINGS	.026	.010	.436	.026	.059	.436
78	MIDICINE	3.141	.427	.444	3.041	.860	.444
79	OTHER CHEMICAL PRODUCTS	1.414	.769	2.183	1.288	1.190	2.183
80	PETROLEUM REFINERY PRODUCTS	1.909	.579	.279	1.829	.980	.279
81	COAL PRODUCTS	.364	.131	.172	.450	.136	.172
82	MISCELLANEOUS ANTISEPTICIZED M	.000	.365	.021	.000	.457	.021
83	CLAY PRODUCTS FOR BUILDING USE	.000	.052	.970	.000	.058	.970
84	GLASSWARE	11.795	.323	.222	11.795	.472	.222
85	POTTERY	1.320	.258	3.054	1.326	.241	3.054
86	CEMENT	.000	.007	.583	.000	.006	.583
87	OTHERNON-METALLIC MINERAL PROD	.064	.033	.105	.065	.028	.105
88	PIG IRON	.000	.500	.432	.000	.500	.432
89	IRON & STEEL SCRAPS	.000	303.511	.000	.000	290.633	.000
90	FERROALLOYS	.000	2.431	3.083	.000	2.607	3.083

TABLE XII-1(CONTINUED). SIMULATION TEST OF THE FINAL DEMAND COMPONENTS

AVERAGE ABSOLUTE SIMULATION ERRORS IN PERCENTAGE OF OUTPUT OF YEARS 1971-1972

SEC#	TITLES	NO COEFFICIENT CHANGE CONSUMPTION	IMPORTS	EXPORTS	LOGISTIC CURVE METHOD CONSUMPTION	IMPORTS	EXPORTS
91	STEEL INGOT	[illegible]	.035	.061	.000	.033	.061
92	HOT-ROLLED PLATES& SHEETS	.000	.120	6.277	.000	.122	6.277
93	STEEL PIPE & TUBE	.000	.123	11.150	.000	.131	11.150
94	COLD-ROLLED & COATED STEEL PLA	.000	.004	5.151	.000	.004	5.151
95	CAST & FORGE IRON	.000	.004	.361	.000	.005	.361
96	NONFERROUS METAL INGOTS	.590	7.267	1.584	.590	7.751	1.584
97	COPPER BRASS PRODUCTS	.000	.197	1.330	.000	.112	1.330
98	ALUMINUM EXTRUDED PRODUCTS	.000	.114	.498	.000	.102	.498
99	OTHER NONFERROUS METAL PRODUCT	.000	.066	.084	.000	.254	.084
100	STRUCTURAL METAL PRODUCTS	.315	.069	.786	[illegible]	.061	.786
101	OTHER METAL PRODUCTS	.617	.107	.761	.607	.105	.761
102	POWER GENERATING MACHINARY & B	.000	.336	3.201	.000	.343	3.201
103	MACHINE TOOLS METALWORKING MAC	.000	20.723	1.653	.000	19.952	1.653
104	INDUSTRIAL MACHINERY	.010	.349	1.112	.009	.443	1.112
105	GENERAL INDUSTRIAL MACHINERY &	.000	.750	2.157	.000	1.150	2.157
106	OFFICE MACHINERY	.069	4.243	4.700	.068	5.070	4.700
107	HOUSEHOLD MACHINERY	1.483	.737	3.971	1.480	.646	3.971
108	PARTS OF MACHINERY	.000	.202	.707	.000	.350	.707
109	STRONG ELECTRIC MACHINERY	.000	.754	1.659	.000	.809	1.659
110	HOUSEHOLD ELECTRICAL MACHINERY	5.609	.268	1.753	5.614	.268	1.753
111	OTHER WEAK ELECTRICAL APPLIANC	.066	.240	1.127	.066	.152	1.127
112	SHIPS & BOATS	.000	.386	7.435	.000	.372	7.435
113	RAILWAY VEHICLES	.000	.195	.308	.000	.200	.308
114	PASSENGER MOTOR CAR	.230	.112	4.406	.251	.130	4.406
115	REPAIR OF PASSENGER MOTOR CAR	3.919	.000	.000	3.840	.000	.000
116	MOTORCYCLES & BICYCLES	3.319	.006	7.670	3.319	.007	7.670
117	AIRCRAFTS	.000	5.295	1.993	.000	5.229	1.993
118	OTHER TRANSPORTATION	.000	.807	.036	.000	.994	.036
119	PRECISION MACHINERY	.537	1.390	1.975	.481	1.625	1.975
120	PHOTOGRAPHIC & OPTICAL INSTRUM	.349	3.311	2.716	.347	3.323	2.716

TABLE XII-1(CONTINUED). SIMULATION TEST OF THE FINAL DEMAND COMPONENTS

AVERAGE ABSOLUTE SIMULATION ERRORS IN PERCENTAGE OF OUTPUT OF YEARS 1971-1972

		NO COEFFICIENT CHANGE			LOGISTIC CURVE METHOD		
SEC#	TITLES	CONSUMPTION	IMPORTS	EXPORTS	CONSUMPTION	IMPORTS	EXPORTS
121	WATCHES & CLOCKS	.916	5.[illegible]76	4.692	.598	5.836	4.692
122	OTHER MANUFACTURING GOODS	5.557	2.113	.796	5.542	2.044	.796
123	HOUSING CONSTRUCTION	.000	.000	.000	.000	.000	.000
124	CONSTRUCTION NOT FOR RESIDENTI	.000	.000	.000	.000	.000	.000
125	BUILDING REPAIRING	.000	.000	.000	.000	.000	.000
126	PUBLIC UTILITY CONSTRUCTION	.000	.000	.000	.000	.000	.000
127	OTHER CONSTRUCTION	.000	.000	.000	.000	.000	.000
128	ELECTRICITY	.804	.000	.000	.861	.000	.000
129	GAS	1.676	.000	.000	1.519	.000	.000
130	WATER-SUPPLY,SEWERAGE	2.299	.005	.007	2.309	.004	.007
131	WHOLESALE TRADE	.410	.102	.346	.405	.030	.346
132	RETAIL TRADE	2.417	.000	.069	2.425	.000	.069
133	FINANCIAL BUSINESS	2.617	.025	.002	2.611	.020	.002
134	INSURANCE BUSINESS	8.349	.424	.322	8.331	.340	.322
135	REAL ESTATE AGENCY	.185	.065	.096	.184	.102	.096
136	RENT FOR HOUSE	3.563	.000	.000	3.607	.000	.000
137	NATIONAL RAILROAD	3.988	.024	.142	4.028	.024	.142
138	LOCAL RAILROAD	5.750	.000	.024	5.814	.000	.024
139	ROAD PASSENGER TRANSPORT	7.240	.029	.023	7.316	.023	.023
140	ROAD FREIGHT TRANSPORT	.441	.000	1.628	.457	.000	1.688
141	ROAD TRANSPORTATION FACILITIES	1.632	.000	.000	1.607	.000	.000
142	SEA TRANSPORT	.002	.546	8.841	.002	1.565	8.841
143	INLAND WATER TRANSPORT	.315	6.720	2.460	.324	5.639	2.460
144	AIR TRANSPORT	4.256	3.667	3.403	4.385	2.770	3.403
145	OTHER TRANSPORT	.546	10.485	7.175	.572	8.714	7.175
146	STORAGE	2.984	.000	.768	3.049	.000	.788
147	TELECOMMUNICATION	5.571	.425	.028	5.647	.425	.028
148	GOVERNMENTAL SERVICES	.000	.000	.000	.000	.000	.000
149	EDUCATION	.569	.000	.000	.558	.000	.000
150	MEDICAL,HEALTH SERVICE	3.264	.000	.000	2.915	.000	.000

TABLE XII-1(CONTINUED). SIMULATION TEST OF THE FINAL DEMAND COMPONENTS

AVERAGE ABSOLUTE SIMULATION ERRORS IN PERCENTAGE OF OUTPUT OF YEARS 1971-1972

SEC#	TITLES	NO COEFFICIENT CHANGE CONSUMPTION	IMPORTS	EXPORTS	LOGISTIC CURVE METHOD CONSUMPTION	IMPORTS	EXPORTS
151	OTHER PUBLIC SERVICES	.107	.000	.000	.125	.000	.000
152	SERVICE FOR BUSINESS ENTERPRIS	.017	[illegible]	.090	.017	.170	.090
153	AMUSEMENT	4.970	.235	.082	4.947	.168	.082
154	RESTAURANT	4.259	.229	.117	4.231	.163	.117
155	OTHER PERSONAL SERVICES	.281	.153	.069	.276	.109	.069
156	NOT CLASSIFIED	.012	.603	.449	.012	.200	.449
	AVERAGE ERROR	1.393	.626	.595	1.403	.636	.995

TABLE XII-2. SIMULATION ERROR OF OUTPUT AND PRICE

AVERAGE ABSOLUTE PERCENTAGE ERRORS OF YEARS 1971-1972

		NO COEFFICIENT CHANGE		LOGISTIC CURVE METHOD	
SEC#	TITLE	OUTPUT	PRICE	OUTPUT	PRICE
1	AGRICULTURE, FORESTRY AND FISH	5.050	7.237	2.659	7.125
2	MINING	6.943	9.021	10.679	7.968
3	FOODS AND TOBACCO	3.192	3.122	2.173	1.587
4	TEXTILE	4.206	5.304	5.049	5.546
5	PULP AND PAPER	3.254	4.560	3.327	4.887
6	CHEMICAL PRODUCTS	1.732	5.565	5.442	6.321
7	PRIMARY METALS	4.244	7.521	5.042	7.461
8	METAL PRODUCTS	5.797	3.904	2.643	4.033
9	NON ELECTRICAL MACHINERY	9.109	5.564	12.379	4.974
10	ELECTRICAL MACHINERY	2.034	6.017	2.817	5.809
11	TRANSPORTATION EQUIPMENT	1.814	2.109	2.975	2.418
12	MISCELLAEOUS MANUFACTURING PRO	1.994	2.747	1.785	3.434
13	CONSTRUCTION	2.839	2.946	2.610	2.781
14	ELECTRICITY, GAS AND WATER SUP	1.460	1.629	.541	1.790
	AVERAGE ERROR	3.614	4.251	4.011	4.222

TABLE XII-3. SIMULATION TEST OF INVESTMENT AND LABOR MARKET VARIABLES

AVERAGE SIMULATION ERRORS OF YEARS 1971-1972

SEC# TITLES	NO COEFFICIENT CHANGE					LOGISTIC CURVE METHOD				
	INVESTMENT	WAGE	EQU	WORK HOUR	EMPLOYMENT	INVESTMENT	WAGE	EQU	WORK HOUR	EMPLOYMENT
1 AGRICULTURE, FORES	.662	3.273	.326	.000	9.475	.662	3.077	.327	.000	6.755
2 MINING	.447	5.522	3.018	1.704	7.902	.127	5.506	3.811	1.429	12.824
3 FOODS AND TOBACCO	.188	2.123	.540	.225	1.653	.180	2.120	.494	.225	1.615
4 TEXTILE	1.565	.416	.451	1.259	2.696	1.728	.275	.452	1.218	3.403
5 PULP AND PAPER	.070	12.151	.511	.555	.590	.099	12.161	.526	.543	.655
6 CHEMICAL PRODUCTS	2.510	.971	.211	.591	2.985	4.976	1.197	.211	.604	7.130
7 PRIMARY METALS	1.606	4.699	.490	1.347	3.477	1.792	4.839	.798	1.436	4.077
8 METAL PRODUCTS	.042	6.204	1.499	1.353	13.919	.393	6.840	1.525	1.177	11.510
9 NON ELECTRICAL MAC	.019	1.639	1.991	.925	7.189	.474	1.552	1.952	1.329	3.645
10 ELECTRICAL MACHINE	1.270	1.691	.314	.245	4.915	1.440	1.763	.312	.190	5.693
11 TRANSPORTATION EQU	.447	10.476	.365	.267	1.752	.737	10.794	.363	.347	2.364
12 MISCELLANEOUS MANU	.082	3.662	.471	1.584	3.506	.082	3.732	.478	1.449	2.003
13 CONSTRUCTION	.084	3.586	.832	2.849	5.946	.084	3.546	.830	2.806	5.761
14 ELECTRICITY, GAS A	.406	2.069	.667	1.523	5.433	.837	2.065	.674	1.523	4.030
15 WHOLESALE AND RETA	6.565	1.687	.898	1.175	3.941	7.057	1.668	.897	1.117	2.988
16 REAL ESTATE	.315	12.826	.992	4.513	5.464	.315	12.840	.993	4.533	5.843
17 TRANSPORT AND COMM	5.887	2.963	.298	.647	6.778	6.189	2.843	.297	.704	9.181
18 FINANCE AND INSURA	.193	3.595	2.266	.914	3.183	.188	3.784	2.266	.914	1.199
19 OTHER SERVICES	.254	1.990	.161	.000	1.173	.269	1.967	.160	.000	.779
AVERAGE ERROR	1.366	2.795	.586	.832	4.632	1.602	2.752	.588	.814	4.005

reports but are not consistent with the various final demand data for 1971 and 1972. They are also inconsistent with the production indices of agriculture, mining, and manufacturing industries. These production indices seemed in closer agreement with the final demands. Until we can solve this data puzzle, therefore, we have aggregated the outputs of the model to a 20 sector level for comparison with the indices of industrial production published at that level. The production index is not available for non-manufacturing industries except Agriculture.

The tables of simulation errors show the simulation errors of the forecasts with and without the across-the-row coefficient change method.

The predictive performance is evaluated by comparing the absolute percentage error of output, price, and other variables.[1] Also, the weighted absolute average errors are calculated using the actual outputs in 1971 as weights.[2]

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[1]The formula for absolute percentage error is

$$APE_i = \left(\sum_{i=1971}^{1972} \frac{|\hat{X}_i - X_i|}{X_i} \right) \Big/ 2$$

$$i = 1 \ldots\ldots\ldots\ldots 156$$

where $\hat{X}_i$ is the predicted value and X_i is the actual value.

[2]Weighted absolute percentage error is

$$WAPE = \sum_{i=1}^{156} APE_i \cdot q_i / T_q$$

where q_i is output of i^{th} sector in 1971, and T_q is total output in 1971.

TABLE XII-4

The Weighted Average Absolute Percentage Errors of the Simulations

	No Coefficient Change	Coefficient Change
a. Output	3.614	4.011
b. Price	4.251	4.222
c. Consumption	1.393	1.403
d. Imports	.626	.636
e. Exports	.995	.995
f. Investment	1.366	1.602
g. Wage Rate	2.795	2.752
h. Productivity	.586	.588
i. Manhours per employee	.832	.814
j. Employment	4.832	4.005

For consumption, exports, and imports, error as a percentage of output[1] of each sector is calculated to see how the error in the final demand of that sector is important in determining the output error of that sector.

The weighted average absolute percentage errors are shown in Table XII-4. The errors do not change very much in these two cases. Unfortunately, the coefficient change method did not reduce the simulation errors. However, we could not judge the effectiveness of the

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[1]Error in percentage of output is

$$APEQ_i = \left(\sum_{i=1971}^{1972} \frac{|\hat{X}_i - X_i|}{q_i} \right) \Big/ 2 \qquad i = 1, \ldots\ldots\ldots\ldots 156$$

coefficient change method by this simulation test because this test covers only two years. The functional form of the across-the-row change method is a time trend equation. Therefore, within two years, we do not expect the coefficient change to play a significant role in determining the simulation errors.

Final demand equations work very well; the percentage errors are all less than 2%. Labor market equations also work very well. The relatively high error of employment to other variables are owing to the errors of output forecast. The errors caused through input-output computation are not significant because the output error is not much bigger than the sum of those of final demand components.

So far, we have discussed the sectoral errors. The aggregate overall error is much smaller than the weighted average sectoral error. The aggregate overall output error is less than 3%. As can be seen in the simulation error tables, some sectors have very large errors. But those sectors are not very important in output share, and do not increase the weighted average error very much. The smaller the output of a sector, the more difficult it is to predict it accurately.

Sensitivity of the Model to Different Exogenous Assumptions

In this section, the forecasting results of the model with different exogenous assumptions are described. The two most important exogenous assumptions are chosen to test the sensitivity of the model, namely, the rate of growth of disposable income and the interest rate. The across-the-row coefficient change method is utilized with the disposable income and interest rate experiments. The rest of the exogenous assumptions are fixed in each simulation. In each simulation, forecasts are made up to 1985; these forecasts will be compared with each other.

A. Simulation With Different Disposable Incomes

Disposable income in Japan grew by an average of 8% a year until 1972. After the oil shock in 1973, the growth rate slowed down a little bit, but the trend is expected to stay around 6% a year. When we ran the model with 6% growth rate of disposable income, labor supply was a binding constraint in the 1980's. Accordingly, two growth rates are chosen, namely, 4% for low growth, and 6% for high growth. These growth rates are applied from 1976 to 1985. Up through 1975, the actual growth rates for disposable income were used.

The changes of disposable income affect directly consumption which then brings about output changes. As output changes, investment and employment also change. Since employment could indicate potential income, we may judge the plausibility of the exogenous assumptions about income by the employment forecast. As we can see in Table XII-5, the 6% growth rate of disposable income requires very much higher employment in 1985 than the potential labor force. The slowing down of labor productivity and declining manhours per worker make the growth in the potential labor supply not fast enough to support a 6% increase in income. On the other hand, the 4% annaul growth of income would bring about large unemployment[1] in the late 1970's. The simulation

[1]Unemployment rate cannot be calculated because we lack the labor force projection. Using constant labor force participation rate of 1970, we only know the approximate trend of unemployment rate.

TABLE XII-5

Sensitivity Analysis With Disposable Income

Year		Disposable Income	Consumption	Private Investment	Employment in 1,000's	G.N.P.
1976	(A)	63,887	53,039	12,413	56,731	98,751
		6%*	5.9%	4.1%	1.2%	6.4%
	(B)	62,682	52,176	12,185	50,252	97,626
		4%	4.2%	2.2%	.3%	5.2%
1978	(A)	71,783	59,514	19,374	54,581	115,692
		6%	5.9%	25.3%	4.1%	8.3%
	(B)	67,797	56,595	18,005	52,719	111,359
		4%	4.1%	22.3%	2.7%	6.9%
1980	(A)	80,656	66,759	26,839	56,111	133,868
		6%	5.9%	15.1%	4.0%	7.3%
	(B)	73,329	61,302	24,220	55,741	125,791
		4%	4.1%	13.7%	2.8%	6.0%
1982	(A)	90,625	74,851	29,890	62,558	148,741
		6%	5.9%	2.5%	2.5%	4.8%
	(B)	79,312	66,308	26,757	57,825	137,071
		4%	4.0%	2.4%	1.5%	3.9%
1985	(A)	107,936	88,926	34,342	68,734	172,742
		6%	5.9%	10.1%	4.0%	5.6%
	(B)	89,216	74,566	29,876	61,474	153,889
		4%	4.0%	8.2%	2.7%	4.2%

*Percentages are growth rate from the previous year.

shows that the balanced growth rates are 6% in the late 1970's and 4% in 1980's. Appendix B shows a standard forecast in which the balanced growth rates of disposable income are used.

The model shows a serious depression in 1975. The G.N.P. had been growing by almost 10% a year up to 1972. The relatively low growth rate of 1971, 6.8% and the actual reduction of disposable income in 1974, -0.6%, caused the depression through 1975 which demonstrates the dynamic aspects of this model.

In Table XII-6, the predictions of major macro variables which were made by using the actual disposable income through 1975 were compared with the actual values. The percentage errors are generally low. Relatively large errors occured in consumption of 1973 and 1974. Through 1972, the growth rate of consumption had been approximately same to that of disposable income. For example, in 1972 consumption increased by 10.7%, while disposable income increased by 11.1%. But in 1973, in spite of 11% increase of disposable income, consumption grew only 7.5%. Instead of consuming the incremental disposable income the Japanese people invested more in 1973. This kind of change in short-term behavioral pattern made the error in consumption relatively bigger than the errors in other years.

The errors of employment in 1972 and 1973 are large. This is owing to the unexpected productivity growth in 1972 and in 1973. The rates of productivity growth were greater than 10% in these years. The growth rate of productivity in 1971 was only 4.5%

TABLE XII-6

Errors of Major Macro Variable Forecasts

	1971	1972	1973	1974	1975
G.N.P.					
Actual	82,212	89,668	98,508	97,365	98,839
Predicted	82,102	91,807	99,272	97,900	96,672
Error	.1%	2.4%	.8%	.5%	2.2%
Consumption					
Actual	40,482	44,293	47,945	48,632	51,535
Predicted	40,512	44,684	49,619	50,152	52,538
Error	.1%	.9%	3.5%	3.1%	1.9%
Investment					
Actual	27,059	29,663	33,912	30,530	29,529
Predicted	27,478	31,042	33,365	31,574	28,049
Error	1.5%	4.6%	1.6%	3.4%	5.0%
Employment					
Actual	52,812	52,760	54,041	53,710	50,881
Predicted	52,843	54,920	56,423	53,668	51,006
Error	.0%	4.1%	4.4%	.0%	.5%

There is a data inconsistency between national accounts and the 1970 Input-Output table. According to national account, G.N.P. in 1970 is 70,634 billion yen, and consumption expenditure is 36,258 billion yen. But the I/O table shows that G.N.P. in 1970 is 76,258 billion yen and consumption expenditure is 37,733 billion yen. The actual number in the table came from national accounts. Because this model is based on 1970 I/O model, the actual numbers in the table are adjusted to be consistent to the I/O table. The actual numbers are taken from '<u>Annual Report on National Income Statistics</u>,' published by Economic Planning Agency, Government of Japan and '<u>Main Economic Indicators</u>,' published by O.E.C.E.

Investment is very sensitive to income change. After the depression in 1975, investment soars in 1978; private investment increases 25.3% for 6% income growth case and 22.3% for 4% income growth case. The constant growth of income causes stable growth of output, which causes steady growth of investment. In 1982, the growth rates of investment are low in both cases. The high growth rate of investment in 1978 and the low growth rate of investment in 1982 can be explained by the dynamic aspect of the investment equation. The high growth rate of output owing to the high growth rate of disposable income in 1976 and 1977 makes the desired capital stock high. Since the investment has been low through 1976, the actual capital stock is low in 1977 and in 1978. Therefore, the model predicts the high growth rate of investment in 1978. Since the growth rate of output declines after 1978, the desired capital stock does not grow fast enough to keep the growth rate of investment high. The model predicts that the growth rate of investment in 1982 is the lowest even though the amount of investment is growing.

Not only on the aggregate macro variable, but also on composition of the sectoral components does this change of disposable income have an influence. The different income elasticities of consumption give different product compositions of consumption with the different growth rates, and therefore, different output shares, which, in turn, determine the composition of employment and investment. Table XII-7 shows the comparison of composition of these variables in 1985 for 20 sectors. As we expected, the low income elasticity of Agricultural product causes low consumption share, low employment share, and low

TABLE XII-7

Comparison of Compositions of
Two Different Growth Rates in Year 1985

Industry	Consumption 6%	Consumption 4%	Employment 6%	Employment 4%	Output 6%	Output 4%
1. Agriculture, forestry and fishery	3.81	3.93	10.31	10.49	3.00	3.08
2. Mining	0	0	.46	.47	1.40	1.42
3. Foods and Tobacco	17.32	17.71	1.11	1.27	3.08	2.92
4. Textile	8.70	8.43	5.13	4.89	2.60	2.47
5. Pulp and Paper	1.27	1.23	.74	.73	1.97	1.95
6. Chemical Products	.92	.92	2.20	2.21	4.98	4.99
7. Primary Metals	0	0	1.69	1.73	3.98	4.10
8. Metal Products	.94	.95	2.35	2.33	2.66	2.67
9. Non-Electrical Machinery	.38	.35	2.58	2.61	5.68	5.79
10. Electrical Machinery	1.47	1.54	2.40	2.50	3.51	3.67
11. Transportation Equipment	1.48	1.12	3.18	3.23	3.78	3.86
12. Miscellaneous Manufact.	3.92	3.83	7.78	7.75	7.77	7.79
13. Construction	0	0	11.76	11.62	6.93	6.89
14. Electricity, Gas & Water	1.97	2.04	.60	.60	2.67	2.68
15. Wholesale & Retail Trade	20.62	21.00	16.93	16.52	14.94	14.68
16. Real Estate	8.97	8.80	1.19	1.17	4.75	4.47
17. Transportation and Communication	8.31	7.96	9.09	9.02	8.81	8.69
18. Finance & Insurance	6.02	6.15	2.24	2.21	4.59	4.53
19. Other Services	13.93	14.05	14.54	14.91	10.84	11.27
20. Non-Classified	.01	.01	3.71	3.75	2.06	2.0[illegible]

(Numbers are in percentages)

output share if disposable income grows fast. On the other hand, Textile gains larger share of employment and output with 6% growth of disposable income.

B. Simulation With Different Interest Rates.

The model does not consider the financial market at all. The only connection to the financial market in this model is through the interest rate, which is given exogenously. The interest rate affects investment and savings, through which it affects total consumption indirectly.

Two simulations are done with different interest rates. First, a constant interest rate, the 1972 level, was used up to 1985. Secondly, the interest rates are chosen so that they have anticyclical effects. Low interest rates are assigned in the depression period and high interest rates are assigned in the 1980's. Disposable income is assumed to increase 6% per year in both cases.

Even though the elasticities of substitution in the investment equation are very low, investments turned out to be sensitive to the interest rates. The low interest rate in 1975 increases investment by 504 billion yen, and the high interest rate in 1985 lowered investment by 896 billion yen. The change of interest rate also affects employment and output. In 1985, the chosen interest rates which have anticyclical effects reduced employment by 324 thousand persons, and reduced GNP by 891 billion yens. Consumption is also affected through savings equation by interest rate change. The difference of consumption in these two cases in 1985 is 108 billion yens.

TABLE XII-8

Sensitivity Analysis With Interest Rates

Year		Interest Rate	Consumption	Private Investment	Employment in 1,000's	G.N.P
1973	(A)	7.0%	47,240 6.9%	15,265 -7.9%	53,801 -.1%	91,627 4.8%
	(B)	6.7%	47,267 7.0%	15,402 -7.1%	53,874 .01%	91,780 4.8%
1975	(A)	7.0%	50,072 4.2%	11,922 -14.5%	50,125 -3.4%	92,845 .8%
	(B)	6.7%	50,100 4.2%	12,426 -13.8%	50,356 -3.4%	93,324 .7%
1978	(A)	7.0%	59,514 5.9%	19,374 25.3%	54,581 4.1%	115,693 8.3%
	(B)	7.6%	59,467 5.9%	18,444 22.0%	54,208 3.6%	114,771 7.8%
1980	(A)	7.9%	66,759 5.9%	26,839 15.1%	59,111 4.0%	133,868 7.3%
	(B)	7.9%	66,686 5.9%	24,843 14.0%	58,336 3.7%	131,982 7.0%
1982	(A)	7.0%	74,851 5.9%	29,890 2.5%	62,558 2.5%	148,741 4.8%
	(B)	8.1%	74,763 5.9%	28,285 4.4%	61,926 2.3%	147,274 5.2%
1985	(A)	7.0%	88,926 5.9%	34,342 10.1%	68,734 4.0%	172,742 5.6%
	(B)	8.3%	88,818 5.9%	33,446 9.0%	68,410 3.9%	171,851 5.4%

Prospects

From the simulation test and the various sensitivity analyses, we could conclude that the model behaves quite reasonably. However, there is still much room for improvements. Here the model will be reviewed critically and possible improvements will be proposed.

A. Exogenous Assumptions

As we can see in the sensitivity analyses, the exogenous assumptions are very critical in forecasting. Even though this model is not designed to forecast short term cyclical movements of the economic variables, the cyclical path of the economy is important in forecasting long run outputs and prices in the future. Due to the dynamic features of the model, the forecasts will vary according to whether we had a recession before or not. Therefore, the forecasting ability of the model could be improved by replacing the exogenous assumptions on disposable income, interest rate, and labor force, with endogenously generated ones which are very sensitive to short run variations.

In fact, income of the 156 sector level can be determined within the model, because we can calculate wage compensation and profit from the wage equation and the markup equation in the price system. However, for that purpose, we need a lot of time and a wealth of data to reformulate and test the equations. At the moment we only calculate wage and labor requirement by 20 sectors. Other income components such as income from assets, transfer income, and taxes, could be treated with macro equations.

Attaching a macro aggregate model to this I/O model could eliminate the exogenous assumptions on income, interest rate, and labor force. By doing so, we may pursue consistency between the aggregate macro model and the multisectoral input-output model.

B. The Behavioral Equations

The forecasts made by the behavioral equations in the model depend on the assumptions of the functional forms of the equations. For instance, in the labor requirement equation, we assume that labor is agumented over time by the Gompertz curve, which forces the labor productivity growth to slow down in the future. The reason for the choice of the Gompertz curve is the expectation that labor productivity in Japan will slow down in the future. This expectation should be tested using recent data. In the investment equation, we employ the Koyck lag scheme because of the small number of observations. Owing to the infinite tail of the lag scheme, we found some unreasonably slow adjustments of actual capital stock to optimal capital stock. The Almon lag scheme might work better if we had enough number of observations. The functional form of the consumption equation is nonlinear. This form allows the interaction between the income variable and the price variables which makes more sense than linear form in which no interaction is allowed. But this nonlinear form requires more accurate price forecasts. It has been common to rely more heavily on income elasticity to forecast consumption because it is hard to know the price in the future. But in this model, price elasticities are equally important in consumption forecasting. Therefore, we should be more careful to get good price forecasts.

The forecasts of the behavioral equation depend also on the *a priori* information used in the estimation procedure. In the estimation of the consumption equation parameter, we employed *a priori* information about income elasticity and group price elasticity. A common econometric method to incorporate existing information in parameter estimation is the mixed estimation technique with which we can test compatibility between existing information and historical data series. Because of the nonlinearity of the consumption equation, we could not apply the mixed estimation technique. The cross section income elasticities were plugged in without any statistical test. Also, arbitrary limits were assigned to the group price elasticities. Therefore, the next step to be done for the consumption equation is to test this *a priori* information in more statistically consistent way. The INFORUM import and export equation estimation method was devised to incorporate existing information with historical data. The utility function which depends on R^2 and the deviation of estimates from existing information is maximized in the technique. The same idea could be used in the consumption equation estimation.

There is room for improvement in the inventory equation. The main problem in the inventory equation was the lack of data. Nonmerchandise imports and exports need more sophisticated equations. The price forecast could be improved by using appropriate demand measures which could bring in short run effect in prices. However, these tasks require a large extension of the model and a wealth of data.

C. I/O Coefficient Forecasts

Unfortunately, the effectiveness of the across-the-row coefficient change method was not really tested in the simulation because of the short simulation period. Even though the errors with constant input-output coefficients were not large, the coefficient change owing to the technological change or relative price change could produce large errors in the future if not accounted for. The projection of input-output coefficients is still an open question in input-output economics. The INFORUM method is designed to project the coefficient change owing to technological change and product mix change. However, we are certain that input-output coefficients change as relative prices change.

This model shows an example for country models in the INFORUM international I/O forecasting model. We expect that different countries have different natures of data. Therefore, when we build other country models, these problems could be dealth with and different methods of handling them could be tried.

APPENDIX A

Data Sources

To build this large forecasting model we need a wealth of data. Besides the input-output table and the capital flow matrix, we had to collect various economic data series. Many of these series were not readily available from published sources. The difficulty in collecting the data of Japan, where the author has never been, was eased by the joint efforts of our Japanese sponsor, the Long Term Credit Bank in Tokyo, and the author. Lots of data were collected and created from unpublished sources by the research team in the bank.

The following is a short description of what is the sources of the important data and how those were created if they were not readily available from published sources.

Input-Output Table and Capital Flow Matrix

The Government of Japan published 1970 Input-Output Table which is used as the basic input-output table in this model in March, 1974. Explanations of the input-output table are found in *1970 Input-Output Tables, Explanatory Report*, and in *1960-1965-1970 Link Input-Output Tables*. The sector classification of output and capital in this model follows the Input-Output Table of 1970 and the capital flow matrix.

Price, Value and Ouantity of Output

Collecting data series of price, value and quantity of output is a main burden of the data work. It was possible to get the value and quantity series of output of six-digit SITC code commodity for the manufacturing industries from 1958 to 1972 from the Census of Manufactures published in 1967, 1970 and 1973. The price series are obtained by dividing the value by the quantity. These series were aggregated into 156 input-output sectors. For tne non-manufacturing industries, the data could be obtained from Statistical Year Book published by the Bureau of Statistics, Office of the Prime Minister. The appropriate conversion was needed from the classification of the book to the input-output sector classification.

Consumption Expenditures and Prices of Consumers Goods

"Annual Report on the Family Income and Expenditure Survey," published by the Government of Japan has the consumption expenditure series and price series of consumer goods. The classification of the consumer goods in the report is not same to the input-output sector classification. Therefore, the conversion was made by using the SITC code. The length of the consumption expenditure series is different for different commodities. Many of the sectors have consumption data series from 1947 to 1971. But a few of the sectors do not have long enough data series to give appropriate degree of freedom in the estimation. Also, there were a few sectors for which we could not convert the consumption expenditure classification into the input-output classification. For the sectors in which we could not get long enough data series or we could not convert the sector classification, we use the output series to get consumption expenditure series assuming that the consumption-output ratio of the sector are constant over time. This arbitrary assumption is not expected to influence very much our consumption forecast because the amount of the total expenditure of these sectors is not large. These sectors are input-output sector number 4, 9, 10, 13, 18, 22, 39, 65, 66, 69, 70, 77, 87, 106, 131, 132, 135, 140, 141, 143, 145, 146, and 147.

Investment and Capital Stock

Investment, Capital Stock and deflator of investment goods by the classification of the capital flow matrix are gotten from unpublished documents. The document was obtained from the Economic Planning Agency of the Japanese Government. Non-manufacturing industry investment data are available in " Annual Report on National Income Statistics" published by the Economic Planning Agency of Japan. The investment data of manufacturing industries are not broken down into the capital flow matrix classification sectors in the report. The Government investment on the social overhead capital is also available in the report. All investment and capital stock data were available from 1953 to 1972.

Imports and Exports

The data series of the Japanese imports and exports of 119 tradable commodities are available in the INFORUM International Trade Model Data Bank. The data in the data bank are obtained from UN and

OECD publications. The 119 sectors in the data bank were converted to the 156 input-output sectors. The foreign prices and the foreign demands for the Japanese commodities are also borrowed from the INFORUM International Trade Model. The imports and exports of non-commodity, such as transportations and services, are obtained from the "Annual Report on National Income Statistics" published by the Economic Planning Agency, Government of Japan.

Miscellaneous Data

The sources of other data series are following:

a. Government expenditure: Annual Report on National Income Statistics. Economic Planning Agency, Government of Japan.

b. Inventory Stocks: Japanese Statistical Yearbook, Bureau of Statistics, Office of the Prime Minister.

c. Wages, manhours per worker, and employment: Yearbook of Labor Statistics, Division of Labor, Statistics and Research, Office of Labor Minister.

d. Population, number of households, and disposable income: Japan Statistical Yearbook, Bureau of Statistics, Office of the Prime Minister.

e. Interest rate (Commerical Bank Loan Rate): Economic Statistics Annual, the Bank of Japan.

APPENDIX B

The Forecasts

The whole output of the model is shown in this appendix. Table B-1 shows the G.N.P. forecasts with various macro-variable forecasts. Also, the exogenous assumptions on disposable income, population, and interest rates are shown in Table B-1. As you may realize, the forecast of output price in 1974 is much lower than the actual price level. The high inflation of Japan in 1974 was mainly caused by the foreign inflation, for instance, the high oil price. Because the international systems are not completed yet, the foreign price forecasts are not available. The foreign price as seen from Japan is assumed to increase 5% per year. Therefore, the actual inflation in 1974 was not shown up in the price forecasts. Also, in imports and exports forecast, we assume constant relative prices after 1972 because only foreign price series are available up to 1972 for the time being. In the tables, all forecasts are in billions of 1970 yen except wage rate. The forecasts of each item are shown in two lines: the first line is the magnitude of the forecast and the second is the annual growth rate of the forecast. Only the private investment are shown in Table 5, the values of investment in 1970 and in 1971 are actual. Actual values are inserted in 1970 for all variables.

The tables are:

Table B-1 G.N.P. Summary

Table B-2 Forecast of Exports

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 1 : GNP SUMMARY(BILLIONS OF 1970 YEN)

	1970	1973	1974	1975	1976	1977	1978	1980	1982	1985
PERSONAL CONSUMPTION EXPENDITURES	37733.5	45619.0	50151.1	52537.4	55649.0	58774.1	61637.0	67548.8	72928.0	80107.4
		11.04	1.07	4.76	5.92	5.62	5.21	4.28	3.70	3.15
GROSS DOMESTIC INVESTMENT	26425.3	33365.6	31574.3	28045.7	28435.6	32647.9	37973.3	47514.6	50334.3	52782.6
		7.48	-5.37	-11.16	1.38	14.81	16.31	10.29	.27	5.92
PRIVATE INDUSTRY INVESTMENT	15933.3	20580.0	18566.6	14420.9	14115.3	17638.3	22279.6	30482.2	31922.7	32300.6
		7.15	-5.78	-22.33	-2.12	24.96	26.31	14.12	-1.69	7.43
GOVERNMENT INVESTMENT	6779.8	7683.0	8013.4	8358.0	8717.4	9092.2	9483.2	10316.3	11222.5	12733.4
		4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
HOUSING INVESTMENT	3712.2	5102.6	4994.3	5270.8	5603.0	5917.4	6210.5	6716.1	7189.1	7748.7
		14.15	-2.12	5.53	6.30	5.61	4.95	3.67	3.14	2.55
INVENTORY CHANGE	2339.2	1852.1	616.7	9.8	764.1	1572.5	2075.2	2381.4	1727.7	2102.0
		-13.18	-66.71	-98.41	7716.62	105.80	31.97	3.31	-20.64	25.72
EXPORTS OF GOODS AND SERVICES	8368.9	13711.4	13689.6	13030.9	14315.9	15282.4	16128.4	18302.9	20546.3	23346.2
		11.58	-.16	-4.81	9.86	6.75	5.54	6.53	5.79	.75
MERCHANDISE	6546.3	10794.0	10778.4	10255.5	11279.2	12049.2	12723.0	14454.3	16240.1	18466.6
		11.72	-.15	-4.85	9.98	6.83	5.59	6.59	5.83	.76
TRANSPORTATION AND OTHER SERVICES	1822.6	2917.4	2911.2	2775.4	3036.7	3233.2	3405.4	3848.6	4306.2	4877.6
		10.96	-.21	-4.67	9.41	6.47	5.32	6.71	5.63	.73
IMPORTS OF GOODS AND SERVICES	7721.9	10465.7	9800.9	9316.7	9841.1	10771.6	11769.8	13611.6	14668.5	16402.9
		7.42	-6.35	-4.94	5.63	9.46	9.27	6.96	2.61	5.26
MERCHANDISE	6861.6	9210.4	8640.2	8229.3	8679.4	9477.1	10332.5	11906.9	12800.0	14230.9
		7.28	-6.19	-4.76	5.47	9.19	9.03	6.78	2.50	5.00
TRANSPORTATION AND OTHER SERVICES	860.3	1255.3	1160.8	1087.4	1161.7	1294.6	1437.3	1704.7	1868.5	2172.0
		8.61	-7.53	-6.32	6.83	11.43	11.03	8.23	3.38	6.99
GOVERNMENT EXPENDITURES	6100.4	7187.7	7495.2	8007.1	8351.4	8710.5	9085.0	9883.2	10751.4	12198.8
		-4.93	4.28	6.83	4.30	4.30	4.30	4.30	4.30	4.30
OTHER FINAL DEMAND COMPONENTS	3337.8	4002.5	4174.6	4354.1	4541.4	4736.6	4937.3	5374.3	5846.5	6633.5
		4.30	4.30	4.30	4.30	4.30	4.24	4.30	4.30	4.30
GROSS NATIONAL PRODUCT	76583.2	99272.5	97900.5	96672.3	102216.4	110952.4	120266.2	137393.7	147465.7	160767.7
		8.13	-1.38	-1.25	5.73	8.55	8.39	6.36	2.59	3.85
PRODUCTIVITY (YEN PER MAN HOUR)	1790.7	2240.5	2368.7	2483.3	2624.2	2780.0	2937.1	3246.5	3539.2	3991.7
		6.52	5.72	4.84	5.67	5.94	5.65	4.97	4.23	4.02
MAN HOURS PER MONTH	187.1	181.4	177.6	176.1	176.2	175.3	173.8	170.6	166.7	162.4
		-1.30	-2.10	-.83	.01	-.49	-.83	-.97	-1.19	-.79
NUMBER OF EMPLOYED(IN 1000 PERSONS)	52605.0	56423.2	53668.8	51006.5	51327.5	53082.2	55181.8	58930.2	60381.8	62204.1
		2.74	-4.88	-4.96	.63	3.42	3.96	3.08	.49	2.09
NOMINAL HOURLY WAGE RATE	381.1	574.4	641.2	713.5	793.6	886.4	989.8	1235.3	1542.9	2165.4
		12.90	11.62	11.29	11.22	11.70	11.66	11.69	11.75	12.08
PRICE OF OUTPUT	100.0	107.9	111.2	114.2	116.9	120.4	125.2	137.3	151.6	177.9
		3.00	2.13	2.64	2.36	3.05	3.92	4.89	5.08	5.97
EXOGENOUS ASSUMPTIONS										
DISPOSABLE INCOME	45815.0	61017.0	60651.0	63913.0	67748.0	71474.0	75047.0	81562.0	87793.0	95933.0
		11.66	-.60	5.38	6.00	5.50	5.00	4.00	3.50	3.00
POPULATION(IN MILLION PERSONS)	103.7	106.3	109.6	110.5	111.8	113.0	114.2	116.8	118.9	122.1
		2.12	1.24	.84	1.10	1.10	1.10	1.10	.90	.90
INTEREST RATE	7.7	7.2	9.1	9.1	8.9	8.7	8.4	8.0	8.0	8.0

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 2 : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1985
1	GRAIN	35.3	26.6 -24.67	25.8 -3.16	28.6 10.99	30.5 6.59	29.0 -4.77	28.7 -1.08	30.4 5.96	33.0 8.69	36.5 10.31	40.2 10.23	44.1 9.74	52.5 8.95	59.1 3.51
2	OTHER CROPS	2.8	3.9 40.76	5.4 38.52	6.2 15.76	7.2 15.72	8.4 15.78	9.7 15.78	11.2 15.78	13.0 15.78	15.0 15.78	17.4 15.78	20.1 15.78	27.0 15.78	36.1 15.78
3	FRUITS	3.7	4.4 19.56	4.7 6.77	4.8 1.36	4.8 1.29	4.9 1.25	5.0 1.23	5.0 1.23	5.1 1.22	5.2 1.22	5.2 1.22	5.3 1.22	5.4 1.22	5.5 1.22
4	OTHER CROPS FOR INDUSTRI	4.9	4.4 -10.87	3.8 -11.90	3.7 -4.13	3.5 -4.18	3.4 -4.21	3.2 -4.22	3.1 -4.22	3.0 -4.22	2.8 -4.22	2.7 -4.22	2.6 -4.22	2.4 -4.22	2.2 -4.22
5	CROP FOR FIBER INDUSTRIA	.1	.1 41.30	.1 -15.43	.1 -19.89	.1 -21.40	.1 -22.10	.0 -22.43	.0 -22.60	.0 -22.68	.0 -22.72	.0 -22.74	.0 -22.74	.0 -22.75	.0 -22.75
6	LIVE STOCKS,POULTRY	1.3	1.2 -9.16	.9 -21.70	1.0 5.96	1.0 5.90	1.1 5.91	1.2 5.91	1.2 5.91	1.3 5.91	1.4 5.91	1.5 5.91	1.6 5.91	1.7 5.91	2.0 5.91
7	LIVE STOCKS,POULTRY FOR	.2	.2 -4.46	.2 -9.88	.2 -8.09	.1 -8.33	.1 -8.84	.1 -8.85	.1 -8.84	.1 -8.85	.1 -8.85	.1 -8.85	.1 -8.85	.1 -8.85	.1 -8.85
8	SERICULTURE	.5	.3 -30.49	.4 11.78	.4 -1.70	.4 -1.70	.4 -1.70	.4 -1.70	.4 -1.70	.4 -1.70	.3 -1.70	.3 -1.70	.3 -1.70	.3 -1.70	.3 -1.70
9	AGRICULTURAL SERVICES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
10	FORESTRY	4.7	5.4 13.95	5.7 6.39	6.4 11.66	6.6 2.99	6.4 -2.04	6.6 2.14	6.8 4.05	7.1 3.98	7.4 4.87	7.8 5.04	8.2 4.93	9.0 4.86	9.6 1.69
11	CHARCOAL & FIREWOOD	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
12	LOGS	.7	.8 20.20	.9 1.47	.9 3.77	.9 1.32	.9 -1.34	.9 .21	.9 1.50	.9 1.63	.9 2.07	1.0 2.31	1.0 2.35	1.0 2.52	1.1 1.12
13	HUNTINGS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
14	FISHERIES	29.7	33.4 12.54	29.3 -12.48	28.3 -3.40	27.3 -3.40	26.4 -3.40	25.5 -3.40	24.6 -3.40	23.8 -3.40	23.0 -3.40	22.2 -3.40	21.4 -3.40	20.0 -3.40	18.7 -3.40
15	WHALING	3.3	3.3 .92	3.1 -7.22	2.8 -8.36	2.6 -8.53	2.4 -8.56	2.2 -8.56	2.0 -8.57	1.8 -8.57	1.7 -8.57	1.5 -8.57	1.4 -8.57	1.2 -8.57	1.0 -8.57
16	INLAND WATER FISHERIES	.1	.1 -24.84	.1 -17.63	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.1 -1.66	.0 -1.66
17	COKING COAL	.1	.1 13.75	.1 -7.90	.1 -10.20	.1 -10.30	.1 -10.31	.1 -10.31	.1 -10.31	.1 -10.31	.0 -10.31	.0 -10.31	.0 -10.31	.0 -10.31	.0 -10.31
18	LIGNITE BRIQUETTES AND L	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
19	IRON ORES CONCENTRATES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
20	ORES & CONCENTRATES OF N	.2	.4 117.05	.4 -12.83	.5 19.35	.5 10.40	.6 13.21	.6 12.28	.7 12.58	.8 12.48	.9 12.51	1.0 12.50	1.1 12.51	1.4 12.51	1.8 12.51
21	PETROLEUMS CRUDE	.5	1.6 268.76	1.8 -2.34	1.5 -16.66	1.5 .77	1.6 3.72	1.3 -16.59	1.4 6.45	1.5 9.15	1.7 14.71	2.0 15.41	2.3 14.01	2.9 12.00	3.7 13.99

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 2(CONTINUED) : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
22	NATURAL GAS	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	LIME STONE SAND GRAVEL	1.5	2.1	1.9	1.7	1.6	1.8	1.8	1.9	2.0	2.1	2.3	2.5	2.6	3.3
			37.13	-6.38	-11.19	-7.52	11.67	.40	7.64	3.84	7.65	8.10	6.64	6.44	10.74
24	SALT CRUDE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	NON-METALIC MINERALS	2.5	3.0	4.1	4.2	4.3	4.4	4.4	4.5	4.5	4.5	4.6	4.6	4.7	4.8
			21.42	33.76	3.60	1.79	2.33	.73	1.08	.58	.91	.94	.61	.85	1.56
26	CARCASSES	.8	.3	.8	.8	.7	.7	.7	.6	.6	.6	.5	.5	.5	.4
			4.44	-3.98	-4.71	-5.06	-5.14	-5.16	-5.16	-5.16	-5.16	-5.16	-5.16	-5.16	-5.16
27	MEAT PRODUCT	.7	.9	.8	.9	.9	.9	.9	.9	.9	1.0	1.0	1.1	1.2	1.4
			31.23	-10.98	7.67	3.47	-5.26	1.06	3.06	4.43	5.04	5.93	6.13	6.17	2.52
28	DAIRY PRODUCT	3.0	3.6	3.7	4.2	4.4	4.3	4.3	4.5	4.8	5.2	5.6	6.0	7.0	7.8
			19.15	4.63	12.12	6.36	-3.58	-.78	4.68	6.90	8.31	8.39	6.13	7.68	3.08
29	VEGETABLE & FRUIT PRESER	12.1	16.1	12.2	12.1	12.0	11.9	11.8	11.7	11.6	11.4	11.3	11.2	11.0	10.8
			33.40	-24.24	-.69	-.94	-.95	-.95	-.95	-.95	-.95	-.95	-.95	-.95	-.95
30	SEA FOOD PRESERVED	79.8	85.5	85.5	84.7	83.9	83.0	82.2	81.3	80.5	79.7	78.9	78.1	76.5	74.9
			7.10	-.01	-.68	-1.00	-1.01	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02	-1.02
31	GRAIN MILL PRODUCTS	18.0	15.7	14.0	15.2	16.0	15.2	15.2	16.0	17.3	19.0	20.8	22.7	26.9	30.1
			-12.96	-10.90	9.19	5.11	-4.87	-.21	5.47	8.08	9.62	9.60	9.18	8.52	3.43
32	BAKERY PRODUCTS	5.7	5.9	6.5	7.3	7.5	7.0	7.2	7.4	7.8	8.2	8.8	9.5	10.9	12.1
			4.21	9.82	11.54	3.70	-7.06	2.18	3.30	5.00	5.97	7.28	7.51	7.31	2.94
33	REFINED SUGAR	.3	.7	.6	.6	.6	.6	.6	.6	.7	.7	.7	.8	.8	.9
			136.80	-20.68	6.92	.73	-2.48	4.62	2.49	3.95	5.09	5.13	5.07	5.08	2.25
34	OTHER FOOD PREPARED	16.2	17.2	19.2	21.0	21.6	20.5	21.0	21.5	22.4	23.5	24.9	26.4	29.8	32.4
			6.26	11.43	9.37	3.08	-5.25	2.41	2.66	4.17	4.85	5.67	6.18	6.14	2.66
35	PREPARED FEEDS FOR ANIMA	2.5	2.1	2.5	2.7	2.8	2.7	2.8	2.9	3.1	3.3	3.4	3.6	4.0	4.4
			-16.97	21.67	7.31	2.27	-3.74	6.38	3.43	4.90	5.57	5.60	5.64	5.50	2.60
36	ALCOHOLIC BEVERAGES	2.6	2.7	3.1	3.4	3.5	3.4	3.5	3.7	3.8	4.0	4.2	4.4	4.7	5.0
			5.51	13.77	7.34	3.31	-.95	3.20	5.23	2.60	4.45	4.99	4.38	4.28	1.90
37	SOFT DRINK	1.7	1.8	2.1	2.4	2.5	2.3	2.4	2.5	2.6	2.8	3.0	3.2	3.6	3.9
			7.84	12.17	16.67	4.11	-9.66	4.19	6.62	5.32	6.21	6.79	6.50	6.07	3.43
38	TOBACCO	.3	.5	.6	.7	.8	.7	.6	.6	.7	.7	.8	.9	1.1	1.2
			83.31	13.07	16.11	5.20	-5.93	-12.17	-2.84	10.45	10.62	10.26	9.81	9.19	4.65
39	SILK REELING & WASTE SIL	2.3	1.9	1.3	1.1	.8	.7	.5	.4	.3	.3	.2	.2	.1	.1
			-17.41	-25.76	-20.58	-20.58	-20.58	-20.58	-20.58	-20.58	-20.58	-20.58	-20.58	-20.58	-20.58
40	COTTON SPINNING	6.2	5.7	6.7	6.2	5.9	5.5	5.2	4.8	4.5	4.3	4.0	3.8	3.3	2.9
			-7.41	15.69	-6.19	-6.17	-6.17	-6.17	-6.17	-6.17	-6.17	-6.17	-6.17	-6.17	-6.17
41	WOOLEN & WORSTED YARN	28.2	29.9	23.3	23.3	22.1	20.5	21.5	22.6	24.2	25.9	27.7	29.5	33.6	35.2
			5.94	-21.95	-.26	-4.84	-7.35	5.08	5.01	6.84	7.11	6.94	6.71	6.58	-1.43
42	LINEN YARN	.3	.2	.3	.3	.2	.2	.2	.3	.3	.3	.4	.4	.4	.5
			-31.54	26.17	.69	-8.34	-9.69	14.87	7.55	9.37	9.88	9.28	8.12	7.88	-1.15

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 2(CONTINUED) : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
43	SPUN RAYON YARN	3.5	3.2 -7.56	6.4 98.58	6.4 .24	6.1 -4.75	5.8 -5.37	6.3 7.86	6.5 4.25	6.9 5.44	7.3 5.95	7.7 5.79	8.1 5.23	9.0 5.36	9.4 -.82
44	SYNTHETIC FIBER YARN	34.8	46.0 32.10	87.4 90.13	88.2 .95	79.3 -10.15	69.8 -12.02	83.0 18.94	90.7 9.29	101.0 11.34	112.8 11.74	125.0 10.84	136.7 9.35	162.5 8.89	174.0 -1.27
45	SILK & RAYON WEAVING	19.7	20.8 5.60	15.1 -27.34	14.2 -6.09	13.3 -6.09	12.5 -6.09	11.8 -6.09	11.0 -6.09	10.4 -6.09	9.7 -6.09	9.1 -6.09	8.6 -6.09	7.6 -6.09	6.7 -6.09
46	COTTON & SPUN RAYON FABR	87.7	89.2 1.75	78.0 -12.58	71.5 -8.40	65.0 -9.05	59.0 -9.24	53.5 -9.30	48.5 -9.31	44.0 -9.32	39.5 -9.32	36.2 -9.32	32.8 -9.32	27.0 -9.32	22.2 -9.32
47	SYNTHETIC FIBERS WOVEN	207.9	272.0 30.82	300.2 10.37	310.5 .74	274.7 -11.53	239.5 -12.79	305.1 27.37	333.5 9.31	366.3 10.43	410.5 11.48	454.3 10.65	494.4 8.83	583.6 8.62	619.9 -1.62
48	WOOLEN FABRICS WOVEN & F	25.1	27.8 10.75	19.7 -29.31	18.2 -7.29	17.2 -5.80	16.3 -4.74	15.7 -4.01	15.1 -3.52	14.7 -3.19	14.2 -2.97	13.8 -2.83	13.4 -2.74	12.7 -2.63	12.1 -2.59
49	LINEN FABRICS WOVEN	1.1	1.1 4.25	1.0 -10.60	1.0 1.33	1.0 -4.67	.9 -5.05	1.0 10.31	1.1 4.05	1.1 4.74	1.2 5.50	1.3 5.39	1.3 4.69	1.4 4.93	1.5 -1.11
50	YARN & FABRIC DYEING & F	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
51	KNITTED FABRICS	77.4	114.7 48.24	125.7 9.58	130.7 3.94	121.3 -7.20	111.7 -7.87	138.6 24.06	150.6 8.64	164.8 9.42	181.2 9.97	197.8 9.17	212.0 7.18	242.1 6.76	257.6 .05
52	ROPES& FISHING NETS	8.1	9.1 12.62	8.8 -3.58	8.6 -1.55	8.4 -2.05	8.3 -2.17	8.1 -2.20	7.9 -2.21	7.7 -2.21	7.6 -2.21	7.4 -2.21	7.2 -2.21	6.9 -2.21	6.6 -2.21
53	OTHER FIBER PRODUCTS	26.5	28.1 6.19	32.3 14.80	33.5 3.68	32.3 -3.50	31.8 -1.73	35.5 11.65	36.6 3.27	37.3 1.86	38.3 2.59	39.3 2.72	40.0 1.86	41.6 2.14	42.6 .21
54	FOOTWEAR EXCEPT RUBBER M	4.9	4.6 -5.84	3.8 -17.04	4.4 14.30	4.3 -2.38	3.8 -11.17	4.4 15.24	4.5 3.11	4.7 3.58	4.9 4.59	5.1 5.22	5.4 4.41	5.8 4.40	5.9 -2.61
55	WEARING APPAREL	97.1	151.5 56.00	96.1 -36.53	95.0 -1.19	92.1 -3.03	88.4 -4.03	84.3 -4.60	80.2 -4.92	76.1 -5.11	72.1 -5.21	68.3 -5.28	64.7 -5.31	58.0 -5.35	51.9 -5.36
56	TEXTILE GARMENTS	21.0	30.3 44.48	24.0 -21.01	24.1 .38	22.8 -5.28	20.9 -8.21	23.2 10.97	24.5 5.55	26.0 6.17	27.7 6.63	29.6 6.56	31.4 6.12	35.0 5.75	36.8 -.59
57	WOOD MILLING	30.0	37.3 24.38	27.3 -26.84	26.5 -2.83	25.6 -3.49	24.7 -3.37	23.9 -3.39	23.1 -3.38	22.3 -3.38	21.6 -3.38	20.8 -3.38	20.1 -3.38	18.8 -3.38	17.5 -3.38
58	WOODEN PRODUCTS	16.5	17.6 6.89	19.0 7.60	19.2 1.41	18.1 -5.80	17.5 -3.36	19.0 8.18	20.3 6.93	20.6 1.52	21.0 2.09	21.5 2.30	21.9 1.81	22.7 1.98	23.4 1.11
59	FURNITURE WOODEN & METAL	9.9	11.7 18.02	15.5 32.62	18.1 16.49	14.9 -17.50	13.8 -7.53	16.3 18.23	17.7 8.65	18.7 5.88	20.0 6.95	21.4 7.04	22.4 4.29	24.8 5.39	26.7 2.43
60	PULP	.9	1.3 49.74	2.0 47.89	2.6 30.61	2.7 2.83	2.5 -6.56	2.7 6.10	2.9 7.63	3.2 10.39	3.5 10.72	3.8 10.07	4.2 9.56	5.0 8.78	5.4 -.09
61	PAPER	37.3	40.1 7.43	46.3 15.25	52.7 13.79	52.7 .02	49.9 -5.43	51.5 3.26	53.9 4.68	57.6 6.90	61.9 7.47	66.5 7.29	71.2 7.13	81.4 6.86	86.8 -.08
62	ARTICLES OF PAPER & PAPE	20.2	23.2 15.09	23.6 1.53	27.1 14.92	27.0 -.33	25.3 -6.25	26.3 3.59	27.6 5.09	29.6 7.44	32.0 8.04	34.5 7.86	37.2 7.63	42.9 7.29	45.9 -.03
63	PRINTING & PUBLISHING	15.1	15.9 5.28	15.1 -4.59	17.1 13.18	16.8 -1.67	15.9 -5.36	17.0 7.08	17.7 3.93	18.6 5.17	19.8 6.55	21.1 6.15	22.3 5.68	24.8 5.68	26.4 .53

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 2(CONTINUED) : FORECAST OF EXPORT: (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
64	LEATHER MANUFACTURES & F	6.7	4.6	7.3	11.7	11.2	8.8	10.8	11.6	12.6	14.0	15.7	17.2	20.4	22.1
			-31.25	58.65	59.95	-3.93	-21.83	22.73	7.46	8.95	11.15	11.61	9.79	9.19	-.74
65	LEATHER PRODUCTS EX. FOO	13.1	14.5	13.8	17.0	17.5	16.4	17.9	19.0	20.2	21.5	22.9	24.4	27.3	29.2
			10.82	-4.94	23.17	2.98	-6.36	9.49	5.79	6.31	6.58	6.66	6.23	5.91	.91
66	ARTICLES OF RUBBER	119.3	139.9	142.4	162.7	158.6	151.3	161.1	169.2	179.0	190.6	202.9	214.8	241.1	256.5
			17.29	1.79	14.23	-2.53	-4.61	6.48	4.99	5.78	6.52	6.41	5.89	6.02	.45
67	BASIC INORGANIC INDUSTRI	4.9	5.7	6.8	8.4	8.5	8.0	8.9	9.6	10.5	11.4	12.5	13.6	15.8	17.3
			17.12	18.42	23.96	1.25	-6.08	10.53	8.18	9.20	9.46	9.22	8.44	8.01	1.39
68	BASIC ORGANIC INDUSTRIAL	67.8	89.4	103.8	127.7	124.5	113.6	124.9	135.0	147.1	161.1	176.3	191.4	223.7	242.5
			31.81	16.10	23.13	-2.51	-8.76	9.92	8.09	8.95	9.53	9.44	8.56	8.14	.54
69	SYNTHETIC DYESTUFF	10.1	9.2	11.4	13.6	13.3	12.2	13.1	14.0	15.2	16.6	18.1	19.6	22.8	24.6
			-9.21	24.54	18.73	-2.00	-8.27	7.64	6.95	8.46	9.12	8.90	8.31	7.92	.32
70	BLASTING POWDER	2.8	3.0	2.7	3.0	2.9	2.8	3.0	3.2	3.3	3.5	3.7	3.9	4.3	4.6
			7.45	-10.35	11.29	-3.77	-3.97	8.84	5.20	5.03	5.82	5.82	5.24	5.29	.84
71	SPUN RAYON	30.7	33.7	42.6	47.3	47.1	44.8	46.4	48.2	50.8	53.8	57.1	60.4	67.6	71.5
			9.92	26.13	11.01	-.26	-4.90	3.62	3.81	5.33	6.04	6.02	5.80	5.83	-.04
72	MATERIALS OF SYNTHETIC F	117.8	169.7	183.1	217.6	216.6	200.8	216.4	231.2	251.8	275.5	300.5	325.3	379.2	409.9
			44.08	7.90	18.85	-.49	-7.29	7.78	6.84	8.89	9.42	9.07	8.25	7.88	.48
73	PLASTIC	86.5	111.4	121.3	146.8	146.2	135.4	146.6	158.5	173.2	190.1	208.6	226.9	266.6	291.6
			28.73	8.93	21.06	-.44	-7.35	8.22	8.14	9.25	9.81	9.69	8.81	8.34	1.29
74	CHEMICAL FERTILIZER	47.7	60.9	73.3	83.5	83.7	79.8	82.4	85.7	90.9	97.0	103.4	110.0	124.3	132.0
			27.62	20.35	14.00	.18	-4.63	3.23	4.08	6.09	6.67	6.55	6.44	6.27	-.03
75	MISCELLANEOUS BASIC CHEM	36.2	41.5	54.0	62.7	63.3	60.3	64.3	67.9	72.5	77.8	83.4	89.1	101.3	108.7
			14.61	30.04	16.14	1.03	-4.69	6.49	5.62	6.88	7.30	7.16	6.80	6.63	.80
76	VEGETABLE & ANIMAL OIL	3.7	3.4	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.4	4.5	4.6
			-6.92	17.98	1.95	.06	-.82	1.42	.76	1.08	1.17	1.19	1.24	1.32	.21
77	COATINGS	4.5	6.7	6.4	7.7	7.7	7.1	7.7	8.2	8.9	9.7	10.5	11.4	13.2	14.3
			49.39	-4.16	19.66	.27	-7.55	7.07	6.54	8.67	9.15	8.80	8.24	7.72	.68
78	MEDICINE	19.7	20.9	22.0	25.1	25.1	23.6	24.5	25.8	27.7	29.8	32.1	34.3	39.2	42.1
			6.22	5.07	14.36	-.00	-6.27	4.04	5.31	7.29	7.66	7.48	7.10	6.81	.65
79	OTHER CHEMICAL PRODUCTS	84.5	145.0	122.7	146.2	147.3	137.5	145.2	154.1	166.8	181.3	196.7	212.7	247.2	266.3
			71.56	-15.37	19.18	.76	-6.64	5.56	6.11	8.24	8.74	8.49	8.13	7.72	.20
80	PETROLEUM REFINERY PRODU	45.3	44.7	51.4	59.7	60.2	56.4	59.3	62.4	66.9	72.0	77.5	83.2	95.4	102.0
			-1.35	14.92	16.29	.77	-6.21	4.99	5.30	7.18	7.71	7.57	7.34	7.02	.04
81	COAL PRODUCTS	1.3	1.6	2.2	2.8	2.9	2.7	2.8	3.1	3.4	3.8	4.1	4.5	5.4	5.8
			26.86	30.70	29.00	3.27	-6.72	6.37	7.96	10.39	10.56	9.96	9.42	8.65	-.00
82	MISCELLANEOUS ANTISEPTIC	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
			-1.21	1.66	7.15	-1.42	-3.59	3.21	2.82	4.06	4.47	4.48	4.23	4.30	.67
83	CLAY PRODUCTS FOR BUILDI	4.9	7.1	7.8	9.4	9.2	8.4	9.2	10.2	10.9	11.8	12.8	13.7	15.9	17.1
			44.44	10.64	20.42	-2.21	-9.05	9.36	11.04	6.77	8.28	8.37	7.70	7.44	.45
84	GLASSWARE	26.3	23.1	32.3	33.8	33.6	33.0	34.2	35.0	35.7	36.6	37.6	38.6	40.5	41.9
			-13.96	40.25	4.57	-.77	-1.63	3.56	2.46	2.02	2.54	2.69	2.45	2.61	.69

- -A*F*C*R*U*M JAPANESE MODEL

TABLE 6 - 2(CONTINUED) : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
85	POTTERY	65.1	70.5 8.32	75.6 7.18	83.9 10.95	83.5 -.36	80.8 -3.31	83.7 3.67	87.3 4.29	91.0 4.24	95.3 4.70	99.8 4.69	104.2 4.40	113.5 4.43	118.7 .20
86	CEMENT	21.6	20.9 -3.72	20.2 -2.25	20.3 .44	20.4 .46	20.5 .47	20.6 .47	20.7 .47	20.8 .47	20.9 .47	21.0 .47	21.1 .47	21.3 .47	21.5 .47
87	OTHERNON-METALLIC MINERA	7.6	8.9 17.49	10.0 11.77	11.8 18.31	11.7 -.85	10.9 -6.64	11.6 6.56	12.6 8.59	13.6 7.27	14.7 8.31	15.9 8.29	17.1 7.65	19.7 7.46	21.4 .93
88	PIG IRON	.5	2.9 439.64	5.3 81.08	6.9 28.56	7.4 7.57	6.1 -17.74	7.6 24.96	8.8 16.56	9.6 8.16	10.4 8.21	11.3 8.66	12.1 7.44	13.9 7.59	14.1 -5.23
89	IRON & STEEL SCRAPS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
90	FERROALLOYS	1.8	3.6 99.18	5.2 44.07	5.9 15.02	6.3 5.64	6.0 -3.88	6.5 7.61	6.9 5.60	7.1 3.03	7.3 3.07	7.5 3.34	7.7 2.59	8.2 3.27	8.3 -2.43
91	STEEL INGOT	1.9	1.5 -21.52	1.8 17.76	2.0 13.93	2.1 6.72	1.9 -11.34	2.3 19.85	2.5 10.05	2.7 6.67	2.8 6.93	3.0 6.88	3.2 6.32	3.6 6.49	3.7 -3.86
92	HOT-ROLLED FLATES& SHEET	457.1	526.4 5.90	605.3 15.73	695.6 14.17	742.7 6.77	661.9 -10.89	789.9 19.35	867.8 9.85	924.6 6.55	987.5 6.80	1054.1 6.74	1119.4 6.20	1256.1 6.37	1284.5 -3.79
93	STEEL PIPE & TUBE	164.6	163.3 -.80	176.9 8.37	204.4 15.49	215.0 5.20	195.3 -9.14	235.3 20.47	260.0 10.50	275.5 5.95	293.0 6.34	311.6 6.36	329.5 5.73	366.2 5.95	373.2 -3.77
94	COLD-ROLLED & COATED STE	305.8	321.0 4.96	330.1 2.85	368.3 11.57	389.0 5.62	352.2 -9.47	409.6 16.29	444.4 8.51	469.8 5.72	498.0 6.00	527.9 6.00	557.3 5.56	618.8 5.79	631.5 -3.48
95	CAST & FORGE IRON	8.5	10.0 17.19	6.8 -31.84	7.8 14.64	8.2 4.89	7.4 -9.25	8.9 20.43	9.9 10.50	10.4 5.97	11.1 6.36	11.8 6.38	12.5 5.74	13.9 5.95	14.2 -3.77
96	NONFERROUS METAL INGOTS	46.8	80.4 64.66	99.4 23.66	106.3 6.97	102.3 -3.73	89.3 -12.71	102.8 15.11	111.2 8.15	117.0 5.26	123.6 5.58	131.3 6.24	138.0 5.14	152.5 5.45	158.3 -1.40
97	COPPER BRASS PRODUCTS	20.3	25.3 24.59	26.1 3.25	27.4 4.85	27.8 1.42	25.0 -10.13	29.9 19.74	32.9 10.08	34.9 6.02	37.2 6.79	39.9 7.07	42.3 6.09	47.5 6.36	48.7 -3.56
98	ALUMINUM EXTRUDED PRODUC	11.5	12.7 10.51	15.3 20.02	17.3 13.38	17.7 2.35	15.9 -9.91	18.2 14.04	19.7 8.19	21.2 7.52	22.7 7.52	24.4 7.19	26.0 6.74	29.6 6.72	30.4 -3.60
99	OTHER NONFERROUS METAL P	10.5	22.3 112.77	22.2 -.61	23.7 7.04	22.8 -3.76	19.9 -12.73	22.9 15.12	24.8 8.16	26.1 5.26	27.6 5.58	29.3 6.24	30.8 5.14	34.0 5.45	35.3 -1.40
100	STRUCTURAL METAL PRODUCT	127.1	123.0 -3.22	209.2 70.10	256.0 22.36	245.5 -4.13	233.1 -5.04	283.1 21.46	304.4 7.53	324.9 6.73	351.1 8.05	378.4 7.80	403.6 6.65	456.1 6.69	498.1 2.17
101	OTHER METAL PRODUCTS	124.4	131.2 5.50	186.7 42.29	203.0 8.72	200.8 -1.07	187.3 -6.74	206.8 12.81	231.9 12.17	237.9 2.59	249.2 4.74	263.6 5.75	276.4 4.85	303.6 5.08	323.0 1.08
102	POWER GENERATING MACHINA	67.9	85.9 26.56	89.7 4.37	104.4 16.39	114.2 9.43	109.2 -4.39	117.0 7.15	126.8 8.35	136.6 7.70	147.6 8.05	159.1 7.83	171.5 7.77	197.0 7.61	212.2 .27
103	MACHINE TOOLS METALWORKI	43.9	47.2 7.45	70.3 48.91	80.4 14.45	88.6 10.18	84.9 -4.20	88.1 3.77	94.3 7.13	99.6 5.54	105.6 6.02	112.5 6.47	119.3 6.05	133.3 5.90	141.5 .05
104	INDUSTRIAL MACHINERY	244.9	329.2 34.43	294.1 -10.66	319.1 8.48	338.4 6.05	322.1 -4.80	337.5 4.76	369.9 9.63	397.4 7.43	428.8 7.91	461.7 7.65	487.8 5.66	546.8 6.56	591.1 .91
105	GENERAL INDUSTRIAL MACHI	102.9	162.4 57.86	133.9 -17.56	152.1 13.62	165.4 8.71	154.2 -6.76	164.4 6.61	181.3 10.28	194.6 7.33	210.0 7.94	227.2 8.18	243.4 7.13	277.6 7.33	302.0 1.28

I*N*F*O*R*U*M JAPANESE MODEL

TABLE 6 - 2(CONTINUED) : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
106	OFFICE MACHINERY	100.5	78.6	370.0	443.3	443.6	419.2	513.2	563.9	593.3	646.2	705.1	754.0	873.8	967.9
			-21.79	370.72	19.82	.08	-5.50	22.41	9.88	5.21	8.91	9.12	6.95	8.20	4.75
107	HOUSEHOLD MACHINERY	53.4	67.5	71.7	87.0	87.6	82.2	91.8	98.6	106.4	115.6	125.2	133.3	151.1	163.1
			26.46	6.15	21.41	.83	-6.33	11.65	7.40	7.91	8.65	8.29	6.52	6.49	1.57
108	PARTS OF MACHINERY	83.8	112.6	130.4	132.1	133.3	132.8	133.8	135.1	136.1	137.3	138.6	139.9	142.5	144.3
			34.41	15.79	1.27	.90	-.32	.69	.98	.79	.86	.96	.91	1.04	.17
109	STRONG ELECTRIC MACHINER	101.2	122.7	142.5	161.8	163.9	154.3	165.7	175.9	193.5	210.0	227.2	244.2	280.5	303.6
			21.26	16.42	13.56	1.29	-5.86	7.37	6.62	7.52	8.55	8.18	7.49	7.49	.78
110	HOUSEHOLD ELECTRICAL MAC	591.1	671.9	1114.7	1219.9	1205.4	1143.5	1204.9	1263.0	1338.4	1426.7	1519.8	1608.5	1800.6	1915.5
			13.66	65.91	9.44	-1.19	-5.14	5.37	4.82	5.97	6.60	6.52	5.84	5.82	.63
111	OTHER WEAK ELECTRICAL AP	231.0	407.4	381.7	458.3	430.9	388.9	436.9	473.3	509.3	551.3	596.6	633.3	714.1	768.8
			76.39	-6.31	20.06	-6.01	-9.73	12.37	8.31	7.61	8.25	8.22	6.15	6.28	1.52
112	SHIPS & BOATS	549.2	676.7	750.6	803.8	794.4	777.4	781.3	785.3	787.1	788.7	830.9	871.8	958.7	999.9
			23.22	10.95	7.05	-1.17	-2.13	.50	.51	.23	.20	5.35	4.92	4.89	-.42
113	RAILWAY VEHICLES	18.2	15.6	18.3	18.4	18.4	18.4	18.4	18.4	18.5	18.5	18.5	18.5	18.6	18.6
			-14.15	17.07	.33	.17	.13	.12	.11	.11	.11	.11	.11	.11	.11
114	PASSENGER MOTOR CAR	517.0	752.8	1019.5	1115.6	1050.0	1008.2	1105.8	1167.6	1189.7	1212.8	1292.2	1367.3	1513.0	1609.9
			45.61	35.43	9.44	-5.90	-3.97	9.67	5.59	1.89	1.94	6.55	5.81	5.47	.91
115	REPAIR OF PASSENGER MOTO	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
116	MOTORCYCLES & BICYCLES	155.9	303.7	304.4	383.6	414.0	471.1	537.3	587.5	619.7	640.5	666.6	683.6	710.4	713.3
			91.15	.22	26.01	7.92	13.80	14.04	9.36	5.48	3.35	4.08	2.55	2.78	-.30
117	AIRCRAFTS	12.9	17.6	11.6	14.2	13.5	14.0	14.7	15.3	15.6	15.9	16.8	17.7	19.5	20.8
			36.77	-34.07	21.90	-4.50	3.23	5.09	4.36	1.58	2.32	5.61	5.16	5.04	1.55
118	OTHER TRANSPORTATION	.8	.8	.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.2	1.3	1.4	1.6
			5.67	10.40	4.24	1.31	-2.67	3.68	3.23	2.40	2.49	7.89	7.79	7.17	1.82
119	PRECISION MACHINERY	46.1	51.3	60.4	73.8	72.1	67.1	72.7	80.1	85.0	90.6	96.8	102.9	116.0	125.6
			11.27	17.76	22.22	-2.38	-6.95	8.46	10.18	6.07	6.61	6.79	6.30	6.59	1.57
120	PHOTOGRAPHIC & OPTICAL I	150.8	131.7	250.6	289.5	287.2	269.9	289.2	312.9	337.4	365.3	395.5	424.5	484.0	527.3
			-12.65	90.27	15.50	-.77	-6.05	7.17	8.20	7.81	8.28	8.28	7.33	6.94	1.90
121	WATCHES & CLOCKS	45.0	66.2	70.1	83.7	83.0	75.7	82.0	87.7	95.1	104.2	113.8	122.7	141.8	152.6
			47.15	5.87	19.38	-.79	-8.83	8.32	7.01	8.34	9.66	9.17	7.83	7.55	.30
122	OTHER MANUFACTURING GOOD	257.8	135.7	337.3	372.6	411.5	454.4	501.9	554.3	612.1	676.0	746.6	824.6	1005.7	1226.7
			-47.37	148.58	10.46	10.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44	10.44
123	HOUSING CONSTRUCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
124	CONSTRUCTION NOT FOR RES	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
125	BUILDING REPAIRING	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
126	PUBLIC UTILITY CONSTRUCT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 2(CONTINUED) : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
127	OTHER CONSTRUCTION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
128	ELECTRICITY	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
129	GAS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
130	WATER-SUPPLY,SEWERAGE	.1	.1 44.71	.2 23.30	.2 12.28	.2 -.11	.2 -5.00	.2 10.35	.2 7.05	.2 5.76	.3 6.36	.3 7.18	.3 6.32	.3 6.45	.3 .77
131	WHOLESALE TRADE	426.2	470.5 10.40	538.2 14.38	582.1 8.16	579.6 -.43	556.8 -3.93	598.0 7.39	628.9 5.18	656.1 4.33	688.1 4.88	726.7 5.60	763.1 5.01	841.8 5.25	891.2 .64
132	RETAIL TRADE	18.7	20.7 10.58	23.7 14.38	25.6 8.16	25.5 -.43	24.5 -3.93	26.3 7.39	27.6 5.18	28.8 4.33	30.2 4.88	31.9 5.60	33.5 5.01	37.0 5.25	39.2 .64
133	FINANCIAL BUSINESS	.3	.4 44.71	.5 23.30	.6 12.28	.6 -.11	.6 -5.00	.6 10.35	.7 7.05	.7 5.76	.8 6.36	.8 7.18	.9 6.32	1.0 6.45	1.0 .77
134	INSURANCE BUSINESS	16.6	20.8 25.53	25.7 23.30	28.8 12.28	28.8 -.11	27.4 -5.00	30.2 10.35	32.3 7.05	34.2 5.76	36.4 6.36	39.0 7.18	41.5 6.32	46.8 6.45	50.1 .77
135	REAL ESTATE AGENCY	8.0	8.9 10.76	10.1 14.38	11.0 8.16	10.9 -.43	10.5 -3.93	11.3 7.39	11.8 5.18	12.4 4.33	13.0 4.88	13.7 5.60	14.4 5.01	15.9 5.25	16.8 .64
136	RENT FOR HOUSE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
137	NATIONAL RAILROAD	9.3	11.7 26.04	14.5 23.30	16.2 12.28	16.2 -.11	15.4 -5.00	17.0 10.35	18.2 7.05	19.2 5.76	20.5 6.36	21.9 7.18	23.3 6.32	26.3 6.45	28.2 .77
138	LOCAL RAILROAD	.5	.6 15.77	.7 23.30	.8 12.28	.8 -.11	.8 -5.00	.8 10.35	.9 7.05	1.0 5.76	1.0 6.36	1.1 7.18	1.2 6.32	1.3 6.45	1.4 .77
139	ROAD PASSENGER TRANSPORT	1.1	1.4 31.55	1.8 23.30	2.0 12.28	2.0 -.11	1.9 -5.00	2.1 10.35	2.2 7.05	2.4 5.76	2.5 6.36	2.7 7.18	2.9 6.32	3.2 6.45	3.5 .77
140	ROAD FREIGHT TRANSPORT	46.4	58.2 25.37	71.7 23.30	80.5 12.28	80.4 -.11	76.4 -5.00	84.3 10.35	90.3 7.05	95.5 5.76	101.6 6.36	108.8 7.18	115.7 6.32	130.5 6.45	139.8 .77
141	ROAD TRANSPORTATION FACI	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
142	SEA TRANSPORT	945.7	1186.3 25.44	1462.7 23.30	1642.4 12.28	1640.5 -.11	1558.5 -5.00	1719.8 10.35	1841.1 7.05	1947.1 5.76	2071.0 6.36	2219.7 7.18	2359.9 6.32	2662.0 6.45	2851.5 .77
143	INLAND WATER TRANSPORT	50.1	62.8 25.36	77.4 23.30	86.9 12.28	86.8 -.11	82.5 -5.00	91.0 10.35	97.5 7.05	103.1 5.76	109.6 6.36	117.5 7.18	124.9 6.32	140.9 6.45	151.0 .77
144	AIR TRANSPORT	71.7	90.0 25.53	111.0 23.30	124.6 12.28	124.5 -.11	118.2 -5.00	130.5 10.35	139.7 7.05	147.7 5.76	157.1 6.36	168.4 7.18	179.1 6.32	202.0 6.45	216.4 .77
145	OTHER TRANSPORT	11.8	14.8 25.09	18.2 23.30	20.4 12.28	20.4 -.11	19.4 -5.00	21.4 10.35	22.9 7.05	24.2 5.76	25.8 6.36	27.6 7.18	29.4 6.32	33.1 6.45	35.5 .77
146	STORAGE	8.9	9.8 10.36	11.2 14.38	12.2 8.16	12.1 -.43	11.6 -3.93	12.5 7.39	13.1 5.18	13.7 4.33	14.4 4.88	15.2 5.60	15.9 5.01	17.6 5.25	18.6 .64
147	TELECOMMUNICATION	2.8	3.1 10.78	3.5 14.38	3.8 8.16	3.8 -.43	3.7 -3.93	3.9 7.39	4.1 5.18	4.3 4.33	4.5 4.88	4.8 5.60	5.0 5.01	5.5 5.25	5.9 .64

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TABLE B - 2(CONTINUED) : FORECAST OF EXPORTS (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
148	GOVERNMENTAL SERVICES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
149	EDUCATION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
150	MEDICAL,HEALTH SERVICE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
151	OTHER PUBLIC SERVICES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
152	SERVICE FOR BUSINESS ENT	4.9	5.4 10.03	6.2 14.38	6.7 8.16	6.6 -.43	6.4 -3.93	6.9 7.39	7.2 5.18	7.5 4.33	7.9 4.88	8.3 5.60	8.7 5.01	9.6 5.25	10.2 .64
153	AMUSEMENT	8.5	9.4 10.34	10.7 14.38	11.6 8.16	11.6 -.43	11.1 -3.93	11.9 7.39	12.5 5.18	13.1 4.33	13.7 4.88	14.5 5.60	15.2 5.01	16.8 5.25	17.8 .64
154	RESTAURANT	14.9	16.5 10.53	18.8 14.38	20.4 8.16	20.3 -.43	19.5 -3.93	20.9 7.39	22.0 5.18	23.0 4.33	24.1 4.88	25.4 5.60	26.7 5.01	29.5 5.25	31.2 .64
155	OTHER PERSONAL SERVICES	10.7	11.8 10.43	13.5 14.38	14.6 8.16	14.6 -.43	14.0 -3.93	15.0 7.39	15.8 5.18	16.5 4.33	17.3 4.88	18.3 5.60	19.2 5.01	21.1 5.25	22.4 .64
156	NOT CLASSIFIED	165.4	192.6 10.38	208.8 14.38	225.9 8.16	224.9 -.43	216.1 -3.93	232.0 7.39	244.0 5.18	254.6 4.33	267.0 4.88	282.0 5.60	296.1 5.01	326.6 5.25	345.8 .64

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TABLE B - 3 : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	GRAIN	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
2	OTHER CROPS	654.3	730.1 5.16	787.0 7.78	859.3 9.18	877.9 2.17	912.2 3.91	963.2 5.58	1015.8 5.46	1067.7 5.11	1117.7 4.68	1164.8 4.21	1210.6 3.94	1292.9 3.11	1369.6 2.89
3	FRUITS	391.7	395.9 1.06	397.6 .44	413.8 4.07	420.7 1.67	413.8 -1.65	426.7 3.11	437.7 2.59	445.5 1.79	450.3 1.08	452.2 .42	450.8 -.31	444.4 -.98	431.7 -1.52
4	OTHER CROPS FOR INDUSTRI	1.5	1.5 -.32	2.2 46.46	2.5 10.67	.8 -66.00	1.9 130.95	2.1 11.09	2.2 3.41	2.2 2.51	2.3 1.58	2.3 .56	2.4 6.93	2.4 -1.42	2.6 3.23
5	CROP FOR FIBER INDUSTRIA	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
6	LIVE STOCKS,POULTRY	227.9	242.2 6.29	274.5 13.31	305.3 11.23	287.0 -6.00	319.0 11.18	341.8 7.14	364.9 6.76	389.4 6.71	413.8 6.28	436.9 5.57	461.6 5.65	496.8 3.27	527.8 2.93
7	LIVE STOCKS,POULTRY FOR	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
8	SERICULTURE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
9	AGRICULTURAL SERVICES	4.2	4.5 6.78	4.9 8.18	5.3 5.35	5.6 5.07	5.8 3.61	6.1 6.15	6.5 6.34	6.9 6.04	7.3 5.62	7.7 5.09	8.0 4.53	8.7 3.68	9.2 3.21
10	FORESTRY	33.6	36.1 7.43	38.3 6.22	40.2 4.62	41.4 3.10	42.1 1.52	43.1 2.47	44.2 2.49	45.2 2.33	46.2 2.14	47.1 1.91	47.8 1.55	49.1 1.20	50.1 1.05
11	CHARCOAL & FIREWOOD	10.9	10.0 -8.54	15.2 52.58	16.3 6.64	2.3 -85.79	10.8 369.24	11.9 9.71	11.7 -1.17	11.5 -2.40	11.0 -3.74	10.4 -5.34	11.1 6.64	9.6 -8.96	9.5 .39
12	LOGS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
13	HUNTINGS	3.0	3.0 -1.40	3.3 10.57	3.4 3.65	2.9 -14.25	3.3 13.59	3.4 3.45	3.5 2.12	3.6 1.94	3.6 1.74	3.7 1.47	3.8 2.40	3.8 .66	3.9 1.44
14	FISHERIES	344.5	365.4 6.07	386.6 5.80	422.6 9.32	453.0 7.18	457.9 1.08	481.1 5.07	507.6 5.50	534.7 5.35	561.6 5.03	587.5 4.60	610.9 3.98	655.9 3.35	693.5 2.78
15	WHALING	11.7	12.4 5.99	13.2 6.16	14.5 10.34	15.4 6.36	15.7 1.90	16.7 6.35	17.9 6.88	19.1 6.67	20.3 6.10	21.3 5.32	22.3 4.43	23.8 3.00	24.9 2.00
16	INLAND WATER FISHERIES	40.4	44.4 9.87	48.0 8.06	53.7 11.69	58.6 9.12	58.9 .59	62.3 5.75	66.2 6.18	70.0 5.68	73.9 5.45	77.5 4.91	80.7 4.19	87.0 3.50	92.1 2.85
17	COKING COAL	4.2	5.0 18.55	6.1 22.38	6.4 5.32	4.2 -34.03	5.6 31.51	5.7 2.19	5.6 -1.19	5.5 -1.73	5.4 -2.26	5.2 -2.88	5.2 -.54	4.8 -4.63	4.5 -2.90
18	LIGNITE BRIQUETTES AND L	.4	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00
19	IRON ORES CONCENTRATES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
20	ORES & CONCENTRATES OF N	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
21	PETROLEUMS CRUDE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00

I*N*F*O*R*U*M JAPANESE MODEL

TABLE 6 - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 MILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
22	NATURAL GAS	.8	.9 7.61	.9 7.71	1.0 5.79	1.1 7.11	1.1 2.74	1.2 5.75	1.3 5.61	1.3 5.44	1.4 5.05	1.5 4.65	1.5 4.13	1.6 3.71	1.7 3.36
23	LIME STONE SAND GRAVEL	-2.3	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00	-2.3 .00
24	SALT CRUDE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
25	NON-METALIC MINERALS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
26	CARCASSES	464.9	493.1 6.07	516.0 4.64	557.5 8.05	574.9 3.11	588.9 2.44	617.7 4.89	649.8 5.21	683.4 5.16	717.7 5.02	752.0 4.78	786.0 4.52	852.6 3.95	917.5 3.73
27	MEAT PRODUCT	129.4	153.5 15.60	166.2 8.28	188.1 13.19	208.5 10.84	217.6 4.36	233.5 7.35	253.0 8.32	274.8 8.63	298.4 8.58	323.1 8.27	347.8 7.67	399.1 6.79	449.4 6.05
28	DAIRY PRODUCT	418.4	431.1 3.02	490.5 13.78	536.2 9.33	472.1 -11.95	537.7 13.88	569.0 5.82	596.4 4.82	624.6 4.73	652.5 4.46	678.9 4.04	711.5 4.81	755.1 2.72	803.7 3.13
29	VEGETABLE & FRUIT PRESER	196.2	209.0 6.50	220.8 5.67	238.9 8.21	252.9 5.86	255.5 1.02	267.1 4.51	279.6 4.71	292.0 4.41	303.6 3.97	314.1 3.46	322.8 2.78	337.9 2.04	348.1 1.40
30	SEA FOOD PRESERVED	641.4	677.8 5.68	715.1 5.50	778.2 8.83	830.8 6.75	840.2 1.14	881.1 4.86	927.7 5.28	975.5 5.16	1023.0 4.67	1066.7 4.47	1110.1 3.88	1189.6 3.26	1256.6 2.73
31	GRAIN MILL PRODUCTS	1381.4	1472.4 6.59	1566.6 6.40	1706.4 8.92	1825.2 6.96	1860.7 1.95	1959.0 5.28	2064.7 5.40	2169.0 5.05	2269.8 4.65	2365.6 4.22	2451.5 3.63	2619.2 3.16	2767.1 2.75
32	BAKERY PRODUCTS	705.2	768.0 8.90	811.7 5.64	870.9 7.35	912.9 4.81	926.3 1.48	971.0 4.82	1013.2 4.35	1052.8 3.91	1092.4 3.76	1133.0 3.72	1173.5 3.57	1267.7 3.94	1374.2 4.24
33	REFINED SUGAR	77.7	79.3 2.07	95.8 20.79	104.9 9.51	76.6 -26.93	99.3 26.03	105.6 6.37	109.9 4.12	114.2 3.88	118.2 3.49	121.7 2.99	127.6 4.84	132.8 1.70	140.9 3.01
34	OTHER FOOD PREPARED	936.9	987.6 5.41	1046.4 5.95	1139.0 8.85	1217.9 6.93	1229.2 .93	1282.8 4.36	1345.6 4.90	1411.0 4.86	1476.6 4.65	1540.5 4.32	1598.9 3.80	1714.0 3.31	1815.8 2.92
35	PREPARED FEEDS FOR ANIMA	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
36	ALCOHOLIC BEVERAGES	691.3	757.0 9.51	856.1 13.09	955.0 11.56	968.5 1.41	1046.7 8.08	1101.8 5.26	1170.1 6.20	1257.7 7.48	1361.8 8.28	1477.7 8.51	1608.0 8.82	1865.1 7.31	2138.7 7.12
37	SOFT DRINK	260.7	284.2 9.00	315.1 10.89	348.9 10.70	365.6 4.79	388.2 6.18	406.6 4.74	431.4 6.09	464.1 7.59	503.8 8.55	548.5 8.88	597.7 8.97	698.0 7.87	802.4 7.24
38	TOBACCO	743.3	747.2 .53	782.8 4.89	820.2 4.65	804.3 -1.94	852.2 5.96	872.2 2.35	898.6 3.03	935.6 4.12	980.9 4.84	1031.4 5.16	1088.4 5.53	1194.2 4.56	1307.1 4.65
39	SILK REELING & WASTE SIL	.4	.4 3.38	.6 40.14	.7 14.43	.4 -40.13	.6 50.56	.7 11.65	.7 6.79	.8 5.99	.8 4.97	.8 3.84	.9 7.04	.9 1.80	1.0 3.67
40	COTTON SPINNING	1.5	1.8 21.94	2.3 24.22	2.8 23.25	3.0 8.64	3.5 14.14	4.0 15.84	4.6 13.51	5.2 13.15	5.8 12.86	6.6 12.94	7.5 13.56	9.9 15.29	13.6 17.89
41	WOOLEN & WORSTED YARN	9.4	10.5 11.42	12.6 20.53	14.6 15.74	14.6 .03	16.1 10.33	17.7 9.60	19.2 8.62	20.8 8.00	22.3 7.24	23.7 6.47	25.3 6.52	28.0 4.98	30.9 4.97
42	LINEN YARN	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00

N*F*C*R*U*M JAPANESE MODEL

TABLE B - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
43	SPUN RAYON YARN	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
44	SYNTHETIC FIBER YARN	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
45	SILK & RAYON WEAVING	307.9	347.9 12.98	400.8 15.22	457.2 14.06	500.7 9.52	525.5 4.96	571.7 8.80	619.9 8.41	669.3 7.97	718.5 7.36	766.8 6.72	814.3 6.20	910.4 5.43	1004.3 5.03
46	COTTON & SPUN RAYON FABR	88.7	98.3 10.83	121.4 23.44	140.8 16.01	134.9 -4.18	153.1 13.50	169.1 10.42	184.0 8.83	199.1 8.19	213.7 7.38	227.7 6.54	243.4 6.90	270.3 4.97	298.8 5.15
47	SYNTHETIC FIBERS WOVEN	120.0	136.2 13.48	158.5 16.36	183.0 15.49	202.2 10.47	211.7 4.72	231.5 9.35	252.2 8.94	273.5 8.42	294.5 7.71	315.1 6.98	335.3 6.41	376.1 5.57	415.6 5.12
48	WOLLEN FABRICS WOVEN & F	230.2	256.5 11.43	347.0 35.27	395.6 14.02	239.9 -39.35	368.2 53.48	416.7 13.16	445.8 6.97	475.8 6.73	505.9 6.33	536.7 6.08	591.1 10.15	673.2 6.58	807.3 9.66
49	LINEN FABRICS WOVEN	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
50	YARN & FABRIC DYEING & F	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
51	KNITTED FABRICS	460.3	510.4 10.88	640.7 25.52	744.2 16.16	693.3 -6.84	806.5 16.32	894.2 10.88	974.6 8.98	1055.7 8.32	1134.8 7.50	1210.3 6.65	1297.3 7.18	1442.4 5.05	1601.0 5.35
52	ROPES& FISHING NETS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
53	OTHER FIBER PRODUCTS	67.5	69.1 2.30	88.4 27.98	99.7 12.79	77.1 -22.62	100.5 30.32	111.6 11.01	120.3 7.82	129.1 7.28	137.5 6.56	145.5 5.79	156.5 7.55	171.4 4.30	190.8 5.49
54	FOOTWEAR EXCEPT RUBBER M	104.9	115.9 10.49	127.6 10.09	144.9 13.54	159.6 10.15	162.8 1.99	173.0 6.28	182.6 5.57	192.2 5.23	200.8 4.47	208.4 3.80	214.7 3.04	225.4 2.04	229.7 .71
55	WEARING APPAREL	901.8	983.4 9.04	1072.9 9.10	1204.9 12.31	1316.0 9.22	1344.4 2.16	1424.2 5.93	1498.8 5.24	1573.4 4.97	1640.6 4.28	1700.7 3.66	1750.9 2.95	1835.3 1.98	1869.8 .70
56	TEXTILE GARMENTS	93.6	104.8 11.98	116.0 10.70	131.1 12.99	143.5 9.47	147.3 2.61	156.1 6.02	164.3 5.23	172.4 4.94	179.7 4.24	186.2 3.63	191.7 2.93	200.8 1.96	204.6 .70
57	WOOD MILLING	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
58	WOODEN PRODUCTS	32.8	37.5 14.26	42.4 13.06	48.7 14.93	54.1 11.06	56.1 3.78	60.9 8.57	65.8 7.97	70.2 6.65	74.1 5.66	77.9 5.05	81.4 4.56	89.3 4.59	96.8 4.01
59	FURNITURE WOODEN & METAL	178.5	197.2 10.45	217.8 10.47	245.0 12.50	267.8 9.31	277.4 3.55	299.0 7.79	320.8 7.30	340.5 6.14	358.4 5.27	375.5 4.76	391.8 4.34	426.0 4.44	463.2 3.92
60	PULP	-53.6	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00	-53.6 .00
61	PAPER	31.3	34.3 9.59	42.0 22.31	48.1 14.57	42.4 -11.88	48.7 15.04	52.9 8.62	56.1 5.98	58.7 4.69	61.0 3.83	62.9 3.11	65.3 3.89	68.1 1.74	70.9 1.90
62	ARTICLES OF PAPER & PAPE	25.7	28.8 12.19	32.2 11.72	36.5 13.42	40.0 9.45	40.9 2.22	43.9 7.27	46.6 6.23	48.9 5.03	51.0 4.32	53.0 3.79	54.7 3.19	58.0 2.74	60.4 1.93
63	PRINTING & PUBLISHING	348.3	401.3 15.22	457.5 13.99	532.2 16.33	595.0 11.79	602.0 1.19	651.0 8.13	696.6 7.01	735.4 5.58	770.1 4.71	801.4 4.07	828.5 3.37	882.4 2.90	919.9 1.96

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
64	LEATHER MANUFACTURES & F	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
65	LEATHER PRODUCTS EX. FOO	73.2	75.5 3.10	109.1 44.59	126.1 15.57	74.4 -41.01	113.7 52.82	127.1 11.80	135.1 6.30	141.2 4.48	144.8 2.61	146.4 1.05	151.8 3.72	147.9 -1.93	146.2 -.94
66	ARTICLES OF RUBBER	112.4	115.7 2.96	146.8 26.85	165.0 12.39	134.8 -18.31	162.0 20.17	175.4 8.27	183.6 4.71	188.5 2.66	190.1 .85	189.5 -.35	190.4 .50	183.5 -2.27	175.7 -2.45
67	BASIC INORGANIC INDUSTRI	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
68	BASIC ORGANIC INDUSTRIAL	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
69	SYNTHETIC DYESTUFF	.4	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00
70	BLASTING POWDER	.4	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00
71	SPUN RAYON	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
72	MATERIALS OF SYNTHETIC F	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
73	PLASTIC	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
74	CHEMICAL FERTILIZER	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
75	MISCELLANEOUS BASIC CHEM	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
76	VEGETABLE & ANIMAL OIL	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
77	COATINGS	.4	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00	.4 .00
78	MEDICINE	287.9	322.2 11.90	366.2 13.66	410.3 12.03	358.3 -12.67	396.4 10.63	411.0 3.68	413.5 .63	412.3 -.30	407.7 -1.12	400.1 -1.87	393.8 -1.56	368.4 -3.63	340.6 -4.13
79	OTHER CHEMICAL PRODUCTS	320.0	348.4 8.86	372.1 6.82	413.7 11.17	379.3 -8.32	392.3 3.44	396.7 1.12	397.4 .17	398.1 .19	397.7 -.12	395.1 -.64	392.2 -.73	375.9 -2.49	353.9 -3.19
80	PETROLEUM REFINERY PRODU	284.9	293.6 3.06	334.2 13.83	365.7 9.42	321.1 -12.20	339.2 5.65	349.5 3.04	361.6 3.45	376.4 4.10	392.8 4.34	410.0 4.38	431.3 5.21	469.7 4.24	516.6 4.95
81	COAL PRODUCTS	23.0	26.0 13.18	29.1 11.65	32.5 11.90	35.6 9.39	38.2 7.28	41.3 8.28	44.5 7.72	47.6 6.96	50.5 6.14	53.3 5.53	55.9 4.87	61.0 4.17	65.3 3.32
82	MISCELLANEOUS ANTISEPTIC	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
83	CLAY PRODUCTS FOR BUILDI	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
84	GLASSWARE	-3.8	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00	-3.8 .00

[illegible] JAPANESE MODEL

TABLE B - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IO-NO TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
85 POTTERY	50.9	54.5 7.00	59.3 8.90	65.4 10.29	70.7 8.09	70.8 .15	74.1 4.70	77.8 4.99	81.2 4.41	84.4 3.91	87.2 3.38	89.6 2.72	94.0 2.15	97.2 1.71
86 CEMENT	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
87 OTHERNON-METALLIC MINERA	9.1	9.4 2.76	10.1 7.72	10.5 4.29	10.7 2.13	11.1 3.67	11.4 2.77	11.7 2.60	12.0 2.40	12.3 2.19	12.5 1.93	12.7 1.59	13.0 1.01	13.2 .89
88 PIG IRON	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
89 IRON & STEEL SCRAPS	-12.8	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00	-12.8 .00
90 FERROALLOYS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
91 STEEL INGOT	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
92 HOT-ROLLED PLATES& SHEET	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
93 STEEL PIPE & TUBE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
94 COLD-ROLLED & COATED STE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
95 CAST & FORGE IRON	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
96 NONFERROUS METAL INGOTS	-6.0	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00	-6.0 .00
97 COPPER BRASS PRODUCTS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
98 ALUMINUM EXTRUDED PRODUC	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
99 OTHER NONFERROUS METAL P	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
100 STRUCTURAL METAL PRODUCT	143.0	160.0 11.91	178.1 11.29	202.3 13.59	223.4 10.42	231.1 3.47	249.6 7.98	268.4 7.53	285.7 6.44	301.6 5.59	316.8 5.04	331.2 4.53	362.3 4.47	392.0 3.92
101 OTHER METAL PRODUCTS	156.2	167.3 7.10	190.1 13.65	212.5 11.75	206.2 -2.95	225.2 9.22	242.3 7.61	258.0 6.47	272.2 5.49	285.0 4.70	296.8 4.17	310.2 4.49	334.2 3.66	360.2 3.72
102 POWER GENERATING MACHINA	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
103 MACHINE TOOLS METALWORKI	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
104 INDUSTRIAL MACHINERY	15.5	16.6 6.67	18.9 14.02	21.1 11.62	20.2 -4.11	21.9 8.53	23.6 7.42	24.7 4.67	25.4 2.90	26.0 2.11	26.5 2.08	27.3 2.80	28.5 2.00	29.3 .99
105 GENERAL INDUSTRIAL MACHI	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00

I*N*F*O*R*U*M JAPANESE MODEL

TABLE 8 - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
106	OFFICE MACHINERY	.6	.6 -27.35	.4 -27.12	.3 -26.53	.2 -27.16	.2 -27.45	.1 -27.26	.1 -27.26	.1 -27.26	.0 -27.26	.0 -27.26	.0 -27.40	.0 -27.40	.0 -27.40
107	HOUSEHOLD MACHINERY	123.4	134.1 8.64	165.5 23.48	186.6 12.65	153.6 -17.67	184.9 20.21	199.0 7.62	208.8 4.92	216.9 3.89	223.3 2.97	228.4 2.25	236.0 3.34	241.2 .75	247.2 1.07
108	PARTS OF MACHINERY	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
109	STRONG ELECTRIC MACHINER	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
110	HOUSEHOLD ELECTRICAL MAC	784.8	823.2 4.89	897.5 9.03	980.4 9.24	1027.4 4.80	1070.4 4.18	1134.8 6.01	1182.8 4.23	1213.9 2.64	1229.3 1.27	1235.1 .47	1231.8 -.27	1204.5 -1.52	1135.3 -3.39
111	OTHER WEAK ELECTRICAL AP	17.4	18.3 5.07	20.0 9.18	21.8 9.33	22.9 4.85	23.9 4.25	25.3 6.05	26.4 4.25	27.1 2.65	27.4 1.28	27.6 .49	27.5 -.26	26.9 -1.51	25.3 -3.38
112	SHIPS & BOATS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
113	RAILWAY VEHICLES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
114	PASSENGER MOTOR CAR	226.4	236.2 4.35	291.0 23.20	317.2 8.98	228.3 -28.01	297.9 30.47	326.0 9.43	333.8 2.40	329.1 -1.43	319.1 -3.03	307.5 -3.62	301.5 -1.96	282.9 -2.81	271.3 -2.72
115	REPAIR OF PASSENGER MOTO	213.9	236.8 10.71	254.2 7.34	276.3 8.71	278.2 .66	285.3 2.55	300.3 5.26	312.1 3.95	319.8 2.46	325.4 1.74	329.8 1.36	332.9 .94	341.2 1.35	347.0 .49
116	MOTORCYCLES & BICYCLES	107.9	113.6 5.26	119.2 5.00	124.9 4.76	130.6 4.54	136.3 4.34	141.9 4.16	147.6 4.00	153.3 3.84	159.0 3.70	164.6 3.57	170.3 3.45	181.7 3.22	193.0 3.03
117	AIRCRAFTS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
118	OTHER TRANSPORTATION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
119	PRECISION MACHINERY	23.4	25.5 8.77	30.4 19.49	33.1 8.69	35.1 5.99	38.9 10.83	43.9 13.00	46.9 6.76	48.6 3.75	49.6 1.98	51.1 2.96	53.0 3.62	59.4 6.15	65.4 4.03
120	PHOTOGRAPHIC & OPTICAL I	111.7	121.9 9.16	134.1 9.97	151.0 12.62	164.8 9.11	167.7 1.76	178.6 6.52	188.9 5.74	197.5 4.59	204.6 3.56	210.4 2.85	214.7 2.06	221.6 1.24	222.7 -.00
121	WATCHES & CLOCKS	135.1	151.4 12.07	185.6 22.56	210.3 13.36	189.2 -10.05	216.2 14.25	235.2 8.80	247.5 5.22	257.2 3.92	264.5 2.83	271.0 2.48	279.6 3.18	290.0 1.47	296.8 .82
122	OTHER MANUFACTURING GOOD	476.6	434.5 -3.84	456.2 5.00	507.1 11.17	539.5 6.37	567.9 5.26	622.3 9.58	659.0 5.90	681.6 3.46	693.8 1.75	702.6 1.27	708.1 .78	715.4 .14	692.4 -2.33
123	HOUSING CONSTRUCTION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
124	CONSTRUCTION NOT FOR RES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
125	BUILDING REPAIRING	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
126	PUBLIC UTILITY CONSTRUCT	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00

INFORUM JAPANESE MODEL

TABLE B - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
127	OTHER CONSTRUCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
128	ELECTRICITY	400.3	437.5	475.4	523.0	559.1	577.7	609.8	645.5	682.5	719.7	756.0	790.2	857.0	921.9
			9.28	8.67	10.02	6.95	3.29	5.56	5.85	5.73	5.45	5.05	4.52	3.94	3.74
129	GAS	121.1	137.4	153.9	181.7	206.7	206.5	224.1	243.4	261.9	279.5	296.2	311.3	342.7	370.1
			13.44	12.02	18.06	13.76	-.07	8.50	8.61	7.61	6.73	5.95	5.10	4.60	3.87
130	WATER-SUPPLY,SEWERAGE	152.1	158.5	173.7	183.3	158.1	175.0	180.9	186.5	193.1	200.2	207.4	216.7	230.6	249.2
			4.19	9.63	5.49	-13.61	10.51	3.38	3.09	3.54	3.69	3.59	4.52	2.99	4.13
131	WHOLESALE TRADE	2030.0	2291.2	2573.1	2960.6	3289.9	3436.5	3770.0	4134.8	4500.5	4866.3	5232.3	5594.9	6406.0	7323.3
			12.87	12.30	15.06	11.12	4.45	9.70	9.68	8.85	8.13	7.52	6.93	6.91	7.00
132	RETAIL TRADE	3778.5	4026.7	4517.3	5064.5	5077.2	5415.0	5819.3	6227.7	6626.9	7011.6	7376.3	7752.4	8433.0	9126.4
			6.57	12.18	12.11	.25	6.65	7.47	7.02	6.41	5.81	5.20	5.10	4.05	4.02
133	FINANCIAL BUSINESS	798.8	843.3	916.2	1017.3	1077.1	1122.4	1219.0	1327.7	1438.0	1548.2	1656.4	1762.6	1979.4	2201.2
			5.57	8.65	11.03	5.90	4.19	8.61	8.91	8.31	7.66	6.99	6.41	5.73	5.43
134	INSURANCE BUSINESS	901.8	953.6	1037.2	1152.6	1221.4	1272.8	1382.8	1506.4	1631.9	1757.2	1880.2	2000.9	2247.3	2499.6
			5.74	8.77	11.13	5.97	4.21	8.64	8.94	8.33	7.68	7.00	6.42	5.74	5.44
135	REAL ESTATE AGENCY	35.1	36.8	40.0	42.6	43.1	46.9	50.4	53.9	57.5	61.0	64.5	68.1	75.1	82.9
			4.77	8.67	6.53	1.13	9.00	7.35	7.01	6.59	6.18	5.79	5.54	4.95	4.98
136	RENT FOR HOUSE	4545.6	4799.0	5302.0	5819.4	6075.6	6174.1	6452.3	6741.9	7010.7	7253.4	7461.9	7640.0	7916.7	8106.2
			5.57	10.48	9.76	4.40	1.62	4.51	4.49	3.99	3.46	2.87	2.39	1.50	1.19
137	NATIONAL RAILROAD	398.1	436.9	516.5	594.0	563.7	639.1	697.6	746.6	791.4	832.2	868.2	907.5	964.3	1020.2
			9.75	18.70	14.56	-5.10	13.37	9.16	7.02	6.00	5.16	4.33	4.53	2.76	2.77
138	LOCAL RAILROAD	300.7	327.9	392.8	450.4	419.8	481.9	527.0	564.0	597.5	627.6	654.4	684.3	725.7	767.6
			9.04	19.82	14.65	-6.80	14.81	9.36	7.01	5.94	5.08	4.23	4.56	2.67	2.75
139	ROAD PASSENGER TRANSPORT	938.0	1038.6	1215.5	1415.2	1339.0	1521.3	1660.8	1777.3	1883.7	1980.7	2066.3	2160.2	2295.2	2428.6
			10.72	16.96	14.54	-5.39	13.62	9.17	7.01	5.99	5.15	4.32	4.55	2.76	2.78
140	ROAD FREIGHT TRANSPORT	206.0	233.0	261.5	295.9	326.6	342.8	371.6	398.3	423.6	447.4	469.3	488.8	526.1	557.5
			13.09	11.80	13.01	10.38	4.97	8.33	7.27	6.34	5.62	4.90	4.15	3.50	2.84
141	ROAD TRANSPORTATION FACI	44.9	50.9	56.9	64.8	71.5	75.0	81.2	87.1	92.6	97.8	102.6	106.8	114.9	121.6
			13.31	11.90	13.74	10.49	4.85	8.29	7.25	6.33	5.55	4.88	4.11	3.46	2.80
142	SEA TRANSPORT	1.1	1.2	1.6	2.0	1.8	2.3	2.7	3.1	3.5	3.9	4.2	4.6	5.2	5.8
			12.24	33.33	21.90	-12.72	33.40	16.85	13.62	12.29	10.86	9.27	9.77	5.35	5.09
143	INLAND WATER TRANSPORT	75.1	84.3	94.7	108.5	117.1	121.9	131.7	141.3	150.4	158.9	166.7	173.6	187.0	198.2
			12.23	12.39	14.57	7.92	4.09	8.06	7.27	6.40	5.66	4.90	4.27	3.42	2.89
144	AIR TRANSPORT	114.0	115.8	137.6	155.0	121.6	143.7	152.4	163.1	175.4	187.9	199.5	213.9	226.7	242.5
			1.57	18.81	12.67	-21.54	18.12	6.06	7.04	7.56	7.08	6.18	7.24	2.60	2.87
145	OTHER TRANSPORT	3.0	3.1	3.5	3.9	4.2	4.6	5.1	5.6	6.1	6.5	6.9	7.2	7.8	8.2
			3.58	11.25	13.47	6.27	9.81	11.38	9.72	8.24	7.02	5.83	4.58	3.36	2.42
146	STORAGE	49.8	57.7	74.1	86.8	80.0	99.5	111.9	119.3	125.2	130.3	134.3	139.0	143.4	146.6
			15.89	28.39	17.14	-7.79	24.34	12.42	6.63	4.98	4.05	3.08	3.49	1.28	.75
147	TELECOMMUNICATION	240.7	237.7	251.3	279.3	275.6	270.5	280.7	306.2	340.4	380.6	425.7	476.8	584.7	712.2
			-1.23	5.72	11.12	-1.32	-1.84	3.77	9.08	11.16	11.81	11.87	11.99	10.15	10.72

I*N*F*O*R*U*M JAPANESE MODEL

TABLE 6 - 3(CONTINUED) : FORECAST OF CONSUMPTION (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
148	GOVERNMENTAL SERVICES	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
149	EDUCATION	424.1	463.9	548.9	599.0	457.6	523.9	530.4	529.4	526.8	520.3	508.0	498.8	448.1	397.8
			9.37	18.33	9.14	-23.61	14.48	1.24	-.20	-.48	-1.23	-2.38	-1.81	-5.92	-5.90
150	MEDICAL;HEALTH SERVICE	2102.8	2442.0	2393.2	2753.3	2516.2	2349.8	2255.1	2203.0	2166.8	2130.8	2082.8	2022.1	1843.0	1624.4
			16.13	-2.00	15.04	-8.61	-6.61	-4.03	-2.31	-1.64	-1.66	-2.25	-2.91	-5.15	-6.30
151	OTHER PUBLIC SERVICES	391.7	430.8	505.0	576.4	561.2	623.0	685.0	747.8	810.2	871.0	929.4	991.9	1104.5	1226.5
			9.97	17.23	14.14	-2.64	11.01	9.94	9.18	8.34	7.51	6.70	6.73	5.24	5.34
152	SERVICE FOR BUSINESS ENT	15.8	17.1	19.6	22.2	22.2	24.1	26.3	28.6	30.8	33.0	35.1	37.2	41.1	45.0
			8.33	14.47	13.32	-.06	8.50	9.15	8.68	7.90	7.10	6.29	6.09	4.75	4.66
153	AMUSEMENT	1305.9	1370.1	1584.9	1716.9	1791.0	1831.9	1895.9	1960.2	2014.5	2057.2	2084.8	2098.5	2086.3	2042.7
			4.91	15.68	8.33	4.31	2.28	3.50	3.39	2.77	2.12	1.34	.65	-.66	-1.05
154	RESTAURANT	1571.5	1621.7	1721.2	1837.7	1826.5	1883.9	1953.4	2027.0	2103.1	2178.8	2251.3	2324.2	2448.4	2565.7
			3.20	6.13	6.77	-.61	3.14	3.68	3.77	3.75	3.60	3.33	3.24	2.43	2.37
155	OTHER PERSONAL SERVICES	1742.8	1836.6	1957.2	2129.9	2244.1	2293.7	2421.1	2559.5	2696.8	2831.4	2961.6	3084.9	3333.6	3575.1
			5.38	6.56	8.83	5.36	2.21	5.56	5.72	5.36	4.99	4.60	4.16	3.78	3.55
156	NOT CLASSIFIED	5.3	5.6	6.1	6.7	7.2	7.2	7.5	7.9	8.2	8.5	8.7	9.0	9.3	9.6
			6.12	8.88	9.79	7.56	-.21	4.36	4.59	4.13	3.63	3.09	2.43	1.82	1.39

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 4 : FORECAST OF IMPORTS (IN 1975 BILLION YEN)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	GRAIN	133.7	162.0 21.14	154.7 -4.47	155.3 .38	155.2 -.06	154.6 -.38	154.6 -.01	154.7 .02	154.7 .01	154.6 -.01	154.6 -.04	154.5 -.08	154.1 -.12	153.7 -.13
2	OTHER CROPS	401.4	363.1 -9.55	374.1 3.04	423.0 13.06	393.2 -7.03	393.8 .15	415.9 5.61	441.4 6.12	467.5 5.92	492.7 5.35	515.8 4.69	538.4 4.39	575.6 3.03	613.5 3.33
3	FRUITS	71.5	79.2 10.70	77.0 -2.69	81.3 5.52	82.1 .99	78.6 -4.25	80.0 1.75	81.5 1.89	82.5 1.28	83.1 .74	83.2 .06	82.4 -.94	79.5 -2.15	75.5 -2.55
4	OTHER CROPS FOR INDUSTRI	166.0	184.4 11.10	184.6 .11	191.5 3.70	154.1 -19.49	138.9 -9.85	131.1 -5.67	126.7 -3.31	123.9 -2.23	121.1 -2.23	117.7 -2.83	113.1 -3.92	96.3 -8.57	82.9 -7.12
5	CROP FOR FIBER INDUSTRIA	182.4	185.6 1.75	194.8 4.94	196.8 1.05	173.0 -12.08	171.7 -.79	174.8 1.84	177.0 1.21	179.3 1.34	181.3 1.10	182.6 .75	184.2 .85	183.0 -.43	184.9 .45
6	LIVE STOCKS,POULTRY	7.5	8.4 12.12	9.3 10.15	10.2 9.94	9.7 -4.79	10.2 5.71	10.8 4.99	11.3 5.00	11.9 5.00	12.4 4.77	13.0 4.30	13.5 4.27	14.3 2.55	15.0 2.52
7	LIVE STOCKS,POULTRY FOR	118.8	111.9 -5.82	112.6 .67	116.0 3.02	90.3 -22.19	101.0 11.89	104.2 3.14	104.7 .45	105.4 .67	105.9 .45	106.2 .25	108.1 1.81	108.1 -.08	110.7 .91
8	SERICULTURE	2.9	2.8 -4.22	3.0 9.33	3.7 23.63	4.1 10.33	4.4 6.45	5.1 16.54	5.9 14.47	6.7 13.75	7.5 12.61	8.4 11.75	9.3 10.54	11.1 8.77	13.0 7.96
9	AGRICULTURAL SERVICES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
10	FORESTRY	6.5	7.7 18.43	7.7 -.27	7.9 2.59	8.3 5.23	8.8 6.12	9.1 3.45	9.3 2.31	9.5 2.34	9.8 2.66	10.1 2.99	10.4 3.44	11.2 3.92	12.0 3.25
11	CHARCOAL & FIREWOOD	1.3	1.2 -7.69	1.5 25.00	1.8 17.95	2.0 15.22	2.3 13.21	2.6 11.67	2.8 10.45	3.1 9.46	3.4 8.64	3.7 7.95	3.9 7.37	4.5 6.42	5.0 5.69
12	LOGS	501.2	432.0 -13.81	497.1 15.07	535.2 7.66	435.8 -18.56	351.5 -19.36	342.5 -2.54	370.1 8.05	396.5 7.13	412.0 3.91	415.0 .74	401.9 -3.16	326.1 -11.29	279.9 -5.64
13	HUNTINGS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
14	FISHERIES	39.3	49.9 26.95	48.9 -1.99	55.2 12.85	57.4 3.98	55.4 -3.50	59.2 6.99	62.3 5.22	65.7 5.40	68.8 4.73	71.7 4.18	74.0 3.19	78.1 2.29	81.4 2.08
15	WHALING	2.0	2.1 2.93	2.2 5.91	2.4 9.46	2.5 4.26	2.5 1.34	2.7 6.54	2.9 7.12	3.1 7.17	3.3 6.90	3.5 6.46	3.7 5.84	4.1 5.02	4.5 4.60
16	INLAND WATER FISHERIES	3.3	5.6 68.23	5.5 -1.05	7.3 31.90	7.0 -3.07	7.4 5.67	8.2 10.22	8.8 6.68	9.5 8.96	10.1 5.46	10.8 7.26	11.2 3.64	12.2 2.12	13.1 1.89
17	COKING COAL	360.4	430.0 19.31	482.1 12.12	483.5 .29	484.9 .28	486.2 .28	487.6 .28	489.0 .28	490.4 .28	491.7 .28	493.1 .28	494.5 .28	497.2 .28	500.0 .28
18	LIGNITE BRIQUETTES AND L	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
19	IRON ORES CONCENTRATES	444.0	481.5 8.44	552.2 14.69	602.7 9.15	581.5 -3.53	521.4 -10.33	573.2 9.93	661.2 15.35	754.9 14.16	847.1 12.21	934.9 10.37	998.4 6.79	1046.3 2.01	1159.5 5.75
20	ORES & CONCENTRATES OF N	374.1	380.9 1.81	456.8 19.92	482.0 5.53	435.8 -9.60	375.5 -13.83	405.3 7.94	463.9 14.47	523.2 12.77	577.5 10.38	625.8 8.37	654.7 4.62	660.8 .18	714.2 4.73
21	PETROLEUMS CRUDE	804.6	807.2 .32	855.0 5.92	874.6 2.29	797.5 -8.81	740.7 -7.11	745.2 .61	767.8 3.03	791.9 3.14	812.3 2.58	827.8 1.91	832.7 .59	812.3 -1.38	818.2 .67

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 4(CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
22	NATURAL GAS	8.3	9.3 12.43	11.2 20.36	13.1 16.51	13.0 -.62	12.6 -3.45	14.1 12.58	16.2 14.97	18.5 13.96	20.8 12.33	23.1 10.91	25.1 8.79	26.6 6.49	33.4 8.11
23	LIME STONE SAND GRAVEL	16.6	17.1 2.73	19.6 14.58	22.1 12.58	22.8 3.14	23.0 .82	25.1 9.55	29.2 15.55	34.0 16.44	39.1 15.27	44.5 13.79	49.5 11.21	57.3 7.03	69.6 11.51
24	SALT CRUDE	21.7	23.5 8.12	26.1 11.20	28.4 9.04	27.9 -2.05	27.5 -1.45	29.5 7.31	31.7 7.70	34.2 7.66	36.6 7.19	39.1 6.64	41.3 5.69	45.2 4.55	49.8 4.45
25	NON-METALIC MINERALS	112.8	132.1 17.15	139.7 5.68	142.1 1.74	130.2 -8.33	117.0 -10.19	115.7 -1.12	120.2 3.90	125.0 4.04	128.6 2.88	130.6 1.54	129.7 -.65	120.5 -4.02	116.6 -.60
26	CARCASSES	97.4	107.0 9.85	114.3 6.83	123.9 8.37	125.4 1.27	126.8 1.06	132.4 4.44	138.6 4.72	145.1 4.67	151.7 4.51	158.1 4.22	164.3 3.91	175.9 3.26	187.0 3.10
27	MEAT PRODUCT	1.7	1.9 11.83	1.9 2.42	2.0 4.69	2.1 3.97	2.2 1.31	2.2 3.08	2.3 3.72	2.4 4.03	2.5 4.17	2.6 4.18	2.7 4.00	2.9 3.78	3.1 3.57
28	DAIRY PRODUCT	18.1	21.3 17.75	28.3 32.97	31.4 10.70	27.2 -13.32	31.6 16.10	33.6 6.38	35.4 5.38	37.3 5.33	39.2 5.04	40.9 4.56	43.1 5.34	46.1 3.12	49.5 3.57
29	VEGETABLE & FRUIT PRESER	23.6	30.1 27.49	31.3 3.89	32.3 3.38	33.0 2.08	33.1 .46	33.8 1.98	34.5 2.16	35.3 2.13	36.0 2.04	36.7 1.88	37.3 1.65	38.4 1.34	39.3 1.16
30	SEA FOOD PRESERVED	63.7	86.4 35.59	94.2 9.03	103.1 9.49	109.5 6.21	110.2 .65	116.1 5.32	122.7 5.67	129.4 5.46	136.0 5.11	142.3 4.66	148.0 4.03	159.1 3.38	168.7 2.94
31	GRAIN MILL PRODUCTS	9.2	7.7 -15.80	7.1 -8.12	6.2 -13.09	5.3 -13.72	4.6 -14.21	3.9 -14.60	3.3 -14.91	2.8 -15.16	2.4 -15.36	2.0 -15.53	1.7 -15.66	1.2 -15.87	.9 -16.01
32	BAKERY PRODUCTS	11.7	16.5 40.62	17.0 3.16	17.7 4.35	18.2 2.53	18.3 .75	18.8 3.02	19.4 2.75	19.9 2.52	20.3 2.47	20.9 2.48	21.4 2.41	22.5 2.67	23.8 2.91
33	REFINED SUGAR	117.3	143.8 22.63	165.2 14.87	178.4 7.95	164.4 -7.81	177.3 7.81	184.9 4.33	191.6 3.57	198.7 3.73	206.1 3.70	213.3 3.52	221.8 3.58	234.9 2.66	250.0 3.23
34	OTHER FOOD PREPARED	34.6	39.2 13.16	42.4 8.23	47.5 12.09	51.1 7.48	52.2 2.20	55.7 6.80	59.7 7.17	63.9 7.03	68.2 6.76	72.6 6.41	76.9 5.50	85.8 5.40	94.9 5.22
35	PREPARED FEEDS FOR ANIMA	5.5	9.7 75.57	8.0 -17.58	8.1 2.06	8.1 -.49	8.2 1.71	8.4 1.66	8.5 1.75	8.7 1.84	8.8 1.87	9.0 1.86	9.2 1.93	9.5 1.60	9.8 1.72
36	ALCOHOLIC BEVERAGES	13.3	13.9 4.58	14.7 5.55	16.0 8.75	15.6 -.91	16.7 5.50	17.4 3.74	18.2 4.67	19.2 5.79	20.5 6.49	21.8 6.70	23.4 7.06	26.4 5.85	29.5 5.94
37	SOFT DRINK	1.3	2.0 57.34	2.2 7.45	2.4 11.39	2.6 4.22	2.7 6.09	2.8 4.83	3.0 6.39	3.3 7.90	3.5 8.77	3.9 8.98	4.2 8.58	4.9 7.54	5.6 7.17
38	TOBACCO	4.0	4.5 11.75	4.5 .62	4.6 2.03	4.6 -.86	4.7 2.77	4.7 1.08	4.8 1.45	4.9 1.98	5.0 2.33	5.1 2.51	5.3 2.73	5.5 2.36	5.8 2.52
39	SILK REELING & WASTE SIL	28.7	50.3 75.43	64.3 27.86	80.0 24.40	88.3 10.38	94.6 7.17	112.0 18.44	129.2 15.34	147.7 14.31	167.0 13.05	186.7 11.82	206.5 10.60	247.1 8.95	290.0 7.89
40	COTTON SPINNING	4.8	11.9 147.56	18.5 56.09	25.0 35.04	17.3 -31.13	24.5 42.06	31.8 29.87	38.6 21.37	46.1 19.37	53.9 16.98	62.0 15.00	71.7 15.62	89.5 11.22	113.8 12.53
41	WOOLEN & WORSTED YARN	13.7	14.9 8.64	32.3 117.28	37.0 14.40	25.8 -30.22	35.2 36.25	40.0 13.84	43.5 8.67	47.3 8.72	51.2 8.18	55.1 7.63	60.7 10.14	69.5 6.87	82.1 8.24
42	LINEN YARN	.8	1.1 42.97	.9 -18.13	1.0 5.68	.9 -9.03	.9 -5.17	.9 8.44	1.0 6.04	1.1 7.51	1.1 6.40	1.2 5.27	1.2 3.62	1.3 1.40	1.4 2.21

INFORUM JAPANESE MODEL

TABLE B - 4 (CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
43	SPAN RAYON YARN	.4	.4	.1	.1	.1	.1	.1	.1	.2	.2	.2	.3	.4	.5
			-11.37	-81.17	15.19	17.09	17.24	17.26	17.26	17.26	17.26	17.26	17.26	17.26	17.26
44	SYNTHETIC FIBER YARN	.5	.9	1.2	1.4	1.4	1.5	1.9	2.2	2.6	3.0	3.5	4.0	5.1	6.3
			76.49	32.36	16.64	3.07	6.92	22.48	17.05	17.02	16.43	15.48	14.50	12.92	10.60
45	SILK & RAYON WEAVING	17.4	23.2	29.9	35.5	39.[illegible]	41.2	45.8	50.6	55.6	60.5	65.3	69.9	78.9	87.9
			33.57	28.80	18.74	10.17	5.15	11.20	10.59	9.81	8.63	7.90	7.07	5.84	5.58
46	COTTON & SPUN RAYON FABR	14.2	19.9	26.7	40.0	53.4	66.7	80.0	93.4	106.7	120.0	133.3	146.7	173.3	200.0
			40.14	34.17	49.93	33.30	24.98	19.99	16.66	14.28	12.50	11.11	10.00	8.33	7.14
47	SYNTHETIC FIBERS WOVEN	2.8	5.0	6.1	7.0	7.4	7.6	8.9	10.1	11.4	12.8	14.3	15.9	19.0	22.2
			80.07	21.27	13.77	5.79	3.61	17.12	13.11	13.02	12.51	11.69	10.50	9.18	7.15
48	WOOLEN FABRICS WOVEN & F	15.8	16.0	25.8	31.0	12.7	26.2	31.0	33.6	36.4	39.2	42.0	47.3	54.7	67.9
			1.15	61.13	20.28	-58.97	106.16	18.24	8.52	8.32	7.59	7.13	12.71	7.36	11.54
49	LINEN FABRICS WOVEN	1.8	2.9	3.5	4.0	3.7	3.5	3.9	4.3	4.7	5.0	5.3	5.5	5.7	6.0
			61.16	22.30	11.98	-7.83	-3.54	10.40	9.86	8.99	7.43	6.01	4.15	1.11	2.16
50	YARN & FABRIC DYEING S F	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
51	KNITTED FABRICS	22.7	38.1	54.6	65.4	58.1	69.1	81.1	90.7	100.6	110.5	120.1	130.6	148.5	166.5
			67.64	43.48	19.77	-11.12	18.84	17.43	11.80	10.94	9.88	8.65	8.73	6.18	5.34
52	ROPES & FISHING NETS	1.8	1.7	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.3	1.2	1.2	1.1	1.0
			-5.46	3.41	-4.13	-4.26	-4.23	-4.24	-4.24	-4.24	-4.24	-4.24	-4.24	-4.24	-4.24
53	OTHER FIBER PRODUCTS	6.3	8.8	11.2	12.6	11.1	12.1	13.3	14.6	15.8	17.0	18.1	19.3	20.7	22.7
			39.92	26.57	11.40	-11.00	9.32	10.24	9.20	8.55	7.65	6.60	6.22	3.38	4.71
54	FOOTWEAR EXCEPT RUBBER M	2.1	3.5	4.3	5.1	5.7	5.7	6.3	6.8	7.3	7.8	8.2	8.6	9.2	9.5
			66.66	22.20	19.43	11.55	.34	9.60	8.43	7.83	6.61	5.60	4.31	2.67	1.69
55	WEARING APPAREL	12.9	16.5	23.3	25.4	26.7	26.8	28.2	29.5	30.9	32.2	33.3	34.2	35.7	36.7
			27.95	41.92	9.00	5.29	.54	4.96	4.83	4.67	4.07	3.54	2.60	1.74	1.38
56	TEXTILE GARMENTS	6.4	7.9	11.7	13.3	14.0	14.2	15.6	17.2	18.8	20.5	22.2	23.7	26.2	29.2
			23.07	45.79	13.34	5.18	1.42	9.82	10.22	9.87	8.94	8.07	6.76	4.89	5.55
57	WOOD MILLING	106.1	79.8	135.4	149.1	143.0	138.4	145.0	158.1	171.9	184.4	195.0	202.9	208.3	219.5
			-24.80	69.70	10.12	-4.11	-3.22	4.77	9.08	8.68	7.26	5.80	4.05	.84	3.38
58	WOODEN PRODUCTS	2.4	3.2	3.4	3.9	3.7	3.6	3.9	4.4	4.9	5.3	5.7	6.0	6.3	6.9
			34.11	6.92	12.08	-3.21	-3.92	8.51	12.68	10.98	9.03	7.43	5.32	2.42	5.31
59	FURNITURE WOODEN & METAL	2.2	2.9	3.3	3.6	3.5	3.4	3.6	4.0	4.4	4.7	5.0	5.2	5.5	5.9
			31.83	14.63	8.62	-3.16	-3.03	7.42	10.34	9.10	7.58	6.15	4.29	1.87	4.20
60	PULP	61.6	65.3	71.4	76.5	75.6	75.0	79.0	84.1	89.4	94.5	99.3	103.5	109.7	117.7
			6.03	9.38	7.11	-1.26	-.75	5.36	6.47	6.26	5.70	5.11	4.19	2.82	3.54
61	PAPER	7.3	10.7	10.9	12.1	11.9	11.8	12.8	14.0	15.3	16.5	17.7	18.7	20.1	22.0
			46.22	1.78	11.55	-1.45	-1.11	8.00	9.82	9.19	8.10	7.04	5.59	3.47	4.53
62	ARTICLES OF PAPER & PAPE	5.9	6.1	6.9	7.7	7.9	8.0	8.7	9.7	10.7	11.7	12.8	13.7	15.4	17.6
			3.35	13.37	11.90	1.72	1.82	8.84	10.78	10.52	9.71	8.88	7.57	5.65	7.09
63	PRINTING & PUBLISHING	26.0	23.5	27.4	30.5	31.1	30.9	33.1	36.0	38.8	41.5	43.9	45.9	46.9	52.5
			-9.62	16.55	11.18	2.11	-.63	7.26	8.56	7.83	6.86	5.93	4.61	2.85	3.91

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 4(CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
64	LEATHER MANUFACTURES & F	7.5	11.9	12.0	14.1	12.3	12.8	14.0	14.8	15.7	16.5	17.1	17.7	18.2	18.5
			58.12	1.30	17.26	-12.60	3.83	9.29	6.19	5.71	4.89	4.11	3.54	1.04	.01
65	LEATHER PRODUCTS EX. FOO	3.6	4.7	9.8	11.7	7.2	10.6	12.1	13.2	14.2	15.0	15.6	16.6	17.1	17.9
			29.39	105.39	19.71	-38.23	46.33	14.50	9.13	7.43	5.69	4.31	6.11	1.19	1.67
66	ARTICLES OF RUBBER	5.6	9.2	10.5	11.6	10.5	10.3	11.0	12.1	13.2	14.2	15.1	15.7	16.1	17.0
			64.35	14.21	10.56	-9.44	-1.93	7.00	9.47	8.92	7.59	6.50	4.37	.80	3.11
67	BASIC INORGANIC INDUSTRI	1.5	1.4	1.5	1.7	1.7	1.6	1.8	2.0	2.2	2.4	2.7	2.9	3.2	3.6
			-6.53	10.53	12.69	-4.93	-3.04	11.17	11.39	10.98	9.98	8.98	7.46	5.68	5.72
68	BASIC ORGANIC INDUSTRIAL	40.7	44.3	49.7	56.2	56.6	58.6	66.4	75.2	85.3	96.7	109.5	123.2	154.0	195.4
			8.96	12.05	13.00	.81	3.45	13.43	13.20	13.46	13.38	13.22	12.51	11.89	12.03
69	SYNTHETIC DYESTUFF	13.6	17.8	20.6	23.9	24.1	26.5	31.0	35.3	40.4	46.1	52.4	59.4	75.0	93.8
			31.00	15.89	15.88	.67	10.16	16.78	14.07	14.33	14.11	13.63	13.43	12.14	11.07
70	BLASTING POWDER	5.8	4.3	5.7	6.2	6.6	7.0	8.0	9.4	11.1	12.9	14.9	16.9	20.8	26.8
			-26.36	32.96	9.02	6.86	6.32	14.37	17.39	17.12	16.36	15.43	13.50	10.86	14.23
71	SPUN RAYON	.2	.1	.0	.0	.0	.0	.0	.0	.0	.0	.0	.1	.1	.1
			-67.82	-30.64	1.13	1.43	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42	1.42
72	MATERIALS OF SYNTHETIC F	5.2	7.2	8.7	10.2	10.5	11.3	13.5	15.7	18.3	21.2	24.5	28.1	36.3	45.8
			38.99	20.04	17.75	2.99	6.58	20.09	16.02	16.43	16.14	15.44	14.64	13.42	11.15
73	PLASTIC	18.0	19.2	23.9	26.7	26.6	26.7	29.5	32.9	36.5	40.1	43.9	47.3	53.4	61.1
			6.83	24.08	12.06	-.36	.08	10.57	11.52	10.89	10.03	9.32	7.87	6.09	6.71
74	CHEMICAL FERTILIZER	19.6	23.8	25.3	27.0	27.7	27.9	28.6	29.5	30.4	31.4	32.2	33.0	34.4	34.2
			21.52	6.27	6.59	2.79	.48	2.78	3.02	3.18	3.00	2.64	2.40	1.94	-1.48
75	MISCELLANEOUS BASIC CHEM	42.2	59.8	69.9	78.7	76.5	75.4	83.1	93.5	104.8	116.4	128.0	138.4	154.7	177.8
			41.71	16.93	12.62	-2.87	-1.41	10.24	12.43	12.14	11.06	9.99	8.10	5.55	7.19
76	VEGETABLE & ANIMAL OIL	50.4	41.8	42.9	44.6	45.0	45.8	47.3	48.9	50.7	52.7	54.7	56.8	61.0	66.1
			-17.09	2.77	3.95	.77	1.77	3.24	3.52	3.71	3.60	3.85	3.83	3.66	4.09
77	COATINGS	5.2	5.4	6.1	6.5	6.3	6.2	6.6	7.3	8.0	8.8	9.5	10.1	10.7	12.0
			3.36	12.61	7.35	-2.46	-2.67	6.65	10.51	10.27	9.15	8.21	6.08	3.09	6.29
78	MEDICINE	79.0	94.6	105.9	123.7	119.6	127.5	135.3	144.1	153.8	164.2	174.7	185.7	206.3	227.8
			19.74	11.98	16.79	-3.30	6.57	6.15	6.46	6.78	6.73	6.40	6.32	5.11	5.11
79	OTHER CHEMICAL PRODUCTS	124.8	155.2	167.6	187.2	183.6	188.4	200.2	214.1	230.1	247.2	265.1	283.1	317.3	358.9
			24.36	8.01	11.65	-1.91	2.60	6.28	6.94	7.47	7.44	7.23	6.82	5.75	6.15
80	PETROLEUM REFINERY PRODU	271.2	281.0	299.2	332.3	329.5	333.0	363.5	406.0	453.8	504.4	556.9	606.8	693.8	817.4
			3.61	6.48	11.06	-.85	1.06	9.19	11.68	11.78	11.15	10.40	8.96	6.75	8.85
81	COAL PRODUCTS	1.7	1.4	1.5	1.6	1.6	1.5	1.6	1.8	1.9	2.1	2.3	2.4	2.6	2.9
			-16.88	6.97	5.25	-.54	-2.92	6.02	8.85	8.99	8.59	8.07	6.30	3.64	6.46
82	MISCELLANEOUS ANTISEPTIC	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
			-.44	15.62	1.65	-15.60	-20.13	-2.87	13.78	13.44	8.97	5.00	-.28	-8.48	.86
83	CLAY PRODUCTS FOR BUILDI	1.9	2.1	2.3	2.5	2.3	2.1	2.2	2.5	2.8	3.0	3.2	3.3	3.3	3.5
			8.00	13.92	7.11	-6.85	-8.17	3.30	11.67	11.42	9.16	6.87	3.74	-1.10	3.73
84	GLASSWARE	8.3	8.7	10.3	11.7	11.9	12.4	13.8	15.8	18.2	20.7	23.5	26.2	31.1	38.2
			4.34	18.44	13.64	2.39	3.52	11.48	14.92	14.90	14.08	13.16	11.46	8.77	11.36

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 4(CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
85	POTTERY	1.6	3.2 95.60	3.6 14.48	4.1 11.68	4.1 .67	4.0 -2.84	4.3 6.80	4.7 11.54	5.3 11.52	5.8 10.38	6.4 9.02	6.8 6.51	7.4 3.67	8.2 6.07
86	CEMENT	1.5	1.6 7.40	1.9 15.48	2.0 8.07	1.9 -5.30	1.8 -6.05	1.9 5.44	2.1 13.50	2.4 12.95	2.6 10.65	2.9 8.42	3.0 5.15	3.1 .28	3.3 5.47
87	OTHERNON-METALLIC MINERA	4.9	4.8 -2.32	5.1 7.49	5.4 5.06	5.3 -1.28	5.2 -2.82	5.3 3.06	5.7 7.46	6.2 7.97	6.6 7.25	7.1 6.29	7.4 4.48	7.6 1.34	8.2 4.88
88	PIG IRON	71.5	39.5 -44.79	31.5 -20.22	35.7 13.41	38.9 8.80	41.3 6.39	43.4 5.04	45.3 4.26	47.0 3.80	48.8 3.53	50.3 3.36	51.9 3.26	55.3 3.16	58.8 3.13
89	IRON & STEEL SCRAPS	126.0	150.0 19.03	166.7 11.12	178.2 6.89	169.0 -5.14	143.7 -14.96	155.9 8.50	175.5 12.52	194.9 11.08	213.0 9.31	228.9 7.42	237.7 3.85	235.1 -.83	244.3 1.81
90	FERROALLOYS	17.2	14.2 -17.52	14.9 4.97	17.0 13.95	16.7 -1.36	15.2 -9.36	17.3 14.22	20.8 19.77	24.5 17.97	28.3 15.58	32.1 13.42	35.1 9.49	36.6 4.39	44.8 8.09
91	STEEL INGOT	2.8	2.0 -29.44	2.2 10.38	2.4 10.48	2.3 -6.17	1.9 -15.27	2.1 11.14	2.5 17.44	2.9 15.34	3.2 12.61	3.6 10.18	3.8 5.93	3.9 .44	4.2 4.20
92	HOT-ROLLED PLATES& SHEET	5.2	8.3 59.51	9.0 8.37	9.6 6.77	9.4 -2.14	8.7 -7.12	9.3 6.64	10.2 10.18	11.3 9.78	12.2 8.77	13.2 7.65	13.9 5.16	14.4 1.60	15.5 3.94
93	STEEL PIPE & TUBE	1.1	1.9 71.45	2.2 14.93	2.4 10.68	2.4 -.52	2.2 -7.35	2.5 11.63	2.8 13.55	3.1 12.05	3.5 11.05	3.8 9.81	4.1 7.19	4.4 3.66	4.9 4.31
94	COLD-ROLLED & COATED STE	.5	.4 -15.98	.4 -1.47	.4 -1.36	.4 .81	.4 1.60	.4 -1.34	.4 -2.25	.4 -2.38	.4 -2.35	.4 -2.24	.4 -1.61	.4 -.44	.4 -1.48
95	CAST & FORGE IRON	.2	.2 -4.53	.4 85.36	.4 9.34	.4 -4.98	.3 -11.28	.3 6.19	.4 20.47	.5 20.64	.6 17.03	.7 13.93	.7 8.59	.8 1.17	.9 10.11
96	NONFERROUS METAL INGOTS	378.1	519.5 37.39	555.4 6.92	577.6 3.98	526.5 -8.84	463.8 -11.90	491.4 5.94	547.7 11.46	603.9 10.25	654.2 8.34	698.0 6.69	721.9 3.43	719.4 -.43	762.6 3.72
97	COPPER BRASS PRODUCTS	3.1	3.3 7.36	4.3 27.97	4.5 5.09	3.9 -13.17	3.1 -19.64	3.4 7.31	3.9 17.83	4.6 15.40	5.1 11.68	5.5 8.58	5.7 3.50	5.5 -2.75	5.7 3.16
98	ALUMINUM EXTRUDED PRODUC	2.3	2.5 7.93	2.7 9.90	3.0 10.43	3.0 -.63	2.9 -2.40	3.2 10.20	3.7 15.55	4.3 15.45	4.9 14.15	5.5 12.82	6.1 9.93	6.9 5.82	8.2 10.36
99	OTHER NONFERROUS METAL P	7.0	8.9 27.52	9.9 10.94	10.5 6.00	10.0 -4.45	9.3 -6.81	9.8 5.03	10.9 11.00	12.1 11.07	13.3 9.65	14.4 8.36	15.1 5.22	15.5 .75	16.9 5.78
100	STRUCTURAL METAL PRODUCT	9.2	10.7 16.07	12.1 13.76	13.3 9.67	13.1 -1.56	12.6 -3.68	13.7 8.34	15.6 13.72	17.7 13.59	19.8 12.05	21.9 10.40	23.5 7.66	25.5 3.55	29.2 8.48
101	OTHER METAL PRODUCTS	16.6	19.4 16.91	22.4 15.30	23.6 5.37	22.0 -6.62	20.8 -5.69	22.5 8.57	25.3 12.37	27.9 10.11	30.4 8.82	32.6 7.54	34.3 4.58	35.4 1.40	38.6 5.13
102	POWER GENERATING MACHINA	27.0	30.7 13.75	33.6 9.30	34.9 3.95	33.5 -3.99	31.3 -6.51	32.2 2.80	34.7 7.90	37.7 8.45	40.6 7.81	43.5 7.14	45.4 4.29	46.0 .38	49.0 3.64
103	MACHINE TOOLS METALWORKI	65.2	183.3 181.17	203.7 11.12	220.6 8.31	183.6 -16.80	115.9 -36.88	105.6 -8.85	156.2 47.88	210.1 34.58	247.5 17.75	269.8 9.02	270.4 .22	213.2 -13.13	216.8 7.90
104	INDUSTRIAL MACHINERY	129.9	145.1 11.73	163.3 12.52	171.4 4.98	165.0 -3.79	144.1 -12.67	145.1 .69	167.0 15.10	197.9 18.54	229.6 16.01	257.7 12.27	273.6 6.14	267.2 -2.10	289.5 6.68
105	GENERAL INDUSTRIAL MACHI	64.5	88.1 36.56	96.9 9.98	107.1 10.54	104.9 -2.04	89.8 -14.40	92.5 2.97	115.9 25.36	147.3 27.12	179.9 22.12	212.3 17.98	236.3 11.31	245.1 .38	294.3 13.98

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 4(CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
106	OFFICE MACHINERY	26.7	37.8 41.69	70.6 86.63	80.5 14.07	80.7 .25	79.3 -1.74	95.4 20.25	109.8 15.06	123.4 12.40	141.4 14.58	161.6 14.31	181.4 12.24	225.7 11.88	292.1 13.96
107	HOUSEHOLD MACHINERY	3.5	7.7 119.35	10.2 32.44	12.7 24.60	9.6 -23.97	10.7 11.25	12.4 15.62	13.8 11.34	15.2 9.71	16.5 8.65	17.6 6.86	18.6 5.49	19.5 2.13	20.6 2.11
108	PARTS OF MACHINERY	27.1	30.1 11.13	34.2 13.72	38.2 11.56	37.0 -3.23	32.4 -12.25	34.3 5.84	42.3 23.13	52.4 23.90	62.7 19.71	73.0 16.36	80.5 10.35	84.1 1.10	99.9 12.43
109	STRONG ELECTRIC MACHINER	32.4	36.8 13.51	42.3 14.89	44.5 5.22	39.2 -11.72	31.6 -19.52	33.6 6.22	42.8 27.49	53.2 24.41	62.7 17.78	70.8 12.91	75.3 6.34	73.1 -2.38	82.2 9.25
110	HOUSEHOLD ELECTRICAL MAC	18.4	26.1 41.60	33.1 27.00	35.0 5.77	34.6 -1.17	33.8 -2.37	35.7 5.74	37.6 5.26	39.5 5.16	41.4 4.79	43.2 4.37	44.7 3.48	47.3 2.82	48.5 -.00
111	OTHER WEAK ELECTRICAL AP	195.2	237.8 21.84	273.4 14.94	285.2 5.60	266.8 -7.76	237.1 -11.13	256.9 8.36	298.6 16.22	342.3 14.63	383.0 11.90	419.6 9.56	443.5 5.69	458.5 1.37	513.6 7.14
112	SHIPS & BOATS	17.8	22.9 28.77	23.7 3.56	24.2 2.15	24.2 -.06	24.3 .21	24.8 1.96	25.3 2.20	25.9 2.23	26.5 2.41	27.4 3.26	28.2 3.10	29.9 2.97	31.7 2.74
113	RAILWAY VEHICLES	.7	1.3 81.97	1.3 .57	1.3 .48	1.2 -7.78	1.2 -1.22	1.2 1.32	1.2 2.00	1.2 1.54	1.2 .97	1.2 .43	1.2 -.07	1.2 -1.33	1.2 -.05
114	PASSENGER MOTOR CAR	27.7	37.5 35.40	43.4 15.73	47.2 8.64	44.4 -5.91	42.0 -5.23	44.6 6.05	50.1 12.29	56.3 12.42	62.5 11.00	68.8 10.14	73.4 6.67	76.3 1.95	84.3 6.47
115	REPAIR OF PASSENGER MOTO	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
116	MOTORCYCLES & BICYCLES	.2	.3 45.87	.3 -3.38	.3 11.98	.3 .14	.3 4.93	.4 7.94	.4 5.58	.4 2.94	.4 1.65	.4 2.18	.4 .51	.4 1.04	.4 -.39
117	AIRCRAFTS	122.2	148.2 21.31	156.5 5.61	152.5 -2.75	149.2 -2.18	156.9 5.16	166.1 5.86	176.2 6.06	186.1 5.66	196.8 5.74	208.1 5.73	219.1 5.30	239.8 4.62	265.3 5.10
118	OTHER TRANSPORTATION	4.3	2.6 -39.69	3.2 25.12	3.4 5.21	3.5 1.69	3.6 4.07	4.0 10.75	4.7 17.94	5.6 19.25	6.6 16.95	7.6 15.21	8.6 13.12	10.4 10.06	13.4 14.18
119	PRECISION MACHINERY	42.2	52.0 23.12	60.1 15.75	65.8 9.33	61.1 -7.09	54.0 -11.63	57.8 7.03	68.0 17.69	78.6 15.54	88.0 12.01	96.4 9.51	101.6 5.46	103.2 .36	114.4 6.84
120	PHOTOGRAPHIC & OPTICAL I	32.1	48.7 51.73	73.4 50.75	81.1 10.37	79.7 -1.64	75.0 -5.98	81.5 8.76	89.1 9.28	96.3 8.04	103.5 7.53	110.7 6.91	116.8 5.52	127.6 4.52	135.9 1.60
121	WATCHES & CLOCKS	33.2	52.4 57.70	61.4 17.19	65.9 13.69	61.6 -11.81	66.6 8.09	73.3 10.03	77.7 6.00	81.9 5.42	86.0 4.99	90.0 4.65	94.3 4.75	101.0 3.29	104.9 .31
122	OTHER MANUFACTURING GOOD	89.8	125.0 39.18	161.8 29.49	184.0 13.72	190.6 3.67	200.3 4.97	225.5 12.61	256.3 13.64	289.0 12.75	322.9 11.73	356.3 10.97	392.5 9.54	455.3 7.48	539.8 9.23
123	HOUSING CONSTRUCTION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
124	CONSTRUCTION NOT FOR RES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
125	BUILDING REPAIRING	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
126	PUBLIC UTILITY CONSTRUCT	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00

JAPANESE MODEL

TABLE B - 4(CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
127	OTHER CONSTRUCTION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
128	ELECTRICITY	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
129	GAS	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
130	WATER-SUPPLY,SEWERAGE	.1	.1 -4.37	.1 12.63	.1 8.06	.1 -7.16	.1 -5.99	.1 6.37	.1 10.74	.1 10.42	.1 9.11	.2 7.85	.2 5.76	.2 2.91	.2 6.75
131	WHOLESALE TRADE	119.1	146.0 22.57	167.2 14.51	182.4 9.11	167.8 -8.02	156.4 -6.77	167.8 7.26	188.1 12.13	210.0 11.63	231.1 10.06	251.0 8.59	266.7 6.26	284.7 3.14	322.5 7.23
132	RETAIL TRADE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
133	FINANCIAL BUSINESS	3.6	4.1 14.22	4.6 12.63	5.0 8.06	4.6 -7.16	4.4 -5.99	4.6 6.37	5.1 10.74	5.7 10.42	6.2 9.11	6.7 7.85	7.1 5.76	7.5 2.91	8.4 6.75
134	INSURANCE BUSINESS	19.8	22.6 13.98	25.4 12.63	27.5 8.06	25.5 -7.16	24.0 -5.99	25.5 6.37	28.2 10.74	31.2 10.42	34.0 9.11	36.7 7.85	38.8 5.76	41.2 2.91	46.3 6.75
135	REAL ESTATE AGENCY	9.0	11.0 22.54	12.6 14.51	13.8 9.11	12.7 -8.02	11.8 -6.77	12.7 7.26	14.2 12.13	15.9 11.63	17.5 10.06	19.0 8.59	20.1 6.26	21.5 3.14	24.4 7.23
136	RENT FOR HOUSE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
137	NATIONAL RAILROAD	.2	.2 9.00	.2 8.26	.3 7.63	.3 7.09	.3 6.62	.3 6.21	.3 5.84	.3 5.52	.4 5.23	.4 4.97	.4 4.74	.4 4.33	.5 3.98
138	LOCAL RAILROAD	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
139	ROAD PASSENGER TRANSPORT	1.3	1.5 14.01	1.7 12.63	1.8 8.06	1.7 -7.16	1.6 -5.99	1.7 6.37	1.9 10.74	2.0 10.42	2.2 9.11	2.4 7.85	2.5 5.76	2.7 2.91	3.0 6.75
140	ROAD FREIGHT TRANSPORT	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
141	ROAD TRANSPORTATION FACI	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
142	SEA TRANSPORT	184.7	210.6 14.01	237.2 12.63	256.3 8.06	237.9 -7.16	223.7 -5.99	237.9 6.37	263.5 10.74	290.9 10.42	317.4 9.11	342.3 7.85	362.1 5.76	384.6 2.91	432.1 6.75
143	INLAND WATER TRANSPORT	132.1	150.6 14.01	169.6 12.63	183.3 8.06	170.2 -7.16	160.0 -5.99	170.2 6.37	188.4 10.74	208.1 10.42	227.0 9.11	244.9 7.85	259.0 5.76	275.1 2.91	309.0 6.75
144	AIR TRANSPORT	61.5	70.1 13.97	78.9 12.63	85.3 8.06	79.2 -7.16	74.4 -5.99	79.2 6.37	87.7 10.74	96.8 10.42	105.7 9.11	114.0 7.85	120.5 5.76	128.0 2.91	143.8 6.75
145	OTHER TRANSPORT	16.5	18.8 13.28	21.2 12.63	22.9 8.06	21.2 -7.16	20.0 -5.99	21.2 6.37	23.5 10.74	26.0 10.42	28.3 9.11	30.5 7.85	32.3 5.76	34.3 2.91	38.6 6.75
146	STORAGE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
147	TELECOMMUNICATION	5.8	6.3 8.51	6.8 7.84	7.3 7.27	7.8 6.78	8.3 6.35	8.8 5.97	9.3 5.63	9.7 5.33	10.2 5.06	10.7 4.82	11.2 4.60	12.2 4.21	13.2 3.88

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 4(CONTINUED) : FORECAST OF IMPORTS (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
148	GOVERNMENTAL SERVICES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
149	EDUCATION	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
150	MEDICAL,HEALTH SERVICE	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
151	OTHER PUBLIC SERVICES	.0	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
152	SERVICE FOR BUSINESS ENT	23.4	28.7 22.49	[illegible] 14.51	35.8 9.11	32.9 -8.02	30.7 -6.77	32.9 7.26	36.9 12.13	41.2 11.63	45.4 10.06	49.3 8.59	52.4 6.26	55.9 3.14	63.3 7.23
153	AMUSEMENT	22.2	27.2 22.63	31.2 14.51	34.0 9.11	31.3 -8.02	29.2 -6.77	31.3 7.26	35.1 12.13	39.2 11.63	43.1 10.06	46.8 8.59	49.7 6.26	53.1 3.14	60.1 7.23
154	RESTAURANT	26.5	32.5 22.64	37.2 14.51	40.6 9.11	37.3 -8.02	34.8 -6.77	37.3 7.26	41.9 12.13	46.7 11.63	51.5 10.06	55.9 8.59	59.4 6.26	63.4 3.14	71.8 7.23
155	OTHER PERSONAL SERVICES	21.7	26.6 22.51	30.4 14.51	33.2 9.11	30.6 -8.02	28.5 -6.77	30.6 7.26	34.3 12.13	38.2 11.63	42.1 10.06	45.7 8.59	48.6 6.26	51.8 3.14	58.7 7.23
156	NOT CLASSIFIED	212.8	260.8 22.55	[illegible] 14.51	325.8 9.11	299.7 -8.02	279.4 -6.77	299.7 7.26	336.1 12.13	375.1 11.63	412.9 10.06	448.3 8.59	476.4 6.26	508.6 3.14	576.1 7.23

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TABLE 6 - 5 : FORECAST OF INVESTMENT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	AGRICULTURE, FORESTRY AN	1174.2	1282.0	1220.2	1519.3	1689.2	1532.4	1494.9	1548.0	1633.1	1768.6	1919.0	2024.5	2003.6	1969.9
			9.19	-4.82	24.51	11.18	-9.28	-2.45	3.55	5.50	8.30	8.50	5.50	-1.60	.37
2	MINING	150.2	191.9	209.8	218.2	215.0	205.4	210.3	226.6	243.8	261.4	277.6	289.2	296.9	327.9
			27.76	9.33	4.01	-1.47	-4.45	2.40	7.72	7.61	7.20	6.20	4.20	1.32	6.23
3	FOODS AND TOBACCO	301.6	484.0	584.3	628.8	609.7	514.9	507.5	549.9	633.9	757.7	871.3	903.1	771.6	752.9
			60.48	20.73	7.61	-3.05	-15.54	-1.44	8.34	15.28	19.55	14.99	3.65	-8.81	2.77
4	TEXTILE	407.0	385.7	513.0	591.5	509.2	490.5	552.3	647.9	788.7	959.4	1099.6	1156.4	1157.0	1316.4
			-5.23	33.01	15.31	-13.91	-3.69	12.61	17.30	21.73	21.64	14.61	5.17	.01	8.90
5	PULP AND PAPER	280.5	248.6	262.5	322.2	262.7	144.7	118.9	192.0	306.3	425.7	497.7	465.4	262.1	297.7
			-11.37	5.58	22.78	-18.47	-44.92	-17.83	61.51	59.50	38.99	16.90	-6.48	-26.32	23.93
6	CHEMICAL PRODUCTS	723.7	938.7	1149.9	704.8	425.1	442.3	738.3	970.9	1176.1	1376.0	1578.6	1777.3	2164.6	2729.9
			29.71	22.50	-38.71	-39.68	4.04	66.92	31.50	21.13	17.00	14.73	12.58	10.53	10.50
7	PRIMARY METALS	1113.6	1293.1	1322.5	1709.2	1395.8	523.8	136.6	782.8	1625.2	2253.5	2659.1	2745.7	1865.3	1720.2
			16.12	2.27	29.24	-18.34	-62.47	-73.92	472.99	107.62	38.66	18.00	3.26	-22.63	10.64
8	METAL PRODUCTS	206.1	267.2	296.6	311.6	242.8	104.9	64.4	164.1	297.2	402.5	475.2	499.2	393.3	373.5
			29.65	10.99	5.07	-22.07	-56.81	-38.59	154.73	81.11	35.45	18.07	5.04	-15.13	7.31
9	NON ELECTRICAL MACHINERY	413.5	336.1	413.2	520.6	408.4	147.7	84.7	318.3	633.7	917.8	1129.5	1196.1	873.6	1003.6
			-18.72	22.95	25.99	-21.56	-63.84	-42.62	275.67	99.08	44.83	23.07	5.89	-18.67	24.25
10	ELECTRICAL MACHINERY	454.3	375.5	545.4	519.7	371.6	184.3	239.7	445.1	607.1	704.9	758.6	760.4	657.8	794.6
			-17.35	45.25	-4.71	-28.47	-50.41	30.03	85.71	36.38	16.11	7.62	.24	-7.44	16.08
11	TRANSPORTATION EQUIPMENT	525.6	681.9	849.7	940.8	707.1	301.1	256.3	576.2	955.3	1239.0	1435.9	1479.1	1061.4	1099.4
			29.74	24.61	10.72	-24.84	-57.42	-14.88	124.82	65.78	29.71	15.89	3.01	-19.07	15.44
12	MISCELLAEOUS MANUFACTURI	1021.1	1237.5	1376.1	1684.1	1747.6	876.6	423.9	690.1	1351.3	2082.7	2799.2	3190.7	2250.3	1799.9
			21.19	11.20	22.38	3.78	-49.84	-51.64	62.80	95.80	54.13	34.40	13.98	-22.58	3.09
13	CONSTRUCTION	832.8	737.3	873.9	895.9	981.3	923.7	772.1	784.4	969.9	1157.6	1324.0	1458.0	1568.3	1613.7
			-11.47	18.52	2.52	9.53	-5.87	-16.41	1.59	23.65	19.36	14.37	10.13	1.52	3.06
14	ELECTRICITY, GAS AND WAT	810.8	1092.2	1254.9	1275.0	1022.0	786.4	789.7	963.1	1214.3	1507.6	1789.1	1924.5	1756.7	1828.9
			34.71	14.90	1.60	-19.84	-23.05	.41	21.97	26.08	24.15	18.67	7.57	-6.77	7.35

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TABLE 6 - 5(CONTINUED) : FORECAST OF INVESTMENT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
15	WHOLE SALE AND RETAIL TR	3100.0	3293.5	3383.2	3737.3	3331.4	2958.3	3249.0	3828.2	4352.7	4834.5	5245.8	5485.3	5434.9	5994.5
			6.24	2.72	10.47	-10.86	-11.20	9.83	17.83	13.70	11.07	8.51	4.57	-1.06	7.36
16	REAL ESTATE	1203.7	530.4	707.0	656.7	713.8	641.8	594.0	629.6	681.4	734.8	781.9	821.6	871.2	899.4
			-55.94	33.29	-7.12	8.70	-10.08	-7.45	6.04	8.19	7.83	6.41	5.08	2.45	1.78
17	TRANSPORT AND COMMUNICAT	927.7	1502.7	2054.6	2091.8	1785.0	1751.6	2017.4	2310.5	2585.3	2869.7	3157.9	3423.1	3850.3	4524.2
			61.98	36.73	1.81	-14.67	-1.87	15.17	14.53	11.89	11.00	10.04	8.40	6.05	8.41
18	FINANCE AND INSURANCE	264.0	310.7	398.6	346.0	355.1	333.0	318.3	343.9	386.2	428.0	468.0	505.0	558.0	606.4
			17.69	28.31	-13.19	2.61	-6.23	-4.41	8.06	12.28	10.84	9.33	7.91	4.36	4.77
19	OTHER SERVICES	1985.6	1419.8	1764.5	1880.5	1766.5	1529.2	1517.4	1635.8	1806.3	1995.8	2179.4	2329.5	2474.6	2604.7
			-28.55	24.27	6.57	-6.06	-13.43	-.77	7.80	10.42	10.49	9.20	6.88	2.20	3.34
20	NON-CLASSIFIED	37.4	23.9	24.9	26.0	27.1	28.2	29.5	30.7	32.1	33.4	34.9	36.4	39.6	43.0
			-36.18	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
21	ROAD CONSTRUCTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
22	HARBOUR	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
23	AIRPORT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
24	HOUSING CONSTRUCTION	3712.2	3784.5	4470.0	5102.6	4994.3	5270.8	5603.0	5917.4	6210.5	6478.2	6716.1	6970.0	7369.4	7748.7
			1.95	18.11	14.15	-2.12	5.53	6.30	5.61	4.95	4.31	3.67	3.78	2.51	2.55
25	ENVIORNMENT	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
26	LAND PROTECTION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
27	LAND COMPOSITION	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
28	OTHERS	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

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TABLE 8 - 6 : FORECAST OF EMPLOYMENT (IN 1000 PERSONS)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	AGRICULTURE, FORESTRY AN	8860.0	8528.9	8338.3	8331.2	8009.6	7735.9	7618.9	7510.8	7414.6	7323.5	7235.6	7150.7	6981.9	6836.3
			-3.74	-2.24	-.08	-3.86	-3.42	-1.51	-1.42	-1.28	-1.23	-1.20	-1.17	-1.25	-1.00
2	MINING	200.0	213.3	194.5	206.6	184.4	161.7	163.5	178.8	197.4	215.7	233.0	246.0	256.7	286.1
			6.66	-8.82	5.97	-10.73	-12.30	1.11	9.37	10.36	9.31	8.01	5.55	1.79	7.01
3	FOODS AND TOBACCO	1107.0	1090.0	1074.2	1054.4	1038.4	1020.0	998.8	975.8	951.2	925.4	898.8	871.7	817.1	762.6
			-1.53	-1.46	-1.84	-1.52	-1.77	-2.07	-2.31	-2.52	-2.71	-2.87	-3.02	-3.23	-3.44
4	TEXTILE	2270.0	2356.6	2403.8	2496.9	2333.3	2312.2	2381.4	2449.8	2540.7	2635.4	2726.9	2819.5	2960.8	3119.7
			3.82	2.00	3.88	-6.55	-.90	2.99	2.87	3.71	3.72	3.47	3.40	2.27	2.54
5	PULP AND PAPER	371.0	379.3	383.5	398.0	381.2	360.0	361.5	373.0	387.4	401.8	415.0	425.3	436.1	456.0
			2.25	1.11	3.77	-4.21	-5.57	.42	3.19	3.86	3.70	3.29	2.49	1.03	2.67
6	CHEMICAL PRODUCTS	628.0	679.6	722.5	772.7	731.5	713.7	754.0	804.0	862.6	927.4	997.2	1069.0	1217.8	1411.0
			8.21	6.32	6.95	-5.34	-2.42	5.65	6.63	7.29	7.51	7.53	7.20	6.80	7.35
7	PRIMARY METALS	794.0	826.9	866.7	888.9	816.5	706.4	727.4	790.6	858.0	920.6	975.7	1006.5	994.4	1037.8
			4.15	4.81	2.56	-7.91	-13.45	2.68	8.69	8.54	7.29	5.99	3.15	-.96	2.87
8	METAL PRODUCTS	1330.0	1235.2	1317.1	1343.3	1226.3	1094.2	1107.4	1186.2	1273.1	1354.5	1422.8	1458.0	1419.4	1449.8
			-7.13	6.63	1.99	-8.70	-10.77	1.20	7.12	7.32	6.39	5.04	2.47	-1.92	2.27
9	NON ELECTRICAL MACHINERY	1175.0	1147.0	1181.4	1214.8	1081.4	848.1	804.4	927.3	1113.9	1304.0	1467.0	1552.1	1465.3	1566.6
			-2.39	3.00	2.83	-10.98	-21.57	-5.15	15.28	20.12	17.06	12.50	5.80	-4.17	6.94
10	ELECTRICAL MACHINERY	1430.0	1445.3	1568.3	1560.0	1373.2	1162.1	1161.1	1252.3	1352.4	1436.7	1500.6	1522.2	1458.5	1495.9
			1.07	8.51	-.53	-11.97	-15.37	-.09	7.85	8.00	6.23	4.45	1.44	-2.47	2.40
11	TRANSPORTATION EQUIPMENT	956.0	1013.6	1105.1	1174.8	1112.2	1065.4	1112.2	1212.4	1327.1	1443.7	1568.3	1665.9	1763.1	1946.5
			5.80	9.03	6.31	-5.33	-4.20	4.39	9.02	9.46	8.79	8.63	6.22	2.49	5.97
12	MISCELLANEOUS MANUFACTURI	3707.0	3674.4	3944.5	4052.6	3799.9	3551.2	3614.6	3792.9	4005.8	4199.4	4383.9	4510.3	4596.2	4859.2
			-.88	7.35	2.74	-6.24	-6.54	1.79	4.93	5.61	4.83	4.39	2.88	.95	3.40
13	CONSTRUCTION	3940.0	3847.0	4159.7	4481.4	4375.5	4139.5	4227.8	4642.7	5169.4	5690.3	6160.4	6508.0	6712.1	7164.6
			-2.36	8.13	7.73	-2.36	-5.39	2.13	9.81	11.34	10.08	8.26	5.64	.76	4.83
14	ELECTRICITY, GAS AND WAT	274.0	270.3	286.4	294.5	280.9	268.5	275.3	288.7	303.2	317.3	330.6	340.7	351.1	372.7
			-1.34	5.92	2.85	-4.62	-4.43	2.56	4.87	5.01	4.66	4.17	3.07	1.37	3.44
15	WHOLE SALE AND RETAIL TR	10074.0	9935.0	10304.5	10604.9	10009.2	9366.4	9354.6	9633.4	9942.6	10197.8	10383.2	10443.4	10200.9	10239.9
			-1.38	3.72	2.92	-5.62	-6.42	-.13	2.98	3.21	2.57	1.82	.58	-1.43	.79
16	REAL ESTATE	273.0	297.5	323.7	351.1	359.7	361.1	374.8	392.1	409.1	424.7	438.5	450.0	465.8	481.1
			8.97	8.81	8.46	2.46	.37	3.81	4.62	4.32	3.83	3.25	2.61	1.48	1.75
17	TRANSPORT AND COMMUNICAT	3246.0	3465.5	3781.3	4067.9	3967.5	3842.0	3937.1	4127.7	4331.1	4542.1	4758.8	4963.8	5278.4	5674.9
			6.76	9.11	7.58	-2.47	-3.16	2.48	4.84	4.93	4.87	4.77	4.31	2.90	3.81
18	FINANCE AND INSURANCE	1095.0	1152.1	1169.7	1213.6	1153.6	1100.4	1120.7	1164.2	1208.7	1248.8	1283.2	1306.2	1325.2	1370.8
			5.21	1.53	3.75	-4.95	-4.61	1.84	3.88	3.83	3.32	2.75	1.79	.59	2.03
19	OTHER SERVICES	9120.0	9501.5	9876.3	9935.7	9548.7	9386.4	9367.8	9425.7	9488.0	9531.0	9545.6	9524.9	9364.7	9283.9
			4.18	3.94	.60	-3.90	-1.70	-.20	.62	.66	.45	.15	-.22	-.85	-.26
20	NON-CLASSIFIED	1753.0	1784.0	1918.3	1979.9	1883.9	1809.2	1864.1	1953.6	2045.3	2130.4	2205.1	2254.2	2279.1	2368.7
			1.77	7.53	3.21	-4.86	-3.96	3.03	4.80	4.70	4.16	3.50	2.23	.41	2.23

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TABLE B - 7 : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	GRAIN	1907.0	1906.8 -.01	1937.5 1.61	2008.5 3.67	1997.0 -.58	1925.5 -3.58	1924.1 -.08	1928.3 .22	1929.6 .07	1926.8 -.14	1918.8 -.42	1903.6 -.79	1865.0 -1.17	1818.2 -1.29
2	OTHER CROPS	1073.2	1115.4 3.93	1136.2 1.87	1151.5 1.34	1142.2 -.80	1142.4 .02	1149.3 .60	1157.2 .69	1165.3 .70	1173.1 .67	1180.3 .61	1187.4 .60	1196.9 .44	1210.7 .51
3	FRUITS	447.0	441.2 -1.29	439.3 -.43	455.2 3.62	458.2 .65	445.2 -2.84	450.3 1.16	456.0 1.26	459.9 .85	462.1 .50	462.3 .04	459.4 -.63	448.5 -1.43	433.5 -1.67
4	OTHER CROPS FOR INDUSTRI	187.0	165.6 -11.42	164.1 -.89	161.7 -1.49	175.1 8.30	180.6 3.12	183.4 1.57	185.0 .85	186.0 .55	187.0 .53	188.2 .66	189.9 .88	195.9 1.68	200.7 1.15
5	CROP FOR FIBER INDUSTRIA	23.2	16.4 -29.46	17.2 4.94	17.3 1.05	15.3 -12.08	15.1 -.79	15.4 1.64	15.6 1.21	15.8 1.34	16.0 1.10	16.1 .75	16.2 .65	16.1 -.43	16.3 .45
6	LIVE STOCKS,POULTRY	1169.9	1220.2 4.30	1296.8 6.28	1394.6 7.54	1342.8 -3.71	1401.6 4.38	1455.9 3.87	1513.0 3.92	1573.0 3.97	1633.1 3.82	1689.8 3.47	1748.6 3.48	1833.0 2.10	1911.4 2.10
7	LIVE STOCKS,POULTRY FOR	.2	.0 -100.00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00	.0 .00
8	SERICULTURE	132.1	137.6 4.22	147.6 7.23	161.5 9.45	169.2 4.73	174.4 3.11	188.8 8.24	203.5 7.76	219.4 7.83	236.3 7.70	253.8 7.39	271.3 6.90	306.6 6.11	344.5 5.82
9	AGRICULTURAL SERVICES	137.4	153.4 11.69	173.6 13.10	200.0 15.23	219.0 9.50	239.5 9.34	268.2 11.99	300.6 12.10	336.5 11.93	375.8 11.69	418.4 11.34	464.4 10.98	565.8 10.16	685.3 10.02
10	FORESTRY	472.9	497.4 5.17	502.4 1.01	509.9 1.50	525.5 3.06	544.8 3.66	556.2 2.11	564.2 1.43	572.5 1.46	582.1 1.68	593.1 1.90	606.3 2.22	637.5 2.59	667.4 2.20
11	CHARCOAL & FIREWOOD	16.9	15.6 -7.52	20.4 30.90	21.0 3.04	6.1 -71.35	13.8 127.04	14.4 4.11	13.8 -3.77	13.2 -4.87	12.3 -6.32	11.3 -8.19	11.5 1.55	8.8 -13.98	8.0 -4.68
12	LOGS	596.6	618.2 3.61	606.6 -1.88	600.6 -.98	616.1 2.58	629.3 2.14	630.7 .22	626.4 -.68	622.3 -.66	619.9 -.39	619.4 -.08	621.4 .33	633.3 1.03	640.5 .41
13	HUNTINGS	6.9	7.1 3.40	7.9 10.61	8.4 7.56	8.1 -3.73	8.8 8.77	9.4 6.19	9.9 5.78	10.5 5.74	11.1 5.59	11.7 5.40	12.3 5.57	13.5 4.60	14.9 5.03
14	FISHERIES	884.6	889.5 .56	915.4 2.91	970.4 6.02	989.7 1.98	972.1 -1.78	1006.0 3.49	1033.1 2.69	1062.6 2.85	1089.9 2.56	1115.1 2.32	1135.1 1.79	1171.5 1.53	1200.2 1.23
15	WHALING	26.9	26.1 -2.92	27.4 4.85	29.6 7.35	30.6 3.38	31.0 1.14	32.7 5.55	34.7 6.10	36.8 6.20	39.0 6.02	41.3 5.69	43.4 5.18	47.6 4.50	51.9 4.35
16	INLAND WATER FISHERIES	48.7	55.2 13.21	56.4 2.13	67.2 19.21	65.8 -2.04	68.3 3.74	73.0 6.87	76.3 4.63	81.2 6.33	84.4 3.95	88.9 5.33	91.3 2.72	97.6 1.62	103.1 1.47
17	COKING COAL	156.1	91.3 -41.54	84.8 -7.11	110.1 29.84	68.9 -37.44	11.2 -83.75	34.3 206.09	79.2 131.29	124.1 56.67	164.3 32.36	198.4 20.79	215.7 8.71	202.5 -3.97	225.2 6.84
18	LIGNITE BRIQUETTES AND L	.9	.9 -.72	.9 -2.15	.9 -.34	.8 -5.87	.8 -3.84	.8 -1.99	.8 -1.51	.8 -1.27	.7 -1.27	.7 -1.34	.7 -1.48	.7 -1.85	.7 -1.47
19	IRON ORES & CONCENTRATES	5.7	3.4 -40.57	3.9 14.69	4.2 9.15	4.1 -3.53	3.7 -10.33	4.0 9.93	4.7 15.35	5.3 14.16	6.0 12.21	6.6 10.37	7.0 6.79	7.4 2.01	8.2 5.75
20	ORES & CONCENTRATES OF N	141.4	85.9 -39.22	82.3 -4.20	82.4 .14	82.2 -.26	81.9 -.34	82.1 .17	82.4 .33	82.6 .33	82.9 .30	83.1 .27	83.2 .16	83.3 .01	83.5 .18
21	PETROLEUMS CRUDE	8.2	1.5 -81.21	1.6 5.93	1.7 2.29	1.5 -8.51	1.4 -7.12	1.4 .61	1.5 3.03	1.5 3.14	1.6 2.58	1.6 1.91	1.6 .59	1.6 -1.38	1.6 .67

I*N*F*O*R*U*M JAPANESE MODEL

TABLE 8 - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
22	NATURAL GAS	17.2	18.3	19.5	21.3	21.2	20.9	22.1	23.8	25.5	27.3	29.0	30.6	33.3	37.0
			5.63	6.64	7.23	-.30	-1.64	5.86	7.41	7.40	6.93	6.45	5.41	4.22	5.53
23	LIME STONE SAND GRAVEL	674.9	753.0	882.6	1005.2	1039.5	1048.8	1157.7	1356.9	1595.0	1852.5	2120.6	2368.5	2753.4	3364.5
			11.58	17.21	13.88	3.42	.89	10.38	17.20	17.55	16.14	14.47	11.69	7.28	11.86
24	SALT CRUDE	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
			-100.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
25	NON-METALIC MINERALS	25.7	4.0	4.3	4.3	4.0	3.6	3.5	3.7	3.8	3.9	4.0	4.0	3.7	3.6
			-84.31	5.68	1.74	-8.33	-10.19	-1.12	3.50	4.04	2.88	1.54	-.65	-4.02	-.80
26	CARCASSES	576.2	604.9	625.2	670.3	677.7	684.0	710.6	740.1	770.7	801.6	831.8	861.0	915.9	968.2
			4.97	3.36	7.22	1.10	.92	3.89	4.15	4.13	4.01	3.77	3.51	2.95	2.82
27	MEAT PRODUCT	159.0	184.8	195.6	218.0	237.1	243.6	259.2	278.6	300.4	323.9	348.4	372.8	423.4	473.0
			16.24	5.86	11.45	8.75	2.75	6.40	7.48	7.82	7.82	7.56	7.01	6.27	5.67
28	DAIRY PRODUCT	541.0	563.6	632.5	688.7	611.3	692.4	729.7	763.2	798.1	832.9	866.0	906.5	962.1	1025.2
			4.17	12.23	8.88	-11.24	13.27	5.39	4.58	4.56	4.36	3.97	4.68	2.76	3.18
29	VEGETABLE & FRUIT PRESER	234.1	249.4	258.7	281.2	295.5	298.7	312.6	328.1	343.8	359.1	373.5	386.3	409.7	428.8
			6.54	3.75	8.67	5.09	1.09	4.67	4.96	4.77	4.44	4.01	3.44	2.71	2.28
30	SEA FOOD PRESERVED	835.7	862.3	894.3	961.5	1009.6	1015.0	1059.1	1108.6	1158.9	1208.6	1256.3	1299.4	1382.3	1454.6
			3.18	3.72	7.51	5.01	.53	4.34	4.67	4.54	4.29	3.94	3.43	2.91	2.56
31	GRAIN MILL PRODUCTS	1754.3	1911.6	2064.5	2285.2	2450.1	2523.1	2695.2	2881.9	3072.6	3265.9	3460.2	3650.1	4047.0	4460.5
			8.97	8.00	10.69	7.21	2.98	6.82	6.93	6.61	6.29	5.95	5.49	5.13	5.00
32	BAKERY PRODUCTS	814.7	887.6	936.5	1005.5	1047.4	1060.1	1111.7	1160.2	1205.7	1251.6	1298.7	1345.6	1453.1	1573.3
			8.95	5.48	7.37	4.17	1.21	4.87	4.38	3.92	3.80	3.77	3.61	3.90	4.16
33	REFINED SUGAR	340.1	296.3	269.5	282.3	268.7	281.2	287.9	294.9	301.8	309.0	316.0	324.3	337.1	351.7
			-12.87	-9.05	4.77	-4.82	4.62	2.38	2.46	2.35	2.37	2.28	2.62	1.90	2.21
34	OTHER FOOD PREPARED	1386.7	1492.4	1556.1	1755.2	1865.5	1900.4	2010.5	2134.5	2264.8	2399.0	2534.8	2667.9	2943.4	3227.7
			7.62	6.96	5.97	6.28	1.87	5.79	6.17	6.10	5.92	5.66	5.25	4.86	4.74
35	PREPARED FEEDS FOR ANIMA	511.4	527.0	562.9	616.8	605.1	652.3	698.9	748.4	801.8	857.3	913.2	972.6	1076.4	1190.0
			3.04	6.81	9.55	-2.21	7.80	7.14	7.09	7.13	6.91	6.53	6.50	4.97	5.00
36	ALCOHOLIC BEVERAGES	1354.1	1446.8	1555.6	1665.4	1657.0	1735.5	1789.0	1858.3	1948.2	2054.6	2172.2	2304.0	2557.6	2828.7
			6.54	7.60	7.06	-.74	4.73	3.08	3.87	4.84	5.47	5.71	6.07	5.11	5.26
37	SOFT DRINK	295.4	323.6	358.3	395.6	411.0	434.2	453.7	480.8	516.4	559.0	606.5	658.2	762.1	870.2
			9.55	10.70	10.43	3.90	5.65	4.49	5.97	7.40	8.25	8.49	8.53	7.22	6.90
38	TOBACCO	816.2	827.6	870.8	912.1	894.4	951.3	974.1	1005.0	1047.9	1099.4	1156.1	1219.5	1336.1	1461.7
			1.40	5.22	4.75	-1.95	6.37	2.40	3.17	4.27	4.91	5.16	5.48	4.50	4.62
39	SILK REELING & WASTE SIL	181.0	187.3	200.6	218.2	227.5	234.6	254.2	273.5	294.2	315.9	338.0	360.2	405.8	453.9
			3.46	7.09	8.78	4.27	3.12	8.35	7.59	7.59	7.35	7.01	6.57	5.95	5.53
40	COTTON SPINNING	232.9	244.4	266.8	284.7	263.2	283.2	303.4	322.1	342.7	364.3	386.6	413.3	462.5	529.4
			4.94	9.17	6.72	-7.55	7.60	7.13	6.18	6.40	6.30	6.12	6.91	5.69	7.06
41	WOOLEN & WORSTED YARN	212.5	233.9	247.9	270.1	216.5	261.4	284.6	301.1	319.1	337.6	356.1	382.7	424.9	484.4
			10.04	6.01	8.94	-19.69	20.53	8.86	5.80	6.00	5.77	5.51	7.46	5.27	6.54
42	LINEN YARN	22.0	21.4	22.6	23.4	22.0	21.3	22.4	23.5	24.7	25.7	26.6	27.3	27.9	28.9
			-2.48	5.45	3.55	-5.76	-3.18	5.09	5.00	4.81	4.20	3.53	2.47	.97	1.55

I*N*F*O*R*U*M JAPANESE MODEL

TABLE D - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
43	SPAN RAYON YARN	74.9	80.2	91.5	98.4	93.2	97.3	105.8	114.3	123.6	133.6	143.8	154.8	175.6	201.4
			7.06	14.11	7.53	-5.28	4.35	8.76	7.99	8.23	8.03	7.67	7.66	6.33	6.91
44	SYNTHETIC FIBER YARN	343.3	427.5	545.7	626.2	643.5	695.3	837.7	969.9	1124.4	1298.9	1490.3	1697.4	2159.4	2682.0
			24.53	27.64	14.74	2.77	8.06	20.47	15.79	15.93	15.52	14.74	13.89	12.50	10.33
45	SILK & RAYON WEAVING	407.1	451.5	499.2	559.5	598.3	620.0	669.5	721.6	774.9	827.6	879.0	928.6	1025.0	1121.9
			10.89	10.58	12.07	6.54	3.62	7.99	7.78	7.40	6.80	6.21	5.64	4.78	4.65
46	COTTON & SPUN RAYON FABR	391.8	391.1	395.0	393.9	347.7	333.8	328.1	323.1	318.3	312.5	305.5	299.5	280.9	269.2
			-.18	1.00	-.27	-11.74	-3.98	-1.73	-1.51	-1.49	-1.83	-2.23	-1.95	-3.40	-1.76
47	SYNTHETIC FIBERS WOVEN	798.0	970.9	1095.0	1239.1	1306.1	1353.5	1576.9	1777.3	2002.4	2246.8	2503.7	2761.6	3302.1	3849.7
			21.67	12.79	13.16	5.56	3.48	16.51	12.71	12.66	12.20	11.44	10.30	9.03	7.05
48	WOOLEN FABRICS WOVEN & F	393.3	427.5	497.4	541.1	388.2	501.1	541.1	565.2	586.6	609.8	633.1	677.8	739.8	850.4
			8.69	16.36	8.79	-28.26	29.09	7.98	4.08	4.16	3.94	3.83	7.05	4.43	7.43
49	LINEN FABRICS WOVEN	16.4	15.9	15.9	16.4	16.0	15.8	16.3	16.8	17.3	17.8	18.2	18.5	18.7	19.0
			-2.97	-.34	3.53	-2.49	-1.07	3.05	3.10	3.01	2.63	2.23	1.60	.44	.88
50	YARN & FABRIC DYEING S F	425.0	469.1	512.8	551.9	517.4	539.8	587.6	624.1	663.3	703.0	741.8	781.7	851.5	922.0
			10.38	9.33	7.62	-6.25	4.33	8.85	6.22	6.28	5.98	5.51	5.39	4.15	3.56
51	KNITTED FABRICS	571.9	639.2	761.3	856.3	792.3	868.7	994.7	1079.0	1166.3	1253.9	1338.0	1430.3	1588.0	1747.0
			11.77	19.09	12.49	-7.48	12.17	11.93	8.47	8.09	7.50	6.71	6.50	5.03	4.45
52	ROPES& FISHING NETS	76.1	81.4	84.2	92.2	95.0	93.1	97.5	103.4	110.0	117.5	125.3	132.2	141.7	153.3
			6.96	3.47	9.42	3.13	-2.00	4.64	6.07	6.40	6.80	6.70	5.45	3.20	4.36
53	OTHER FIBER PRODUCTS	283.9	288.6	329.6	356.2	327.7	349.2	375.0	400.6	426.6	451.8	475.3	498.8	529.2	569.8
			1.72	14.15	8.06	-8.01	6.57	7.41	6.83	6.48	5.91	5.19	4.95	2.74	3.88
54	FOOTWEAR EXCEPT RUBBER M	152.6	163.5	175.6	196.6	211.5	212.0	225.9	239.3	252.8	265.0	276.1	285.1	299.2	308.0
			7.11	7.42	11.97	7.59	.23	6.55	5.92	5.63	4.85	4.17	3.26	2.06	1.32
55	WEARING APPAREL	1289.2	1431.1	1458.3	1610.1	1707.4	1717.7	1814.2	1912.9	2012.9	2104.2	2186.6	2254.2	2358.0	2431.4
			11.00	1.90	10.41	6.04	.61	5.62	5.44	5.23	4.53	3.92	3.09	1.91	1.51
56	TEXTILE GARMENTS	263.3	296.0	315.6	349.0	363.6	368.0	397.8	431.9	468.1	504.2	539.7	571.8	626.2	689.2
			12.41	6.61	10.61	4.23	1.16	8.10	8.56	8.39	7.71	7.04	5.96	4.38	5.00
57	WOOD MILLING	1818.9	1782.1	1958.3	2107.3	2040.7	1990.7	2062.3	2205.3	2354.5	2490.2	2606.3	2692.1	2750.0	2872.5
			-2.02	9.89	7.61	-3.16	-2.45	3.60	6.93	6.77	5.76	4.66	3.29	.69	2.79
58	WOODEN PRODUCTS	454.6	454.9	509.7	545.6	534.9	522.2	548.6	591.1	632.6	670.5	704.5	730.7	759.7	811.2
			.05	12.05	7.03	-1.96	-2.38	5.04	7.76	7.02	5.99	5.07	3.71	1.73	3.86
59	FURNITURE WOODEN & METAL	1145.1	1163.1	1288.1	1369.4	1337.0	1307.0	1378.5	1485.4	1589.3	1683.7	1766.1	1827.2	1891.9	2006.7
			1.57	10.75	6.32	-2.37	-2.25	5.47	7.76	6.99	5.94	4.90	3.45	1.52	3.46
60	PULP	439.7	460.9	517.5	564.4	555.4	550.2	587.3	634.4	683.0	730.0	774.6	813.0	870.7	944.2
			4.82	12.26	9.06	-1.58	-.94	6.74	8.03	7.66	6.89	6.10	4.96	3.29	4.10
61	PAPER	987.9	1026.2	1128.4	1217.8	1205.3	1195.8	1263.1	1352.3	1443.9	1532.1	1615.0	1685.4	1787.0	1917.9
			3.88	9.96	7.92	-1.03	-.78	5.63	7.06	6.78	6.11	5.41	4.36	2.76	3.66
62	ARTICLES OF PAPER & PAPE	1193.0	1286.2	1435.6	1586.5	1610.9	1637.2	1767.1	1939.4	2125.7	2315.9	2506.7	2683.7	2989.0	3387.6
			7.81	11.62	10.51	1.54	1.63	7.93	9.75	9.61	8.95	8.24	7.06	5.32	6.72
63	PRINTING & PUBLISHING	1853.0	1994.0	2197.9	2389.5	2429.7	2417.5	2557.9	2735.3	2911.5	3078.0	3231.7	3358.5	3541.6	3769.7
			7.61	10.23	8.71	1.68	-.50	5.81	6.94	6.44	5.72	5.00	3.92	2.45	3.39

TABLE B - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
64	LEATHER MANUFACTURES & F	83.5	77.8	90.3	101.3	91.9	94.4	100.7	105.3	109.8	113.9	117.5	120.7	123.2	124.9
			-6.78	15.99	12.21	-9.32	2.73	6.69	4.57	4.28	3.72	3.16	2.74	.82	.01
65	LEATHER PRODUCTS EX. FOO	106.0	108.9	142.4	163.3	114.7	151.1	167.8	179.8	190.5	199.3	206.3	216.7	222.7	231.6
			2.79	30.69	14.73	-29.80	31.78	11.04	7.17	5.95	4.62	3.53	5.04	1.00	1.41
66	ARTICLES OF RUBBER	739.6	804.9	897.7	976.5	898.6	884.2	935.5	1009.6	1086.1	1157.0	1222.4	1269.2	1294.2	1360.8
			8.84	11.53	8.77	-7.97	-1.61	5.80	7.93	7.58	6.53	5.65	3.83	.71	2.75
67	BASIC INORGANIC INDUSTRI	294.1	314.0	351.8	383.2	369.7	361.7	390.0	422.1	456.5	491.2	525.6	556.7	610.1	675.7
			6.75	12.04	8.91	-3.53	-2.15	7.82	8.22	8.15	7.61	7.00	5.92	4.63	4.75
68	BASIC ORGANIC INDUSTRIAL	1191.5	1393.4	1680.0	1980.1	2001.2	2092.0	2457.6	2865.1	3335.5	3865.9	4460.0	5096.8	6527.7	8450.1
			16.95	20.56	17.86	1.07	4.54	17.48	16.58	16.42	15.90	15.37	14.28	13.19	13.05
69	SYNTHETIC DYESTUFF	53.2	57.9	68.5	80.1	80.6	89.3	105.0	120.3	138.2	158.3	180.5	205.3	260.3	326.6
			8.83	18.35	16.89	.71	10.71	17.60	14.66	14.85	14.55	14.00	13.75	12.37	11.23
70	BLASTING POWDER	35.9	40.2	43.4	45.9	47.9	49.9	54.7	61.4	69.2	77.8	87.3	96.9	115.7	144.3
			12.12	7.94	5.64	4.43	4.17	9.69	12.23	12.59	12.52	12.20	10.99	9.20	12.49
71	SPUN RAYON	137.8	148.1	169.3	182.2	176.7	175.0	184.0	192.2	201.2	210.3	218.9	227.1	241.6	253.0
			7.52	14.32	7.57	-3.00	-.94	5.16	4.44	4.68	4.49	4.09	3.78	3.00	1.37
72	MATERIALS OF SYNTHETIC F	782.3	991.6	1179.8	1379.9	1419.6	1515.0	1808.9	2090.4	2425.2	2808.0	3233.5	3699.3	4763.3	6004.1
			26.75	18.98	16.96	2.88	6.72	19.40	15.56	16.02	15.79	15.15	14.41	13.26	11.04
73	PLASTIC	695.9	703.7	840.4	938.7	935.4	936.2	1032.4	1148.3	1270.6	1395.5	1523.2	1641.0	1848.7	2110.7
			1.11	19.43	11.69	-.35	.08	10.28	11.23	10.64	9.83	9.15	7.73	6.00	6.62
74	CHEMICAL FERTIRIZER	227.4	243.4	264.2	287.5	298.0	299.9	310.7	322.8	335.9	348.6	360.2	371.0	391.1	388.6
			6.99	8.57	8.81	3.66	.63	3.60	3.89	4.06	3.80	3.32	2.99	2.38	-1.81
75	MISCELLANEOUS BASIC CHEM	453.1	477.0	546.9	607.9	592.3	584.8	638.2	709.6	788.0	868.1	948.4	1020.1	1132.9	1292.4
			5.28	14.66	11.14	-2.57	-1.26	9.13	11.19	11.04	10.17	9.26	7.56	5.22	6.81
76	VEGETABLE & ANIMAL OIL	258.7	292.8	321.5	363.5	372.1	391.8	428.4	469.6	514.5	562.3	612.5	664.3	769.5	894.8
			13.19	9.80	13.07	2.35	5.29	9.37	9.60	9.58	9.28	8.92	8.46	7.44	7.74
77	COATINGS	224.8	244.2	284.5	311.7	302.1	292.0	316.5	357.7	402.2	445.9	488.8	523.1	564.0	637.7
			8.60	16.52	9.56	-3.08	-3.34	8.37	13.02	12.44	10.88	9.61	7.02	3.52	7.10
78	MEDICINE	1033.2	1206.9	1293.0	1496.1	1449.5	1539.3	1628.8	1728.6	1840.2	1958.4	2078.4	2204.4	2438.7	2685.4
			16.81	7.14	15.71	-3.12	6.19	5.82	6.13	6.45	6.43	6.12	6.06	4.93	4.94
79	OTHER CHEMICAL PRODUCTS	727.5	830.0	864.5	978.5	957.7	985.6	1054.7	1135.8	1229.2	1329.2	1433.5	1539.1	1738.5	1961.4
			14.09	4.16	13.19	-2.13	2.91	7.02	7.69	8.22	8.14	7.85	7.37	6.15	6.52
80	PETROLEUM REFINERY PRODU	2376.7	2601.1	3006.9	3351.8	3322.3	3358.6	3677.4	4119.8	4618.2	5145.3	5691.8	6211.5	7118.1	8406.6
			9.44	15.60	11.47	-.88	1.09	9.49	12.03	12.10	11.41	10.62	9.13	6.86	8.98
81	COAL PRODUCTS	621.0	692.6	809.7	904.2	894.0	839.0	949.0	1120.4	1309.9	1507.4	1708.7	1878.5	2099.6	2465.4
			11.54	16.90	11.67	-1.12	-6.15	13.11	18.06	16.91	15.08	13.36	9.94	5.44	9.26
82	MISCELLANEOUS ANTISEPTIC	27.2	27.4	29.4	29.8	26.4	22.8	22.4	24.3	26.5	28.1	29.1	29.0	26.1	25.4
			.45	7.47	1.33	-11.26	-13.63	-1.83	8.68	8.87	6.16	3.53	-.20	-5.95	.58
83	CLAY PRODUCTS FOR BUILDI	226.0	235.0	263.1	279.4	262.5	243.8	250.8	276.1	303.8	328.6	348.8	360.6	357.5	373.2
			4.00	11.92	6.20	-6.02	-7.12	2.84	10.10	10.03	8.14	6.17	3.38	-.99	3.38
84	GLASSWARE	475.5	513.0	607.3	690.0	706.5	731.4	815.2	936.7	1076.0	1227.3	1388.7	1547.7	1840.9	2258.2
			7.88	18.40	13.62	2.39	3.52	11.46	14.90	14.88	14.06	13.15	11.45	8.76	11.36

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
85	POTTERY	266.2	278.4 4.58	307.6 10.48	339.7 10.44	341.8 .60	333.1 -2.53	353.2 6.04	389.7 10.33	430.3 10.42	471.2 9.49	510.3 8.31	543.0 6.40	585.4 3.43	647.9 5.70
86	CEMENT	442.2	449.2 1.58	498.7 11.02	532.9 6.64	510.6 -4.17	478.7 -6.26	498.5 4.14	550.4 10.41	606.9 10.27	659.5 8.66	705.4 6.97	735.9 4.32	746.2 .23	798.5 4.66
87	OTHERNON-METALLIC MINERA	1271.6	1339.4 5.33	1516.2 13.20	1656.9 9.27	1619.6 -2.25	1538.3 -5.02	1624.0 5.57	1839.3 13.26	2086.4 13.43	2329.2 11.64	2555.1 9.70	2726.0 6.69	2865.3 1.94	3189.0 6.95
88	PIG IRON	1344.9	1483.4 10.30	1716.4 15.70	1890.2 10.12	1839.7 -2.67	1665.5 -9.47	1847.1 10.91	2148.8 16.33	2474.3 15.15	2800.7 13.19	3118.3 11.34	3359.6 7.74	3584.8 2.93	4043.8 6.69
89	IRON & STEEL SCRAPS	56.6	39.9 -29.59	44.3 11.12	47.4 6.99	44.9 -5.14	38.2 -14.96	41.5 8.50	46.6 12.52	51.8 11.08	56.6 9.31	60.8 7.42	63.2 3.85	62.5 -.83	64.9 1.81
90	FERROALLOYS	209.7	236.5 12.75	278.0 17.58	311.2 11.54	307.6 -1.15	283.4 -7.89	316.8 11.81	369.9 16.76	427.7 15.63	486.8 13.82	545.7 12.09	592.9 8.65	646.2 4.05	741.8 7.53
91	STEEL INGOT	2453.1	2578.6 5.12	2893.5 12.20	3112.1 7.55	2970.0 -4.56	2640.0 -11.11	2844.1 7.73	3199.1 12.48	3565.9 11.47	3913.7 9.75	4229.9 8.08	4432.7 4.80	4495.2 .36	4784.5 3.47
92	HOT-ROLLED FLATES& SHEET	3537.1	3766.9 6.50	4283.9 13.73	4676.0 9.15	4543.5 -2.83	4112.8 -9.48	4486.1 9.07	5096.3 13.60	5742.2 12.67	6378.3 11.08	6982.0 9.47	7420.2 6.28	7759.6 1.91	8471.4 4.68
93	STEEL PIPE & TUBE	556.4	584.5 5.06	655.1 12.07	730.2 11.48	726.2 -.55	669.3 -7.84	752.8 12.48	861.4 14.43	971.1 12.73	1083.7 11.60	1194.9 10.25	1284.3 7.48	1389.9 3.79	1534.0 4.46
94	COLD-ROLLED & COATED STE	1789.5	1890.9 5.67	2114.8 11.84	2279.5 7.78	2183.0 -4.23	1990.0 -8.84	2154.3 8.25	2426.7 12.65	2708.0 11.59	2978.9 10.00	3231.7 8.49	3408.7 5.48	3524.6 1.36	3811.5 4.28
95	CAST & FORGE IRON	1410.6	1548.7 9.79	1772.1 14.43	1943.5 9.67	1843.6 -5.14	1628.5 -11.66	1733.2 6.43	2100.8 21.21	2547.3 21.25	2991.9 17.45	3417.5 14.22	3716.3 8.74	3865.8 1.19	4463.4 10.26
96	NONFERROUS METAL INGOTS	997.9	936.9 -6.12	1083.8 15.68	1127.9 4.07	1026.0 -9.03	901.1 -12.18	956.1 6.11	1068.4 11.75	1180.4 10.48	1280.8 8.51	1366.1 6.82	1415.8 3.49	1410.8 -.44	1497.0 3.78
97	COPPER BRASS PRODUCTS	298.2	311.6 4.50	348.7 11.89	360.4 3.37	328.5 -8.86	287.1 -12.59	299.5 4.31	331.9 10.81	364.8 9.93	393.7 7.91	417.4 6.01	427.8 2.51	414.2 -1.98	426.6 2.26
98	ALUMINUM EXTRUDED PRODUC	255.4	284.1 11.25	346.8 22.09	392.2 13.08	389.2 -.77	377.7 -2.95	425.2 12.57	505.0 18.77	596.6 18.14	693.5 16.24	793.7 14.44	881.3 11.03	1005.3 6.36	1218.0 11.19
99	OTHER NONFERROUS METAL P	445.6	499.5 12.09	573.3 14.79	619.0 7.96	583.1 -5.80	530.5 -9.01	566.7 6.81	649.7 14.65	742.4 14.27	832.1 12.09	917.4 10.25	975.1 6.29	1002.6 .89	1111.8 6.83
100	STRUCTURAL METAL PRODUCT	2183.8	2243.0 2.71	2654.0 18.32	2982.5 12.38	2924.2 -1.95	2789.1 -4.62	3083.7 10.56	3609.0 17.03	4200.5 16.39	4796.6 14.19	5372.8 12.01	5841.6 8.72	6379.9 3.99	7430.3 9.41
101	OTHER METAL PRODUCTS	1600.8	1699.1 6.14	1965.4 15.51	2065.4 5.08	1939.5 -6.26	1835.2 -5.38	1983.4 8.08	2215.5 11.70	2428.7 9.62	2633.5 8.43	2824.0 7.23	2959.4 4.79	3055.5 1.35	3321.2 4.95
102	POWER GENERATING MACHINA	883.9	1002.5 13.42	1073.9 7.13	1136.4 5.82	1070.9 -5.76	968.3 -9.58	1009.6 4.26	1129.3 11.86	1267.5 12.24	1406.1 10.93	1542.6 9.71	1630.6 5.70	1661.4 .49	1799.1 4.97
103	MACHINE TOOLS METALWORKI	908.7	742.8 -18.26	853.8 14.94	945.9 10.79	744.2 -21.33	375.7 -49.51	319.9 -14.86	595.0 85.99	888.8 49.39	1091.8 22.84	1213.3 11.12	1216.4 .26	905.4 -16.23	925.0 10.30
104	INDUSTRIAL MACHINERY	3351.0	3729.5 11.30	4119.7 10.46	4391.8 6.60	4174.7 -4.94	3475.8 -16.74	3509.3 .96	4241.7 20.87	5276.6 24.40	6336.0 20.08	7277.8 14.86	7807.1 7.27	7593.6 -2.46	8338.2 7.84
105	GENERAL INDUSTRIAL MACHI	1502.0	1806.8 20.30	2065.0 14.29	2364.9 14.53	2300.8 -2.71	1857.1 -19.28	1935.4 4.22	2624.4 35.60	3547.9 35.19	4505.5 26.99	5455.9 21.09	6161.0 12.92	6420.1 .43	7865.1 15.58

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
106	OFFICE MACHINERY	342.7	332.4 -3.02	713.0 114.52	828.4 16.18	830.7 .28	814.4 -1.96	1001.0 22.91	1167.8 16.67	1325.9 13.53	1534.8 15.76	1769.7 15.31	1999.4 12.98	2514.7 12.45	3265.3 14.48
107	HOUSEHOLD MACHINERY	323.7	338.1 4.44	380.5 12.54	424.9 11.67	371.4 -12.50	390.5 5.14	420.0 7.56	444.8 5.90	468.4 5.31	491.5 4.93	511.4 4.04	528.3 3.32	544.2 1.33	564.3 1.35
108	PARTS OF MACHINERY	1014.1	1197.7 18.11	1426.0 19.06	1601.1 12.28	1546.5 -3.41	1346.3 -12.95	1430.0 6.22	1781.3 24.56	2228.1 25.08	2684.6 20.49	3138.4 16.90	3472.2 10.64	3628.9 1.12	4327.2 12.72
109	STRONG ELECTRIC MACHINER	1427.7	1628.9 14.09	1864.9 14.49	1959.8 5.09	1735.4 -11.45	1405.4 -19.02	1490.0 6.02	1887.3 26.67	2337.2 23.83	2744.9 17.45	3093.5 12.70	3286.8 6.25	3193.2 -2.35	3554.5 9.13
110	HOUSEHOLD ELECTRICAL MAC	2397.1	2415.8 .78	3084.9 27.69	3266.5 5.89	3227.8 -1.19	3149.9 -2.41	3334.3 5.86	3512.9 5.35	3697.2 5.25	3877.3 4.87	4049.3 4.44	4192.4 3.53	4432.7 2.66	4549.5 -.00
111	OTHER WEAK ELECTRICAL AP	3805.0	4125.9 8.43	4795.7 16.23	5100.2 6.26	4674.5 -8.35	4111.8 -12.04	4487.4 9.14	5277.7 17.61	6106.0 15.69	6878.0 12.64	7572.6 10.10	8025.4 5.98	8310.3 1.43	9354.6 7.46
112	SHIPS & BOATS	1060.9	1316.0 24.04	1506.9 14.51	1626.7 7.95	1623.1 -.22	1634.7 .72	1746.1 6.81	1873.9 7.32	2006.1 7.06	2152.2 7.29	2354.5 9.40	2553.4 8.45	2944.8 7.38	3380.2 6.22
113	RAILWAY VEHICLES	329.6	344.7 4.56	380.1 10.27	382.7 .71	339.3 -11.35	333.0 -1.85	339.8 2.02	350.1 3.03	358.2 2.31	363.4 1.45	365.7 .64	365.3 -.10	352.1 -1.97	349.4 -.07
114	PASSENGER MOTOR CAR	4430.0	5087.9 14.85	5960.2 17.14	6514.6 9.30	6102.7 -6.32	5759.4 -5.62	6135.8 6.54	6946.4 13.21	7865.8 13.24	8781.2 11.64	9718.4 10.67	10396.8 6.98	10820.2 1.41	12000.6 6.73
115	REPAIR OF PASSENGER MOTO	1008.9	1085.1 7.55	1201.7 10.75	1259.8 8.17	1265.6 -2.68	1259.0 -.48	1331.7 5.77	1433.3 7.64	1534.7 7.07	1629.5 6.17	1716.3 5.33	1784.9 4.00	1865.1 2.04	2009.2 4.31
116	MOTORCYCLES & BICYCLES	571.0	779.5 36.53	747.7 -4.08	856.7 14.57	858.1 .17	906.3 5.65	993.2 9.35	1057.6 6.49	1053.5 -.39	1114.2 1.85	1142.0 2.50	1153.9 1.04	1164.4 1.15	1158.6 -.45
117	AIRCRAFTS	120.3	115.5 -3.97	119.3 3.29	117.4 -1.59	116.0 -1.25	119.4 2.93	123.4 3.40	127.9 3.60	132.3 3.44	137.0 3.57	142.0 3.63	146.8 3.43	156.0 3.09	167.2 3.52
118	OTHER TRANSPORTATION	103.5	130.0 25.64	154.8 19.09	161.4 4.22	163.6 1.39	169.1 3.34	184.1 8.88	211.8 15.08	247.0 16.59	283.9 14.94	322.6 13.64	361.1 11.93	433.5 9.32	547.0 13.32
119	PRECISION MACHINERY	387.9	397.9 2.56	461.4 15.98	505.0 9.45	468.8 -7.17	413.6 -11.77	443.1 7.12	522.5 17.92	604.6 15.71	677.9 12.12	742.9 9.59	783.8 5.50	795.8 .38	882.7 6.89
120	PHOTOGRAPHIC & OPTICAL I	472.9	420.0 -11.18	595.2 41.70	649.2 9.07	639.5 -1.45	606.0 -5.28	652.5 7.67	706.1 8.21	756.8 7.18	808.1 6.78	858.8 6.27	902.1 5.04	978.8 4.16	1037.2 1.48
121	WATCHES & CLOCKS	241.8	267.0 10.45	306.0 14.58	344.2 12.51	307.2 -10.76	329.6 7.29	359.6 9.10	379.3 5.49	398.2 4.98	416.6 4.61	434.5 4.31	453.7 4.42	484.0 3.08	501.4 .29
122	OTHER MANUFACTURING GOOD	2221.3	2121.7 -4.49	2656.3 25.20	2978.5 12.13	3076.6 3.29	3214.1 4.47	3580.5 11.40	4026.7 12.46	4500.7 11.77	4992.6 10.93	5506.6 10.30	6002.4 9.00	6914.1 7.12	8139.7 8.85
123	HOUSING CONSTRUCTION	5137.9	4694.9 -8.62	5593.9 19.40	6263.5 11.97	6274.5 .18	6571.2 4.73	6953.8 5.82	7401.0 6.43	7847.7 6.04	8276.7 5.47	8675.2 4.81	9091.2 4.80	9796.8 3.49	10484.9 3.48
124	CONSTRUCTION NOT FOR RES	4335.7	4282.0 -1.24	4653.9 8.68	4941.5 6.18	4529.3 -8.34	3683.4 -18.68	3605.2 -2.12	4197.0 16.41	4935.0 17.58	5612.1 13.72	6157.9 9.73	6401.0 3.95	5903.6 -5.30	6034.7 4.39
125	BUILDING REPAIRING	1388.8	1510.0 8.72	1708.3 13.13	1891.5 10.73	1956.3 3.42	2012.7 2.88	2164.8 7.56	2355.3 8.80	2557.7 8.59	2762.8 8.02	2966.2 7.36	3156.6 6.42	3485.1 4.82	3869.3 5.90
126	PUBLIC UTILITY CONSTRUCT	2162.7	2312.7 6.94	2420.3 4.66	2581.7 6.67	2687.3 4.09	2736.6 1.84	2843.1 3.89	2978.4 4.76	3124.7 4.91	3289.2 5.26	3462.4 5.27	3627.1 4.76	3905.0 3.62	4221.0 4.15

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
127	OTHER CONSTRUCTION	3333.6	3859.5	4351.6	4555.3	4101.3	3446.7	3476.5	4160.6	5006.8	5793.8	6456.2	6811.3	6504.4	6968.5
			15.73	12.30	4.63	-9.97	-15.91	.87	19.61	20.34	15.72	11.47	5.47	-3.51	6.76
128	ELECTRICITY	1869.8	2008.5	2256.4	2479.5	2482.5	2469.4	2658.2	2926.3	3218.0	3513.2	3804.6	4060.0	4445.4	4993.6
			7.43	12.33	9.89	.12	-.53	7.65	10.08	9.97	9.17	8.30	6.71	4.40	6.32
129	GAS	242.6	273.4	309.9	354.7	380.9	380.6	412.9	455.3	500.0	544.9	589.4	629.3	698.6	763.0
			12.60	13.34	14.47	7.38	-.07	8.48	10.27	9.83	8.98	8.16	6.77	5.03	6.23
130	WATER-SUPPLY,SEWERAGE	528.8	577.7	645.1	676.4	663.4	698.3	741.3	797.8	861.5	928.6	997.4	1065.3	1181.9	1339.1
			9.25	11.67	4.85	-1.93	5.26	6.17	7.62	7.98	7.78	7.41	6.82	5.15	6.79
131	WHOLESALE TRADE	9254.3	9963.9	11221.6	12334.2	12368.6	12022.3	12886.4	14357.5	15954.5	17516.0	19000.8	20191.8	21703.8	24246.0
			7.67	12.62	9.92	.28	-2.80	7.20	11.40	11.12	9.79	8.48	6.27	3.36	6.49
132	RETAIL TRADE	4943.6	5283.8	5896.1	6559.2	6587.1	6944.0	7437.4	7973.2	8512.8	9040.7	9546.6	10050.3	10932.3	11892.3
			6.88	11.59	11.25	.42	5.42	7.10	7.20	6.77	6.20	5.60	5.28	4.05	4.37
133	FINANCIAL BUSINESS	3619.6	3815.4	4170.0	4432.2	4368.9	4294.1	4517.2	4858.5	5217.1	5559.4	5877.3	6132.4	6465.0	6954.3
			5.41	9.30	6.29	-1.43	-1.71	5.20	7.56	7.38	6.56	5.72	4.34	2.45	4.07
134	INSURANCE BUSINESS	1288.4	1333.4	1429.6	1544.5	1579.6	1596.1	1702.7	1826.6	1951.9	2075.8	2195.9	2310.0	2535.1	2771.1
			3.49	7.21	8.04	2.27	1.17	6.54	7.27	6.86	6.35	5.79	5.19	4.59	4.54
135	REAL ESTATE AGENCY	1360.4	1434.4	1583.9	1702.6	1667.8	1642.9	1729.5	1864.3	2006.8	2143.1	2269.4	2369.7	2486.2	2675.9
			5.45	10.42	7.50	-2.04	-1.50	5.28	7.79	7.64	6.60	5.89	4.42	2.16	4.20
136	RENT FOR HOUSE	4545.9	4799.3	5302.3	5819.8	6076.0	6174.5	6452.7	6742.3	7011.2	7253.9	7462.4	7640.6	7917.3	8106.8
			5.57	10.48	9.76	4.40	1.62	4.51	4.49	3.99	3.46	2.87	2.39	1.50	1.19
137	NATIONAL RAILROAD	955.0	993.0	1102.9	1177.0	1100.0	1141.2	1198.3	1260.6	1319.1	1370.6	1413.3	1452.2	1488.0	1542.2
			3.97	11.07	6.71	-6.54	3.75	5.00	5.20	4.64	3.90	3.12	2.75	1.04	1.68
138	LOCAL RAILROAD	456.4	480.3	549.1	604.0	559.1	608.7	651.0	689.3	724.3	755.2	781.2	808.7	841.4	879.3
			5.22	14.34	10.00	-7.44	8.87	6.95	5.89	5.07	4.26	3.45	3.52	1.74	2.24
139	ROAD PASSENGER TRANSPORT	1188.8	1292.3	1502.4	1682.0	1589.0	1755.6	1895.5	2019.6	2134.1	2237.6	2327.7	2422.5	2550.1	2664.5
			8.70	16.26	11.95	-5.53	10.49	7.97	6.55	5.67	4.85	4.03	4.07	2.31	2.58
140	ROAD FREIGHT TRANSPORT	1312.6	1489.6	1767.8	2039.1	2139.6	2216.6	2501.1	2908.6	3383.0	3903.2	4461.0	5007.3	6008.2	7476.7
			13.41	18.76	15.35	4.93	3.60	12.83	16.29	16.31	15.38	14.29	12.25	9.21	12.27
141	ROAD TRANSPORTATION FACI	163.1	189.8	229.3	271.4	293.3	322.1	370.4	431.5	501.8	580.3	666.7	758.4	949.1	1218.2
			16.39	20.79	18.37	8.06	9.82	15.00	16.49	16.29	15.65	14.89	13.75	11.60	13.63
142	SEA TRANSPORT	945.6	1212.4	1522.9	1722.6	1742.8	1659.5	1842.4	1961.7	2059.8	2181.1	2335.1	2485.2	2832.6	3009.9
			28.19	25.61	13.11	1.17	-4.78	11.02	6.47	5.00	5.89	7.06	6.43	7.07	-.21
143	INLAND WATER TRANSPORT	631.9	702.4	801.1	857.5	833.0	778.0	828.6	870.6	908.7	947.4	986.0	1011.5	1039.7	1048.4
			11.15	14.06	7.05	-2.86	-6.60	6.50	5.07	4.38	4.25	4.08	2.59	1.35	-.90
144	AIR TRANSPORT	260.4	293.5	362.8	421.7	406.5	445.9	502.7	570.1	648.3	737.9	838.9	950.0	1174.8	1471.5
			12.72	23.63	16.23	-3.60	9.69	12.73	13.42	13.71	13.82	13.69	13.25	10.97	11.80
145	OTHER TRANSPORT	58.0	65.0	77.9	89.5	91.5	99.8	111.7	123.8	136.6	150.8	166.4	183.5	219.4	261.7
			12.13	19.77	14.68	2.31	9.09	11.92	10.77	10.36	10.39	10.35	10.26	9.23	8.82
146	STORAGE	210.8	228.6	263.8	290.1	276.2	296.9	320.1	343.7	367.3	389.8	410.4	428.8	450.4	480.3
			8.45	15.40	9.99	-4.81	7.51	7.82	7.37	6.86	6.14	5.28	4.47	2.28	3.34
147	TELECOMMUNICATION	1258.6	1303.0	1423.5	1521.1	1475.2	1425.7	1485.8	1600.7	1729.6	1858.8	1983.8	2092.1	2245.7	2474.8
			3.52	9.25	6.86	-3.02	-3.35	4.21	7.73	8.05	7.47	6.73	5.46	3.34	5.52

TABLE 8 - 7(CONTINUED) : FORECAST OF OUTPUT (IN 1970 BILLION YEN)

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
148	GOVERNMENTAL SERVICES	2250.9	2536.1	2789.7	2652.1	2765.5	2954.4	3081.5	3214.0	3352.1	3496.3	3646.7	3803.4	4137.6	4501.1
			12.67	10.00	-4.93	4.28	6.83	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
149	EDUCATION	2310.3	2589.0	2886.6	2821.4	2775.1	2999.6	3112.6	3222.6	3335.8	3450.2	3563.8	3686.0	3915.3	4169.6
			12.06	11.49	-2.26	-1.64	8.09	3.77	3.53	3.51	3.43	3.29	3.43	3.02	3.23
150	MEDICAL,HEALTH SERVICE	2620.3	3025.1	3034.6	3363.1	3152.1	3029.1	2963.6	2941.9	2937.5	2934.7	2921.2	2896.6	2794.3	2659.3
			15.45	.31	10.82	-6.27	-3.90	-2.16	-.73	-.15	-.10	-.46	-.84	-2.13	-2.44
151	OTHER PUBLIC SERVICES	561.2	605.5	692.4	768.2	741.5	793.0	858.0	929.2	1000.4	1069.1	1133.8	1199.6	1309.9	1436.3
			7.89	14.37	10.94	-3.48	6.95	8.19	8.30	7.66	6.86	6.05	5.80	4.25	4.78
152	SERVICE FOR BUSINESS ENT	2293.8	2406.5	2674.2	2868.1	2794.3	2733.0	2866.0	3092.4	3337.9	3574.4	3792.7	3963.6	4147.0	4459.3
			4.91	11.13	7.25	-2.58	-2.19	4.86	7.90	7.94	7.09	6.11	4.51	1.98	4.21
153	AMUSEMENT	2197.8	2332.1	2611.3	2797.7	2897.9	2965.8	3079.9	3205.0	3323.3	3430.4	3521.8	3595.4	3690.5	3772.4
			6.11	11.97	7.14	3.58	2.34	3.85	4.06	3.69	3.22	2.66	2.09	1.09	1.10
154	RESTAURANT	2701.7	2861.5	3012.0	3183.0	3233.7	3354.0	3486.2	3623.1	3764.7	3909.3	4054.3	4203.9	4494.8	4788.2
			5.91	5.26	5.68	1.59	3.72	3.94	3.92	3.91	3.84	3.71	3.69	3.29	3.19
155	OTHER PERSONAL SERVICES	3313.1	3488.8	3765.5	4050.2	4129.4	4143.5	4360.0	4639.0	4926.2	5204.8	5469.2	5698.5	6071.2	6518.4
			5.30	7.93	7.56	1.96	.34	5.23	6.40	6.19	5.66	5.08	4.19	3.03	3.81
156	NOT CLASSIFIED	3509.6	3726.0	4169.4	4484.4	4436.8	4428.0	4737.5	5154.0	5600.1	6050.7	6492.0	6874.4	7437.6	8242.2
			6.17	11.90	7.55	-1.06	-.20	6.99	8.79	8.66	8.05	7.29	5.89	3.82	5.52

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TABLE 6 - E : FORECAST OF NOMINAL WAGE PER HOUR

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	AGRICULTURE, FORESTRY AN	332.5	396.9 19.35	438.7 10.54	470.0 7.14	507.0 7.87	545.2 7.53	579.8 6.36	618.2 6.62	665.7 7.67	721.9 8.45	787.5 9.08	862.4 9.52	1043.9 10.16	1277.9 10.67
2	MINING	410.6	459.0 11.78	520.3 13.35	585.7 12.57	663.2 13.24	743.4 12.09	828.7 11.46	930.4 12.28	1049.1 12.76	1181.3 12.59	1326.5 12.29	1485.6 12.00	1845.6 11.27	2279.5 11.17
3	FOODS AND TOBACCO	342.2	389.2 13.73	446.8 14.81	501.4 12.22	564.0 12.48	663.3 17.61	778.3 17.34	882.3 13.36	983.8 11.51	1093.0 11.09	1215.8 11.24	1355.9 11.52	1718.5 13.02	2193.9 12.65
4	TEXTILE	262.5	303.5 15.61	359.8 18.56	413.9 15.04	479.8 15.93	547.1 14.02	640.2 17.01	742.1 15.92	847.5 14.19	967.4 14.16	1105.1 14.23	1263.2 14.31	1670.9 15.22	2214.2 14.95
5	PULP AND PAPER	382.1	399.3 4.51	458.4 14.79	504.9 10.15	569.2 12.72	637.0 11.92	706.4 10.89	784.3 11.03	868.8 10.77	960.4 10.55	1059.9 10.36	1167.9 10.19	1420.4 10.36	1723.4 10.02
6	CHEMICAL PRODUCTS	489.5	572.0 16.85	666.0 16.45	773.9 16.20	900.5 16.36	1048.3 16.40	1220.6 16.44	1421.4 16.45	1657.1 16.58	1932.0 16.59	2251.8 16.55	2623.3 16.50	3553.4 16.34	4796.7 16.14
7	PRIMARY METALS	501.8	588.7 17.33	683.4 16.07	779.6 14.08	883.6 13.34	986.7 11.66	1071.5 8.59	1224.7 14.31	1419.5 15.90	1640.0 15.53	1887.2 15.08	2164.2 14.68	2777.2 12.75	3547.0 13.36
8	METAL PRODUCTS	369.1	477.3 29.31	516.2 8.16	594.6 15.19	667.9 12.32	740.9 10.93	814.6 9.96	921.8 13.15	1052.7 14.21	1199.0 13.89	1362.3 13.62	1542.5 13.23	1942.1 11.83	2428.9 12.04
9	NON ELECTRICAL MACHINERY	418.2	477.6 14.19	540.3 13.14	607.5 12.44	681.0 12.10	762.1 11.91	850.5 11.60	949.2 11.60	1059.6 11.63	1182.7 11.62	1320.5 11.65	1475.5 11.74	1848.1 11.92	2322.1 12.12
10	ELECTRICAL MACHINERY	354.0	425.7 20.26	499.4 17.32	588.0 17.74	691.8 17.64	816.0 17.96	963.2 18.04	1144.1 18.78	1369.7 19.72	1640.5 19.77	1973.9 20.32	2375.9 20.37	3471.4 20.87	5118.6 21.53
11	TRANSPORTATION EQUIPMENT	430.0	553.9 28.82	632.1 14.11	712.2 12.68	789.5 10.87	847.6 7.36	916.1 8.08	1009.9 10.23	1125.6 11.46	1253.0 11.32	1391.6 11.05	1549.1 11.32	1867.5 9.23	2230.9 9.53
12	MISCELLANEOUS MANUFACTURI	341.4	404.3 18.41	442.6 9.50	513.1 15.92	559.1 8.95	625.3 11.84	683.6 9.30	768.8 12.50	853.6 11.03	957.1 12.13	1062.3 11.00	1186.0 11.64	1461.7 11.14	1805.3 11.37
13	CONSTRUCTION	360.4	416.9 15.69	468.8 12.43	515.8 10.03	561.3 8.82	606.9 8.14	654.1 7.77	703.7 7.58	757.7 7.69	815.8 7.67	876.1 7.63	944.8 7.84	1093.4 7.56	1264.8 7.56
14	ELECTRICITY, GAS AND WAT	606.0	721.6 19.12	792.1 9.77	886.4 11.76	971.0 9.54	1066.2 9.81	1161.6 8.95	1264.5 8.86	1378.8 9.04	1500.7 8.84	1631.9 8.74	1772.2 8.60	2085.4 8.41	2447.1 8.32
15	WHOLE SALE AND RETAIL TR	369.7	436.0 17.94	495.1 13.56	556.0 12.28	620.9 11.68	690.8 11.27	767.2 11.06	850.8 10.90	944.0 10.95	1046.8 10.89	1159.9 10.81	1284.6 10.74	1573.3 10.64	1924.1 10.58
16	REAL ESTATE	544.8	585.3 7.43	662.8 13.24	711.2 7.31	779.2 9.55	841.3 7.97	912.7 8.49	985.9 8.02	1070.4 8.57	1160.2 8.38	1258.2 8.45	1363.8 8.39	1602.7 8.38	1883.2 8.42
17	TRANSPORT AND COMMUNICAT	442.7	516.5 16.67	574.7 11.28	640.4 11.43	710.7 10.98	786.5 10.67	869.2 10.51	959.3 10.36	1060.2 10.52	1170.6 10.42	1292.1 10.38	1425.6 10.33	1734.9 10.29	2107.3 10.19
18	FINANCE AND INSURANCE	511.5	611.0 19.45	676.4 10.71	751.9 11.16	838.6 11.53	930.9 11.00	1034.7 11.15	1150.2 11.16	1279.7 11.25	1422.7 11.18	1581.5 11.16	1757.8 11.15	2175.5 11.29	2694.7 11.28
19	OTHER SERVICES	343.5	386.3 12.44	432.4 11.93	482.7 11.63	539.5 11.78	602.9 11.75	672.8 11.59	751.0 11.63	839.5 11.78	939.4 11.89	1052.0 11.98	1178.7 12.05	1481.8 12.14	1865.8 12.25

Constant manhours per employee are assumed to calculate nominal wage for sectors 1 and 19 because the model does not forecast manhours per employee for these sectors. The constant manhours are 100 for Agriculture and 170 for Other Services. These numbers are from Statistical Year Book, 1972, published by the Japanese Government.

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TABLE B - 5 : FORECAST OF PRODUCTIVITY (YEN PER MANHOUR)

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	AGRICULTURE, FORESTRY AN	567.0	601.6	630.9	657.6	684.3	711.4	737.6	763.3	789.1	814.7	840.2	865.4	914.3	961.4
			6.11	4.88	4.24	4.06	3.96	3.69	3.48	3.38	3.25	3.13	2.99	2.72	2.49
2	MINING	2071.4	2003.8	2460.0	2666.4	3030.2	3352.0	3676.3	4004.7	4334.2	4659.5	4979.1	5292.3	5895.5	6465.3
			-3.26	22.77	8.39	13.64	10.62	9.68	8.93	8.23	7.51	6.86	6.29	5.31	4.54
3	FOODS AND TOBACCO	3948.1	4265.6	4643.1	5182.3	5447.1	5810.7	6297.4	6861.7	7505.3	8227.3	9022.7	9899.6	11860.5	14213.0
			8.04	8.85	11.61	5.11	6.67	8.38	8.96	9.38	9.62	9.67	9.72	9.31	9.57
4	TEXTILE	1204.7	1305.6	1424.2	1524.8	1633.8	1744.6	1871.3	1987.7	2092.0	2195.7	2300.5	2407.4	2637.9	2868.6
			8.37	9.08	7.06	7.15	6.78	7.26	6.22	5.25	4.95	4.76	4.64	4.67	4.08
5	PULP AND PAPER	5223.9	5546.3	6105.2	6488.0	6945.7	7432.4	7906.3	8335.3	8720.1	9083.7	9438.3	9787.3	10503.9	11179.0
			6.17	10.08	6.27	7.05	7.01	6.38	5.43	4.62	4.17	3.90	3.70	3.58	2.95
6	CHEMICAL PRODUCTS	4573.3	4894.5	5298.5	5712.5	6124.5	6532.0	6932.1	7321.9	7700.5	8066.7	8419.6	8758.6	9393.2	9968.2
			7.02	8.25	7.81	7.21	6.65	6.12	5.62	5.17	4.76	4.37	4.03	3.41	2.89
7	PRIMARY METALS	7172.4	7608.1	8249.1	8839.5	9403.0	9921.3	10352.1	10909.8	11513.5	12104.7	12675.4	13228.7	14235.1	15265.7
			6.07	8.42	7.16	6.37	5.51	4.34	5.39	5.54	5.13	4.71	4.37	3.52	3.37
8	METAL PRODUCTS	1224.1	1413.4	1542.8	1682.5	1817.7	1956.5	2098.7	2256.4	2417.1	2574.1	2733.4	2900.5	3270.7	3692.7
			15.46	9.15	9.06	8.04	7.64	7.27	7.51	7.12	6.50	6.19	6.11	6.22	6.23
9	NON ELECTRICAL MACHINERY	3041.2	3511.5	3963.3	4296.9	4667.6	5070.8	5484.0	5830.1	6111.8	6358.3	6624.9	6932.8	7676.3	8370.3
			15.46	12.87	8.42	8.63	8.64	8.15	6.31	4.83	4.03	4.19	4.65	5.31	3.99
10	ELECTRICAL MACHINERY	2467.6	2659.1	2925.8	3172.4	3425.5	3681.7	3940.8	4203.6	4468.1	4728.6	4988.1	5244.0	5751.8	6247.6
			7.76	10.03	8.43	7.98	7.48	7.04	6.67	6.29	5.83	5.49	5.13	4.59	4.08
11	TRANSPORTATION EQUIPMENT	3446.1	3829.9	4036.3	4181.3	4296.9	4391.4	4485.5	4569.9	4642.1	4702.1	4756.2	4810.3	4903.0	4977.1
			11.14	5.39	3.59	2.77	2.20	2.14	1.88	1.58	1.29	1.15	1.14	.96	.67
12	MISCELLANEOUS MANUFACTURI	1597.2	1705.1	1839.2	1995.5	2128.2	2277.5	2418.9	2577.6	2729.9	2888.4	3041.8	3201.5	3521.9	3845.5
			6.76	7.87	8.50	6.65	7.01	6.21	6.56	5.91	5.81	5.31	5.25	4.83	4.42
13	CONSTRUCTION	1728.5	1862.2	1927.6	1958.3	1980.6	1997.8	2013.5	2028.4	2042.7	2055.9	2067.9	2079.0	2099.9	2119.3
			7.74	3.51	1.60	1.14	.87	.78	.74	.71	.64	.59	.54	.49	.44
14	ELECTRICITY, GAS AND WAT	4541.4	5067.1	5425.3	5818.5	6180.5	6560.2	6928.3	7301.1	7680.0	8055.0	8428.5	8800.1	9543.8	10284.9
			11.57	7.07	7.25	6.22	6.14	5.61	5.38	5.19	4.88	4.64	4.41	4.05	3.73
15	WHOLE SALE AND RETAIL TR	636.5	702.6	765.6	830.2	897.2	968.8	1044.2	1122.7	1203.8	1287.4	1373.9	1463.4	1653.2	1858.9
			10.38	8.98	8.43	8.08	7.97	7.79	7.51	7.22	6.95	6.72	6.51	6.22	5.97
16	REAL ESTATE	10006.6	10191.4	10446.3	10658.3	10880.4	11094.3	11306.6	11512.8	11718.7	11922.4	12125.4	12328.1	12736.8	13152.6
			1.85	2.50	2.03	2.08	1.97	1.91	1.82	1.79	1.74	1.70	1.67	1.64	1.62
17	TRANSPORT AND COMMUNICAT	997.2	1054.3	1117.1	1181.3	1247.1	1315.0	1384.0	1453.4	1523.3	1593.9	1665.3	1737.3	1883.5	2031.6
			5.72	5.96	5.74	5.57	5.45	5.25	5.01	4.81	4.63	4.47	4.32	4.06	3.79
18	FINANCE AND INSURANCE	2239.5	2268.8	2462.0	2562.6	2713.2	2848.0	2983.9	3120.6	3258.1	3395.3	3532.5	3669.5	3943.6	4215.9
			1.31	8.52	4.09	5.88	4.97	4.77	4.58	4.41	4.21	4.04	3.88	3.61	3.32
19	OTHER SERVICES	980.6	1023.8	1065.4	1110.3	1154.5	1199.7	1245.8	1293.2	1342.2	1392.2	1443.2	1494.9	1599.7	1705.7
			4.40	4.07	4.21	3.99	3.91	3.84	3.81	3.78	3.73	3.66	3.58	3.40	3.22

For sectors 1 and 19, the same manhours per employee are used as those in hourly wage calculation.

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TABLE B - 10 : FORECAST OF PRICE

IO-NO TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1 GRAIN	100.0	104.7	110.0	115.1	120.9	125.0	128.5	132.7	137.7	143.7	150.8	158.9	178.8	204.6
		4.68	5.05	4.69	5.04	3.40	2.74	3.27	3.79	4.37	4.91	5.40	6.28	7.22
2 OTHER CROPS	100.0	98.5	101.3	105.7	111.0	115.9	121.0	126.7	133.0	139.9	147.4	155.5	173.7	194.9
		-1.49	2.86	4.30	5.01	4.45	4.35	4.72	4.97	5.19	5.36	5.51	5.74	6.02
3 FRUITS	100.0	102.4	107.5	113.0	119.4	124.4	128.8	134.3	140.8	148.5	157.5	167.9	193.4	226.7
		2.37	4.96	5.13	5.70	4.14	3.58	4.24	4.84	5.48	6.07	6.60	7.56	8.54
4 OTHER CROPS FOR INDUSTRI	100.0	105.8	111.7	117.5	123.5	128.9	134.0	139.1	144.4	149.9	155.8	162.2	176.5	193.7
		5.80	5.59	5.20	5.05	4.38	3.94	3.84	3.80	3.84	3.93	4.06	4.41	4.91
5 CROP FOR FIBER INDUSTRIA	100.0	108.7	116.0	120.7	127.9	127.8	129.2	134.6	140.8	148.3	156.9	166.8	190.4	221.0
		8.67	6.74	4.06	5.99	-.08	1.05	4.19	4.62	5.32	5.83	6.25	7.07	8.16
6 LIVE STOCKS,POULTRY	100.0	105.5	109.0	113.2	117.3	121.0	124.5	128.2	132.2	136.4	141.2	146.4	158.7	174.3
		5.53	3.31	3.83	3.58	3.18	2.94	2.97	3.07	3.23	3.45	3.70	4.28	4.98
7 LIVE STOCKS,POULTRY FOR	100.0	87.6	121.3	127.5	134.0	140.9	148.1	155.7	163.7	172.1	180.9	190.2	210.2	232.3
		-12.37	38.39	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13
8 SERICULTURE	100.0	96.0	98.9	102.8	108.6	112.1	115.1	119.7	125.5	132.8	141.4	151.3	175.8	207.6
		-4.01	2.87	4.10	5.61	3.23	2.67	4.00	4.92	5.77	6.47	7.05	8.01	8.96
9 AGRICULTURAL SERVICES	100.0	104.2	108.0	112.0	116.3	120.3	124.1	128.1	132.4	137.0	142.0	147.5	160.1	175.4
		4.17	3.69	3.73	3.78	3.43	3.20	3.25	3.34	3.48	3.66	3.85	4.30	4.83
10 FORESTRY	100.0	104.5	110.3	115.8	122.0	125.6	128.3	132.0	136.5	142.1	148.7	156.3	175.0	199.1
		4.46	5.61	4.96	5.33	3.01	2.13	2.85	3.44	4.07	4.65	5.15	6.04	6.93
11 CHARCOAL & FIREWOOD	100.0	104.4	108.2	113.0	118.6	122.6	126.1	130.2	135.1	141.0	147.7	155.5	174.5	198.6
		4.43	3.61	4.46	4.90	3.44	2.80	3.30	3.77	4.30	4.81	5.28	6.12	6.93
12 LOGS	100.0	101.1	102.9	105.2	108.0	111.0	114.1	117.6	121.4	125.6	130.5	136.0	149.3	166.4
		1.13	1.76	2.21	2.71	2.77	2.80	2.99	3.24	3.53	3.87	4.22	4.97	5.77
13 HUNTINGS	100.0	115.7	130.6	144.5	157.7	169.6	180.6	191.0	201.0	210.9	220.7	230.6	251.0	273.1
		15.70	12.85	10.63	9.15	7.58	6.45	5.77	5.27	4.91	4.65	4.47	4.30	4.35
14 FISHERIES	100.0	105.0	110.6	115.7	121.7	124.9	127.4	131.4	136.5	142.8	150.2	158.6	178.5	203.4
		4.97	5.35	4.62	5.15	2.68	2.01	3.11	3.91	4.62	5.16	5.59	6.23	7.04
15 WHALING	100.0	103.1	109.2	115.2	121.6	126.1	129.7	133.9	138.9	144.7	151.5	159.1	177.3	200.1
		3.08	5.93	5.50	5.54	3.70	2.87	3.26	3.69	4.21	4.67	5.07	5.71	6.47
16 INLAND WATER FISHERIES	100.0	109.8	117.3	125.2	132.9	139.9	146.3	152.4	158.4	164.4	170.4	176.5	189.3	203.6
		9.80	7.77	6.79	6.15	5.25	4.57	4.20	3.92	3.75	3.64	3.59	3.59	3.76
17 COKING COAL	100.0	102.1	104.0	106.3	109.0	111.8	114.7	118.2	122.3	127.0	132.1	137.8	150.2	164.7
		2.06	1.89	2.26	2.54	2.55	2.61	3.02	3.48	3.82	4.06	4.25	4.47	4.84
18 LIGNITE BRIQUETTES AND L	100.0	105.9	110.6	115.5	120.2	124.5	128.6	132.9	137.7	142.9	148.3	154.0	165.9	179.3
		5.92	4.40	4.41	4.11	3.61	3.25	3.38	3.61	3.74	3.80	3.82	3.80	4.04
19 IRON ORES CONCENTRATES	100.0	108.2	109.5	115.1	121.0	127.2	133.7	140.6	147.6	155.4	163.3	171.7	189.8	209.7
		8.16	1.22	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13
20 ORES & CONCENTRATES OF N	100.0	104.3	104.5	106.8	110.0	113.5	117.3	122.3	128.3	134.9	142.1	149.6	165.7	184.2
		4.29	.18	2.18	3.03	3.18	3.38	4.22	4.91	5.20	5.28	5.30	5.23	5.56
21 PETROLEUMS CRUDE	100.0	154.9	209.8	220.5	352.0	420.0	441.5	464.2	488.0	513.0	539.3	566.9	626.6	692.5
		54.86	35.46	5.13	59.61	19.32	5.13	5.13	5.13	5.13	5.13	5.13	5.13	5.13

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 10(CONTINUED) : FORECAST OF PRICE

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
22	NATURAL GAS	100.0	103.5 3.51	102.9 -.60	105.8 2.80	109.1 3.16	111.3 2.04	113.2 1.69	117.8 4.00	124.7 5.91	132.8 6.46	141.2 6.36	149.9 6.16	167.6 5.59	188.7 6.49
23	LIME STONE SAND GRAVEL	100.0	101.1 1.14	101.4 .22	102.7 1.31	104.6 1.82	106.4 1.75	108.3 1.76	111.1 2.65	115.1 3.60	120.0 4.21	125.4 4.56	131.4 4.78	144.6 4.91	160.1 5.41
24	SALT CRUDE	100.0	109.6 9.61	109.4 -.22	115.0 5.13	120.9 5.13	127.1 5.13	133.6 5.13	140.4 5.13	147.6 5.13	155.2 5.13	163.2 5.13	171.5 5.13	189.6 5.13	209.5 5.13
25	NON-METALIC MINERALS	100.0	90.1 -9.87	86.5 -4.03	92.8 7.22	98.5 6.19	104.5 6.09	110.8 6.07	117.9 6.34	125.4 6.37	133.2 6.26	141.4 6.16	150.0 6.09	168.6 5.97	169.4 6.02
26	CARCASSES	100.0	104.4 4.38	111.4 6.73	115.9 4.05	120.0 3.50	123.5 2.96	126.7 2.53	129.5 2.22	132.1 2.04	134.7 1.99	137.5 2.03	140.4 2.15	147.3 2.53	156.0 3.06
27	MEAT PRODUCT	100.0	97.9 -2.12	101.3 3.53	102.2 .86	102.5 .28	103.6 1.07	104.6 1.00	105.0 .38	105.0 -.02	104.9 -.12	104.8 -.02	105.1 .20	106.5 .90	109.8 1.69
28	DAIRY PRODUCT	100.0	109.2 9.16	116.3 6.50	120.8 3.94	123.8 2.43	128.0 3.38	132.3 3.41	135.9 2.70	138.8 2.16	141.5 1.91	144.2 1.89	147.1 2.02	154.3 2.60	164.1 3.25
29	VEGETABLE & FRUIT PRESER	100.0	99.3 -.67	99.3 -.03	99.1 -.24	98.5 -.61	99.5 1.09	100.7 1.17	101.3 .57	101.6 .37	102.1 .47	102.8 .69	103.8 .95	106.7 1.55	111.1 2.17
30	SEA FOOD PRESERVED	100.0	103.9 3.89	106.7 2.75	108.4 1.58	109.4 .86	111.3 1.80	113.1 1.61	114.3 1.04	115.2 .78	116.2 .83	117.4 1.05	118.9 1.33	123.3 2.00	129.5 2.64
31	GRAIN MILL PRODUCTS	100.0	105.1 5.14	106.9 1.64	107.1 .24	106.9 -.20	105.0 -1.83	102.0 -2.81	99.2 -2.74	96.9 -2.30	95.2 -1.75	94.1 -1.21	93.4 -.72	93.1 .00	94.1 .74
32	BAKERY PRODUCTS	100.0	103.4 3.38	107.0 3.52	110.6 3.37	114.1 3.16	117.8 3.21	121.6 3.20	125.3 3.07	129.0 2.93	132.6 2.79	136.1 2.68	139.6 2.59	146.7 2.50	154.2 2.50
33	REFINED SUGAR	100.0	105.0 4.95	109.5 4.36	113.6 3.70	117.0 3.01	120.6 3.08	124.2 3.00	127.5 2.66	130.4 2.28	133.0 1.94	135.2 1.67	137.2 1.46	140.7 1.24	144.1 1.19
34	OTHER FOOD PREPARED	100.0	107.9 7.92	111.9 3.65	114.3 2.23	115.8 1.24	120.3 3.89	124.9 3.84	128.2 2.62	130.7 2.02	133.3 1.94	136.1 2.13	139.5 2.45	148.1 3.30	159.9 4.04
35	PREPARED FEEDS FOR ANIMA	100.0	101.5 1.48	102.3 .80	103.1 .60	103.8 .70	104.5 .61	105.0 .53	105.6 .52	106.2 .58	106.9 .69	107.8 .84	108.9 1.04	112.0 1.51	116.4 2.12
36	ALCOHOLIC BEVERAGES	100.0	103.1 3.08	106.1 2.93	108.8 2.57	111.0 2.00	114.1 2.75	117.6 3.11	121.0 2.87	124.0 2.48	126.6 2.11	128.9 1.82	131.0 1.63	135.1 1.54	139.5 1.65
37	SOFT DRINK	100.0	102.6 2.63	105.4 2.65	107.7 2.27	109.4 1.56	112.7 3.02	116.8 3.60	120.5 3.17	123.7 2.62	126.4 2.22	128.9 2.00	131.4 1.94	137.1 2.23	144.6 2.76
38	TOBACCO	100.0	104.8 4.80	108.7 3.77	111.0 2.12	111.3 .27	115.1 3.42	120.1 4.33	123.6 2.90	125.4 1.41	125.8 .36	125.5 -.24	124.9 -.49	124.1 -.17	124.6 .22
39	SILK REELING & WASTE SIL	100.0	104.3 4.33	108.1 3.58	112.0 3.61	116.3 3.88	119.8 2.96	123.1 2.77	126.9 3.15	131.3 3.47	136.4 3.85	142.2 4.21	148.6 4.52	163.8 5.14	182.9 5.91
40	COTTON SPINNING	100.0	99.4 -.62	98.8 -.63	98.7 -.02	98.9 .19	96.5 -2.43	95.0 -1.53	94.9 -.13	94.8 -.11	94.6 -.27	93.8 -.76	92.4 -1.54	87.4 -3.15	80.2 -4.55
41	WOOLEN & WORSTED YARN	100.0	104.8 4.85	114.0 8.72	118.2 3.68	121.1 2.50	120.9 -.22	121.1 .16	122.4 1.07	123.6 1.04	124.8 .94	125.6 .66	125.9 .22	125.0 -.35	122.9 -.82
42	LINEN YARN	100.0	111.1 11.13	116.1 4.48	117.4 1.13	118.9 1.23	112.9 -5.04	111.1 -1.52	112.8 1.47	113.6 .70	114.1 .45	113.8 -.23	112.5 -1.20	107.3 -2.88	100.6 -3.17

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - IO(CONTINUED) : FORECAST OF PRICE

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
43	SPAN RAYON YARN	100.0	100.6 .62	102.1 1.48	103.1 .93	104.4 1.29	103.4 -.96	102.8 -.54	103.7 .88	105.2 1.41	107.0 1.68	106.7 1.63	110.2 1.35	112.1 .69	113.4 .64
44	SYNTHETIC FIBER YARN	100.0	97.5 -2.45	98.4 .87	98.5 .14	101.2 2.67	104.5 3.31	108.6 3.91	113.7 4.69	119.7 5.29	126.7 5.61	134.6 6.24	143.4 6.57	164.1 7.10	190.0 7.60
45	SILK & RAYON WEAVING	100.0	107.2 7.17	107.1 -.09	112.8 5.36	114.0 1.08	114.9 .78	116.0 .97	117.6 1.36	119.5 1.60	121.6 1.75	124.0 1.91	126.4 1.95	131.3 1.93	136.5 1.99
46	COTTON & SPUN RAYON FABR	100.0	102.4 2.38	105.9 3.43	109.5 3.36	113.2 3.38	114.9 1.56	116.9 1.68	119.7 2.43	122.6 2.61	126.1 2.65	129.1 2.44	131.7 1.99	134.3 .91	135.4 .00
47	SYNTHETIC FIBERS WOVEN	100.0	108.4 8.36	104.2 -3.88	106.2 1.92	107.0 .79	108.5 1.38	110.7 2.07	113.9 2.87	116.0 3.57	122.5 4.21	126.8 4.79	135.6 5.28	152.2 6.14	173.6 7.05
48	WOOLEN FABRICS WOVEN & F	100.0	100.3 .30	105.5 5.17	109.6 3.90	113.5 3.56	113.7 .18	115.2 1.25	118.2 2.65	121.2 2.52	124.0 2.35	126.4 1.93	128.1 1.31	129.5 .28	129.2 -.13
49	LINEN FABRICS WOVEN	100.0	99.5 -.49	101.0 1.52	101.2 .13	100.8 -.37	95.2 -5.56	91.8 -3.49	91.2 -.73	90.4 -.88	89.3 -1.18	87.6 -1.94	84.9 -3.06	77.3 -5.11	67.9 -6.51
50	YARN & FABRIC DYEING & F	100.0	105.7 5.70	111.4 5.38	117.0 5.01	122.5 4.71	127.2 3.87	131.9 3.68	136.9 3.76	142.0 3.74	147.3 3.72	152.7 3.68	158.2 3.61	169.5 3.48	161.6 3.56
51	KNITTED FABRICS	100.0	102.1 2.05	103.1 1.06	104.7 1.48	106.7 1.95	108.5 1.65	110.5 1.86	113.0 2.30	116.0 2.60	119.3 2.87	122.9 3.05	126.8 3.16	135.2 3.27	144.6 3.52
52	ROPES & FISHING NETS	100.0	102.1 2.10	102.9 .78	104.5 1.61	107.5 2.78	110.4 2.76	113.9 3.16	118.3 3.83	123.4 4.29	129.1 4.68	135.5 4.97	142.6 5.17	156.4 5.49	177.6 6.04
53	OTHER FIBER PRODUCTS	100.0	104.0 3.95	107.1 3.06	110.6 3.21	113.9 3.02	117.2 2.85	120.4 2.75	123.6 2.68	126.8 2.61	130.1 2.55	133.3 2.49	136.5 2.43	143.0 2.32	149.5 2.24
54	FOOTWEAR EXCEPT RUBBER M	100.0	100.8 .76	100.6 -.17	102.0 1.43	103.0 .96	101.6 -1.39	100.8 -.79	101.3 .57	102.3 .91	103.4 1.08	104.3 .89	104.8 .43	104.0 -.60	101.9 -1.06
55	WEARING APPAREL	100.0	104.3 4.34	106.9 2.49	111.3 4.06	115.1 3.47	115.3 .10	119.3 3.54	125.9 5.47	132.6 5.36	140.3 5.84	148.8 6.06	158.1 6.21	180.4 7.05	211.3 8.70
56	TEXTILE GARMENTS	100.0	101.9 1.93	106.3 4.28	108.7 2.27	112.6 3.58	111.7 -.76	114.3 2.27	118.9 4.08	123.3 3.69	128.1 3.87	132.9 3.78	137.7 3.59	148.0 3.74	161.6 4.87
57	WOOD MILLING	100.0	97.0 -3.00	97.8 .83	99.5 1.78	100.2 .68	100.2 -.03	100.3 .14	102.3 2.00	105.0 2.65	108.3 3.09	111.4 2.88	114.6 2.89	121.0 2.78	130.0 4.09
58	WOODEN PRODUCTS	100.0	100.6 .58	101.0 .39	102.5 1.49	104.0 1.51	105.2 1.15	106.3 1.00	108.3 1.88	111.3 2.78	115.3 3.58	119.8 3.95	124.8 4.16	135.3 4.10	147.7 4.74
59	FURNITURE WOODEN & METAL	100.0	99.9 -.08	101.1 1.16	102.3 1.26	104.1 1.76	105.6 1.42	106.9 1.25	109.0 1.95	112.0 2.74	115.9 3.48	120.4 3.88	125.4 4.13	136.1 4.18	148.8 4.78
60	PULP	100.0	104.5 4.51	103.2 -1.26	107.2 3.88	106.7 -.45	106.3 -.41	106.0 -.25	106.5 .44	107.7 1.13	109.5 1.69	111.8 2.13	114.6 2.50	121.4 3.02	130.0 3.69
61	PAPER	100.0	101.4 1.43	101.9 .51	104.4 2.45	106.7 2.13	107.7 .94	108.6 .89	111.3 2.44	115.0 3.37	119.3 3.75	124.0 3.89	128.9 3.98	139.6 4.09	152.6 4.81
62	ARTICLES OF PAPER & PAPE	100.0	102.0 2.01	102.9 .91	104.8 1.79	107.2 2.29	108.2 .98	109.1 .82	112.1 2.69	116.5 3.95	121.7 4.45	127.2 4.58	133.1 4.60	145.5 4.54	160.5 5.31
63	PRINTING & PUBLISHING	100.0	96.4 -3.57	92.8 -3.75	93.2 .37	94.7 1.68	95.2 .48	95.7 .52	98.8 3.24	103.6 4.93	109.3 5.51	115.4 5.57	121.8 5.49	135.0 5.23	150.9 6.08

N*F*C*R*A*U*M JAPANESE MODEL

TABLE B - 10(CONTINUED) : FORECAST OF PRICE

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
64	LEATHER MANUFACTURES & F	100.0	99.1 -.86	99.9 .76	102.1 2.24	102.7 .55	102.4 -.28	102.1 -.27	103.7 1.52	105.8 2.06	108.5 2.51	111.0 2.32	113.7 2.42	119.1 2.48	127.7 4.03
65	LEATHER PRODUCTS EX. FOO	100.0	103.6 3.56	105.2 1.59	107.3 2.03	109.4 1.95	111.4 1.78	113.3 1.68	115.4 1.92	118.0 2.26	121.2 2.65	124.8 2.97	128.8 3.25	138.2 3.69	150.0 4.36
66	ARTICLES OF RUBBER	100.0	105.3 5.34	106.0 .63	109.6 3.42	112.7 2.81	115.4 2.39	118.1 2.34	122.3 3.57	128.2 4.76	135.6 5.77	144.0 6.26	153.5 6.57	174.8 6.79	202.0 7.84
67	BASIC INORGANIC INDUSTRI	100.0	100.2 .23	100.2 .01	100.7 .48	101.7 .96	102.6 .82	103.6 1.03	105.4 1.74	107.9 2.32	110.9 2.85	114.6 3.31	118.9 3.72	129.1 4.36	142.1 5.15
68	BASIC ORGANIC INDUSTRIAL	100.0	101.3 1.32	101.3 -.05	104.9 3.62	107.8 2.70	110.1 2.20	113.7 3.22	120.1 5.68	128.9 7.25	139.6 8.34	152.2 9.01	166.5 9.43	200.5 9.79	244.6 10.81
69	SYNTHETIC DYESTUFF	100.0	106.8 6.78	111.3 4.20	116.1 4.35	121.4 4.56	125.9 3.71	131.0 4.08	137.8 5.18	145.6 5.66	154.3 5.93	163.6 6.07	173.7 6.16	196.0 6.24	222.6 6.74
70	BLASTING POWDER	100.0	106.1 6.14	109.1 2.79	113.6 4.14	119.9 5.52	120.9 .87	125.2 3.56	136.8 9.25	150.7 10.15	166.3 10.37	183.5 10.34	202.5 10.37	246.8 10.41	308.4 12.52
71	SPUN RAYON	100.0	101.2 1.21	104.4 3.18	106.9 2.35	111.8 4.57	114.0 1.96	117.1 2.75	123.4 5.41	131.0 6.13	139.5 6.49	148.8 6.68	159.0 6.83	181.9 6.99	211.4 8.21
72	MATERIALS OF SYNTHETIC F	100.0	95.1 -4.90	127.6 34.13	114.5 -10.24	141.2 23.36	154.2 9.21	163.2 5.83	173.9 6.56	185.6 6.70	198.3 6.85	212.1 6.95	227.1 7.08	261.0 7.25	304.6 8.44
73	PLASTIC	100.0	103.6 3.64	113.9 9.92	115.9 1.76	123.3 6.36	126.1 2.25	130.1 3.19	138.7 6.61	149.5 7.80	162.1 8.41	176.2 8.70	191.9 8.89	228.0 9.02	275.2 10.33
74	CHEMICAL FERTIRIZER	100.0	100.0 -.01	100.3 .27	101.0 .75	102.3 1.28	103.3 1.01	104.7 1.36	107.3 2.40	110.7 3.26	115.2 4.05	120.6 4.71	127.0 5.30	142.8 6.26	163.9 7.47
75	MISCELLANEOUS BASIC CHEM	100.0	99.9 -.06	99.6 -.37	100.0 .41	101.1 1.11	101.6 .46	102.5 .89	105.0 2.44	108.7 3.55	113.5 4.43	119.3 5.08	125.9 5.58	141.6 6.17	161.5 7.08
76	VEGETABLE & ANIMAL OIL	100.0	105.9 5.85	110.5 4.43	113.9 2.99	116.5 2.33	118.2 1.41	119.2 .89	120.1 .76	121.0 .70	121.8 .71	122.8 .77	123.6 .67	126.5 1.12	130.2 1.62
77	COATINGS	100.0	100.5 .45	101.1 .65	104.7 3.51	109.0 4.18	110.7 1.56	113.9 2.88	121.2 6.44	130.5 7.62	141.2 8.20	153.1 8.46	166.4 8.63	196.6 8.71	235.7 9.93
78	MEDICINE	100.0	98.0 -1.99	97.8 -.17	99.4 1.61	102.6 3.20	103.9 1.30	106.4 2.34	112.5 5.72	120.8 7.45	131.1 8.44	142.7 8.91	155.8 9.13	185.5 9.10	223.2 10.06
79	OTHER CHEMICAL PRODUCTS	100.0	99.0 -1.03	102.2 3.25	106.7 4.38	112.3 5.31	112.7 .33	117.2 4.00	127.5 8.79	138.3 8.46	150.2 8.63	163.2 8.64	177.5 8.72	209.6 8.68	252.9 10.42
80	PETROLEUM REFINERY PRODU	100.0	104.0 3.97	109.4 5.25	113.9 4.05	121.3 6.57	129.0 6.31	135.8 5.24	142.0 4.62	147.9 4.17	153.6 3.84	159.0 3.52	164.2 3.25	173.8 2.77	183.0 2.61
81	COAL PRODUCTS	100.0	99.7 -.25	99.4 -.31	99.2 -.22	98.8 -.46	98.0 -.77	97.2 -.86	96.9 -.28	97.3 .38	98.2 .95	99.5 1.34	101.1 1.60	104.7 1.83	109.6 2.54
82	MISCELLANEOUS ANTISEPTIC	100.0	103.6 3.59	106.8 3.08	109.9 2.96	112.9 2.72	115.7 2.43	118.2 2.21	120.9 2.23	123.7 2.33	126.7 2.48	130.0 2.59	133.6 2.71	141.3 2.90	150.3 3.27
83	CLAY PRODUCTS FOR BUILDI	100.0	94.7 -5.29	92.6 -2.27	93.6 1.10	95.3 1.79	96.8 1.63	98.4 1.65	101.5 3.15	106.0 4.47	111.9 5.51	118.4 5.80	125.3 5.85	139.4 5.39	155.9 6.02
84	GLASSWARE	100.0	105.6 5.62	109.3 3.53	113.4 3.74	117.3 3.40	120.7 2.92	123.9 2.64	127.9 3.24	133.0 3.94	139.1 4.59	145.9 4.89	153.2 5.05	168.9 4.97	187.3 5.52

I*N*F*O*R*U*M   JAPANESE MODEL

TABLE B - 10(CONTINUED) : FORECAST OF PRICE

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
85	POTTERY	100.0	103.9 3.90	107.9 3.86	111.9 3.72	115.9 3.59	120.0 3.46	124.0 3.35	128.0 3.24	132.0 3.14	136.0 3.05	140.1 2.96	144.1 2.87	152.1 2.72	160.2 2.59
86	CEMENT	100.0	104.5 4.52	108.0 3.34	112.1 3.75	116.0 3.49	119.5 3.06	122.9 2.79	126.9 3.32	131.9 3.91	137.8 4.45	144.2 4.69	151.2 4.82	165.9 4.74	182.9 5.18
87	OTHER NON-METALLIC MINERA	100.0	98.5 -1.54	98.0 -.49	99.7 1.75	102.1 2.41	104.6 2.43	107.2 2.54	111.2 3.66	116.4 4.72	122.9 5.60	130.3 6.01	138.5 6.24	156.3 6.27	178.0 6.96
88	PIG IRON	100.0	99.9 -.11	98.9 -.99	99.3 .39	100.5 1.20	102.2 1.68	104.2 1.91	106.8 2.49	110.1 3.11	114.1 3.62	118.6 3.99	123.7 4.25	134.8 4.44	147.5 4.68
89	IRON & STEEL SCRAPS	100.0	108.3 8.33	109.8 1.35	115.4 5.13	121.3 5.13	127.6 5.13	134.1 5.13	141.0 5.13	148.2 5.13	155.8 5.13	163.8 5.13	172.2 5.13	190.3 5.13	210.3 5.13
90	FERROALLOYS	100.0	103.5 3.49	104.2 .68	106.3 2.01	108.1 1.67	110.0 1.76	111.9 1.78	114.2 2.02	116.9 2.35	120.0 2.66	123.5 2.94	127.4 3.17	136.2 3.47	146.4 3.76
91	STEEL INGOT	100.0	100.0 .03	101.9 1.83	105.0 3.13	109.0 3.79	113.4 4.03	118.1 4.13	123.7 4.71	130.2 5.31	137.7 5.76	146.1 6.06	155.2 6.26	175.6 6.38	199.4 6.64
92	HOT-ROLLED PLATES& SHEET	100.0	101.8 1.79	102.3 .52	103.9 1.51	105.8 1.91	108.1 2.11	110.3 2.10	113.5 2.82	117.6 3.62	122.5 4.21	128.1 4.58	134.3 4.81	147.7 4.84	162.7 5.09
93	STEEL PIPE & TUBE	100.0	102.1 2.09	106.6 4.42	107.3 .64	111.2 3.66	114.3 2.75	116.7 2.13	119.6 2.51	123.4 3.18	128.1 3.75	133.4 4.15	139.3 4.40	152.0 4.45	166.3 4.71
94	COLD-ROLLED & COATED STE	100.0	102.0 2.01	103.3 1.24	104.5 1.21	106.0 1.39	107.3 1.23	108.3 .93	110.7 2.22	114.3 3.29	118.7 3.86	123.6 4.11	128.9 4.23	139.6 3.99	151.6 4.39
95	CAST & FORGE IRON	100.0	99.7 -.33	99.9 .24	100.7 .82	102.0 1.28	103.5 1.47	105.0 1.47	107.2 2.06	110.2 2.82	114.1 3.48	118.6 3.99	123.8 4.34	135.3 4.58	148.5 4.86
96	NONFERROUS METAL INGOTS	100.0	96.9 -3.08	96.2 -.75	96.8 .63	98.2 1.43	99.9 1.72	101.7 1.80	104.3 2.55	107.8 3.39	112.1 4.00	117.0 4.38	122.4 4.59	134.0 4.61	147.0 4.64
97	COPPER BRASS PRODUCTS	100.0	94.3 -5.73	92.6 -1.75	92.1 -.59	92.1 -.00	92.0 -.11	91.7 -.31	92.7 1.16	94.8 2.16	97.3 2.66	100.1 2.89	103.1 3.01	109.1 2.79	116.0 3.29
98	ALUMINUM EXTRUDED PRODUC	100.0	103.8 3.82	110.1 6.06	110.4 .27	112.0 1.46	113.1 .95	113.8 .60	115.4 1.43	118.0 2.22	121.1 2.66	124.6 2.86	128.2 2.95	135.6 2.78	143.8 3.08
99	OTHER NONFERROUS METAL P	100.0	97.4 -2.59	96.0 -1.44	95.7 -.30	96.1 .44	96.6 .52	96.9 .31	98.4 1.45	101.0 2.69	104.5 3.49	108.6 3.90	113.0 4.06	122.0 3.79	131.8 4.13
100	STRUCTURAL METAL PRODUCT	100.0	99.9 -.07	98.9 -1.07	98.7 -.12	98.3 -.47	96.4 -1.92	94.1 -2.38	93.6 -.51	95.1 1.58	97.5 2.51	99.8 2.35	101.4 1.63	101.4 -.53	99.9 -.51
101	OTHER METAL PRODUCTS	100.0	99.8 -.17	96.7 -3.12	96.0 -.78	94.9 -1.10	92.9 -2.10	90.6 -2.48	89.8 -.92	90.7 .99	92.6 2.06	94.6 2.18	96.2 1.73	97.0 -.06	96.4 -.13
102	POWER GENERATING MACHINA	100.0	95.7 -4.27	94.1 -1.66	97.0 3.09	99.1 2.08	97.8 -1.24	96.4 -1.42	100.5 4.19	110.0 9.43	121.3 10.33	131.3 8.25	139.5 6.22	150.9 3.57	168.8 6.98
103	MACHINE TOOLS METALWORKI	100.0	107.1 7.13	86.1 -19.64	98.0 13.79	81.8 -16.48	70.2 -14.15	61.7 -12.14	57.5 -6.91	58.1 1.10	62.5 7.67	68.8 10.00	75.4 9.54	86.3 6.22	98.5 7.59
104	INDUSTRIAL MACHINERY	100.0	92.2 -7.83	90.3 -2.07	93.8 3.92	95.8 2.17	93.9 -2.04	91.7 -2.32	96.3 5.03	107.5 11.58	120.5 12.15	131.2 8.90	139.1 5.95	147.5 2.45	163.9 6.99
105	GENERAL INDUSTRIAL MACHI	100.0	101.0 1.04	100.9 -.17	104.0 3.08	106.9 2.81	106.9 .02	106.0 -.85	110.0 3.76	120.4 9.51	134.4 11.63	148.0 10.08	159.5 7.77	175.6 4.33	198.6 7.58

J*N*F*L*R*U*P JAPANESE MODEL

TABLE B - IC(CONTINUED) : FORECAST OF PRICE

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
106	OFFICE MACHINERY	100.0	98.6	98.8	100.9	104.0	106.6	109.2	114.1	122.7	134.6	149.1	164.6	198.7	245.6
			-1.39	.15	2.17	3.03	2.57	2.44	4.44	7.55	9.86	10.59	10.44	9.74	11.98
107	HOUSEHOLD MACHINERY	100.0	100.9	101.1	102.2	103.5	103.7	103.1	104.1	107.9	114.2	121.6	128.8	140.5	152.8
			.93	.16	1.10	1.24	.19	-.53	.94	3.70	5.86	6.41	5.93	4.00	4.70
108	PARTS OF MACHINERY	100.0	102.4	103.7	105.5	107.2	107.3	106.4	107.1	111.1	117.8	125.3	132.3	142.0	151.1
			2.44	1.23	1.77	1.58	.13	-.86	.68	3.70	5.98	6.38	5.60	3.00	3.56
109	STRONG ELECTRIC MACHINER	100.0	99.4	100.3	104.6	109.5	115.1	121.3	129.1	139.0	150.8	164.8	180.9	220.8	274.9
			-.63	.91	4.32	4.70	5.08	5.41	6.44	7.66	8.49	9.26	9.76	10.67	11.91
110	HOUSEHOLD ELECTRICAL MAC	100.0	102.2	103.8	106.5	109.7	113.6	118.2	123.7	130.6	138.8	148.7	160.4	190.1	230.6
			2.24	1.57	2.54	3.05	3.56	4.03	4.69	5.51	6.32	7.14	7.87	9.17	10.46
111	OTHER WEAK ELECTRICAL AP	100.0	93.9	94.5	97.8	102.3	107.8	114.0	121.7	131.4	142.9	156.7	172.8	213.3	268.5
			-6.09	.67	3.45	4.64	5.30	5.82	6.75	7.90	8.81	9.65	10.26	11.31	12.49
112	SHIPS & BOATS	100.0	102.6	106.1	110.5	113.9	112.9	114.4	121.8	132.3	143.4	154.4	165.8	185.0	210.0
			2.61	3.36	4.20	3.10	-.93	1.32	6.48	8.68	8.38	7.61	7.44	5.08	7.44
113	RAILWAY VEHICLES	100.0	101.5	104.2	107.1	110.1	112.6	115.1	118.2	122.1	126.9	132.4	138.6	152.4	168.2
			1.52	2.63	2.62	2.81	2.27	2.16	2.68	3.36	3.91	4.32	4.70	4.84	5.21
114	PASSENGER MOTOR CAR	100.0	104.3	109.1	114.6	119.4	121.5	124.0	130.3	140.1	151.8	164.6	178.6	205.5	236.2
			4.28	4.61	4.90	4.33	1.75	2.05	5.06	7.53	8.41	8.43	8.45	6.80	7.70
115	REPAIR OF PASSENGER MOTO	100.0	108.6	116.9	124.9	132.6	139.5	145.9	152.6	159.9	167.8	176.2	185.2	204.6	225.5
			8.59	7.62	6.88	6.17	5.19	4.62	4.60	4.77	4.91	5.00	5.12	5.00	5.11
116	MOTORCYCLES & BICYCLES	100.0	101.8	103.7	106.4	108.7	108.2	108.2	111.8	118.4	126.5	135.1	144.4	161.4	180.7
			1.80	1.89	2.59	2.13	-.47	.04	3.33	5.92	6.78	6.80	6.89	5.28	6.33
117	AIRCRAFTS	100.0	99.4	99.4	99.9	100.7	101.3	101.9	103.4	105.8	109.3	113.5	118.6	130.3	144.4
			-.60	-.02	.52	.83	.52	.63	1.43	2.41	3.23	3.88	4.47	4.88	5.46
118	OTHER TRANSPORTATION	100.0	106.2	113.2	120.9	128.3	132.3	137.2	147.4	162.3	180.0	199.6	221.8	268.5	327.5
			6.20	6.63	6.78	6.09	3.10	3.76	7.42	10.12	10.90	10.91	11.11	9.57	11.15
119	PRECISION MACHINERY	100.0	103.2	103.4	106.9	109.3	110.6	111.7	115.5	121.1	128.0	135.0	142.1	155.6	172.4
			3.18	.25	3.33	2.29	1.13	1.00	3.43	4.83	5.68	5.48	5.27	4.54	5.72
120	PHOTOGRAPHIC & OPTICAL I	100.0	100.5	101.2	104.6	107.7	109.9	111.8	115.9	121.8	129.2	137.0	145.0	160.9	180.1
			.47	.73	3.36	2.96	2.03	1.75	3.66	5.08	6.03	6.03	5.88	5.21	6.19
121	WATCHES & CLOCKS	100.0	99.5	99.8	105.8	108.6	110.0	111.7	117.8	125.6	134.7	143.4	152.3	169.1	191.9
			-.46	.23	6.01	2.68	1.31	1.56	5.46	6.59	7.23	6.48	6.18	5.34	7.16
122	OTHER MANUFACTURING GOOD	100.0	113.1	120.0	125.2	129.3	131.7	134.0	139.3	146.4	155.0	164.2	173.8	194.0	220.0
			13.14	6.05	4.32	3.33	1.86	1.76	3.89	5.14	5.89	5.88	5.87	5.66	6.96
123	HOUSING CONSTRUCTION	100.0	107.9	108.6	116.1	117.2	118.3	119.4	120.5	121.7	122.8	124.0	125.3	127.9	130.6
			7.86	.69	6.91	.93	.93	.93	.94	.95	.97	.98	1.00	1.03	1.07
124	CONSTRUCTION NOT FOR RES	100.0	102.7	105.3	108.1	111.2	114.3	117.5	120.9	124.7	128.9	133.6	138.8	150.3	163.7
			2.70	2.53	2.70	2.79	2.79	2.80	2.92	3.15	3.40	3.64	3.85	4.14	4.44
125	BUILDING REPAIRING	100.0	105.4	110.5	115.7	120.8	125.9	130.8	135.9	141.3	147.0	153.2	159.8	174.1	190.4
			5.36	4.90	4.67	4.44	4.17	3.95	3.88	3.93	4.07	4.19	4.29	4.43	4.66
126	PUBLIC UTILITY CONSTRUCT	100.0	104.7	109.3	114.1	118.9	123.8	128.7	133.8	139.3	145.2	151.5	158.3	173.3	190.4
			4.69	4.43	4.35	4.26	4.09	3.96	3.97	4.08	4.23	4.36	4.48	4.66	4.91

I*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 10(CONTINUED) : FORECAST OF PRICE

IO-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
127	OTHER CONSTRUCTION	100.0	100.8 .79	103.2 2.43	106.4 3.06	110.5 3.85	114.8 3.89	119.3 3.94	124.6 4.41	130.9 5.12	138.4 5.73	146.9 6.11	156.2 6.32	176.8 6.39	200.9 6.73
128	ELECTRICITY	100.0	101.3 1.33	102.5 1.12	103.8 1.30	105.4 1.53	106.8 1.34	108.1 1.24	109.7 1.46	111.6 1.76	113.9 2.00	116.3 2.17	119.0 2.29	124.7 2.37	131.0 2.58
129	GAS	100.0	105.8 5.76	109.2 3.23	112.1 2.66	115.1 2.66	116.8 1.47	117.9 .96	119.8 1.61	122.5 2.27	125.7 2.61	129.1 2.70	132.5 2.65	139.0 2.53	146.0 2.64
130	WATER-SUPPLY,SEWERAGE	100.0	104.9 4.88	111.6 6.42	117.7 5.46	123.9 5.25	129.9 4.89	135.9 4.56	141.8 4.35	147.7 4.16	153.6 3.98	159.4 3.82	165.3 3.66	176.9 3.37	188.4 3.15
131	WHOLESALE TRADE	100.0	100.8 .84	100.5 -.37	100.0 -.44	99.5 -.50	97.4 -2.10	94.5 -3.01	92.1 -2.55	90.4 -1.83	89.1 -1.41	88.0 -1.28	86.8 -1.37	83.2 -2.41	78.1 -3.21
132	RETAIL TRADE	100.0	104.3 4.33	107.0 2.60	109.4 2.18	111.4 1.82	111.4 .06	110.4 -.95	109.7 -.64	109.5 -.12	109.7 .12	109.8 .11	109.7 -.08	107.9 -1.12	104.2 -1.86
133	FINANCIAL BUSINESS	100.0	104.1 4.14	107.0 2.71	111.6 4.31	116.5 4.38	121.9 4.65	127.9 4.93	134.5 5.20	141.9 5.49	150.0 5.72	158.9 5.93	168.6 6.12	191.0 6.53	217.9 6.91
134	INSURANCE BUSINESS	100.0	104.8 4.80	108.4 3.46	113.0 4.18	117.7 4.19	122.8 4.35	128.4 4.56	134.6 4.81	141.4 5.08	148.9 5.32	157.2 5.56	166.3 5.77	187.2 6.20	212.3 6.61
135	REAL ESTATE AGENCY	100.0	107.3 7.27	107.4 .14	112.6 4.79	116.0 3.07	120.1 3.47	124.8 3.93	130.2 4.33	136.4 4.81	143.4 5.12	151.1 5.37	159.5 5.53	176.2 5.75	199.8 5.91
136	RENT FOR HOUSE	100.0	106.9 6.93	106.7 -.22	112.0 4.96	115.6 3.27	120.0 3.78	125.2 4.29	131.0 4.71	137.8 5.19	145.4 5.48	153.7 5.70	162.6 5.83	182.7 6.01	205.6 6.13
137	NATIONAL RAILROAD	100.0	95.4 -4.55	94.1 -1.40	95.6 1.63	95.1 -.56	91.3 -3.96	91.5 .17	94.8 3.62	98.6 4.06	102.7 4.14	107.2 4.32	111.9 4.47	121.8 4.19	133.7 5.14
138	LOCAL RAILROAD	100.0	100.1 .10	98.8 -1.33	99.4 .61	99.2 -.13	97.1 -2.19	96.2 -.88	97.7 1.59	100.7 2.99	104.3 3.66	108.6 4.06	113.3 4.31	123.3 4.29	134.9 4.80
139	ROAD PASSENGER TRANSPORT	100.0	98.6 -1.44	98.3 -.26	99.2 .95	99.9 .65	99.0 -.94	98.8 -.16	100.5 1.68	103.4 2.92	107.2 3.66	111.6 4.13	116.6 4.44	127.4 4.55	139.9 4.93
140	ROAD FREIGHT TRANSPORT	100.0	106.8 6.77	111.2 4.16	114.7 3.13	116.8 1.84	116.6 -.16	117.0 .30	119.0 1.76	122.2 2.70	126.2 3.21	130.6 3.53	135.5 3.73	145.9 3.74	157.6 4.08
141	ROAD TRANSPORTATION FACI	100.0	106.0 5.96	110.5 4.25	115.1 4.15	119.4 3.71	123.2 3.19	126.8 2.94	130.4 2.86	134.1 2.81	137.8 2.76	141.5 2.72	145.3 2.69	153.1 2.63	161.3 2.63
142	SEA TRANSPORT	100.0	96.2 -3.75	92.8 -3.55	89.9 -3.12	87.3 -2.91	84.7 -3.04	82.3 -2.77	80.5 -2.15	79.3 -1.50	78.6 -.87	78.4 -.26	78.7 .34	80.5 1.34	83.8 2.33
143	INLAND WATER TRANSPORT	100.0	104.7 4.66	109.7 4.79	114.3 4.24	118.7 3.87	122.7 3.30	126.4 3.04	130.2 2.98	134.0 2.95	137.9 2.92	141.9 2.90	146.0 2.89	154.5 2.85	163.5 2.88
144	AIR TRANSPORT	100.0	100.9 .90	102.4 1.50	103.7 1.29	105.2 1.39	106.3 1.09	107.6 1.16	109.2 1.50	111.2 1.86	113.7 2.22	116.6 2.57	120.0 2.93	126.4 3.57	139.1 4.29
145	OTHER TRANSPORT	100.0	106.5 6.52	110.1 3.40	113.0 2.64	114.7 1.48	114.5 -.20	114.6 .12	116.2 1.33	118.7 2.20	122.0 2.76	125.9 3.18	130.3 3.49	140.2 3.78	152.1 4.38
146	STORAGE	100.0	101.2 1.18	100.5 -.70	102.0 1.55	102.2 .20	99.6 -2.57	99.8 .23	103.3 3.45	107.8 4.42	112.9 4.69	116.4 4.90	124.4 5.05	137.2 4.93	152.6 5.83
147	TELECOMMUNICATION	100.0	102.3 2.26	104.5 2.23	106.8 2.12	108.6 1.93	110.5 1.55	112.1 1.45	113.8 1.55	115.7 1.67	117.8 1.78	120.0 1.89	122.4 2.01	127.8 2.21	133.9 2.46

*N*F*O*R*U*M JAPANESE MODEL

TABLE B - 10(CONTINUED) : FORECAST OF PRICE

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
148	GOVERNMENTAL SERVICES	100.0	103.1	112.0	121.1	131.4	142.7	154.8	168.0	182.6	198.7	216.6	236.4	282.7	339.7
			3.11	8.62	8.14	8.53	8.56	8.47	8.53	8.70	8.85	9.00	9.14	9.41	9.69
149	EDUCATION	100.0	103.8	109.9	115.5	121.9	128.8	136.2	144.2	152.9	162.4	172.8	184.2	210.5	242.4
			3.82	5.84	5.11	5.56	5.66	5.75	5.88	6.03	6.20	6.39	6.59	7.00	7.43
150	MEDICAL,HEALTH SERVICE	100.0	102.4	111.3	114.4	123.5	132.6	141.8	151.4	161.4	172.0	183.4	195.8	224.1	258.8
			2.40	8.73	2.71	7.95	7.40	6.98	6.73	6.61	6.59	6.63	6.74	7.08	7.61
151	OTHER PUBLIC SERVICES	100.0	105.8	111.6	117.4	123.3	129.2	135.1	141.2	147.3	153.6	160.0	166.5	180.3	195.2
			5.79	5.48	5.21	4.99	4.79	4.61	4.47	4.35	4.25	4.17	4.11	4.04	4.04
152	SERVICE FOR BUSINESS ENT	100.0	104.9	109.8	114.9	120.3	126.1	132.2	139.0	146.5	154.9	164.2	174.5	198.5	228.0
			4.94	4.63	4.61	4.73	4.80	4.89	5.11	5.40	5.71	6.01	6.29	6.75	7.31
153	AMUSEMENT	100.0	104.8	110.2	116.3	123.0	130.4	138.5	147.4	157.2	168.1	180.1	193.5	224.6	262.8
			4.81	5.19	5.47	5.79	6.03	6.21	6.42	6.66	6.91	7.16	7.40	7.85	8.29
154	RESTAURANT	100.0	106.6	112.9	119.0	125.0	130.8	136.7	142.5	148.4	154.4	160.7	167.2	181.4	197.6
			6.55	5.94	5.42	5.02	4.70	4.45	4.26	4.14	4.07	4.05	4.07	4.20	4.45
155	OTHER PERSONAL SERVICES	100.0	107.3	114.4	121.3	128.2	135.0	141.8	148.7	155.8	163.3	171.2	179.6	198.2	219.7
			7.31	6.59	6.06	5.67	5.31	5.03	4.87	4.81	4.81	4.84	4.90	5.09	5.38
156	NOT CLASSIFIED	100.0	100.7	102.7	106.5	111.5	117.0	122.9	129.7	137.4	146.3	156.2	167.3	192.9	224.4
			.66	2.02	3.74	4.66	4.92	5.09	5.49	5.97	6.43	6.79	7.08	7.49	7.99

IAN*F*C*P*U*M JAPANESE MODEL

TABLE B - 11 : FORECAST OF MONTHLY MANHOURS PER EMPLOYEE

IC-NO	TITLE	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1983	1985
1	AGRICULTURE, FORESTRY AN	1.0	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00
2	MINING	192.9	186.8 -3.14	187.7 .48	186.1 -.86	182.3 -2.05	180.2 -1.14	181.0 .46	180.7 -.20	179.1 -.88	177.3 -1.00	175.6 -1.01	173.6 -1.12	169.9 -.94	167.8 -.64
3	FOODS AND TOBACCO	183.5	182.4 -.59	180.9 -.85	179.1 -.97	177.3 -1.03	175.4 -1.07	173.5 -1.09	171.5 -1.10	169.6 -1.12	167.7 -1.13	165.8 -1.15	163.9 -1.16	160.0 -1.19	156.2 -1.22
4	TEXTILE	186.9	184.7 -1.16	182.9 -.98	181.3 -.89	177.9 -1.86	177.4 -.31	176.4 -.55	174.5 -1.06	172.9 -.92	171.2 -.96	169.5 -.99	167.9 -.97	164.5 -1.01	161.2 -1.06
5	PULP AND PAPER	109.3	188.8 72.76	187.9 -.50	185.8 -1.10	182.6 -1.75	180.7 -1.04	180.1 -.34	178.5 -.84	176.7 -1.02	174.8 -1.07	172.9 -1.08	171.0 -1.14	167.1 -1.09	163.8 -1.03
6	CHEMICAL PRODUCTS	177.3	174.0 -1.89	172.1 -1.04	170.6 -.91	167.5 -1.82	166.5 -.61	166.0 -.30	164.5 -.85	163.2 -.83	161.7 -.87	160.3 -.89	158.8 -.92	155.9 -.90	153.1 -.98
7	PRIMARY METALS	192.3	187.6 -2.45	187.8 .12	185.5 -1.23	181.7 -2.02	179.3 -1.33	181.8 1.36	181.7 -.04	180.3 -.78	178.7 -.90	177.1 -.90	175.1 -1.10	171.7 -.91	170.0 -.57
8	METAL PRODUCTS	193.3	188.2 -2.65	189.6 .77	186.3 -1.76	181.8 -2.39	180.0 -1.00	181.7 .94	181.3 -.20	179.5 -1.00	177.6 -1.08	175.6 -1.10	173.4 -1.26	169.4 -1.02	167.3 -.59
9	NON ELECTRICAL MACHINERY	194.2	189.3 -2.51	189.2 -.05	186.7 -1.35	182.3 -2.37	178.8 -1.89	181.8 1.68	184.7 1.60	183.6 -.59	181.4 -1.21	179.3 -1.18	176.7 -1.45	172.4 -.94	172.3 .08
10	ELECTRICAL MACHINERY	180.3	177.2 -1.74	177.1 -.06	173.9 -1.80	170.7 -1.81	168.8 -1.13	169.6 .47	169.0 -.32	167.4 -.96	165.6 -1.09	163.8 -1.07	161.9 -1.20	158.3 -1.00	155.9 -.79
11	TRANSPORTATION EQUIPMENT	192.5	190.2 -1.21	188.1 -1.07	185.9 -1.18	182.5 -1.82	181.4 -.64	181.3 -.03	180.5 -.45	179.1 -.79	177.5 -.86	176.1 -.80	174.3 -1.01	171.0 -.86	168.7 -.68
12	MISCELLAEOUS MANUFACTURI	187.7	182.7 -2.67	183.1 .25	180.6 -1.39	177.2 -1.89	175.8 -.79	175.6 -.12	174.5 -.62	172.8 -.93	171.1 -1.00	169.4 -1.01	167.5 -1.09	164.0 -1.00	161.2 -.87
13	CONSTRUCTION	199.0	193.7 -2.68	194.7 .51	192.1 -1.30	188.0 -2.14	185.9 -1.08	186.4 .27	186.6 .11	185.2 -.76	183.3 -1.04	181.3 -1.08	179.1 -1.20	175.0 -1.05	172.9 -.51
14	ELECTRICITY, GAS AND WAT	176.0	174.0 -1.15	172.3 -.99	170.7 -.90	169.3 -.84	167.9 -.82	166.5 -.81	165.2 -.80	163.9 -.80	162.6 -.80	161.3 -.81	159.9 -.81	157.3 -.83	154.7 -.84
15	WHOLE SALE AND RETAIL TR	185.7	192.0 -1.97	180.8 -.63	178.8 -1.09	175.9 -1.65	174.2 -.97	173.4 -.45	172.1 -.77	170.4 -.99	168.6 -1.05	166.8 -1.07	164.9 -1.12	161.3 -1.07	158.2 -.96
16	REAL ESTATE	180.0	171.3 -4.81	169.7 -.95	167.5 -1.29	164.9 -1.58	162.6 -1.37	160.9 -1.07	158.9 -1.26	156.8 -1.33	154.6 -1.35	152.5 -1.38	150.4 -1.40	146.1 -1.43	142.0 -1.42
17	TRANSPORT AND COMMUNICAT	191.6	188.1 -1.80	189.5 .70	185.1 -2.28	177.0 -4.43	177.3 .21	179.1 .98	177.5 -.85	175.7 -1.02	174.0 -1.01	172.1 -1.04	170.1 -1.20	166.0 -1.06	163.0 -1.10
18	FINANCE AND INSURANCE	166.7	164.1 -1.53	162.0 -1.29	160.1 -1.17	158.4 -1.10	156.7 -1.08	155.0 -1.07	153.3 -1.07	151.7 -1.07	150.1 -1.08	148.4 -1.09	146.8 -1.10	143.5 -1.13	140.2 -1.15
19	OTHER SERVICES	1.0	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00
20	NON-CLASSIFIED	1.0	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00	1.0 .00

Sectors 1, 19, and 20, have no manhour equation because of the lack of data. For these sectors, the model forecast man-month rather than man-hours.

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