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Title of Thesis: Simulation with a Dynamic Interindustry Forecasting Model

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SIMULATION WITH A DYNAMIC INPUT-OUTPUT FORECASTING MODEL

by

Thomas C. Reimbold

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ABSTRACT

Title of Thesis: Simulation with a Dynamic Interindustry Forecasting Model

Thomas C. Reimbold, Doctor of Philosophy, 1974

Thesis directed by: Professor Clopper Almon, Jr.

Detailed economic forecasts are a vital instrument of modern business planning. While government is often satisfied with forecasts of aggregates such as business investment or consumption expenditures, business managers need to know the implications of such a forecast on their company's sales. Consequently, there is a great need for forecasts which identify the change in output by products. Such forecasts of the American economy are produced by the Interindustry Forecasting Project of the University of Maryland, INFORUM. The results of the forecasting model show the distribution of sales of each of 185 products, as they are used

- in producing these 185 products
- for capital equipment by each of 90 industries
- in each of 28 types of construction
- for personal consumption expenditures
- for exports (less imports)
- for inventory change
- for federal government defense and non-defense requirements
- for state and local government requirements

The objective of the model is to provide organizations with an economic forecast in sufficient detail to make it the basic input for the firm's long-term planning.

But how reliable are the forecasts it produces? This study will attempt to answer that question. The timeliness of a careful evaluation of I-O models is clear from the increasing number of countries which use the input-output technique in their planning. Examples are Norway,[1] Japan,[2] the Netherlands,[3] the Common Market Organization,[4] the United Nations,[5] and the Soviet Union.[6] The question remains, however, Do these models deserve trust or suspicion?

Since the University of Maryland forecasts of the American economy are generated by a fully operational and complete I-O model, it should provide the answers to the above question. A number of U.S. companies already use the forecasts of the model for market analysis and corporate long-term planning; but again, up to now, the model has never been evaluated. It is therefore this model which will be tested in the process of this study.

The study has been divided into the following component parts: Chapter I is a description of all stochastic equations which, at the outset of this study

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[1] Schreiner, (49), pp. 449-487.

[2] Loercher, (36), pp. 80-90.

[3] Merkies, and Van de Pas (40).

[4] Duval, Fontela, and McNeil (21).

[5] United Nations (53).

[6] Treml, Gallik, Kostinsky, and Kruger (51).

were used to estimate final demand and labor productivity. An explanation of the solution procedure of the INFORUM model is also included. Chapter II describes the data used in the regression estimates of the parameters and also gives a source documentation for each component of the 185-sector final demand matrix which includes personal consumption expenditures, construction and equipment investment, imports, exports, inventory change, and purchases by all government agencies including state and local. Also explained in this chapter are the matrices of the intermediate, capital-equipment, construction, and government purchases and the balancing of these matrices to be consistent with final demands and product outputs in each year of the simulation. Chapters III, IV, and V explain in full detail the theory, the regression techniques, and the individual simulation results of the consumption functions, investment equations, and labor productivity equations, since they are the most important equations of the model. Chapter VI describes the inventory equations, and Chapter VII discusses the regression and simulation experience of the across-the-row coefficient change equations. The complete model simulation is discussed in Chapter VIII. The final chapter summarizes the results of this study.

The testing of the model is conducted by simulation. All equations are estimated through 1966 and used to forecast through 1971. Each equation is tested individually as well as by the complete model simulation. Although the findings of this study were encouraging, they reminded us that more research will be required. The overall, weighted average absolute percentage error of the five year simulation is only 4.3 percent. In view of the volatility of many industry output series, this performance seems

quite creditable. But the individual, year-by-year error plots show up plenty of places for further work. Errare humanum est, and, it appears, we are happy to say that the humans still have the upper hand in the INFORUM model.

Simultaneously with this study, the INFORUM project also completed a book which describes in great detail the concept of the forecasting model. This book, therefore, already discusses some of the preliminary findings of this thesis. In particular, the testing of the individual final demand equations is covered in 1985: Interindustry Forecasts of the American Economy, by Almon, Buckler, Horwitz, and Reimbold.

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CHAPTER I

EXPLANATION OF THE UNIVERSITY OF MARYLAND I-O MODEL

The Interindustry Forecasting Project of the University of Maryland has for a number of years maintained a 185-Sector Input-Output Forecasting Model of the American economy. The model consists of over one thousand regression equations which are used in forecasting consumer demands, investment activities, exports and imports, changes in the stock of materials used by the 185 industries, coefficient changes, and labor requirements.

The system of the model is explained in Figure I-1. The 185 products sold are listed down the left-hand side as sellers, and each row of the table shows the distribution of sales of a product among buyers. On the left side of the heavy vertical line is the intermediate use (A-matrix), while on the right of this line are the final demand components which also equal to Gross National Product (GNP). The matrices (B-, C-, and G-matrix) are used to distribute the different kinds of final demand categories to the 185 producing sectors of the model. Hence, the coefficients mentioned below refer not only to the A-matrix but also to the three matrices used for distribution.

The solution to the model is found in four steps: (1) Projections of final demand components; (2) Predictions of coefficient changes; (3) Calculations of consistent domestic production; and (4) Calculations of labor productivity and employment. The forecasting of final demand begins by projecting the level of future federal, state, and local government expenditures which are in part exogenous to the model. While state and local

BUYER / SELLER	185 PRODUCTS BOUGHT FOR USE IN PRODUCTION	GNP - COMPONENTS						
		90 CAPITAL EQUIPMENT BUYERS	28 TYPES OF STRUCTURE PURCHASED	9 GOVERNMENT CATEGORIES	4 OTHER FINAL DEMAND CATEGORIES			
185 PRODUCTS PRODUCED AND SOLD	A - MATRIX SALES TO INTERMEDIATE USE	B - MATRIX SALES TO CAPITAL EQUIPMENT INVESTMENT	C - MATRIX SALES TO CONSTRUC-TION INVESTMENT	G - MATRIX SALES TO FEDERAL AND STATE&LOCAL GOVERNMENT	PLUS EXPORTS	LESS IMPORTS	INVENTORY CHANGE	PERSONAL CONSUMPTION
	EMPLOYMENT (90-INDUSTRIES)							

Figure I-1: Distribution of Sales of 185 Products to Type of Buyer

government expenditures are predicted via regression equations, historical trends, developments in the military situation, and the domestic policy of government are the basic information used to make the federal expenditure projections.

All remaining final demand components—consumption, investment, exports and imports, and inventory changes—are predicted with regression equations in the INFORUM model. The final-demand equations are estimated for the period 1947-1971 and required a number of different estimating techniques. Because the forecasts of the model depend so heavily on the predictive performance of these final-demand equations (over 90 percent of final demand is predicted by them), the model builders as well as its users need to know the behavior and forecasting ability of each individual regression equation.

The forecasts depend not only on adequate predictions of final demand, but also on the correct forecast of the I-O coefficients. The model uses therefore a technique to account for coefficient changes induced by technological change, price-induced substitution, changes in taste, and other economic effects. The forecast of I-O coefficients also requires testing, for the size of output error which may result from this procedure needs to be known.

The evaluation of the INFORUM model will be carried out by simulating forecasts for a past period of years. That is, all stochastic equations of the model are estimated from 1947 through, say, 1966 and with these equations we simulate forecasts for the known period between 1967 and 1971.[1]

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[1] For some equations (coefficient change and inventory) the time series data started in 1958 and 1960, respectively. Consequently, the equations were estimated through 1971 and the simulation of these two items overlapped the regression period.

The following is then a brief introduction to the equations which were used in the INFORUM model at the outset of this study. Because each equation is tested by simulation, a number of alterations and respecifications of equations took place in the process of this study. For consumption and employment additional equations are tested.

A. Consumption Functions

$$(I\text{-}1) \quad C_{it} = a_1 + a_2 Y_t + a_3 P_{it} + a_4 t + a_5 \Delta Y_t; \; i = 1, 2, \ldots, 185.$$

Here C_{it} stands for personal consumption expenditures per capita of the i^{th} good in year t, Y_t is the disposable income per capita, and P_{it} refers to the relative price of the i^{th} good. In the standard equation, the income coefficient (a_2) stems from a cross-section study,[1] while the remaining coefficients are derived from time series analysis. Furthermore, with the recent decline in the population growth rate, the proportion of the population in specific age groups is changing. To account for the

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[1]The reason for preferring a cross-section income elasticity equation is explained by Almon (1), pp. 27-53. Furthermore, a discussion of the pros and cons of this method is given by Laughhunn(35).

structural change we have made an adjustment for age. Prior to this test over 60 percent of the equations used the "age-adjusted population". The selection was based on the most-variance-explained criterion. The simulation is expected to determine the importance of the aging population problem in explaining consumption expenditures.

B. Investment Equations

$$(I\text{-}2)\quad I_{it} = b_1 + \sum_{j=1}^{6} b_{j+1}\left(\frac{Q_{i,t+1-j} - Q_{i,t-j}}{Q_{i,t-j}} - \sigma_i \frac{r_{i,t+1-j} - r_{i,t-j}}{r_{i,t-j}}\right)^{*}$$

$$K_{i,t-j} + R_{it};\ i = 1, 2, \ldots, 90.$$

In this neo-classical stock adjustment equation, which is derived from the standard CES-production function, I_{it} denotes total investment of the i^{th} sector in year t, Q_{it} is the output of that sector, r_{it} is the cost of capital while R_{it} , σ_i and K_{it} refer to replacement investment, elasticity of substitution of capital for labor, and capital stock, respectively. The actual calculations of the rental rate stem from the work of Thomas Mayor[1] who in turn drew heavily on the investment behavior theory developed by

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[1] Mayor (39), pp. 26-36.

Hall and Jorgenson.[1] A complete derivation of the above equation with an explanation of the operational experience and the estimation technique used to find the capital stock of a particular industry is given in Chapter VIII.

C. Construction Equations

There is no single uniform equation that could be used to estimate all construction sectors. Consequently, we show only the equation for residential housing, while, of course, the other 27 equations are also stochastically estimated and require testing.

$$(I\text{-}3) \quad S_{rt} = \lambda(c_1 C_t + c_2 D_{t-1} + c_3 \pi_{t-1} - H_{r,t-1})$$

where S_{rt} denotes the residential construction per household in year t. C_t stands for total personal consumption expenditures (proxy for permanent income), D_t is the interest rate differential between short-term and long-term rates (proxy for credit availability), π_t is the ratio of rent over cost for housing (proxy for builder's profit expectations), H_{rt} is the stock of residential housing and λ is the adjustment rate.[2]

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[1] Hall and Jorgenson (27), pp. 391-414.

[2] The complete construction sector of the model is discussed by Horwitz (29).

D. Import and Export Equations

$$(I\text{-}4)\quad M_{it} = [m_1 + m_2(Q_{it} + M_{it} - E_{it})]*P_{it}^{m3};\ i = 1, 2, \ldots, 185.$$

$$(I\text{-}5)\quad E_{it} = (e_1 + e_2 Q_{i,t-1})*P_{it}^{e3};\ i = 1, 2, \ldots, 185.$$

Here M_{it} and E_{it} denote merchandise imports and exports of the $i^{\underline{th}}$ good in year t, respectively. The last term of each equation is the relative price level (foreign price over domestic price of the $i^{\underline{th}}$ good). Hence, m_3 and e_3 are the respective price elasticities.[1]

E. Inventory Equations

$$(I\text{-}6a)\quad V_{it} = v_1 + v_2 Q_{it}^* + v_3(Q_{it}^* - Q_{i,t-1}^*);\ i = 1, 2, \ldots, 185.$$

$$(I\text{-}6b)\quad V_{it} = v_1 + v_2(Q_{it}^* - Q_{i,t-1}^*) + v_3 V_{i,t-1};\ i = 1, 2, \ldots, 185.$$

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[1] For a full discussion on the treatment of exports and imports in an input-output model, see Buckler and Almon (13).

In these two equations, V_i is the stock of inventory and Q_i^* stands for total domestic supply of the $i^{\underline{th}}$ good.[1] Domestic supply refers here to total domestic output plus imports (excluding inventory change and diagonal use). Both equations make use of the accelerator principle and have in addition an expectation or habit formation term.

F. Logistic Growth Curve Equation for Coefficient Changes

$$(I\text{-}7) \quad a_t = \frac{c}{1 - Ae^{-bct}}$$

In this equation a_t is the coefficient in year t, c is the assymptote of the logistic growth curve, A is a constant of integration and b is the (constant) ratio of the percent change to the gap between a_t and c.[2] The coefficient change may apply to a single coefficient or may be

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[1] Actually the INFORUM model used the following equation before the start of the simulation study:

$$V_{it} = 0.6\ (v_i Q_{it} - V_{i,t-1}) + V_{i,t-1}$$

But, for the explanation of the solution procedure, it was desirable to introduce the newly selected equations at this early stage.

[2] For a complete explanation of logistic growth curve fitting and the mathematical derivation of the above equation, see (4).

used as a uniform change across-the-row. It may apply to the intermediate use coefficients, the A-matrix, as well as to the coefficients of the equipment sales (B), construction sales (C), and government sales (G) matrices. For a number of coefficients more detail information is available and consequently they are subject to more individual treatment. The coefficient change procedure will also be tested by the simulation.

G. Labor Productivity Equations

$$\text{(I-7a)} \quad \ln(L/Q)_{it} = d_1 + d_2 t + d_3(\ln Q_{it} - \ln Q_{i,t-1}); \; i = 1, 2, \ldots, 90.$$

$$\text{(I-7b)} \quad \ln(L/Q)_{it} = d_1 + d_2 A_{it} + d_3(\ln Q_{it} - \ln Q_{i,t-1}); \; i = 1, 2, \ldots, 90.$$

In these equations L_{it} is the employment (adjusted for changes in average work week) of the $i^{\underline{th}}$ industry. Hence, the dependent variable represents the change in employment per unit of output. A_{it} refers to the average installation date of total physical capital stock in use by the $i^{\underline{th}}$ industry. Both types of the equation were used in the model at the outset of this study. The variable A is introduced instead of just time to account for any gain in productivity which may result from newly installed capital equipment. When based on the regression fit, both equations were equally preferred by the model. The simulation should shed some more light on the adequacy of the two equations.

H. Government

Here the model identifies the following nine individual expenditure components:

(1) Expenditures by the Commodity Credit Corporation (CCC)

(a) Net gain or loss from direct price support programs (CCCGL)

(b) Change in stock of inventory and net loans outstanding (CCCDV)

(2) Expenditures by the National Aeronautical and Space Administration (NASA)

(3) Other federal non-defense expenditures (OFDN)

(4) Spending by the Atomic Energy Commission (AEC)

(5) The Department of Defense (DOD)

(6)-(9) State and local expenditures on education (EDUC), on health, welfare, and sanitation (HWS), on safety (SAFE), and on all other (GEN).

In short, the simulation will evaluate the consumption equations used to predict personal consumption expenditures of each of 133 PCE items identified by the 185 products; the investment equations used to predict the purchase of capital equipment by 90 investment sectors; the construction equations used to predict expenditures on structures by 28 construction types; export and import equations used to predict not only the level of imports and exports for each of the 185 sectors, but also in the aggregate the balance of payments on current accounts; the inventory equations used to forecast changes in the stock of materials held of each of the 185 products; the coefficient change technique; and finally, the productivity equations used to predict employment per unit of output of all 90 investment sectors. Government expenditures, however, will remain exogenous to the model simulation.

I. Solution procedure of the INFORUM Model

The complete model simulation will center around the following I-O equation which must be solved for each of the 185 outputs:

$$(I\text{-}9)\quad Q_{it} = \sum_{j=1}^{185} a_{ijt}Q_{jt} + \sum_{j=1}^{90} b_{ijt}I_{jt} + \sum_{j=1}^{28} c_{ijt}S_{jt} + \sum_{j=1}^{9} g_{ijt}G_{jt} + (E_{it} - M_{it}) + C_{it} + \Delta V_{it};\ i = 1, 2, \ldots, 185.$$

Equation (I-9) is graphically explained in Figure I-1. All variables shown in this equation (except of government) are endogenous to the simulation. To identify the individual error components, the simulation test of the above equation will proceed in four steps: (a) with constant 1965 base year coefficients, (b) with logistic curve, equi-proportional changes across each row, (c) with completely balanced matrices, and (d) with completely balanced matrices and final demand calculated from actual output. Point (b) represents the actual forecasting model, and its test results are compared to the behavior of the other three simulations.

Once final demand is known, output of each sector can be determined by:

$$(I\text{-}10)\quad q = (I - A)^{-1}f$$

where q is a vector of outputs, f is the vector of total final demand, and A is the intermediate demand coefficient matrix. However the solution method used in the INFORUM model is somewhat more complicated since some of the final demand components depend on current output. Consequently, in the model these components are determined simultaneously with total output. The components in question are construction and equipment investment, imports, and inventory change. The following is a short

description of the solution procedure.

A first estimate of investment demand is found by extrapolating the previous year's output. Then, with the estimated final demand (except of imports and inventory change), the model determines the level of domestic output, imports and inventory change simultaneously. Instead of employing the inverse matrix (as shown by the preceding equation), the model uses the Seidel method for the solution procedure.[1] There are at least two reasons for using this method: (1) Since coefficient changes are incorporated in the forecast, an inverse matrix would have to be recomputed every year; and (2) The Seidel process saves storage space since only non-zero coefficients need to be stored.

The Seidel process is iterative; that is, with each iteration a new output for each industry is calculated. The new output is compared with the previous output and the process is repeated until the new output converges to the previous output. The convergence process is speeded up by using the sectors in a triangular order. The model accomplishes this by entering the sectors in a decreasing order of the ratio of final demand to output.

The following are the equations to be solved simultaneously for outputs. At the beginning of the iteration process Q in equation (I-11) is the extrapolated output of the previous year. It is subsequently updated as each iteration provides a new estimate of output and intermediate demand. F in equation (I-12) refers to final demand, except for inventory changes and imports, and $D_i = 1 - a_{ii}$.

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[1] For a complete discussion of the Seidel method and proof of convergence, see Almon (2), pp. 24-25.

The solution process is started by calculating X, the intermediate demand of output (excluding diagonal use) by equation (I-11). Next we can calculate the change in inventory by equation (I-14) and solve equations (I-12) and (I-13) simultaneously for outputs and imports. As soon as this process is completed for all industries we recalcualte equipment and construction investment by making use of the new outputs. With the new final demand the whole solution process is repeated. The model currently uses two to three large cycles (recalculating final demand), and five to ten small cycles (Seidel) to converge to satisfactory results. A graphical explanation of the complete INFORUM model with solution procedure is shown in Figure I-2.

The basic requirement for the forecast simulation with the model are the regression parameters of all stochastic equations, the individual final demand components described above, and outputs of each of the 185 sectors connected by consistent I-O coefficients to final demand. The next chapter presents therefore a description and source documentation of the data used in making up the final demand components and explanatory variables of the regressions. Included is also a short explanation of the RAS[1] balancing method by which consistent I-O coefficients are calculated once outputs, inputs, and final demands are known. That is, we used this method to derive from the 1963 OBE matrix (base year matrix) a set of consistent matrices for each of the following years through 1971. A brief summary of the balancing results is also presented in the next chapter.

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[1] A good explanation of the RAS balancing method is given by Bacharach (9).

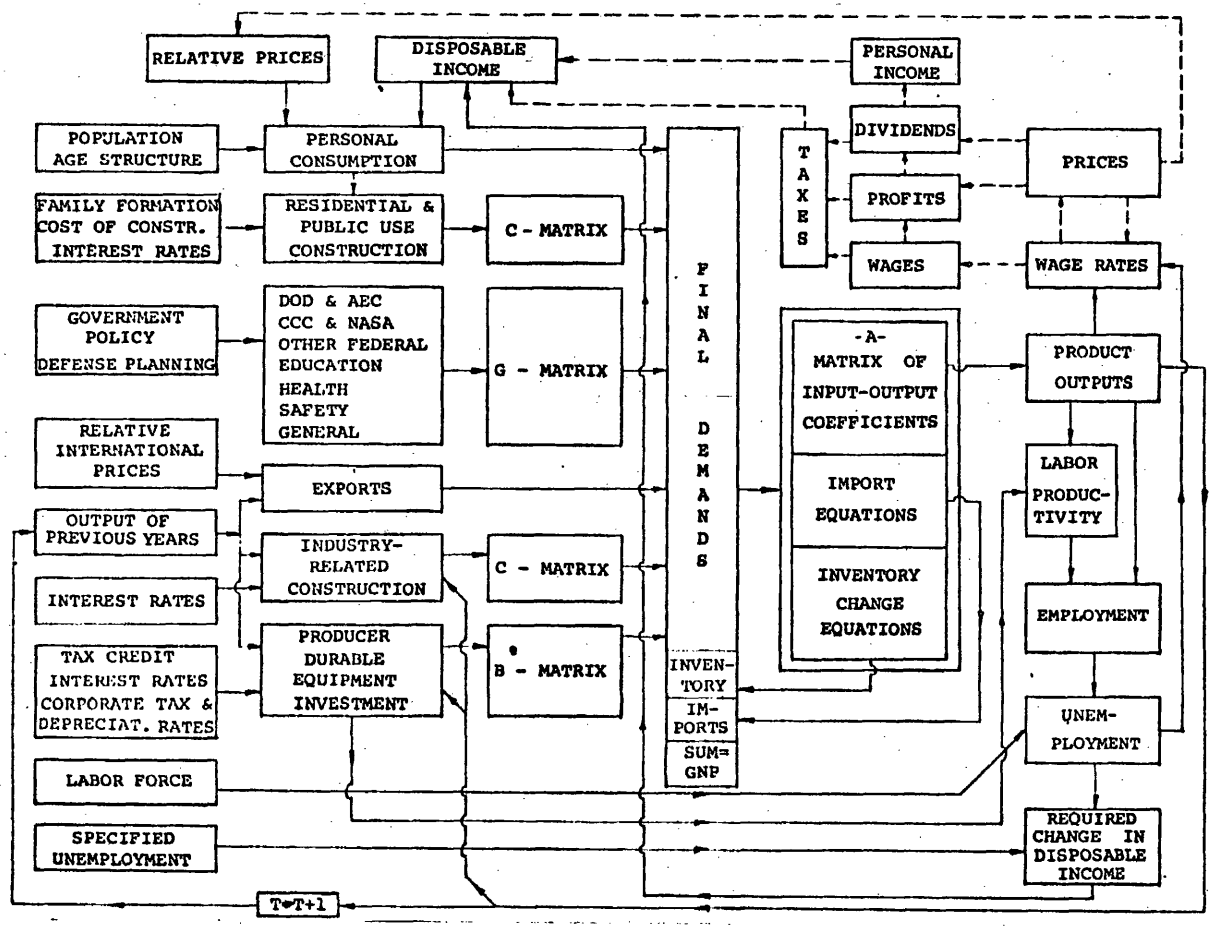

Figure I-2: Flow-Diagram of the INFORUM Model with Solution Procedure

CHAPTER II

DATA SOURCE AND DOCUMENTATION

To make these forecasts and to estimate the large number of stochastic equations one naturally needs a wealth of data. Besides the input-output transaction table and the capital sales matrix, which were obtained from the Department of Commerce for 1963, we had to collect a large number of data series. Many of these series were not readily available from published sources, and it took not only hard work but sometimes necessary improvisation to obtain the required data at the proper level of detail.[1] The following is therefore a short description of how the most important data series were obtained or created.

A. Personal Consumption Expenditures (PCE) by Type of Product

There are tables of "Personal Consumption Expenditure by Type of Product" in the National Accounts; but, though they are based on production statistics in certain "benchmark" years, they rely on less firm sources,

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[1] As explained above, the INFORUM Model identifies 185 producing sectors. Hence the data used in the model must be available at least at this level of disaggregation. Appendix II-a of this chapter shows a complete listing of the sector breakdown with included SIC-codes.

such as sales of various types of stores, in other years. These series may, therefore, creep relative to production statistics. Moreover, they group items from many different industries under a single head. The rather specific category, "China, glassware, tableware and utensils" covers products from at least four of our industries. To use these categories would only shift the problem to determining the industrial composition of each of them. The assumption that the composition had remained constant was inconsistent with statistics on product shipments. Because of the inconsistencies, we decided to discard the national accounts series and to use product shipments to determine the course of sales to PCE by each industry.

From the Department of Commerce, we obtained the amount of each five-digit product which it allocated to PCE in the 1963 input-output table.[1] We then constructed a consistent time series on 5-digit product shipments from 1958 to 1971, added imports and subtracted exports to get domestic use.[2] Next, PCE as a fraction of domestic use in 1963 was computed.

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[1]"Five-digit" refers to the five-digit level of detail of the Standard Industrial Classification. There are some 1100 five-digit products. Unfortunately, these allocations included retail-sales taxes and other excise taxes. Our PCE estimates, like those in the official input-output table, are therefore in the somewhat peculiar unit of "producer prices plus the value of excise taxes".

[2]U.S. Department of Commerce (66). The published data are inconsistent as the SIC-code (in particular at the 5-digit level) has undergone changes since 1958. For only a few sectors, as shown in the 1967 Census of Manufactures, has the Census attempted to revise the data back to 1958. Consequently, we had to complete this revision. Furthermore, we had consistent export and import series only at the 185-sector level. Within each sector, these exports and imports were pro-rated to the 5-digit level in proportion to domestic shipments. All of this 5-digit work is described by Reimbold (47).

We then assumed that this fraction remained constant in earlier and later years and computed the implied PCE at the 5-digit level. The 5-digit PCE was then aggregated to the 185-sector level.

For most products, the assumption of a constant PCE proportion is fairly realistic at the 5-digit level, as the following example illustrates.

SIC Number	Product Name	% Allocated to PCE
24991	Picture & mirror frames	85
24992	Pallets and skids	0

The first of these items, Picture frames, is a consumer good and will always be purchased chiefly by consumers. The second, Pallets and skids, is virtually never purchased by consumers. At the 5-digit level, therefore, the PCE share will be fairly constant for each of them. But both products are in the same 4-digit product class, 2499. The PCE share of the 4-digit product will shift if the product mix shifts. The assumption of constant PCE shares is therefore much sounder at the five-digit than at the four-digit level. We had to abandon the constant-PCE-share assumption and just use our judgment, however, for some products. For instance:

(1) Small arms, for they are not divided between military and civilian at the 5-digit level; the Vietnam War played havoc with the PCE share.

(2) Carpets, once principally PCE items, have found new markets as investment and construction goods.

(3) Household Furniture, which has found increasing use in offices.

To estimate consumption spending prior to 1958 by the same method required, to put it plainly, more work than it was worth, for the change in the SIC numbers in that year affected a great many 5-digit numbers. Moreover, as we shall see, early years carry less weight than recent years in determining the forecast. We therefore took a shortcut. At the 185-sector level, we regressed PCE on total sector output over the years 1958-1970. We then used these equations to "backcast" PCE from 1957 to 1947, years for which we had estimates of output, but not PCE.

The 5-digit approach could be used, of course, only on manufactured commodities. An entirely similar approach was applied to the few agricultural commodities, such as eggs which sell directly to the consumer, and to retail deliveries of coal. For the service sectors, we used the PCE tables of the national accounts in constant dollars and a table of the percentage distribution of each category among the input-output industries, both kindly given to us in full detail by the Commerce Department. In the service sectors, there is very little problem in going from the national accounts categories to our sectors.

B. Producer Durable Equipment Expenditures

The INFORUM model identifies both the producer durable equipment expenditures (PDE) by type of product as well as investment expenditures by purchasing industries. Although there are 185 producing sectors, lack of data limits the model to only 90 investing industries—aggregates of the

185. The theory of the investment equations requires that they predict equipment expenditures by industry. To transform these expenditures into purchases by kind of product (PDE), we make use of the capital coefficient matrix (See Figure I-2).

The data series on PDE by product is derived in exactly the same way we obtained the data on PCE from the 5-digit product shipments.[1] We need explain therefore only the investment data by purchaser. Again, for the manufacturing sectors, data is readily available at the 4-digit level (at least for the postwar period).[2] But to build up capital stock we needed more data. Consequently, we used the national account series on PDE to extend the investment data back to 1927. This earlier, somewhat questionable series is used only in the calculations of capital stock, while the investment functions are estimated with the genuine data starting in 1947.

In the following data documentation I_t denotes the gross equipment investment in year t in current prices. NPE_t denotes the New Plant and Equipment figure for the appropriate industry in the BEA-SEC investment survey.[3] We also use tc to denote the closest economic census year preceding year t; in the census years tc = t. The census years are 1947, 1954, 1958, 1963, and 1967. In 1965, for example, tc = 1963.

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[1] For a complete description, see (47).

[2] U.S. Department of Commerce (57).

[3] U.S. Department of Commerce, Bureau of Economic Analysis (62).

1. Agriculture

I_t = The sum of farm spending on motor vehicles and on other machinery and equipment.

Source: Farm Income Situation, U.S. Department of Agriculture.

2. Mining (except oil and gas)

Let I_{tc} = Equipment investment in the metal mining, anthracite, bituminous and non-metal industries in year tc.

Source: Census of Mineral Industries

$I_t = I_{tc} * (NPE_t \text{ in Mining}) / (NPE_{tc} \text{ in Mining})$

3. Oil and Gas Extraction

I_{tc} = investment by oil and gas extraction

Source: Census of Mineral Industries

X_t = shipments of oilfield machinery

Source: Census and Annual Survey of Manufactures

$I_t = I_{tc} * (X_t / X_{tc})$

4. Construction

The unpublished NPE series for construction is, beginning in 1963, 1.70, 1.93, 2.02, 2.06, 1.95, 2.18, 2.69, 2.40, 2.47P. Earlier years were obtained by moving the 1963 figure back by the output of SIC 3531, Construction Machinery. All of NPE was taken to be equipment.

5.-79. Manufacturing

These are taken directly from the Census and Annual Survey of Manufactures.

80. Railroads

The most comprehensive figure is obtained from the formula

$I_t = NPE_t$ (Railroad) - S_t (Railroad)

where S_t is construction from Table 1 of the U.S. Department of Commerce, Bureau of the Census, Construction Reports, "Value of New Constructions Put into Place", 1946-1963 (Revised) and 1958-1970. (See also Monthly Supplements.) The Construction expenditures of telephone and telegraph, electric utility and gas utility, used below, are from the same table.

81. Trucking

From Transport Statistics of the U.S., Part 7, Tables 9 and 12, one obtains the figure for Revenue Freight equipment acquired by Class I Common Carriers of General Freight (CICCGF). Besides these carriers, ther are "Other Common Carriers", "Contract Carriers", and "Class II Carriers Engaged in Local Service". The depreciation on their assets totals about half of the depreciation on the assets of the CICCGF. In addition to freight equipment, the carriers buy shop equipment, office equipment, and miscellaneous equipment, totaling, according to depreciation, some 15 percent of freight equipment.

We take, therefore, 1.725 = (1.50 x 1.15) times freight equipment acquired by CICCGF as our estimates for I for this sector.

82. Miscellaneous Transportation

This sector includes mainly water transportation, busses, taxis, and oil pipelines and travel agents. The "Other transportation" item in NP&E includes this sector plus sector 81. As a rough estimate, we assume that 25 percent of NPE is construction, so we set

$$I_t = .74NPE_t \text{ (Other transportation)} - I_{81,t}$$

83. Airlines

$$I_t = NPE_t \text{ (Airlines)}$$

84. Trade

The 1963 figure $3757 million is moved by the index of service industry machinery, SIC 3580.

85. Communication

$$I_t = NPE_t \text{ (Communication)} - S_t \text{ (Telephone \& Telegraph)}$$

86. Finance and Service

This is a residual sector found by subtracting all other sectors from total PDE.

87. Electric Utility

$I_t = NPE_t$ (Electric Utility) - S_t (Electric Utility)

88. Gas and Other Utility

$I_t = NPE_t$ (Gas and Other Utility) - S_t (Gas Utility)

89. Personal Automobile

The Department of Commerce allocated 15 percent of automobiles sold to individuals to PDE on the grounds that these cars are used by salesmen and others in their business. We continue this practice in the future, so that this PDE item is driven by the PCE equation for automobiles.

90. Computer Rental

This item represents leased computers which do not show up in the investment expenditures of the using establishment, nor in that of the manufacturing establishment. It is defined as 88.7 percent of the excess of production over exports of general purpose digital computers. Current data on production of these devices can be found in EDP Industry Reports, but the value found there is about twice that in the Census of Manufactures. For 1967, the Census gives $1905 million while EDP gives $3900 million. We have to adjust EDP data to the Census level.

C. Calculation of Inventory by Product*

Our object is to find a vector v of inventories by product held. But most data is on a vector h of inventories by holder. Some information, however, is directly on some elements of v. To bring both sources together, we create a matrix V in which the entry in the i^{th} row and j^{th} column is the inventory of product i held by holder j. The first step is to obtain a matrix, say B, such that each element b_{ij} shows the share of product i in a dollar's worth of inventory held by holder j. Then using our known vector of year-end stocks by holder, say h, we calculate a first estimate of V as

$$V = B\hat{h}$$

where $\hat{h}$ is a diagonal matrix with the elements of h on the diagonal.

There are 147 sectors of the model which produce goods that can be kept in inventory. Thus, the V-matrix has 147 rows. In the h-vector we have tried to distinguish as many kinds of business as possible, for the kind of business tells a lot about the types of products held. Table II-1 shows the 349 elements currently in h, along with the data source for each.

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*This method was developed by Horwitz (30).

Table II-1:
Source Data of Inventory by Holder

Cumulative Number of Columns	Number of Columns	Holder	Source of Data
1	1	Farming: Cotton.....	"The BalanceSheet of the Farming Sector", Agriculture Information Bulletin, USDA
2	1	Grains.....	"
3	1	Tobacco....	"
4	1	Vegetables, other crops..	"
7	3	Dairying, Poultry, and Eggs, Meat, other livestock products.....	"Livestock and Poultry Inventory, Jan. 1", USDA Crop Reporting Board, LvGnl (67)
15	88	Mining (incl. petroleum) and Construction.....	BEA worksheets, IRS Corporate Tax Returns (Most recent year estimated from trend)
140	125	Manufactures) (finished and in-process goods)..	Census Bureau: Annual Survey of Manufactures
265	125	Manufactures) (materials and supplies).....	"
266	1	Consumers of steel mill shapes (Manufactures)..	Census Bureau: Current Industrial Report M33-3
267	1	Consumers of brass mill shapes (Manufactures)...	"
268	2	Electric Utilities (Copper Wire & Coal)..	CIR M33-K, and Survey of Current Business
326	58	Wholesale Trade.....	Census Bureau: Current Business Report, Monthly Wholesale Trade Report, Dec. issue, and accompanying unpublished data
347	21	Retail Trade.....	Census Bureau: Current Business Report, Annual Retail Trade Report, BR-13
349	2	Trade and Transportation (margins).....	BEA, 1958 Input-Output Study

1. Producing Sectors

Each of the first 140 columns of B has one 1.0 and 0's elsewhere—for we can simply assign inventories of finished goods and goods in process directly to the producing industries. Inventories of materials (the next 125 columns) are assumed to be composed of "stockable" goods held in proportion to their use as inputs. These proportions are derived from the A-matrix of input coefficients. (See discussion below.) For steel and copper inventories, additional detail is available. Current Industrial Report (CIR) M33-3 gives, for steel, a total tonnage for holdings of all manufacturing consumers. This tonnage, multiplied by a composite price found in the Survey of Current Business, gives a control total for the steel row in the V-matrix. The CIR publication also assumes that 80 percent of the stocks held by steel wholesalers consist of steel alone; this sum is placed directly into the V-matrix. Detail concerning brass mill shapes is given in CIR M33-K. Subtotals of holdings by certain two-digit SIC groups and electric utilities are given, and there is a breakdown by shape for the total. By using this data and rough weighted averages of the appropriate BLS wholesale prices for wire and mill shapes, several control subtotals were obtained on groups of sectors within the copper row of the B-matrix. The prices used for estimates such as this are the average of the December and the following January prices; this average is BEA's method of approximating year-end prices.

Inventories of copper wire and coal held by electric utilities are also reported; the coal inventories, in the Survey of Current Business; the copper, in CIR M-33-K. The copper wire data cover only investor-owned firms, which account for 75 percent of all power sales to ultimate consumers, so an estimate of the total copper wire inventories of utilities was obtained by bringing this ratio up to 100 percent.

These known values are inserted into the V-matrix. The steel or copper row (or part of it, in the case of copper) is then adjusted proportionately (excluding the known row element).

2. Wholesale and Retail Trade

Almost as much inventory is held in the trade sectors as in manufacturing, but the data are much more scarce. We try to identify as many kinds of business as are permitted by the availability of annual data. There are presently 79 kinds, 58 in wholesale trade, and 21 in retail.

The list of wholesale kinds of business comes from the 1963 Census of Business. Annual inventory data are not carried in quite this much detail in the Monthly Wholesale Trade Report, but Census has supplied us with a set of unpublished statistics. Merchant wholesalers, independent traders who hold title to the goods they sell, are the only part of wholesale trade for which annual data is published. They account for about 75 percent of all wholesale inventories. Nonpublished annual

annual data for other wholesalers, such as manufacturers' sales branches and assemblers of farm products, were obtained from BEA worksheets. These were estimated by BEA, using detail information from the 1963 Census of Business. No annual data is separately available for petroleum bulk stations and terminals, although in Business Census years, we see that they are quite important. Yearly inventories were estimated by using changes in prices and in total physical stocks (found in the Minerals Yearbook), then benchmarking back to 1963. Retail trade, with fewer types of business, is easier to handle, and the inventory data may simply be read out from the Annual Retail Trade Report.

To calculate the trade portion of the inventory coefficient matrix "B", we would like to know the share of each product in the total inventory. On those shares there is no data at all. There is, however, data on sales by "product line". Even this information is available only in census years, so in the interim we assume that in any one kind of business there is a constant ratio of the sales of any product to the total sales. For any non-census year, all we need do is multiply though by a vector of total sales. The derivation of these sales shares, however, is not an easy task, since the commodity lines in trade are not at all comparable to the SIC or to our own sectoring. Moreover, the 225 wholesale lines are not even comparable to the 173 in retail trade. Thus, it was necessary to analyze the content of each line and assign all or part of it to one of the 139 input-output sectors. If a line had to be broken up, the product shipments from the 1963 Census of Manufactures were used for forming ratios.

As for the inventory calculation itself, it was unreasonable to apply the same inventory-sales ratio for every product held in a certain business. Thus, the basic assumption was that the trade inventory-sales ratio of product i in kind-of-business j (r^t_{ij}) is proportional to that of finished product i in manufacturing industry i(r_i^m). The constant of proportionality is the term that forces the total figures to add correctly:

$$(II\text{-}1) \qquad r^t_{ij} = \frac{r^m_i V_j}{r^m_i S_{ij}}$$

where V_j is the inventory total for business j and S_{ij} is the sales of i in business j. After algebraic manipulation we see that

$$(II\text{-}2) \qquad B_{ij} = \frac{V_{ij}}{V_j} = \frac{r^t_{ij} S_{ij}}{\sum_k r^t_{kj} S_{kj}}$$

where $r^t_{ij} = V_{ij}/S_{ij}$. Hence, to estimate inventories by product in trade, we need only to utilize the sales by product (from above) and the shipments for each input-output industry, in addition to the inventory data itself.

3. Inventory Valuation Adjustment (IVA)

In order to obtain consistent statistics for the national accounts,

BEA adjusts inventory changes for differences between book value (as reported) and current replacement cost (which is desired). The calculation is complex and depends upon knowledge of reported accounting practices, but basically it is just a price adjustment. Since we know the inventories held by product and the actual IVA for trade and manufacturing in the base year, we can use the input-output deflators to estimate IVA by input-output sector. Last year's inventories by product are put into current prices and then adjusted proportionately to the correct total, in such a way that all entries, positive and negative, move in the same direction.

Ideally, year-end prices should be used for this calculation, but we used annual averages because they were readily available to us. A special problem occurs in agriculture, for which there is no IVA entry in the national accounts. This absence is due to the practice of computing agricultural inventory change as the change in quantity valued at an average price, rather than the usual subtraction of two current-dollar figures. For consistency, however, we have also applied an IVA-type adjustment to the agricultural sectors, (1-8).

4. Trade, Transportation, and Insurance Margins

In the input-output model it is necessary to have all items reflect producer's prices rather than purchaser's prices. Therefore, at the retail level, we must strip off the wholesale trade margins for each product held. These margins for transportation and wholesale trade has

remained constant since 1963 (based on available BEA data). Retail trade stocks were then adjusted to producer prices using these ratios, and the margins placed into the transportation and trade rows (Manufactures' finished goods are not adjusted upward for manufactures' profits, for these profits are not actually realized until after the good is sold). Insurance margins are small and were neglected therefore.

D. Gross Domestic Outputs

The full statistical base for computing the output of an industry as done by the Department of Commerce is available only in economic census years, 1958, 1963, 1967. We have to be content with a simpler series which can be easily calculated each year. The sources of these are described in Table II-2. Each industry's 1963 output from the government input-output table has been moved forward and backward by the series described here. In the table SAUS,SCB, and GPO are abreviations for Statistical Abstract of the U.S., Survey of Current Business, and Gross Product Originating.

In the agricultural sectors, the definition of output should be production, not marketing. However, the basic source for these sectors is farm marketings. Production may be significantly larger than marketing when, for example, a farmer raises part of the feed for his livestock. For crops, we have adjusted the marketing statistics to include other production.[1]

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[1] For Grains (5) and Other crops (7), production that was not marketed was estimated by taking the difference between Farm value (SAUS 72-T.1010, "Principal Crops - Acreage, Production, Value") and Marketings of principal crops (SAUS 72-T.990, "Farm Marketings by Price Support Status"). Corn, wheat, sorghums, oats, and barley were used to adjust grains; hay was used to adjust Other crops.

TABLE II-2: SOURCE LISTING OF OUTPUT INFORMATION

No.	Sector	Current Dollar Output Source	Deflator Source
1.	Dairy products	SAUS 72 T.991 - Dairy Products	Wholesale Price Index (WPI) - Fluid Milk
2.	Poultry and eggs	SAUS 72 T.991 - Eggs, Broilers, Turkeys, and other poultry	Prices received by farmers in Survey of Current Business (SCB) - Poultry and eggs
3.	Livestock	SAUS 72 T.991 - Hogs, Cattle, Sheep, Wool, Other Livestock products	WPI - Livestock
4.	Cotton	SAUS 72 T.991 - Cotton	Prices received by farmers - Cotton
5.	Grains	SAUS 72 T.991 - Food grains, feed grains	WPI - Livestock
6.	Tobacco	SAUS 72 T.991 - Tobacco	Prices received by farmers - Tobacco
7.	Other crops	SAUS 72 T.991 - Oil bearing crops, Vegetables, Fruits and tree nuts, Other crops	WPI - Fruits and vegetables - fresh and dried
8.	Forestry and fishery products	Fishery - Value of catch SAUS 72-T.1061, "Fisheries - Quantity and Value of Catch" Forestry - Cost of Stumpage[1]	Unpublished - Bureau of Economic Analysis (BEA) Gross Product Originating (GPO) Agr. Services, forestry, fisheries
10.	Agricultural services	GPO - Agricultural services, forestry, fisheries	GPO

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[1]Cost of stumpage (C.S.) for any year t is estimated by

$$(C.S.)_t = (C.S./C.M.)_{tc} * (C.M.)_t$$

Where C.M. stands for cost of materials and tc refers to the most recent census year. The Census of Manufactures and Annual Survey of Manufactures product cost of stumpage and/or materials for the lumber sectors - Standard Industrial Classification (SIC) 2411, 2421, 2426, 2429 - are the data source.

TABLE II-2: (Cont'd)

11.	Iron ore	SAUS 72 T.1083, "Mineral Production" - Value	
		SAUS 72 T.1083 - Iron ore	SAUS 72 T.1087, "Average Price of Selected Mineral Products" - Iron ore
12.	Copper ore	SAUS 72 T.1083 - Copper ore	SAUS 72 T.1087 - Copper, electrolytic
13.	Other nonferrous metals	SAUS 72 T.1083 - Total metals, less Iron ore and less Copper ore	Minerals Yearbook 1969 T.30, "Index of Average Unit Mine Value of Minerals Produced" - Nonferrous metals[1]
14.	Coal mining	SAUS 72 T.1083 - Bituminous and lignite, Pa. anthracite	WPI - Coal
15.	Crude petroleum	SAUS 72 T.1083 - Total mineral fuels less Coal.	WPI - Crude petroleum
16.	Stone and clay	SAUS 72 T.1083 - Total Non-metals less chemical fertilizer mining	GPO - SIC 14
17.	Chemical fertilizer mining	SAUS 72 T.1083 - Barite, Flourspor, Potassium salts, Borate, Phosphate rock, Rock salt, Sulfur	GPO - SIC 14
18.	New construction[2]	SCB july issues. National Accounts T.5.2. - "Purchases of Structures by Type	SCB T.5.3
19.	Maintenance and repair construction	GPO	GPO

[1]Nonferrous metals price index was adjusted to exclude copper.

[2]The appropriate output for new construction is obtained by multiplying structures by the new construction matrix.

TABLE II-2: (Cont'd)

Manufacturing[1] (20-150)

151.	Railroads	SAUS 72 T.872 "Operating by Type of Transport"	
		SAUS 72 T.872-Railroads	GPO-SIC 40
152.	Busses and local transit	SAUS 72 T.872-Motor carriers of passengers	PCE-Sector 152
153.	Trucking	SAUS 72 T.872-Motor carriers of property	GPO-SIC 42
154.	Water	SAUS 72 T.872-Waterlines	GPO-SIC 44
155.	Airlines	SAUS 72 T.872-Domestic scheduled air carriers	PCE-Sector 155
156.	Pipelines	SAUS 72 T.872-Pipelines	GPO-SIC 46
157.	Transportation services	GPO-SIC 47	GPO-SIC 47
158.	Telephone and telegraph	SAUS 72 T.793, "Telephone and Telegraph Systems" - Operating revenues, domestic telephones, and Total	GPO-Telephone and Telegraph
159.	Radio and TV broadcasting	SAUS 72 T.800, "Commercial Broadcast Stations, Number and Revenues" - Total revenues	GPO-Radio and TV
160.	Electricity	SAUS 72 T.825, "Electric Utilities - Balance Sheet and Income Account of Privately-Owned Companies" - Electric operating revenues	Consumer Price Index (CPI) Electricity

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[1]The value of product shipments by 4-digit SIC are the sources for manufacturing outputs. This data, from the Annual Survey of Manufactures, becomes available with about a two-year lag. The deflators for 4-digit shipments are unpublished data supplied by BEA.

The total output includes, besides the producer's value of products shipped, the excise and retail sales taxes on those products, plus the value of contract services, plus the increase in finished product inventories.

TABLE II-2(Cont'd)

161.	Natural gas	SAUS 72 T.835, "Gas Utility Industry-Summary" - Revenues	CPI-Gas
162.	Water and sewer services	SAUS 72 T.657, "Summary of State and Local Government Finances" - Water supply revenue	CPI-Residential water and sewer services
163.	Wholesale trade[1]	GPO	GPO
164.	Retail trade	GPO	GPO
165.	Banking	FDIC Annual Report, Table 113, Commercial bank non-interest income; + T.2.5. SCB, "Services Rendered Without Payment From Financial Intermediaries".	PCE (Personal consumption expenditures) - sector 165
166.	Insurance	SCB July issues T.1.12, "National Income by Industry"	PCE-sector 166
167.	Owner-occupied housing	SCB July issues T.2.5, "Personal Consumption Expenditures" + .75 x Rental value of Farm Dwellings.	SCB T.26
168.	Real Estate	SCB T.1.12, Income + SCB T.6.9, Capital Consumption Allowances	PCE-sector 168
169.	Hotels and Trailer Courts[2]		
170.	Personal and Repair Services		
173.	Auto Repair		
174.	Movies and Amusements		
175.	Medical Services		

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[1]The output of trade is trade margins only. The entries in the trade rows show the trade margins on all items bought by a particular industry or type of final demand.

[2]Outputs for the following service sectors are derived by adding an estimate of intermediate use to personal consumption expenditures. The estimates of intermediate use are derived by multiplying outputs for all other sectors by the 1969 A-matrix coefficients for the service sectors. PCE deflators were used to convert series to 1969 constant dollars.

TABLE II-2(Cont'd)

176.	Private Schools and Non-Profit Organizations		
171.	Business Services	SCB, T.1.12 Misc business services + Legal services + Misc. Professional services.	PCE-Sector 171
172.	Advertising	SAUS 72 T.1259, "Advertising - Estimated Expenditures"	GPO-SIC 73
177.	Post Office	SAUS 72 T.786, "U.S. Postal Service - Summary", Total Revenues	PCE-Sector 177
178.	Federal Government Enterprises[1]		
180.	Other State and Local Enterprises		
182.	Business Travel (Dummy)		
183.	Office Supplies (Dummy)		
184.	Unimportant Industries (Dummy)		
185.	Computer Rental[1]		

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[1]Outputs for these sectors are obtained in the same manner as the service sectors; i.e., using interindustry coefficients to estimate intermediate flows. Sector 179 is not defined and sectors 181, non-competitive imports, has no output. The computer rental industry in the Maryland model has only one input (Sector 114-Computers and related machinery) and its sales are the value of rentals to other industries and final demand. Our study of computer demand estimated a simple equation relating computer shipments and rental value:

$$S_t = 2.22(R_t - .87R_{t-1})$$

The output series prior to 1966 is scaled by a monthly rental value index reported by Chow in "Technological Change and Demand for Computers", (American Economic Review, Dec.1967). Subsequent outputs have been calculated by turning the above equation around and solving for R_t; the shipments data comes from EDP Reports. The deflator used is the 4-digit deflator for electronic computing equipment.

E. Labor Force Statistics and Employment

Unfortunately, there is no single set of statistics on employment by industry in which the industry employment adds up to the total employment reported in the labor force statistics. Ideally, we would like to have, for each industry, all employees, all self-employed, and all unpaid family workers, for all these are counted as "employed" in the labor force. But we have to settle for less and to use different sources for different industries. The sources are three:

(1) Employment and Earnings and Monthly Report on the Labor Force (U.S. Department of Labor). The labor force table shows total employment in agriculture. This total is exactly what we are looking for, because it fits perfectly with the labor force estimates.

(2) National Income Accounts, Tables 6.3, 6.4, and 6.6 (July issues of the Survey of Current Business). This source permits us to include self-employed. It is therefore used where self-employment is important, namely, construction, transportation, communication, trade, and all of the service industries (agricultural services, forestry and fishery included in employment sector 1). It is also the most convenient source for government enterprises and the government industry. It does not provide sufficient industry detail in Manufacturing and does not permit adjustments for the length of the work week in productivity calculations. By definition, Table 6.6, "Number of persons engaged in production by industry", is derived from Table 6.4, "Number of full-time equivalent employees by industry", by adding estimates of self-employment by industry. Therefore, we subtract the figures in Table 6.4 from those in Table 6.6 to estimate the number of self-employed by industry. To this estimate, we add the figures in Table 6.3,

"Average number of full-time and part-time employees by industry". The reason for counting the part-time employees on the same basis as full-time employees is that they are so counted in the labor force statistics.

(3) The same document used for source 1 also provides, in the Establishment Data section, the most detailed information by industry. It was therefore used for all of the manufacturing industries. A useful historical compilation is found in Employment and Earning Statistics for the United States, 1909-1967 (U.S. Department of Labor: October, 1967). (We put employment for SIC 138 under the Petroleum Extraction industry rather than under the Construction industry as specified by the sectoring plan of the I-O table.)

The total employment from these sources for the years 1960, 1965-1971 are shown in the line "Total Jobs in Model" in the attached Labor Balance table. Below this line appears the number of persons employed as reported in the labor force statistics (more correctly, this line shows total civilian employment plus military employment derived from source 2). Notice that the total jobs exceed the total employed. The reason naturally lies in the fact that many people hold more than one job. In the labor force, they are counted as one employed person, but in our jobs-by-industry statistics, they necessarily turn up once for each job. To convert our reconciliation adjustment into a true "multiple job adjustment", we add self-employed in manufacturing and unpaid family workers[1] in non-agricultural industries. The result appears in the bottom line of Table II-3.

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[1]From Source 1 (January issue), "Employed persons by class of worker, sex and age.

Table II-3:
Labor Balance: 1960, 1965-1971
(in 1000's)

Source*	1960	1965	1966	1967	1968	1969	1970	1971
1 Agriculture	5,458	4,361	3,979	3,844	3,817	3,606	3,462	3,387
2 Agricultural Services, Forestry & Fisheries	305	325	325	330	334	345	351	357
2 Mining	737	670	667	650	646	659	665	654
2 Construction	3,596	3,990	4,079	4,012	4,114	4,323	4,227	4,305
3 Manufacturing	16,796	18,062	19,186	19,447	19,781	20,167	19,349	18,529
2 Transportation	3,045	2,713	2,797	2,834	2,878	2,907	2,880	2,833
2 Communication	844	885	933	972	983	1,055	1,128	1,130
2 Utilities	628	638	647	658	669	685	702	710
2 Trade	13,818	15,021	15,550	15,925	16,441	17,076	17,425	17,761
2 Finance and Insurance	2,977	3,348	3,436	3,537	3,689	3,875	3,999	4,099
2 Services	11,580	13,485	14,013	14,360	14,791	15,231	15,575	15,733
2 Government	11,276	13,211	14,451	15,234	15,976	16,106	16,139	16,119
Total Jobs in Model	71,060	76,709	80,063	81,812	84,119	86,035	85,902	85,617
2 Persons Employed	68,294	73,820	76,051	77,104	79,437	81,365	81,723	81,858
Reconciliation Adjustment	2,766	2,889	4,012	4,708	4,862	4,670	4,179	3,759
1 Unpaid Family Workers (outside agriculture)	529	591	500	506	485	517	502	521
2 Self-Employed in Manufacturing	375	349	340	323	325	315	331	327
Multiple Job Adjustment	3,670	3,829	4,852	5,537	5,672	5,502	5,012	4,607

*For explanation of source numbers, see text.

F. Government Expenditures

Based on the availability of data, total expenditures by agencies of the federal government have been broken down into five parts, namely: two types of defense oriented expenditures (AEC and DOD) and three types of non-defense expenditures (CCC, NASA, and Others).

1. Federal Defense Related Expenditures

In general, detail information on government purchases of goods and services are rather scarce. This holds also for the purchases by the Department of Defense (DOD) and Atomic Energy Commission (AEC). Nevertheless, there exist two basic sources of data: one, the purchasing records of the Department of Defense; and two, the shipment records of defense-oriented industries.

Since the defense-oriented shipment records are rather incomplete, one is tempted to use the DOD records. This approach was taken by R.P. Oliver of the Bureau of Labor Statistics (BLS) in an attempt to trace down the employment effect of major industries resulting from defense-related expenditures.[1] The way the DOD-Data are recorded, however, causes problems. That is, the data are principally based on payment and awards of contracts rather than actual shipments. Consequently, the use of these data distorts the timing of the output effect. Furthermore,

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[1] Oliver (45), pp. 9-16 and (46), pp. 3-11.

the input-output analysis is based on outputs in producer prices while the DOD records reflect the cost in purchasing prices. For these and a number of other reasons has the Office of Business Economics (OBE) based their defense vector on industry shipments and had made no use of the DOD records employed by Oliver.

For similar reasons and also to stay compatable with 1963 OBE Table,[1] the INFORUM defense vector, at least partially, is based on industry shipment data. The main source of information for these data is the Current Industrial Report (MA-175) of shipments of defense-oriented industries.[2] But there are at least two dificiencies connected with this report: (1) the data are reported on an industry rather than product basis; and (2) the data reported cover only a specific group of manufacturing sectors. More specifically, they cover less than 60 percent of total defense expenditures. Nevertheless, the report identifies government purchases in producer prices by prime- and sub-contracts of the DOD, NASA, AEC, and Other agencies.

We relied heavily on MA-175 in constructing the INFORUM defense vector. But since only about 60 percent of total defense expenditures are covered by this report, we had to use the other sources mentioned above as well. The following is a description of the actual steps

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[1] U.S. Department of Commerce (66), pp.186-191.

[2] U.S. Department of Commerce (56)

taken in creating the two DOD and AEC components of the defense sector for 1964-1971.

(1) We started out with the 1963 OBE[1] defense vector $OBEDEF_{1963}$ and subtracted from it the published defense-oriented shipments $MA175_{1963}$.[2] The resulting vector of residual defense expenditures $RESDEF_{63}$ remained to be explained.

$$RESDEF_{i,1963} = OBEDEF_{i,1963} - MA175_{i,1963}, \quad i=1,2, \ldots, 185.$$

(2) To get a first estimate of RESDEF for the period 1964-1971, we used the growth rates of the corresponding sectors of the Oliver defense vectors $OLIVER_{63-71}$ and applied them to $RESDEF_{63}$.

$$RESDEF_{it} = \left(1 + \frac{OLIVER_{kt} - OLIVER_{k,1963}}{OLIVER_{k,1963}}\right) * RESDEF_{i,1963},$$

$$i = 1,2, \ldots, 185.$$

so that the $i^{\underline{th}}$ INFORUM sector is included in the $k^{\underline{th}}$ of Oliver sectors.

(3) Next we obtained from the National Accounts[3] total defense expenditures (TOTDEF) and subtracted from it compensation

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[1] U.S. Department of Commerce (66), pp. 186-191.

[2] See (56).

[3] U.S. Department of Commerce (61), Table 3.11.

of employees (WAGE), construction expenditures (CONSTR), and the sum of all MA175 sectors.

$$RNADEF_t = TOTDEF_t - WAGE_t - \sum_{i=1}^{185} MA175_{it};\ t = 1963, \ldots$$

We used this residual (RNADEF) to scale up or down the entries of $RESDEF_{64-71}$.

$$RESDEF^*_{it} = RESDEF_{it}(RNADEF/\Sigma RESDEF)_t;\ t = 1963, \ldots$$

(4) Finally we added $MA175_{64-71}$ to the $RESDEF_{64-71}$ to get the estimate of total defense expenditures by 185 outputs from 1964 through 1971.

$$DEFENS_{it} = MA175_{it} + RESDEF^*_{it},\ i=1,2, \ldots, 185;\ t=1963, \ldots$$

A listing of the defense expenditures (AECDOD) by 185 product classes in current dollars for the years 1964-1971 is shown in the appendix of this chapter. Mainly caused by the United States engagement in the Vietnamese War, defense purchases peaked in 1968, and amounted to almost 46 billion dollars. They then decreased to nearly the pre-escalation level of about 35 billion in 1970.

2. Federal Non-Defense Expenditures

Out of total federal non-defense expenditures on goods and services, the purchases by the Commodity Credit Corporation (CCC) and the National Aeronautical Space Administration (NASA) have fluctuated more than any other (federal non-defense) agency's expenditures. Consequently, to predict future federal purchases it is essential to separate the purchases by these two agencies from other non-defense expenditures. For example, total expenditures on goods and services by NASA rose from $2.9 billion in 1963 to about $5.3 billion in 1966 only to return to less than $2.0 billion in 1970. Even stronger fluctuations in expenditures were shown by the CCC. The purchases of $1.3 billion in 1963 changed to a net sales of $1.6 billion in 1968 and finally declined to almost no gain or loss in 1970.[1] The reported gains or losses from CCC operations stem from changes in stock of commodities, changes in the amount of commodity loans outstanding and direct price support programs (selling and buying of surplus commodities). Hence, the treatment of the Commodity Credit Corporation must distinguish between actual gains or losses of commodity price support operations and the temporary effect of inventory changes, be it loans or commodities.

a. Commodity Credit Corporation Operating Cost (CCC)

The Office of Business Economics (OBE) has treated the CCC operations in a somewhat peculiar fashion.[2] The federal non-defense column (97.20)

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[1] Figures are given in 1969 constant dollars.

[2] See (66), pp.176-195, Columns and Rows 78.03 and 97.20.

includes only the net changes in CCC stock of commodities and loans outstanding while the actual accrued cost (net losses, transportation and warehousing cost) of the price support programs are shown in a special CCC-column (78.03) within the "intermediate" part of the I-O table. In other words, a purchase of cotton shows up in the cotton row of column 97.20 as an addition to the cotton stockpile. Hence, the commodity inventory is always evaluated at the purchasing (support) price. Next, the CCC sales of cotton shows up again in the federal-non-defense column at exactly the cost of purchase while the difference between the purchase and sales price, including handling charges, is entered in the CCC-industry column (78.03). This CCC column becomes a peculiar industry with positive inputs, zero outputs, and infinite input-output coefficients.

The reason for creating the CCC-industry is to keep the CCC loss out of GNP; in the GNP, the cotton is evaluated at market prices rather than at the support level. The treatment of the CCC in the INFORUM model is somewhat different but achieves the same results. Instead of creating the CCC-industry column, the gain and loss vector is treated as a final demand component and to offset the GNP effect the negative of the CCC column totals is inserted into the CCC row. This method relates negative output to no input, which causes no computational problems.

The INFORUM model also separated the change in CCC stocks and loans outstanding from the government non-defense vector (97.20). The data for the two CCC columns stem from the CCC Annual Report.[1] This is a

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[1] U.S. Commodity Credit Corporation (55).

fiscal year report; but since July-December subtotals are published as well, one can easily convert the data into an annual series. The following individual items are identified in this report: (1) net gains or losses from direct price support programs; (2) change in net stock of commodities; (3) change in net loans outstanding; and (4) transportation and warehousing charges. We combine items (1) and (4) to find CCC's operating cost, (CCCGL), and sum (2) and (3) to get transient, change-of-stock costs, (CCCDV).

b. National Aeronautical Space Administration (NASA)

The main items purchased by this agency are guided missles, communication equipment, aircraft, aircraft engines and equipment. The source of data is again the Current Industrial Report of defense-oriented shipments.

c. Other Federal-Non-Defense Expenditures (OTHFND)

This is the residual vector between total Federal-Non-Defense expenditures (FND) and the sum of CCCGL, CCCDV, and NASA. There exists no single source for these OTHFND purchases. Consequently, we made use of the 1963 OBE-FND vector (column 97.20). First, we calculated the 1963 Other-Federal-Non-Defense vector by:

$$OTHFND_{i,1963} = OBEFND_{i,1963} - NASA_{i,1963} - CCC_{i,1963},$$
$$i = 1,2, \ldots, 185.$$

Then we used the proportions of this vector to distribute total Other-Federal-Non-Defense expenditures (TOTFND) which were obtained from the

National Income Accounts.[1]

$$OTHFND_{it} = TOTFND_t * OTHFND_{i,1963} / \sum_{j=1}^{185} FND_{jt},$$

$$i = 1,2, \ldots, 185; \; t = 1964, \ldots$$

The sum of these individual Federal-Non-Defense components must, of course, add up to total non-defense purchases of goods and services.

$$FND_{it} = CCCGL_{it} + CCCDV_{it} + NASA_{it} + OTHFND_{it},$$

$$i = 1,2, \ldots, 185; \; t = 1964, \ldots$$

Furthermore, total federal government purchases of goods and services are found by summing up defense and non-defense expenditures.

$$F_{it} = DEFENS_{it} + FND_{it}, \quad i=1,2,\ldots,185; t=1964,\ldots$$

The individual components of total federal expenditures in current dollars for the years 1964-1971 are shown in Appendix II-b of this chapter.

3. State and Local Expenditures

Expenditures by state and local governments are treated in the same way as other federal expenditures. That is, we use the national account figures and distribute them by the constant proportion of the 1963 I-O table.

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[1] See (61), Nos. 7, Table 3.11.

G. Balancing of the Transaction Matrices

The transaction matrices of the INFORUM model (Equation I-9 and Figures I-1 and I-2) are only available for certain base years. The most recent intermediate sales matrix is for 1963[1] and a capital flow matrix was made available only for 1958[2] and 1963.[3] To be sure, there are also commodity transaction tables for 1947[4], 1958[5] and 1966.[6] But the lesser detail used in these matrices does not meet our requirement.[7]

We applied the RAS balancing procedure to the 1963 commodity and capital flow matrices to get a set of consistent matrices for each year of the simulation.[8] The following is a brief explanation of the balancing technique and a discussion of the balancing results.

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[1]U.S. Department of Commerce, Office of Business Economics (66).

[2]U.S. Department of Labor, Bureau of Labor Statistics (68).

[3]U.S. Department of Commerce, Office of Business Economics (63).

[4]U.S. Department of Commerce, Office of Business Economics (64).

[5]U.S. Department of Commerce, Office of Business Economics (65).

[6]U.S. Department of Commerce, Office of Business Economics (66).

[7]The 1947 and 1958 tables are made consistent with the 1963 table. However, BEA has made this revision only at the 80 sector detail. Similarly, the 1966 table identifies only 80 sectors.

[8]This method was originally suggested by Stone (51). The name stems from the row (r) and column (s) adjustment factors, which are used to update the base year matrix (A).

1. RAS Balancing Method

The RAS balancing technique was first used in 1960 by Professor Stone's Cambridge Growth Project.[1] It has found wide acceptance as the most common tool used in updating transaction matrices. Following the Stone technique, the link between two matrices of different time periods are two diagonal transformation matrices of row and column adjustment factors.

$$(II\text{-}3) \qquad A_t = \hat{R}_t A_o \hat{S}_t$$

Where $\hat{R}$ and $\hat{S}$ are diagonal matrices, and $1'A_t = u_t$ and $A_t 1 = v_t$ are the column and row controls, respectively. The row adjustment factors (r) in this equation explain the rate by which additional output is absorbed by all input sectors. Hence, they are also called absorption factors. The column adjustment factors (s), on the other hand, explain the extent of input substitution (change in composition of intermediate inputs per unit of a given output). They are also called fabrication factors.

The solution to equation (II-3) is found iteratively. Convergence is assured as long as for a given set of prices the output of each sector exceeds its input. This condition also assures that all elements of $\hat{R}$, A, and $\hat{S}$ are non-negative. Although it is not possible to identify all causes for coefficients to change, we know of at least three reasons: (1) technological change, (2) price induced substitution, and (3) change in taste.

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[1] Department of Applied Economics, University of Cambridge (20).

The coefficient change effect of (1) may not be large, particularly if either the Leontief technology (constant volume coefficients) or Cobb-Douglas technology (constant value coefficients) come close to describing the economy. Consequently, an argument can be made for both balancing in value or volume terms. The former method is already described by equation (II-3). But for the Leontief case, the equation becomes:[1]

$$(II\text{-}4) \quad A_t = \hat{R}_t \hat{P}_t A_o \hat{P}_t^{-1} \hat{S}_t$$

Where $\hat{P}_t$ is a diagonal matrix with the following price ratios (p_{io}/p_{it}) as its elements.

To find the balancing solution to (II-3) or (II-4), the RAS method scales rows and columns of the base year matrix progressively up or down to the correct controls until the final adjustment factors approach unity. We simply first scale all the elements in each row to the correct row sums. Then we scale the elements of each column to obtain the right column sums. Each row-scaling with subsequent column-scaling is one iteration. We repeat this process until all rows and columns add up to the correct sums. If we let r^k and s^k be the row and column factors of the $k^{\underline{th}}$ iteration, and K stands for the number of iterations required to convergence, the row and column adjustment factors are found by:

$$(II\text{-}5) \quad r_{it} = \prod_{k=1}^{K} r_{it}^k, \text{ such that } r_{it}^K \sim 1; \; i = 1, 2, \ldots, m.$$

$$(II\text{-}6) \quad s_{jt} = \prod_{k=1}^{K} s_{jt}^k, \text{ such that } s_{jt}^K \sim 1; \; j = 1, 2, \ldots, n.$$

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[1] As specific technologies are usually unknown, the Cobb-Douglas production function approach is widely used in studies of interindustry behavior. This assumption was also made in studying I-O price information (48).

While the Stone balancing procedure does not depend on any specific production function, it allows us to study production isoquants as the economy moves from year 0 to year t. A complete analysis of the balancing results with particular emphasis on production techniques and substitution effects would go much beyond the scope of this dissertation and should be undertaken elsewhere. We have, however, tested the validity of the Cobb-Douglas technique, as the balancing was carried out in value as well as in volume terms.

2. Data Requirement

To start the RAS balancing procedure, one needs to know the row and column controls of the matrices for each year of balancing. The row controls of the A, C, and G matrix (from now on just referred to as A-matrix) are total output minus final demand, except for construction expenditures and the portion of government which are included in the balancing procedure. (See Appendix II-b, last column of each table.)[1]

A column control is total intermediate input, which is also the residual between total value of output and value added. The data on both of these items, however, is not readily available for all the 185 sectors. The cost of material inputs for all manufacturing sectors is published annually, but it excludes contract work and services and is therefore

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[1] To our knowledge, this is the only available time series of final demand components at this level of detail. Most balancing operations performed elsewhere used constant coefficient bridge tables to overcome this data problem. See Sarma (49).

incomplete.[1] To get the proper controls of the first 185 columns, the column total of the OBE table are moved forward by the index of cost of materials for manufacturing and by the index of production for the others. The remaining A-matrix column controls are, of course, the purchase of structures by 28 types and the government expenditures by category.

The controls of the capital flow matrix are more readily available. The row controls are represented by the 185-order PDE vector and the column controls are the equipment purchases by 90 investment sectors. Only the first 185 columns of the A-matrix represent the true I-O transaction table, the other three matrices are so called bridge tables. The bridge tables are used to convert final demand expenditures in purchaser prices by user type into individual components of the 185-order outputs in producer prices. Hence, the column controls of the B, C, and G matrices are in purchaser prices while the row controls are in producer prices.

The INFORUM matrices are balanced in two steps. That is, the A, C, and G matrices of Figure I-1 are balanced jointly, but without the capital flow matrix. The main reason for balancing the B-matrix independently from the remaining system is the availability of data on its row totals.

3. The Balancing Results

As pointed out above, we used the 1963 OBE transaction table as the base year matrix for balancing consecutive commodity flow, construction, and government matrices through 1971. There are slight differences between our final demand vectors and those of the Commerce Department's.

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[1] U.S. Department of Commerce, Bureau of the Census (58).

The discrepancies are particularly noticeable in inventory change, imports, and exports. Several attempts to straighten out the differences failed, for we were unable to determine the cause for the discrepancies. We have chosen therefore to stay with the final demand information reported in Appendix II-b. Our time series of final demand components, as it uses the same data source and methodology over time, is at least consistent within itself.

We not only balanced the matrices for 1964-1971, but also the base year matrix to make it conform with our final demand information. We must keep in mind, however, that this initial balancing operation was required only due to data problems and the 1963 row and column adjustment factors are not very meaningful.[1] For this reason, they were excluded from the coefficient change analysis.

The A-matrix was actually balanced under three different conditions: (a) the number of iterations was limited to six and the balancing procedure was terminated with a final row adjustment in case of non-convergence; (b) complete RAS in value terms; and (c) complete RAS with price adjustment. The following is a description of the individual balancing results.

a. Limited RAS with Terminal Row Adjustment

By applying the full RAS balancing procedure, small flows often show

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[1] We could have adjusted outputs so that intermediate demand would have agreed with the 1963 OBE table. But we purposely avoided this step to maintain consistency with the standard INFORUM output data.

a strong row and column adjustment in the same direction.[1] We attempted to eliminate this problem of unreasonable large coefficient changes by limiting the convergence process to six iterations. Furthermore, since we have more confidence in the row controls than in the column controls, we terminated the balancing procedure with a final row adjustment. The cumulative row and column adjustment factors[2] of the "limited convergence" A-matrix balancing from 1963 through 1971 are shown in the first two columns of Table II-4.

The amount by which the individual factors differ from unity gives the total adjustment required, for either row or column, to make their sum add up to the correct totals. The first entry of the row adjustment vector, 0.8324, states that the Dairy farm row was scaled down by about 17 percent between 1963 and 1971. The same entry of the column vector explains a 43 percent rise in the Dairy farm column for the same period. In other words, between 1963 and 1971, the absorption of Dairy farm output has fallen by 17 percent while at the same time the intermediate use of this industry has risen by 43 percent.

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[1] One method to overcome this problem was reported in Brody and Carter (5).

[2] The cumulative adjustment factors are calculated by:

$$r_i = \prod_{t=1963}^{1971} \left(\prod_{k=1}^{K} r_{it}^{k} \right), \quad i = 1,2, \ldots , m.$$

$$s_j = \prod_{t=1963}^{1971} \left(\prod_{k=1}^{K} s_{jt}^{k} \right), \quad j = 1,2, \ldots , n.$$

Where K refers again to the number of iterations required for convergence.

Table II-4:

ACCUMULATED R*A*S ROW AND COLUMN ADJUSTMENT FACTORS

SEC#	TITLES	LIMITED CONVERGENCE ROW-ADJ	LIMITED CONVERGENCE COL-ADJ	FULL RAS IN VALUE TERMS ROW-ADJ	FULL RAS IN VALUE TERMS COL-ADJ	FULL RAS IN VOLUME TERMS ROW-ADJ	FULL RAS IN VOLUME TERMS COL-ADJ
1	DAIRY FARM PRODUCTS	.832	1.428	.700	1.487	.905	2.001
2	POULTRY AND EGGS	.516	1.125	.512	1.165	.320	1.266
3	MEAT, ANIMALS, MISC. LIVESTOC	.538	1.541	.527	1.613	.491	1.957
4	COTTON	.259	.917	.360	.913	.215	.847
5	GRAINS	.529	1.041	.507	1.042	.281	1.057
6	TOBACCO	.345	1.053	.686	1.051	.741	1.061
7	FRUITS, VEGETABLES, AND OTHER	1.193	.968	.909	.984	.921	.962
8	FORESTRY AND FISHERY PRODUCTS	.650	.963	1.286	.914	1.698	.860
9	NO SECTOR	1.000	1.000	1.000	1.000	1.000	1.000
10	AGRICULTURAL, FORESTRY AND FI	1.538	1.283	1.526	1.260	2.316	1.503
11	IRON ORE MINING	1.009	1.049	.934	1.048	.801	1.081
12	COPPER ORE MINING	.883	.991	1.251	.889	1.473	.862
13	OTHER NON-FERROUS METAL ORE M	1.267	.899	.912	.993	.882	1.003
14	COAL MINING	1.236	1.034	1.156	1.032	1.646	.999
15	CRUDE PETROLEUM AND NATURAL G	1.768	.979	1.038	.981	1.140	1.093
16	STONE AND CLAY MINING	.832	.952	.900	.940	.796	.957
17	CHEMICAL FERTILIZER MINING	1.043	1.020	1.178	1.001	1.172	1.015
18	NEW CONSTRUCTION	1.182	.876	1.233	.838	1.239	.825
19	MAINTENANCE AND REPAIR CONSTR	1.044	.883	1.085	.841	1.067	.836
20	COMPLETE GUIDED MISSILES	.497	.821	.622	.501	.610	.487
21	AMMUNITION	1.912	.793	2.339	.706	2.279	.724
22	OTHER ORDNANCE	.842	1.057	.985	.971	1.036	.951
23	MEAT PRODUCTS	.619	1.657	.601	1.729	.600	1.854
24	DAIRY PRODUCTS	.791	1.159	.690	1.314	.790	1.114
25	CANNED AND FROZEN FOODS	.767	.976	.680	1.068	.681	1.040
26	GRAIN MILL PRODUCTS	.738	1.278	.714	1.348	.554	1.664
27	BAKERY PRODUCTS	.605	1.126	.590	1.209	.587	1.324
28	SUGAR	.909	.971	.727	1.217	.615	1.307
29	CONFECTIONERY PRODUCTS	.843	1.021	.797	1.103	.863	1.135
30	ALCOHOLIC BEVERAGES	.712	1.093	.565	1.180	.645	1.159
31	SOFT DRINKS AND FLAVORINGS	1.558	.932	.636	1.153	.669	1.165
32	FATS AND OILS	1.055	1.016	.846	1.182	.703	1.232
33	MISC. FOOD PRODUCTS	.607	.981	.602	1.047	.639	1.076
34	TOBACCO PRODUCTS	.348	2.208	.633	1.444	.714	1.327
35	BROAD AND NARROW FABRICS	.720	1.358	1.001	1.092	.821	1.337
36	FLOOR COVERINGS	1.413	1.096	1.290	.945	1.042	1.115
37	MISC TEXTILES	.676	1.158	.822	1.048	.687	1.232
38	KNITTING PRODUCTS	1.853	.937	2.221	.778	1.677	.944
39	APPAREL PRODUCTS	.646	1.167	.896	.922	.800	1.053
40	HOUSEHOLD TEXTILES	.866	1.186	.969	.994	.783	1.146
41	LUMBER AND WOOD PRODUCTS	.720	1.309	1.007	.956	1.152	.863
42	VENEER AND PLYWOOD	1.139	1.109	1.123	.998	1.047	.992
43	MILLWORK AND WOOD PRODUCTS	1.247	1.108	1.333	.969	1.316	.931
44	WOODEN CONTAINERS	.499	1.147	.479	1.010	.481	.962
45	HOUSEHOLD FURNITURE	1.099	1.031	1.069	.949	1.043	.979
46	OTHER FURNITURE	1.002	.980	1.088	.938	1.055	.955
47	PULP MILL PRODUCTS	.628	1.114	.834	1.019	.873	1.010

Table II-4: (cont.)

SEC# TITLES	LIMITED CONVERGENCE ROW-ADJ	LIMITED CONVERGENCE COL-ADJ	FULL RAS IN VALUE TERMS ROW-ADJ	FULL RAS IN VALUE TERMS COL-ADJ	FULL RAS IN VOLUME TERMS ROW-ADJ	FULL RAS IN VOLUME TERMS COL-ADJ
48 PAPER AND PAPERBOARD MILL PRO	1.005	1.156	1.026	1.029	.962	1.024
49 PAPER PRODUCTS, NEC	.963	.989	.961	.977	.886	1.042
50 WALL AND BUILDING PAPER	.773	1.042	.889	.986	.810	1.011
51 PAPERBOARD CONTAINERS	.919	1.003	.919	.984	.832	1.024
52 NEWSPAPERS	1.059	.944	1.107	.912	.896	.952
53 PERIODICALS	.829	.999	.868	.969	.649	1.005
54 BOOKS	.872	1.046	.725	1.094	.649	1.163
55 INDUSTRIAL CHEMICALS	1.051	.969	1.023	.973	.909	1.014
56 BUSINESS FORMS AND BLANK BOOK	1.574	1.023	1.602	1.017	1.754	1.043
57 COMMERCIAL PRINTING	.999	.981	1.023	.966	.996	1.011
58 MISC. PRINTING, PUBLICATONS,	.901	.953	.840	.930	.830	.985
59 FERTILIZERS	.877	1.001	.919	.970	.856	1.029
60 PESTICIDES AND OTHER AGRICULT	1.502	.967	1.512	.978	1.427	1.053
61 MISC. CHEMICAL PRODUCTS	.997	.984	1.029	1.001	.991	1.047
62 PLASTIC MATERIALS AND RESINS	1.228	.968	.999	.978	.664	1.057
63 SYNTHETIC RUBBER PRODUCTS	.867	.972	1.005	.978	.735	1.058
64 CELLULOSIC FIBER PRODUCTS	.510	1.180	.719	1.060	.603	1.060
65 NON-CELLULOSIC FIBER PRODUCTS	1.275	.956	1.507	.972	1.011	1.046
66 DRUGS	.924	.978	.930	.982	.659	1.059
67 CLEANING AND TOILET PREPARATI	1.089	.963	1.206	.968	1.047	1.003
68 PAINTS	.883	.918	.913	.977	.894	1.077
69 PETROLEUM REFINING PRODUCTS	1.052	.715	.974	1.001	.874	.947
70 FUEL-OIL	1.028	1.000	1.186	1.000	1.023	1.000
71 PAVING AND ASPHALT	1.235	.996	1.283	.978	1.278	1.032
72 TIRES AND INNER TUBES	1.225	1.132	1.150	1.025	1.033	1.156
73 RUBBER PRODUCTS	.858	1.041	.963	.960	.944	1.058
74 MISC. PLASTIC PRODUCTS	1.528	.848	1.574	.931	1.248	1.170
75 INDUSTRIAL LEATHER PRODUCTS A	.389	1.477	.921	.992	.896	1.056
76 LEATHER FOOTWEAR	.510	1.393	.755	1.005	.693	1.073
77 OTHER LEATHER PRODUCTS	.504	1.244	.572	1.008	.556	1.109
78 GLASS	1.219	.924	1.028	.937	1.005	.975
79 STRUCTURAL CLAY PRODUCTS	.917	.971	.957	.955	.920	.989
80 POTTERY	1.062	.959	1.079	.941	1.097	.980
81 CEMENT, CONCRETE, AND GYPSUM	1.010	1.008	1.065	.968	1.025	.993
82 OTHER STONE AND CLAY PRODUCTS	.945	1.030	1.008	.987	.944	1.054
83 STEEL	.954	.992	.957	.985	.979	.975
84 COPPER	.845	1.159	1.039	.936	1.256	.810
85 LEAD	.945	.983	.919	1.032	.925	1.033
86 ZINC	.945	.873	1.018	1.108	1.034	1.122
87 ALUMINUM	1.094	.930	.956	1.033	.939	1.034
88 PRIMARY NON-FERROUS METALS, N	1.489	.831	1.383	.976	1.429	1.020
89 NON-FERROUS ROLLING AND DRAWI	.908	.883	.993	.885	1.158	.892
90 NON-FERROUS WIRE AND INSULATI	1.114	1.035	1.149	.963	1.206	.909
91 NON-FERROUS CASTINGS AND FORG	.857	.981	1.201	.927	1.356	.877
92 METAL CANS	1.325	1.041	1.053	1.037	1.134	1.013
93 METAL BARRELS, DRUMS AND PAIL	1.055	1.039	.947	1.024	1.035	.999
94 PLUMBING AND HEATING EQUIPMEN	.846	.992	.849	.945	.815	.911

Table II-4: (cont.)

SEC#	TITLES	LIMITED CONVERGENCE ROW-ADJ	LIMITED CONVERGENCE COL-ADJ	FULL RAS IN VALUE TERMS ROW-ADJ	FULL RAS IN VALUE TERMS COL-ADJ	FULL RAS IN VOLUME TERMS ROW-ADJ	FULL RAS IN VOLUME TERMS COL-ADJ
95	STRUCTURAL METAL PRODUCTS	1.194	1.012	1.227	1.002	1.193	.987
96	SCREW MACHINE PRODUCTS	.955	1.002	1.003	.973	1.153	.953
97	METAL STAMPINGS	1.107	1.016	1.036	.993	1.138	.971
98	CUTLERY, HAND TOOLS AND HARDW	1.015	1.029	1.086	.967	1.099	.951
99	MISC. FABRICATED WIRE PRODUCT	.839	1.051	.874	1.001	.854	.998
100	VALVES, PIPES AND PIPE FITTIN	1.099	1.023	1.177	.962	1.276	.918
101	OTHER FABRICATED METAL PRODUC	.987	.987	1.092	.969	1.087	.983
102	ENGINES AND TURBINES	1.663	.886	1.511	.882	1.485	.854
103	FARM MACHINERY	.723	.981	.681	.985	.676	.963
104	CONSTRUCTION, MINING, AND OIL	1.165	.945	1.148	.944	1.118	.931
105	MATERIALS HANDLING MACHINERY	1.238	.942	1.267	.929	1.277	.915
106	MACHINE TOOLS, METAL CUTTING	.894	.964	.995	.952	1.082	.954
107	MACHINE TOOLS, METAL FORMING	.833	.977	.933	.976	1.038	.953
108	OTHER METAL WORKING MACHINERY	.883	1.001	.971	.968	.979	.955
109	SPECIAL INDUSTRIAL MACHINERY	.707	.989	.733	.991	.793	.977
110	PUMPS, COMPRESSORS, BLOWERS A	1.277	.959	1.303	.933	1.356	.912
111	BALL AND ROLLER BEARINGS	.838	1.070	.925	1.012	.798	1.037
112	POWER TRANSMISSION EQUIPMENT	1.081	1.023	.944	.988	.909	.977
113	INDUSTRIAL PATTERNS	1.421	.955	1.443	.909	1.484	.893
114	COMPUTERS AND RELATED MACHINE	1.402	.806	.925	.945	.865	1.014
115	OTHER OFFICE MACHINERY	.719	.937	.740	.914	.650	.960
116	SERVICE INDUSTRY MACHINERY	1.750	.913	1.623	.908	1.500	.894
117	MACHINE SHOP PRODUCTS	1.161	.951	1.413	.879	1.574	.842
118	ELECTRICAL MEASURING INSTRUME	1.279	.847	1.574	.787	1.548	.840
119	TRANSFORMERS AND SWITCHGEARS	1.109	.891	1.376	.886	1.293	.893
120	MOTORS AND GENERATORS	1.137	.962	1.058	.928	1.060	.931
121	INDUSTRIAL CONTROLS	1.474	.816	1.223	.831	1.162	.843
122	WELDING APPARATUS AND GRAPHIT	1.096	.954	1.034	.941	.904	.960
123	HOUSEHOLD APPLIANCES	1.362	.957	1.268	.938	1.137	.939
124	ELECTRIC LIGHTING AND WIRING	1.109	.990	1.167	.931	1.148	.938
125	RADIO AND TELEVISION RECEIVIN	.812	.936	.809	.856	.649	.975
126	PHONOGRAPH RECORDS	1.199	.893	.923	.939	.833	1.046
127	COMMUNICATION EQUIPMENT	2.728	.787	3.402	.695	3.303	.750
128	ELECTRONIC COMPONENTS	1.232	.901	1.430	.879	1.085	.923
129	BATTERIES	1.114	1.018	1.173	.979	1.147	.991
130	ELECTRICAL EQUIPMENT FOR ENGI	1.091	.974	.978	.970	1.049	.951
131	X-RAY AND OTHER ELECTRICAL EQ	.669	.898	.962	.864	.928	.878
132	TRUCK, BUS, AND TRAILER BODIE	.150	.976	.131	.978	.134	.971
133	MOTOR VEHICLES AND PARTS	1.105	.986	1.002	1.000	1.016	.970
134	AIRCRAFT	.999	.917	1.312	.640	1.346	.619
135	AIRCRAFT ENGINES AND PARTS	.602	1.106	.999	.900	1.060	.854
136	AIRCRAFT EQUIPMENT, NEC	.927	1.053	2.327	.670	2.432	.644
137	SHIP, BOAT BUILDING AND REPAI	.650	.914	.860	.902	.852	.893
138	RAILROAD EQUIPMENT	.426	1.216	.573	1.136	.570	1.123
139	CYCLES AND PARTS, TRANSPORTAT	1.723	.833	1.090	.931	1.040	.940
140	TRAILER COACHES	.166	.989	.086	.998	.084	1.021
141	ENGINEERING AND SCIENTIFIC IN	.544	1.042	.703	.959	.685	.984

Table II-4: (cont.)

SEC#	TITLES	LIMITED CONVERGENCE ROW-ADJ	LIMITED CONVERGENCE COL-ADJ	FULL RAS IN VALUE TERMS ROW-ADJ	FULL RAS IN VALUE TERMS COL-ADJ	FULL RAS IN VOLUME TERMS ROW-ADJ	FULL RAS IN VOLUME TERMS COL-ADJ
142	MECHANICAL MEASURING DEVICES	.927	.983	.974	.916	1.045	.911
143	OPTICAL AND OPHTHALMIC PRODUC	.652	.924	.612	.930	.561	.980
144	MEDICAL AND SURGICAL INSTRUME	1.189	.981	1.227	.938	.940	.991
145	PHOTOGRAPHIC EQUIPMENT	1.672	.875	1.694	.873	1.364	.933
146	WATCHES, CLOCKS, AND PARTS	1.616	.750	1.149	.890	1.158	.878
147	JEWELRY AND SILVERWARE	.579	.998	.605	.972	.614	.975
148	TOYS, SPORTING GOODS, MUSICAL	.910	.990	.961	.937	.911	.998
149	OFFICE SUPPLIES	1.182	.989	1.277	.930	1.316	.956
150	MISC. MANUFACTURING, NEC	.666	1.064	1.058	.947	.913	1.014
151	RAILROADS	.808	1.003	.827	.952	.749	.977
152	BUSSES	.841	1.060	.852	1.038	.835	1.031
153	TRUCKING	1.241	.879	1.257	.846	1.231	.855
154	WATER TRANSPORTATION	.916	1.106	.876	1.042	.918	1.022
155	AIRLINES	1.460	.809	1.521	.758	1.509	.742
156	PIPELINES	1.071	.840	.965	.897	.553	.886
157	TRAVEL AGENTS, OTHER TRANSPOR	.971	.944	.994	.918	1.383	.958
158	TELEPHONE AND TELEGRAPH	1.158	.846	1.196	.803	.882	.826
159	RADIO AND TELEVISION BROADCAS	1.117	.901	1.167	.878	.977	.847
160	ELECTRIC UTILITIES	1.103	.899	1.130	.896	.981	.873
161	NATURAL GAS	1.188	.777	1.056	.968	1.055	.924
162	WATER AND SEWER SERVICES	.921	.934	.942	.915	1.013	.929
163	WHOLESALE TRADE	1.243	.903	1.278	.883	1.236	.907
164	RETAIL TRADE	1.700	.966	1.747	.945	1.801	.980
165	CREDIT AGENCIES AND BROKERS	1.472	.842	1.506	.816	1.684	.813
166	INSURANCE AND BROKER'S AGENTS	1.288	.846	1.327	.818	1.371	.820
167	OWNER OCCUPIED DWELLINGS	1.000	.938	1.000	.900	1.000	.896
168	REAL ESTATE	.994	.965	1.014	.931	.912	.940
169	HOTEL AND LODGING PLACES	.748	.931	.707	.905	.959	.930
170	PERSONAL AND REPAIR SERVICES	.985	.963	1.011	.894	.972	.969
171	BUSINESS SERVICES	1.385	.881	1.426	.860	1.656	.896
172	ADVERTISING	.904	.996	.919	.955	.940	1.138
173	AUTO REPAIR	1.033	.873	1.055	.874	1.119	.871
174	MOTION PICTURES AND AMUSEMENT	1.106	.927	1.123	.903	1.237	.887
175	MEDICAL SERVICES	.969	.970	.970	.953	.955	1.048
176	PRIVATE SCHOOLS AND NON-PROFI	1.286	.960	1.308	.936	1.353	.983
177	POSTAL SERVICES	.974	.922	1.002	.900	1.015	.956
178	FEDERAL GOVERNMENT ENTERPRISE	1.086	.825	1.127	.817	1.055	.737
179	LOCAL AND GOVERNMENT PASSENGE	1.000	1.000	1.000	1.000	1.000	1.000
180	STATE AND LOCAL ELECTRIC UTIL	.711	.962	.723	.921	.600	.916
181	DIRECTLY ALLOCATED IMPORTS	1.191	1.000	1.200	1.000	1.043	1.000
182	BUSINESS TRAVEL	1.390	1.184	1.437	1.273	1.060	1.146
183	OFFICE SUPPLIES	.815	.841	.841	.821	.637	.790
184	UNIMPORTANT INDUSTRIES	.795	1.058	.823	1.008	.657	1.019
185	COMPUTER RENTAL	3.254	1.000	3.357	1.000	2.767	1.000

A glance at Table II-4 suggests that most of the large adjustments occurred in the rows of the non-manufacturing industries. In a number of cases the adjustment factors are unreasonably different from unity, which strongly indicates that there is still a data problem associated with some of these sectors. The column adjustment factors, on the other hand, seem to be more stable. Economically, this observation could mean that firms allow for input substitution but maintain a constant production function. The next question is then, what is the behavior of the adjustment factors under the full RAS method?

b. Full RAS in Value Terms

The main reason for stopping short of convergence was to avoid unreasonable large changes in small coefficients. To test this proposition, we must first check how many iterations were required for a complete solution, and second analyze the different magnitude of individual coefficient changes.

The row and column adjustment factors of the fully balanced matrices in value terms are shown in the center columns of Table II-4. Except for a few sectors, our initial fear that under the full RAS a number of small coefficients would show unreasonably large changes was not substantiated. In general, the resulting coefficient changes for the full RAS are smaller than for the limited convergence approach. This result is even better demonstrated by the table of significant coefficient changes shown in Appendix II-c.

c. Full RAS in Volume Terms

A priori, one would expect that the balancing in volume terms should be superior as it uses additional information of price changes. But as was explained above, this hypothesis presupposes a technology which may or

may not be correctly identified by the Leontief production function. It is therefore of a certain interest to compare the volume balancing with the one in value terms.

The last two columns of Table II-4 contain the volume adjustment factors. Since the adjustment factors in column 5-6 are net of prices changes, the difference between these and the ones shown in columns 3-4 should be the change in relative price level. Indeed, the two results are quite comparable for the relative price for a large number of sectors may have remained rather constant for the 1963-71 period. A similar conclusion can be reached by comparing the number of iterations required for a complete solution which are summarized in Table II-5. This table also shows the remaining errors of the balanced matrices.

Since the value term balancing required fewer iterations, little or nothing is gained from the price adjustment. In short, the balancing results neither support nor reject the assumption of a Leontief technology. Only if one could separate the effect of technological change from the other induced changes would the cross-product matrix of r's and s's be a good test of the volume term hypothesis.

In the appendix of this chapter we have included tables of significant coefficient changes for each of the three different ways of balancing the A-matrix. All coefficients greater than 0.01 which reported changes of more than 10 percent in any particular year are listed. There is a separate table for each year of the balancing and "MAX IT. = 6", "FULL R*A*S", and

Table II-5:
Comparison of Three Different Balancing Procedures

Year	Limited Convergence (MAX ITER.: 6)			Full RAS (Value Terms)			Full RAS (Volume Terms)		
	No. of Iterat.	Last Row-Adj.	Last Col-Adj.	No. of Iterat.	Last Row-Adj.	Last Col-Adj.	No. of Iterat.	Last Row-Adj.	Last Col-Adj.
1963	6	0.0257	0.0252	11	0.0085	0.0085	11	0.0085	0.0085
1964	6	0.0240	0.0236	12	0.0089	0.0089	12	0.0089	0.0089
1965	6	0.0377	0.0393	12	0.0092	0.0093	12	0.0090	0.0091
1966	6	0.0182	0.0205	8	0.0074	0.0085	8	0.0060	0.0070
1967	6	0.0278	0.0271	13	0.0097	0.0097	14	0.0093	0.0093
1968	6	0.0191	0.0220	8	0.0084	0.0095	9	0.0068	0.0071
1969	6	0.0078	0.0080	6	0.0097	0.0096	7	0.0091	0.0090
1970	6	0.0845	0.0782	17	0.0089	0.0088	18	0.0096	0.0096
1971	6	0.0649	0.0695	13	0.0073	0.0074	14	0.0089	0.0090

"PRICE ADJ." refer to the three different balancing procedures, respectively. Outside a few, unimportant industries such as Directly allocated imports (181), or the Flow of Unimportant industries (184), the individual coefficient changes, though greater than 10 percent, generally stayed within reason. It is also interesting to note, that the full RAS in value terms showed the fewest significant changes. This is even more surprising when one realizes that the coefficient changes of the volume balancing are reported net of price changes. Again, a priori, we expected the net coefficient change to be smaller, but on the average, the volume balancing did not conform with our expectation.

The behavior of the coefficients over time is even better explained when they are graphed. The plots of a few selected cumulative r's and s's are also shown in the appendix of this chapter. However, they only show the behavior of total row and column adjustment factors from 1963 through 1971. Nevertheless, to study the difference of the three different balancing procedures, these plots should be adequate. For example, the cumulative s's of sector 8, Forestry and fishery products, did not deviate very much from one approach to the other, while the r's showed a completely different pattern. This observation was repeated for a number of sectors, but it would appear that the majority of these sectors were affected by some inherent data problems.

The inadequacy of the limited convergence approach is well domonstrated by Industrial leather products (75). Both the row and column coefficients are completely distorted by this method and only the diagonal term remained stable. For most of the big intermediate flow sectors, such as Other stone

and clay products (82) or Steel (83), the data is generally more reliable and the pattern of the r's and s's is not only very rational but it hardly differs between balancing methods. The metal sectors, such as Copper (84), Lead (85), Zinc 86, Aluminum (87), and Other primary non-ferrous metals (88) all demonstrate rather well why we prefer the value balancing. The next four sectors, however, were selected to show how small the difference is between the value and volume balancing.

d. The Balancing of the Capital Flow Matrix

The most recent capital flow matrix was published for 1963.[1] This matrix, however, identifies only 77 columns, and we require 90. To get a base year matrix, therefore, we had to expand this matrix by separating some of the 77 columns as well as reduce it by aggregating the 363 rows to our 185 output sectors.[2] Next, we collected all available information on capital flows from the 1967 Census of Manufactures. This enabled us to prespecify over 150 known flows. The remaining flows were then balanced to the 1967 row controls (PDE by 185 producing sectors) and column controls (equipment expenditures by 90 industries).

The resulting 1967 capital flow matrix was then chosen to be our base-year matrix. By using the proper controls for each year, we were now able to balance backward to 1963 and foreward to 1971. We employed the full RAS in value terms for this updating activity. The accuracy behavior of all four balanced matrices (A, B, C, and G) will be tested for each year (1963-1971) of simulation with the whole INFORUM model.

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[1] U.S. Department of Commerce, Bureau of Business Economics (62).

[2] A complete explanation of the expansion process and other details on the 1967 capital flow matrix balancing can be found in Carlyle (16).

APPENDIX II-a

Definitions for the 185 and 90 sectors in the INFORUM Forecasting Model

DEFINITIONS FOR THE 185 SECTORS IN THE I*N*F*O*R*U*M FORECASTING MODEL
(THE 90-SECTOR NUMBERS OF INVEST AND EMPLOY FOLLOW AFTER TITLES)

	SECTOR TITLES	IO-90	STD. INDUSTRIAL CLASSIFICATION					
1	DAIRY FARM PRODUCTS	(1)	132					
2	POULTRY AND EGGS	(1)	133					
3	MEAT, ANIMALS AND MISC LIVESTOCK PR	(1)	135	136	139	193		
4	COTTON	(1)	112					
5	GRAINS	(1)	113					
6	TOBACCO	(1)	114					
7	FRUITS, VEGETABLES, AND OTHER CROPS	(1)	122	123	119	192		
8	FORESTRY AND FISHERY PRODUCTS	(1)	741	811	822	823	842	843
			861	912	913	914	919	
9	NO DEF'N	(0)	0					
10	AGRICULTURAL, FORESTRY AND FISHERY	(1)	710	723	729	731	851	989
11	IRON ORES	(2)	1011	1062	1064	1069		
12	COPPER ORE	(2)	1021					
13	OTHER NON-FERROUS METAL ORES	(2)	1031	1051	1092	1093	1094	1099
14	COAL MINING	(2)	1111	1211				
15	CRUDE PETROLEUN AND NATURAL GAS	(3)	1311	1312	1313	1321		
16	STONE AND CLAY MINING	(2)	1411	1422	1442	1452	1453	1454
			1455	1459	1492	1493	1494	1495
			1496	1497	1498	1499		
17	CHEMICAL FERTILIZER MINING	(2)	1473	1474	1475	1476	1477	1479
18	NEW CONSTRUCTION	(4)	1500	1500	1500	1600	1500	
19	MAINTENANCE AND REPAIR CONSTRUCTION	(0)	1500	1500				
20	COMPLETE GUIDED MISSILES	(5)	1925					
21	AMMUNITION	(5)	1929	1961				
22	OTHER ORDNANCE	(5)	1931	1941	1951	1911	1999	
23	MEAT PRODUCTS	(6)	2010					
24	DAIRY PRODUCTS	(7)	2021	2022	2023	2024	2026	
25	CANNED AND FROZEN FOODS	(8)	2031	2032	2033	2034	2035	2036
			2037					
26	GRAIN MILL PRODUCTS	(9)	2041	2043	2045	2042	2044	2046
27	BAKERY PRODUCTS	(10)	2050					
28	SUGAR	(11)	2060					
29	CONFECTIONERY PRODUCTS	(12)	2070					
30	ALCOHOLIC BEVERAGES	(13)	2082	2083	2084	2085		
31	SOFT DRINKS AND FLAVORINGS	(13)	2086	2087				
32	FATS AND OILS	(14)	2091	2092	2093	2094	2096	
33	MISC FOOD PRODUCTS	(14)	2095	2097	2098	2099		
34	TOBACCO PRODUCTS	(15)	2111	2121	2131	2141		
35	BROAD AND NARROW FABRICS	(16)	2211	2221	2231	2261	2262	2201
			2241	2269	2281	2282	2283	2284
36	FLOOR COVERINGS	(17)	2270					
37	MISC TEXTILES	(18)	2291	2292	2293	2294	2295	2296
			2297	2298	2299			
38	KNITTING	(19)	2251	2252	2253	2254	2259	2256
39	APPAREL	(20)	2310	2320	2330	2340	2350	2360
			2370	2380	3992			
40	HOUSEHOLD TEXTILES	(21)	2391	2392	2393	2394	2395	2396
			2397	2398	2399			
41	LUMBER AND WOOD PRODUCTS	(22)	2411	2421	2426	2429		
42	VENEER AND PLYWOOD	(23)	2432					

DEFINITIONS FOR THE 185 SECTORS IN THE I*N*F*O*R*U*M FORECASTING MODEL
(THE 90-SECTOR NUMBERS OF INVEST AND EMPLOY FOLLOW AFTER TITLES)

	SECTOR TITLES	IO-90	STD. INDUSTRIAL CLASSIFICATION					
43	MILLWORK AND WOOD PRODUCTS	(23)	2431	2433	2491	2499		
44	WOODEN CONTAINERS	(24)	2440					
45	HOUSEHOLD FURNITURE	(25)	2511	2519	2512	2514	2515	
46	OTHER FURNITURE	(25)	2521	2522	2531	2541	2542	2591
			2599					
47	PULP MILLS	(27)	2611					
48	PAPER AND PAPERBOARD MILLS	(27)	2621	2631				
49	PAPER PRODUCTS, NEC	(27)	2642	2647	2641	2643	2645	2646
			2649					
50	WALL AND BUILDING PAPER	(27)	2644	2661				
51	PAPERBOARD CONTAINERS	(28)	2650					
52	NEWSPAPERS	(29)	2711					
53	PERIODICALS	(30)	2721					
54	BOOKS	(30)	2730					
55	INDUSTRIAL CHEMICALS	(31)	2810					
56	BUSINESS FORMS, BLANK BOOKS	(30)	2761	2782				
57	COMMERCIAL PRINTING	(30)	2751	2752				
58	MISC. PRINTING & PUBL., INCL. GREET	(30)	2741	2771	2753	2789	2790	
59	FERTILIZERS	(32)	2871	2872				
60	PESTICIDES AND OTHER AGRICULTURAL C	(32)	2879					
61	MISC CHEMICAL PRODUCTS	(33)	2861	2890				
62	PLASTIC MATERIALS AND RESINS	(34)	2821					
63	SYNTHETIC RUBBER	(34)	2822					
64	CELLULOSIC FIBERS	(34)	2823					
65	NON-CELLULOSIC FIBERS	(34)	2824					
66	DRUGS	(35)	2830					
67	CLEANING AND TOILET PREPARATIONS	(36)	2840	-2844	2844			
68	PAINTS	(37)	2851					
69	GASOLINE	(38)	2911	2990				
70	HEATING OIL	(38)	2915					
71	PAVING AND ASPHALT	(38)	2951	2952				
72	TIRES AND INNER TUBES	(39)	3011					
73	RUBBER PRODUCTS	(40)	3021	3031	3069			
74	MISC PLASTIC PRODUCTS	(41)	3079					
75	LEATHER TANNING AND INDUSTRIAL LEAT	(42)	3111	3121				
76	LEATHER FOOTWEAR	(43)	3131	3140				
77	OTHER LEATHER PRODUCTS	(43)	3151	3161	3170	3199		
78	GLASS	(44)	3211	3229	3231	3221		
79	STRUCTURAL CLAY PRODUCTS	(45)	3251	3253	3255	3259		
80	POTTERY	(45)	3261	3262	3263	3264	3269	
81	CEMENT, CONCRETE, AND GYPSUM	(45)	3241	3271	3272	3273	3274	3275
82	OTHER STONE AND CLAY PRODUCTS	(45)	3281	3291	3292	3293	3295	3296
			3297	3299				
83	STEEL	(46)	3310	3320	3391	3399		
84	COPPER	(47)	3331	3341	3351	3362		
85	LEAD	(47)	3332					
86	ZINC	(47)	3333					
87	ALUMINUM	(47)	3334	3352	3361			
88	PRIMARY NON-FERROUS METALS, NEC	(47)	3339					
89	NON-FERROUS ROLLING AND DRAWING, NE	(47)	3356					

DEFINITIONS FOR THE 185 SECTORS IN THE I*N*F*O*R*U*M FORECASTING MODEL
(THE 90-SECTOR NUMBERS OF INVEST AND EMPLOY FOLLOW AFTER TITLES)

	SECTOR TITLES	IO-90	STD. INDUSTRIAL CLASSIFICATION					
90	NON-FERROUS WIRE DRAWING AND INSULA	(47)	3357					
91	NON-FERROUS CASTINGS AND FORGINGS	(47)	3369	3392				
92	METAL CANS	(48)	3411					
93	METAL BARRELS, DRUMS AND PAILS	(48)	3491					
94	PLUMBING AND HEATING EQUIPMENT	(49)	3431	3432	3433			
95	STRUCTURAL METAL PRODUCTS	(50)	3441	3442	3443	3444	3446	3449
96	SCREW MACHINE PRODUCTS	(51)	3450					
97	METAL STAMPINGS	(51)	3461					
98	CUTLERY, HAND TOOLS AND HARDWARE	(52)	3421	3423	3425	3429		
99	MISC FABRICATED WIRE PRODUCTS	(52)	3481					
100	VALVES, PIPE FITTINGS, AND FABRICAT	(52)	3494	3498				
101	OTHER FABRICATED METAL PRODUCTS, NE	(52)	3471	3479	3492	3493	3496	3497
			3499					
102	ENGINES AND TURBINES	(53)	3511	3519				
103	FARM MACHINERY	(54)	3522					
104	CONSTRUCTION, MINING, AND OIL FIELD	(55)	3531	3532	3533			
105	MATERIALS HANDLING MACHINERY	(55)	3534	3535	3536	3537		
106	MACHINE TOOLS, METAL CUTTING	(56)	3541					
107	MACHINE TOOLS, METAL FORMING	(56)	3542					
108	OTHER METAL WORKING MACHINERY	(56)	3544	3545	3548			
109	SPECIAL INDUSTRIAL MACHINERY	(57)	3551	3552	3553	3554	3555	3559
110	PUMPS, COMPRESSORS, BLOWERS AND FAN	(58)	3561	3564				
111	BALL AND ROLLER BEARINGS	(58)	3562					
112	POWER TRANSMISSION EQUIPMENT	(58)	3566					
113	INDUSTRIAL PATTERNS	(58)	3565	3567	3569			
114	COMPUTERS AND RELATED MACHINES	(60)	3571	3573	3574			
115	OTHER OFFICE MACHINERY	(60)	3572	3576	3579			
116	SERVICE INDUSTRY MACHINERY	(61)	3581	3582	3585	3586	3589	
117	MACHINE SHOP PRODUCTS	(59)	3590					
118	ELECTRICAL MEASURING INSTRUMENTS	(62)	3611					
119	TRANSFORMERS AND SWITCHGEAR	(62)	3612	3613				
120	MOTORS AND GENERATORS	(63)	3621					
121	INDUSTRIAL CONTROLS	(63)	3622					
122	WELDING APPARATUS AND GRAPHITE PROD	(63)	3623	3624	3629			
123	HOUSEHOLD APPLIANCES	(64)	3631	3632	3633	3634	3635	3636
			3639					
124	ELECTRIC LIGHTING AND WIRING EQUIPM	(65)	3641	3642	3643	3644		
125	RADIO AND TV RECEIVING	(66)	3651					
126	PHONOGRAPH RECORDS	(66)	3652					
127	COMMUNICATION EQUIPMENT	(67)	3661	3662				
128	ELECTRONIC COMPONENTS	(68)	3671	3672	3673	3674	3679	
129	BATTERIES	(69)	3691	3692				
130	ENGINE ELECTRICAL EQUIPMENT	(69)	3694					
131	X-RAY EQUIPMENT AND ELECTRICAL EQUI	(69)	3693	3699				
132	TRUCK, BUS, AND TRAILER BODIES	(70)	3713	3715				
133	MOTOR VEHICLES AND PARTS	(70)	3711	3714	3717			
134	AIRCRAFT	(71)	3721					
135	AIRCRAFT ENGINES AND PARTS	(71)	3722					
136	AIRCRAFT EQUIPMENT, NEC	(71)	3723	3729				
137	SHIP AND BOAT BUILDING AND REPAIR	(72)	3731	3732				

DEFINITIONS FOR THE 185 SECTORS IN THE I*N*F*O*R*U*M FORECASTING MODEL
(THE 90-SECTOR NUMBERS OF INVEST AND EMPLOY FOLLOW AFTER TITLES)

	SECTOR TITLES	IO-90	STD. INDUSTRIAL CLASSIFICATION					
138	RAILROAD EQUIPMENT	(73)	3741	3742				
139	CYCLES AND PARTS, TRANSPORTATION EQ	(74)	3751	3799				
140	TRAILER COACHES	(74)	3791					
141	ENGINEERING AND SCIENTIFIC INSTRUME	(75)	3811					
142	MECHANICAL MEASURING DEVICES	(76)	3821	3822				
143	OPTICAL AND OPHTHALMIC GOODS	(78)	3831	3851				
144	MEDICAL AND SURGICAL INSTRUMENTS	(77)	3841	3842	3843			
145	PHOTOGRAPHIC EQUIPMENT	(78)	3861					
146	WATCHES, CLOCKS, AND PARTS	(78)	3870					
147	JEWELRY AND SILVERWARE	(79)	3910	3961				
148	TOYS, SPORTING GOODS, MUSICAL INSTR	(79)	3931	3941	3942	3943	3949	
149	OFFICE SUPPLIES	(79)	3950					
150	MISC MANUFACTURING, NEC	(79)	3962	3963	3964	3981	3991	3982
			3996	3988	3994	3993	3983	3984
			3987	3995	3999			
151	RAILROADS	(80)	4000	4740				
152	BUSSES	(82)	4100					
153	TRUCKING	(81)	4200	4730				
154	WATER TRANSPORTATION	(82)	4400					
155	AIRLINES	(83)	4500					
156	PIPELINES	(82)	4600					
157	TRAVEL AGTS, OTH TRANS SER.	(82)	4700	4701	4702	4705	4706	4707
			4708	4709				
158	TELEPHONE AND TELEGRAPH	(85)	4800	4801	4802	4804	4805	4806
			4807	4808	4809			
159	RADIO AND TV BROADCASTING	(85)	4830					
160	ELECTRIC UTULITIES	(87)	4910	4930				
161	NATURAL GAS	(88)	4920	4930				
162	WATER AND SEWER SERVICES	(88)	4940	4950	4960	4970	4930	
163	WHOLESALE TRADE	(84)	5000					
164	RETAIL TRADE	(84)	5200	5300	5400	5500	5600	5700
			5800	5900	7396			
165	CREDIT AGENCIES AND BROKERS	(86)	6000	6100	6700	6200		
166	INSURANCE AND BROKER'S AGENTS	(86)	6300	6400				
167	OWNER-OCCUPIED DWELLINGS	(0)	6400					
168	REAL ESTATE	(86)	6500	-6561	6600			
169	HOTEL AND LODGING PLACES	(86)	7000					
170	PERSONAL AND REPAIR SERVICES	(86)	7200	-7230	-7240	7600	-7694	-7699
			7230	7240				
171	BUSINESS SERVICES	(86)	7300	-7310	-7396	7694	7699	8100
			8900	8921				
172	ADVERTISING	(86)	7310					
173	AUTO REPAIR	(86)	7500					
174	MOTION PICTURES AND AMUSEMENTS	(86)	7800	7900				
175	MEDICAL SERVICES	(86)	8010	8020	8030	8040	8061	7220
			8070	8090				
176	PRIVATE SCHOOLS AND NONPROFIT ORGAN	(86)	8200	8400	8600	8921		
177	POST OFFICE	(0)	0					
178	FEDERAL GOV. ENTERPRISES	(0)	0					
179	LOCAL GOV. PASSENGER TRANSIT	(0)	0					

DEFINITIONS FOR THE 185 SECTORS IN THE I*N*F*O*R*U*M FORECASTING MODEL
(THE 90-SECTOR NUMBERS OF INVEST AND EMPLOY FOLLOW AFTER TITLES)

	SECTOR TITLES	IO-90	STD. INDUSTRIAL CLASSIFICATION
180	STATE AND LOCAL ELECTRIC UTILITIES	(0)	0
181	DIRECTLY ALLOCATED IMPORTS	(0)	0
182	BUSINESS TRAVEL	(0)	0
183	OFFICE SUPPLIES	(0)	0
184	UNIMPORTANT INDUSTRY	(0)	0
185	COMPUTER RENTAL	(0)	0
186	PERSONAL CONSUMPTION EXPENDITURES	(0)	0
187	DEFENSE EXPENDITURES	(0)	0
188	NON-DEFENSE FEDERAL EXPENDITURES	(0)	0
189	EDUCATION	(0)	0
190	HEALTH, WELFARE, AND SANITATION	(0)	0
191	POLICE, FIRE, AND SAFETY	(0)	0
192	GENERAL STATE AND LOCAL GOV. EXPEND	(0)	0
193	CHANGE IN INVENTORIES	(0)	0
194	EXPORTS	(0)	0
195	IMPORTS	(0)	0

APPENDIX II-b

Outputs and Final Demand Components

of 185 Sectors for 1963-1971

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1963 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	4912.	189.	0.	-351.	0.	0.	0.	0.	0.	0.	-162.	5074.	1
2	POULTRY AND EGGS	3554.	1460.	0.	2.	20.	-6.	2.	0.	0.	0.	1478.	2076.	2
3	MEAT, ANIMALS AND MISC	16054.	113.	0.	-1051.	52.	-443.	0.	0.	0.	0.	-1329.	17383.	3
4	COTTON	2776.	0.	0.	13.	478.	-26.	0.	0.	389.	306.	1160.	1616.	4
5	GRAINS	12635.	0.	0.	360.	2075.	-28.	0.	0.	-420.	390.	2377.	10258.	5
6	TOBACCO	1356.	0.	0.	69.	14.	-20.	0.	0.	0.	0.	63.	1293.	6
7	FRUITS, VEGETABLES, AND	7706.	2865.	0.	492.	210.	-318.	3.	0.	-70.	29.	3211.	4495.	7
8	FORESTRY AND FISHERY PR	1323.	409.	0.	18.	9.	-388.	1.	0.	0.	0.	49.	1274.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	1765.	15.	0.	5.	0.	0.	19.	0.	0.	0.	39.	1726.	10
11	IRON ORES	992.	0.	0.	-20.	101.	-415.	0.	0.	0.	0.	-334.	1326.	11
12	COPPER ORE	659.	0.	0.	50.	0.	-13.	0.	0.	0.	0.	37.	622.	12
13	OTHER NON-FERROUS METAL	607.	0.	0.	7.	2.	-93.	0.	0.	0.	0.	-84.	691.	13
14	COAL MINING	2618.	147.	0.	-12.	297.	-3.	34.	0.	0.	0.	463.	2155.	14
15	CRUDE PETROLEUN AND NAT	10597.	0.	0.	-131.	9.	-1435.	0.	0.	0.	0.	-1557.	12154.	15
16	STONE AND CLAY MINING	1829.	15.	0.	7.	40.	-21.	0.	0.	0.	0.	41.	1788.	16
17	CHEMICAL FERTILIZER MIN	392.	0.	0.	6.	59.	-120.	0.	0.	0.	0.	-55.	447.	17
18	NEW CONSTRUCTION	23423.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23423.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	4007.	0.	0.	-13.	59.	-59.	3049.	831.	0.	0.	3867.	140.	20
21	AMMUNITION	646.	105.	0.	-29.	169.	-12.	303.	0.	0.	0.	536.	110.	21
22	OTHER ORDNANCE	1186.	76.	0.	-38.	196.	-12.	660.	8.	0.	0.	890.	296.	22
23	MEAT PRODUCTS	18026.	13721.	0.	45.	259.	-682.	73.	0.	0.	0.	13416.	4610.	23
24	DAIRY PRODUCTS	10901.	8190.	0.	-20.	192.	-48.	70.	0.	-105.	478.	8757.	2144.	24
25	CANNED AND FROZEN FOODS	6858.	6058.	0.	98.	218.	-244.	12.	0.	0.	0.	6142.	716.	25
26	GRAIN MILL PRODUCTS	8303.	1880.	0.	63.	434.	-35.	6.	0.	10.	127.	2485.	5818.	26
27	BAKERY PRODUCTS	5812.	5553.	0.	0.	5.	-13.	8.	0.	0.	0.	5553.	259.	27
28	SUGAR	2426.	851.	0.	132.	4.	-699.	1.	0.	0.	0.	289.	2137.	28
29	CONFECTIONERY PRODUCTS	2166.	1795.	0.	64.	18.	-63.	0.	0.	0.	0.	1814.	352.	29
30	ALCOHOLIC BEVERAGES	6751.	5517.	0.	33.	12.	-430.	2.	0.	0.	0.	5134.	1617.	30
31	SOFT DRINKS AND FLAVORI	2959.	2254.	0.	21.	26.	0.	8.	0.	0.	0.	2309.	650.	31
32	FATS AND OILS	3927.	666.	0.	115.	409.	-150.	0.	0.	-17.	19.	1042.	2885.	32
33	MISC FOOD PRODUCTS	3908.	3436.	0.	0.	62.	-73.	12.	0.	0.	-6.	3431.	477.	33
34	TOBACCO PRODUCTS	7331.	4942.	0.	-26.	490.	-107.	0.	0.	0.	0.	5299.	2032.	34
35	BROAD AND NARROW FABRIC	11989.	630.	0.	121.	242.	-407.	36.	0.	0.	40.	662.	11327.	35
36	FLOOR COVERINGS	1119.	878.	80.	28.	0.	-52.	4.	0.	0.	0.	938.	181.	36
37	MISC TEXTILES	1905.	115.	0.	32.	24.	-459.	5.	0.	0.	0.	-283.	2188.	37
38	KNITTING	3200.	1992.	0.	3.	17.	-13.	0.	0.	0.	0.	1999.	1201.	38
39	APPAREL	14534.	12613.	0.	363.	181.	-483.	50.	0.	0.	0.	12724.	1810.	39
40	HOUSEHOLD TEXTILES	3015.	1293.	0.	4.	25.	-31.	70.	0.	0.	0.	1361.	1654.	40
41	LUMBER AND WOOD PRODUCT	5789.	124.	0.	111.	162.	-487.	0.	0.	0.	0.	-90.	5879.	41
42	VENEER AND PLYWOOD	1342.	0.	0.	30.	7.	-189.	0.	0.	0.	0.	-152.	1494.	42
43	MILLWORK AND WOOD PRODU	2623.	168.	5.	44.	21.	-106.	5.	0.	0.	0.	137.	2486.	43
44	WOODEN CONTAINERS	380.	0.	0.	34.	2.	-2.	5.	0.	0.	0.	39.	341.	44
45	HOUSEHOLD FURNITURE	3925.	2977.	172.	82.	27.	-28.	10.	0.	0.	0.	3240.	685.	45
46	OTHER FURNITURE	1820.	133.	1127.	57.	5.	-11.	19.	0.	0.	0.	1330.	490.	46

1963 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	748.	0.	0.	3.	173.	-344.	0.	0.	0.	0.	-168.	916.	47
48	PAPER AND PAPERBOARD MI	6132.	32.	0.	166.	175.	-764.	8.	0.	0.	0.	-383.	6515.	48
49	PAPER PRODUCTS, NEC	4391.	1208.	0.	76.	73.	-23.	16.	0.	0.	0.	1350.	3041.	49
50	WALL AND BUILDING PAPER	337.	0.	0.	-22.	6.	-5.	0.	0.	0.	0.	-21.	358.	50
51	PAPERBOARD CONTAINERS	4580.	74.	0.	80.	22.	-3.	10.	0.	0.	0.	183.	4397.	51
52	NEWSPAPERS	4256.	1163.	0.	-2.	2.	-2.	0.	0.	0.	0.	1161.	3095.	52
53	PERIODICALS	2051.	565.	0.	20.	41.	-5.	41.	0.	0.	0.	662.	1389.	53
54	BOOKS	2210.	943.	0.	-152.	68.	-80.	177.	0.	0.	0.	956.	1254.	54
55	INDUSTRIAL CHEMICALS	11162.	149.	0.	99.	644.	-277.	877.	0.	0.	0.	1492.	9670.	55
56	BUSINESS FORMS, BLANK B	812.	52.	0.	5.	0.	0.	0.	0.	0.	0.	57.	755.	56
57	COMMERCIAL PRINTING	2771.	85.	0.	-3.	52.	0.	0.	0.	0.	0.	134.	2637.	57
58	MISC. PRINTING & PUBL.,	1348.	368.	0.	-7.	0.	-22.	0.	0.	0.	0.	339.	1009.	58
59	FERTILIZERS	1245.	41.	0.	1.	45.	-33.	0.	0.	0.	0.	54.	1191.	59
60	PESTICIDES AND OTHER AG	512.	4.	0.	30.	37.	-5.	2.	0.	0.	0.	68.	444.	60
61	MISC CHEMICAL PRODUCTS	2341.	201.	0.	37.	307.	-65.	85.	0.	0.	0.	565.	1776.	61
62	PLASTIC MATERIALS AND R	2692.	12.	0.	33.	276.	-8.	23.	0.	0.	0.	336.	2356.	62
63	SYNTHETIC RUBBER	873.	0.	0.	5.	141.	-10.	3.	0.	0.	0.	139.	734.	63
64	CELLULOSIC FIBERS	665.	0.	0.	-7.	19.	-26.	8.	0.	0.	0.	-6.	671.	64
65	NON-CELLULOSIC FIBERS	1402.	0.	0.	23.	111.	-26.	12.	0.	0.	0.	120.	1282.	65
66	DRUGS	3660.	1982.	0.	92.	258.	-62.	17.	0.	0.	0.	2287.	1373.	66
67	CLEANING AND TOILET PRE	4738.	3446.	0.	21.	82.	-14.	22.	0.	0.	0.	3557.	1181.	67
68	PAINTS	2315.	23.	0.	42.	24.	-1.	2.	0.	0.	0.	90.	2225.	68
69	GASOLINE	18563.	4091.	0.	-7.	341.	-239.	528.	0.	0.	0.	4714.	13849.	69
70	HEATING OIL	4082.	2072.	0.	-1.	96.	-658.	132.	0.	0.	0.	1641.	2441.	70
71	PAVING AND ASPHALT	889.	0.	0.	19.	5.	0.	0.	0.	0.	0.	24.	865.	71
72	TIRES AND INNER TUBES	2834.	1169.	0.	23.	65.	-31.	48.	0.	0.	0.	1274.	1560.	72
73	RUBBER PRODUCTS	2788.	537.	18.	34.	85.	-60.	91.	0.	0.	0.	705.	2083.	73
74	MISC PLASTIC PRODUCTS	3497.	158.	0.	79.	41.	-62.	29.	0.	0.	0.	245.	3252.	74
75	LEATHER TANNING AND IND	895.	0.	0.	-11.	42.	-55.	0.	0.	0.	0.	-24.	919.	75
76	LEATHER FOOTWEAR	2567.	2358.	0.	-1.	10.	-97.	0.	0.	0.	0.	2270.	297.	76
77	OTHER LEATHER PRODUCTS	773.	674.	0.	14.	6.	-66.	4.	0.	0.	0.	632.	141.	77
78	GLASS	2816.	238.	0.	74.	84.	-113.	8.	0.	0.	0.	291.	2525.	78
79	STRUCTURAL CLAY PRODUCT	790.	0.	0.	26.	36.	-32.	0.	0.	0.	0.	30.	760.	79
80	POTTERY	465.	102.	0.	20.	15.	-90.	1.	0.	0.	0.	48.	417.	80
81	CEMENT, CONCRETE, AND G	5107.	2.	0.	16.	4.	-16.	0.	0.	0.	0.	6.	5101.	81
82	OTHER STONE AND CLAY PR	2521.	112.	0.	54.	64.	-70.	30.	0.	0.	0.	190.	2331.	82
83	STEEL	22381.	10.	0.	138.	492.	-805.	13.	0.	0.	0.	-152.	22533.	83
84	COPPER	3748.	0.	0.	44.	196.	-306.	5.	0.	0.	0.	-61.	3809.	84
85	LEAD	373.	0.	0.	-9.	1.	-52.	0.	0.	0.	0.	-60.	433.	85
86	ZINC	313.	0.	0.	-17.	8.	-33.	0.	0.	0.	0.	-42.	355.	86
87	ALUMINUM	4120.	9.	0.	69.	111.	-212.	20.	0.	0.	0.	-3.	4123.	87
88	PRIMARY NON-FERROUS MET	469.	0.	0.	8.	21.	-243.	0.	0.	0.	0.	-214.	683.	88
89	NON-FERROUS ROLLING AND	610.	0.	0.	15.	33.	-16.	7.	0.	0.	0.	39.	571.	89
90	NON-FERROUS WIRE DRAWIN	2140.	3.	22.	8.	33.	-7.	63.	0.	0.	0.	122.	2018.	90
91	NON-FERROUS CASTINGS AN	508.	0.	0.	11.	5.	-5.	3.	0.	0.	0.	14.	494.	91
92	METAL CANS	2029.	0.	0.	51.	12.	-12.	3.	0.	0.	0.	54.	1975.	92
93	METAL BARRELS, DRUMS AN	322.	0.	9.	8.	9.	0.	5.	0.	0.	0.	31.	291.	93

1963 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1453.	73.	0.	44.	36.	-4.	4.	0.	0.	0.	153.	1300.	94
95	STRUCTURAL METAL PRODUC	6912.	15.	536.	154.	192.	0.	48.	0.	0.	0.	945.	5967.	95
96	SCREW MACHINE PRODUCTS	1810.	23.	0.	11.	24.	-41.	12.	0.	0.	0.	29.	1781.	96
97	METAL STAMPINGS	4279.	246.	0.	47.	100.	-3.	12.	0.	0.	0.	402.	3877.	97
98	CUTLERY, HAND TOOLS AND	2609.	459.	12.	44.	97.	-85.	8.	0.	0.	0.	535.	2074.	98
99	MISC FABRICATED WIRE PR	1423.	31.	0.	0.	17.	-76.	3.	0.	0.	0.	-25.	1448.	99
100	VALVES, PIPE FITTINGS,	1851.	0.	175.	7.	91.	-16.	16.	0.	0.	0.	273.	1578.	100
101	OTHER FABRICATED METAL	2219.	90.	55.	24.	64.	0.	3.	0.	0.	0.	236.	1983.	101
102	ENGINES AND TURBINES	2080.	125.	357.	23.	269.	-33.	157.	1.	0.	0.	899.	1181.	102
103	FARM MACHINERY	2607.	200.	1722.	-130.	283.	-218.	11.	0.	0.	0.	1868.	739.	103
104	CONSTRUCTION, MINING, A	3632.	0.	1760.	27.	924.	0.	99.	5.	0.	0.	2815.	817.	104
105	MATERIALS HANDLING MACH	1427.	0.	665.	24.	98.	0.	64.	0.	0.	0.	851.	576.	105
106	MACHINE TOOLS, METAL CU	991.	15.	621.	29.	135.	-46.	36.	6.	0.	0.	796.	195.	106
107	MACHINE TOOLS, METAL FO	468.	0.	271.	-14.	92.	-16.	8.	0.	0.	0.	341.	127.	107
108	OTHER METAL WORKING MAC	3241.	62.	367.	44.	192.	-18.	25.	0.	0.	0.	672.	2569.	108
109	SPECIAL INDUSTRIAL MACH	3199.	21.	2025.	83.	543.	-127.	10.	0.	0.	0.	2555.	644.	109
110	PUMPS, COMPRESSORS, BLO	1627.	0.	718.	72.	164.	-12.	33.	0.	0.	0.	975.	652.	110
111	BALL AND ROLLER BEARING	967.	0.	0.	20.	58.	-27.	10.	0.	0.	0.	61.	906.	111
112	POWER TRANSMISSION EQUI	916.	0.	0.	34.	54.	0.	8.	0.	0.	0.	96.	820.	112
113	INDUSTRIAL PATTERNS	1195.	0.	668.	41.	94.	-4.	168.	0.	0.	0.	967.	228.	113
114	COMPUTERS AND RELATED M	2612.	0.	1309.	5.	255.	-47.	317.	25.	0.	0.	1864.	748.	114
115	OTHER OFFICE MACHINERY	696.	88.	334.	37.	61.	-84.	15.	0.	0.	0.	451.	245.	115
116	SERVICE INDUSTRY MACHIN	3026.	336.	1112.	102.	176.	0.	49.	0.	0.	0.	1775.	1251.	116
117	MACHINE SHOP PRODUCTS	2063.	2.	6.	-26.	16.	-16.	48.	0.	0.	0.	30.	2033.	117
118	ELECTRICAL MEASURING IN	802.	0.	426.	-20.	61.	-61.	143.	0.	0.	0.	549.	253.	118
119	TRANSFORMERS AND SWITCH	1756.	8.	851.	-5.	80.	-8.	53.	0.	0.	0.	979.	777.	119
120	MOTORS AND GENERATORS	1651.	13.	278.	24.	84.	-14.	136.	0.	0.	0.	521.	1130.	120
121	INDUSTRIAL CONTROLS	670.	0.	85.	19.	35.	-35.	21.	0.	0.	0.	125.	545.	121
122	WELDING APPARATUS AND G	829.	1.	222.	9.	58.	-8.	24.	0.	0.	0.	306.	523.	122
123	HOUSEHOLD APPLIANCES	3861.	2793.	120.	207.	122.	-90.	9.	0.	0.	0.	3161.	700.	123
124	ELECTRIC LIGHTING AND W	2738.	422.	46.	-4.	72.	-38.	13.	0.	0.	0.	511.	2227.	124
125	RADIO AND TV RECEIVING	2393.	1888.	112.	113.	66.	-256.	42.	0.	0.	0.	1965.	428.	125
126	PHONOGRAPH RECORDS	203.	173.	0.	6.	7.	-5.	1.	0.	0.	0.	182.	21.	126
127	COMMUNICATION EQUIPMENT	8457.	61.	1811.	365.	389.	-65.	4251.	439.	0.	0.	7251.	1206.	127
128	ELECTRONIC COMPONENTS	4085.	176.	96.	25.	196.	-76.	361.	29.	0.	0.	807.	3278.	128
129	BATTERIES	727.	242.	112.	23.	9.	-14.	47.	0.	0.	0.	419.	308.	129
130	ENGINE ELECTRICAL EQUIP	915.	72.	0.	-29.	61.	0.	40.	0.	0.	0.	144.	771.	130
131	X-RAY EQUIPMENT AND ELE	295.	55.	86.	-1.	11.	-15.	9.	0.	0.	0.	145.	150.	131
132	TRUCK, BUS, AND TRAILER	931.	0.	765.	5.	16.	-16.	38.	0.	0.	0.	808.	123.	132
133	MOTOR VEHICLES AND PART	36097.	15369.	4892.	697.	1253.	-647.	643.	0.	0.	0.	22207.	13890.	133
134	AIRCRAFT	4391.	49.	602.	227.	458.	-34.	2645.	414.	0.	0.	4361.	30.	134
135	AIRCRAFT ENGINES AND PA	3790.	0.	0.	46.	270.	-6.	2091.	513.	0.	0.	2914.	876.	135
136	AIRCRAFT EQUIPMENT, NEC	4048.	0.	0.	9.	410.	-70.	1476.	232.	0.	0.	2057.	1991.	136
137	SHIP AND BOAT BUILDING	1914.	192.	344.	-74.	36.	-10.	979.	1.	0.	0.	1468.	446.	137
138	RAILROAD EQUIPMENT	1473.	0.	946.	9.	126.	-2.	5.	0.	0.	0.	1084.	389.	138
139	CYCLES AND PARTS, TRANS	381.	213.	110.	10.	20.	-102.	1.	0.	0.	0.	252.	129.	139
140	TRAILER COACHES	695.	587.	65.	4.	0.	0.	0.	0.	0.	0.	656.	39.	140

1963 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	764.	0.	121.	-231.	119.	-17.	253.	16.	0.	0.	261.	503.	141
142	MECHANICAL MEASURING DE	1494.	16.	281.	20.	151.	-15.	33.	4.	0.	0.	490.	1004.	142
143	OPTICAL AND OPHTHALMIC	488.	235.	143.	58.	32.	-59.	10.	3.	0.	0.	422.	66.	143
144	MEDICAL AND SURGICAL IN	937.	132.	270.	54.	80.	-10.	29.	0.	0.	0.	555.	382.	144
145	PHOTOGRAPHIC EQUIPMENT	1725.	368.	197.	16.	127.	-87.	89.	7.	0.	0.	717.	1008.	145
146	WATCHES, CLOCKS, AND PA	460.	255.	0.	20.	5.	-88.	1.	0.	0.	0.	193.	267.	146
147	JEWELRY AND SILVERWARE	1189.	1030.	0.	60.	70.	-87.	2.	0.	0.	0.	1075.	114.	147
148	TOYS, SPORTING GOODS, M	2126.	1595.	253.	87.	49.	-169.	4.	0.	0.	0.	1819.	307.	148
149	OFFICE SUPPLIES	560.	171.	0.	20.	28.	-4.	0.	0.	0.	0.	215.	345.	149
150	MISC MANUFACTURING, NEC	2223.	540.	244.	13.	35.	-87.	4.	0.	0.	0.	749.	1474.	150
151	RAILROADS	10895.	1959.	221.	10.	99.	-99.	50.	20.	0.	42.	2302.	8593.	151
152	BUSSES	3774.	2272.	0.	0.	0.	0.	11.	0.	0.	0.	2283.	1491.	152
153	TRUCKING	13412.	2362.	310.	14.	0.	0.	339.	0.	0.	126.	3151.	10261.	153
154	WATER TRANSPORTATION	3176.	353.	5.	1.	1569.	-1636.	270.	0.	0.	2.	564.	2612.	154
155	AIRLINES	4245.	1328.	16.	1.	435.	-594.	345.	0.	0.	0.	1531.	2714.	155
156	PIPELINES	1023.	160.	0.	0.	0.	0.	0.	0.	0.	0.	160.	863.	156
157	TRAVEL AGTS, OTH TRANS	364.	14.	0.	0.	0.	0.	0.	0.	0.	0.	14.	350.	157
158	TELEPHONE AND TELEGRAPH	12942.	5542.	485.	0.	0.	0.	335.	0.	0.	0.	6362.	6580.	158
159	RADIO AND TV BROADCASTI	2297.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2297.	159
160	ELECTRIC UTULITIES	15373.	6057.	0.	0.	0.	0.	348.	0.	0.	0.	6405.	8968.	160
161	NATURAL GAS	11106.	3799.	0.	0.	0.	0.	39.	0.	0.	0.	3838.	7268.	161
162	WATER AND SEWER SERVICE	2944.	1502.	0.	0.	0.	0.	22.	0.	0.	0.	1524.	1420.	162
163	WHOLESALE TRADE	47212.	17516.	2349.	107.	1455.	0.	672.	0.	0.	0.	22099.	25113.	163
164	RETAIL TRADE	71509.	56266.	1859.	0.	0.	0.	0.	0.	0.	0.	58125.	13384.	164
165	CREDIT AGENCIES AND BRO	15235.	8929.	0.	0.	0.	0.	0.	0.	0.	0.	8929.	6306.	165
166	INSURANCE AND BROKER'S	17326.	7940.	0.	0.	0.	0.	16.	0.	0.	0.	7956.	9370.	166
167	OWNER-OCCUPIED DWELLING	38726.	38726.	0.	0.	0.	0.	0.	0.	0.	0.	38726.	0.	167
168	REAL ESTATE	45147.	15036.	1224.	0.	0.	0.	84.	0.	0.	0.	16344.	28803.	168
169	HOTEL AND LODGING PLACE	3583.	2118.	0.	0.	0.	0.	297.	0.	0.	0.	2415.	1168.	169
170	PERSONAL AND REPAIR SER	11382.	9956.	0.	0.	0.	0.	1.	0.	0.	0.	9957.	1425.	170
171	BUSINESS SERVICES	22587.	2847.	0.	0.	0.	0.	1790.	0.	0.	0.	4637.	17950.	171
172	ADVERTISING	12687.	120.	0.	0.	0.	0.	1.	0.	0.	0.	121.	12566.	172
173	AUTO REPAIR	10770.	6693.	0.	0.	0.	0.	18.	0.	0.	0.	6711.	4059.	173
174	MOTION PICTURES AND AMU	7456.	4712.	0.	0.	0.	0.	122.	0.	0.	0.	4834.	2622.	174
175	MEDICAL SERVICES	19041.	17686.	0.	0.	0.	0.	82.	0.	0.	0.	17768.	1273.	175
176	PRIVATE SCHOOLS AND NON	14060.	11649.	0.	0.	0.	0.	862.	0.	0.	0.	12511.	1549.	176
177	POST OFFICE	4141.	882.	0.	0.	0.	0.	102.	0.	0.	0.	984.	3157.	177
178	FEDERAL GOV. ENTERPRISE	442.	6.	0.	0.	0.	0.	2.	0.	0.	0.	8.	434.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1225.	353.	0.	0.	0.	0.	14.	0.	0.	0.	367.	858.	180
181	DIRECTLY ALLOCATED IMPO	5370.	2429.	0.	0.	0.	0.	2165.	0.	0.	0.	4594.	776.	181
182	BUSINESS TRAVEL	7543.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7543.	182
183	OFFICE SUPPLIES	2106.	0.	0.	0.	0.	0.	93.	0.	0.	0.	93.	2013.	183
184	UNIMPORTANT INDUSTRY	230.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	230.	184
185	COMPUTER RENTAL	878.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	878.	185
	SUM TOTALS	965465.	360717.	34093.	4640.	23132.	-18676.	29457.	2554.	-213.	1553.	437257.	528208.	

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1964 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	5089.	173.	0.	-212.	0.	0.	0.	0.	0.	0.	-39.	5128.	1
2	POULTRY AND EGGS	3576.	1432.	0.	19.	18.	-8.	18.	0.	0.	0.	1479.	2097.	2
3	MEAT, ANIMALS AND MISC	15628.	124.	0.	-1126.	46.	-384.	4.	0.	0.	0.	-1336.	16964.	3
4	COTTON	2466.	0.	0.	32.	566.	-23.	0.	0.	131.	266.	972.	1494.	4
5	GRAINS	10970.	0.	0.	-767.	2364.	-32.	0.	0.	-647.	551.	1469.	9501.	5
6	TOBACCO	1510.	0.	0.	-97.	16.	-22.	0.	0.	0.	0.	-103.	1613.	6
7	FRUITS, VEGETABLES, AND	8284.	3018.	0.	86.	227.	-377.	21.	0.	-58.	20.	2937.	5347.	7
8	FORESTRY AND FISHERY PR	1307.	411.	0.	8.	13.	-422.	3.	0.	0.	0.	13.	1294.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	2000.	16.	0.	-14.	0.	0.	16.	0.	0.	0.	18.	1962.	10
11	IRON ORES	1173.	0.	0.	-12.	106.	-541.	0.	0.	0.	0.	-447.	1620.	11
12	COPPER ORE	717.	0.	0.	-19.	0.	-26.	0.	0.	0.	0.	-45.	762.	12
13	OTHER NON-FERROUS METAL	680.	0.	0.	13.	5.	-111.	0.	0.	0.	0.	-93.	773.	13
14	COAL MINING	2796.	122.	0.	38.	290.	-3.	35.	0.	0.	0.	482.	2314.	14
15	CRUDE PETROLEUN AND NAT	10769.	0.	0.	-7.	8.	-1507.	0.	0.	0.	0.	-1506.	12275.	15
16	STONE AND CLAY MINING	1946.	15.	0.	2.	46.	-66.	0.	0.	0.	0.	-3.	1949.	16
17	CHEMICAL FERTILIZER MIN	437.	0.	0.	1.	72.	-133.	0.	0.	0.	0.	-60.	497.	17
18	NEW CONSTRUCTION	24577.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	24577.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	3868.	0.	0.	5.	52.	-52.	2560.	1167.	0.	0.	3732.	136.	20
21	AMMUNITION	577.	117.	0.	38.	148.	-17.	193.	1.	0.	0.	480.	97.	21
22	OTHER ORDNANCE	1053.	80.	0.	-5.	172.	-17.	552.	8.	0.	0.	790.	263.	22
23	MEAT PRODUCTS	18955.	14298.	0.	37.	321.	-573.	147.	0.	0.	0.	14230.	4725.	23
24	DAIRY PRODUCTS	11335.	8462.	0.	44.	232.	-51.	160.	0.	-209.	386.	9024.	2311.	24
25	CANNED AND FROZEN FOODS	7281.	6445.	0.	154.	219.	-270.	26.	0.	0.	0.	6574.	707.	25
26	GRAIN MILL PRODUCTS	8469.	2107.	0.	-29.	451.	-44.	13.	0.	0.	146.	2644.	5825.	26
27	BAKERY PRODUCTS	5979.	5713.	0.	1.	6.	-16.	18.	0.	0.	0.	5722.	257.	27
28	SUGAR	2258.	765.	0.	-3.	4.	-528.	3.	0.	0.	0.	241.	2017.	28
29	CONFECTIONERY PRODUCTS	2292.	1905.	0.	6.	21.	-70.	1.	0.	0.	0.	1863.	429.	29
30	ALCOHOLIC BEVERAGES	7177.	5854.	0.	98.	13.	-481.	4.	0.	0.	0.	5488.	1689.	30
31	SOFT DRINKS AND FLAVORI	3265.	2495.	0.	4.	29.	-7.	19.	0.	0.	0.	2540.	725.	31
32	FATS AND OILS	4112.	692.	0.	41.	526.	-174.	0.	0.	5.	12.	1102.	3010.	32
33	MISC FOOD PRODUCTS	4236.	3723.	0.	93.	72.	-72.	26.	0.	1.	0.	3843.	393.	33
34	TOBACCO PRODUCTS	7484.	5006.	0.	-20.	507.	-120.	0.	0.	0.	0.	5373.	2111.	34
35	BROAD AND NARROW FABRIC	12776.	659.	0.	35.	268.	-401.	76.	0.	0.	26.	663.	12113.	35
36	FLOOR COVERINGS	1384.	1055.	131.	21.	0.	-59.	3.	0.	0.	0.	1151.	233.	36
37	MISC TEXTILES	2058.	120.	0.	21.	24.	-454.	4.	0.	0.	0.	-285.	2343.	37
38	KNITTING	3453.	2119.	0.	44.	21.	-13.	0.	0.	0.	0.	2171.	1282.	38
39	APPAREL	15074.	13143.	0.	398.	191.	-577.	120.	0.	0.	0.	13275.	1799.	39
40	HOUSEHOLD TEXTILES	3094.	1352.	0.	69.	31.	-43.	75.	0.	0.	0.	1484.	1610.	40
41	LUMBER AND WOOD PRODUCT	6142.	130.	0.	-24.	183.	-493.	0.	0.	0.	0.	-204.	6346.	41
42	VENEER AND PLYWOOD	1520.	0.	0.	25.	10.	-215.	0.	0.	0.	0.	-180.	1700.	42
43	MILLWORK AND WOOD PRODU	2811.	187.	6.	12.	26.	-103.	20.	0.	0.	0.	148.	2663.	43
44	WOODEN CONTAINERS	382.	0.	0.	-5.	3.	-2.	8.	0.	0.	0.	4.	378.	44
45	HOUSEHOLD FURNITURE	4213.	3150.	235.	157.	29.	-37.	10.	0.	0.	0.	3544.	669.	45
46	OTHER FURNITURE	1922.	140.	1189.	51.	6.	-14.	27.	0.	0.	0.	1399.	523.	46

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1964 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	824.	0.	0.	3.	197.	-387.	0.	0.	0.	0.	-187.	1011.	47
48	PAPER AND PAPERBOARD MI	6601.	34.	0.	7.	218.	-828.	8.	0.	0.	0.	-561.	7162.	48
49	PAPER PRODUCTS, NEC	4573.	1266.	0.	11.	86.	-20.	16.	0.	0.	0.	1359.	3214.	49
50	WALL AND BUILDING PAPER	357.	0.	0.	6.	6.	-7.	0.	0.	0.	0.	5.	352.	50
51	PAPERBOARD CONTAINERS	4804.	76.	0.	38.	20.	-2.	7.	0.	0.	0.	139.	4665.	51
52	NEWSPAPERS	4621.	1263.	0.	0.	2.	-2.	0.	0.	0.	0.	1263.	3358.	52
53	PERIODICALS	2187.	612.	0.	7.	48.	-9.	31.	0.	0.	0.	689.	1498.	53
54	BOOKS	2428.	1040.	0.	28.	78.	-92.	132.	0.	0.	0.	1186.	1242.	54
55	INDUSTRIAL CHEMICALS	12045.	152.	0.	95.	826.	-307.	744.	6.	0.	0.	1516.	10529.	55
56	BUSINESS FORMS, BLANK B	877.	59.	0.	5.	0.	0.	0.	0.	0.	0.	64.	813.	56
57	COMMERCIAL PRINTING	2892.	86.	0.	19.	62.	0.	0.	0.	0.	0.	167.	2725.	57
58	MISC. PRINTING & PUBL.,	1459.	414.	0.	12.	0.	-25.	0.	0.	0.	0.	401.	1058.	58
59	FERTILIZERS	1366.	45.	0.	15.	71.	-21.	0.	0.	0.	0.	110.	1256.	59
60	PESTICIDES AND OTHER AG	533.	4.	0.	0.	40.	-9.	1.	0.	0.	0.	36.	497.	60
61	MISC CHEMICAL PRODUCTS	2556.	217.	0.	23.	353.	-72.	85.	0.	0.	0.	606.	1950.	61
62	PLASTIC MATERIALS AND R	2909.	13.	0.	8.	346.	-15.	16.	0.	0.	0.	368.	2541.	62
63	SYNTHETIC RUBBER	931.	0.	0.	6.	163.	-17.	2.	0.	0.	0.	154.	777.	63
64	CELLULOSIC FIBERS	729.	0.	0.	-2.	24.	-36.	6.	0.	0.	0.	-8.	737.	64
65	NON-CELLULOSIC FIBERS	1612.	0.	0.	3.	139.	-27.	8.	0.	0.	0.	123.	1489.	65
66	DRUGS	3839.	2088.	0.	41.	266.	-76.	23.	0.	0.	0.	2342.	1497.	66
67	CLEANING AND TOILET PRE	5157.	3728.	0.	56.	92.	-19.	33.	0.	0.	0.	3890.	1267.	67
68	PAINTS	2387.	24.	0.	41.	27.	-1.	19.	0.	0.	0.	110.	2277.	68
69	GASOLINE	19268.	4489.	0.	3.	356.	-223.	438.	0.	0.	0.	5063.	14205.	69
70	HEATING OIL	3932.	2164.	0.	1.	64.	-707.	110.	0.	0.	0.	1632.	2300.	70
71	PAVING AND ASPHALT	926.	0.	0.	13.	7.	-1.	0.	0.	0.	0.	19.	907.	71
72	TIRES AND INNER TUBES	2976.	1233.	0.	45.	73.	-45.	37.	0.	0.	0.	1343.	1633.	72
73	RUBBER PRODUCTS	2939.	573.	20.	39.	92.	-67.	83.	0.	0.	0.	740.	2199.	73
74	MISC PLASTIC PRODUCTS	3812.	173.	0.	55.	52.	-60.	23.	0.	0.	0.	243.	3569.	74
75	LEATHER TANNING AND IND	928.	0.	0.	-1.	42.	-56.	1.	0.	0.	0.	-14.	942.	75
76	LEATHER FOOTWEAR	2695.	2498.	0.	107.	10.	-102.	0.	0.	0.	0.	2513.	182.	76
77	OTHER LEATHER PRODUCTS	828.	739.	0.	-7.	6.	-93.	24.	0.	0.	0.	669.	159.	77
78	GLASS	3001.	274.	0.	88.	105.	-123.	8.	0.	0.	0.	352.	2649.	78
79	STRUCTURAL CLAY PRODUCT	878.	0.	0.	-9.	38.	-40.	0.	0.	0.	0.	-11.	889.	79
80	POTTERY	494.	107.	0.	15.	18.	-95.	1.	0.	0.	0.	46.	448.	80
81	CEMENT, CONCRETE, AND G	5242.	2.	0.	37.	6.	-16.	0.	0.	0.	0.	29.	5213.	81
82	OTHER STONE AND CLAY PR	2738.	118.	0.	30.	73.	-81.	81.	0.	0.	0.	221.	2517.	82
83	STEEL	25115.	11.	0.	388.	647.	-961.	7.	0.	0.	0.	92.	25023.	83
84	COPPER	4233.	0.	0.	-38.	216.	-386.	5.	0.	0.	0.	-203.	4436.	84
85	LEAD	468.	0.	0.	9.	3.	-58.	0.	0.	0.	0.	-46.	514.	85
86	ZINC	358.	0.	0.	-4.	8.	-41.	0.	0.	0.	0.	-37.	395.	86
87	ALUMINUM	4003.	10.	0.	106.	142.	-218.	27.	0.	0.	0.	67.	3936.	87
88	PRIMARY NON-FERROUS MET	523.	0.	0.	8.	48.	-251.	0.	1.	0.	0.	-194.	717.	88
89	NON-FERROUS ROLLING AND	671.	0.	0.	11.	43.	-12.	10.	1.	0.	0.	53.	618.	89
90	NON-FERROUS WIRE DRAWIN	2387.	4.	23.	-12.	32.	-18.	47.	4.	0.	0.	80.	2307.	90
91	NON-FERROUS CASTINGS AN	557.	0.	0.	9.	6.	-6.	3.	2.	0.	0.	14.	543.	91
92	METAL CANS	2191.	0.	0.	19.	14.	-14.	3.	0.	0.	0.	22.	2169.	92
93	METAL BARRELS, DRUMS AN	343.	0.	10.	1.	11.	-6.	5.	0.	0.	0.	21.	322.	93

1964 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INT6OV	SEC#
94	PLUMBING AND HEATING EQ	1542.	55.	0.	92.	42.	-6.	9.	0.	0.	0.	192.	1350.	94
95	STRUCTURAL METAL PRODUC	7452.	17.	600.	62.	181.	-16.	47.	13.	0.	0.	904.	6548.	95
96	SCREW MACHINE PRODUCTS	1977.	26.	0.	28.	27.	-51.	11.	3.	0.	0.	44.	1933.	96
97	METAL STAMPINGS	4599.	264.	0.	54.	116.	-5.	10.	0.	0.	0.	439.	4160.	97
98	CUTLERY, HAND TOOLS AND	2805.	469.	13.	89.	111.	-102.	7.	0.	0.	0.	587.	2218.	98
99	MISC FABRICATED WIRE PR	1514.	33.	0.	24.	17.	-62.	4.	0.	0.	0.	16.	1498.	99
100	VALVES, PIPE FITTINGS,	1967.	0.	186.	38.	101.	-25.	13.	4.	0.	0.	317.	1650.	100
101	OTHER FABRICATED METAL	2528.	104.	57.	4.	70.	-32.	7.	2.	0.	0.	212.	2316.	101
102	ENGINES AND TURBINES	2267.	120.	362.	67.	362.	-43.	166.	7.	0.	0.	1041.	1226.	102
103	FARM MACHINERY	2946.	219.	1899.	171.	368.	-209.	16.	0.	0.	0.	2464.	482.	103
104	CONSTRUCTION, MINING, A	4140.	0.	2028.	176.	1111.	-17.	106.	4.	0.	0.	3408.	732.	104
105	MATERIALS HANDLING MACH	1608.	0.	761.	35.	106.	-11.	57.	0.	0.	0.	948.	660.	105
106	MACHINE TOOLS, METAL CU	1217.	19.	740.	42.	191.	-49.	29.	4.	0.	0.	976.	241.	106
107	MACHINE TOOLS, METAL FO	542.	0.	301.	30.	116.	-10.	4.	0.	0.	0.	441.	101.	107
108	OTHER METAL WORKING MAC	3746.	70.	433.	82.	193.	-30.	34.	0.	0.	0.	782.	2964.	108
109	SPECIAL INDUSTRIAL MACH	3635.	23.	2330.	191.	622.	-178.	23.	0.	0.	0.	3011.	624.	109
110	PUMPS, COMPRESSORS, BLO	1810.	0.	807.	91.	177.	-23.	38.	1.	0.	0.	1091.	719.	110
111	BALL AND ROLLER BEARING	1091.	0.	0.	27.	73.	-32.	8.	0.	0.	0.	76.	1015.	111
112	POWER TRANSMISSION EQUI	984.	0.	0.	34.	63.	-12.	7.	0.	0.	0.	92.	892.	112
113	INDUSTRIAL PATTERNS	1324.	0.	731.	53.	109.	-4.	130.	1.	0.	0.	1020.	304.	113
114	COMPUTERS AND RELATED M	2881.	0.	1453.	213.	312.	-41.	284.	43.	0.	0.	2264.	617.	114
115	OTHER OFFICE MACHINERY	751.	96.	360.	-40.	69.	-96.	16.	0.	0.	0.	405.	346.	115
116	SERVICE INDUSTRY MACHIN	3373.	376.	1216.	51.	211.	-4.	56.	0.	0.	0.	1906.	1467.	116
117	MACHINE SHOP PRODUCTS	2090.	2.	6.	25.	20.	-20.	26.	1.	0.	0.	60.	2030.	117
118	ELECTRICAL MEASURING IN	844.	0.	443.	4.	74.	-74.	120.	16.	0.	0.	583.	261.	118
119	TRANSFORMERS AND SWITCH	1926.	8.	946.	38.	87.	-8.	31.	0.	0.	0.	1102.	824.	119
120	MOTORS AND GENERATORS	1761.	14.	298.	25.	96.	-22.	123.	3.	0.	0.	537.	1224.	120
121	INDUSTRIAL CONTROLS	769.	0.	99.	29.	29.	-29.	14.	3.	0.	0.	145.	624.	121
122	WELDING APPARATUS AND G	916.	1.	258.	17.	63.	-11.	23.	0.	0.	0.	351.	565.	122
123	HOUSEHOLD APPLIANCES	4105.	2979.	127.	94.	136.	-103.	12.	0.	0.	0.	3245.	860.	123
124	ELECTRIC LIGHTING AND W	2973.	452.	50.	36.	83.	-56.	13.	4.	0.	0.	582.	2391.	124
125	RADIO AND TV RECEIVING	2711.	2159.	122.	-31.	82.	-275.	38.	0.	0.	0.	2095.	616.	125
126	PHONOGRAPH RECORDS	231.	198.	0.	8.	7.	-5.	1.	0.	0.	0.	209.	22.	126
127	COMMUNICATION EQUIPMENT	8284.	63.	1822.	32.	405.	-72.	3785.	657.	0.	0.	6692.	1592.	127
128	ELECTRONIC COMPONENTS	4139.	171.	97.	25.	237.	-69.	361.	36.	0.	0.	858.	3281.	128
129	BATTERIES	756.	254.	110.	0.	10.	-16.	46.	3.	0.	0.	407.	349.	129
130	ENGINE ELECTRICAL EQUIP	948.	75.	0.	1.	66.	-7.	24.	1.	0.	0.	160.	788.	130
131	X-RAY EQUIPMENT AND ELE	386.	83.	93.	0.	12.	-17.	16.	0.	0.	0.	187.	199.	131
132	TRUCK, BUS, AND TRAILER	1019.	0.	842.	43.	19.	-19.	41.	0.	0.	0.	926.	93.	132
133	MOTOR VEHICLES AND PART	37208.	15955.	5041.	754.	1441.	-868.	743.	0.	0.	0.	23066.	14142.	133
134	AIRCRAFT	4727.	69.	885.	-98.	514.	-25.	2788.	564.	0.	0.	4697.	30.	134
135	AIRCRAFT ENGINES AND PA	3932.	0.	0.	23.	228.	-10.	1940.	649.	0.	0.	2830.	1102.	135
136	AIRCRAFT EQUIPMENT, NEC	3828.	0.	0.	30.	416.	-69.	1325.	261.	0.	0.	1963.	1865.	136
137	SHIP AND BOAT BUILDING	2139.	222.	417.	134.	71.	-11.	1060.	4.	0.	0.	1897.	242.	137
138	RAILROAD EQUIPMENT	1937.	0.	1419.	62.	100.	-17.	5.	0.	0.	0.	1569.	368.	138
139	CYCLES AND PARTS, TRANS	445.	266.	126.	6.	26.	-131.	1.	0.	0.	0.	294.	151.	139
140	TRAILER COACHES	916.	781.	85.	-1.	0.	0.	0.	0.	0.	0.	865.	51.	140

1964 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	670.	0.	104.	-12.	125.	-25.	233.	14.	0.	0.	439.	231.	141
142	MECHANICAL MEASURING DE	1624.	17.	307.	29.	168.	-15.	31.	10.	0.	0.	547.	1077.	142
143	OPTICAL AND OPHTHALMIC	512.	258.	160.	38.	36.	-70.	7.	6.	0.	0.	435.	77.	143
144	MEDICAL AND SURGICAL IN	1000.	139.	290.	3.	88.	-15.	21.	2.	0.	0.	528.	472.	144
145	PHOTOGRAPHIC EQUIPMENT	2015.	423.	260.	21.	151.	-110.	116.	6.	0.	0.	867.	1148.	145
146	WATCHES, CLOCKS, AND PA	505.	282.	0.	45.	6.	-97.	2.	0.	0.	0.	238.	267.	146
147	JEWELRY AND SILVERWARE	1263.	1075.	0.	13.	70.	-81.	4.	0.	0.	0.	1081.	182.	147
148	TOYS, SPORTING GOODS, M	2254.	1704.	266.	-45.	63.	-190.	6.	0.	0.	0.	1804.	450.	148
149	OFFICE SUPPLIES	594.	178.	0.	14.	28.	-6.	0.	0.	0.	0.	214.	380.	149
150	MISC MANUFACTURING, NEC	2380.	586.	273.	37.	40.	-106.	6.	0.	0.	0.	836.	1544.	150
151	RAILROADS	11258.	2038.	249.	11.	108.	-108.	54.	55.	0.	41.	2448.	8810.	151
152	BUSSES	3988.	2291.	0.	0.	0.	0.	12.	0.	0.	0.	2303.	1685.	152
153	TRUCKING	14364.	2482.	340.	15.	0.	0.	313.	0.	0.	120.	3270.	11094.	153
154	WATER TRANSPORTATION	3256.	375.	6.	1.	1726.	-1718.	290.	0.	0.	2.	682.	2574.	154
155	AIRLINES	4825.	1493.	18.	1.	483.	-651.	313.	0.	0.	0.	1657.	3168.	155
156	PIPELINES	1053.	173.	0.	0.	0.	0.	0.	0.	0.	0.	173.	880.	156
157	TRAVEL AGTS, OTH TRANS	392.	15.	0.	0.	0.	0.	0.	0.	0.	0.	15.	377.	157
158	TELEPHONE AND TELEGRAPH	13937.	5950.	522.	0.	0.	0.	308.	0.	0.	0.	6780.	7157.	158
159	RADIO AND TV BROADCASTI	2546.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2546.	159
160	ELECTRIC UTULITIES	16211.	6397.	0.	0.	0.	0.	347.	0.	0.	0.	6744.	9467.	160
161	NATURAL GAS	11776.	3969.	0.	0.	0.	0.	41.	0.	0.	0.	4010.	7766.	161
162	WATER AND SEWER SERVICE	3128.	1579.	0.	0.	0.	0.	24.	0.	0.	0.	1603.	1525.	162
163	WHOLESALE TRADE	50741.	18564.	2609.	45.	1667.	0.	761.	0.	0.	0.	23646.	27095.	163
164	RETAIL TRADE	77386.	59631.	2024.	0.	0.	0.	0.	0.	0.	0.	61655.	15731.	164
165	CREDIT AGENCIES AND BRO	16963.	9930.	0.	0.	0.	0.	0.	0.	0.	0.	9930.	7033.	165
166	INSURANCE AND BROKER'S	18082.	8398.	0.	0.	0.	0.	13.	0.	0.	0.	8411.	9671.	166
167	OWNER-OCCUPIED DWELLING	41015.	41015.	0.	0.	0.	0.	0.	0.	0.	0.	41015.	0.	167
168	REAL ESTATE	48712.	16468.	1321.	0.	0.	0.	115.	0.	0.	0.	17904.	30808.	168
169	HOTEL AND LODGING PLACE	3887.	2309.	0.	0.	0.	0.	219.	0.	0.	0.	2528.	1359.	169
170	PERSONAL AND REPAIR SER	12162.	10628.	0.	0.	0.	0.	0.	0.	0.	0.	10628.	1534.	170
171	BUSINESS SERVICES	25130.	3082.	0.	0.	0.	0.	1397.	0.	0.	0.	4479.	20651.	171
172	ADVERTISING	13701.	129.	0.	0.	0.	0.	1.	0.	0.	0.	130.	13571.	172
173	AUTO REPAIR	10768.	6692.	0.	0.	0.	0.	17.	0.	0.	0.	6709.	4059.	173
174	MOTION PICTURES AND AMU	7944.	4982.	0.	0.	0.	0.	83.	0.	0.	0.	5065.	2879.	174
175	MEDICAL SERVICES	21330.	19830.	0.	0.	0.	0.	73.	0.	0.	0.	19903.	1427.	175
176	PRIVATE SCHOOLS AND NON	15241.	12636.	0.	0.	0.	0.	763.	0.	0.	0.	13399.	1842.	176
177	POST OFFICE	4565.	924.	0.	0.	0.	0.	95.	0.	0.	0.	1019.	3546.	177
178	FEDERAL GOV. ENTERPRISE	470.	6.	0.	0.	0.	0.	1.	0.	0.	0.	7.	463.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1328.	391.	0.	0.	0.	0.	16.	0.	0.	0.	407.	921.	180
181	DIRECTLY ALLOCATED IMPO	5506.	2438.	0.	0.	0.	0.	2039.	0.	0.	0.	4477.	1029.	181
182	BUSINESS TRAVEL	8887.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8887.	182
183	OFFICE SUPPLIES	2214.	0.	0.	0.	0.	0.	74.	0.	0.	0.	74.	2140.	183
184	UNIMPORTANT INDUSTRY	245.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	245.	184
185	COMPUTER RENTAL	1255.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1255.	185
	SUM TOTALS	1027060.	383664.	37926.	3634.	26247.	-20394.	27619.	3567.	-777.	1570.	463056.	564004.	

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1965 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	5104.	158.	0.	46.	0.	0.	0.	0.	0.	0.	204.	4900.	1
2	POULTRY AND EGGS	3843.	1477.	0.	56.	21.	-8.	40.	0.	0.	0.	1586.	2257.	2
3	MEAT, ANIMALS AND MISC	18200.	136.	0.	3075.	58.	-501.	10.	0.	0.	0.	2778.	15422.	3
4	COTTON	2279.	0.	0.	-312.	403.	-20.	0.	0.	135.	172.	378.	1901.	4
5	GRAINS	12130.	0.	0.	715.	2413.	-21.	0.	0.	-928.	686.	2865.	9265.	5
6	TOBACCO	1267.	0.	0.	12.	20.	-26.	0.	0.	0.	0.	6.	1261.	6
7	FRUITS, VEGETABLES, AND	8594.	3195.	0.	166.	258.	-420.	46.	0.	70.	23.	3338.	5256.	7
8	FORESTRY AND FISHERY PR	1391.	472.	0.	35.	22.	-480.	5.	0.	0.	0.	54.	1337.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	2144.	18.	0.	-2.	0.	0.	13.	0.	0.	0.	29.	2115.	10
11	IRON ORES	1172.	0.	0.	-7.	110.	-573.	0.	0.	0.	0.	-470.	1642.	11
12	COPPER ORE	844.	0.	0.	9.	4.	-7.	0.	0.	0.	0.	6.	838.	12
13	OTHER NON-FERROUS METAL	750.	0.	0.	-8.	8.	-139.	0.	0.	0.	0.	-139.	889.	13
14	COAL MINING	2897.	118.	0.	-11.	299.	-2.	39.	0.	0.	0.	443.	2454.	14
15	CRUDE PETROLEUN AND NAT	11093.	0.	0.	-83.	10.	-1564.	0.	0.	0.	0.	-1637.	12730.	15
16	STONE AND CLAY MINING	2043.	16.	0.	6.	58.	-65.	0.	0.	0.	0.	15.	2028.	16
17	CHEMICAL FERTILIZER MIN	511.	0.	0.	10.	102.	-158.	0.	0.	0.	0.	-46.	557.	17
18	NEW CONSTRUCTION	26203.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	26203.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	3835.	0.	0.	94.	51.	-51.	2104.	1503.	0.	0.	3701.	134.	20
21	AMMUNITION	619.	132.	0.	10.	146.	-20.	247.	1.	0.	0.	516.	103.	21
22	OTHER ORDNANCE	1143.	91.	0.	-20.	170.	-21.	628.	9.	0.	0.	857.	286.	22
23	MEAT PRODUCTS	20122.	15198.	0.	43.	285.	-597.	261.	0.	0.	0.	15190.	4932.	23
24	DAIRY PRODUCTS	11235.	8450.	0.	-21.	174.	-56.	294.	0.	-34.	237.	9044.	2191.	24
25	CANNED AND FROZEN FOODS	7732.	6817.	0.	-122.	242.	-279.	47.	0.	0.	0.	6705.	1027.	25
26	GRAIN MILL PRODUCTS	8602.	2072.	0.	31.	435.	-50.	25.	0.	9.	135.	2657.	5945.	26
27	BAKERY PRODUCTS	6111.	5839.	0.	1.	5.	-17.	34.	0.	0.	0.	5862.	249.	27
28	SUGAR	2182.	746.	0.	100.	4.	-498.	6.	0.	0.	0.	358.	1824.	28
29	CONFECTIONERY PRODUCTS	2338.	1953.	0.	37.	16.	-62.	1.	0.	0.	0.	1945.	393.	29
30	ALCOHOLIC BEVERAGES	7467.	6278.	0.	24.	18.	-537.	8.	0.	0.	0.	5791.	1676.	30
31	SOFT DRINKS AND FLAVORI	3295.	2522.	0.	2.	23.	-8.	37.	0.	0.	0.	2576.	719.	31
32	FATS AND OILS	4529.	761.	0.	-55.	621.	-160.	0.	0.	-8.	27.	1186.	3343.	32
33	MISC FOOD PRODUCTS	4314.	3815.	0.	18.	53.	-67.	47.	0.	1.	0.	3867.	447.	33
34	TOBACCO PRODUCTS	7524.	5142.	0.	6.	464.	-141.	0.	0.	0.	0.	5471.	2053.	34
35	BROAD AND NARROW FABRIC	13688.	727.	0.	115.	237.	-506.	137.	0.	0.	20.	730.	12958.	35
36	FLOOR COVERINGS	1415.	1048.	157.	82.	9.	-60.	2.	0.	0.	0.	1238.	177.	36
37	MISC TEXTILES	2268.	124.	0.	36.	76.	-470.	3.	0.	0.	0.	-231.	2499.	37
38	KNITTING	3795.	2334.	0.	168.	24.	-18.	0.	0.	0.	0.	2508.	1287.	38
39	APPAREL	15812.	13867.	0.	488.	180.	-683.	223.	0.	0.	0.	14075.	1737.	39
40	HOUSEHOLD TEXTILES	3441.	1399.	0.	30.	31.	-48.	91.	0.	0.	0.	1503.	1938.	40
41	LUMBER AND WOOD PRODUCT	6181.	125.	0.	-34.	214.	-501.	0.	0.	0.	0.	-196.	6377.	41
42	VENEER AND PLYWOOD	1595.	0.	0.	24.	12.	-221.	0.	0.	0.	0.	-185.	1780.	42
43	MILLWORK AND WOOD PRODU	2924.	194.	6.	0.	24.	-118.	41.	0.	0.	0.	147.	2777.	43
44	WOODEN CONTAINERS	441.	0.	0.	-12.	2.	-2.	13.	0.	0.	0.	1.	440.	44
45	HOUSEHOLD FURNITURE	4548.	3318.	308.	26.	30.	-48.	11.	0.	0.	0.	3645.	903.	45
46	OTHER FURNITURE	2134.	148.	1334.	46.	7.	-19.	42.	0.	0.	0.	1558.	576.	46

1965 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	826.	0.	0.	8.	182.	-417.	0.	0.	0.	0.	-227.	1053.	47
48	PAPER AND PAPERBOARD MI	6863.	36.	0.	63.	243.	-870.	9.	0.	0.	0.	-519.	7382.	48
49	PAPER PRODUCTS, NEC	5084.	1398.	0.	42.	79.	-20.	18.	0.	0.	0.	1517.	3567.	49
50	WALL AND BUILDING PAPER	370.	0.	0.	17.	7.	-6.	0.	0.	0.	0.	18.	352.	50
51	PAPERBOARD CONTAINERS	5201.	77.	0.	39.	19.	-2.	4.	0.	0.	0.	137.	5064.	51
52	NEWSPAPERS	4887.	1335.	0.	-1.	3.	-3.	0.	0.	0.	0.	1334.	3553.	52
53	PERIODICALS	2318.	655.	0.	20.	57.	-7.	22.	0.	0.	0.	747.	1571.	53
54	BOOKS	2606.	1121.	0.	46.	88.	-102.	89.	0.	0.	0.	1242.	1364.	54
55	INDUSTRIAL CHEMICALS	13121.	130.	0.	208.	916.	-362.	611.	13.	0.	0.	1516.	11605.	55
56	BUSINESS FORMS, BLANK B	941.	59.	0.	3.	0.	0.	0.	0.	0.	0.	62.	879.	56
57	COMMERCIAL PRINTING	3134.	105.	0.	11.	65.	0.	0.	0.	0.	0.	181.	2953.	57
58	MISC. PRINTING & PUBL.,	1604.	443.	0.	10.	0.	-24.	0.	0.	0.	0.	429.	1175.	58
59	FERTILIZERS	1463.	47.	0.	45.	60.	-27.	0.	0.	0.	0.	125.	1338.	59
60	PESTICIDES AND OTHER AG	609.	5.	0.	-3.	41.	-11.	0.	0.	0.	0.	32.	577.	60
61	MISC CHEMICAL PRODUCTS	2765.	244.	0.	15.	271.	-84.	85.	0.	0.	0.	531.	2234.	61
62	PLASTIC MATERIALS AND R	3366.	15.	0.	42.	364.	-25.	8.	0.	0.	0.	404.	2962.	62
63	SYNTHETIC RUBBER	962.	0.	0.	5.	146.	-22.	1.	0.	0.	0.	130.	832.	63
64	CELLULOSIC FIBERS	760.	0.	0.	6.	16.	-28.	3.	0.	0.	0.	-3.	763.	64
65	NON-CELLULOSIC FIBERS	1878.	0.	0.	65.	92.	-55.	4.	0.	0.	0.	106.	1772.	65
66	DRUGS	4320.	2369.	0.	53.	276.	-95.	34.	0.	0.	0.	2637.	1683.	66
67	CLEANING AND TOILET PRE	5545.	4007.	0.	76.	100.	-22.	50.	0.	0.	0.	4211.	1334.	67
68	PAINTS	2586.	26.	0.	19.	32.	-1.	42.	0.	0.	0.	118.	2468.	68
69	GASOLINE	19991.	4564.	0.	36.	326.	-274.	349.	0.	0.	0.	5001.	14990.	69
70	HEATING OIL	4178.	2331.	0.	0.	51.	-824.	87.	0.	0.	0.	1645.	2533.	70
71	PAVING AND ASPHALT	963.	0.	0.	0.	10.	0.	0.	0.	0.	0.	10.	953.	71
72	TIRES AND INNER TUBES	3324.	1374.	0.	78.	83.	-50.	28.	0.	0.	0.	1513.	1811.	72
73	RUBBER PRODUCTS	3094.	579.	22.	37.	83.	-77.	75.	0.	0.	0.	719.	2375.	73
74	MISC PLASTIC PRODUCTS	4493.	202.	0.	96.	63.	-72.	17.	0.	0.	0.	306.	4187.	74
75	LEATHER TANNING AND IND	1008.	0.	0.	13.	41.	-74.	1.	0.	0.	0.	-19.	1027.	75
76	LEATHER FOOTWEAR	2781.	2573.	0.	103.	9.	-116.	0.	0.	0.	0.	2569.	212.	76
77	OTHER LEATHER PRODUCTS	865.	779.	0.	24.	8.	-112.	52.	0.	0.	0.	751.	114.	77
78	GLASS	3290.	272.	0.	43.	115.	-125.	9.	0.	0.	0.	314.	2976.	78
79	STRUCTURAL CLAY PRODUCT	899.	0.	0.	4.	46.	-39.	0.	0.	0.	0.	11.	888.	79
80	POTTERY	520.	104.	0.	8.	17.	-108.	3.	0.	0.	0.	24.	496.	80
81	CEMENT, CONCRETE, AND G	5604.	2.	0.	-6.	8.	-25.	0.	0.	0.	0.	-21.	5625.	81
82	OTHER STONE AND CLAY PR	2982.	127.	0.	49.	83.	-87.	156.	0.	0.	0.	328.	2654.	82
83	STEEL	27793.	12.	0.	465.	588.	-1480.	8.	0.	0.	0.	-407.	28200.	83
84	COPPER	5029.	0.	0.	71.	272.	-377.	7.	0.	0.	0.	-27.	5056.	84
85	LEAD	574.	0.	0.	10.	2.	-71.	0.	0.	0.	0.	-59.	633.	85
86	ZINC	405.	0.	0.	-6.	2.	-52.	0.	0.	0.	0.	-56.	461.	86
87	ALUMINUM	4606.	11.	0.	26.	148.	-287.	34.	0.	0.	0.	-68.	4674.	87
88	PRIMARY NON-FERROUS MET	568.	0.	0.	-10.	48.	-354.	0.	2.	0.	0.	-314.	882.	88
89	NON-FERROUS ROLLING AND	748.	0.	0.	27.	50.	-23.	14.	2.	0.	0.	70.	678.	89
90	NON-FERROUS WIRE DRAWIN	2958.	4.	29.	48.	38.	-26.	30.	9.	0.	0.	132.	2826.	90
91	NON-FERROUS CASTINGS AN	653.	0.	0.	18.	11.	-11.	3.	4.	0.	0.	25.	628.	91
92	METAL CANS	2320.	0.	0.	38.	12.	-12.	4.	0.	0.	0.	42.	2278.	92
93	METAL BARRELS, DRUMS AN	370.	0.	15.	2.	5.	-7.	6.	0.	0.	0.	21.	349.	93

1965 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1580.	52.	0.	34.	44.	-7.	16.	0.	0.	0.	139.	1441.	94
95	STRUCTURAL METAL PRODUC	8294.	20.	696.	188.	201.	-21.	46.	25.	0.	0.	1155.	7139.	95
96	SCREW MACHINE PRODUCTS	2219.	29.	0.	46.	34.	-73.	10.	7.	0.	0.	53.	2166.	96
97	METAL STAMPINGS	5461.	310.	0.	51.	121.	-4.	10.	0.	0.	0.	488.	4973.	97
98	CUTLERY, HAND TOOLS AND	3239.	522.	15.	61.	108.	-114.	6.	0.	0.	0.	598.	2641.	98
99	MISC FABRICATED WIRE PR	1660.	36.	0.	16.	25.	-70.	6.	0.	0.	0.	13.	1647.	99
100	VALVES, PIPE FITTINGS,	2243.	0.	212.	123.	133.	-34.	11.	9.	0.	0.	454.	1789.	100
101	OTHER FABRICATED METAL	2708.	112.	59.	29.	76.	-45.	11.	3.	0.	0.	245.	2463.	101
102	ENGINES AND TURBINES	2463.	121.	366.	92.	499.	-62.	176.	13.	0.	0.	1205.	1258.	102
103	FARM MACHINERY	3222.	243.	2117.	134.	392.	-256.	25.	0.	0.	0.	2655.	567.	103
104	CONSTRUCTION, MINING, A	4710.	0.	2333.	100.	1175.	-33.	112.	4.	0.	0.	3691.	1019.	104
105	MATERIALS HANDLING MACH	1837.	0.	898.	38.	114.	-15.	51.	0.	0.	0.	1086.	751.	105
106	MACHINE TOOLS, METAL CU	1485.	27.	951.	46.	178.	-75.	22.	1.	0.	0.	1150.	335.	106
107	MACHINE TOOLS, METAL FO	598.	0.	359.	34.	91.	-13.	0.	0.	0.	0.	471.	127.	107
108	OTHER METAL WORKING MAC	4279.	79.	481.	106.	176.	-44.	50.	0.	0.	0.	848.	3431.	108
109	SPECIAL INDUSTRIAL MACH	4222.	18.	2763.	144.	653.	-231.	41.	0.	0.	0.	3388.	834.	109
110	PUMPS, COMPRESSORS, BLO	2101.	0.	939.	97.	235.	-36.	44.	3.	0.	0.	1282.	819.	110
111	BALL AND ROLLER BEARING	1232.	0.	0.	44.	73.	-43.	6.	1.	0.	0.	81.	1151.	111
112	POWER TRANSMISSION EQUI	1136.	0.	0.	36.	88.	-15.	7.	0.	0.	0.	116.	1020.	112
113	INDUSTRIAL PATTERNS	1490.	0.	847.	-7.	90.	-7.	91.	2.	0.	0.	1016.	474.	113
114	COMPUTERS AND RELATED M	3124.	0.	1631.	140.	319.	-63.	249.	61.	0.	0.	2337.	787.	114
115	OTHER OFFICE MACHINERY	822.	105.	383.	37.	104.	-111.	20.	0.	0.	0.	538.	284.	115
116	SERVICE INDUSTRY MACHIN	3902.	435.	1416.	106.	234.	-6.	72.	0.	0.	0.	2257.	1645.	116
117	MACHINE SHOP PRODUCTS	2378.	2.	7.	16.	26.	-26.	5.	1.	0.	0.	31.	2347.	117
118	ELECTRICAL MEASURING IN	926.	0.	470.	15.	108.	-108.	96.	33.	0.	0.	614.	312.	118
119	TRANSFORMERS AND SWITCH	2230.	10.	1094.	40.	93.	-15.	8.	1.	0.	0.	1231.	999.	119
120	MOTORS AND GENERATORS	2026.	17.	325.	14.	133.	-36.	110.	7.	0.	0.	570.	1456.	120
121	INDUSTRIAL CONTROLS	873.	0.	112.	42.	36.	-36.	8.	7.	0.	0.	169.	704.	121
122	WELDING APPARATUS AND G	1091.	1.	320.	10.	66.	-14.	24.	0.	0.	0.	407.	684.	122
123	HOUSEHOLD APPLIANCES	4523.	3321.	137.	163.	136.	-126.	17.	0.	0.	0.	3648.	875.	123
124	ELECTRIC LIGHTING AND W	3279.	522.	56.	87.	120.	-81.	14.	7.	0.	0.	725.	2554.	124
125	RADIO AND TV RECEIVING	3448.	2830.	156.	50.	78.	-372.	37.	0.	0.	0.	2779.	669.	125
126	PHONOGRAPH RECORDS	225.	191.	0.	15.	9.	-5.	2.	0.	0.	0.	212.	13.	126
127	COMMUNICATION EQUIPMENT	8642.	84.	1938.	215.	338.	-102.	3320.	875.	0.	0.	6668.	1974.	127
128	ELECTRONIC COMPONENTS	5561.	212.	139.	202.	226.	-117.	361.	44.	0.	0.	1067.	4494.	128
129	BATTERIES	868.	283.	137.	48.	18.	-16.	46.	7.	0.	0.	523.	345.	129
130	ENGINE ELECTRICAL EQUIP	1109.	90.	0.	122.	54.	-11.	7.	3.	0.	0.	265.	844.	130
131	X-RAY EQUIPMENT AND ELE	330.	55.	95.	11.	21.	-22.	24.	0.	0.	0.	184.	146.	131
132	TRUCK, BUS, AND TRAILER	1197.	0.	1003.	51.	18.	-18.	45.	1.	0.	0.	1100.	97.	132
133	MOTOR VEHICLES AND PART	46064.	20152.	6346.	1196.	1484.	-1055.	961.	0.	0.	0.	29084.	16980.	133
134	AIRCRAFT	5350.	101.	1311.	-23.	759.	-90.	2544.	713.	0.	0.	5315.	35.	134
135	AIRCRAFT ENGINES AND PA	4064.	0.	0.	130.	239.	-27.	1790.	785.	0.	0.	2917.	1147.	135
136	AIRCRAFT EQUIPMENT, NEC	4032.	0.	0.	44.	429.	-72.	1173.	289.	0.	0.	1863.	2169.	136
137	SHIP AND BOAT BUILDING	2414.	234.	492.	119.	49.	-15.	1141.	6.	0.	0.	2026.	388.	137
138	RAILROAD EQUIPMENT	2387.	0.	1741.	4.	125.	-8.	6.	0.	0.	0.	1868.	519.	138
139	CYCLES AND PARTS, TRANS	512.	345.	161.	13.	31.	-214.	2.	0.	0.	0.	338.	174.	139
140	TRAILER COACHES	958.	824.	89.	7.	0.	0.	0.	0.	0.	0.	920.	38.	140

1965 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	724.	0.	117.	13.	114.	-30.	214.	13.	0.	0.	441.	283.	141
142	MECHANICAL MEASURING DE	1786.	19.	348.	50.	194.	-18.	29.	15.	0.	0.	637.	1149.	142
143	OPTICAL AND OPHTHALMIC	561.	284.	186.	110.	35.	-87.	3.	9.	0.	0.	540.	21.	143
144	MEDICAL AND SURGICAL IN	1100.	149.	322.	16.	87.	-17.	13.	4.	0.	0.	574.	526.	144
145	PHOTOGRAPHIC EQUIPMENT	2427.	498.	330.	58.	188.	-117.	144.	5.	0.	0.	1106.	1321.	145
146	WATCHES, CLOCKS, AND PA	581.	329.	1.	52.	8.	-121.	3.	0.	0.	0.	272.	309.	146
147	JEWELRY AND SILVERWARE	1438.	1207.	0.	96.	76.	-83.	5.	0.	0.	0.	1301.	137.	147
148	TOYS, SPORTING GOODS, M	2515.	1926.	294.	81.	63.	-225.	9.	0.	0.	0.	2148.	367.	148
149	OFFICE SUPPLIES	628.	189.	0.	7.	29.	-11.	0.	0.	0.	0.	214.	414.	149
150	MISC MANUFACTURING, NEC	2521.	608.	274.	23.	84.	-102.	8.	0.	0.	0.	895.	1626.	150
151	RAILROADS	11753.	2163.	295.	17.	111.	-111.	57.	89.	0.	32.	2653.	9100.	151
152	BUSSES	4400.	2335.	0.	0.	0.	0.	15.	0.	0.	0.	2350.	2050.	152
153	TRUCKING	15797.	2693.	398.	23.	0.	0.	317.	0.	0.	96.	3527.	12270.	153
154	WATER TRANSPORTATION	3425.	397.	7.	1.	1751.	-1810.	351.	0.	0.	1.	698.	2727.	154
155	AIRLINES	5626.	1726.	20.	1.	552.	-753.	309.	0.	0.	0.	1855.	3771.	155
156	PIPELINES	1101.	180.	0.	0.	0.	0.	0.	0.	0.	0.	180.	921.	156
157	TRAVEL AGTS, OTH TRANS	453.	14.	0.	0.	0.	0.	0.	0.	0.	0.	14.	439.	157
158	TELEPHONE AND TELEGRAPH	14953.	6462.	560.	0.	0.	0.	310.	0.	0.	0.	7332.	7621.	158
159	RADIO AND TV BROADCASTI	2780.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2780.	159
160	ELECTRIC UTULITIES	17141.	6716.	0.	0.	0.	0.	386.	0.	0.	0.	7102.	10039.	160
161	NATURAL GAS	12229.	4106.	0.	0.	0.	0.	48.	0.	0.	0.	4154.	8075.	161
162	WATER AND SEWER SERVICE	3270.	1668.	0.	0.	0.	0.	30.	0.	0.	0.	1698.	1572.	162
163	WHOLESALE TRADE	54513.	19738.	3039.	129.	1742.	0.	965.	0.	0.	0.	25613.	28900.	163
164	RETAIL TRADE	81550.	64086.	2416.	0.	0.	0.	0.	0.	0.	0.	66502.	15048.	164
165	CREDIT AGENCIES AND BRO	18163.	11122.	0.	0.	0.	0.	0.	0.	0.	0.	11122.	7041.	165
166	INSURANCE AND BROKER'S	18983.	9038.	0.	0.	0.	0.	11.	0.	0.	0.	9049.	9934.	166
167	OWNER-OCCUPIED DWELLING	43477.	43477.	0.	0.	0.	0.	0.	0.	0.	0.	43477.	0.	167
168	REAL ESTATE	52463.	17986.	1422.	0.	0.	0.	168.	0.	0.	0.	19576.	32887.	168
169	HOTEL AND LODGING PLACE	4315.	2580.	0.	0.	0.	0.	146.	0.	0.	0.	2726.	1589.	169
170	PERSONAL AND REPAIR SER	12991.	11333.	0.	0.	0.	0.	0.	0.	0.	0.	11333.	1658.	170
171	BUSINESS SERVICES	27813.	3344.	0.	0.	0.	0.	1064.	0.	0.	0.	4408.	23405.	171
172	ADVERTISING	14766.	141.	0.	0.	0.	0.	1.	0.	0.	0.	142.	14624.	172
173	AUTO REPAIR	11793.	7329.	0.	0.	0.	0.	17.	0.	0.	0.	7346.	4447.	173
174	MOTION PICTURES AND AMU	8345.	5185.	0.	0.	0.	0.	43.	0.	0.	0.	5228.	3117.	174
175	MEDICAL SERVICES	23098.	21489.	0.	0.	0.	0.	69.	0.	0.	0.	21558.	1540.	175
176	PRIVATE SCHOOLS AND NON	16599.	13757.	0.	0.	0.	0.	727.	0.	0.	0.	14484.	2115.	176
177	POST OFFICE	4786.	994.	0.	0.	0.	0.	98.	0.	0.	0.	1092.	3694.	177
178	FEDERAL GOV. ENTERPRISE	517.	7.	0.	0.	0.	0.	2.	0.	0.	0.	9.	508.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1466.	442.	0.	0.	0.	0.	20.	0.	0.	0.	462.	1004.	180
181	DIRECTLY ALLOCATED IMPO	6044.	2720.	0.	0.	0.	0.	2122.	0.	0.	0.	4842.	1202.	181
182	BUSINESS TRAVEL	11029.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	11029.	182
183	OFFICE SUPPLIES	2343.	0.	0.	0.	0.	0.	59.	0.	0.	0.	59.	2284.	183
184	UNIMPORTANT INDUSTRY	263.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	263.	184
185	COMPUTER RENTAL	1780.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1780.	185
	SUM TOTALS	1113800.	413516.	44495.	11750.	27308.	-23557.	26904.	4586.	-755.	1429.	505676.	608124.	

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1966 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	5667.	158.	0.	441.	0.	0.	0.	0.	0.	0.	599.	5068.	1
2	POULTRY AND EGGS	4321.	1714.	0.	53.	26.	-10.	84.	0.	0.	0.	1867.	2454.	2
3	MEAT, ANIMALS AND MISC	20529.	147.	0.	1362.	59.	-523.	22.	0.	0.	0.	1067.	19462.	3
4	COTTON	1587.	0.	0.	-368.	360.	-20.	0.	0.	-515.	537.	-6.	1593.	4
5	GRAINS	13406.	0.	0.	988.	2126.	-21.	0.	0.	-1601.	286.	1778.	11628.	5
6	TOBACCO	1291.	0.	0.	45.	35.	-26.	0.	0.	0.	17.	71.	1220.	6
7	FRUITS, VEGETABLES, AND	9194.	3569.	0.	153.	270.	-470.	83.	0.	205.	12.	3822.	5372.	7
8	FORESTRY AND FISHERY PR	1430.	465.	0.	-16.	33.	-533.	7.	0.	0.	0.	-44.	1474.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	2409.	19.	0.	17.	0.	0.	14.	0.	0.	0.	50.	2359.	10
11	IRON ORES	1249.	0.	0.	104.	129.	-603.	0.	0.	0.	0.	-370.	1619.	11
12	COPPER ORE	912.	0.	0.	38.	0.	-7.	0.	0.	0.	0.	31.	881.	12
13	OTHER NON-FERROUS METAL	771.	0.	0.	15.	14.	-121.	0.	0.	0.	0.	-92.	863.	13
14	COAL MINING	3047.	127.	0.	42.	293.	-2.	32.	0.	0.	0.	492.	2555.	14
15	CRUDE PETROLEUN AND NAT	11985.	0.	0.	31.	22.	-1561.	0.	0.	0.	0.	-1508.	13493.	15
16	STONE AND CLAY MINING	2107.	17.	0.	24.	67.	-67.	0.	0.	0.	0.	41.	2066.	16
17	CHEMICAL FERTILIZER MIN	584.	0.	0.	25.	128.	-188.	0.	0.	0.	0.	-35.	619.	17
18	NEW CONSTRUCTION	27004.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	27004.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	4318.	0.	0.	119.	13.	-13.	2429.	1627.	0.	0.	4175.	143.	20
21	AMMUNITION	1521.	146.	0.	19.	265.	-17.	852.	2.	0.	0.	1267.	254.	21
22	OTHER ORDNANCE	1690.	100.	0.	127.	207.	-39.	868.	5.	0.	0.	1268.	422.	22
23	MEAT PRODUCTS	22013.	16767.	0.	74.	314.	-810.	481.	0.	0.	0.	16826.	5187.	23
24	DAIRY PRODUCTS	11882.	8934.	0.	120.	111.	-77.	577.	0.	-39.	61.	9687.	2195.	24
25	CANNED AND FROZEN FOODS	8350.	7339.	0.	273.	246.	-318.	88.	0.	0.	0.	7628.	722.	25
26	GRAIN MILL PRODUCTS	9369.	2236.	0.	45.	461.	-48.	45.	0.	16.	125.	2880.	6489.	26
27	BAKERY PRODUCTS	6504.	6214.	0.	8.	7.	-21.	64.	0.	0.	0.	6272.	232.	27
28	SUGAR	2305.	792.	0.	-16.	6.	-570.	11.	0.	0.	0.	223.	2082.	28
29	CONFECTIONERY PRODUCTS	2488.	2074.	0.	30.	15.	-66.	3.	0.	0.	0.	2056.	432.	29
30	ALCOHOLIC BEVERAGES	8009.	6758.	0.	99.	21.	-591.	15.	0.	0.	0.	6302.	1707.	30
31	SOFT DRINKS AND FLAVORI	3630.	2765.	0.	22.	27.	-8.	67.	0.	0.	0.	2873.	757.	31
32	FATS AND OILS	4986.	887.	0.	61.	557.	-219.	0.	0.	1.	13.	1300.	3686.	32
33	MISC FOOD PRODUCTS	4443.	3990.	0.	7.	47.	-122.	82.	0.	2.	0.	4006.	437.	33
34	TOBACCO PRODUCTS	7765.	5295.	0.	-18.	555.	-139.	0.	0.	0.	0.	5693.	2072.	34
35	BROAD AND NARROW FABRIC	14716.	804.	0.	161.	248.	-588.	340.	0.	0.	36.	1001.	13715.	35
36	FLOOR COVERINGS	1515.	1097.	196.	63.	14.	-70.	14.	0.	0.	0.	1314.	201.	36
37	MISC TEXTILES	2424.	130.	0.	43.	84.	-483.	23.	0.	0.	0.	-203.	2627.	37
38	KNITTING	4081.	2419.	0.	176.	24.	-20.	0.	0.	0.	0.	2599.	1482.	38
39	APPAREL	16482.	14467.	0.	553.	161.	-748.	505.	0.	0.	0.	14938.	1544.	39
40	HOUSEHOLD TEXTILES	3656.	1546.	0.	76.	36.	-73.	164.	0.	0.	0.	1749.	1907.	40
41	LUMBER AND WOOD PRODUCT	6612.	139.	0.	38.	238.	-533.	0.	0.	0.	0.	-118.	6730.	41
42	VENEER AND PLYWOOD	1670.	0.	0.	83.	13.	-260.	0.	0.	0.	0.	-164.	1834.	42
43	MILLWORK AND WOOD PRODU	3078.	211.	7.	38.	26.	-123.	85.	0.	0.	0.	244.	2834.	43
44	WOODEN CONTAINERS	489.	0.	0.	-2.	3.	-3.	78.	0.	0.	0.	76.	413.	44
45	HOUSEHOLD FURNITURE	4890.	3479.	385.	208.	24.	-71.	18.	0.	0.	0.	4043.	847.	45
46	OTHER FURNITURE	2448.	152.	1549.	47.	16.	-27.	49.	0.	0.	0.	1786.	662.	46

1966 FINAL DEMAND COMPONENTS (CONT.)

SECH	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SECH
47	PULP MILLS	871.	0.	0.	25.	200.	-444.	0.	0.	0.	0.	-219.	1090.	47
48	PAPER AND PAPERBOARD MI	7639.	39.	0.	207.	296.	-993.	10.	0.	0.	0.	-441.	8080.	48
49	PAPER PRODUCTS, NEC	5524.	1493.	0.	112.	70.	-23.	20.	0.	0.	0.	1672.	3852.	49
50	WALL AND BUILDING PAPER	369.	0.	0.	34.	8.	-7.	0.	0.	0.	0.	35.	334.	50
51	PAPERBOARD CONTAINERS	5727.	83.	0.	91.	22.	-2.	28.	0.	0.	0.	222.	5505.	51
52	NEWSPAPERS	5257.	1437.	0.	2.	3.	-3.	1.	0.	0.	0.	1440.	3817.	52
53	PERIODICALS	2423.	681.	0.	42.	41.	-7.	43.	0.	0.	0.	800.	1623.	53
54	BOOKS	2983.	1277.	0.	141.	130.	-129.	177.	0.	0.	0.	1596.	1387.	54
55	INDUSTRIAL CHEMICALS	14059.	146.	0.	512.	983.	-445.	617.	8.	0.	0.	1821.	12238.	55
56	BUSINESS FORMS, BLANK B	1067.	67.	0.	16.	3.	-3.	0.	0.	0.	0.	83.	984.	56
57	COMMERCIAL PRINTING	3411.	118.	0.	65.	63.	-26.	0.	0.	0.	0.	220.	3191.	57
58	MISC. PRINTING & PUBL.,	1741.	477.	0.	38.	6.	-4.	0.	0.	0.	0.	517.	1224.	58
59	FERTILIZERS	1590.	52.	0.	81.	95.	-34.	0.	0.	0.	0.	194.	1396.	59
60	PESTICIDES AND OTHER AG	705.	5.	0.	31.	60.	-16.	1.	0.	0.	0.	81.	624.	60
61	MISC CHEMICAL PRODUCTS	3052.	272.	0.	64.	293.	-103.	193.	0.	0.	0.	719.	2333.	61
62	PLASTIC MATERIALS AND R	3840.	18.	0.	82.	404.	-32.	9.	0.	0.	0.	481.	3359.	62
63	SYNTHETIC RUBBER	1051.	0.	0.	27.	159.	-27.	1.	0.	0.	0.	160.	891.	63
64	CELLULOSIC FIBERS	739.	0.	0.	27.	15.	-31.	4.	0.	0.	0.	15.	724.	64
65	NON-CELLULOSIC FIBERS	1986.	0.	0.	-111.	96.	-66.	4.	0.	0.	0.	-77.	2063.	65
66	DRUGS	4757.	2638.	0.	182.	273.	-126.	117.	0.	0.	0.	3084.	1673.	66
67	CLEANING AND TOILET PRE	6070.	4345.	0.	205.	110.	-22.	175.	0.	0.	0.	4813.	1257.	67
68	PAINTS	2730.	27.	0.	74.	37.	-1.	34.	0.	0.	0.	171.	2559.	68
69	GASOLINE	21442.	4988.	0.	82.	361.	-305.	364.	2.	0.	0.	5492.	15950.	69
70	HEATING OIL	4469.	2457.	0.	13.	41.	-871.	91.	0.	0.	0.	1731.	2738.	70
71	PAVING AND ASPHALT	1002.	0.	0.	-1.	10.	0.	0.	0.	0.	0.	9.	993.	71
72	TIRES AND INNER TUBES	3610.	1502.	0.	74.	78.	-69.	60.	0.	0.	0.	1645.	1965.	72
73	RUBBER PRODUCTS	3328.	596.	23.	93.	92.	-79.	100.	0.	0.	0.	825.	2503.	73
74	MISC PLASTIC PRODUCTS	5158.	217.	0.	166.	77.	-101.	35.	0.	0.	0.	394.	4764.	74
75	LEATHER TANNING AND IND	1090.	0.	0.	9.	40.	-88.	1.	0.	0.	0.	-38.	1128.	75
76	LEATHER FOOTWEAR	3012.	2807.	0.	128.	10.	-151.	0.	0.	0.	0.	2794.	218.	76
77	OTHER LEATHER PRODUCTS	942.	847.	0.	17.	12.	-123.	126.	0.	0.	0.	879.	63.	77
78	GLASS	3537.	292.	0.	112.	121.	-151.	17.	0.	0.	0.	391.	3146.	78
79	STRUCTURAL CLAY PRODUCT	910.	0.	0.	51.	30.	-38.	0.	0.	0.	0.	43.	867.	79
80	POTTERY	555.	106.	0.	13.	19.	-128.	2.	0.	0.	0.	12.	543.	80
81	CEMENT, CONCRETE, AND G	5666.	3.	0.	34.	10.	-29.	0.	0.	0.	0.	18.	5648.	81
82	OTHER STONE AND CLAY PR	3207.	133.	0.	105.	111.	-111.	97.	0.	0.	0.	335.	2872.	82
83	STEEL	28786.	12.	0.	144.	530.	-1557.	9.	0.	0.	0.	-862.	29648.	83
84	COPPER	6045.	0.	0.	81.	284.	-667.	8.	0.	0.	0.	-294.	6339.	84
85	LEAD	582.	0.	0.	21.	2.	-89.	0.	0.	0.	0.	-66.	648.	85
86	ZINC	431.	0.	0.	36.	1.	-89.	0.	0.	0.	0.	-52.	483.	86
87	ALUMINUM	5420.	14.	0.	215.	164.	-327.	95.	0.	0.	0.	161.	5259.	87
88	PRIMARY NON-FERROUS MET	675.	0.	0.	62.	64.	-361.	0.	2.	0.	0.	-233.	908.	88
89	NON-FERROUS ROLLING AND	942.	0.	0.	56.	53.	-21.	19.	0.	0.	0.	107.	835.	89
90	NON-FERROUS WIRE DRAWIN	3692.	6.	36.	89.	47.	-54.	64.	15.	0.	0.	203.	3489.	90
91	NON-FERROUS CASTINGS AN	807.	0.	0.	43.	11.	-11.	5.	4.	0.	0.	52.	755.	91
92	METAL CANS	2555.	0.	0.	25.	16.	-16.	15.	0.	0.	0.	40.	2515.	92
93	METAL BARRELS, DRUMS AN	384.	0.	14.	2.	6.	-6.	24.	0.	0.	0.	40.	344.	93

1966 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1604.	63.	0.	87.	56.	-6.	15.	0.	0.	0.	215.	1389.	94
95	STRUCTURAL METAL PRODUC	9466.	25.	812.	80.	277.	-29.	72.	13.	0.	0.	1250.	8216.	95
96	SCREW MACHINE PRODUCTS	2677.	33.	0.	103.	45.	-84.	24.	9.	0.	0.	130.	2547.	96
97	METAL STAMPINGS	5834.	306.	0.	87.	171.	-6.	19.	0.	0.	0.	577.	5257.	97
98	CUTLERY, HAND TOOLS AND	3468.	574.	19.	188.	124.	-133.	12.	0.	0.	0.	784.	2684.	98
99	MISC FABRICATED WIRE PR	1808.	39.	0.	31.	24.	-84.	13.	0.	0.	0.	23.	1785.	99
100	VALVES, PIPE FITTINGS,	2651.	0.	246.	53.	154.	-47.	23.	8.	0.	0.	437.	2214.	100
101	OTHER FABRICATED METAL	3060.	125.	61.	124.	79.	-60.	26.	2.	0.	0.	357.	2703.	101
102	ENGINES AND TURBINES	2901.	168.	445.	135.	413.	-77.	307.	13.	0.	0.	1404.	1497.	102
103	FARM MACHINERY	3966.	333.	2661.	675.	405.	-330.	18.	0.	0.	0.	3762.	204.	103
104	CONSTRUCTION, MINING, A	5204.	0.	2681.	255.	1185.	-108.	314.	1.	0.	0.	4328.	876.	104
105	MATERIALS HANDLING MACH	2184.	0.	1099.	104.	124.	-22.	43.	0.	0.	0.	1348.	836.	105
106	MACHINE TOOLS, METAL CU	1755.	35.	1205.	100.	158.	-154.	28.	1.	0.	0.	1373.	382.	106
107	MACHINE TOOLS, METAL FO	715.	0.	447.	28.	89.	-21.	14.	1.	0.	0.	558.	157.	107
108	OTHER METAL WORKING MAC	5076.	92.	572.	151.	207.	-61.	48.	0.	0.	0.	1009.	4067.	108
109	SPECIAL INDUSTRIAL MACH	4781.	24.	3172.	238.	728.	-317.	39.	0.	0.	0.	3884.	897.	109
110	PUMPS, COMPRESSORS, BLO	2347.	0.	1041.	121.	276.	-46.	63.	1.	0.	0.	1456.	891.	110
111	BALL AND ROLLER BEARING	1339.	0.	0.	59.	78.	-67.	15.	0.	0.	0.	85.	1254.	111
112	POWER TRANSMISSION EQUI	1320.	0.	0.	65.	97.	-18.	5.	1.	0.	0.	150.	1170.	112
113	INDUSTRIAL PATTERNS	1746.	0.	1011.	80.	102.	-10.	94.	6.	0.	0.	1283.	463.	113
114	COMPUTERS AND RELATED M	4381.	0.	2369.	206.	382.	-84.	365.	97.	0.	0.	3335.	1046.	114
115	OTHER OFFICE MACHINERY	1047.	139.	494.	76.	118.	-146.	20.	0.	0.	0.	701.	346.	115
116	SERVICE INDUSTRY MACHIN	4450.	495.	1594.	141.	284.	-16.	108.	0.	0.	0.	2606.	1844.	116
117	MACHINE SHOP PRODUCTS	2714.	3.	8.	134.	13.	-13.	22.	3.	0.	0.	170.	2544.	117
118	ELECTRICAL MEASURING IN	1094.	0.	555.	43.	128.	-128.	102.	31.	0.	0.	731.	363.	118
119	TRANSFORMERS AND SWITCH	2589.	11.	1282.	60.	98.	-35.	13.	3.	0.	0.	1432.	1157.	119
120	MOTORS AND GENERATORS	2329.	19.	401.	96.	127.	-48.	86.	7.	0.	0.	688.	1641.	120
121	INDUSTRIAL CONTROLS	1060.	0.	136.	82.	38.	-38.	8.	7.	0.	0.	233.	827.	121
122	WELDING APPARATUS AND G	1252.	1.	388.	55.	76.	-23.	33.	0.	0.	0.	530.	722.	122
123	HOUSEHOLD APPLIANCES	4686.	3464.	142.	435.	142.	-154.	21.	0.	0.	0.	4050.	636.	123
124	ELECTRIC LIGHTING AND W	3632.	549.	60.	129.	152.	-111.	12.	4.	0.	0.	795.	2837.	124
125	RADIO AND TV RECEIVING	4479.	3776.	190.	380.	88.	-526.	42.	0.	0.	0.	3950.	529.	125
126	PHONOGRAPH RECORDS	248.	210.	0.	23.	11.	-6.	2.	0.	0.	0.	240.	8.	126
127	COMMUNICATION EQUIPMENT	9797.	113.	2099.	414.	349.	-176.	3820.	932.	0.	0.	7551.	2246.	127
128	ELECTRONIC COMPONENTS	7511.	281.	187.	344.	311.	-185.	508.	54.	0.	0.	1500.	6011.	128
129	BATTERIES	915.	298.	145.	15.	24.	-22.	66.	1.	0.	0.	527.	388.	129
130	ENGINE ELECTRICAL EQUIP	1177.	95.	0.	163.	65.	-23.	26.	1.	0.	0.	327.	850.	130
131	X-RAY EQUIPMENT AND ELE	408.	62.	115.	31.	50.	-28.	26.	0.	0.	0.	256.	152.	131
132	TRUCK, BUS, AND TRAILER	1430.	0.	1181.	24.	29.	-29.	37.	0.	0.	0.	1242.	188.	132
133	MOTOR VEHICLES AND PART	45510.	19846.	6567.	1165.	1943.	-2119.	1051.	0.	0.	0.	28453.	17057.	133
134	AIRCRAFT	6982.	128.	1889.	788.	719.	-200.	2845.	768.	0.	0.	6937.	45.	134
135	AIRCRAFT ENGINES AND PA	4500.	0.	0.	319.	272.	-43.	2037.	649.	0.	0.	3234.	1266.	135
136	AIRCRAFT EQUIPMENT, NEC	5068.	0.	0.	319.	436.	-119.	1361.	317.	0.	0.	2314.	2754.	136
137	SHIP AND BOAT BUILDING	2714.	262.	544.	130.	29.	-19.	1392.	4.	0.	0.	2342.	372.	137
138	RAILROAD EQUIPMENT	2664.	0.	2010.	42.	96.	-8.	5.	0.	0.	0.	2145.	519.	138
139	CYCLES AND PARTS, TRANS	543.	409.	181.	8.	9.	-262.	1.	0.	0.	0.	346.	197.	139
140	TRAILER COACHES	981.	840.	90.	11.	11.	-11.	0.	0.	0.	0.	941.	40.	140

1966 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	877.	0.	141.	67.	139.	-32.	339.	7.	0.	0.	661.	216.	141
142	MECHANICAL MEASURING DE	1962.	21.	378.	74.	227.	-19.	31.	19.	0.	0.	731.	1231.	142
143	OPTICAL AND OPHTHALMIC	641.	322.	224.	63.	38.	-108.	3.	9.	0.	0.	551.	90.	143
144	MEDICAL AND SURGICAL IN	1237.	165.	367.	1.	101.	-23.	19.	4.	0.	0.	634.	603.	144
145	PHOTOGRAPHIC EQUIPMENT	2993.	606.	441.	151.	235.	-132.	238.	3.	0.	0.	1542.	1451.	145
146	WATCHES, CLOCKS, AND PA	678.	385.	1.	64.	8.	-157.	5.	0.	0.	0.	306.	372.	146
147	JEWELRY AND SILVERWARE	1572.	1308.	0.	188.	94.	-98.	6.	0.	0.	0.	1498.	74.	147
148	TOYS, SPORTING GOODS, M	2724.	2084.	331.	193.	72.	-268.	9.	0.	0.	0.	2421.	303.	148
149	OFFICE SUPPLIES	693.	203.	0.	40.	34.	-14.	0.	0.	0.	0.	263.	430.	149
150	MISC MANUFACTURING, NEC	2614.	616.	267.	86.	96.	-104.	8.	0.	0.	0.	969.	1645.	150
151	RAILROADS	12259.	2294.	335.	20.	112.	-112.	69.	283.	0.	42.	3043.	9216.	151
152	BUSSES	4480.	2429.	0.	0.	0.	0.	21.	0.	0.	0.	2450.	2030.	152
153	TRUCKING	17043.	2919.	456.	27.	0.	0.	406.	0.	0.	124.	3932.	13111.	153
154	WATER TRANSPORTATION	3699.	426.	8.	1.	1843.	-1933.	436.	0.	0.	2.	783.	2916.	154
155	AIRLINES	6345.	1929.	25.	1.	653.	-896.	362.	0.	0.	0.	2074.	4271.	155
156	PIPELINES	1146.	194.	0.	0.	0.	0.	0.	0.	0.	0.	194.	952.	156
157	TRAVEL AGTS, OTH TRANS	479.	13.	0.	0.	0.	0.	0.	0.	0.	0.	13.	466.	157
158	TELEPHONE AND TELEGRAPH	16405.	6946.	615.	0.	0.	0.	404.	0.	0.	0.	7965.	8440.	158
159	RADIO AND TV BROADCASTI	3100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3100.	159
160	ELECTRIC UTULITIES	18387.	7142.	0.	0.	0.	0.	312.	0.	0.	0.	7454.	10933.	160
161	NATURAL GAS	12993.	4274.	0.	0.	0.	0.	39.	0.	0.	0.	4313.	8680.	161
162	WATER AND SEWER SERVICE	3451.	1764.	0.	0.	0.	0.	25.	0.	0.	0.	1789.	1662.	162
163	WHOLESALE TRADE	59745.	21298.	3614.	111.	1865.	0.	1157.	0.	0.	0.	28045.	31700.	163
164	RETAIL TRADE	89386.	69022.	2784.	0.	0.	0.	0.	0.	0.	0.	71806.	17580.	164
165	CREDIT AGENCIES AND BRO	20671.	12695.	0.	0.	0.	0.	0.	0.	0.	0.	12695.	7976.	165
166	INSURANCE AND BROKER'S	21694.	10169.	0.	0.	0.	0.	34.	0.	0.	0.	10203.	11491.	166
167	OWNER-OCCUPIED DWELLING	46167.	46167.	0.	0.	0.	0.	0.	0.	0.	0.	46167.	0.	167
168	REAL ESTATE	55872.	19117.	1515.	0.	0.	0.	117.	0.	0.	0.	20749.	35123.	168
169	HOTEL AND LODGING PLACE	4692.	2790.	0.	0.	0.	0.	296.	0.	0.	0.	3086.	1606.	169
170	PERSONAL AND REPAIR SER	13719.	11911.	0.	0.	0.	0.	1.	0.	0.	0.	11912.	1807.	170
171	BUSINESS SERVICES	31511.	3744.	0.	0.	0.	0.	1213.	0.	0.	0.	4957.	26554.	171
172	ADVERTISING	16136.	142.	0.	0.	0.	0.	1.	0.	0.	0.	143.	15993.	172
173	AUTO REPAIR	12365.	7684.	0.	0.	0.	0.	20.	0.	0.	0.	7704.	4661.	173
174	MOTION PICTURES AND AMU	8841.	5459.	0.	0.	0.	0.	93.	0.	0.	0.	5552.	3289.	174
175	MEDICAL SERVICES	25413.	23647.	0.	0.	0.	0.	56.	0.	0.	0.	23703.	1710.	175
176	PRIVATE SCHOOLS AND NON	18083.	14967.	0.	0.	0.	0.	585.	0.	0.	0.	15552.	2531.	176
177	POST OFFICE	5107.	1056.	0.	0.	0.	0.	75.	0.	0.	0.	1131.	3976.	177
178	FEDERAL GOV. ENTERPRISE	577.	7.	0.	0.	0.	0.	1.	0.	0.	0.	8.	569.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1534.	459.	0.	0.	0.	0.	15.	0.	0.	0.	474.	1060.	180
181	DIRECTLY ALLOCATED IMPO	6309.	2698.	0.	0.	0.	0.	2612.	0.	0.	0.	5310.	999.	181
182	BUSINESS TRAVEL	12297.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12297.	182
183	OFFICE SUPPLIES	2501.	0.	0.	0.	0.	0.	90.	0.	0.	0.	90.	2411.	183
184	UNIMPORTANT INDUSTRY	283.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	283.	184
185	COMPUTER RENTAL	2129.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2129.	185
	SUM TOTALS	1213538.	444002.	51811.	18509.	29167.	-28343.	33965.	4924.	-1931.	1255.	553359.	660179.	

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1967 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	5820.	150.	0.	-87.	0.	0.	0.	0.	0.	0.	63.	5757.	1
2	POULTRY AND EGGS	3906.	1371.	0.	-28.	6.	-11.	102.	0.	0.	0.	1440.	2466.	2
3	MEAT, ANIMALS AND MISC	20296.	165.	0.	-46.	61.	-358.	25.	0.	0.	0.	-153.	20449.	3
4	COTTON	1071.	0.	0.	258.	385.	-30.	0.	0.	-1422.	427.	-382.	1453.	4
5	GRAINS	12845.	0.	0.	-345.	2500.	-21.	0.	0.	-232.	187.	2089.	10756.	5
6	TOBACCO	1167.	0.	0.	-45.	24.	-26.	0.	0.	0.	30.	-17.	1184.	6
7	FRUITS, VEGETABLES, AND	9406.	3613.	0.	8.	276.	-463.	106.	0.	141.	24.	3705.	5701.	7
8	FORESTRY AND FISHERY PR	1344.	429.	0.	35.	26.	-495.	8.	0.	0.	0.	3.	1341.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	2692.	20.	0.	-8.	19.	-19.	18.	0.	0.	0.	30.	2662.	10
11	IRON ORES	1197.	0.	0.	53.	110.	-574.	0.	0.	0.	0.	-411.	1608.	11
12	COPPER ORE	643.	0.	0.	12.	23.	-30.	0.	0.	0.	0.	5.	638.	12
13	OTHER NON-FERROUS METAL	827.	0.	0.	9.	11.	-146.	0.	0.	0.	0.	-126.	953.	13
14	COAL MINING	3203.	114.	0.	53.	302.	-2.	43.	0.	0.	0.	510.	2693.	14
15	CRUDE PETROLEUN AND NAT	12898.	0.	0.	60.	117.	-1529.	0.	0.	0.	0.	-1352.	14250.	15
16	STONE AND CLAY MINING	2082.	17.	0.	9.	73.	-57.	0.	0.	0.	0.	42.	2040.	16
17	CHEMICAL FERTILIZER MIN	628.	0.	0.	10.	137.	-207.	0.	0.	0.	0.	-60.	688.	17
18	NEW CONSTRUCTION	26942.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	26942.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	4339.	0.	0.	104.	32.	-32.	2811.	1272.	0.	0.	4187.	152.	20
21	AMMUNITION	3576.	160.	0.	274.	113.	-44.	2470.	6.	0.	0.	2979.	597.	21
22	OTHER ORDNANCE	2068.	110.	0.	-19.	187.	-49.	1314.	8.	0.	0.	1551.	517.	22
23	MEAT PRODUCTS	23095.	17543.	0.	73.	279.	-834.	538.	0.	0.	0.	17599.	5496.	23
24	DAIRY PRODUCTS	12377.	9334.	0.	24.	105.	-82.	608.	0.	178.	73.	10240.	2137.	24
25	CANNED AND FROZEN FOODS	8842.	7797.	0.	292.	239.	-355.	94.	0.	0.	0.	8067.	775.	25
26	GRAIN MILL PRODUCTS	10017.	2584.	0.	68.	500.	-44.	49.	0.	5.	397.	3559.	6458.	26
27	BAKERY PRODUCTS	6634.	6333.	0.	2.	6.	-23.	68.	0.	0.	0.	6386.	248.	27
28	SUGAR	2502.	882.	0.	50.	7.	-674.	12.	0.	0.	0.	277.	2225.	28
29	CONFECTIONERY PRODUCTS	2738.	2328.	0.	33.	18.	-81.	3.	0.	0.	0.	2301.	437.	29
30	ALCOHOLIC BEVERAGES	8504.	7131.	0.	137.	19.	-660.	15.	0.	0.	0.	6642.	1862.	30
31	SOFT DRINKS AND FLAVORI	4079.	3162.	0.	33.	34.	-9.	70.	0.	0.	0.	3290.	789.	31
32	FATS AND OILS	4801.	922.	0.	4.	544.	-230.	0.	0.	8.	1.	1249.	3552.	32
33	MISC FOOD PRODUCTS	4614.	4152.	0.	44.	68.	-144.	89.	0.	0.	0.	4209.	405.	33
34	TOBACCO PRODUCTS	7916.	5543.	0.	51.	579.	-143.	0.	0.	0.	0.	6030.	1886.	34
35	BROAD AND NARROW FABRIC	14503.	777.	0.	119.	238.	-507.	610.	0.	0.	33.	1270.	13233.	35
36	FLOOR COVERINGS	1708.	1193.	254.	-20.	17.	-60.	11.	0.	0.	0.	1395.	313.	36
37	MISC TEXTILES	2270.	130.	0.	13.	67.	-403.	17.	0.	0.	0.	-176.	2446.	37
38	KNITTING	4642.	2571.	0.	-98.	27.	-22.	0.	0.	0.	0.	2478.	2164.	38
39	APPAREL	16406.	14506.	0.	375.	155.	-815.	832.	0.	0.	0.	15053.	1353.	39
40	HOUSEHOLD TEXTILES	3659.	1522.	0.	53.	37.	-77.	277.	0.	0.	0.	1812.	1847.	40
41	LUMBER AND WOOD PRODUCT	6817.	137.	0.	52.	305.	-522.	0.	0.	0.	0.	-28.	6845.	41
42	VENEER AND PLYWOOD	1647.	0.	0.	-1.	16.	-241.	0.	0.	0.	0.	-226.	1873.	42
43	MILLWORK AND WOOD PRODU	3375.	240.	8.	53.	27.	-127.	206.	0.	0.	0.	407.	2968.	43
44	WOODEN CONTAINERS	497.	0.	0.	-7.	3.	-3.	181.	0.	0.	0.	174.	323.	44
45	HOUSEHOLD FURNITURE	4946.	3546.	451.	51.	25.	-81.	18.	0.	0.	0.	4010.	936.	45
46	OTHER FURNITURE	2587.	166.	1625.	49.	18.	-31.	90.	0.	0.	0.	1917.	670.	46

1967 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	930.	0.	0.	11.	221.	-414.	0.	0.	0.	0.	-182.	1112.	47
48	PAPER AND PAPERBOARD MI	7692.	39.	0.	53.	310.	-963.	13.	0.	0.	0.	-548.	8240.	48
49	PAPER PRODUCTS, NEC	5598.	1572.	0.	59.	76.	-27.	25.	0.	0.	0.	1705.	3893.	49
50	WALL AND BUILDING PAPER	368.	0.	0.	-1.	7.	-6.	0.	0.	0.	0.	0.	368.	50
51	PAPERBOARD CONTAINERS	5869.	102.	0.	46.	22.	-2.	32.	0.	0.	0.	200.	5669.	51
52	NEWSPAPERS	5551.	1517.	0.	2.	3.	-3.	1.	0.	0.	0.	1520.	4031.	52
53	PERIODICALS	2689.	759.	0.	5.	67.	-8.	36.	0.	0.	0.	859.	1830.	53
54	BOOKS	3236.	1394.	0.	67.	126.	-140.	147.	0.	0.	0.	1594.	1642.	54
55	INDUSTRIAL CHEMICALS	14436.	157.	0.	-9.	1034.	-451.	667.	9.	0.	0.	1407.	13029.	55
56	BUSINESS FORMS, BLANK B	1201.	75.	0.	7.	3.	-4.	0.	0.	0.	0.	81.	1120.	56
57	COMMERCIAL PRINTING	3709.	119.	0.	32.	56.	-24.	0.	0.	0.	0.	183.	3526.	57
58	MISC. PRINTING & PUBL.,	1837.	525.	0.	16.	5.	-3.	0.	0.	0.	0.	543.	1294.	58
59	FERTILIZERS	1602.	53.	0.	36.	125.	-41.	0.	0.	0.	0.	173.	1429.	59
60	PESTICIDES AND OTHER AG	874.	7.	0.	19.	66.	-18.	2.	0.	0.	0.	76.	798.	60
61	MISC CHEMICAL PRODUCTS	3113.	286.	0.	8.	298.	-116.	436.	0.	0.	0.	912.	2201.	61
62	PLASTIC MATERIALS AND R	3627.	16.	0.	46.	406.	-29.	11.	0.	0.	0.	450.	3177.	62
63	SYNTHETIC RUBBER	1017.	0.	0.	13.	154.	-23.	2.	0.	0.	0.	146.	871.	63
64	CELLULOSIC FIBERS	697.	0.	0.	-12.	17.	-28.	4.	0.	0.	0.	-19.	716.	64
65	NON-CELLULOSIC FIBERS	2022.	0.	0.	164.	95.	-60.	5.	0.	0.	0.	204.	1818.	65
66	DRUGS	5035.	2778.	0.	134.	304.	-124.	232.	0.	0.	0.	3324.	1711.	66
67	CLEANING AND TOILET PRE	6569.	4752.	0.	80.	113.	-23.	346.	0.	0.	0.	5268.	1301.	67
68	PAINTS	2723.	27.	0.	39.	42.	-1.	52.	0.	0.	0.	159.	2564.	68
69	GASOLINE	22864.	5097.	0.	380.	367.	-292.	414.	0.	0.	0.	5966.	16898.	69
70	HEATING OIL	5087.	2675.	0.	4.	55.	-913.	103.	0.	0.	0.	1924.	3163.	70
71	PAVING AND ASPHALT	1081.	0.	0.	-6.	10.	0.	0.	0.	0.	0.	4.	1077.	71
72	TIRES AND INNER TUBES	3670.	1540.	0.	-40.	66.	-98.	73.	0.	0.	0.	1541.	2129.	72
73	RUBBER PRODUCTS	3395.	606.	23.	1.	92.	-107.	134.	0.	0.	0.	749.	2646.	73
74	MISC PLASTIC PRODUCTS	5812.	221.	0.	100.	81.	-114.	44.	0.	0.	0.	332.	5480.	74
75	LEATHER TANNING AND IND	1015.	0.	0.	-7.	41.	-79.	3.	0.	0.	0.	-42.	1057.	75
76	LEATHER FOOTWEAR	3086.	2927.	0.	-17.	9.	-210.	0.	0.	0.	0.	2709.	377.	76
77	OTHER LEATHER PRODUCTS	998.	915.	0.	3.	11.	-146.	186.	0.	0.	0.	969.	29.	77
78	GLASS	3686.	305.	0.	15.	122.	-165.	23.	0.	0.	0.	300.	3386.	78
79	STRUCTURAL CLAY PRODUCT	873.	0.	0.	22.	26.	-35.	0.	0.	0.	0.	13.	860.	79
80	POTTERY	560.	108.	0.	19.	20.	-133.	5.	0.	0.	0.	19.	541.	80
81	CEMENT, CONCRETE, AND G	5839.	3.	0.	10.	10.	-23.	0.	0.	0.	0.	0.	5839.	81
82	OTHER STONE AND CLAY PR	3077.	129.	0.	-22.	110.	-95.	241.	0.	0.	0.	363.	2714.	82
83	STEEL	27468.	12.	0.	158.	527.	-1615.	33.	0.	0.	0.	-885.	28353.	83
84	COPPER	4834.	0.	0.	113.	185.	-670.	12.	0.	0.	0.	-360.	5194.	84
85	LEAD	476.	0.	0.	27.	2.	-104.	0.	0.	0.	0.	-75.	551.	85
86	ZINC	344.	0.	0.	22.	5.	-71.	0.	0.	0.	0.	-44.	388.	86
87	ALUMINUM	5925.	13.	0.	178.	181.	-263.	105.	5.	0.	0.	219.	5706.	87
88	PRIMARY NON-FERROUS MET	660.	0.	0.	21.	71.	-401.	0.	1.	0.	0.	-308.	968.	88
89	NON-FERROUS ROLLING AND	1055.	0.	0.	4.	64.	-19.	5.	0.	0.	0.	54.	1001.	89
90	NON-FERROUS WIRE DRAWIN	3430.	4.	35.	54.	48.	-44.	94.	11.	0.	0.	202.	3228.	90
91	NON-FERROUS CASTINGS AN	905.	0.	0.	14.	14.	-14.	7.	3.	0.	0.	24.	881.	91
92	METAL CANS	2620.	0.	0.	58.	12.	-12.	27.	0.	0.	0.	85.	2535.	92
93	METAL BARRELS, DRUMS AN	383.	0.	12.	1.	4.	-7.	45.	0.	0.	0.	55.	328.	93

1967 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1601.	47.	0.	-1.	52.	-7.	29.	0.	0.	0.	120.	1481.	94
95	STRUCTURAL METAL PRODUC	10046.	26.	846.	9.	223.	-38.	147.	4.	0.	0.	1217.	8829.	95
96	SCREW MACHINE PRODUCTS	2701.	32.	0.	64.	51.	-96.	32.	12.	0.	0.	95.	2606.	96
97	METAL STAMPINGS	5670.	326.	0.	136.	199.	-21.	26.	0.	0.	0.	666.	5004.	97
98	CUTLERY, HAND TOOLS AND	3505.	604.	19.	106.	129.	-152.	17.	0.	0.	0.	723.	2782.	98
99	MISC FABRICATED WIRE PR	1714.	33.	0.	-6.	27.	-86.	12.	0.	0.	0.	-20.	1734.	99
100	VALVES, PIPE FITTINGS,	2645.	0.	242.	113.	167.	-58.	30.	2.	0.	0.	496.	2149.	100
101	OTHER FABRICATED METAL	3199.	132.	76.	48.	79.	-78.	31.	1.	0.	0.	289.	2910.	101
102	ENGINES AND TURBINES	3355.	150.	626.	11.	419.	-97.	390.	5.	0.	0.	1504.	1851.	102
103	FARM MACHINERY	4181.	387.	2827.	383.	408.	-362.	25.	0.	0.	0.	3668.	513.	103
104	CONSTRUCTION, MINING, A	5087.	0.	2533.	143.	1239.	-80.	487.	0.	0.	0.	4322.	765.	104
105	MATERIALS HANDLING MACH	2258.	0.	1121.	21.	121.	-27.	56.	0.	0.	0.	1292.	966.	105
106	MACHINE TOOLS, METAL CU	2044.	43.	1433.	41.	186.	-224.	34.	2.	0.	0.	1515.	529.	106
107	MACHINE TOOLS, METAL FO	712.	0.	455.	30.	90.	-38.	5.	1.	0.	0.	543.	169.	107
108	OTHER METAL WORKING MAC	5083.	89.	556.	118.	187.	-86.	71.	0.	0.	0.	935.	4148.	108
109	SPECIAL INDUSTRIAL MACH	4792.	22.	3206.	106.	755.	-358.	71.	0.	0.	0.	3802.	990.	109
110	PUMPS, COMPRESSORS, BLO	2570.	0.	1139.	13.	314.	-50.	74.	1.	0.	0.	1491.	1079.	110
111	BALL AND ROLLER BEARING	1300.	0.	0.	29.	79.	-75.	22.	0.	0.	0.	55.	1245.	111
112	POWER TRANSMISSION EQUI	1331.	0.	0.	29.	102.	-18.	10.	1.	0.	0.	124.	1207.	112
113	INDUSTRIAL PATTERNS	1743.	0.	1011.	9.	111.	-10.	64.	2.	0.	0.	1187.	556.	113
114	COMPUTERS AND RELATED M	4932.	0.	2679.	-68.	512.	-105.	306.	115.	0.	0.	3439.	1493.	114
115	OTHER OFFICE MACHINERY	1165.	164.	552.	68.	125.	-171.	33.	0.	0.	0.	771.	394.	115
116	SERVICE INDUSTRY MACHIN	4804.	551.	1621.	102.	315.	-17.	136.	0.	0.	0.	2708.	2096.	116
117	MACHINE SHOP PRODUCTS	4022.	4.	13.	82.	14.	-14.	49.	1.	0.	0.	149.	3873.	117
118	ELECTRICAL MEASURING IN	1237.	0.	622.	32.	154.	-154.	110.	16.	0.	0.	780.	457.	118
119	TRANSFORMERS AND SWITCH	2821.	12.	1457.	65.	100.	-40.	22.	1.	0.	0.	1617.	1204.	119
120	MOTORS AND GENERATORS	2426.	18.	460.	21.	154.	-66.	120.	3.	0.	0.	710.	1716.	120
121	INDUSTRIAL CONTROLS	1133.	0.	146.	6.	38.	-38.	13.	3.	0.	0.	168.	965.	121
122	WELDING APPARATUS AND G	1178.	1.	362.	25.	76.	-35.	48.	0.	0.	0.	477.	701.	122
123	HOUSEHOLD APPLIANCES	4770.	3563.	150.	91.	138.	-169.	37.	0.	0.	0.	3810.	960.	123
124	ELECTRIC LIGHTING AND W	3717.	547.	61.	62.	166.	-126.	10.	0.	0.	0.	720.	2997.	124
125	RADIO AND TV RECEIVING	4124.	3638.	172.	154.	90.	-627.	51.	0.	0.	0.	3478.	646.	125
126	PHONOGRAPH RECORDS	308.	262.	0.	9.	13.	-8.	2.	0.	0.	0.	278.	30.	126
127	COMMUNICATION EQUIPMENT	10965.	122.	2187.	477.	438.	-197.	4748.	525.	0.	0.	8300.	2665.	127
128	ELECTRONIC COMPONENTS	7195.	248.	171.	265.	343.	-169.	572.	42.	0.	0.	1472.	5723.	128
129	BATTERIES	948.	321.	128.	-14.	22.	-20.	82.	3.	0.	0.	522.	426.	129
130	ENGINE ELECTRICAL EQUIP	1278.	104.	0.	-73.	67.	-29.	36.	3.	0.	0.	108.	1170.	130
131	X-RAY EQUIPMENT AND ELE	419.	62.	130.	2.	61.	-30.	26.	0.	0.	0.	251.	168.	131
132	TRUCK, BUS, AND TRAILER	1336.	0.	1098.	-14.	25.	-25.	97.	0.	0.	0.	1181.	155.	132
133	MOTOR VEHICLES AND PART	41004.	18311.	6074.	-401.	2259.	-2853.	1337.	0.	0.	0.	24727.	16277.	133
134	AIRCRAFT	9300.	236.	2908.	1570.	1058.	-75.	3019.	524.	0.	0.	9240.	60.	134
135	AIRCRAFT ENGINES AND PA	5020.	0.	0.	-51.	313.	-41.	2454.	564.	0.	0.	3239.	1781.	135
136	AIRCRAFT EQUIPMENT, NEC	5751.	0.	0.	171.	589.	-208.	1461.	186.	0.	0.	2199.	3552.	136
137	SHIP AND BOAT BUILDING	3021.	304.	559.	148.	70.	-21.	1363.	0.	0.	0.	2423.	598.	137
138	RAILROAD EQUIPMENT	2292.	0.	1678.	3.	127.	-6.	7.	0.	0.	0.	1809.	483.	138
139	CYCLES AND PARTS, TRANS	651.	436.	210.	19.	14.	-225.	2.	0.	0.	0.	456.	195.	139
140	TRAILER COACHES	1305.	1129.	120.	4.	13.	-13.	0.	0.	0.	0.	1253.	52.	140

1967 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	1110.	0.	185.	60.	147.	-44.	398.	6.	0.	0.	752.	358.	141
142	MECHANICA_ MEASURING DE	2035.	22.	391.	13.	260.	-22.	32.	8.	0.	0.	704.	1331.	142
143	OPTICAL AND OPHTHALMIC	788.	381.	258.	-69.	39.	-115.	4.	6.	0.	0.	504.	284.	143
144	MEDICAL AND SURGICAL IN	1508.	195.	471.	106.	117.	-26.	32.	1.	0.	0.	896.	612.	144
145	PHOTOGRAPHIC EQUIPMENT	3318.	682.	502.	53.	266.	-147.	256.	6.	0.	0.	1618.	1700.	145
146	WATCHES, CLOCKS, AND PA	748.	431.	1.	47.	10.	-167.	17.	0.	0.	0.	339.	409.	146
147	JEWELRY AND SILVERWARE	1759.	1482.	0.	111.	99.	-102.	9.	0.	0.	0.	1599.	160.	147
148	TOYS, SPORTING GOODS, M	2645.	2036.	324.	108.	75.	-300.	14.	0.	0.	0.	2257.	388.	148
149	OFFICE SUPPLIES	704.	210.	0.	10.	33.	-14.	0.	0.	0.	0.	239.	465.	149
150	MISC MANUFACTURING, NEC	2804.	625.	338.	5.	116.	-111.	13.	0.	0.	0.	986.	1818.	150
151	RAILROADS	11914.	2313.	334.	7.	119.	-119.	79.	288.	0.	20.	3041.	8873.	151
152	BUSSES	4699.	2549.	0.	0.	0.	0.	22.	0.	0.	0.	2571.	2128.	152
153	TRUCKING	17742.	3004.	466.	9.	0.	0.	469.	0.	0.	61.	4009.	13733.	153
154	WATER TRANSPORTATION	3425.	458.	8.	0.	1851.	-1879.	520.	0.	0.	1.	959.	2466.	154
155	AIRLINES	7619.	2328.	27.	1.	820.	-1020.	426.	0.	0.	0.	2582.	5037.	155
156	PIPELINES	1212.	202.	0.	0.	0.	0.	0.	0.	0.	0.	202.	1010.	156
157	TRAVEL AGTS, OTH TRANS	547.	13.	0.	0.	0.	0.	0.	0.	0.	0.	13.	534.	157
158	TELEPHONE AND TELEGRAPH	17601.	7577.	660.	0.	0.	0.	485.	0.	0.	0.	8722.	8879.	158
159	RADIO AND TV BROADCASTI	3209.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3209.	159
160	ELECTRIC UTULITIES	19475.	7618.	0.	0.	0.	0.	501.	0.	0.	0.	8119.	11356.	160
161	NATURAL GAS	13639.	4466.	0.	0.	0.	0.	63.	0.	0.	0.	4529.	9110.	161
162	WATER AND SEWER SERVICE	3569.	1811.	0.	0.	0.	0.	40.	0.	0.	0.	1851.	1718.	162
163	WHOLESALE TRADE	63030.	22227.	3864.	39.	2017.	0.	1365.	0.	0.	0.	29512.	33518.	163
164	RETAIL TRADE	95631.	71632.	2832.	0.	0.	0.	0.	0.	0.	0.	74464.	21167.	164
165	CREDIT AGENCIES AND BRO	22530.	13938.	0.	0.	0.	0.	0.	0.	0.	0.	13938.	8592.	165
166	INSURANCE AND BROKER'S	22736.	10937.	0.	0.	0.	0.	62.	0.	0.	0.	10999.	11737.	166
167	OWNER-OCCUPIED DWELLING	48936.	48936.	0.	0.	0.	0.	0.	0.	0.	0.	48936.	0.	167
168	REAL ESTATE	59307.	20377.	1608.	0.	0.	0.	202.	0.	0.	0.	22187.	37120.	168
169	HOTEL AND LODGING PLACE	5227.	3145.	0.	0.	0.	0.	244.	0.	0.	0.	3389.	1838.	169
170	PERSONAL AND REPAIR SER	14590.	12641.	0.	0.	0.	0.	1.	0.	0.	0.	12642.	1948.	170
171	BUSINESS SERVICES	34867.	3998.	0.	0.	0.	0.	1411.	0.	0.	0.	5409.	29458.	171
172	ADVERTISING	16326.	159.	0.	0.	0.	0.	1.	0.	0.	0.	160.	16166.	172
173	AUTO REPAIR	12785.	7945.	0.	0.	0.	0.	22.	0.	0.	0.	7967.	4818.	173
174	MOTION PICTURES AND AMU	9389.	5776.	0.	0.	0.	0.	56.	0.	0.	0.	5832.	3557.	174
175	MEDICAL SERVICES	28649.	26673.	0.	0.	0.	0.	75.	0.	0.	0.	26748.	1901.	175
176	PRIVATE SCHOOLS AND NON	20037.	16626.	0.	0.	0.	0.	788.	0.	0.	0.	17414.	2623.	176
177	POST OFFICE	5447.	1162.	0.	0.	0.	0.	102.	0.	0.	0.	1264.	4183.	177
178	FEDERAL GOV. ENTERPRISE	607.	7.	0.	0.	0.	0.	2.	0.	0.	0.	9.	598.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1587.	476.	0.	0.	0.	0.	21.	0.	0.	0.	497.	1090.	180
181	DIRECTLY ALLOCATED IMPO	7075.	3395.	0.	0.	0.	0.	3227.	0.	0.	0.	6622.	453.	181
182	BUSINESS TRAVEL	13658.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	13658.	182
183	OFFICE SUPPLIES	2580.	0.	0.	0.	0.	0.	77.	0.	0.	0.	77.	2503.	183
184	UNIMPORTANT INDUSTRY	288.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	288.	184
185	COMPUTER RENTAL	2709.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2709.	185
	SUM TOTALS	1268384.	467758.	54325.	8341.	31619.	-29908.	43060.	3647.	-1322.	1254.	578774.	689610.	

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1968 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	6035.	142.	0.	134.	0.	0.	0.	0.	0.	0.	276.	5759.	1
2	POULTRY AND EGGS	4108.	1526.	0.	45.	5.	-14.	123.	0.	0.	0.	1685.	2423.	2
3	MEAT, ANIMALS AND MISC	21439.	184.	0.	1364.	63.	-435.	34.	0.	0.	0.	1210.	20229.	3
4	COTTON	1287.	0.	0.	-61.	381.	-16.	0.	0.	12.	90.	406.	881.	4
5	GRAINS	12706.	0.	0.	994.	2327.	-19.	0.	0.	799.	77.	4178.	8528.	5
6	TOBACCO	1253.	0.	0.	-14.	15.	-29.	0.	0.	0.	31.	3.	1250.	6
7	FRUITS, VEGETABLES, AND	9855.	3654.	0.	121.	258.	-542.	117.	0.	485.	25.	4118.	5737.	7
8	FORESTRY AND FISHERY PR	1788.	423.	0.	-52.	25.	-594.	11.	0.	0.	0.	-187.	1975.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	2732.	23.	0.	4.	22.	-22.	21.	0.	0.	0.	48.	2684.	10
11	IRON ORES	1223.	0.	0.	-40.	106.	-585.	0.	0.	0.	0.	-519.	1742.	11
12	COPPER ORE	889.	0.	0.	43.	45.	-68.	0.	0.	0.	0.	20.	869.	12
13	OTHER NON-FERROUS METAL	904.	0.	0.	-20.	17.	-144.	0.	0.	0.	0.	-147.	1051.	13
14	COAL MINING	3194.	105.	0.	-84.	315.	-2.	44.	0.	0.	0.	378.	2816.	14
15	CRUDE PETROLEUN AND NAT	13500.	0.	0.	139.	43.	-1689.	0.	0.	0.	0.	-1507.	15007.	15
16	STONE AND CLAY MINING	2209.	18.	0.	3.	86.	-64.	0.	0.	0.	0.	43.	2166.	16
17	CHEMICAL FERTILIZER MIN	628.	0.	0.	-2.	132.	-246.	0.	0.	0.	0.	-116.	744.	17
18	NEW CONSTRUCTION	30331.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	30331.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	4392.	0.	0.	97.	39.	-39.	2975.	1166.	0.	0.	4238.	154.	20
21	AMMUNITION	4461.	176.	0.	214.	111.	-63.	3263.	15.	0.	0.	3716.	745.	21
22	OTHER ORDNANCE	2470.	121.	0.	30.	221.	-71.	1540.	11.	0.	0.	1852.	618.	22
23	MEAT PRODUCTS	24238.	18530.	0.	84.	279.	-968.	752.	0.	0.	0.	18677.	5561.	23
24	DAIRY PRODUCTS	12809.	9602.	0.	39.	127.	-88.	939.	0.	1.	293.	10913.	1896.	24
25	CANNED AND FROZEN FOODS	9534.	8457.	0.	499.	225.	-422.	141.	0.	0.	0.	8900.	634.	25
26	GRAIN MILL PRODUCTS	10021.	2738.	0.	-5.	552.	-41.	73.	0.	22.	40.	3379.	6642.	26
27	BAKERY PRODUCTS	6842.	6531.	0.	3.	5.	-28.	105.	0.	0.	0.	6616.	226.	27
28	SUGAR	2668.	942.	0.	146.	6.	-731.	18.	0.	0.	0.	381.	2287.	28
29	CONFECTIONERY PRODUCTS	2893.	2474.	0.	71.	19.	-100.	4.	0.	0.	0.	2468.	425.	29
30	ALCOHOLIC BEVERAGES	9178.	7849.	0.	88.	26.	-734.	24.	0.	0.	0.	7253.	1925.	30
31	SOFT DRINKS AND FLAVORI	4465.	3474.	0.	23.	39.	-11.	109.	0.	0.	0.	3634.	831.	31
32	FATS AND OILS	4557.	929.	0.	64.	507.	-260.	0.	0.	-1.	3.	1242.	3315.	32
33	MISC FOOD PRODUCTS	4822.	4324.	0.	48.	75.	-124.	131.	0.	-1.	0.	4453.	369.	33
34	TOBACCO PRODUCTS	8106.	5791.	0.	-4.	625.	-160.	0.	0.	0.	0.	6252.	1854.	34
35	BROAD AND NARROW FABRIC	15524.	805.	0.	267.	222.	-614.	301.	0.	0.	69.	1050.	14474.	35
36	FLOOR COVERINGS	2030.	1381.	346.	146.	19.	-77.	28.	0.	0.	0.	1843.	187.	36
37	MISC TEXTILES	2574.	143.	0.	18.	61.	-436.	45.	0.	0.	0.	-169.	2743.	37
38	KNITTING	5159.	2899.	0.	193.	24.	-29.	0.	0.	0.	0.	3087.	2072.	38
39	APPAREL	17070.	15284.	0.	1055.	170.	-1072.	523.	0.	0.	0.	15960.	1110.	39
40	HOUSEHOLD TEXTILES	4071.	1689.	0.	85.	35.	-89.	161.	0.	0.	0.	1881.	2190.	40
41	LUMBER AND WOOD PRODUCT	7826.	159.	0.	137.	396.	-730.	0.	0.	0.	0.	-38.	7864.	41
42	VENEER AND PLYWOOD	2057.	0.	0.	-12.	19.	-349.	0.	0.	0.	0.	-342.	2399.	42
43	MILLWORK AND WOOD PRODU	3877.	281.	9.	35.	30.	-155.	23.	0.	0.	0.	223.	3654.	43
44	WOODEN CONTAINERS	491.	0.	0.	34.	2.	-3.	29.	0.	0.	0.	62.	429.	44
45	HOUSEHOLD FURNITURE	5479.	3865.	571.	155.	27.	-120.	30.	0.	0.	0.	4528.	951.	45
46	OTHER FURNITURE	2725.	195.	1699.	53.	18.	-47.	41.	0.	0.	0.	1959.	766.	46

1968 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	1013.	0.	0.	-3.	241.	-452.	0.	0.	0.	0.	-214.	1227.	47
48	PAPER AND PAPERBOARD MI	8205.	39.	0.	54.	371.	-963.	15.	0.	0.	0.	-484.	8689.	48
49	PAPER PRODUCTS, NEC	6141.	1766.	0.	46.	87.	-34.	29.	0.	0.	0.	1894.	4247.	49
50	WALL AND BUILDING PAPER	391.	0.	0.	-9.	8.	-9.	0.	0.	0.	0.	-10.	401.	50
51	PAPERBOARD CONTAINERS	6294.	106.	0.	74.	22.	-3.	42.	0.	0.	0.	241.	6053.	51
52	NEWSPAPERS	5940.	1624.	0.	2.	3.	-5.	1.	0.	0.	0.	1625.	4315.	52
53	PERIODICALS	2823.	826.	0.	35.	68.	-11.	79.	0.	0.	0.	997.	1826.	53
54	BOOKS	3367.	1430.	0.	54.	134.	-138.	326.	0.	0.	0.	1806.	1561.	54
55	INDUSTRIAL CHEMICALS	15478.	172.	0.	19.	1181.	-537.	910.	9.	0.	0.	1754.	13724.	55
56	BUSINESS FORMS, BLANK B	1315.	80.	0.	5.	3.	-7.	0.	0.	0.	0.	81.	1234.	56
57	COMMERCIAL PRINTING	3944.	132.	0.	28.	61.	-29.	0.	0.	0.	0.	192.	3752.	57
58	MISC. PRINTING & PUBL.,	1986.	589.	0.	15.	5.	-3.	0.	0.	0.	0.	606.	1380.	58
59	FERTILIZERS	1597.	51.	0.	-20.	129.	-35.	0.	0.	0.	0.	125.	1472.	59
60	PESTICIDES AND OTHER AG	991.	8.	0.	-4.	88.	-21.	1.	0.	0.	0.	72.	919.	60
61	MISC CHEMICAL PRODUCTS	3383.	303.	0.	53.	355.	-121.	324.	1.	0.	0.	915.	2468.	61
62	PLASTIC MATERIALS AND R	4090.	18.	0.	14.	506.	-39.	14.	0.	0.	0.	513.	3577.	62
63	SYNTHETIC RUBBER	1106.	0.	0.	-5.	164.	-32.	2.	0.	0.	0.	129.	977.	63
64	CELLULOSIC FIBERS	770.	0.	0.	31.	23.	-45.	6.	0.	0.	0.	15.	755.	64
65	NON-CELLULOSIC FIBERS	2568.	0.	0.	64.	112.	-86.	6.	0.	0.	0.	96.	2472.	65
66	DRUGS	5558.	3067.	0.	131.	335.	-137.	81.	0.	0.	0.	3477.	2081.	66
67	CLEANING AND TOILET PRE	7037.	5071.	0.	218.	129.	-25.	124.	0.	0.	0.	5517.	1520.	67
68	PAINTS	2792.	27.	0.	48.	50.	-2.	40.	0.	0.	0.	163.	2629.	68
69	GASOLINE	23913.	5362.	0.	193.	393.	-367.	434.	0.	0.	0.	6015.	17898.	69
70	HEATING OIL	5398.	2797.	0.	-2.	23.	-1000.	109.	0.	0.	0.	1927.	3471.	70
71	PAVING AND ASPHALT	1144.	0.	0.	7.	10.	0.	0.	0.	0.	0.	17.	1127.	71
72	TIRES AND INNER TUBES	4194.	1772.	0.	175.	84.	-140.	88.	0.	0.	0.	1979.	2215.	72
73	RUBBER PRODUCTS	3628.	640.	26.	40.	103.	-150.	131.	0.	0.	0.	790.	2838.	73
74	MISC PLASTIC PRODUCTS	6579.	254.	0.	112.	95.	-185.	51.	0.	0.	0.	327.	6252.	74
75	LEATHER TANNING AND IND	1024.	0.	0.	9.	43.	-95.	1.	0.	0.	0.	-42.	1066.	75
76	LEATHER FOOTWEAR	3348.	3264.	0.	110.	10.	-314.	0.	0.	0.	0.	3070.	278.	76
77	OTHER LEATHER PRODUCTS	1041.	982.	0.	50.	13.	-187.	151.	0.	0.	0.	1009.	32.	77
78	GLASS	4072.	339.	0.	29.	135.	-225.	22.	0.	0.	0.	300.	3772.	78
79	STRUCTURAL CLAY PRODUCT	946.	0.	0.	41.	25.	-46.	0.	0.	0.	0.	20.	926.	79
80	POTTERY	622.	123.	0.	-7.	20.	-155.	0.	0.	0.	0.	-19.	641.	80
81	CEMENT, CONCRETE, AND G	6138.	3.	0.	26.	10.	-27.	0.	0.	0.	0.	12.	6126.	81
82	OTHER STONE AND CLAY PR	3299.	138.	0.	70.	118.	-117.	20.	0.	0.	0.	229.	3070.	82
83	STEEL	29440.	13.	0.	266.	608.	-2408.	26.	0.	0.	0.	-1495.	30935.	83
84	COPPER	5705.	0.	0.	36.	260.	-870.	10.	0.	0.	0.	-564.	6269.	84
85	LEAD	490.	0.	0.	30.	2.	-95.	0.	0.	0.	0.	-63.	553.	85
86	ZINC	324.	0.	0.	0.	10.	-92.	0.	0.	0.	0.	-82.	406.	86
87	ALUMINUM	6579.	15.	0.	134.	174.	-380.	71.	0.	0.	0.	14.	6565.	87
88	PRIMARY NON-FERROUS MET	910.	0.	0.	-5.	111.	-464.	0.	1.	0.	0.	-357.	1267.	88
89	NON-FERROUS ROLLING AND	962.	0.	0.	-4.	68.	-22.	5.	0.	0.	0.	47.	915.	89
90	NON-FERROUS WIRE DRAWIN	3218.	4.	33.	21.	52.	-43.	69.	7.	0.	0.	143.	3075.	90
91	NON-FERROUS CASTINGS AN	928.	0.	0.	5.	11.	-11.	6.	3.	0.	0.	14.	914.	91
92	METAL CANS	3022.	0.	0.	41.	12.	-12.	12.	0.	0.	0.	53.	2969.	92
93	METAL BARRELS, DRUMS AN	404.	0.	13.	1.	3.	-12.	20.	0.	0.	0.	25.	379.	93

1968 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P•C•E	P•D•E	D-VENT	EXPORT	IMPORT	D•O•D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1730.	61.	0.	54.	56.	-9.	12.	0.	0.	0.	174.	1556.	94
95	STRUCTURAL METAL PRODUC	10424.	29.	885.	195.	226.	-45.	131.	2.	0.	0.	1423.	9001.	95
96	SCREW MACHINE PRODUCTS	2913.	35.	0.	27.	58.	-107.	35.	12.	0.	0.	60.	2853.	96
97	METAL STAMPINGS	6534.	342.	0.	47.	326.	-33.	24.	0.	0.	0.	706.	5828.	97
98	CUTLERY, HAND TOOLS AND	3786.	627.	22.	120.	130.	-196.	16.	0.	0.	0.	719.	3067.	98
99	MISC FABRICATED WIRE PR	1898.	36.	0.	18.	28.	-91.	22.	0.	0.	0.	13.	1885.	99
100	VALVES, PIPE FITTINGS,	2849.	0.	259.	36.	176.	-73.	28.	2.	0.	0.	428.	2421.	100
101	OTHER FABRICATED METAL	3560.	145.	96.	24.	88.	-120.	30.	1.	0.	0.	264.	3296.	101
102	ENGINES AND TURBINES	3920.	195.	770.	92.	466.	-121.	328.	11.	0.	0.	1741.	2179.	102
103	FARM MACHINERY	4182.	443.	2799.	-69.	376.	-342.	23.	0.	0.	0.	3230.	952.	103
104	CONSTRUCTION, MINING, A	5503.	0.	2767.	190.	1354.	-94.	322.	0.	0.	0.	4539.	964.	104
105	MATERIALS HANDLING MACH	2397.	0.	1224.	11.	122.	-76.	52.	0.	0.	0.	1333.	1064.	105
106	MACHINE TOOLS, METAL CU	1952.	45.	1374.	2.	166.	-210.	32.	2.	0.	0.	1411.	541.	106
107	MACHINE TOOLS, METAL FO	717.	0.	447.	8.	102.	-32.	5.	0.	0.	0.	530.	187.	107
108	OTHER METAL WORKING MAC	5050.	95.	573.	-29.	198.	-111.	56.	0.	0.	0.	782.	4268.	108
109	SPECIAL INDUSTRIAL MACH	5036.	28.	3395.	99.	799.	-425.	32.	0.	0.	0.	3928.	1108.	109
110	PUMPS, COMPRESSORS, BLO	2591.	0.	1168.	40.	319.	-60.	77.	1.	0.	0.	1545.	1046.	110
111	BALL AND ROLLER BEARING	1302.	0.	0.	21.	75.	-79.	17.	0.	0.	0.	34.	1268.	111
112	POWER TRANSMISSION EQUI	1382.	0.	0.	11.	105.	-25.	9.	0.	0.	0.	100.	1282.	112
113	INDUSTRIAL PATTERNS	1747.	0.	1022.	-23.	118.	-10.	58.	3.	0.	0.	1168.	579.	113
114	COMPUTERS AND RELATED M	5205.	0.	2880.	158.	555.	-118.	344.	98.	0.	0.	3917.	1288.	114
115	OTHER OFFICE MACHINERY	1173.	173.	621.	103.	119.	-297.	21.	0.	0.	0.	740.	433.	115
116	SERVICE INDUSTRY MACHIN	5373.	614.	1796.	17.	357.	-31.	152.	0.	0.	0.	2905.	2468.	116
117	MACHINE SHOP PRODUCTS	4007.	4.	13.	-25.	17.	-17.	60.	0.	0.	0.	52.	3955.	117
118	ELECTRICAL MEASURING IN	1268.	0.	623.	18.	185.	-185.	137.	13.	0.	0.	791.	477.	118
119	TRANSFORMERS AND SWITCH	3039.	13.	1597.	4.	100.	-58.	17.	0.	0.	0.	1673.	1366.	119
120	MOTORS AND GENERATORS	2457.	20.	446.	20.	157.	-78.	105.	8.	0.	0.	678.	1779.	120
121	INDUSTRIAL CONTROLS	1179.	0.	152.	3.	41.	-41.	26.	2.	0.	0.	183.	996.	121
122	WELDING APPARATUS AND G	1222.	1.	400.	2.	77.	-33.	40.	0.	0.	0.	487.	735.	122
123	HOUSEHOLD APPLIANCES	5322.	4055.	164.	68.	140.	-228.	20.	0.	0.	0.	4219.	1103.	123
124	ELECTRIC LIGHTING AND W	4047.	598.	65.	62.	169.	-154.	17.	0.	0.	0.	757.	3290.	124
125	RADIO AND TV RECEIVING	4437.	4078.	199.	-85.	118.	-816.	62.	0.	0.	0.	3556.	881.	125
126	PHONOGRAPH RECORDS	357.	303.	0.	-8.	14.	-8.	3.	0.	0.	0.	304.	53.	126
127	COMMUNICATION EQUIPMENT	12094.	123.	2275.	340.	485.	-240.	5113.	512.	0.	0.	8608.	3486.	127
128	ELECTRONIC COMPONENTS	7029.	239.	161.	69.	412.	-227.	587.	42.	0.	0.	1283.	5746.	128
129	BATTERIES	978.	330.	136.	28.	25.	-24.	82.	3.	0.	0.	580.	398.	129
130	ENGINE ELECTRICAL EQUIP	1491.	123.	0.	25.	80.	-49.	36.	2.	0.	0.	217.	1274.	130
131	X-RAY EQUIPMENT AND ELE	452.	69.	141.	14.	64.	-37.	34.	0.	0.	0.	285.	167.	131
132	TRUCK, BUS, AND TRAILER	1494.	0.	1223.	180.	23.	-23.	68.	0.	0.	0.	1471.	23.	132
133	MOTOR VEHICLES AND PART	50294.	23193.	7858.	1198.	2736.	-4599.	1479.	0.	0.	0.	31865.	18429.	133
134	AIRCRAFT	10859.	308.	3793.	1143.	1756.	-136.	3424.	501.	0.	0.	10789.	70.	134
135	AIRCRAFT ENGINES AND PA	5122.	0.	0.	87.	360.	-50.	2201.	347.	0.	0.	2945.	2177.	135
136	AIRCRAFT EQUIPMENT, NEC	6248.	0.	0.	106.	576.	-203.	1330.	192.	0.	0.	2001.	4247.	136
137	SHIP AND BOAT BUILDING	3086.	347.	663.	57.	28.	-28.	1242.	0.	0.	0.	2309.	777.	137
138	RAILROAD EQUIPMENT	1754.	0.	1214.	12.	70.	-6.	8.	0.	0.	0.	1298.	456.	138
139	CYCLES AND PARTS, TRANS	765.	540.	253.	69.	15.	-285.	2.	0.	0.	0.	594.	171.	139
140	TRAILER COACHES	1751.	1529.	161.	14.	18.	-18.	0.	0.	0.	0.	1704.	47.	140

1968 FINAL DEMAND COMPONENTS (CONT.)

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141	ENGINEERING AND SCIENTI	1164.	0.	198.	11.	137.	-53.	467.	29.	0.	0.	789.	375.	141
142	MECHANICAL MEASURING DE	2055.	22.	391.	13.	266.	-30.	28.	7.	0.	0.	697.	1358.	142
143	OPTICAL AND OPHTHALMIC	804.	393.	278.	152.	45.	-137.	4.	7.	0.	0.	742.	62.	143
144	MEDICAL AND SURGICAL IN	1683.	221.	516.	77.	127.	-32.	39.	3.	0.	0.	951.	732.	144
145	PHOTOGRAPHIC EQUIPMENT	3723.	733.	571.	-63.	298.	-188.	323.	3.	0.	0.	1677.	2046.	145
146	WATCHES, CLOCKS, AND PA	792.	442.	1.	-18.	14.	-178.	17.	0.	0.	0.	278.	514.	146
147	JEWELRY AND SILVERWARE	1974.	1642.	0.	145.	123.	-130.	6.	0.	0.	0.	1786.	188.	147
148	TOYS, SPORTING GOODS, M	2967.	2328.	365.	104.	76.	-383.	11.	0.	0.	0.	2501.	466.	148
149	OFFICE SUPPLIES	714.	221.	0.	38.	34.	-15.	0.	0.	0.	0.	278.	436.	149
150	MISC MANUFACTURING, NEC	2934.	667.	361.	50.	130.	-126.	10.	0.	0.	0.	1092.	1842.	150
151	RAILROADS	12442.	2470.	363.	36.	130.	-130.	80.	388.	0.	5.	3342.	9100.	151
152	BUSSES	4928.	2601.	0.	0.	0.	0.	33.	0.	0.	0.	2634.	2294.	152
153	TRUCKING	19456.	3254.	518.	49.	0.	0.	620.	0.	0.	16.	4457.	14999.	153
154	WATER TRANSPORTATION	3498.	476.	9.	2.	1909.	-2026.	650.	0.	0.	0.	1020.	2478.	154
155	AIRLINES	8741.	2615.	29.	3.	907.	-1136.	544.	0.	0.	0.	2962.	5779.	155
156	PIPELINES	1246.	212.	0.	0.	0.	0.	0.	0.	0.	0.	212.	1034.	156
157	TRAVEL AGTS, OTH TRANS	530.	14.	0.	0.	0.	0.	0.	0.	0.	0.	14.	516.	157
158	TELEPHONE AND TELEGRAPH	19150.	8228.	718.	0.	0.	0.	598.	0.	0.	0.	9544.	9606.	158
159	RADIO AND TV BROADCASTI	3573.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3573.	159
160	ELECTRIC UTULITIES	21156.	8274.	0.	0.	0.	0.	336.	0.	0.	0.	8610.	12546.	160
161	NATURAL GAS	14497.	4648.	0.	0.	0.	0.	42.	0.	0.	0.	4690.	9807.	161
162	WATER AND SEWER SERVICE	3775.	1926.	0.	0.	0.	0.	27.	0.	0.	0.	1953.	1822.	162
163	WHOLESALE TRADE	69812.	23864.	4266.	250.	2171.	0.	1737.	0.	0.	0.	32288.	37524.	163
164	RETAIL TRADE	105634.	77698.	3243.	0.	0.	0.	0.	0.	0.	0.	80941.	24693.	164
165	CREDIT AGENCIES AND BRO	26260.	16224.	0.	0.	0.	0.	0.	0.	0.	0.	16224.	10036.	165
166	INSURANCE AND BROKER'S	23724.	11719.	0.	0.	0.	0.	28.	0.	0.	0.	11747.	11977.	166
167	OWNER-OCCUPIED DWELLING	52712.	52712.	0.	0.	0.	0.	0.	0.	0.	0.	52712.	0.	167
168	REAL ESTATE	63007.	21837.	1708.	0.	0.	0.	111.	0.	0.	0.	23656.	39351.	168
169	HOTEL AND LODGING PLACE	5696.	3413.	0.	0.	0.	0.	551.	0.	0.	0.	3964.	1732.	169
170	PERSONAL AND REPAIR SER	15518.	13400.	0.	0.	0.	0.	1.	0.	0.	0.	13401.	2117.	170
171	BUSINESS SERVICES	37611.	4225.	0.	0.	0.	0.	1839.	0.	0.	0.	6064.	31547.	171
172	ADVERTISING	17546.	180.	0.	0.	0.	0.	1.	0.	0.	0.	181.	17365.	172
173	AUTO REPAIR	14047.	8729.	0.	0.	0.	0.	31.	0.	0.	0.	8760.	5287.	173
174	MOTION PICTURES AND AMU	10135.	6150.	0.	0.	0.	0.	193.	0.	0.	0.	6343.	3792.	174
175	MEDICAL SERVICES	31633.	29455.	0.	0.	0.	0.	74.	0.	0.	0.	29529.	2104.	175
176	PRIVATE SCHOOLS AND NON	22379.	18594.	0.	0.	0.	0.	780.	0.	0.	0.	19374.	3005.	176
177	POST OFFICE	6042.	1328.	0.	0.	0.	0.	99.	0.	0.	0.	1427.	4615.	177
178	FEDERAL GOV. ENTERPRISE	659.	8.	0.	0.	0.	0.	2.	0.	0.	0.	10.	649.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1699.	517.	0.	0.	0.	0.	20.	0.	0.	0.	537.	1162.	180
181	DIRECTLY ALLOCATED IMPO	7078.	3235.	0.	0.	0.	0.	3775.	0.	0.	0.	7010.	68.	181
182	BUSINESS TRAVEL	14554.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14554.	182
183	OFFICE SUPPLIES	2714.	0.	0.	0.	0.	0.	164.	0.	0.	0.	164.	2550.	183
184	UNIMPORTANT INDUSTRY	302.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	302.	184
185	COMPUTER RENTAL	3411.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3411.	185
	SUM TOTALS	1374488.	509145.	59867.	13767.	34539.	-36993.	45991.	3404.	1317.	649.	631686.	742802.	

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1969 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	6289.	135.	0.	390.	0.	0.	0.	0.	0.	0.	525.	5764.	1
2	POULTRY AND EGGS	4749.	1811.	0.	90.	4.	-12.	148.	0.	0.	0.	2041.	2708.	2
3	MEAT, ANIMALS AND MISC	24500.	206.	0.	2918.	73.	-399.	40.	0.	0.	0.	2838.	21662.	3
4	COTTON	1324.	0.	0.	17.	233.	-7.	0.	0.	261.	15.	519.	805.	4
5	GRAINS	13198.	0.	0.	63.	2050.	-22.	0.	0.	37.	103.	2231.	10967.	5
6	TOBACCO	1386.	0.	0.	-13.	25.	-26.	0.	0.	0.	29.	15.	1371.	6
7	FRUITS, VEGETABLES, AND	10071.	3918.	0.	308.	302.	-567.	134.	0.	126.	38.	4259.	5812.	7
8	FORESTRY AND FISHERY PR	1932.	447.	0.	21.	23.	-654.	8.	0.	0.	0.	-155.	2087.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	3026.	25.	0.	-10.	25.	-25.	23.	0.	0.	0.	38.	2988.	10
11	IRON ORES	1359.	0.	0.	27.	160.	-520.	0.	0.	0.	0.	-333.	1692.	11
12	COPPER ORE	1295.	0.	0.	71.	1.	-3.	0.	0.	0.	0.	69.	1226.	12
13	OTHER NON-FERROUS METAL	984.	0.	0.	11.	12.	-174.	0.	0.	0.	0.	-151.	1135.	13
14	COAL MINING	3499.	110.	0.	17.	372.	-1.	60.	0.	0.	0.	558.	2941.	14
15	CRUDE PETROLEUN AND NAT	14350.	0.	0.	133.	30.	-1904.	0.	0.	0.	0.	-1741.	16091.	15
16	STONE AND CLAY MINING	2353.	19.	0.	11.	95.	-70.	0.	0.	0.	0.	55.	2298.	16
17	CHEMICAL FERTILIZER MIN	550.	0.	0.	10.	113.	-229.	0.	0.	0.	0.	-106.	656.	17
18	NEW CONSTRUCTION	32590.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	32590.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	4318.	0.	0.	-76.	63.	-63.	2990.	1253.	0.	0.	4167.	151.	20
21	AMMUNITION	4466.	194.	0.	-191.	144.	-80.	3641.	12.	0.	0.	3720.	746.	21
22	OTHER ORDNANCE	2449.	133.	0.	-15.	288.	-58.	1487.	2.	0.	0.	1837.	612.	22
23	MEAT PRODUCTS	26851.	20533.	0.	59.	353.	-1087.	697.	0.	0.	0.	20555.	6296.	23
24	DAIRY PRODUCTS	13079.	9781.	0.	23.	117.	-89.	889.	0.	-81.	131.	10771.	2308.	24
25	CANNED AND FROZEN FOODS	10100.	8933.	0.	171.	273.	-405.	135.	0.	0.	0.	9107.	993.	25
26	GRAIN MILL PRODUCTS	10564.	3027.	0.	33.	553.	-44.	63.	0.	39.	45.	3716.	6848.	26
27	BAKERY PRODUCTS	7135.	6824.	0.	0.	4.	-33.	97.	0.	0.	0.	6892.	243.	27
28	SUGAR	2696.	956.	0.	91.	4.	-723.	16.	0.	0.	0.	344.	2352.	28
29	CONFECTIONERY PRODUCTS	3061.	2599.	0.	69.	21.	-101.	4.	0.	0.	0.	2592.	469.	29
30	ALCOHOLIC BEVERAGES	10101.	8646.	0.	125.	28.	-819.	22.	0.	0.	0.	8002.	2099.	30
31	SOFT DRINKS AND FLAVORI	4971.	3920.	0.	16.	42.	-11.	105.	0.	0.	0.	4072.	899.	31
32	FATS AND OILS	4869.	927.	0.	17.	553.	-186.	0.	0.	26.	8.	1345.	3524.	32
33	MISC FOOD PRODUCTS	5211.	4683.	0.	81.	72.	-125.	128.	0.	2.	0.	4841.	370.	33
34	TOBACCO PRODUCTS	8480.	6122.	0.	-2.	614.	-147.	0.	0.	0.	0.	6587.	1893.	34
35	BROAD AND NARROW FABRIC	15800.	795.	0.	39.	266.	-639.	247.	0.	0.	65.	773.	15027.	35
36	FLOOR COVERINGS	2307.	1526.	439.	108.	20.	-87.	20.	0.	0.	0.	2026.	281.	36
37	MISC TEXTILES	2695.	149.	0.	69.	67.	-440.	32.	0.	0.	0.	-123.	2818.	37
38	KNITTING	5594.	3117.	0.	257.	30.	-35.	0.	0.	0.	0.	3369.	2225.	38
39	APPAREL	18211.	16504.	0.	256.	192.	-1381.	447.	0.	0.	0.	16018.	2193.	39
40	HOUSEHOLD TEXTILES	4277.	1827.	0.	172.	33.	-99.	177.	0.	0.	0.	2110.	2167.	40
41	LUMBER AND WOOD PRODUCT	8442.	172.	0.	211.	438.	-800.	0.	0.	0.	0.	21.	8421.	41
42	VENEER AND PLYWOOD	2061.	0.	0.	48.	35.	-386.	0.	0.	0.	0.	-303.	2364.	42
43	MILLWORK AND WOOD PRODU	4442.	305.	11.	45.	36.	-189.	21.	0.	0.	0.	229.	4213.	43
44	WOODEN CONTAINERS	507.	0.	0.	16.	3.	-4.	20.	0.	0.	0.	35.	472.	44
45	HOUSEHOLD FURNITURE	5856.	4106.	690.	162.	27.	-198.	23.	0.	0.	0.	4810.	1046.	45
46	OTHER FURNITURE	3048.	206.	1941.	114.	20.	-76.	30.	0.	0.	0.	2235.	813.	46

1969 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	1076.	0.	0.	7.	264.	-524.	0.	0.	0.	0.	-253.	1329.	47
48	PAPER AND PAPERBOARD MI	8937.	44.	0.	150.	398.	-1056.	14.	0.	0.	0.	-450.	9387.	48
49	PAPER PRODUCTS, NEC	6693.	1968.	0.	156.	93.	-45.	26.	0.	0.	0.	2198.	4495.	49
50	WALL AND BUILDING PAPER	435.	0.	0.	11.	9.	-10.	0.	0.	0.	0.	10.	425.	50
51	PAPERBOARD CONTAINERS	6662.	107.	0.	99.	23.	-4.	37.	0.	0.	0.	262.	6400.	51
52	NEWSPAPERS	6540.	1788.	0.	2.	3.	-5.	1.	0.	0.	0.	1789.	4751.	52
53	PERIODICALS	2919.	857.	0.	33.	69.	-16.	73.	0.	0.	0.	1016.	1903.	53
54	BOOKS	3617.	1527.	0.	80.	147.	-157.	296.	0.	0.	0.	1893.	1724.	54
55	INDUSTRIAL CHEMICALS	16299.	165.	0.	314.	1309.	-600.	744.	5.	0.	0.	1937.	14362.	55
56	BUSINESS FORMS, BLANK B	1481.	91.	0.	10.	3.	-13.	0.	0.	0.	0.	91.	1390.	56
57	COMMERCIAL PRINTING	4277.	140.	0.	36.	59.	-32.	0.	0.	0.	0.	203.	4074.	57
58	MISC. PRINTING & PUBL.,	2132.	614.	0.	25.	7.	-3.	0.	0.	0.	0.	643.	1489.	58
59	FERTILIZERS	1392.	43.	0.	14.	96.	-38.	0.	0.	0.	0.	115.	1277.	59
60	PESTICIDES AND OTHER AG	997.	8.	0.	47.	65.	-17.	2.	0.	0.	0.	105.	892.	60
61	MISC CHEMICAL PRODUCTS	3645.	338.	0.	73.	325.	-122.	348.	0.	0.	0.	962.	2683.	61
62	PLASTIC MATERIALS AND R	4360.	20.	0.	92.	505.	-38.	10.	0.	0.	0.	589.	3771.	62
63	SYNTHETIC RUBBER	1172.	0.	0.	15.	127.	-42.	2.	0.	0.	0.	102.	1070.	63
64	CELLULOSIC FIBERS	777.	0.	0.	-3.	23.	-27.	5.	0.	0.	0.	-2.	779.	64
65	NON-CELLULOSIC FIBERS	2615.	0.	0.	57.	126.	-74.	5.	0.	0.	0.	114.	2501.	65
66	DRUGS	6096.	3361.	0.	262.	379.	-157.	60.	0.	0.	0.	3905.	2191.	66
67	CLEANING AND TOILET PRE	7682.	5565.	0.	77.	126.	-30.	93.	0.	0.	0.	5831.	1851.	67
68	PAINTS	2889.	28.	0.	34.	49.	-2.	30.	0.	0.	0.	139.	2750.	68
69	GASOLINE	25281.	5959.	0.	77.	363.	-424.	344.	0.	0.	0.	6319.	18962.	69
70	HEATING OIL	5639.	2829.	0.	5.	41.	-1067.	86.	0.	0.	0.	1894.	3745.	70
71	PAVING AND ASPHALT	1237.	0.	0.	1.	10.	0.	0.	0.	0.	0.	11.	1226.	71
72	TIRES AND INNER TUBES	4701.	2013.	0.	70.	83.	-164.	73.	0.	0.	0.	2075.	2626.	72
73	RUBBER PRODUCTS	3771.	676.	24.	79.	110.	-176.	108.	0.	0.	0.	821.	2950.	73
74	MISC PLASTIC PRODUCTS	7321.	292.	0.	155.	102.	-244.	38.	0.	0.	0.	343.	6978.	74
75	LEATHER TANNING AND IND	999.	0.	0.	4.	40.	-100.	1.	0.	0.	0.	-55.	1054.	75
76	LEATHER FOOTWEAR	3343.	3345.	0.	293.	10.	-410.	0.	0.	0.	0.	3238.	105.	76
77	OTHER LEATHER PRODUCTS	1062.	1008.	0.	59.	14.	-199.	136.	0.	0.	0.	1018.	44.	77
78	GLASS	4478.	361.	0.	169.	146.	-244.	20.	0.	0.	0.	452.	4026.	78
79	STRUCTURAL CLAY PRODUCT	991.	0.	0.	-18.	29.	-54.	0.	0.	0.	0.	-43.	1034.	79
80	POTTERY	674.	132.	0.	28.	22.	-185.	1.	0.	0.	0.	-2.	676.	80
81	CEMENT, CONCRETE, AND G	6496.	3.	0.	18.	10.	-36.	0.	0.	0.	0.	-5.	6501.	81
82	OTHER STONE AND CLAY PR	3650.	146.	0.	-49.	138.	-134.	27.	0.	0.	0.	128.	3522.	82
83	STEEL	31050.	13.	0.	235.	953.	-2151.	9.	0.	0.	0.	-941.	31991.	83
84	COPPER	7116.	0.	0.	169.	251.	-495.	8.	1.	0.	0.	-66.	7182.	84
85	LEAD	579.	0.	0.	10.	2.	-84.	0.	0.	0.	0.	-72.	651.	85
86	ZINC	382.	0.	0.	14.	3.	-104.	0.	0.	0.	0.	-87.	469.	86
87	ALUMINUM	7098.	16.	0.	47.	275.	-285.	62.	2.	0.	0.	117.	6981.	87
88	PRIMARY NON-FERROUS MET	1035.	0.	0.	30.	184.	-499.	0.	2.	0.	0.	-283.	1318.	88
89	NON-FERROUS ROLLING AND	1069.	0.	0.	-24.	91.	-30.	4.	8.	0.	0.	49.	1020.	89
90	NON-FERROUS WIRE DRAWIN	3647.	4.	40.	59.	58.	-49.	29.	3.	0.	0.	144.	3503.	90
91	NON-FERROUS CASTINGS AN	957.	0.	0.	15.	11.	-11.	8.	2.	0.	0.	25.	932.	91
92	METAL CANS	3241.	0.	0.	18.	11.	-11.	9.	0.	0.	0.	27.	3214.	92
93	METAL BARRELS, DRUMS AN	420.	0.	14.	6.	4.	-14.	14.	0.	0.	0.	24.	396.	93

1969 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1853.	58.	0.	101.	61.	-13.	15.	0.	0.	0.	222.	1631.	94
95	STRUCTURAL METAL PRODUC	11111.	34.	952.	119.	247.	-60.	58.	8.	0.	0.	1358.	9753.	95
96	SCREW MACHINE PRODUCTS	3059.	37.	0.	57.	63.	-137.	29.	2.	0.	0.	51.	3008.	96
97	METAL STAMPINGS	6751.	380.	0.	90.	316.	-37.	21.	0.	0.	0.	770.	5981.	97
98	CUTLERY, HAND TOOLS AND	4052.	688.	24.	146.	141.	-233.	14.	0.	0.	0.	780.	3272.	98
99	MISC FABRICATED WIRE PR	1909.	34.	0.	20.	32.	-99.	17.	0.	0.	0.	4.	1905.	99
100	VALVES, PIPE FITTINGS,	2965.	0.	280.	101.	200.	-83.	24.	4.	0.	0.	526.	2439.	100
101	OTHER FABRICATED METAL	3728.	152.	112.	70.	96.	-95.	29.	2.	0.	0.	366.	3362.	101
102	ENGINES AND TURBINES	4503.	215.	877.	154.	502.	-149.	368.	6.	0.	0.	1973.	2530.	102
103	FARM MACHINERY	4063.	491.	2674.	194.	383.	-353.	30.	0.	0.	0.	3419.	644.	103
104	CONSTRUCTION, MINING, A	5985.	0.	3033.	324.	1500.	-123.	265.	0.	0.	0.	4999.	986.	104
105	MATERIALS HANDLING MACH	2700.	0.	1417.	63.	154.	-111.	39.	0.	0.	0.	1562.	1138.	105
106	MACHINE TOOLS, METAL CU	1920.	47.	1327.	102.	187.	-195.	35.	2.	0.	0.	1505.	415.	106
107	MACHINE TOOLS, METAL FO	750.	0.	464.	20.	116.	-38.	4.	0.	0.	0.	566.	184.	107
108	OTHER METAL WORKING MAC	5367.	107.	619.	150.	195.	-114.	50.	0.	0.	0.	1007.	4360.	108
109	SPECIAL INDUSTRIAL MACH	5427.	30.	3628.	206.	916.	-470.	28.	0.	0.	0.	4338.	1089.	109
110	PUMPS, COMPRESSORS, BLO	2802.	0.	1260.	129.	349.	-76.	70.	0.	0.	0.	1732.	1070.	110
111	BALL AND ROLLER BEARING	1395.	0.	0.	39.	88.	-89.	18.	0.	0.	0.	56.	1339.	111
112	POWER TRANSMISSION EQUI	1495.	0.	0.	57.	124.	-31.	7.	0.	0.	0.	157.	1338.	112
113	INDUSTRIAL PATTERNS	1872.	0.	1093.	44.	123.	-13.	68.	2.	0.	0.	1317.	555.	113
114	COMPUTERS AND RELATED M	6103.	0.	3426.	341.	806.	-266.	372.	38.	0.	0.	4717.	1386.	114
115	OTHER OFFICE MACHINERY	1307.	166.	684.	73.	129.	-280.	23.	0.	0.	0.	795.	512.	115
116	SERVICE INDUSTRY MACHIN	6293.	737.	2031.	177.	394.	-43.	128.	0.	0.	0.	3424.	2869.	116
117	MACHINE SHOP PRODUCTS	4101.	4.	13.	47.	20.	-20.	57.	0.	0.	0.	121.	3980.	117
118	ELECTRICAL MEASURING IN	1397.	0.	672.	21.	227.	-227.	125.	13.	0.	0.	831.	566.	118
119	TRANSFORMERS AND SWITCH	3194.	14.	1638.	48.	102.	-61.	13.	0.	0.	0.	1754.	1440.	119
120	MOTORS AND GENERATORS	2606.	22.	459.	45.	158.	-94.	127.	2.	0.	0.	719.	1887.	120
121	INDUSTRIAL CONTROLS	1296.	0.	166.	45.	48.	-48.	22.	10.	0.	0.	243.	1053.	121
122	WELDING APPARATUS AND G	1363.	1.	427.	20.	85.	-35.	38.	0.	0.	0.	536.	827.	122
123	HOUSEHOLD APPLIANCES	5568.	4262.	177.	32.	155.	-309.	17.	0.	0.	0.	4334.	1234.	123
124	ELECTRIC LIGHTING AND W	4319.	606.	69.	204.	205.	-179.	7.	0.	0.	0.	912.	3407.	124
125	RADIO AND TV RECEIVING	4125.	4168.	203.	286.	146.	-1183.	60.	0.	0.	0.	3680.	445.	125
126	PHONOGRAPH RECORDS	455.	383.	0.	22.	18.	-7.	3.	0.	0.	0.	419.	36.	126
127	COMMUNICATION EQUIPMENT	13010.	134.	2538.	78.	557.	-263.	4835.	452.	0.	0.	8331.	4679.	127
128	ELECTRONIC COMPONENTS	7557.	235.	174.	280.	597.	-284.	461.	29.	0.	0.	1492.	6065.	128
129	BATTERIES	1055.	364.	133.	46.	26.	-28.	73.	5.	0.	0.	619.	436.	129
130	ENGINE ELECTRICAL EQUIP	1572.	129.	0.	137.	87.	-55.	26.	0.	0.	0.	324.	1248.	130
131	X-RAY EQUIPMENT AND ELE	558.	78.	157.	18.	73.	-45.	52.	0.	0.	0.	333.	225.	131
132	TRUCK, BUS, AND TRAILER	1755.	0.	1457.	92.	27.	-27.	33.	0.	0.	0.	1582.	173.	132
133	MOTOR VEHICLES AND PART	52152.	23272.	8472.	830.	3125.	-5671.	1170.	0.	0.	0.	31198.	20954.	133
134	AIRCRAFT	10361.	298.	3680.	-341.	1790.	-128.	4636.	361.	0.	0.	10296.	65.	134
135	AIRCRAFT ENGINES AND PA	4837.	0.	0.	152.	369.	-40.	2379.	231.	0.	0.	3091.	1746.	135
136	AIRCRAFT EQUIPMENT, NEC	6293.	0.	0.	107.	633.	-189.	1393.	186.	0.	0.	2130.	4163.	136
137	SHIP AND BOAT BUILDING	3316.	427.	690.	-86.	154.	-43.	1207.	4.	0.	0.	2353.	963.	137
138	RAILROAD EQUIPMENT	2064.	0.	1599.	13.	74.	-5.	8.	0.	0.	0.	1689.	375.	138
139	CYCLES AND PARTS, TRANS	845.	651.	330.	8.	19.	-426.	3.	0.	0.	0.	585.	260.	139
140	TRAILER COACHES	2221.	1954.	204.	30.	24.	-24.	0.	0.	0.	0.	2188.	33.	140

1969 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	1180.	0.	201.	32.	143.	-57.	352.	14.	0.	0.	685.	495.	141
142	MECHANICAL MEASURING DE	2139.	22.	404.	42.	304.	-38.	24.	29.	0.	0.	787.	1352.	142
143	OPTICAL AND OPHTHALMIC	909.	447.	321.	81.	60.	-167.	3.	9.	0.	0.	754.	155.	143
144	MEDICAL AND SURGICAL IN	1912.	243.	598.	58.	150.	-41.	29.	0.	0.	0.	1037.	875.	144
145	PHOTOGRAPHIC EQUIPMENT	4004.	777.	618.	28.	324.	-223.	125.	3.	0.	0.	1652.	2352.	145
146	WATCHES, CLOCKS, AND PA	860.	477.	1.	-11.	16.	-194.	21.	0.	0.	0.	310.	550.	146
147	JEWELRY AND SILVERWARE	2075.	1760.	0.	189.	147.	-209.	6.	0.	0.	0.	1893.	182.	147
148	TOYS, SPORTING GOODS, M	3213.	2647.	412.	217.	90.	-599.	10.	0.	0.	0.	2777.	436.	148
149	OFFICE SUPPLIES	808.	244.	0.	28.	36.	-22.	0.	0.	0.	0.	286.	522.	149
150	MISC MANUFACTURING, NEC	3149.	711.	388.	72.	139.	-108.	9.	0.	0.	0.	1211.	1938.	150
151	RAILROADS	13092.	2610.	400.	24.	133.	-133.	91.	191.	0.	12.	3328.	9764.	151
152	BUSSES	5007.	2730.	0.	0.	0.	0.	33.	0.	0.	0.	2763.	2244.	152
153	TRUCKING	21900.	3499.	569.	33.	0.	0.	603.	0.	0.	35.	4739.	17161.	153
154	WATER TRANSPORTATION	3618.	521.	10.	1.	1930.	-2064.	645.	0.	0.	1.	1044.	2574.	154
155	AIRLINES	10690.	3006.	33.	2.	1050.	-1399.	476.	0.	0.	0.	3168.	7522.	155
156	PIPELINES	1343.	229.	0.	0.	0.	0.	0.	0.	0.	0.	229.	1114.	156
157	TRAVEL AGTS, OTH TRANS	585.	15.	0.	0.	0.	0.	0.	0.	0.	0.	15.	570.	157
158	TELEPHONE AND TELEGRAPH	21329.	9149.	799.	0.	0.	0.	532.	0.	0.	0.	10480.	10849.	158
159	RADIO AND TV BROADCASTI	3914.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3914.	159
160	ELECTRIC UTULITIES	23054.	9050.	0.	0.	0.	0.	368.	0.	0.	0.	9418.	13636.	160
161	NATURAL GAS	15644.	4975.	0.	0.	0.	0.	46.	0.	0.	0.	5021.	10623.	161
162	WATER AND SEWER SERVICE	4021.	2112.	0.	0.	0.	0.	31.	0.	0.	0.	2143.	1878.	162
163	WHOLESALE TRADE	76554.	25686.	4675.	173.	2367.	0.	1628.	0.	0.	0.	34529.	42025.	163
164	RETAIL TRADE	114560.	83544.	3442.	0.	0.	0.	0.	0.	0.	0.	86986.	27574.	164
165	CREDIT AGENCIES AND BRO	32098.	18343.	0.	0.	0.	0.	0.	0.	0.	0.	18343.	13755.	165
166	INSURANCE AND BROKER'S	24880.	12759.	0.	0.	0.	0.	28.	0.	0.	0.	12787.	12093.	166
167	OWNER-OCCUPIED DWELLING	57160.	57160.	0.	0.	0.	0.	0.	0.	0.	0.	57160.	0.	167
168	REAL ESTATE	68554.	23974.	1859.	0.	0.	0.	118.	0.	0.	0.	25951.	42603.	168
169	HOTEL AND LODGING PLACE	6232.	3719.	0.	0.	0.	0.	583.	0.	0.	0.	4302.	1930.	169
170	PERSONAL AND REPAIR SER	16301.	14021.	0.	0.	0.	0.	1.	0.	0.	0.	14022.	2279.	170
171	BUSINESS SERVICES	42333.	4655.	0.	0.	0.	0.	1827.	0.	0.	0.	6482.	35851.	171
172	ADVERTISING	18858.	209.	0.	0.	0.	0.	1.	0.	0.	0.	210.	18648.	172
173	AUTO REPAIR	15310.	9515.	0.	0.	0.	0.	27.	0.	0.	0.	9542.	5768.	173
174	MOTION PICTURES AND AMU	10878.	6616.	0.	0.	0.	0.	196.	0.	0.	0.	6812.	4066.	174
175	MEDICAL SERVICES	36383.	33905.	0.	0.	0.	0.	71.	0.	0.	0.	33976.	2407.	175
176	PRIVATE SCHOOLS AND NON	24283.	20162.	0.	0.	0.	0.	748.	0.	0.	0.	20910.	3373.	176
177	POST OFFICE	6679.	1457.	0.	0.	0.	0.	106.	0.	0.	0.	1563.	5116.	177
178	FEDERAL GOV. ENTERPRISE	731.	8.	0.	0.	0.	0.	2.	0.	0.	0.	10.	721.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1798.	554.	0.	0.	0.	0.	21.	0.	0.	0.	575.	1223.	180
181	DIRECTLY ALLOCATED IMPO	7590.	3616.	0.	0.	0.	0.	3929.	0.	0.	0.	7545.	45.	181
182	BUSINESS TRAVEL	15829.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	15829.	182
183	OFFICE SUPPLIES	2808.	0.	0.	0.	0.	0.	174.	0.	0.	0.	174.	2634.	183
184	UNIMPORTANT INDUSTRY	315.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	315.	184
185	COMPUTER RENTAL	4017.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4017.	185
	SUM TOTALS	1486003.	551422.	65048.	14903.	37710.	-40853.	45748.	2893.	410.	482.	677763.	808240.	

I*N*F*O*R*U*M 185-ORDER FINAL DEMAND COMPONENTS USED IN MATRIX BALANCING DATE 102173 PAGE

1970 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	6610.	126.	0.	212.	0.	0.	0.	0.	0.	0.	338.	6272.	1
2	POULTRY AND EGGS	4617.	1774.	0.	-67.	3.	-21.	118.	0.	0.	0.	1807.	2810.	2
3	MEAT, ANIMALS AND MISC	25607.	228.	0.	37.	72.	-358.	31.	0.	0.	0.	10.	25597.	3
4	COTTON	1239.	0.	0.	-80.	311.	-7.	0.	0.	-116.	13.	121.	1118.	4
5	GRAINS	13488.	0.	0.	389.	2788.	-30.	0.	0.	-48.	126.	3225.	10263.	5
6	TOBACCO	1483.	0.	0.	-587.	23.	-27.	0.	0.	0.	26.	-565.	2048.	6
7	FRUITS, VEGETABLES, AND	10388.	3791.	0.	323.	326.	-646.	116.	0.	-459.	30.	3481.	6907.	7
8	FORESTRY AND FISHERY PR	1960.	515.	0.	-3.	24.	-736.	6.	0.	0.	0.	-194.	2154.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	3150.	27.	0.	-56.	26.	-26.	24.	0.	0.	0.	-5.	3155.	10
11	IRON ORES	1378.	0.	0.	74.	202.	-617.	0.	0.	0.	0.	-341.	1719.	11
12	COPPER ORE	1750.	0.	0.	66.	55.	-81.	0.	0.	0.	0.	40.	1710.	12
13	OTHER NON-FERROUS METAL	1052.	0.	0.	-2.	13.	-159.	0.	0.	0.	0.	-148.	1200.	13
14	COAL MINING	4685.	120.	0.	79.	603.	-1.	53.	0.	0.	0.	854.	3831.	14
15	CRUDE PETROLEUN AND NAT	15498.	0.	0.	-88.	47.	-1937.	0.	0.	0.	0.	-1978.	17476.	15
16	STONE AND CLAY MINING	2387.	20.	0.	20.	107.	-78.	0.	0.	0.	0.	69.	2318.	16
17	CHEMICAL FERTILIZER MIN	562.	0.	0.	0.	98.	-242.	0.	0.	0.	0.	-144.	706.	17
18	NEW CONSTRUCTION	33002.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	33002.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	3746.	0.	0.	-75.	7.	-7.	2605.	1085.	0.	0.	3615.	131.	20
21	AMMUNITION	2666.	213.	0.	-199.	150.	-55.	2111.	1.	0.	0.	2221.	445.	21
22	OTHER ORDNANCE	2078.	146.	0.	-77.	286.	-66.	1122.	1.	0.	0.	1412.	666.	22
23	MEAT PRODUCTS	27494.	21056.	0.	-48.	345.	-1251.	572.	0.	0.	0.	20674.	6820.	23
24	DAIRY PRODUCTS	13176.	9825.	0.	51.	147.	-112.	675.	0.	14.	124.	10724.	2452.	24
25	CANNED AND FROZEN FOODS	10313.	9111.	0.	160.	292.	-460.	102.	0.	0.	0.	9205.	1108.	25
26	GRAIN MILL PRODUCTS	11091.	3171.	0.	-18.	519.	-62.	47.	0.	-12.	61.	3706.	7385.	26
27	BAKERY PRODUCTS	7314.	6985.	0.	7.	4.	-37.	73.	0.	0.	0.	7032.	282.	27
28	SUGAR	2939.	1063.	0.	45.	9.	-826.	13.	0.	0.	0.	304.	2635.	28
29	CONFECTIONERY PRODUCTS	3247.	2803.	0.	136.	25.	-125.	3.	0.	0.	0.	2842.	405.	29
30	ALCOHOLIC BEVERAGES	11011.	9526.	0.	270.	22.	-895.	16.	0.	0.	0.	8939.	2072.	30
31	SOFT DRINKS AND FLAVORI	5587.	4369.	0.	28.	47.	-11.	81.	0.	0.	0.	4514.	1073.	31
32	FATS AND OILS	5829.	1020.	0.	47.	793.	-212.	0.	0.	-27.	23.	1644.	4185.	32
33	MISC FOOD PRODUCTS	5819.	5270.	0.	51.	52.	-141.	103.	0.	0.	0.	5335.	484.	33
34	TOBACCO PRODUCTS	8740.	6387.	0.	-929.	597.	-152.	0.	0.	0.	0.	5903.	2837.	34
35	BROAD AND NARROW FABRIC	15561.	830.	0.	3.	295.	-735.	187.	0.	0.	53.	633.	14928.	35
36	FLOOR COVERINGS	2347.	1487.	499.	27.	22.	-71.	14.	0.	0.	0.	1978.	369.	36
37	MISC TEXTILES	2640.	135.	0.	-36.	71.	-380.	23.	0.	0.	0.	-187.	2827.	37
38	KNITTING	5922.	3076.	0.	2.	35.	-114.	0.	0.	0.	0.	2999.	2923.	38
39	APPAREL	17821.	16245.	0.	27.	198.	-1554.	297.	0.	0.	0.	15213.	2608.	39
40	HOUSEHOLD TEXTILES	4194.	1895.	0.	185.	35.	-104.	86.	0.	0.	0.	2097.	2097.	40
41	LUMBER AND WOOD PRODUCT	7722.	163.	0.	-3.	511.	-665.	0.	0.	0.	0.	6.	7716.	41
42	VENEER AND PLYWOOD	1850.	0.	0.	94.	25.	-321.	0.	0.	0.	0.	-202.	2052.	42
43	MILLWORK AND WOOD PRODU	4295.	286.	10.	33.	37.	-189.	18.	0.	0.	0.	195.	4100.	43
44	WOODEN CONTAINERS	402.	0.	0.	28.	3.	-4.	18.	0.	0.	0.	45.	357.	44
45	HOUSEHOLD FURNITURE	5870.	4137.	790.	113.	23.	-207.	18.	0.	0.	0.	4874.	996.	45
46	OTHER FURNITURE	2915.	204.	1851.	91.	20.	-80.	27.	0.	0.	0.	2113.	802.	46

1970 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	1138.	0.	0.	25.	428.	-504.	0.	0.	0.	0.	-51.	1189.	47
48	PAPER AND PAPERBOARD MI	9120.	46.	0.	56.	425.	-1060.	12.	0.	0.	0.	-521.	9641.	48
49	PAPER PRODUCTS, NEC	6663.	1920.	0.	11.	95.	-47.	24.	0.	0.	0.	2003.	4660.	49
50	*ALL AND BUILDING PAPER	400.	0.	0.	20.	9.	-12.	0.	0.	0.	0.	17.	383.	50
51	PAPERBOARD CONTAINERS	6830.	108.	0.	-7.	26.	-4.	30.	0.	0.	0.	153.	6677.	51
52	NEWSPAPERS	6638.	1815.	0.	-3.	3.	-7.	1.	0.	0.	0.	1809.	4829.	52
53	PERIODICALS	2859.	909.	0.	16.	73.	-34.	66.	0.	0.	0.	1030.	1829.	53
54	BOOKS	3673.	1615.	0.	13.	150.	-188.	265.	0.	0.	0.	1855.	1818.	54
55	INDUSTRIAL CHEMICALS	16684.	161.	0.	242.	1497.	-682.	721.	0.	0.	0.	1939.	14745.	55
56	BUSINESS FORMS, BLANK B	1539.	87.	0.	7.	3.	-17.	0.	0.	0.	0.	80.	1459.	56
57	COMMERCIAL PRINTING	4545.	188.	0.	-3.	62.	-43.	0.	0.	0.	0.	204.	4341.	57
58	MISC. PRINTING & PUBL.,	2019.	596.	0.	11.	9.	-3.	0.	0.	0.	0.	613.	1406.	58
59	FERTILIZERS	1422.	47.	0.	42.	92.	-49.	0.	0.	0.	0.	132.	1290.	59
60	PESTICIDES AND OTHER AG	951.	7.	0.	6.	80.	-19.	1.	0.	0.	0.	75.	876.	60
61	MISC CHEMICAL PRODUCTS	3576.	332.	0.	-8.	390.	-123.	255.	0.	0.	0.	846.	2730.	61
62	PLASTIC MATERIALS AND R	4479.	20.	0.	-7.	551.	-49.	9.	0.	0.	0.	524.	3955.	62
63	SYNTHETIC RUBBER	1127.	0.	0.	10.	165.	-46.	2.	0.	0.	0.	131.	996.	63
64	CELLULOSIC FIBERS	681.	0.	0.	-28.	25.	-25.	4.	0.	0.	0.	-24.	705.	64
65	NON-CELLULOSIC FIBERS	2529.	0.	0.	51.	113.	-102.	4.	0.	0.	0.	66.	2463.	65
66	DRUGS	6465.	3548.	0.	176.	457.	-193.	53.	0.	0.	0.	4041.	2424.	66
67	CLEANING AND TOILET PRE	8193.	5871.	0.	318.	138.	-31.	80.	0.	0.	0.	6376.	1817.	67
68	PAINTS	3041.	30.	0.	69.	53.	-1.	27.	0.	0.	0.	178.	2863.	68
69	GASOLINE	26437.	6654.	0.	228.	379.	-535.	236.	0.	0.	0.	6962.	19475.	69
70	HEATING OIL	5726.	2642.	0.	6.	50.	-1258.	59.	0.	0.	0.	1499.	4227.	70
71	PAVING AND ASPHALT	1338.	0.	0.	12.	11.	-1.	0.	0.	0.	0.	22.	1316.	71
72	TIRES AND INNER TUBES	4608.	2019.	0.	45.	75.	-228.	58.	0.	0.	0.	1969.	2639.	72
73	RUBBER PRODUCTS	3472.	705.	22.	41.	109.	-232.	86.	0.	0.	0.	731.	2741.	73
74	MISC PLASTIC PRODUCTS	7570.	382.	0.	69.	117.	-296.	30.	0.	0.	0.	302.	7268.	74
75	LEATHER TANNING AND IND	912.	0.	0.	-15.	36.	-102.	1.	0.	0.	0.	-80.	992.	75
76	LEATHER FOOTWEAR	3258.	3378.	0.	-38.	11.	-509.	0.	0.	0.	0.	2842.	416.	76
77	OTHER LEATHER PRODUCTS	1056.	996.	0.	21.	14.	-214.	109.	0.	0.	0.	926.	130.	77
78	GLASS	4557.	358.	0.	69.	163.	-260.	17.	0.	0.	0.	347.	4210.	78
79	STRUCTURAL CLAY PRODUCT	963.	0.	0.	3.	35.	-42.	0.	0.	0.	0.	-4.	967.	79
80	POTTERY	677.	128.	0.	6.	26.	-199.	1.	0.	0.	0.	-38.	715.	80
81	CEMENT, CONCRETE, AND G	6766.	3.	0.	72.	11.	-52.	0.	0.	0.	0.	34.	6732.	81
82	OTHER STONE AND CLAY PR	3508.	145.	0.	80.	146.	-143.	24.	0.	0.	0.	252.	3256.	82
83	STEEL	29867.	13.	0.	464.	1260.	-2396.	44.	0.	0.	0.	-615.	30482.	83
84	COPPER	7661.	0.	0.	280.	335.	-538.	7.	0.	0.	0.	84.	7577.	84
85	LEAD	621.	0.	0.	9.	2.	-86.	0.	0.	0.	0.	-75.	696.	85
86	ZINC	392.	0.	0.	43.	2.	-90.	0.	0.	0.	0.	-45.	437.	86
87	ALUMINUM	6568.	14.	0.	208.	325.	-258.	41.	0.	0.	0.	330.	6238.	87
88	PRIMARY NON-FERROUS MET	1033.	0.	0.	-71.	133.	-623.	0.	1.	0.	0.	-560.	1593.	88
89	NON-FERROUS ROLLING AND	996.	0.	0.	8.	102.	-46.	10.	0.	0.	0.	74.	922.	89
90	NON-FERROUS WIRE DRAWIN	4015.	4.	48.	19.	68.	-100.	17.	2.	0.	0.	58.	3957.	90
91	NON-FERROUS CASTINGS AN	845.	0.	0.	19.	10.	-10.	2.	0.	0.	0.	21.	824.	91
92	METAL CANS	3613.	0.	0.	116.	12.	-12.	8.	0.	0.	0.	124.	3489.	92
93	METAL BARRELS, DRUMS AN	407.	0.	13.	6.	4.	-19.	13.	0.	0.	0.	17.	390.	93

1970 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1778.	57.	0.	65.	65.	-14.	13.	0.	0.	0.	186.	1592.	94
95	STRUCTURAL METAL PRODUC	11453.	31.	1020.	60.	277.	-87.	36.	4.	0.	0.	1341.	10112.	95
96	SCREW MACHINE PRODUCTS	2758.	33.	0.	40.	63.	-170.	19.	3.	0.	0.	-12.	2770.	96
97	METAL STAMPINGS	6254.	372.	0.	36.	288.	-40.	17.	0.	0.	0.	673.	5581.	97
98	CUTLERY, HAND TOOLS AND	3765.	718.	24.	379.	144.	-262.	11.	0.	0.	0.	1014.	2751.	98
99	MISC FABRICATED WIRE PR	1745.	36.	0.	45.	34.	-120.	11.	0.	0.	0.	6.	1739.	99
100	VALVES, PIPE FITTINGS,	3123.	0.	294.	85.	227.	-111.	17.	1.	0.	0.	513.	2610.	100
101	OTHER FABRICATED METAL	3701.	158.	127.	66.	103.	-103.	16.	0.	0.	0.	367.	3334.	101
102	ENGINES AND TURBINES	4548.	193.	956.	168.	545.	-214.	288.	2.	0.	0.	1938.	2610.	102
103	FARM MACHINERY	4082.	478.	2760.	203.	330.	-353.	27.	0.	0.	0.	3445.	637.	103
104	CONSTRUCTION, MINING, A	6344.	0.	3089.	259.	1783.	-184.	201.	0.	0.	0.	5148.	1196.	104
105	MATERIALS HANDLING MACH	2684.	0.	1399.	19.	183.	-75.	41.	0.	0.	0.	1567.	1117.	105
106	MACHINE TOOLS, METAL CU	1654.	37.	1076.	-37.	250.	-160.	22.	1.	0.	0.	1189.	465.	106
107	MACHINE TOOLS, METAL FO	773.	0.	491.	34.	103.	-42.	0.	0.	0.	0.	586.	187.	107
108	OTHER METAL WORKING MAC	5434.	105.	647.	-2.	233.	-135.	38.	0.	0.	0.	886.	4548.	108
109	SPECIAL INDUSTRIAL MACH	5386.	33.	3562.	65.	1043.	-554.	31.	0.	0.	0.	4180.	1206.	109
110	PUMPS, COMPRESSORS, BLO	2993.	0.	1365.	87.	365.	-94.	52.	1.	0.	0.	1776.	1217.	110
111	BALL AND ROLLER BEARING	1304.	0.	0.	20.	97.	-100.	17.	0.	0.	0.	34.	1270.	111
112	POWER TRANSMISSION EQUI	1464.	0.	0.	26.	127.	-35.	5.	1.	0.	0.	124.	1340.	112
113	INDUSTRIAL PATTERNS	1701.	0.	984.	47.	145.	-14.	76.	2.	0.	0.	1240.	461.	113
114	COMPUTERS AND RELATED M	6498.	0.	3538.	117.	1217.	-354.	421.	18.	0.	0.	4957.	1541.	114
115	OTHER OFFICE MACHINERY	1247.	171.	672.	69.	130.	-327.	22.	0.	0.	0.	737.	510.	115
116	SERVICE INDUSTRY MACHIN	6319.	756.	1996.	164.	422.	-69.	102.	0.	0.	0.	3371.	2948.	116
117	MACHINE SHOP PRODUCTS	4238.	4.	13.	72.	22.	-22.	39.	1.	0.	0.	129.	4109.	117
118	ELECTRICAL MEASURING IN	1280.	0.	593.	24.	249.	-249.	108.	12.	0.	0.	737.	543.	118
119	TRANSFORMERS AND SWITCH	3332.	14.	1716.	64.	111.	-60.	11.	0.	0.	0.	1856.	1476.	119
120	MOTORS AND GENERATORS	2592.	22.	454.	28.	164.	-108.	85.	1.	0.	0.	646.	1946.	120
121	INDUSTRIAL CONTROLS	1221.	0.	157.	-4.	44.	-44.	9.	12.	0.	0.	174.	1047.	121
122	WELDING APPARATUS AND G	1416.	1.	430.	42.	106.	-45.	31.	0.	0.	0.	565.	851.	122
123	HOUSEHOLD APPLIANCES	5708.	4398.	177.	190.	144.	-325.	12.	0.	0.	0.	4596.	1112.	123
124	ELECTRIC LIGHTING AND W	4404.	632.	74.	111.	193.	-231.	4.	0.	0.	0.	783.	3621.	124
125	RADIO AND TV RECEIVING	3428.	3857.	189.	59.	127.	-1398.	51.	0.	0.	0.	2885.	543.	125
126	PHONOGRAPH RECORDS	457.	388.	0.	36.	16.	-8.	3.	0.	0.	0.	435.	22.	126
127	COMMUNICATION EQUIPMENT	13555.	135.	2954.	-136.	565.	-308.	4464.	328.	0.	0.	8002.	5553.	127
128	ELECTRONIC COMPONENTS	7365.	221.	168.	145.	793.	-349.	354.	20.	0.	0.	1352.	6013.	128
129	BATTERIES	1102.	379.	138.	0.	31.	-29.	43.	1.	0.	0.	563.	539.	129
130	ENGINE ELECTRICAL EQUIP	1504.	124.	0.	177.	94.	-66.	24.	2.	0.	0.	355.	1149.	130
131	X-RAY EQUIPMENT AND ELE	516.	75.	171.	14.	88.	-52.	25.	0.	0.	0.	321.	195.	131
132	TRUCK, BUS, AND TRAILER	1593.	0.	1289.	-56.	25.	-25.	29.	0.	0.	0.	1262.	331.	132
133	MOTOR VEHICLES AND PART	43507.	19796.	7529.	9.	2892.	-6276.	983.	0.	0.	0.	24933.	18574.	133
134	AIRCRAFT	8816.	186.	2296.	1105.	1938.	-59.	3079.	219.	0.	0.	8764.	52.	134
135	AIRCRAFT ENGINES AND PA	4823.	0.	0.	-164.	390.	-45.	2297.	164.	0.	0.	2642.	2181.	135
136	AIRCRAFT EQUIPMENT, NEC	5472.	0.	0.	-50.	746.	-249.	879.	173.	0.	0.	1499.	3973.	136
137	SHIP AND BOAT BUILDING	3340.	375.	682.	-86.	91.	-51.	1320.	0.	0.	0.	2331.	1009.	137
138	RAILROAD EQUIPMENT	1987.	0.	1531.	5.	76.	-8.	8.	0.	0.	0.	1612.	375.	138
139	CYCLES AND PARTS, TRANS	1024.	901.	413.	26.	27.	-654.	3.	0.	0.	0.	716.	308.	139
140	TRAILER COACHES	2625.	2335.	242.	21.	19.	-19.	0.	0.	0.	0.	2598.	27.	140

1970 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	1287.	0.	221.	10.	140.	-61.	394.	11.	0.	0.	715.	572.	141
142	MECHANICAL MEASURING DE	2100.	21.	383.	38.	362.	-42.	22.	3.	0.	0.	787.	1313.	142
143	OPTICAL AND OPHTHALMIC	869.	431.	330.	151.	66.	-183.	3.	10.	0.	0.	808.	61.	143
144	MEDICAL AND SURGICAL IN	1953.	252.	615.	39.	166.	-50.	19.	9.	0.	0.	1050.	903.	144
145	PHOTOGRAPHIC EQUIPMENT	4111.	744.	682.	137.	369.	-260.	56.	8.	0.	0.	1736.	2375.	145
146	WATCHES, CLOCKS, AND PA	814.	489.	1.	92.	11.	-211.	7.	0.	0.	0.	389.	425.	146
147	JEWELRY AND SILVERWARE	2006.	1865.	0.	183.	146.	-267.	5.	0.	0.	0.	1932.	74.	147
148	TOYS, SPORTING GOODS, M	3210.	2791.	419.	179.	108.	-764.	8.	0.	0.	0.	2741.	469.	148
149	OFFICE SUPPLIES	826.	242.	0.	34.	38.	-21.	0.	0.	0.	0.	293.	533.	149
150	MISC MANUFACTURING, NEC	3314.	762.	332.	79.	140.	-133.	8.	0.	0.	0.	1188.	2126.	150
151	RAILROADS	13739.	2628.	392.	20.	146.	-146.	0.	0.	0.	17.	3057.	10682.	151
152	BUSSES	5281.	2861.	0.	0.	0.	0.	28.	0.	0.	0.	2889.	2392.	152
153	TRUCKING	22884.	3565.	563.	27.	0.	0.	512.	0.	0.	51.	4718.	18166.	153
154	WATER TRANSPORTATION	4036.	564.	10.	1.	2258.	-2319.	547.	0.	0.	1.	1062.	2974.	154
155	AIRLINES	11117.	3389.	34.	1.	1255.	-1588.	422.	0.	0.	0.	3513.	7604.	155
156	PIPELINES	1447.	242.	0.	0.	0.	0.	0.	0.	0.	0.	242.	1205.	156
157	TRAVEL AGTS, OTH TRANS	656.	16.	0.	0.	0.	0.	0.	0.	0.	0.	16.	640.	157
158	TELEPHONE AND TELEGRAPH	23077.	9902.	865.	0.	0.	0.	542.	0.	0.	0.	11309.	11768.	158
159	RADIO AND TV BROADCASTI	3977.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3977.	159
160	ELECTRIC UTULITIES	25316.	9984.	0.	0.	0.	0.	331.	0.	0.	0.	10315.	15001.	160
161	NATURAL GAS	16977.	5305.	0.	0.	0.	0.	42.	0.	0.	0.	5347.	11630.	161
162	WATER AND SEWER SERVICE	4385.	2345.	0.	0.	0.	0.	30.	0.	0.	0.	2375.	2010.	162
163	WHOLESALE TRADE	81863.	26653.	4580.	168.	2701.	0.	1470.	0.	0.	0.	35572.	46291.	163
164	RETAIL TRADE	121231.	85262.	3378.	0.	0.	0.	0.	0.	0.	0.	88640.	32591.	164
165	CREDIT AGENCIES AND BRO	35758.	18713.	0.	0.	0.	0.	0.	0.	0.	0.	18713.	17045.	165
166	INSURANCE AND BROKER'S	30425.	13453.	0.	0.	0.	0.	25.	0.	0.	0.	13478.	16947.	166
167	OWNER-OCCUPIED DWELLING	61477.	61477.	0.	0.	0.	0.	0.	0.	0.	0.	61477.	0.	167
168	REAL ESTATE	72212.	26293.	1958.	0.	0.	0.	109.	0.	0.	0.	28360.	43852.	168
169	HOTEL AND LODGING PLACE	6538.	3897.	0.	0.	0.	0.	515.	0.	0.	0.	4412.	2126.	169
170	PERSONAL AND REPAIR SER	16931.	14565.	0.	0.	0.	0.	1.	0.	0.	0.	14566.	2365.	170
171	BUSINESS SERVICES	46149.	5250.	0.	0.	0.	0.	1805.	0.	0.	0.	7055.	39094.	171
172	ADVERTISING	18972.	223.	0.	0.	0.	0.	1.	0.	0.	0.	224.	18748.	172
173	AUTO REPAIR	16701.	10379.	0.	0.	0.	0.	23.	0.	0.	0.	10402.	6299.	173
174	MOTION PICTURES AND AMU	11704.	7104.	0.	0.	0.	0.	151.	0.	0.	0.	7255.	4449.	174
175	MEDICAL SERVICES	40667.	37864.	0.	0.	0.	0.	65.	0.	0.	0.	37929.	2738.	175
176	PRIVATE SCHOOLS AND NON	26174.	21735.	0.	0.	0.	0.	685.	0.	0.	0.	22420.	3754.	176
177	POST OFFICE	6910.	1535.	0.	0.	0.	0.	99.	0.	0.	0.	1634.	5276.	177
178	FEDERAL GOV. ENTERPRISE	787.	9.	0.	0.	0.	0.	2.	0.	0.	0.	11.	776.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1864.	589.	0.	0.	0.	0.	19.	0.	0.	0.	608.	1256.	180
181	DIRECTLY ALLOCATED IMPO	8119.	4109.	0.	0.	0.	0.	3502.	0.	0.	0.	7611.	508.	181
182	BUSINESS TRAVEL	16704.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16704.	182
183	OFFICE SUPPLIES	2929.	0.	0.	0.	0.	0.	158.	0.	0.	0.	158.	2771.	183
184	UNIMPORTANT INDUSTRY	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	303.	184
185	COMPUTER RENTAL	4415.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4415.	185
	SUM TOTALS	1537411.	575274.	63212.	7853.	42579.	-45632.	37826.	2097.	-648.	525.	683086.	854325.	

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1971 FINAL DEMAND COMPONENTS

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
1	DAIRY FARM PRODUCTS	6876.	119.	0.	508.	0.	0.	0.	0.	0.	0.	627.	6249.	1
2	POULTRY AND EGGS	4260.	1424.	0.	33.	2.	-16.	92.	0.	0.	0.	1535.	2725.	2
3	MEAT, ANIMALS AND MISC	25926.	246.	0.	3337.	78.	-294.	24.	0.	0.	0.	3391.	22535.	3
4	COTTON	1428.	0.	0.	335.	487.	-7.	0.	0.	-334.	133.	614.	814.	4
5	GRAINS	14920.	0.	0.	483.	2797.	-28.	0.	0.	354.	55.	3661.	11259.	5
6	TOBACCO	1422.	0.	0.	65.	24.	-31.	0.	0.	0.	24.	82.	1340.	6
7	FRUITS, VEGETABLES, AND	11363.	4265.	0.	459.	367.	-630.	91.	0.	-291.	1.	4262.	7101.	7
8	FORESTRY AND FISHERY PR	2127.	568.	0.	4.	28.	-819.	4.	0.	0.	0.	-215.	2342.	8
9	NO DEF'N	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9
10	AGRICULTURAL, FORESTRY	3296.	29.	0.	0.	26.	-26.	18.	0.	0.	0.	47.	3249.	10
11	IRON ORES	1304.	0.	0.	10.	114.	-576.	0.	0.	0.	0.	-452.	1756.	11
12	COPPER ORE	1396.	0.	0.	40.	7.	-4.	0.	0.	0.	0.	43.	1353.	12
13	OTHER NON-FERROUS METAL	980.	0.	0.	8.	13.	-169.	0.	0.	0.	0.	-148.	1128.	13
14	COAL MINING	4838.	137.	0.	39.	565.	-2.	41.	0.	0.	0.	780.	4058.	14
15	CRUDE PETROLEUN AND NAT	16430.	0.	0.	-143.	40.	-2555.	0.	0.	0.	0.	-2658.	19088.	15
16	STONE AND CLAY MINING	2345.	20.	0.	1.	110.	-69.	0.	0.	0.	0.	62.	2283.	16
17	CHEMICAL FERTILIZER MIN	547.	0.	0.	0.	96.	-258.	0.	0.	0.	0.	-162.	709.	17
18	NEW CONSTRUCTION	39058.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	39058.	18
19	MAINTENANCE AND REPAIR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19
20	COMPLETE GUIDED MISSILE	3552.	0.	0.	104.	24.	-24.	2254.	1033.	0.	0.	3391.	161.	20
21	AMMUNITION	1760.	235.	0.	-19.	143.	-35.	996.	1.	0.	0.	1321.	439.	21
22	OTHER ORDNANCE	1568.	161.	0.	8.	274.	-73.	737.	1.	0.	0.	1108.	460.	22
23	MEAT PRODUCTS	28280.	21628.	0.	176.	358.	-1290.	445.	0.	0.	0.	21317.	6963.	23
24	DAIRY PRODUCTS	13936.	10211.	0.	39.	208.	-96.	525.	0.	-10.	210.	11087.	2849.	24
25	CANNED AND FROZEN FOODS	11108.	9837.	0.	363.	305.	-505.	79.	0.	0.	0.	10079.	1029.	25
26	GRAIN MILL PRODUCTS	11396.	3427.	0.	6.	456.	-69.	37.	0.	30.	38.	3925.	7471.	26
27	BAKERY PRODUCTS	7535.	7188.	0.	8.	4.	-39.	56.	0.	0.	0.	7217.	318.	27
28	SUGAR	3123.	1108.	0.	71.	6.	-864.	10.	0.	0.	0.	331.	2792.	28
29	CONFECTIONERY PRODUCTS	3362.	2867.	0.	44.	28.	-114.	2.	0.	0.	0.	2827.	535.	29
30	ALCOHOLIC BEVERAGES	11989.	10369.	0.	165.	27.	-965.	13.	0.	0.	0.	9609.	2380.	30
31	SOFT DRINKS AND FLAVORI	5766.	4507.	0.	25.	50.	-11.	63.	0.	0.	0.	4634.	1132.	31
32	FATS AND OILS	6306.	1097.	0.	35.	957.	-226.	0.	0.	1.	27.	1891.	4415.	32
33	MISC FOOD PRODUCTS	5975.	5430.	0.	36.	47.	-159.	80.	0.	-3.	0.	5431.	544.	33
34	TOBACCO PRODUCTS	9018.	6793.	0.	64.	215.	-166.	0.	0.	0.	0.	6906.	2112.	34
35	BROAD AND NARROW FABRIC	16025.	844.	0.	83.	301.	-798.	156.	0.	0.	0.	586.	15439.	35
36	FLOOR COVERINGS	2489.	1526.	586.	56.	21.	-78.	11.	0.	0.	0.	2122.	367.	36
37	MISC TEXTILES	2668.	141.	0.	42.	80.	-404.	18.	0.	0.	0.	-123.	2791.	37
38	KNITTING	6480.	3024.	0.	142.	25.	-233.	0.	0.	0.	0.	2958.	3522.	38
39	APPAREL	18566.	17181.	0.	844.	159.	-1916.	231.	0.	0.	0.	16499.	2067.	39
40	HOUSEHOLD TEXTILES	4515.	1959.	0.	112.	43.	-112.	67.	0.	0.	0.	2069.	2446.	40
41	LUMBER AND WOOD PRODUCT	8701.	172.	0.	177.	446.	-947.	0.	0.	0.	0.	-152.	8853.	41
42	VENEER AND PLYWOOD	2253.	0.	0.	5.	27.	-401.	0.	0.	0.	0.	-369.	2622.	42
43	MILLWORK AND WOOD PRODU	5030.	297.	11.	46.	37.	-193.	14.	0.	0.	0.	212.	4818.	43
44	WOODEN CONTAINERS	379.	0.	0.	95.	2.	-4.	14.	0.	0.	0.	107.	272.	44
45	HOUSEHOLD FURNITURE	6515.	4512.	953.	123.	23.	-239.	14.	0.	0.	0.	5386.	1129.	45
46	OTHER FURNITURE	2951.	227.	1856.	12.	20.	-92.	21.	0.	0.	0.	2044.	907.	46

1971 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
47	PULP MILLS	1088.	0.	0.	42.	328.	-508.	0.	0.	0.	0.	-138.	1226.	47
48	PAPER AND PAPERBOARD MI	9349.	44.	0.	9.	469.	-1123.	9.	0.	0.	0.	-592.	9941.	48
49	PAPER PRODUCTS, NEC	6933.	2037.	0.	103.	112.	-53.	19.	0.	0.	0.	2218.	4715.	49
50	WALL AND BUILDING PAPER	482.	0.	0.	-13.	12.	-13.	0.	0.	0.	0.	-14.	496.	50
51	PAPERBOARD CONTAINERS	6961.	110.	0.	26.	28.	-4.	23.	0.	0.	0.	183.	6778.	51
52	NEWSPAPERS	7038.	1924.	0.	-1.	3.	-8.	1.	0.	0.	0.	1919.	5119.	52
53	PERIODICALS	2944.	980.	0.	47.	76.	-33.	51.	0.	0.	0.	1121.	1823.	53
54	BOOKS	3860.	1706.	0.	94.	153.	-202.	206.	0.	0.	0.	1957.	1903.	54
55	INDUSTRIAL CHEMICALS	16940.	158.	0.	11.	1509.	-799.	561.	0.	0.	0.	1440.	15500.	55
56	BUSINESS FORMS, BLANK B	1600.	91.	0.	-1.	3.	-18.	0.	0.	0.	0.	75.	1525.	56
57	COMMERCIAL PRINTING	4694.	198.	0.	20.	60.	-41.	0.	0.	0.	0.	237.	4457.	57
58	MISC. PRINTING & PUBL.,	2047.	640.	0.	9.	10.	-3.	0.	0.	0.	0.	656.	1391.	58
59	FERTILIZERS	1451.	49.	0.	-52.	105.	-53.	0.	0.	0.	0.	49.	1402.	59
60	PESTICIDES AND OTHER AG	979.	8.	0.	3.	92.	-30.	1.	0.	0.	0.	74.	905.	60
61	MISC CHEMICAL PRODUCTS	3708.	353.	0.	33.	393.	-121.	199.	0.	0.	0.	857.	2851.	61
62	PLASTIC MATERIALS AND R	4733.	21.	0.	24.	552.	-49.	7.	0.	0.	0.	555.	4178.	62
63	SYNTHETIC RUBBER	1167.	0.	0.	-6.	164.	-62.	1.	0.	0.	0.	97.	1070.	63
64	CELLULOSIC FIBERS	697.	0.	0.	24.	30.	-27.	3.	0.	0.	0.	30.	667.	64
65	NON-CELLULOSIC FIBERS	2891.	0.	0.	29.	138.	-163.	3.	0.	0.	0.	7.	2884.	65
66	DRUGS	6897.	3826.	0.	71.	442.	-232.	41.	0.	0.	0.	4148.	2749.	66
67	CLEANING AND TOILET PRE	8433.	6018.	0.	-145.	138.	-35.	62.	0.	0.	0.	6038.	2395.	67
68	PAINTS	3164.	31.	0.	1.	54.	-2.	21.	0.	0.	0.	105.	3059.	68
69	GASOLINE	27948.	7012.	0.	362.	379.	-588.	183.	0.	0.	0.	7348.	20600.	69
70	HEATING OIL	6017.	2778.	0.	0.	49.	-1395.	46.	0.	0.	0.	1478.	4539.	70
71	PAVING AND ASPHALT	1622.	0.	0.	10.	11.	-4.	0.	0.	0.	0.	17.	1605.	71
72	TIRES AND INNER TUBES	5236.	2302.	0.	153.	83.	-282.	45.	0.	0.	0.	2301.	2935.	72
73	RUBBER PRODUCTS	3673.	750.	25.	-3.	118.	-304.	67.	0.	0.	0.	653.	3020.	73
74	MISC PLASTIC PRODUCTS	8412.	429.	0.	37.	125.	-276.	23.	0.	0.	0.	338.	8074.	74
75	LEATHER TANNING AND IND	952.	0.	0.	4.	42.	-97.	1.	0.	0.	0.	-50.	1002.	75
76	LEATHER FOOTWEAR	3175.	3387.	0.	88.	11.	-604.	0.	0.	0.	0.	2882.	293.	76
77	OTHER LEATHER PRODUCTS	1008.	956.	0.	12.	15.	-217.	85.	0.	0.	0.	851.	157.	77
78	GLASS	5062.	406.	0.	124.	163.	-265.	13.	0.	0.	0.	441.	4621.	78
79	STRUCTURAL CLAY PRODUCT	1035.	0.	0.	19.	34.	-46.	0.	0.	0.	0.	7.	1028.	79
80	POTTERY	699.	136.	0.	18.	23.	-198.	0.	0.	0.	0.	-21.	720.	80
81	CEMENT, CONCRETE, AND G	7535.	4.	0.	-5.	11.	-66.	0.	0.	0.	0.	-56.	7591.	81
82	OTHER STONE AND CLAY PR	3666.	152.	0.	57.	152.	-142.	18.	0.	0.	0.	237.	3429.	82
83	STEEL	30667.	14.	0.	145.	766.	-3190.	34.	0.	0.	0.	-2231.	32898.	83
84	COPPER	6492.	0.	0.	166.	244.	-449.	5.	0.	0.	0.	-34.	6526.	84
85	LEAD	529.	0.	0.	-32.	1.	-57.	0.	0.	0.	0.	-88.	617.	85
86	ZINC	408.	0.	0.	-34.	3.	-114.	0.	0.	0.	0.	-145.	553.	86
87	ALUMINUM	6632.	14.	0.	167.	178.	-346.	32.	0.	0.	0.	45.	6587.	87
88	PRIMARY NON-FERROUS MET	1055.	0.	0.	8.	75.	-539.	0.	1.	0.	0.	-455.	1510.	88
89	NON-FERROUS ROLLING AND	949.	0.	0.	36.	93.	-36.	8.	0.	0.	0.	101.	848.	89
90	NON-FERROUS WIRE DRAWIN	3778.	4.	46.	13.	59.	-70.	13.	2.	0.	0.	67.	3711.	90
91	NON-FERROUS CASTINGS AN	814.	0.	0.	-3.	8.	-8.	2.	0.	0.	0.	-1.	815.	91
92	METAL CANS	3869.	0.	0.	-22.	12.	-12.	6.	0.	0.	0.	-16.	3885.	92
93	METAL BARRELS, DRUMS AN	433.	0.	14.	1.	7.	-15.	10.	0.	0.	0.	17.	416.	93

1971 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
94	PLUMBING AND HEATING EQ	1935.	61.	0.	178.	68.	-16.	10.	0.	0.	0.	301.	1634.	94
95	STRUCTURAL METAL PRODUC	12239.	34.	1087.	136.	252.	-90.	28.	4.	0.	0.	1451.	10788.	95
96	SCREW MACHINE PRODUCTS	2664.	33.	0.	-14.	63.	-151.	14.	3.	0.	0.	-52.	2716.	96
97	METAL STAMPINGS	7155.	373.	0.	3.	339.	-48.	13.	0.	0.	0.	680.	6475.	97
98	CUTLERY, HAND TOOLS AND	4285.	746.	26.	128.	154.	-275.	9.	0.	0.	0.	788.	3497.	98
99	MISC FABRICATED WIRE PR	1839.	38.	0.	-3.	30.	-134.	9.	0.	0.	0.	-60.	1899.	99
100	VALVES, PIPE FITTINGS,	3272.	0.	307.	32.	248.	-126.	13.	1.	0.	0.	475.	2797.	100
101	OTHER FABRICATED METAL	3644.	156.	124.	-7.	99.	-131.	12.	0.	0.	0.	253.	3391.	101
102	ENGINES AND TURBINES	5153.	196.	1163.	-18.	638.	-217.	224.	2.	0.	0.	1988.	3165.	102
103	FARM MACHINERY	4130.	530.	2757.	101.	334.	-366.	21.	0.	0.	0.	3377.	753.	103
104	CONSTRUCTION, MINING, A	6572.	0.	3306.	224.	1713.	-187.	144.	0.	0.	0.	5200.	1372.	104
105	MATERIALS HANDLING MACH	2688.	0.	1362.	29.	191.	-65.	31.	0.	0.	0.	1548.	1140.	105
106	MACHINE TOOLS, METAL CU	1192.	27.	761.	-21.	196.	-109.	21.	1.	0.	0.	876.	316.	106
107	MACHINE TOOLS, METAL FO	616.	0.	371.	-3.	106.	-28.	0.	0.	0.	0.	446.	170.	107
108	OTHER METAL WORKING MAC	4639.	109.	621.	-18.	262.	-105.	36.	0.	0.	0.	905.	3734.	108
109	SPECIAL INDUSTRIAL MACH	5185.	33.	3546.	546.	1037.	-736.	29.	0.	0.	0.	4455.	730.	109
110	PUMPS, COMPRESSORS, BLO	3037.	0.	1411.	-6.	378.	-112.	49.	1.	0.	0.	1721.	1316.	110
111	BALL AND ROLLER BEARING	1266.	0.	0.	-3.	95.	-114.	16.	0.	0.	0.	-6.	1272.	111
112	POWER TRANSMISSION EQUI	1391.	0.	0.	3.	123.	-41.	4.	1.	0.	0.	90.	1301.	112
113	INDUSTRIAL PATTERNS	1601.	0.	901.	-14.	152.	-12.	72.	2.	0.	0.	1101.	500.	113
114	COMPUTERS AND RELATED M	5919.	0.	3415.	-137.	1209.	-629.	328.	17.	0.	0.	4203.	1716.	114
115	OTHER OFFICE MACHINERY	1181.	132.	554.	69.	113.	-112.	20.	0.	0.	0.	776.	405.	115
116	SERVICE INDUSTRY MACHIN	6836.	828.	2141.	19.	440.	-83.	96.	0.	0.	0.	3441.	3395.	116
117	MACHINE SHOP PRODUCTS	4156.	4.	13.	3.	25.	-25.	37.	1.	0.	0.	58.	4098.	117
118	ELECTRICAL MEASURING IN	1205.	0.	570.	-16.	213.	-213.	84.	11.	0.	0.	649.	556.	118
119	TRANSFORMERS AND SWITCH	3357.	15.	1716.	2.	113.	-56.	9.	0.	0.	0.	1799.	1558.	119
120	MOTORS AND GENERATORS	2545.	23.	419.	-16.	190.	-131.	66.	1.	0.	0.	552.	1993.	120
121	INDUSTRIAL CONTROLS	1241.	0.	158.	-15.	55.	-55.	7.	12.	0.	0.	162.	1079.	121
122	WELDING APPARATUS AND G	1372.	1.	408.	11.	110.	-44.	24.	0.	0.	0.	510.	862.	122
123	HOUSEHOLD APPLIANCES	6244.	4848.	190.	-42.	151.	-387.	9.	0.	0.	0.	4769.	1475.	123
124	ELECTRIC LIGHTING AND W	4650.	686.	76.	45.	192.	-252.	3.	0.	0.	0.	750.	3900.	124
125	RADIO AND TV RECEIVING	3810.	4377.	200.	25.	147.	-1593.	40.	0.	0.	0.	3196.	614.	125
126	PHONOGRAPH RECORDS	528.	452.	0.	25.	15.	-11.	2.	0.	0.	0.	483.	45.	126
127	COMMUNICATION EQUIPMENT	13189.	119.	3000.	-191.	561.	-393.	4606.	313.	0.	0.	8015.	5174.	127
128	ELECTRONIC COMPONENTS	7356.	230.	171.	-65.	740.	-403.	276.	19.	0.	0.	968.	6388.	128
129	BATTERIES	1192.	414.	144.	47.	31.	-29.	34.	1.	0.	0.	642.	550.	129
130	ENGINE ELECTRICAL EQUIP	1612.	133.	0.	176.	106.	-79.	19.	2.	0.	0.	357.	1255.	130
131	X-RAY EQUIPMENT AND ELE	574.	83.	200.	13.	95.	-64.	19.	0.	0.	0.	346.	228.	131
132	TRUCK, BUS, AND TRAILER	1710.	0.	1365.	295.	31.	-31.	23.	0.	0.	0.	1683.	27.	132
133	MOTOR VEHICLES AND PART	59283.	29159.	10483.	1372.	3508.	-8535.	711.	0.	0.	0.	36698.	22585.	133
134	AIRCRAFT	8131.	128.	1863.	-813.	2476.	-48.	4267.	208.	0.	0.	8081.	50.	134
135	AIRCRAFT ENGINES AND PA	3947.	0.	0.	-75.	419.	-48.	2505.	156.	0.	0.	2957.	990.	135
136	AIRCRAFT EQUIPMENT, NEC	4946.	0.	0.	-97.	911.	-285.	959.	164.	0.	0.	1652.	3294.	136
137	SHIP AND BOAT BUILDING	3457.	409.	797.	123.	51.	-56.	1377.	0.	0.	0.	2701.	756.	137
138	RAILROAD EQUIPMENT	2053.	0.	1453.	28.	172.	-9.	6.	0.	0.	0.	1650.	403.	138
139	CYCLES AND PARTS, TRANS	1177.	1153.	522.	48.	42.	-928.	2.	0.	0.	0.	839.	338.	139
140	TRAILER COACHES	3231.	2897.	298.	20.	25.	-25.	0.	0.	0.	0.	3215.	16.	140

1971 FINAL DEMAND COMPONENTS (CONT.)

SEC#	SECTOR TITLES	OUTPUT	P*C*E	P*D*E	D-VENT	EXPORT	IMPORT	D*O*D	NASA	CCC-DV	CCC-GL	TOT-FD	INTGOV	SEC#
141	ENGINEERING AND SCIENTI	1175.	0.	204.	11.	127.	-62.	307.	11.	0.	0.	598.	577.	141
142	MECHANICAL MEASURING DE	2168.	22.	391.	1.	374.	-52.	17.	2.	0.	0.	755.	1413.	142
143	OPTICAL AND OPHTHALMIC	817.	466.	262.	124.	69.	-185.	3.	10.	0.	0.	749.	68.	143
144	MEDICAL AND SURGICAL IN	2208.	279.	718.	51.	185.	-60.	22.	9.	0.	0.	1204.	1004.	144
145	PHOTOGRAPHIC EQUIPMENT	4623.	801.	826.	3.	417.	-307.	31.	8.	0.	0.	1779.	2844.	145
146	WATCHES, CLOCKS, AND PA	823.	515.	1.	20.	11.	-229.	5.	0.	0.	0.	323.	500.	146
147	JEWELRY AND SILVERWARE	2161.	1995.	0.	132.	146.	-237.	4.	0.	0.	0.	2040.	121.	147
148	TOYS, SPORTING GOODS, M	3332.	2771.	450.	143.	164.	-732.	6.	0.	0.	0.	2802.	530.	148
149	OFFICE SUPPLIES	851.	250.	0.	15.	38.	-20.	0.	0.	0.	0.	283.	568.	149
150	MISC MANUFACTURING, NEC	3397.	805.	368.	68.	156.	-188.	6.	0.	0.	0.	1215.	2182.	150
151	RAILROADS	14629.	2876.	440.	35.	173.	-173.	0.	0.	0.	14.	3365.	11264.	151
152	BUSSES	5514.	2967.	0.	0.	0.	0.	22.	0.	0.	0.	2989.	2525.	152
153	TRUCKING	26360.	3883.	617.	49.	0.	0.	398.	0.	0.	41.	4988.	21372.	153
154	WATER TRANSPORTATION	4221.	600.	11.	2.	2199.	-2407.	426.	0.	0.	1.	832.	3389.	154
155	AIRLINES	11994.	3713.	35.	3.	1375.	-1733.	328.	0.	0.	0.	3721.	8273.	155
156	PIPELINES	1521.	255.	0.	0.	0.	0.	0.	0.	0.	0.	255.	1266.	156
157	TRAVEL AGTS, OTH TRANS	657.	15.	0.	0.	0.	0.	0.	0.	0.	0.	15.	642.	157
158	TELEPHONE AND TELEGRAPH	25245.	10860.	946.	0.	0.	0.	422.	0.	0.	0.	12228.	13017.	158
159	RADIO AND TV BROADCASTI	4041.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4041.	159
160	ELECTRIC UTULITIES	28552.	11121.	0.	0.	0.	0.	257.	0.	0.	0.	11378.	17174.	160
161	NATURAL GAS	18056.	5761.	0.	0.	0.	0.	33.	0.	0.	0.	5794.	12262.	161
162	WATER AND SEWER SERVICE	4863.	2605.	0.	0.	0.	0.	23.	0.	0.	0.	2628.	2235.	162
163	WHOLESALE TRADE	88491.	28456.	4779.	222.	2782.	0.	1144.	0.	0.	0.	37383.	51108.	163
164	RETAIL TRADE	132335.	91766.	4027.	0.	0.	0.	0.	0.	0.	0.	95793.	36542.	164
165	CREDIT AGENCIES AND BRO	35805.	19837.	0.	0.	0.	0.	0.	0.	0.	0.	19837.	15968.	165
166	INSURANCE AND BROKER'S	35295.	14825.	0.	0.	0.	0.	20.	0.	0.	0.	14845.	20450.	166
167	OWNER-OCCUPIED DWELLING	67076.	67076.	0.	0.	0.	0.	0.	0.	0.	0.	67076.	0.	167
168	REAL ESTATE	79235.	28789.	2148.	0.	0.	0.	85.	0.	0.	0.	31022.	48213.	168
169	HOTEL AND LODGING PLACE	6862.	4091.	0.	0.	0.	0.	401.	0.	0.	0.	4492.	2370.	169
170	PERSONAL AND REPAIR SER	17264.	14781.	0.	0.	0.	0.	1.	0.	0.	0.	14782.	2482.	170
171	BUSINESS SERVICES	48590.	5755.	0.	0.	0.	0.	1404.	0.	0.	0.	7159.	41431.	171
172	ADVERTISING	19843.	217.	0.	0.	0.	0.	1.	0.	0.	0.	218.	19625.	172
173	AUTO REPAIR	18500.	11497.	0.	0.	0.	0.	18.	0.	0.	0.	11515.	6985.	173
174	MOTION PICTURES AND AMU	12271.	7430.	0.	0.	0.	0.	117.	0.	0.	0.	7547.	4724.	174
175	MEDICAL SERVICES	45087.	41967.	0.	0.	0.	0.	51.	0.	0.	0.	42018.	3069.	175
176	PRIVATE SCHOOLS AND NON	27658.	22915.	0.	0.	0.	0.	533.	0.	0.	0.	23448.	4210.	176
177	POST OFFICE	7255.	1626.	0.	0.	0.	0.	77.	0.	0.	0.	1703.	5552.	177
178	FEDERAL GOV. ENTERPRISE	841.	9.	0.	0.	0.	0.	1.	0.	0.	0.	10.	831.	178
179	LOCAL GOV. PASSENGER TR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	179
180	STATE AND LOCAL ELECTRI	1943.	621.	0.	0.	0.	0.	15.	0.	0.	0.	636.	1307.	180
181	DIRECTLY ALLOCATED IMPO	8775.	4503.	0.	0.	0.	0.	2724.	0.	0.	0.	7227.	1548.	181
182	BUSINESS TRAVEL	17746.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17746.	182
183	OFFICE SUPPLIES	3041.	0.	0.	0.	0.	0.	123.	0.	0.	0.	123.	2918.	183
184	UNIMPORTANT INDUSTRY	303.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	303.	184
185	COMPUTER RENTAL	4739.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4739.	185
	SUM TOTALS	1645052.	625235.	67613.	12696.	43408.	-52408.	33221.	1998.	-253.	544.	732054.	912998.	

APPENDIX II-c

Tables of Significant Coefficient Changes

and Graphs of Row and Column Adjustment Factors

(1963-1971)

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1964
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-10	3	4	.04923	-16	3	5	.05704	-12	3	6	.05782	-13	3	7	.04991	-14
3	37	.10542	-13	4	32	.07176	-16	4	35	.11129	-12	5	2	.17092	-12	5	30	.02534	-12
6	34	.15338	19	7	25	.13904	15	7	28	.19348	15	7	29	.03826	14	7	32	.32983	11
7	33	.04530	13	10	2	.11003	21	10	4	.12902	13	10	5	.02955	19	10	7	.03826	15
10	8	.06200	19	11	83	.05219	15	11	88	.03027	14	12	84	.13994	10	13	87	.03143	17
15	161	.16503	-13	23	25	.02974	-13	23	182	.08593	-10	33	8	.03346	-22	40	37	.03749	-10
42	45	.03366	10	42	46	.03061	10	59	5	.04102	11	65	35	.05274	13	65	36	.13602	10
65	37	.10640	14	70	151	.02617	-14	70	153	.03016	-15	83	133	.08965	10	84	21	.04744	15
84	91	.05691	13	84	94	.06678	11	84	96	.03641	10	84	98	.02657	12	84	100	.09089	10
84	116	.02917	12	84	119	.02718	10	84	120	.02509	11	84	142	.03287	13	85	89	.02520	16
85	129	.14567	12	87	21	.04211	-14	87	22	.04958	-11	87	90	.02992	-20	87	91	.08463	-15
87	95	.06666	-15	87	97	.02823	-15	87	101	.04201	-15	87	132	.06556	-12	87	136	.03122	-11
87	140	.05066	-18	97	131	.02857	-10	101	10	.07468	12	104	12	.02648	-21	104	14	.03244	-11
104	16	.02727	-12	104	17	.04121	-11	117	13	.05279	-11	117	91	.08699	-10	117	135	.11136	-12
123	140	.05880	15	127	20	.07696	22	127	134	.09259	27	128	114	.09125	14	128	131	.03050	-12
133	132	.06463	-11	133	140	.05123	-17	133	173	.07881	-12	135	134	.04829	20	137	154	.06404	-48
143	184	.03370	16	144	184	.03209	12	151	85	.02701	-12	153	3	.03574	12	154	11	.08837	-12
154	14	.03585	-11	154	17	.06992	-12	163	141	.02530	20	164	173	.02874	15	164	182	.05973	15
166	154	.02661	18	171	5	.04366	11	171	71	.02511	11	171	136	.02577	15	172	34	.04022	-15
181	29	.08321	20	181	33	.26383	20	181	37	.02730	24	181	72	.05543	21	181	73	.03081	21
181	147	.09691	14	181	154	.16374	48	181	155	.04192	18	181	178	.41992	14				

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R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1965
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-18	3	4	.04923	-35	3	5	.05704	-34	3	6	.05782	-33	3	7	.04991	-35
3	23	.52727	-12	3	37	.10542	-40	4	32	.07176	40	4	35	.11129	15	5	1	.46135	-11
5	2	.17092	-17	5	26	.28093	-17	5	30	.02534	-21	6	34	.15338	-21	7	33	.04530	-10
11	88	.03027	-11	13	12	.02620	16	23	25	.02974	-23	23	182	.08593	-11	26	3	.06231	10
26	29	.02908	-10	28	25	.02504	-15	28	27	.04231	-10	28	29	.09121	-11	28	31	.10929	-14
30	182	.09170	-10	35	37	.06902	12	35	45	.05438	12	35	73	.05113	11	35	76	.02686	12
35	77	.03178	13	35	144	.05768	10	35	150	.02512	11	40	37	.03749	18	40	77	.03788	19
41	46	.03309	-10	45	140	.04193	31	49	26	.02592	17	49	27	.02824	13	51	24	.03477	13
60	4	.02691	11	65	35	.05274	13	65	36	.13602	17	65	37	.10640	26	65	38	.08779	15
74	147	.02577	12	78	25	.03344	11	78	30	.03616	16	78	31	.05639	12	78	143	.06191	14
83	44	.09276	10	83	143	.02902	16	85	89	.02520	12	85	129	.14567	12	87	22	.04958	17
87	90	.02992	16	87	91	.08463	12	87	95	.06666	14	87	97	.02823	14	87	101	.04201	15
87	132	.06556	12	87	140	.05066	21	88	145	.02611	12	88	147	.04017	19	97	93	.05997	15
97	116	.02700	16	97	123	.02691	17	97	131	.02857	14	97	132	.02777	13	98	43	.03889	18
98	46	.03300	12	98	77	.02811	13	101	10	.07468	11	104	12	.02648	31	104	14	.03244	34
104	16	.02727	33	104	17	.04121	31	108	135	.03443	12	127	20	.07696	12	127	134	.09259	18
128	21	.07981	30	128	22	.02677	42	128	114	.09125	16	128	118	.10272	28	128	125	.29274	21
128	127	.14551	20	128	131	.03050	38	128	141	.04001	32	128	170	.03552	42	131	124	.03347	-27
133	132	.06463	17	133	140	.05123	25	133	173	.07881	22	135	134	.04829	-22	135	155	.03089	-18
136	134	.12846	12	137	154	.06404	55	143	184	.03370	-77	151	13	.03895	-11	151	28	.02817	10
151	85	.02701	-13	151	86	.04093	-15	153	2	.05798	14	153	3	.03574	33	163	2	.03255	12
163	26	.06593	12	163	35	.02601	-14	163	36	.05799	-11	163	38	.02825	-12	163	40	.05509	-10
163	85	.13440	-11	163	88	.05422	-11	163	118	.03225	-14	163	125	.04352	-19	163	138	.02786	-10
163	141	.02530	-12	164	18	.04059	-12	164	19	.04779	-11	164	173	.02874	-16	166	154	.02661	-10
171	5	.04366	11	172	26	.03162	13	172	34	.04022	43	172	125	.04501	-18	181	29	.08321	20
181	33	.26383	15	181	147	.09691	15	182	169	.02974	15	182	171	.03631	14	182	174	.02685	16
182	178	.03034	11																

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1966
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	14	3	4	.04923	35	3	5	.05704	37	3	6	.05782	35	3	7	.04991	39
3	23	.52727	12	3	37	.10542	37	4	32	.07176	-22	4	35	.11129	-20	5	1	.46135	12
5	2	.17092	20	5	26	.28093	20	5	30	.02534	35	10	5	.02955	10	10	7	.03826	11
10	8	.06200	14	13	12	.02620	-13	13	87	.03143	-13	23	25	.02974	12	23	182	.08593	16
26	3	.06231	-11	26	29	.02908	10	28	25	.02504	11	33	8	.03346	-12	38	39	.04475	11
40	37	.03749	-13	45	125	.07991	-11	49	54	.03346	12	54	56	.09071	-14	64	37	.06261	-15
65	35	.05274	12	67	75	.04416	-15	67	184	.02650	-14	74	147	.02577	11	78	143	.06191	-14
83	18	.03244	-10	83	21	.02987	-15	83	100	.13535	-10	83	119	.07986	-10	83	131	.02943	-10
83	143	.02902	-15	84	91	.05691	17	84	94	.06678	14	84	96	.03641	18	84	98	.02657	19
84	100	.09089	13	84	116	.02917	16	84	119	.02718	13	84	120	.02509	14	84	142	.03287	14
85	89	.02520	-11	88	145	.02611	-10	89	147	.05937	14	90	119	.04354	12	90	120	.05920	13
90	122	.02661	14	90	130	.05020	14	90	131	.09559	12	95	140	.05339	14	97	131	.02857	-11
100	47	.03428	13	100	94	.04295	11	100	113	.02705	13	100	116	.03409	13	100	137	.03625	12
102	103	.05135	10	102	138	.02569	16	104	12	.02648	-19	104	14	.03244	-16	104	16	.02727	-18
104	17	.04121	-17	112	103	.06405	10	117	136	.02914	-16	123	140	.05880	-26	127	20	.07696	-16
128	22	.02677	15	128	118	.10272	10	128	125	.29274	13	128	131	.03050	13	128	141	.04001	20
128	170	.03552	16	131	124	.03347	-28	133	132	.06463	-12	133	173	.07881	-12	135	134	.04829	-15
136	20	.20004	11	136	134	.12846	21	137	154	.06404	-27	143	184	.03370	307	151	26	.02856	-16
153	2	.05798	-11	153	3	.03574	-21	163	85	.13440	11	163	88	.05422	11	163	138	.02786	15
163	152	.04019	12	164	173	.02874	13	164	182	.05973	18	166	154	.02661	16	172	26	.03162	-10
172	34	.04022	15	180	184	.02678	-12	181	29	.08321	-27	181	33	.26383	-25	181	37	.02730	-29
181	72	.05543	-24	181	73	.03081	-25	181	147	.09691	-22	181	154	.16374	-20	181	155	.04192	-24
181	178	.41992	-24																

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R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1967
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
3	37	.10542	17	4	32	.07176	-22	5	2	.17092	-12	8	25	.04149	-23	8	41	.15821	-18
10	2	.11003	22	10	4	.12902	12	10	5	.02955	17	10	7	.03826	18	10	8	.06200	20
12	84	.13994	-29	13	12	.02620	41	13	85	.10851	28	33	8	.03346	-17	35	37	.06902	-12
35	38	.28682	-14	35	39	.27301	-10	35	40	.28629	-10	35	45	.05438	-20	35	73	.05113	-19
35	76	.02686	-17	35	77	.03178	-15	35	144	.05768	-19	35	150	.02512	-19	37	8	.04932	-22
37	45	.02663	-16	37	72	.12083	-10	37	77	.10127	-10	37	99	.03096	-13	38	39	.04475	34
41	19	.02726	-11	41	140	.02886	-13	43	50	.04538	10	45	125	.07991	22	47	50	.04398	-10
48	54	.03346	-11	48	145	.02962	-10	49	36	.03655	14	49	183	.19869	-11	49	184	.06528	-11
51	24	.03477	-12	53	184	.03296	19	54	56	.09071	13	55	12	.03840	29	55	35	.02700	24
55	129	.05610	11	56	126	.02981	12	60	4	.02691	20	61	17	.03733	-10	61	57	.05483	-10
61	63	.03204	-13	62	90	.04813	13	62	126	.16590	-14	65	35	.05274	-13	65	36	.13602	-15
65	37	.10640	-19	65	38	.08779	-20	67	184	.02650	-11	73	22	.04599	-10	73	36	.03578	14
74	40	.02923	27	74	45	.04188	13	74	46	.03909	11	74	49	.02589	13	74	67	.04862	10
74	77	.04608	20	74	144	.02740	14	74	148	.05328	10	75	76	.20371	-16	75	77	.10855	-14
78	143	.06191	-20	83	12	.02761	17	83	18	.03244	-12	83	22	.10192	-15	83	102	.10904	-12
83	103	.14786	-14	83	105	.12596	-10	83	106	.07855	-10	83	117	.09174	-16	83	135	.04284	-29
83	137	.06066	-11	83	143	.02902	-25	84	21	.04744	-33	84	90	.30441	-25	84	91	.05691	-41
84	94	.06678	-37	84	96	.03641	-37	84	98	.02657	-37	84	100	.09089	-34	84	116	.02917	-39
84	119	.02718	-40	84	120	.02509	-37	84	142	.03287	-39	85	89	.02520	-29	85	129	.14567	-22
86	85	.13103	-12	86	91	.11051	-24	87	21	.04211	16	87	90	.02992	29	87	136	.03122	-10
89	91	.02668	14	89	147	.05937	12	90	119	.04354	-10	90	122	.02661	-10	90	130	.05020	-11
97	93	.05997	-12	97	116	.02700	-15	97	123	.02691	-17	97	131	.02857	-15	97	132	.02777	-15
102	104	.03336	17	102	137	.04074	11	102	138	.02569	29	104	12	.02648	13	104	16	.02727	-10
108	117	.03026	-12	108	135	.03443	-25	111	106	.05371	-11	116	94	.03689	17	117	13	.05279	43

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1967
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
117	91	.08699	55	117	102	.03032	48	117	103	.03152	45	117	135	.11136	20	117	136	.02914	34
121	106	.05201	10	121	107	.02932	12	121	119	.07947	13	123	140	.05880	40	128	21	.07981	-14
128	22	.02677	-29	128	114	.09125	-38	128	118	.10272	-19	128	125	.29274	-13	128	127	.14551	-18
128	131	.03050	-21	128	141	.04001	-28	128	170	.03562	-24	133	132	.06463	-16	133	140	.05123	-23
133	173	.07881	-19	135	134	.04829	41	135	155	.03089	51	137	154	.06404	65	142	94	.03617	11
143	184	.03370	213	144	184	.03209	-16	145	58	.03332	13	150	184	.03609	-10	151	5	.02896	-12
151	7	.04237	-11	151	13	.03895	-14	151	59	.03977	-10	151	86	.04093	-11	153	41	.04626	12
153	90	.02631	29	154	11	.08837	-12	154	14	.03585	-12	154	17	.06992	-13	154	69	.02501	-20
163	33	.03810	10	163	35	.02601	24	163	36	.05799	21	163	37	.05519	16	163	38	.02825	13
163	39	.03455	18	163	40	.05509	19	163	75	.03238	16	163	77	.03612	12	163	84	.05412	60
163	85	.13440	18	163	90	.03413	28	163	100	.02886	14	163	125	.04352	15	163	129	.03314	11
163	138	.02786	14	163	143	.05603	-17	164	18	.04059	13	164	19	.04779	14	164	173	.02874	18
164	182	.05973	14	171	135	.02507	-16	171	178	.13559	14	172	34	.04022	22	172	54	.03325	-10
181	29	.08321	-54	181	33	.26383	-52	181	37	.02730	-50	181	72	.05543	-51	181	73	.03081	-54
181	147	.09691	-57	181	154	.16374	-55	181	155	.04192	-61	181	178	.41992	-53	182	178	.03034	12
181	147	.09691	-57																

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R*A*S COEFFICIENT CHANGES (DC,GT.10%) IN YEAR 1968
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-15	3	4	.04923	-18	3	5	.05704	-19	3	6	.05782	-19	3	7	.04991	-18
3	37	.10542	-22	4	32	.07176	-37	4	35	.11129	-48	5	1	.46135	-20	5	2	.17092	-28
5	3	.30833	-22	5	26	.28093	-26	5	30	.02534	-35	7	25	.13904	-16	7	28	.19348	-10
7	29	.03826	-15	7	33	.04530	-13	8	25	.04149	45	8	41	.15821	22	10	8	.06200	-11
12	84	.13994	13	23	25	.02974	-11	24	182	.02808	-15	28	25	.02504	-10	32	2	.03945	-16
32	26	.08138	-13	32	27	.03086	-20	32	67	.03064	-28	32	68	.04368	-27	33	8	.03346	-21
38	39	.04475	-10	40	37	.03749	10	40	77	.03788	10	42	43	.05741	14	42	44	.05093	14
42	45	.03366	17	42	46	.03061	17	42	140	.06948	18	45	140	.04193	-11	48	149	.08351	-10
49	26	.02592	17	55	12	.03840	-11	57	126	.08489	-10	65	35	.05274	29	65	36	.13602	19
65	37	.10640	23	65	38	.08779	24	67	75	.04416	11	67	184	.02650	15	74	49	.02589	13
75	77	.10855	-12	78	143	.06191	24	83	143	.02902	29	84	21	.04744	13	84	90	.30441	10
84	91	.05691	12	84	94	.06678	12	84	96	.03641	13	84	98	.02657	13	84	100	.09089	11
84	116	.02917	11	84	119	.02718	14	84	120	.02509	14	84	142	.03287	14	85	89	.02520	-11
87	22	.04958	16	87	140	.05066	10	88	89	.21164	19	88	145	.02611	28	88	147	.04017	24
89	91	.02668	-13	89	147	.05937	-11	90	119	.04354	-12	90	120	.05920	-12	90	122	.02661	-11
90	130	.05020	-12	90	131	.09559	-10	95	137	.04540	-11	95	140	.05339	-11	97	93	.05997	10
97	131	.02857	13	101	10	.07468	12	101	139	.03901	10	104	14	.03244	16	104	16	.02727	15
104	17	.04121	15	105	184	.05567	12	117	136	.02914	-11	127	134	.09259	10	128	114	.09125	17
135	155	.03089	23	136	134	.12846	15	137	154	.06404	11	143	184	.03370	-81	144	184	.03209	14
145	58	.03332	11	145	183	.06701	10	149	183	.13968	-12	150	77	.05858	-11	151	26	.02856	16
151	28	.02817	10	151	41	.07525	-13	151	42	.09456	-11	151	86	.04093	-11	153	2	.05798	15
153	3	.03574	25	153	41	.04626	-10	154	69	.02501	-10	163	2	.03255	18	163	26	.06593	23
163	27	.03420	12	163	29	.04337	11	163	31	.02543	10	163	32	.03178	27	163	33	.03810	13
163	84	.05412	-11	163	143	.05603	29	163	146	.07499	-18	164	182	.05973	16	165	184	.02763	14
169	182	.13264	-11	171	135	.02507	-12	171	136	.02577	-16	172	26	.03162	18	172	146	.03932	-22
181	29	.08321	-85	181	33	.26383	-85	181	37	.02730	-86	181	72	.05543	-87	181	73	.03081	-87
181	147	.09691	-87	181	154	.16374	-86	181	155	.04192	-87	181	178	.41992	-86				

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1969
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
4	32	.07176	-16	5	1	.46135	12	5	2	.17092	20	5	3	.30833	19	5	26	.28093	16
5	30	.02534	17	8	25	.04149	-13	12	84	.13994	24	13	12	.02620	-10	15	161	.16503	12
17	59	.10592	-12	24	182	.02808	13	26	1	.12109	-10	30	182	.09170	12	32	27	.03086	10
32	67	.03064	10	32	68	.04368	10	43	140	.05327	10	45	125	.07991	10	55	12	.03840	-10
56	126	.02981	16	59	4	.02609	-17	59	5	.04102	-16	59	6	.02952	-16	59	184	.02559	-19
67	75	.04416	19	67	184	.02650	11	69	152	.03350	10	72	132	.03279	12	72	184	.02789	10
75	77	.10855	-12	83	12	.02761	-14	83	135	.04284	13	83	139	.14261	-14	83	143	.02902	-14
84	91	.05691	13	84	94	.06678	10	84	96	.03641	11	84	98	.02657	11	84	100	.09089	11
84	116	.02917	10	84	120	.02509	10	84	142	.03287	11	85	89	.02520	16	85	129	.14567	11
87	90	.02992	-11	87	136	.03122	19	92	33	.02648	10	92	67	.02998	11	92	68	.04711	10
101	139	.03901	-14	102	103	.05135	15	102	104	.03336	11	102	137	.04074	10	102	138	.02569	18
104	12	.02648	-12	108	135	.03443	11	112	139	.04822	-12	116	94	.03689	10	117	13	.05279	-10
117	102	.03032	-10	117	136	.02914	14	127	20	.07696	57	127	134	.09259	43	133	132	.06463	11
133	140	.05123	13	135	134	.04829	-22	135	155	.03089	-36	136	20	.20004	-21	136	134	.12846	-28
143	184	.03370	148	149	183	.13968	11	153	41	.04626	11	153	44	.03438	10	153	105	.02770	10
153	112	.02775	10	153	117	.02537	12	163	59	.04251	12	163	75	.03238	11	163	76	.02880	15
163	92	.02861	10	163	95	.02758	10	163	103	.03785	12	163	106	.03558	11	163	125	.04352	13
163	138	.02786	14	163	152	.04019	10	165	157	.03777	22	165	184	.02763	24	171	135	.02507	29
171	136	.02577	38	181	29	.08321	-39	181	33	.26383	-39	181	37	.02730	-35	181	72	.05543	-37
181	73	.03081	-37	181	147	.09691	-37	181	154	.16374	-38	181	155	.04192	-41	181	178	.41992	-39
181	73	.03081	-37																

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1970
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	14	3	4	.04923	28	3	5	.05704	28	3	6	.05782	25	3	7	.04991	25
3	23	.52727	10	3	37	.10542	26	4	32	.07176	27	4	35	.11129	53	5	3	.30833	-13
6	34	.15338	46	7	25	.13904	24	7	28	.19348	12	7	29	.03826	29	7	32	.32983	13
7	33	.04530	24	8	25	.04149	-28	12	84	.13994	33	13	87	.03143	16	14	160	.04816	16
14	178	.09003	10	15	161	.16503	12	26	1	.12109	13	28	25	.02504	20	28	27	.04231	24
28	29	.09121	25	28	31	.10929	15	32	2	.03945	28	32	26	.08138	29	32	27	.03086	22
32	67	.03064	32	32	68	.04368	26	33	8	.03346	33	38	39	.04475	26	40	37	.03749	-14
41	19	.02726	-25	41	42	.21984	-12	41	43	.26488	-12	41	44	.27755	-12	41	45	.09227	-19
41	46	.03309	-19	41	47	.21601	-21	41	48	.09485	-18	41	50	.03614	-22	41	140	.02886	-17
42	45	.03366	-16	42	46	.03061	-15	42	140	.06948	-13	47	48	.11349	-15	47	50	.04398	-19
47	64	.20061	-14	48	54	.03346	11	48	58	.06740	11	48	149	.08351	11	50	71	.11247	-11
55	12	.03840	-12	55	48	.03768	11	55	64	.14566	12	57	92	.04356	15	57	183	.18427	15
58	56	.03726	-13	58	57	.07298	-12	62	68	.09404	11	62	74	.29759	10	62	90	.04813	12
62	126	.16590	17	62	148	.03327	19	62	150	.04598	19	70	151	.02617	16	70	153	.03016	12
73	16	.03201	-13	73	22	.04599	-10	73	36	.03578	-12	73	76	.07757	-10	73	129	.10429	-14
73	149	.02985	-10	74	45	.04188	10	74	46	.03909	10	75	76	.20371	-17	75	77	.10855	-16
78	124	.03835	11	78	143	.06191	15	83	12	.02761	-22	83	17	.03131	-10	83	135	.04284	-20
84	21	.04744	19	84	91	.05691	19	84	94	.06678	18	84	96	.03641	20	84	98	.02657	24
84	100	.09089	15	84	116	.02917	19	84	119	.02718	16	84	120	.02509	19	84	142	.03287	20
85	129	.14567	13	86	85	.13103	-12	87	90	.02992	-15	88	89	.21164	17	88	145	.02611	27
88	147	.04017	30	90	130	.05020	11	92	30	.05207	19	92	67	.02998	22	92	68	.04711	16
95	140	.05339	15	96	94	.02515	-10	97	93	.05997	-10	97	116	.02700	-14	97	123	.02691	-12
97	131	.02857	-15	98	43	.03889	-11	98	46	.03300	-17	98	77	.02811	-20	99	122	.05587	-12
100	47	.03428	10	104	14	.03244	10	104	16	.02727	15	104	17	.04121	13	108	135	.03443	-13

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1970
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
117	135	.11136	-11	127	20	.07696	13	131	124	.03347	-13	133	132	.06463	-18	133	140	.05123	-16
133	173	.07881	-21	135	134	.04829	53	135	155	.03089	60	143	184	.03370	-56	151	28	.02817	-16
151	41	.07525	26	151	42	.09456	22	151	47	.11615	10	151	48	.04279	13	153	41	.04626	26
153	44	.03438	22	153	46	.03361	12	154	11	.08837	12	154	17	.06992	11	157	184	.02846	17
160	48	.02704	14	163	22	.03352	11	163	32	.03178	-11	163	40	.05509	12	163	43	.03378	26
163	44	.02704	27	163	45	.04079	16	163	46	.03645	16	163	47	.03022	14	163	48	.03583	17
163	50	.03506	11	163	73	.03054	12	163	75	.03238	21	163	76	.02880	11	163	77	.03612	13
163	82	.02975	10	163	83	.02826	10	163	92	.02861	15	163	93	.03279	17	163	94	.04218	11
163	95	.02758	16	163	98	.02607	17	163	99	.02738	16	163	102	.03225	15	163	103	.03785	15
163	104	.03115	12	163	105	.03671	13	163	106	.03558	11	163	107	.03661	11	163	109	.03355	10
163	110	.03070	12	163	113	.03182	14	163	115	.02641	13	163	116	.04795	12	163	118	.03225	10
163	122	.03759	11	163	123	.04018	14	163	124	.03748	12	163	125	.04352	11	163	128	.03874	10
163	130	.03986	14	163	131	.06454	10	163	132	.04491	18	163	137	.02600	11	163	138	.02786	17
163	141	.02530	11	163	142	.02747	13	163	143	.05603	15	163	146	.07499	25	163	147	.03288	11
163	148	.04307	10	163	149	.03656	11	163	150	.04035	10	163	173	.09042	12	164	18	.04059	16
164	19	.04779	15	164	173	.02874	20	165	157	.03777	18	165	184	.02763	26	166	154	.02661	20
166	180	.03349	31	168	166	.05399	-12	171	136	.02577	13	172	25	.04161	-12	172	31	.03840	-16
172	33	.05019	-12	172	34	.04022	-54	172	146	.03932	13	181	29	.08321	931	181	33	.26383	886
181	37	.02730	971	181	72	.05543	1068	181	73	.03081	1059	181	147	.09691	1048	181	154	.16374	922
181	155	.04192	1052	181	178	.41992	900	183	166	.02580	-11								

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1971
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-16	3	4	.04923	-27	3	5	.05704	-27	3	6	.05782	-25	3	7	.04991	-28
3	37	.10542	-22	4	32	.07176	-43	4	35	.11129	-34	5	3	.30833	14	6	34	.15338	-39
12	84	.13994	-20	13	12	.02620	12	13	87	.03143	-12	15	161	.16503	16	16	50	.03300	-11
16	71	.07118	-12	16	79	.07399	-11	16	81	.10661	-10	23	25	.02974	-17	23	182	.08593	-13
26	3	.06231	10	35	38	.28682	-10	35	40	.28629	-10	35	45	.05438	-17	35	73	.05113	-15
35	76	.02686	-11	35	77	.03178	-13	35	144	.05768	-15	35	150	.02512	-13	37	8	.04932	-12
37	45	.02663	-14	37	72	.12083	-11	37	77	.10127	-11	37	99	.03096	-18	38	39	.04475	16
40	37	.03749	27	40	77	.03788	18	42	44	.05093	10	42	45	.03366	11	50	71	.11247	13
51	29	.06020	-10	53	184	.03296	-11	55	12	.03840	20	55	35	.02700	13	57	92	.04356	-14
64	35	.03651	-15	64	37	.06261	-20	67	75	.04416	23	67	184	.02650	25	72	139	.06853	11
72	184	.02789	18	73	22	.04599	15	73	36	.03578	18	73	76	.07757	15	73	129	.10429	14
73	149	.02985	12	74	40	.02923	12	74	49	.02589	13	78	25	.03344	14	78	30	.03616	13
78	31	.05639	10	78	124	.03835	12	78	128	.03346	13	78	143	.06191	14	83	12	.02761	40
83	17	.03131	11	83	18	.03244	15	83	22	.10192	20	83	44	.09276	11	83	94	.09699	14
83	96	.20953	12	83	98	.11110	10	83	100	.13535	20	83	101	.10764	12	83	104	.17475	10
83	105	.12596	12	83	106	.07855	18	83	107	.11805	17	83	108	.08400	19	83	109	.09783	22
83	110	.08621	13	83	111	.18705	11	83	112	.17692	13	83	113	.08197	13	83	115	.03011	14
83	117	.09174	16	83	119	.07986	15	83	120	.10639	14	83	122	.04814	13	83	123	.08671	10
83	124	.06481	12	83	130	.05236	14	83	131	.02943	12	83	135	.04284	70	83	137	.06066	12
83	143	.02902	13	83	144	.06065	15	83	148	.03312	14	83	150	.04061	18	84	21	.04744	-40
84	90	.30441	-18	84	91	.05691	-27	84	94	.06678	-30	84	96	.03641	-31	84	98	.02657	-33
84	100	.09089	-27	84	116	.02917	-33	84	119	.02718	-29	84	120	.02509	-30	84	142	.03287	-29
85	129	.14567	-12	86	85	.13103	26	86	91	.11051	22	87	22	.04958	18	87	90	.02992	31
87	91	.08463	16	87	136	.03122	36	88	145	.02611	-11	88	147	.04017	-14	89	147	.05937	-13

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1971
(MAX IT. =6)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
90	119	.04354	-12	90	120	.05920	-12	90	122	.02661	-13	90	130	.05020	-12	90	131	.09559	-14
94	140	.06131	-14	97	93	.05997	26	97	116	.02700	33	97	123	.02691	34	97	131	.02857	37
97	132	.02777	29	97	133	.07052	12	98	43	.03889	27	98	46	.03300	24	98	77	.02811	34
101	10	.07468	10	102	103	.05135	19	102	104	.03336	21	102	137	.04074	23	102	138	.02569	13
104	12	.02648	35	108	91	.03436	-15	108	102	.02764	-22	108	104	.03306	-20	108	106	.06841	-15
108	107	.07510	-15	108	117	.03026	-16	108	135	.03443	22	116	94	.03689	17	117	102	.03032	-13
117	103	.03152	-12	117	135	.11136	36	117	136	.02914	11	120	110	.04781	10	121	106	.05201	11
121	107	.02932	10	123	140	.05880	13	128	22	.02677	17	128	127	.14551	12	128	141	.04001	13
131	124	.03347	26	133	132	.06463	41	133	140	.05123	47	133	173	.07881	39	135	134	.04829	-61
135	155	.03089	-68	136	20	.20004	-20	136	134	.12846	-20	137	154	.06404	-31	142	94	.03617	10
145	58	.03332	14	145	183	.06701	15	150	77	.05858	-10	150	184	.03609	-10	153	3	.03574	23
153	4	.04056	12	153	5	.03257	12	153	7	.11591	10	153	8	.09164	10	153	51	.02663	18
153	68	.03079	10	153	74	.03544	12	153	81	.04219	11	153	82	.02527	11	153	90	.02631	28
153	117	.02537	11	153	126	.04889	10	154	14	.03585	10	154	17	.06992	11	163	10	.02951	12
163	35	.02601	18	163	36	.05799	10	163	37	.05519	11	163	39	.03455	14	163	84	.05412	41
163	90	.03413	19	165	157	.03777	-10	165	184	.02763	-11	168	10	.03342	12	171	135	.02507	44
171	136	.02577	17	171	178	.13559	-12	172	33	.05019	-11	172	34	.04022	158	172	125	.04501	-10
172	146	.03932	-13	181	29	.08321	185	181	33	.26383	174	181	37	.02730	228	181	72	.05543	202
181	73	.03081	198	181	147	.09691	192	181	154	.16374	190	181	155	.04192	215	181	178	.41992	168
182	178	.03034	-11																

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1964
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-11	3	4	.04923	-17	3	5	.05704	-13	3	6	.05782	-14	3	7	.04991	-15
3	37	.10542	-12	4	32	.07176	-16	4	35	.11129	-11	5	2	.17092	-12	5	30	.02534	-14
6	34	.15338	22	7	25	.13904	13	7	28	.19348	16	7	29	.03826	13	7	32	.32983	11
7	33	.04530	12	10	2	.11003	22	10	4	.12902	13	10	5	.02955	18	10	7	.03826	15
10	8	.06200	18	13	87	.03143	12	23	25	.02974	-13	23	182	.08593	-11	33	8	.03346	-22
48	54	.03346	12	54	56	.09071	-11	59	5	.04102	10	70	151	.02617	-11	70	153	.03016	-12
83	138	.25766	11	85	89	.02520	11	87	21	.04211	-14	87	22	.04958	-12	87	90	.02992	-19
87	91	.08463	-15	87	95	.06666	-15	87	97	.02823	-16	87	101	.04201	-16	87	132	.06556	-15
87	136	.03122	-13	87	140	.05066	-17	101	10	.07468	16	104	12	.02648	-17	104	14	.03244	-11
104	16	.02727	-13	104	17	.04121	-12	117	135	.11136	-11	123	140	.05880	14	127	20	.07696	30
127	134	.09259	32	128	114	.09125	31	128	141	.04001	12	131	124	.03347	25	135	134	.04829	41
135	155	.03089	32	137	154	.06404	-47	144	184	.03209	11	153	3	.03574	16	163	26	.06593	12
163	138	.02786	10	163	141	.02530	19	164	173	.02874	12	164	182	.05973	16	166	154	.02661	16
171	5	.04366	12	171	136	.02577	13	172	26	.03162	11	172	34	.04022	-27	181	29	.08321	21
181	33	.26383	21	181	37	.02730	27	181	72	.05543	21	181	73	.03081	21	181	147	.09691	13
181	154	.16374	45	181	155	.04192	16	181	178	.41992	14								

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1965
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-21	3	4	.04923	-39	3	5	.05704	-38	3	6	.05782	-37	3	7	.04991	-38
3	23	.52727	-12	3	37	.10542	-42	4	32	.07176	42	4	35	.11129	18	5	1	.46135	-12
5	2	.17092	-18	5	26	.28093	-18	5	30	.02534	-22	6	34	.15338	-21	10	2	.11003	10
11	88	.03027	-11	23	25	.02974	-26	23	182	.08593	-14	26	3	.06231	12	26	27	.17698	-10
26	29	.02908	-12	28	25	.02504	-13	28	29	.09121	-10	28	31	.10929	-11	30	182	.09170	-11
35	37	.06902	10	45	140	.04193	28	49	26	.02592	18	49	27	.02824	13	51	10	.04915	11
51	24	.03477	11	60	4	.02691	10	65	36	.13602	13	65	37	.10640	23	65	38	.08779	12
78	30	.03616	10	83	143	.02902	10	84	21	.04744	-11	85	89	.02520	10	85	129	.14567	11
87	140	.05066	13	88	147	.04017	16	102	138	.02569	-12	104	12	.02648	30	104	14	.03244	31
104	16	.02727	30	104	17	.04121	28	127	134	.09259	12	128	21	.07981	24	128	22	.02677	35
128	118	.10272	22	128	125	.29274	18	128	127	.14551	16	128	131	.03050	32	128	141	.04001	25
128	170	.03552	33	131	124	.03347	-32	136	134	.12846	14	137	154	.06404	50	143	184	.03370	-76
151	26	.02856	10	151	85	.02701	-13	151	86	.04093	-11	153	2	.05798	13	153	3	.03574	36
163	2	.03255	12	163	26	.06593	12	163	35	.02601	-14	163	36	.05799	-10	163	38	.02825	-11
163	85	.13440	-11	163	118	.03225	-14	163	125	.04352	-17	163	138	.02786	-10	163	141	.02530	-13
164	18	.04059	-12	164	19	.04779	-11	164	173	.02874	-12	166	154	.02661	-11	168	10	.03342	13
171	5	.04366	11	172	26	.03162	15	172	34	.04022	64	172	125	.04501	-15	181	29	.08321	20
181	33	.26383	15	181	37	.02730	11	181	147	.09691	16	182	169	.02974	13	182	171	.03631	13
182	174	.02685	14																

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1966
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	13	3	4	.04923	35	3	5	.05704	37	3	6	.05782	35	3	7	.04991	39
3	23	.52727	12	3	37	.10542	37	4	32	.07176	-23	4	35	.11129	-21	5	1	.46135	12
5	2	.17092	20	5	26	.28093	20	5	30	.02534	34	8	25	.04149	12	10	5	.02955	10
10	7	.03826	11	10	8	.06200	12	13	12	.02620	-18	13	85	.10851	-12	13	87	.03143	-16
23	25	.02974	12	23	182	.08593	16	26	3	.06231	-11	26	29	.02908	10	28	25	.02504	10
33	8	.03346	-11	38	39	.04475	12	54	56	.09071	-12	64	37	.06261	-16	65	35	.05274	13
67	75	.04416	-13	67	184	.02650	-14	74	147	.02577	14	78	143	.06191	-10	83	143	.02902	-11
84	91	.05691	17	84	94	.06678	12	84	96	.03641	15	84	98	.02657	15	84	100	.09089	11
84	116	.02917	13	84	119	.02718	12	84	120	.02509	12	84	142	.03287	12	87	90	.02992	-12
88	145	.02611	-12	89	147	.05937	12	90	119	.04354	12	90	120	.05920	12	90	122	.02661	14
90	130	.05020	13	90	131	.09559	11	95	140	.05339	12	100	47	.03428	12	100	94	.04295	10
100	113	.02705	12	100	116	.03409	11	100	137	.03625	12	102	103	.05135	12	104	12	.02648	-17
104	14	.03244	-16	104	16	.02727	-18	104	17	.04121	-17	123	140	.05880	-26	127	20	.07696	-10
128	114	.09125	17	128	141	.04001	12	137	154	.06404	-26	143	184	.03370	277	151	26	.02856	-14
151	86	.04093	13	153	2	.05798	-10	153	3	.03574	-20	163	85	.13440	12	163	88	.05422	17
163	147	.03288	11	163	152	.04019	12	164	173	.02874	10	164	182	.05973	19	166	154	.02661	13
180	184	.02678	-12	181	29	.08321	-27	181	33	.26383	-25	181	37	.02730	-29	181	72	.05543	-25
181	73	.03081	-26	181	147	.09691	-21	181	154	.16374	-22	181	155	.04192	-23	181	178	.41992	-23
181	73	.03081	-26																

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1967
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
3	37	.10542	10	4	32	.07176	-14	5	2	.17092	-12	5	30	.02534	-10	7	33	.04530	10
8	25	.04149	-15	8	41	.15821	-12	10	2	.11003	23	10	4	.12902	13	10	5	.02955	18
10	7	.03826	18	10	8	.06200	17	11	88	.03027	-10	13	12	.02620	38	13	85	.10851	39
13	87	.03143	15	13	88	.12951	13	33	8	.03346	-16	35	38	.28682	-10	35	45	.05438	-15
35	73	.05113	-14	35	76	.02686	-16	35	77	.03178	-12	35	144	.05768	-14	35	150	.02512	-15
37	8	.04932	-17	37	45	.02663	-13	37	99	.03096	-11	38	39	.04475	38	41	140	.02886	-10
43	50	.04538	10	43	149	.02530	10	45	125	.07991	18	49	184	.06528	-13	50	71	.11247	10
53	184	.03296	24	54	56	.09071	11	55	12	.03840	10	55	13	.02528	-11	55	35	.02700	18
56	126	.02981	13	60	4	.02691	22	61	63	.03204	-10	62	68	.09404	-15	62	74	.29759	-10
62	126	.16590	-19	62	148	.03327	-19	62	150	.04598	-17	65	35	.05274	-11	65	36	.13602	-13
65	37	.10640	-15	65	38	.08779	-18	67	184	.02650	-11	70	151	.02617	13	70	154	.12068	15
72	139	.06853	14	73	36	.03578	19	74	40	.02923	22	74	45	.04188	11	74	49	.02589	15
74	67	.04862	12	74	77	.04608	15	74	144	.02740	12	78	143	.06191	-16	81	82	.02525	12
83	22	.10192	-12	83	102	.10904	-11	83	103	.14786	-12	83	117	.09174	-14	83	135	.04284	-21
83	143	.02902	-20	84	21	.04744	-16	84	90	.30441	-10	84	91	.05691	-26	84	94	.06678	-20
84	96	.03641	-19	84	98	.02657	-20	84	100	.09089	-18	84	116	.02917	-23	84	119	.02718	-22
84	120	.02509	-20	84	142	.03287	-22	85	89	.02520	-23	85	129	.14567	-18	86	91	.11051	-21
87	21	.04211	20	87	90	.02992	28	87	95	.06666	13	87	97	.02823	14	87	101	.04201	12
89	147	.05937	10	90	130	.05020	-12	98	77	.02811	13	102	103	.05135	13	102	104	.03336	23
102	137	.04074	17	102	138	.02569	24	104	16	.02727	-11	105	184	.05567	11	108	135	.03443	-16
116	94	.03689	19	117	13	.05279	36	117	91	.08699	48	117	102	.03032	43	117	103	.03152	41
117	135	.11136	27	117	136	.02914	34	123	140	.05880	36	128	21	.07981	-11	128	22	.02677	-24
128	114	.09125	-27	128	118	.10272	-14	128	125	.29274	-10	128	127	.14551	-14	128	131	.03050	-17
128	141	.04001	-21	128	170	.03552	-18	135	134	.04829	14	135	155	.03089	22	136	20	.20004	11

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R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1967
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
136	134	.12846	12	137	154	.06404	95	142	94	.03617	12	143	184	.03370	175	144	184	.03209	-16
145	58	.03332	12	150	77	.05858	10	151	13	.03895	-17	151	86	.04093	-19	153	29	.02954	10
153	41	.04626	10	153	74	.03544	14	153	90	.02631	18	154	11	.08837	-13	154	14	.03585	-14
154	17	.06992	-14	154	69	.02501	-12	163	26	.06593	12	163	29	.04337	10	163	33	.03810	13
163	35	.02601	20	163	36	.05799	18	163	37	.05519	15	163	38	.02825	11	163	39	.03455	14
163	40	.05509	15	163	74	.03348	14	163	84	.05412	27	163	85	.13440	13	163	90	.03413	18
163	125	.04352	10	163	143	.05603	-15	164	18	.04059	13	164	19	.04779	13	164	173	.02874	11
164	182	.05973	18	168	13	.05870	-12	171	52	.03919	10	171	135	.02507	-11	171	178	.13559	15
172	34	.04022	17	181	29	.08321	-53	181	33	.26383	-52	181	37	.02730	-51	181	72	.05543	-52
181	73	.03081	-55	181	147	.09691	-57	181	154	.16374	-56	181	155	.04192	-61	181	178	.41992	-53
182	178	.03034	13																

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1968
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-15	3	4	.04923	-18	3	5	.05704	-19	3	6	.05782	-18	3	7	.04991	-19
3	37	.10542	-22	4	32	.07176	-35	4	35	.11129	-42	5	1	.46135	-20	5	2	.17092	-28
5	3	.30833	-21	5	26	.28093	-26	5	30	.02534	-35	8	25	.04149	43	8	41	.15821	27
10	8	.06200	-11	12	84	.13994	12	13	12	.02620	-10	23	25	.02974	-14	24	182	.02808	-16
32	27	.03086	-10	32	67	.03064	-17	32	68	.04368	-16	33	8	.03346	-20	42	45	.03366	11
42	46	.03061	12	42	140	.06948	16	45	140	.04193	-10	49	26	.02592	16	54	56	.09071	-12
55	12	.03840	-12	65	35	.05274	25	65	36	.13602	19	65	37	.10640	23	65	38	.08779	21
67	184	.02650	14	78	143	.06191	24	83	143	.02902	26	84	21	.04744	20	84	90	.30441	11
84	91	.05691	17	84	94	.06678	16	84	96	.03641	16	84	98	.02657	17	84	100	.09089	13
84	116	.02917	16	84	119	.02718	17	84	120	.02509	18	84	142	.03287	18	85	89	.02520	-20
85	129	.14567	-10	87	22	.04958	13	88	89	.21164	18	88	145	.02611	26	88	147	.04017	25
89	91	.02668	-12	89	147	.05937	-12	90	119	.04354	-12	90	120	.05920	-11	90	122	.02661	-10
90	130	.05020	-10	92	33	.02648	11	95	137	.04540	-11	101	10	.07468	11	101	139	.03901	12
104	14	.03244	17	104	16	.02727	16	104	17	.04121	15	105	184	.05567	10	112	139	.04822	12
117	103	.03152	-10	117	135	.11136	-10	117	136	.02914	-10	135	155	.03089	19	137	154	.06404	13
143	184	.03370	-80	144	184	.03209	14	149	183	.13968	-12	151	26	.02856	11	151	41	.07525	-13
151	42	.09456	-10	153	2	.05798	12	153	3	.03574	23	153	41	.04626	-11	163	2	.03255	16
163	26	.06593	18	163	32	.03178	13	163	84	.05412	-13	163	143	.05603	26	163	146	.07499	-13
164	182	.05973	13	165	184	.02763	13	169	182	.13264	-11	171	135	.02507	-10	171	136	.02577	-10
172	26	.03162	14	172	146	.03932	-16	181	29	.08321	-85	181	33	.26383	-85	181	37	.02730	-86
181	72	.05543	-86	181	73	.03081	-86	181	147	.09691	-86	181	154	.16374	-86	181	155	.04192	-87
181	178	.41992	-85																

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R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1969
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
4	32	.07176	-12	4	35	.11129	-10	5	1	.46135	12	5	2	.17092	20	5	3	.30833	18
5	26	.28093	17	5	30	.02534	21	6	34	.15338	12	11	83	.05219	-11	12	84	.13994	12
13	12	.02620	-17	13	85	.10851	-11	17	59	.10592	-10	24	182	.02808	16	26	1	.12109	-10
43	140	.05327	10	45	125	.07991	11	56	126	.02981	18	59	4	.02609	-16	59	5	.04102	-16
59	6	.02952	-15	59	184	.02559	-18	67	75	.04416	16	67	184	.02650	12	72	132	.03279	10
72	184	.02789	11	83	138	.25766	12	83	139	.14261	-11	83	143	.02902	-12	87	136	.03122	-11
89	91	.02668	10	101	139	.03901	-12	102	103	.05135	11	102	138	.02569	23	112	139	.04822	-13
117	136	.02914	-12	120	138	.04117	11	127	20	.07696	25	127	134	.09259	33	128	114	.09125	10
131	124	.03347	19	133	132	.06463	12	133	140	.05123	14	133	173	.07881	10	135	134	.04829	-29
135	155	.03089	-27	137	154	.06404	21	143	184	.03370	145	149	183	.13968	12	151	86	.04093	13
153	126	.04889	10	163	59	.04251	11	163	76	.02880	11	163	88	.05422	14	163	103	.03785	11
163	125	.04352	11	163	138	.02786	23	163	152	.04019	10	165	157	.03777	22	165	184	.02763	24
171	135	.02507	18	172	34	.04022	-11	181	29	.08321	-38	181	33	.26383	-37	181	37	.02730	-35
181	72	.05543	-37	181	73	.03081	-38	181	147	.09691	-38	181	154	.16374	-40	181	155	.04192	-44
181	178	.41992	-39																

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1970
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	15	3	4	.04923	32	3	5	.05704	32	3	6	.05782	27	3	7	.04991	30
3	37	.10542	23	4	32	.07176	36	4	35	.11129	40	5	3	.30833	-14	6	34	.15338	43
7	25	.13904	12	7	28	.19348	10	7	29	.03826	16	7	33	.04530	10	8	41	.15821	15
12	84	.13994	22	13	12	.02620	-10	13	87	.03143	10	14	160	.04816	17	14	178	.09003	10
23	25	.02974	16	26	1	.12109	12	30	182	.09170	-12	32	2	.03945	12	32	26	.08138	15
32	27	.03086	10	32	67	.03064	17	32	68	.04368	14	33	8	.03346	32	35	45	.05438	17
35	73	.05113	14	35	77	.03178	10	35	144	.05768	12	35	150	.02512	12	37	45	.02663	10
37	99	.03096	11	38	39	.04475	33	41	19	.02726	-10	42	45	.03366	-13	42	46	.03061	-12
47	48	.11349	-10	47	50	.04398	-12	50	71	.11247	-10	53	184	.03296	-19	57	183	.18427	11
58	56	.03726	-11	62	126	.16590	11	73	36	.03578	-10	73	76	.07757	-10	74	147	.02577	10
78	143	.06191	11	83	12	.02761	-12	83	135	.04284	-17	85	129	.14567	12	87	21	.04211	-17
87	22	.04958	-13	87	90	.02992	-12	87	136	.03122	-18	88	89	.21164	16	88	145	.02611	24
88	147	.04017	27	92	30	.05207	10	92	67	.02998	11	95	140	.05339	12	98	46	.03300	-10
98	77	.02811	-15	100	113	.02705	10	104	14	.03244	10	104	16	.02727	14	104	17	.04121	13
108	91	.03436	10	108	102	.02764	11	117	13	.05279	10	117	91	.08699	11	117	102	.03032	12
117	103	.03152	12	128	131	.03050	10	128	141	.04001	10	131	124	.03347	-14	135	134	.04829	33
135	155	.03089	48	137	154	.06404	-16	143	184	.03370	-58	150	184	.03609	17	151	42	.09456	15
151	48	.04279	10	151	86	.04093	10	153	44	.03438	14	157	184	.02846	15	160	48	.02704	10
163	43	.03378	18	163	44	.02704	19	163	45	.04079	12	163	46	.03645	13	163	47	.03022	12
163	48	.03583	14	163	49	.02949	12	163	50	.03506	12	163	57	.03994	14	163	59	.04251	10
163	60	.04625	11	163	62	.03059	11	163	63	.04426	11	163	66	.02882	10	163	67	.03128	11
163	71	.08122	11	163	73	.03054	10	163	82	.02975	10	163	83	.02826	11	163	92	.02861	14
163	93	.03279	13	163	94	.04218	10	163	95	.02758	15	163	98	.02607	14	163	99	.02738	13
163	100	.02886	10	163	102	.03225	13	163	103	.03785	13	163	104	.03115	10	163	105	.03671	12

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R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1970
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
163	106	.03558	10	163	107	.03661	11	163	109	.03355	10	163	110	.03070	11	163	113	.03182	13
163	115	.02641	12	163	116	.04795	11	163	119	.02725	11	163	122	.03759	12	163	123	.04018	13
163	124	.03748	12	163	126	.02880	13	163	130	.03986	13	163	131	.06454	10	163	132	.04491	13
163	137	.02600	12	163	138	.02786	14	163	139	.06149	11	163	141	.02530	10	163	142	.02747	12
163	143	.05603	18	163	146	.07499	33	163	147	.03288	14	163	149	.03656	12	164	18	.04059	15
164	19	.04779	14	164	173	.02874	16	165	157	.03777	18	165	184	.02763	22	166	154	.02661	28
166	180	.03349	32	168	166	.05399	-12	172	33	.05019	-10	172	34	.04022	-67	172	146	.03932	18
181	29	.08321	966	181	33	.26383	911	181	37	.02730	903	181	72	.05543	995	181	73	.03081	1001
181	147	.09691	1040	181	154	.16374	973	181	155	.04192	997	181	178	.41992	890	183	166	.02580	-10
181	147	.09691	1040																

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1971
(FULL R*A*S)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-13	3	4	.04923	-25	3	5	.05704	-25	3	6	.05782	-21	3	7	.04991	-25
3	37	.10542	-23	4	32	.07176	-28	4	35	.11129	-30	5	3	.30833	13	6	34	.15338	-36
7	29	.03826	-14	7	33	.04530	-17	16	50	.03300	-12	16	71	.07118	-12	16	79	.07399	-11
16	81	.10661	-10	16	82	.05905	-10	23	25	.02974	-11	24	182	.02808	10	30	182	.09170	10
37	45	.02663	-10	37	72	.12083	-11	37	77	.10127	-10	37	99	.03096	-10	38	39	.04475	16
45	125	.07991	-12	50	71	.11247	10	64	37	.06261	-10	65	35	.05274	12	65	37	.10640	11
67	75	.04416	18	67	184	.02650	29	73	22	.04599	12	83	21	.02987	-17	83	135	.04284	47
84	21	.04744	-31	84	91	.05691	-15	84	94	.06678	-14	84	96	.03641	-16	84	98	.02657	-17
84	100	.09089	-13	84	116	.02917	-16	84	119	.02718	-15	84	120	.02509	-15	84	142	.03287	-15
86	85	.13103	26	86	91	.11051	33	87	21	.04211	-17	87	136	.03122	17	88	145	.02611	-10
88	147	.04017	-12	89	147	.05937	-13	90	119	.04354	-11	90	120	.05920	-10	90	122	.02661	-12
90	131	.09559	-12	94	140	.06131	-12	102	103	.05135	13	102	104	.03336	13	102	137	.04074	13
102	138	.02569	10	104	12	.02648	18	108	91	.03436	-23	108	102	.02764	-24	108	104	.03306	-24
108	106	.06841	-19	108	107	.07510	-19	108	117	.03026	-20	108	135	.03443	10	117	13	.05279	-13
117	91	.08699	-11	117	102	.03032	-13	117	103	.03152	-13	117	135	.11136	27	123	140	.05880	15
128	22	.02677	23	128	118	.10272	10	128	127	.14551	12	128	131	.03050	13	128	141	.04001	13
131	124	.03347	10	135	134	.04829	-55	135	155	.03089	-60	136	20	.20004	-10	137	154	.06404	-32
143	184	.03370	14	145	58	.03332	12	145	183	.06701	11	153	3	.03574	18	153	25	.03043	12
153	90	.02631	18	153	94	.03206	12	153	105	.02770	10	153	112	.02775	10	153	117	.02537	15
153	139	.05911	10	163	22	.03352	10	163	84	.05412	16	163	90	.03413	10	163	146	.07499	-10
165	157	.03777	-11	168	10	.03342	11	168	109	.02984	11	171	135	.02507	43	171	136	.02577	14
171	178	.13559	-13	172	34	.04022	230	172	146	.03932	-13	181	29	.08321	190	181	33	.26383	179
181	37	.02730	207	181	72	.05543	195	181	73	.03081	193	181	147	.09691	190	181	154	.16374	189
181	155	.04192	225	181	178	.41992	168	182	178	.03034	-11								

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R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1964
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-16	3	4	.04923	-25	3	5	.05704	-20	3	6	.05782	-21	3	7	.04991	-23
3	37	.10542	-17	4	32	.07176	-22	4	35	.11129	-13	5	1	.46135	-10	5	2	.17092	-20
5	26	.28093	-15	5	30	.02534	-24	6	34	.15338	21	7	25	.13904	19	7	28	.19348	29
7	29	.03826	22	7	32	.32983	15	7	33	.04530	20	10	2	.11003	42	10	4	.12902	27
10	5	.02955	36	10	7	.03826	30	10	8	.06200	29	13	87	.03143	16	23	25	.02974	-19
23	182	.08593	-15	26	3	.06231	10	26	29	.02908	-11	28	25	.02504	-19	28	27	.04231	-12
28	29	.09121	-18	28	31	.10929	-16	32	26	.08138	12	33	8	.03346	-20	48	53	.11991	10
48	54	.03346	16	48	56	.21178	14	49	26	.02592	12	53	184	.03296	-24	54	56	.09071	-11
55	35	.02700	10	59	5	.04102	13	59	6	.02952	12	70	151	.02617	-16	70	153	.03016	-17
83	138	.25766	12	84	21	.04744	14	85	89	.02520	20	85	129	.14567	16	87	21	.04211	-12
87	22	.04958	-11	87	90	.02992	-19	87	91	.08463	-16	87	95	.06666	-14	87	97	.02823	-15
87	101	.04201	-15	87	132	.06556	-14	87	136	.03122	-11	87	140	.05066	-16	90	120	.05920	10
90	122	.02661	10	97	132	.02777	10	101	10	.07468	23	104	12	.02648	-18	104	14	.03244	-10
104	16	.02727	-13	104	17	.04121	-12	108	102	.02764	10	108	104	.03306	10	117	135	.11136	-11
123	140	.05980	13	127	20	.07696	28	127	134	.09259	30	128	114	.09125	23	128	118	.10272	-11
128	125	.29274	-10	128	127	.14551	-12	128	131	.03050	-15	128	170	.03552	-10	131	124	.03347	26
135	134	.04829	43	135	155	.03089	34	137	154	.06404	-47	143	184	.03370	10	151	59	.03977	-10
151	85	.02701	-16	151	86	.04093	-10	153	2	.05798	12	153	3	.03574	30	163	10	.02951	12
163	26	.06593	17	163	138	.02786	10	163	141	.02530	19	164	173	.02874	13	164	182	.05973	17
166	154	.02661	16	168	10	.03342	11	171	5	.04366	16	171	71	.02511	12	171	136	.02577	15
171	166	.04279	10	171	169	.02824	10	171	176	.02766	11	171	180	.11564	11	172	11	.02752	11
172	26	.03162	24	172	30	.07083	10	172	31	.03840	11	172	34	.04022	-22	172	54	.03325	12
172	125	.04501	10	172	146	.03932	14	181	29	.08321	19	181	33	.26383	17	181	37	.02730	27
181	72	.05543	18	181	73	.03081	18	181	154	.16374	39	181	155	.04192	12	181	178	.41992	11
181	72	.05543	18																

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1965
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-23	3	4	.04923	-37	3	5	.05704	-35	3	6	.05782	-35	3	7	.04991	-35
3	23	.52727	-12	3	37	.10542	-38	4	32	.07176	30	5	1	.46135	-19	5	2	.17092	-29
5	3	.30833	-17	5	26	.28093	-28	5	30	.02534	-36	6	34	.15338	-19	7	25	.13904	-13
7	29	.03826	-10	7	32	.32983	-10	7	33	.04530	-14	10	2	.11003	20	11	88	.03027	-11
16	79	.07399	-11	16	82	.05905	-10	23	25	.02974	-21	23	182	.08593	-10	26	27	.17698	-15
26	29	.02908	-18	28	25	.02504	-17	28	27	.04231	-11	28	29	.09121	-14	28	31	.10929	-15
30	182	.09170	-12	32	2	.03945	13	32	26	.08138	15	45	125	.07991	10	45	140	.04193	28
49	26	.02592	28	49	27	.02824	17	51	10	.04915	10	60	4	.02691	13	65	37	.10640	15
83	143	.02902	11	85	89	.02520	18	85	129	.14567	18	87	132	.06556	10	87	140	.05066	13
88	147	.04017	15	90	122	.02661	11	90	130	.05020	10	90	131	.09559	10	92	68	.04711	-10
102	138	.02569	-12	104	12	.02648	28	104	14	.03244	33	104	16	.02727	32	104	17	.04121	29
111	106	.05371	-10	127	134	.09259	10	128	21	.07981	18	128	22	.02677	28	128	118	.10272	18
128	125	.29274	15	128	127	.14551	12	128	131	.03050	26	128	141	.04001	19	128	170	.03552	27
131	124	.03347	-32	136	134	.12846	14	137	154	.06404	43	143	184	.03370	-76	151	13	.03895	-12
151	26	.02856	13	151	55	.03640	-10	151	59	.03977	-10	151	85	.02701	-19	151	86	.04093	-15
151	139	.03386	-10	153	2	.05798	16	153	3	.03574	37	153	117	.02537	-10	154	14	.03585	10
156	15	.05574	-12	157	184	.02846	21	163	2	.03255	16	163	26	.06593	17	163	35	.02601	-13
163	36	.05799	-11	163	38	.02825	-12	163	40	.05509	-10	163	85	.13440	-16	163	88	.05422	-10
163	90	.03413	-10	163	109	.03355	-10	163	113	.03182	-10	163	118	.03225	-15	163	125	.04352	-17
163	128	.03874	-10	163	129	.03314	-12	163	138	.02786	-12	163	141	.02530	-14	163	152	.04019	-10
164	18	.04059	-14	164	19	.04779	-13	164	173	.02874	-14	166	154	.02661	-12	168	10	.03342	15
171	5	.04366	11	172	26	.03162	23	172	30	.07083	11	172	34	.04022	53	172	125	.04501	-13
181	29	.08321	22	181	33	.26383	17	181	37	.02730	11	181	147	.09691	16	182	169	.02974	11
182	171	.03631	12	182	174	.02685	11												

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1966
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	15	3	4	.04923	34	3	5	.05704	38	3	6	.05782	35	3	7	.04991	39
3	23	.52727	11	3	37	.10542	40	4	32	.07176	-34	4	35	.11129	-32	5	1	.46135	11
5	2	.17092	17	5	26	.28093	20	5	30	.02534	31	8	25	.04149	23	8	41	.15821	12
10	4	.12902	14	10	5	.02955	17	10	7	.03826	18	10	8	.06200	19	12	84	.13994	-12
13	12	.02620	-21	13	85	.10851	-14	13	87	.03143	-19	13	88	.12951	-11	23	25	.02974	16
23	182	.08593	18	26	3	.06231	-12	33	8	.03346	-15	41	140	.02886	10	54	56	.09071	-12
64	37	.06261	-17	65	35	.05274	13	66	175	.02909	-12	67	75	.04416	-18	67	184	.02650	-16
74	147	.02577	13	83	143	.02902	-11	84	21	.04744	10	84	91	.05691	20	84	94	.06678	13
84	96	.03641	17	84	98	.02657	18	84	100	.09089	13	84	116	.02917	14	84	119	.02718	14
84	120	.02509	14	84	142	.03287	14	85	89	.02520	-10	85	129	.14567	-11	87	21	.04211	-12
87	90	.02992	-14	88	145	.02611	-14	89	147	.05937	11	90	119	.04354	14	90	120	.05920	15
90	122	.02661	17	90	130	.05020	16	90	131	.09559	13	95	140	.05339	12	100	47	.03428	17
100	94	.04295	14	100	113	.02705	16	100	116	.03409	15	100	137	.03625	16	102	103	.05135	11
104	12	.02648	-15	104	14	.03244	-15	104	16	.02727	-16	104	17	.04121	-16	108	135	.03443	11
123	140	.05880	-27	127	20	.07696	-11	128	114	.09125	17	128	141	.04001	13	128	170	.03552	12
137	154	.06404	-30	143	184	.03370	274	151	5	.02896	-11	151	7	.04237	-10	151	26	.02856	-16
151	41	.07525	-14	151	42	.09456	-11	151	47	.11615	-10	151	86	.04093	13	151	139	.03386	-10
153	2	.05798	-12	153	3	.03574	-21	153	90	.02631	-11	156	15	.05574	-10	157	184	.02846	-10
163	32	.03178	11	163	35	.02601	14	163	85	.13440	17	163	88	.05422	21	163	103	.03785	10
163	129	.03314	10	163	147	.03288	12	163	152	.04019	13	164	182	.05973	18	166	154	.02661	13
171	178	.13559	10	180	184	.02678	-13	181	29	.08321	-26	181	33	.26383	-24	181	37	.02730	-27
181	72	.05543	-23	181	73	.03081	-24	181	147	.09691	-21	181	154	.16374	-24	181	155	.04192	-22
181	178	.41992	-24	183	166	.02580	-12												

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1967
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-17	2	23	.09497	-19	3	4	.04923	-17	3	5	.05704	-10	3	7	.04991	-10
4	32	.07176	-24	4	35	.11129	-13	5	2	.17092	-18	5	30	.02534	-10	7	33	.04530	13
10	2	.11003	41	10	4	.12902	30	10	5	.02955	40	10	7	.03826	40	10	8	.06200	37
13	12	.02620	24	13	85	.10851	32	14	178	.09003	10	23	182	.08593	-10	32	2	.03945	-17
32	27	.03086	-10	32	67	.03064	-10	33	8	.03346	-21	35	38	.28682	-10	35	45	.05438	-18
35	73	.05113	-16	35	76	.02686	-14	35	77	.03178	-11	35	144	.05768	-17	35	150	.02512	-17
37	8	.04932	-25	37	45	.02663	-17	37	72	.12083	-10	37	77	.10127	-10	37	99	.03096	-16
38	39	.04475	35	45	125	.07991	21	48	145	.02962	-11	49	36	.03655	14	49	183	.19869	-10
49	184	.06528	-13	51	24	.03477	-12	53	172	.10156	10	53	184	.03296	32	55	35	.02700	24
56	126	.02981	17	60	4	.02691	15	61	17	.03733	-11	61	57	.05483	-10	61	63	.03204	-14
62	68	.09404	-17	62	74	.29759	-10	62	90	.04813	-10	62	126	.16590	-21	62	148	.03327	-20
62	150	.04598	-19	65	35	.05274	-15	65	36	.13602	-17	65	37	.10640	-19	65	38	.08779	-21
67	184	.02650	-13	70	151	.02617	13	70	154	.12068	14	72	139	.06853	15	73	36	.03578	23
73	76	.07757	11	74	40	.02923	19	74	49	.02589	11	74	77	.04608	15	75	76	.20371	-15
75	77	.10855	-12	78	143	.06191	-22	81	82	.02525	12	83	18	.03244	-10	83	22	.10192	-13
83	102	.10904	-12	83	103	.14786	-13	83	117	.09174	-15	83	135	.04284	-22	83	143	.02902	-20
84	21	.04744	-15	84	90	.30441	-10	84	91	.05691	-24	84	94	.06678	-20	84	96	.03641	-18
84	98	.02657	-19	84	100	.09089	-17	84	116	.02917	-22	84	119	.02718	-20	84	120	.02509	-19
84	142	.03287	-21	85	89	.02520	-27	85	129	.14567	-20	86	85	.13103	-12	86	91	.11051	-26
87	21	.04211	19	87	90	.02992	27	87	95	.06666	12	87	97	.02823	13	87	101	.04201	12
88	89	.21164	11	88	145	.02611	10	88	147	.04017	11	89	147	.05937	10	90	130	.05020	-12
98	77	.02811	18	101	10	.07468	14	102	103	.05135	13	102	104	.03336	23	102	137	.04074	18
102	138	.02569	25	104	16	.02727	-11	105	184	.05567	10	108	117	.03026	-10	108	135	.03443	-18
116	94	.03689	17	117	13	.05279	41	117	91	.08699	49	117	102	.03032	44	117	103	.03152	42

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1967
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
117	135	.11136	26	117	136	.02914	34	123	140	.05880	36	128	21	.07981	-12	128	22	.02677	-25
128	114	.09125	-28	128	118	.10272	-15	128	125	.29274	-11	128	127	.14551	-15	128	131	.03050	-18
128	141	.04001	-22	128	170	.03552	-18	135	134	.04829	15	135	155	.03089	24	136	20	.20004	11
136	134	.12846	12	137	154	.06404	91	142	94	.03617	13	143	184	.03370	170	144	184	.03209	-19
145	58	.03332	14	150	77	.05858	12	151	5	.02896	-12	151	7	.04237	-12	151	13	.03895	-15
151	59	.03977	-10	151	86	.04093	-13	153	3	.03574	11	153	29	.02954	10	153	51	.02663	11
153	74	.03544	18	153	90	.02631	18	154	11	.08837	-11	154	14	.03585	-12	154	17	.06992	-13
154	69	.02501	-10	156	15	.05574	-10	157	184	.02846	17	163	10	.02951	15	163	26	.06593	11
163	33	.03810	13	163	35	.02601	25	163	36	.05799	22	163	37	.05519	19	163	38	.02825	15
163	39	.03455	16	163	40	.05509	18	163	74	.03348	16	163	75	.03238	17	163	77	.03612	13
163	84	.05412	24	163	85	.13440	16	163	90	.03413	17	163	125	.04352	11	163	143	.05603	-14
164	18	.04059	16	164	19	.04779	17	164	173	.02874	15	164	182	.05973	21	168	4	.13435	-13
168	10	.03342	11	168	13	.05870	-10	171	52	.03919	12	171	135	.02507	-11	171	157	.02957	10
171	178	.13559	16	172	34	.04022	18	172	174	.02628	-10	181	29	.08321	-54	181	33	.26383	-53
181	37	.02730	-50	181	72	.05543	-52	181	73	.03081	-55	181	147	.09691	-58	181	154	.16374	-57
181	155	.04192	-62	181	178	.41992	-55												

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1968
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-11	3	4	.04923	-17	3	5	.05704	-19	3	6	.05782	-19	3	7	.04991	-20
3	37	.10542	-22	4	32	.07176	-38	4	35	.11129	-43	5	1	.46135	-29	5	2	.17092	-38
5	3	.30833	-33	5	26	.28093	-37	5	30	.02534	-49	8	25	.04149	28	8	41	.15821	13
10	4	.12902	-12	10	5	.02955	-14	10	7	.03826	-14	10	8	.06200	-15	12	84	.13994	11
23	25	.02974	-14	23	182	.08593	-10	24	182	.02808	-17	26	27	.17698	-15	26	29	.02908	-19
28	25	.02504	-10	32	27	.03086	-12	32	67	.03064	-22	32	68	.04368	-20	33	8	.03346	-20
38	39	.04475	-10	41	19	.02726	12	41	45	.09227	10	41	46	.03309	11	41	47	.21601	10
41	48	.09485	11	41	50	.03614	14	41	140	.02886	14	42	43	.05741	14	42	44	.05093	13
42	45	.03366	20	42	46	.03061	21	42	140	.06948	24	45	140	.04193	-10	49	26	.02592	20
54	56	.09071	-12	55	12	.03840	-14	55	89	.07667	-11	62	90	.04813	-17	62	126	.16590	-10
62	148	.03327	-11	62	150	.04598	-10	65	35	.05274	18	65	36	.13602	13	65	37	.10640	18
65	38	.08779	14	67	184	.02650	13	78	143	.06191	30	83	143	.02902	28	84	21	.04744	27
84	90	.30441	16	84	91	.05691	23	84	94	.06678	22	84	96	.03641	22	84	98	.02657	24
84	100	.09089	19	84	116	.02917	23	84	119	.02718	25	84	120	.02509	25	84	142	.03287	25
85	89	.02520	-18	86	91	.11051	-10	87	22	.04958	13	88	89	.21164	22	88	145	.02611	33
88	147	.04017	30	89	91	.02668	-12	89	147	.05937	-11	90	119	.04354	-12	90	120	.05920	-12
90	122	.02661	-10	90	130	.05020	-11	92	33	.02648	12	95	137	.04540	-12	98	43	.03889	-10
101	10	.07468	10	101	139	.03901	13	104	14	.03244	18	104	16	.02727	18	104	17	.04121	16
105	184	.05567	13	108	135	.03443	-10	112	139	.04822	12	128	21	.07981	-10	128	127	.14551	-10
135	155	.03089	21	137	154	.06404	12	143	184	.03370	-80	144	184	.03209	12	149	183	.13968	-12
151	26	.02856	19	151	41	.07525	-15	151	42	.09456	-15	153	2	.05798	22	153	3	.03574	32
153	41	.04626	-12	153	44	.03438	-11	153	90	.02631	-10	157	184	.02846	-16	163	2	.03255	24
163	26	.06593	26	163	27	.03420	13	163	32	.03178	11	163	84	.05412	-18	163	143	.05603	25
163	146	.07499	-15	164	182	.05973	13	165	157	.03777	10	165	184	.02763	19	172	26	.03162	24
172	146	.03932	-16	181	29	.08321	-86	181	33	.26383	-86	181	37	.02730	-87	181	72	.05543	-86
181	73	.03081	-87	181	147	.09691	-87	181	154	.16374	-86	181	155	.04192	-87	181	178	.41992	-86
181	73	.03081	-87																

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1969
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
4	32	.07176	-22	4	35	.11129	-19	5	2	.17092	13	5	3	.30833	10	5	26	.28093	10
6	34	.15338	12	11	83	.05219	-15	12	84	.13994	15	13	12	.02620	-25	13	85	.10851	-18
13	87	.03143	-19	13	88	.12951	-11	24	182	.02808	14	26	1	.12109	-13	26	3	.06231	-11
26	29	.02908	-11	43	18	.02722	12	43	50	.04538	14	43	140	.05327	14	43	149	.02530	13
45	125	.07991	14	49	59	.03881	10	55	12	.03840	-11	56	126	.02981	21	59	4	.02609	-24
59	5	.04102	-22	59	6	.02952	-22	59	184	.02559	-27	60	4	.02691	-11	62	90	.04813	-13
67	75	.04416	12	83	138	.25766	12	83	139	.14261	-10	83	143	.02902	-12	87	136	.03122	-11
89	91	.02668	13	89	147	.05937	11	101	139	.03901	-11	102	103	.05135	10	102	138	.02569	22
112	139	.04822	-13	117	136	.02914	-12	120	138	.04117	14	127	20	.07696	23	127	134	.09259	31
131	124	.03347	16	133	132	.06463	12	133	140	.05123	14	133	173	.07881	10	135	134	.04829	-28
135	155	.03089	-27	137	154	.06404	18	143	184	.03370	143	151	13	.03895	11	151	59	.03977	10
151	86	.04093	21	163	32	.03178	10	163	35	.02601	14	163	36	.05799	11	163	37	.05519	12
163	38	.02825	12	163	40	.05509	11	163	59	.04251	17	163	60	.04625	12	163	62	.03059	12
163	63	.04426	11	163	68	.04345	10	163	74	.03348	12	163	76	.02880	12	163	83	.02826	10
163	85	.13440	10	163	88	.05422	20	163	103	.03785	12	163	106	.03558	10	163	125	.04352	14
163	126	.02880	12	163	138	.02786	24	163	152	.04019	11	165	157	.03777	27	165	184	.02763	29
171	4	.02535	11	171	5	.04366	13	171	135	.02507	18	171	159	.02780	10	171	166	.04279	10
172	34	.04022	-14	181	29	.08321	-41	181	33	.26383	-40	181	37	.02730	-37	181	72	.05543	-40
181	73	.03081	-40	181	147	.09691	-41	181	154	.16374	-43	181	155	.04192	-48	181	178	.41992	-42
181	73	.03081	-40																

I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1970
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
3	4	.04923	30	3	5	.05704	32	3	6	.05782	26	3	7	.04991	28	3	23	.52727	10
3	37	.10542	25	4	32	.07176	39	4	35	.11129	48	6	34	.15338	37	7	29	.03826	10
8	25	.04149	15	8	41	.15821	28	12	84	.13994	26	13	87	.03143	14	14	160	.04816	39
14	178	.09003	27	17	59	.10592	16	23	25	.02974	15	26	1	.12109	11	26	29	.02908	12
30	182	.09170	-13	32	2	.03945	18	32	26	.08138	21	32	27	.03086	19	32	67	.03064	30
32	68	.04368	27	33	8	.03346	41	35	45	.05438	14	35	73	.05113	10	37	45	.02663	10
38	39	.04475	30	41	19	.02726	-19	41	45	.09227	-13	41	46	.03309	-14	41	47	.21601	-12
41	48	.09485	-13	41	50	.03614	-16	41	140	.02886	-10	42	43	.05741	-13	42	44	.05093	-13
42	45	.03366	-20	42	46	.03061	-21	42	140	.06948	-17	50	71	.11247	-12	53	184	.03296	-18
55	12	.03840	-12	55	89	.07667	-11	58	56	.03726	-12	58	57	.07298	-10	58	183	.06530	-10
59	6	.02952	-12	74	45	.04188	10	78	143	.06191	13	83	12	.02761	-13	83	44	.09276	12
83	135	.04284	-17	84	91	.05691	12	84	94	.06678	11	84	96	.03641	13	84	98	.02657	15
84	116	.02917	12	84	119	.02718	12	84	120	.02509	11	84	142	.03287	13	85	129	.14567	10
87	21	.04211	-16	87	22	.04958	-13	87	90	.02992	-14	87	91	.08463	-10	87	136	.03122	-19
88	89	.21164	26	88	145	.02611	43	88	147	.04017	43	90	130	.05020	10	92	30	.05207	11
92	67	.02998	15	92	68	.04711	12	95	140	.05339	15	98	77	.02811	-12	100	47	.03428	15
100	113	.02705	11	100	137	.03625	10	108	102	.02764	10	117	91	.08699	11	117	102	.03032	12
117	103	.03152	12	120	138	.04117	10	131	124	.03347	-14	135	134	.04829	33	135	155	.03089	48
143	184	.03370	-58	150	184	.03609	13	151	42	.09456	21	153	11	.07293	11	153	41	.04626	14
153	44	.03438	26	153	46	.03361	14	153	50	.05790	12	153	51	.02663	14	153	61	.03407	10
153	66	.02870	11	153	67	.02865	11	153	71	.05039	13	153	82	.02527	11	153	105	.02770	11
153	112	.02775	11	153	126	.04889	13	153	139	.05911	11	157	184	.02846	28	158	166	.02621	-10
163	43	.03378	25	163	44	.02704	25	163	45	.04079	16	163	46	.03645	14	163	47	.03022	16
163	48	.03583	15	163	49	.02949	12	163	50	.03506	12	163	57	.03994	14	163	59	.04251	10

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1970
(PRICE ADJ.)

ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
163	60	.04625	12	163	62	.03059	12	163	63	.04426	12	163	66	.02882	10	163	67	.03128	11
163	71	.08122	12	163	73	.03054	11	163	75	.03238	12	163	82	.02975	10	163	92	.02861	13
163	93	.03279	12	163	95	.02758	13	163	98	.02607	12	163	99	.02738	12	163	102	.03225	12
163	103	.03785	12	163	105	.03671	10	163	113	.03182	11	163	115	.02641	11	163	116	.04795	10
163	119	.02725	10	163	122	.03759	11	163	123	.04018	12	163	124	.03748	11	163	126	.02880	13
163	130	.03986	12	163	132	.04491	12	163	137	.02600	10	163	138	.02786	13	163	139	.06149	10
163	141	.02530	10	163	142	.02747	11	163	143	.05603	18	163	146	.07499	35	163	147	.03288	10
163	148	.04307	10	163	149	.03656	11	164	18	.04059	15	164	19	.04779	15	164	173	.02874	15
165	157	.03777	24	165	184	.02763	26	166	154	.02661	30	166	180	.03349	31	168	14	.02768	-10
168	166	.05399	-13	171	52	.03919	11	171	71	.02511	10	171	176	.02766	11	172	25	.04161	-10
172	33	.05019	-11	172	34	.04022	-72	172	146	.03932	18	180	184	.02678	-11	181	29	.08321	934
181	33	.26383	887	181	37	.02730	897	181	72	.05543	994	181	73	.03081	995	181	147	.09691	985
181	154	.16374	971	181	155	.04192	953	181	178	.41992	824	182	178	.03034	-17	183	166	.02580	-14
181	154	.16374	971																

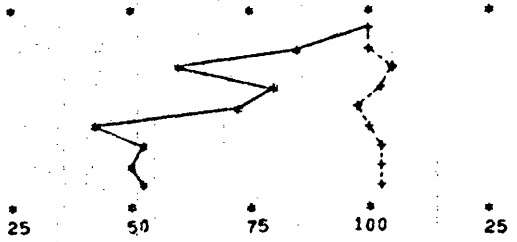
I*N*F*O*R*U*M 1963-1971 R*A*S ROW AND COLUMN ADJUSTMENT FACTORS OF A-MAT BALA DATE 103173 PAGE

R*A*S COEFFICIENT CHANGES (DC.GT.10%) IN YEAR 1971
(PRICE ADJ.)

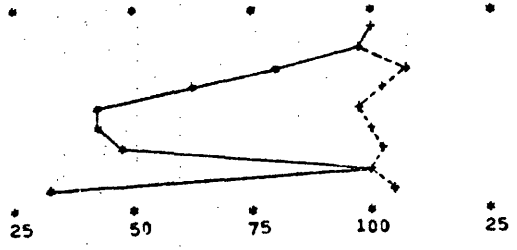
ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC	ROW#	COL#	COEF.	%DC
2	10	.15740	-20	2	23	.09497	-13	3	4	.04923	-24	3	5	.05704	-23	3	6	.05782	-18
3	7	.04991	-24	3	37	.10542	-21	4	32	.07176	-21	4	35	.11129	-20	5	3	.30833	12
6	34	.15338	-36	7	29	.03826	-10	7	33	.04530	-13	8	41	.15821	-12	13	12	.02620	13
13	88	.12951	10	16	50	.03300	-14	16	71	.07118	-13	16	79	.07399	-12	16	81	.10661	-12
16	82	.05905	-11	23	25	.02974	-13	24	182	.02808	11	30	182	.09170	14	37	45	.02663	-10
38	39	.04475	15	41	19	.02726	13	41	45	.09227	10	41	46	.03309	10	41	140	.02886	15
42	140	.06948	13	45	125	.07991	-10	49	26	.02592	-10	49	183	.19869	-11	51	29	.06020	-10
55	89	.07667	17	65	35	.05274	10	67	75	.04416	18	67	184	.02650	29	73	22	.04599	13
83	12	.02761	11	83	21	.02987	-13	83	22	.10192	11	83	108	.08400	10	83	135	.04284	55
84	21	.04744	-35	84	90	.30441	-12	84	91	.05691	-20	84	94	.06678	-21	84	96	.03641	-23
84	98	.02657	-24	84	100	.09089	-18	84	116	.02917	-22	84	119	.02718	-22	84	120	.02509	-21
84	142	.03287	-21	86	85	.13103	31	86	91	.11051	36	87	21	.04211	-17	87	90	.02992	11
87	136	.03122	15	88	89	.21164	-19	88	145	.02611	-30	88	147	.04017	-30	89	91	.02668	-10
89	147	.05937	-14	90	119	.04354	-15	90	120	.05920	-14	90	122	.02661	-16	90	130	.05020	-11
90	131	.09559	-16	94	140	.06131	-12	97	93	.05997	-10	102	103	.05135	12	102	104	.03336	13
102	137	.04074	13	104	12	.02648	19	108	91	.03436	-23	108	102	.02764	-26	108	104	.03306	-25
108	106	.06841	-21	108	107	.07510	-21	108	117	.03026	-22	108	135	.03443	11	117	13	.05279	-14
117	102	.03032	-11	117	103	.03152	-12	117	135	.11136	32	121	106	.05201	13	121	107	.02932	13
123	140	.05880	14	128	22	.02677	19	128	131	.03050	10	131	124	.03347	10	135	134	.04829	-55
135	155	.03089	-61	136	20	.20004	-10	137	154	.06404	-29	143	184	.03370	13	153	3	.03574	17
153	25	.03043	12	153	74	.03544	11	153	82	.02527	10	153	90	.02631	26	153	94	.03206	14
153	105	.02770	12	153	112	.02775	12	153	117	.02537	16	153	139	.05911	12	156	15	.05574	-15
163	10	.02951	13	163	22	.03352	11	163	84	.05412	25	163	90	.03413	16	164	182	.05973	10
165	157	.03777	-14	165	184	.02763	-12	166	154	.02661	10	168	10	.03342	15	168	109	.02984	11
171	135	.02507	53	171	136	.02577	19	171	178	.13559	-13	172	33	.05019	-10	172	34	.04022	298
172	146	.03932	-12	181	29	.08321	193	181	33	.26383	182	181	37	.02730	214	181	72	.05543	202
181	73	.03081	203	181	147	.09691	211	181	154	.16374	203	181	155	.04192	235	181	178	.41992	166
182	178	.03034	-18	183	166	.02580	-11												

LIMITED CONVERGENCE

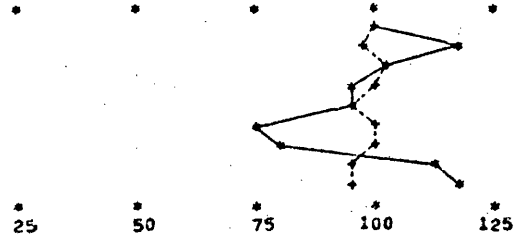
PLOT OF R(*) AND S(+) FACTORS



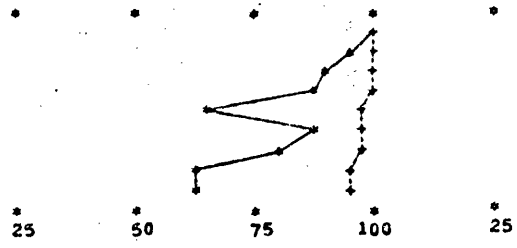
PLOT OF R(*) AND S(+) FACTORS



PLOT OF R(*) AND S(+) FACTORS

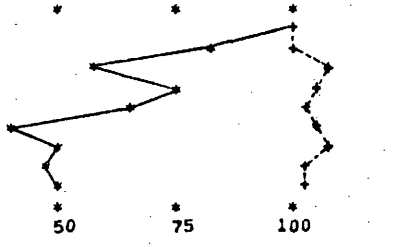


PLOT OF R(*) AND S(+) FACTORS

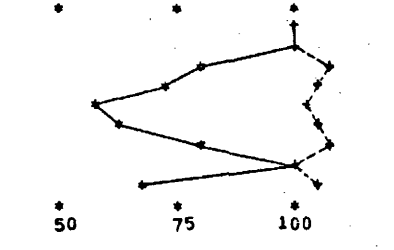


FULL RAS IN VALUE TERMS

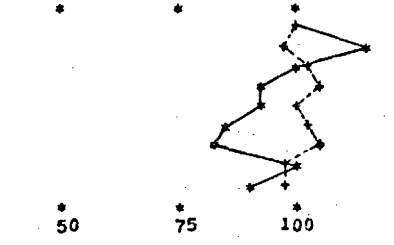
SEC# 5 GRAINS



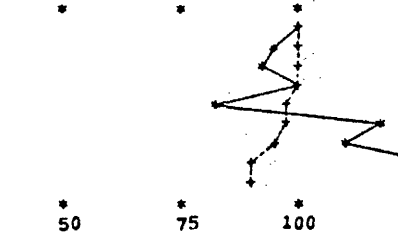
SEC# 6 TOBACCO



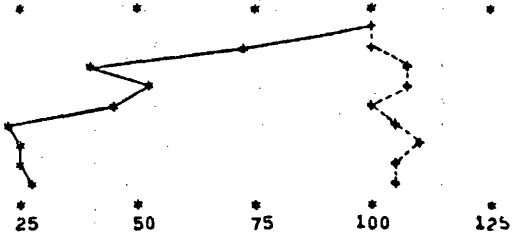
SEC# 7 FRUITS, VEGETABLES, AND OTHER

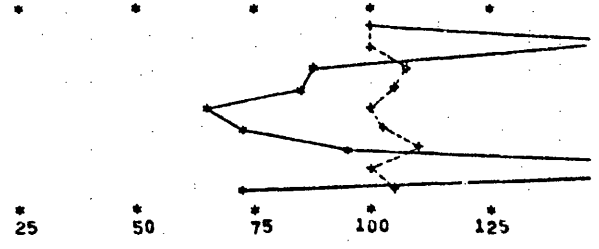


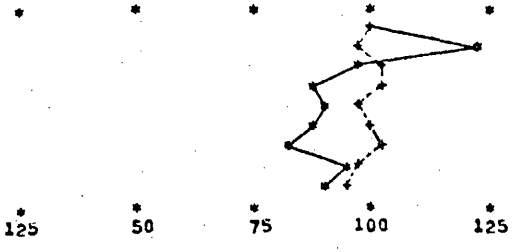
SEC# 8 FORESTRY AND FISHERY PRODUCTS

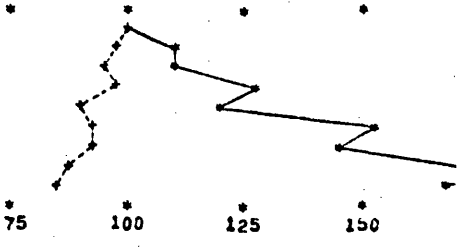


FULL RAS IN VOLUME TERMS









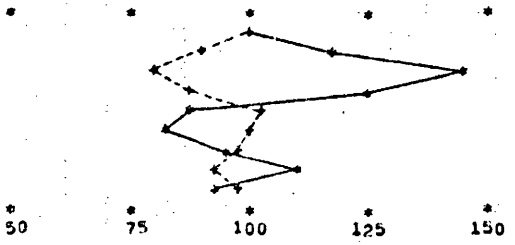
LIMITED CONVERGENCE

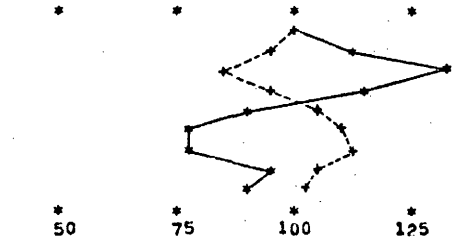
FULL RAS IN VALUE TERMS

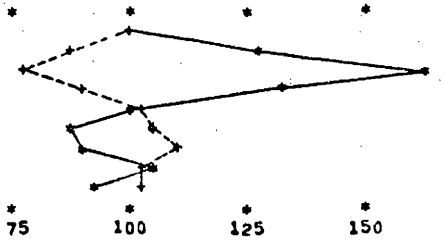
FULL RAS IN VOLUME TERMS

PLOT OF R(*) AND S(+) FACTORS

SEC# 85 LEAD

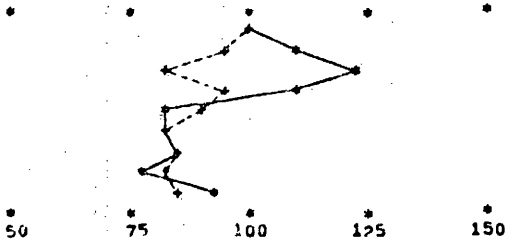


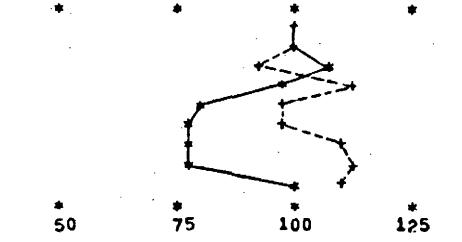


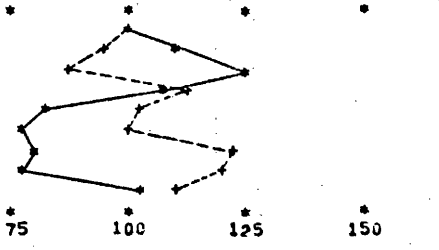


PLOT OF R(*) AND S(+) FACTORS

SEC# 86 ZINC

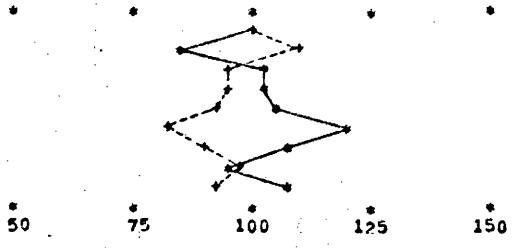


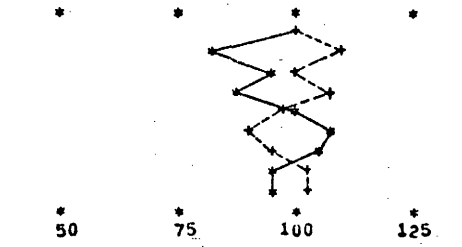


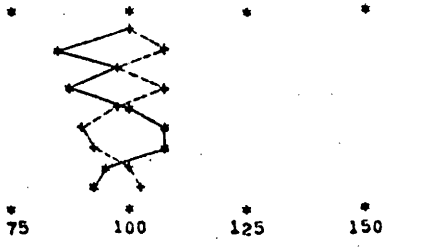


PLOT OF R(*) AND S(+) FACTORS

SEC# 87 ALUMINUM

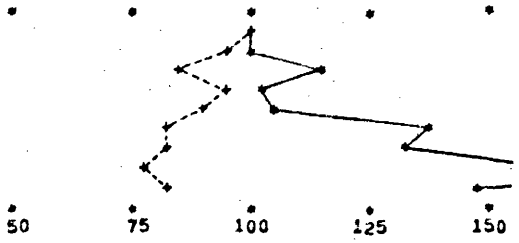


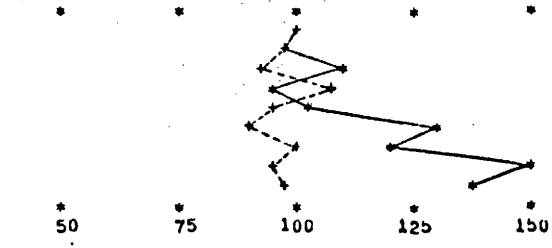


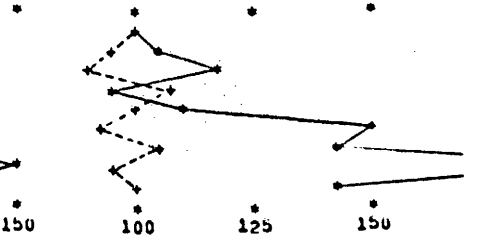


PLOT OF R(*) AND S(+) FACTORS

SEC# 88 PRIMARY NON-FERROUS METALS, N







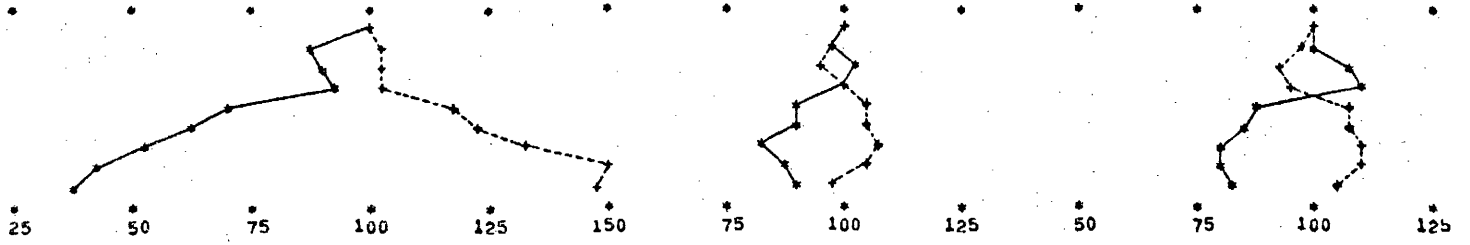
LIMITED CONVERGENCE

FULL RAS IN VALUE TERMS

FULL RAS IN VOLUME TERMS

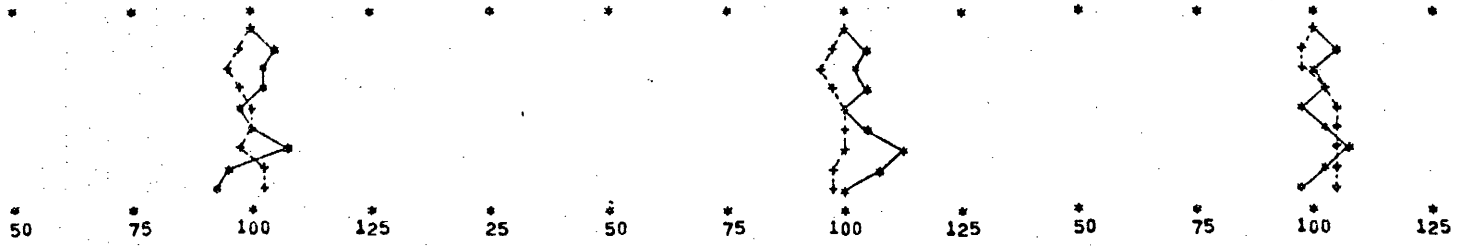
PLOT OF R(*) AND S(+) FACTORS

SEC# 75 INDUSTRIAL LEATHER PRODUCTS A



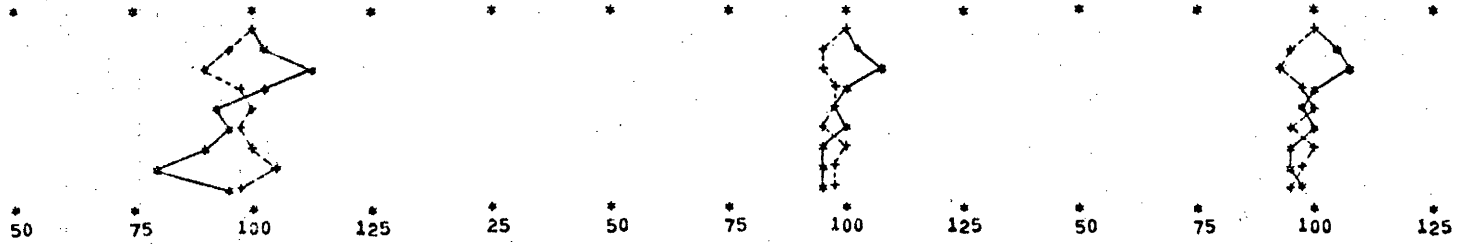
PLOT OF R(*) AND S(+) FACTORS

SEC# 82 OTHER STONE AND CLAY PRODUCTS



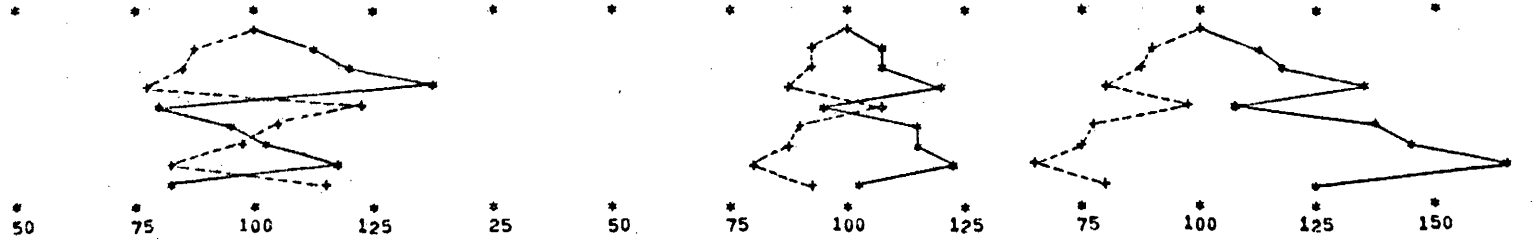
PLOT OF R(*) AND S(+) FACTORS

SEC# 83 STEEL



PLOT OF R(*) AND S(+) FACTORS

SEC# 84 COPPER

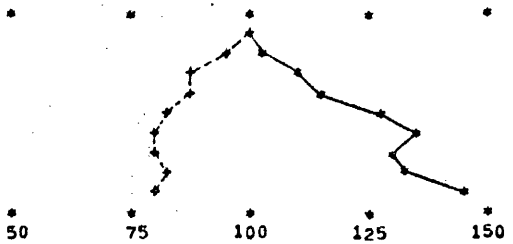


LIMITED CONVERGENCE

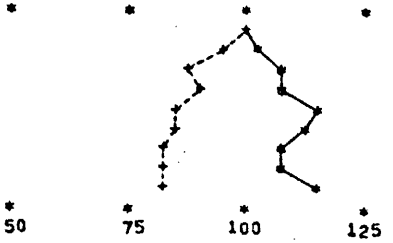
FULL RAS IN VALUE TERMS

FULL RAS IN VOLUME TERMS

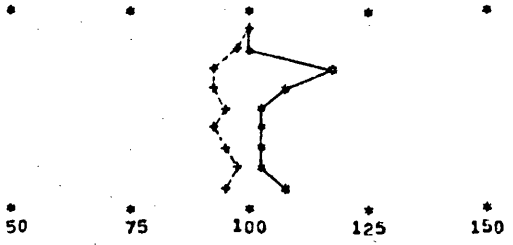
PLOT OF R(*) AND S(*) FACTORS



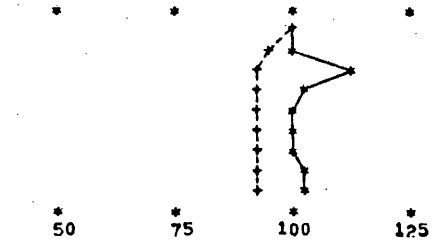
SECT 121 INDUSTRIAL CONTROLS

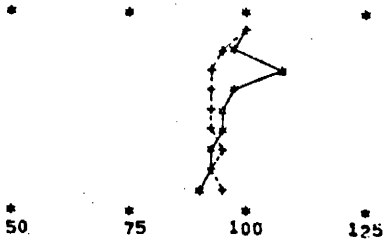


PLOT OF R(*) AND S(*) FACTORS

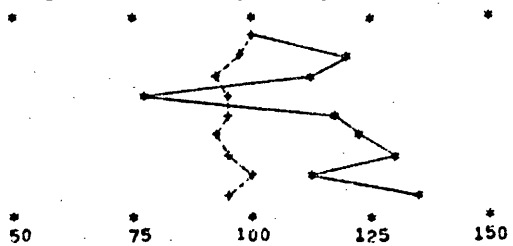


SECT 122 WELDING APPARATUS AND GRAPHIT

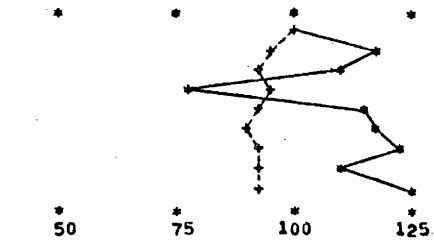


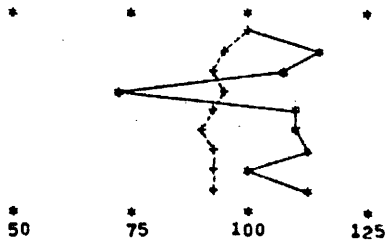


PLOT OF R(*) AND S(*) FACTORS

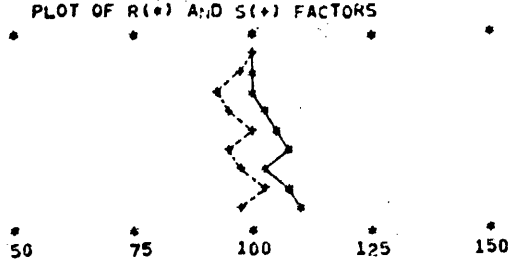


SECT 123 HOUSEHOLD APPLIANCES

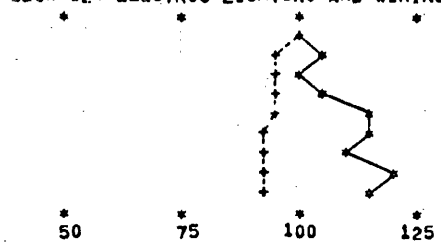


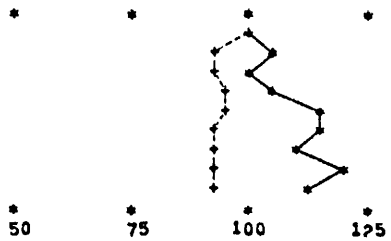


PLOT OF R(*) AND S(*) FACTORS



SECT 124 ELECTRIC LIGHTING AND WIRING





CHAPTER III

SIMULATION WITH THE CONSUMPTION FUNCTIONS

Personal consumption expenditures (PCE) in the INFORUM model depend on disposable income, the relative price level, population age structure, and time trend; but PCE is not a function of output. This fact makes it possible to test the forecasting performance of the PCE equations without considering the output effect of the model. The testing of the other stochastic final demand equations--which do depend on outputs--will, of course, require not only the testing with known outputs, but also a simulation with calculated outputs of the I-O model to determine the size of feedback error generated within the model.

Total consumer expenditures are by far the largest component of final demand. They account for over 65 percent of Gross National Product (GNP) or total final demand. The PCE-share of GNP has been fairly constant during the past two decades, but this constant relationship is no indication for the stability of the PCE composition. For example, in 1951 only 34 percent of total consumer expenditures went into the purchase of services, while today more than 40 percent of the consumer budget is used on this category. There are a large number of other noticeable shifts; the relative share of durable goods, for example, increased from 13 percent to 18 percent while the share of food decreased from 28 percent to 21 percent of the total PCE during the past 20 years.[1]

The shifts in the way consumers spend their income are even more visible

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[1] U.S. Department of Commerce (66).

if one identifies 133 PCE-items, as we do in the INFORUM model, for the model to be tested has one PCE-equation for each of the 133 (out of 185) products bought by consumers. The instability of the PCE composition at this level of detail makes greater demands on the INFORUM consumption functions than are made on consumption equations of macro-economic models where total PCE is identified by only three or four sectors. That is, the 133 consumption equations of the INFORUM model must not only predict the expenditure growth resulting from changes in personal income; but, more importantly, they must forecast trends in consumer buying habits. Changes in consumer attitude are, of course, of particular interest to the users of the model. Although, the forecast of total PCE via 133 stochastic regression equations seems to be more difficult than the prediction of it with just one or a few equations, the disaggregation into 133 PCE-items has one major advantage: it removes most of causality from consumption to income, from dependent to independent variable. This "simultaneity" is a common problem with aggregated consumption functions.

At the beginning of this study the model used the standard consumption equation introduced in Chapter I for the estimation of all 133 PCE items. With the large number of equations used in the INFORUM model, there is an obvious desire to restrict each final demand component to just one or a few basic equations for all sectors. Only the estimation of construction expenditures by 28 types requires a number of different equations.[1]

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[1]The estimation experience of the construction sectors is discussed by Horwitz (29).

A. Aim of the Simulation Tests

The standard INFORUM consumption function is estimated under a number of restrictive assumptions. One of the aims of this simulation is therefore to determine whether or not an unconstrained model would have performed better. The basic questions to be answered are then the following:

(1) INFORUM imposes an income elastitcity from cross-section data on the time-series equations. Is this imposition justified, or would not a completely unconstrained time-series estimation (OLS) of the income elasticity provide better regression results and give a more reasonable forecast?

(2) If the time-series income elasticity equation proves to be preferable, what type of equation would, at least for the period 1964-70, have given the best forecasting performance?

(3) If the cross-section income elasticity equation proves to be preferable, would not an adjustment to the elasticity (stemming from the 1961 BLS-Survey) be necessary to account for possible changes in consumer purchasing habits?[1] By how much will this adjustment, if found to be necessary, improve the forecasting performance of the equations in future years?

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[1]U.S. Department of Labor, Bureau of Labor Statistics (69).

(4) Is the observed change in consumption pattern caused mainly by a preference change of consumers, or can the proportional change of the population in specific age groups, caused by slower population growth, explain at least some of the changes?

(5) Which sectors, if any, seem to require a different type of regression equation?

(6) Does a post regression auto-correlation adjustment prove useful?

(7) Does a declining weight scheme, which assures a better fit in the more recent years of the estimation period, improve the forecasting performance (and what is the effect of it on the serial correlation adjustment)?

B. Habit and Impulse as Alternative Consumption Functions

As an alternative to the INFORUM consumption function, we tested also the predictive performance of an auto-regressive model. Consumer demand equations using the level of past expenditures as one of the explanatory variables (auto-regressive or dynamic model) were successfully tested by Houthakker and Taylor, in a study of consumer behavior for the

U.S. Bureau of Labor Statistics.[1] In evaluating their regression and simulation results, the authors wrote:

> "We feel that the empirical results have justified our initial enthusiams for the dynamic model, ... of 83 regression equations estimated..., 72 are dynamic,... The results ... show the dynamic model to even better advantage. In addition, use of the dynamic model has largely sidestepped the problems associated with auto-correlation..."

The appeal as well as the danger of employing auto-regressive models for forecasting is well known by model builders. R. L. Cooper noted that a simple auto-regressive model would out-perform large scale econometric models.[2] However, he compared only a one period forecast, while the concensus on this subject is that forecasts of auto-regressive models deteriorate quickly as one lengthens the forecasting horizon.[3]

The two types of equations to be tested are then the standard INFORUM consumption function, which we may call "impulse" and a variation of the Houthakker-Taylor equations, called "habit".

$$\text{IMPULSE:} \quad C_t = a_1 + a_2 Y_t + a_3 P_t + a_4 t + a_5 \Delta Y_t$$

$$\text{HABIT:} \quad C_t = a_1 + a_2 Y_t + a_3 P_t + a_4 C_{t-1} + a_5 \Delta Y_t$$

---

[1] Houthakker and Taylor (31), pp. 10-15, and 195.

[2] Cooper (18), pp. 918, 19.

[3] Hickman (27), p. 13.

Although these two equations look alike, they have an important difference. By the former, the consumer makes his expenditure decision on impulse, based only on current information. In the latter equation, consumers are strongly influenced by a habit formation. The real difference between the two equations is that "impulse" responds very quickly (and sometimes over overreacts for $a_5 > 0$) to any change in income or price, while "habit" allows for only a slow expenditure adjustment. With the regression results of sector 35, Broad and narrow fabrics, the difference in consumer behavior theory of the two equations is demonstrated in Figure III-1.[1]

As this graph shows, both "impulse" and "habit" produce a long-term ten percent rise in spending in response to a one-time ten percent rise in income. But "impulse", after initially overshooting, reaches the full effect in two years while it takes the habit equation forever to respond fully to the change in income.

The initial simulation test involved the following five equations:

(1) The impulse time series income elasticity equation "IMP-TS" Here, the estimation of the equations was constrained only by non-positivity condition of the price elasticity.

(2) The standard INFORUM impulse cross section equation "IMP-CS" based on the 1961 BLS-Survey. A number of different constraints

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[1] The price term dropped out of the equations because of the non-positivity constraint on the price elasticity.

Impulse: $C_t^I = 0.10 + 0.0015Y_t + 0.0030dY_t$

Habit: $C_t^H = -0.10 + 0.0005Y_t + 0.75C_{T-1}^H$

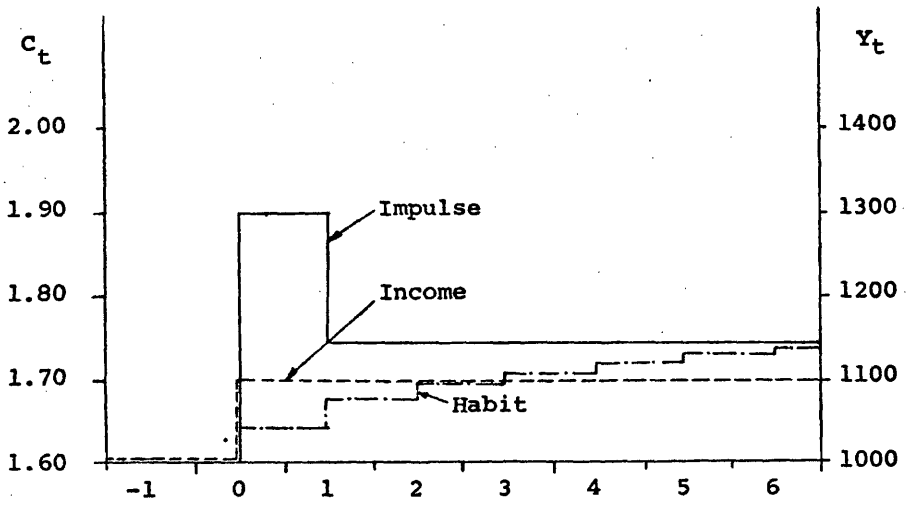

Figure III-1: Forecast Comparison between Impulse and Habit Equations

were imposed on the estimation of those equations to assure sensible regression results, namely:

(a) non-positive price elasticity

(b) the change income coefficient must be less negative than the income coefficient:

$$-a_5 < a_2 = \eta_y (C/Y)_{1961}, \text{ for } a_5 < 0.$$

(c) to assure a closer current period fit, a declining weight scheme has been attached to the time series. The two most recent years have a weight of 1.0; before that it declines exponentially at five percent per year over the preceding years.[1]

(3) The standard equation with age adjustment "IMP-CSAGE". This is the same as the preceding equation subject to the same conditions, except this equation uses the "age-adjusted population" in the estimation.

(4) The habit time series equation "HAB-TS". The only constraint on the estimation of this equation is again the non-positive price elasticity.

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[1] The declining weight scheme, of course, must be considered as an additional constraint to the ordinary least-squares (OLS) estimate of the above equations. Note, post.OLS regression adjustment to a coefficient is easily accomplished by using the matrix of partial derivatives of the estimated coefficients, see Appendix III-a.

(5) The habit cross-section equation "HAB-CS". This is the same as the preceding equation subject to the same conditions, except it uses the predetermined income coefficient.

C. Analysis of the Simulation Results

The simulation results of the 55 most important PCE-sectors are summarized in the first 5 columns of Table III-1. The entries in each column show the root mean square percentage error (RMSPE) of the simulation period 1964-1970, for the 5 different ways of fitting these equations to the 1947-1963 data.[1] In these simulation tests, actual data on disposable income, PCE-prices, and population were used. The habit equation, however, had to use its own predicted lagged expenditure variable.

1. Habit versus Impulse and Cross-Section versus Time Series Income Elasticity Estimations

Returning to the above seven basic questions, we can learn from these initial simulations that the preference given to the cross-section income elasticity was only partially justified. Although IMP-TS had about twice the forecasting error of IMP-CS, the time series equation produced better forecasts for 15 out of the 55 sectors. Moreover, HAB-TS out-performed IMP-TS by 40 to 15 which rates the performance of HAB-TS almost even with IMP-CS. Here the score was 30 to 25 in favor of IMPULSE. The two habit

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[1]The root mean square percentage error shown in Tables III-1 through III-5 is calculated by:

$$RMSPE_i = 100\left[\sum_{t=1}^{T} \frac{(C_{it} - \hat{C}_{it})^2}{C_{it}} / (T-t+1)\right]^{1/2}; \quad i = 1, 2, \ldots, 185.$$

Where t refers to the first year and T to the last year of the simulation.

Table III-1:

SIMULATION RESULTS OF THE 55 MOST IMPORTANT PCE-SECTORS

SEC#	OUTPUT SECTOR	IMP-TS	IMP-CS	IMP-CSAGE	HAB-TS	HAB-CS	SEARCH	IMP-CHOIC	IMP-CHAGE	HAB-CHOIC	WINNER
2	POULTRY AND EGGS	4.7	7.3	7.6	4.6	11.8	4.2	7.4	7.7	11.1	4
7	FRUITS, VEGETABLES, AND	9.5	8.9	9.1	31.8	13.5	2.9	3.0	2.7	19.5	8
23	MEAT PRODUCTS	9.2	6.2	5.8	11.9	4.4	3.4	3.4	3.4	8.2	8
24	DAIRY PRODUCTS	5.7	11.6	11.4	4.7	14.3	8.5	7.8	7.7	6.8	4
25	CANNED AND FROZEN FOODS	16.2	8.4	7.5	17.7	9.4	2.3	4.3	3.7	7.3	8
26	GRAIN MILL PRODUCTS	17.4	7.8	8.6	20.3	21.3	5.2	5.1	5.4	17.5	7
27	BAKERY PRODUCTS	14.6	12.2	11.8	13.2	10.4	7.4	8.4	8.2	4.4	9
29	SUGAR	6.8	7.5	7.7	15.7	14.5	6.8	7.4	7.6	6.4	9
29	CONFECTIONERY PRODUCTS	31.0	11.3	11.9	10.4	9.6	2.0	2.1	2.0	5.4	8
30	ALCOHOLIC BEVERAGES	6.7	1.7	1.7	23.2	7.9	1.6	1.8	1.7	8.6	8
31	SOFT DRINKS AND FLAVORI	31.6	8.8	9.3	19.2	19.5	3.3	3.5	3.7	6.7	7
32	FATS AND OILS	12.5	6.2	6.4	5.1	12.8	4.1	4.0	4.6	7.0	8
33	MISC FOOD PRODUCTS	4.2	16.7	15.6	34.5	3.2	12.6	12.6	11.6	3.1	9
34	TOBACCO PRODUCTS	36.1	16.9	16.2	8.6	2.6	12.6	11.8	11.3	1.7	9
35	BROAD AND NARROW FABRIC	19.0	7.0	6.4	3.6	8.1	5.3	5.3	5.3	6.9	4
36	FLOOR COVERINGS	19.1	16.2	17.2	15.6	13.3	8.3	15.7	16.7	12.7	9
38	KNITTING	21.8	12.7	13.7	13.1	14.5	8.0	10.4	11.2	10.8	7
39	APPAREL	13.1	4.7	4.1	3.9	6.0	3.9	3.9	3.8	3.8	9
40	HOUSEHOLD TEXTILES	22.4	3.8	4.3	5.4	5.2	3.5	3.5	3.9	4.9	7
45	HOUSEHOLD FURNITURE	48.8	5.3	5.0	16.5	8.3	1.6	2.1	2.0	7.2	8
49	PAPER PRODUCTS, NEC	21.4	6.5	5.7	32.1	7.1	3.3	4.1	3.7	3.7	9
52	NEWSPAPERS	10.7	5.5	6.0	6.4	2.3	2.1	2.1	2.2	2.4	7
53	PERIODICALS	31.1	5.1	4.8	9.6	8.1	2.9	3.7	3.5	11.3	8
66	DRUGS	6.8	13.1	13.5	2.1	17.4	3.0	3.0	3.0	10.3	4
67	CLEANING AND TOILET PRE	27.1	10.5	11.1	5.8	3.4	2.9	3.0	3.0	15.5	8
69	PETROLEUM REFINING AND	24.9	3.5	3.5	5.1	1.9	3.4	3.4	3.4	5.8	5
72	TIRES AND INNER TUBES	17.7	6.3	6.5	8.6	10.0	4.9	4.7	4.7	5.3	8
73	RUBBER PRODUCTS	41.7	9.1	9.1	13.3	11.8	1.5	1.7	1.8	4.8	7
76	LEATHER FOOTWEAR	34.3	2.6	2.4	5.3	16.9	2.3	2.3	2.3	13.9	8
77	OTHER LEATHER PRODUCTS	24.5	5.5	5.6	2.8	6.8	4.5	4.6	4.2	4.1	4
123	HOUSEHOLD APPLIANCES	38.4	12.5	12.8	11.3	13.5	2.5	2.5	2.7	2.7	7
125	RADIO AND TV RECEIVING	39.3	21.6	21.8	9.9	19.1	9.1	16.0	16.3	19.6	4
133	MOTOR VEHICLES AND PART	62.2	12.6	12.6	21.8	17.6	11.0	12.2	12.2	10.2	9
140	TRAILER COACHES	20.5	34.8	35.1	22.1	36.6	17.8	34.7	35.1	26.9	1
147	JEWELRY AND SILVERWARE	48.3	11.4	11.7	37.5	8.3	2.0	5.6	6.0	14.9	7
148	TOYS, SPORTING GOODS, M	5.0	11.8	10.4	35.7	10.3	4.2	9.3	8.1	8.0	1
152	BUSSES	11.5	17.5	16.0	8.2	10.1	1.5	11.3	9.8	5.2	9
155	AIRLINES	18.1	15.9	16.2	6.0	33.8	7.5	15.2	15.5	30.8	8
159	TELEPHONE AND TELEGRAPH	9.9	6.4	6.5	3.8	15.3	2.6	2.6	2.7	21.5	7
160	ELECTRIC UTILITIES	2.9	6.9	6.0	2.9	15.0	2.5	4.1	3.5	11.2	8
161	NATURAL GAS	20.5	16.9	15.6	31.5	4.3	9.5	16.6	15.5	4.9	5
162	WATER AND SEWER SERVICE	4.0	13.9	13.4	12.6	1.5	5.6	15.3	14.8	3.0	5
164	RETAIL TRADE	4.6	5.6	5.7	21.1	38.5	.8	.8	.9	28.4	7
165	CREDIT AGENCIES AND BRO	16.1	4.0	4.3	4.0	6.3	3.3	3.3	3.3	4.7	8
166	INSURANCE AND BROKER'S	26.7	13.1	12.1	18.9	10.3	1.2	8.1	7.2	1.1	9
167	OWNER-OCCUPIED DWELLING	3.1	14.7	13.5	8.6	5.3	.7	3.7	2.1	5.6	8
168	REAL ESTATE	7.8	1.5	1.2	5.1	17.5	1.5	1.5	1.2	11.7	8
169	HOTEL AND LODGING PLACE	6.1	12.4	11.9	18.2	4.5	2.0	6.9	6.6	5.2	5
170	PERSONAL AND REPAIR SER	9.2	12.6	12.0	7.5	5.4	2.4	4.0	3.6	2.8	9
171	BUSINESS SERVICES	37.4	4.7	4.3	4.6	3.9	3.2	3.2	3.4	4.1	7
173	AUTO REPAIR	4.4	15.0	14.9	16.5	12.6	2.2	7.4	7.5	1.5	9
174	MOTION PICTURES AND AMU	16.8	15.1	14.9	6.1	4.0	1.5	1.6	1.5	5.2	8
175	MEDICAL SERVICES	20.1	3.0	3.4	2.4	7.1	1.2	1.2	1.4	8.7	7
176	PRIVATE SCHOOLS AND NON	15.6	16.8	16.3	5.8	15.8	1.1	10.6	10.4	14.6	4
177	POST OFFICE	6.9	5.2	4.7	5.8	2.5	3.0	3.9	3.4	2.7	5
	TOTAL WEIGHTED ERROR	17.2	9.7	9.4	10.4	9.9	3.4	5.4	5.1	8.1	

equations showed about an equal performance, HAB-TS had a slight advantage in score (31 to 34), while HAB-CS produced a somewhat smaller average error (9.9% to 10.4%).[1] The age adjustment had but a little effect on the simulation results. In short, HABIT out-classed IMPULSE on a time series elasticity comparison, but IMP-CS showed the best overall results.

Next we had to ask ourselves what can be learned from the simulation results which, in turn, could improve the forecasting ability of the INFORUM consumption equations. Any average error above ten percent was felt to be excessive. But all five equations tested showed, for a large number of sectors, a RMSPE above ten percent; and the weighted RMSPE of only the cross-section elasticity equations were just slightly below ten percent. The large forecasting errors were recorded despite post regression auto-correlation adjustments.[2] The following is a more detailed analysis of the simulation test. In particular we shall attempt to improve the forecasting performance of the equations by varying the cross-section income elasticity to account for possible structural changes.

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[1] $$\text{Weighted RMSPE} = \left(\sum_{i=1}^{185} \text{RMSPE}_i * \sum_{t=1}^{T} C_{it}\right) \Big/ \sum_{i=1}^{185}\left(\sum_{t=1}^{T} C_{it}\right)$$

where t = 1 in the first year of the simulation and T is the number of years in the test period.

[2] The adjustment was only made for first order auto-correlation. In simulating forecasts with the OBE econometric model, Green found the first order adjustment to be adequate (26). Hence, the adjusted predicted value of consumer expenditures is found by

$$\hat{C}_t^* = \hat{C}_t + \rho^t (C_o - \hat{C}_o).$$

Where t = 1 in the first year of the simulation and ρ is the estimated auto-correlation coefficient derived from the Durbin-Watson (DW) statistics by $\rho = 1 - DW/2$. Because the error term serial correlation is naturally larger for IMPULSE than for HABIT, the improvement in efficiency should be greater for the former.

Although HAB-TS out-performed IMP-TS, neither performed very well. The latter in particular seemed to have difficulty in separating the effects of an income change from changes in taste. This result, however, is actually reinforcing the preference given to the cross-section elasticity.[1] The HAB-TS produced the better forecast because it was not asked to make the distinction between the two effects. Both equations, however, failed drastically to predict the change in consumption spendings caused by the sharp rise in income during the simulation period.

We have purposely chosen the 1964-1970 period for the initial simulation since the income growth rate was about three times what it had been in the previous decade. By making the test harder, we felt the results would be more conclusive. With the high income growth and adjusted consumer buying habits, the standard INFORUM equation performed best. But there were large forecasting errors in some important consumption sectors such as:

- Miscellaneous Food Products (16.7%)
- Tobacco Products (16.9%)
- Radio and T.V. (21.6%)
- Bus Transportation (17.5%)

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[1]As explained, the INFORUM model builders prefer the IMP-CS equation if all equations perform equally well.

- Air Travel (15.9%)
- Natural Gas (16.9%)
- Automobile Repair (15.0%)
- Motion Pictures (15.1%)
- Private Schools (16.8%)

These errors, and the fact that IMP-TS out-performed IMP-CS in 15 sectors, suggests that perhaps we can learn more from the simulation about the income elasticity than we may know from the BLS-Survey. There are at least three reasons for suspecting the CS elasticities: (1) The family budget survey conducted by the BLS is now over ten years old, and the income elasticity for a large number of products is likely to change during one decade; (2) The analysis of the survey data for a number of products, particularly food items, was hampered by statistical problems with small samples; (3) The product identification used by the survey did not always correspond to the sectoring plan of the INFORUM model.[1]

A sector-by-sector analysis of the IMP-CS simulations revealed that with the imposed elasticity a large number of equations predicted consistently either too much or too little response to the income boom of the sixties.[2] Initiated by the above results, we re-run the test by letting the simulation

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[1]In particular the Service Sectors were inadequately identified. See INFORUM Sectoring Plan (Appendix II-a) and BLS Survey (69).

[2]The root mean square error approach measures the size of average absolute error only. It does not reveal any consistency of either over or under predicting. A sort of average error approach may be more appropriate in this particular case.

decide whether or not the predetermined income elasticities should be changed. We applied the same estimating procedure as listed under (2) above, except we now searched by an iterative process for the optimum value of a_2. That is, we started the regression with the initial value of a_2 (as derived from the BLS cross-section elasticity); but then searched for a new value of a_2, say a_2^*, until we found the equation with the lowest simulation error.[1] Consequently, the value of a_2 is not found by a repeated OLS estimate of it, but rather its value is determined by the simulation fit of the equation.

The search simulation was conducted with and without the declining weight scheme as well as with and without the post regression rho-adjustment. The use of the search elasticity improved the forecast by almost threefold as indicated by the total weighted error (compare columns 2 and 6).

If we had full confidence in the data, particularly the PCE-series used, we probably would have fully accepted the search-simulation results with the new elasticities. But considering the way the PCE-data are generated (see in Chapter II the explanation of the constant PCE-share assumption at the 5-digit product detail and the treatment of Floor-Coverings and Small Arms), one cannot accept the search results without further investigation. In addition to the data problems, we suspected that the search elasticities would reflect, besides changes in taste, other effects such as supply constraints, product changes,

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[1] To avoid unexplainable results, we constrained the new search elasticity of each item to $0 < \eta_y^* = a_2^* (C/Y)_{1961} < 5$.

introduction of new products and the replacement of old ones. Consequently, each sector required individual examination and judgment to find a sensible elasticity as the best measure of consumer response to true economic changes. The chosen elasticities, labeled "CHOICE", as well as the other elasticities, are shown in Table III-6.

The simulation results with CHOICE applied to IMPULSE and HABIT are shown in columns 7 and 9 of Table III-1, respectively. The total weighted forecasting error of IMP-CHOIC is about half the IMP-CS error and less than one-third of the IMP-TS error. The results of IMP-CS almost satisfy our pre-imposed conditions. Only 12 sectors recorded a RMSPE of over 10 percent with half of them over 15 percent. Most of the large forecasting errors could be explained, however, after some further investigations for possible causes. The results of this investigation are summarized in Table III-1a (see also simulation plots in Appendix III-b). In short, we found at least five reasons for the unsatisfactory performance of the above 12 equations: (1) data problems (sectors 33 and 36); (2) introduction of new products (38, 125, 140, and 155); (3) limited supply conditions (161 and 162); (4) need for a different type consumption equation (133 and possibly 125 and 140); and (5) other external effects such as the ban on T.V. advertising resulting from possible health hazards of cigarette smoking (34), public need for urban transportation (152), and improved conditions of public schools (176).

The forecasts of IMPULSE with the choice elasticities imposed are

Table III-1a:
Impulse PCE-Equations with Large Simulation Errors

SECT. NO.	PRODUCT TITLE	η_Y	η_P	R^2	D.W.	RMSE (mil$)	RMSPE (%)	REASON FOR LARGE ERROR
33*	Miscellaneous Foods	0.10 (0.40)	-0.35	0.98	1.62	598.	12.6	Residual sector, strongly affected by reclassification
34*	Tobacco	0.00 (0.35)	-0.84	0.91	1.20	707.	11.8	Scare effect from illness (cancer) threats
36*	Floor Coverings	1.85 (1.85)	-0.99	0.86	0.96	279.	15.7	PCE-share adjustment (Chap.II) appears to be inadequate
38	Knitting	1.50 (1.19)	0.00	0.97	1.72	152.	10.4	Introduction of double-knits, (1967-1971)
125	Radio and TV	1.70 (0.61)	-1.35	0.94	1.30	530.	16.0	Introduction of color TV, (1965-1969)
133*	Motor Vehicles	1.00 (1.13)	-0.42	0.75	2.22	2297.	12.2	Probably requires a stock adjustment equation
140*	Trailer Coaches	1.80 (1.80)	-0.72	0.91	1.81	592.	34.7	Introduction of mobile homes, may require a new equation
152*	Bus Transportation	0.50 (0.20)	0.00	0.95	1.19	315.	11.3	Decline in railroad services, emphasis on urban transport
155	Air Travel	2.00 (1.90)	-0.02	0.99	1.37	433.	15.2	Introduction of jet-travel with reduction in fares
161*	Natural Gas	0.75 (0.75)	-0.29	0.99	1.07	808.	16.6	Limited supply conditions, (1965-1971)
162*	Water & Sewer	0.75 (0.75)	-1.25	0.94	0.76	298.	15.3	Limited supply conditions, (1965-1971)

now far better than the forecasts produced by either of the two habit equations. The score between IMP-CHOIC and HAB-CS is 47 to 8 in favor of IMPULSE. Nevertheless, to assure the same basis of comparison we had to give the habit equations the benefit of the chosen elasticities as well. We did this by imposing CHOICE as the long-term elasticity on each equation.[1]

The errors of the resulting forecast are shown in column 9, HAB-CHOIC, Table III-1. It improved the forecast for all but 18 sectors (compare columns 5 and 9). But even the improved habit equations were less accurate than the IMP-CHOIC equations except for 20 products. In addition, the total weighted error was much in favor of IMPULSE by 5.4 percent to 8.1 percent.[2]

For most of the 20 PCE-items, for which HABIT proved to be more accurate than IMPULSE, the differential error between the two equations was very small and negligible; but for at least the following six products: 33, Miscellaneous food; 34, Tobacco; 152, Bus transportation; 161-162, Gas and water utilities; and 173, Auto repair, the habit equations were significantly better and were chosen to replace the corresponding impulse equations.

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[1] Long-term equilibrium implies that $C_t = C_{t-1}$ and $\eta_y = a_2/(1-a_4)*(Y/C)_{1961}$. Hence, we estimate the HAB-CHOIC equations subject to $a_2 = (1-a_4)\,\eta_y\,(C/Y)_{1961}$.

[2] Since search was conducted on IMPULSE there exist a natural bias against HABIT when imposed to CHOICE. But, as explained, the INFORUM model builders prefer IMPULSE if both perform about the same.

Moreover, eight of the eleven IMPULSE equations with large errors, shown in Table III-1a, were out-performed by HABIT (marked by *). Five of them are now replaced by the chosen habit equations. The selection process is further tested by the complete model simulation of Chapter VIII.

The use of the choice elasticities in conjunction with the standard INFORUM consumption model for all but six sectors, for which HABIT with imposed long-term elasticities was used, clearly produced the best forecasts. The total weighted RMSPE for 1964-1970 was reduced to almost 5 percent of IMP-CS, and 8 percent of HAB-CS. On the far right of Table III-1 we also show a winner column; it depicts the best equation based on the simulation error. The SEARCH equations are excluded from this contest as they are replaced by CHOICE. The initial five types of equations are represented by only 15 out of the 55 sectors.

Besides imposing the income coefficients derived from the cross-section choice elasticities upon the OLS estimating procedure, the INFORUM PCE-regression analysis also used the age of population adjustment, the declining weight scheme as well as the post regression auto-correlation adjustments. Each of these methods also required testing.

2. Effect of Population Age Formation on Consumer Buying Habits

The change in overall population growth seems to suggest that a

variable representing the average age formation of households should have a significant impact on consumer buying habits.[1] The INFORUM model builders have studied this effect for 32 products and have adjusted the total population (used in the analysis of per capita consumption) of the corresponding consumption sectors accordingly.[2] The forecasting errors of the simulations with age adjustment applied to IMP-CS and IMP-CHOIC are shown in columns 3 and 8 (IMP-CSAGE and IMP-CHAGE) of Table III-1, respectively. When compared with the non-age equations (columns 2 and 7) it follows that the impact of age as a determinant of consumption expenditures seemed to be rather small. Nevertheless, the age adjustment improved the forecast of at least 25 equations and

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[1]The theory is based on the idea that different age groups of consumers have different consumption pattern. Consequently, if the respective weight of individual groups changes as a result of the slower birth rate, the aggregated (weighted) consumption pattern will change. For a short discussion on the subject, see Evans, (22), pp. 46-47.

[2]Let n = 5 refer to the number of consumer groups, E_{ij} stand for average expenditures per household in the i^{th} group on good j of the 1960-61 BLS Survey, D_{it} be the number of households in group i in year t, A_{jt} be the adjustment applied to the population of the j^{th} good in year t, then:

$$A_{jt} = \left(\sum_{i=1}^{n} E_{ij}D_{it}\right)/\left(\sum_{i=1}^{n} E_{ij}D_{i,1961}\right);\ t = 1947, 1948, \ldots$$

we decided to use it for these sectors.[1]

3. Post Regression Auto-Correlation Adjustment

As explained, the INFORUM model uses a first order post regression auto-correlation adjustment to improve the forecasting efficiency of the estimated equations.[2] The auto-correlation or rho-adjustment was tested in conjunction with the four basic equations: IMP-TS, IMP-CS, HAB-TS, and HAB-CS. Each equation was estimated with and without the use of declining weights. The subsequent simulations were conducted in three parts: (1) without weights and no rho-adjustment; (2) with rho-adjustment but without weights; and (3) with rho-adjustment and weights. The forecast errors of these simulations are shown in Tables III-2 and III-3. Each equation improved slightly with the rho-adjustment when measured by the overall weighted RMSPE. Because the average improvement was so marginal, it seems hardly worth the effort.[3] The same holds for the combination of rho-adjustment

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[1] One also may argue that the real impact from the current birth rate decline may not be felt until the mid-seventies.

[2] Goldberger in (24), pp. 369-375, showed that the predictive efficiency of a model can substantially be improved if one makes the appropriate adjustments.

[3] To test this scheme the six year simulation is probably too long for the adjustment approaches quickly zero as one goes out in time. See also Section IV-4.

Table III-2:

SIMULATION TESTING OF AUTO-CORRELATION ADJUSTMENT

SEC#	OUTPUT SECTOR	IMP-TS	IMP-TSRHO	IMP-TSRDW	IMP-CS	IMP-CSRHO	IMP-CSRDW	HAB-TS	HAB-TSRHO	HAB-TSRDW	WINNER
2	POULTRY AND EGGS	4.7	4.7	9.9	6.6	6.6	7.4	4.6	4.6	4.7	8
7	FRUITS, VEGETABLES, AND	12.3	9.5	7.8	9.1	5.9	3.0	31.7	31.8	27.2	6
23	MEAT PRODUCTS	9.2	9.2	6.1	3.8	3.8	3.4	11.9	11.9	17.2	6
24	DAIRY PRODUCTS	5.6	5.7	13.5	7.6	7.6	7.8	4.7	4.7	3.1	9
25	CANNED AND FROZEN FOODS	16.2	16.2	23.1	3.7	3.7	4.3	17.7	17.7	16.1	5
26	GRAIN MILL PRODUCTS	17.4	17.4	28.3	5.8	5.7	5.1	20.3	20.3	20.3	6
27	BAKERY PRODUCTS	14.6	14.6	24.0	10.1	10.0	8.4	13.2	13.2	7.9	9
28	SUGAR	6.8	6.8	6.8	7.8	7.8	7.4	15.6	15.7	15.5	3
29	CONFECTIONERY PRODUCTS	31.2	31.0	33.1	3.9	3.4	2.1	10.4	10.4	9.8	6
33	ALCOHOLIC BEVERAGES	6.6	6.7	1.7	2.7	2.7	1.8	23.2	23.2	21.2	3
31	SOFT DRINKS AND FLAVORI	31.6	31.6	26.7	4.9	4.6	3.5	19.1	19.2	31.3	6
32	FATS AND OILS	12.9	12.5	4.0	5.9	5.6	4.0	5.5	5.1	10.9	6
33	MISC FOOD PRODUCTS	4.2	4.2	16.0	13.3	13.2	12.6	34.5	34.5	26.3	2
34	TOBACCO PRODUCTS	36.1	36.1	40.6	11.5	11.4	11.8	8.7	8.6	9.9	8
35	BROAD AND NARROW FABRIC	18.9	19.0	11.0	5.4	5.3	5.3	3.6	3.6	3.8	8
36	FLOOR COVERINGS	19.7	19.1	19.7	19.8	19.1	15.7	15.6	15.6	13.6	9
38	KNITTING	21.8	21.8	19.6	10.6	10.6	10.4	13.1	13.1	9.9	9
39	APPAREL	13.1	13.1	21.0	3.8	3.8	3.9	3.8	3.9	4.6	7
40	HOUSEHOLD TEXTILES	22.4	22.4	14.5	3.6	3.6	3.5	8.5	5.4	4.2	6
45	HOUSEHOLD FURNITURE	49.2	48.8	41.3	3.9	3.9	2.1	16.9	16.5	11.4	6
49	PAPER PRODUCTS, NEC	21.4	21.4	12.0	5.3	5.2	4.1	32.1	32.1	25.8	6
52	NEWSPAPERS	10.8	10.7	6.4	3.0	2.9	2.1	6.3	6.4	11.4	8
53	PERIODICALS	31.2	31.1	33.0	2.5	2.5	3.7	9.5	9.6	9.5	5
65	DRUGS	6.9	6.8	4.7	2.6	2.8	3.0	2.0	2.1	3.7	7
67	CLEANING AND TOILET PRE	28.2	27.1	24.4	3.7	3.3	3.0	5.8	5.8	9.3	6
69	PETROLEUM REFINING AND	25.9	24.9	8.7	4.5	4.3	3.4	4.2	5.1	9.9	6
72	TIRES AND INNER TUBES	17.8	17.7	11.5	4.6	4.6	4.7	9.0	8.6	6.3	5
73	RUBBER PRODUCTS	41.5	41.7	40.1	5.5	4.2	1.7	13.2	13.3	18.5	6
76	LEATHER FOOTWEAR	34.3	34.3	26.9	2.5	2.5	2.3	5.3	5.3	9.2	6
77	OTHER LEATHER PRODUCTS	24.5	24.5	22.1	5.0	4.9	4.6	2.8	2.8	4.0	8
123	HOUSEHOLD APPLIANCES	38.4	38.4	32.9	2.5	2.5	2.5	11.3	11.3	9.0	6
125	RADIO AND TV RECEIVING	39.3	39.3	46.5	15.0	15.0	16.0	9.9	9.9	9.8	9
133	MOTOR VEHICLES AND PART	62.2	62.2	70.4	13.0	13.0	12.2	21.8	21.8	20.8	6
143	TRAILER COACHES	20.5	20.5	16.1	34.7	34.6	34.7	22.1	22.1	22.2	3
147	JEWELRY AND SILVERWARE	48.3	48.3	44.6	8.0	7.8	5.6	37.5	37.5	32.5	6
148	TOYS, SPORTING GOODS, M	5.1	5.0	10.8	9.2	9.1	9.3	35.7	35.7	28.1	2
152	BUSES	11.6	11.5	3.1	13.3	13.2	11.3	8.2	8.2	3.0	9
155	AIRLINES	18.1	18.1	17.7	15.3	15.3	15.2	6.0	6.0	4.8	9
158	TELEPHONE AND TELEGRAPH	9.9	9.9	8.3	2.6	2.6	2.6	3.8	3.8	4.8	6
160	ELECTRIC UTILITIES	3.1	2.9	2.5	4.6	4.4	4.1	2.8	2.9	1.4	9
161	NATURAL GAS	20.6	20.5	16.4	17.6	17.5	16.6	31.5	31.5	23.8	3
162	WATER AND SEWER SERVICE	3.9	4.0	10.6	9.2	9.7	15.3	12.4	12.6	21.8	1
164	RETAIL TRADE	4.6	4.6	2.2	.9	.9	.8	21.1	21.1	20.4	6
165	CREDIT AGENCIES AND BRO	16.2	16.1	18.8	3.3	3.3	3.3	4.0	4.0	4.8	6
166	INSURANCE AND BROKERS	26.7	26.7	29.1	9.9	9.7	8.1	18.9	18.9	17.4	6
167	OWNER-OCCUPIED DWELLING	3.2	3.1	2.6	4.0	4.0	3.7	8.5	8.6	10.1	3
168	REAL ESTATE	8.0	7.8	6.5	1.4	1.4	1.5	6.0	5.1	8.7	5
169	HOTEL AND LODGING PLACE	6.1	6.1	6.0	7.5	7.4	6.9	18.2	18.2	16.0	3
170	PERSONAL AND REPAIR SER	10.0	9.2	7.9	3.0	2.9	4.0	7.5	7.5	7.3	5
171	BUSINESS SERVICES	38.2	37.4	28.7	4.7	4.4	3.2	4.5	4.6	6.3	6
173	AUTO REPAIR	4.5	4.4	5.1	8.9	8.8	7.4	16.5	16.5	16.4	2
174	MOTION PICTURES AND AMU	19.1	16.8	12.3	7.6	4.5	1.6	6.1	6.1	6.4	6
175	MEDICAL SERVICES	20.3	20.1	17.4	2.0	1.8	1.2	2.4	2.4	1.8	6
176	PRIVATE SCHOOLS AND NON	15.6	15.6	16.4	12.1	11.9	10.6	5.7	5.8	4.4	9
177	POST OFFICE	6.9	6.9	9.5	2.7	2.7	3.9	5.8	5.8	6.9	5
	TOTAL WEIGHTED ERROR	17.4	17.2	17.3	6.0	5.9	5.4	10.4	10.4	10.6	

Table III-3:

SIMULATION TESTING OF AUTO-CORRELATION ADJUSTMENT

SEC#	OUTPUT SECTOR	IMP-TS	IMP-TSRHO	IMP-TSRD#	IMP-CS	IMP-CSRHO	IMP-CSRD#	HAB-CS	HAB-CSRHO	HAB-CSRD#	WINNER
2	POULTRY AND EGGS	4.7	4.7	9.9	6.6	6.6	7.4	11.7	11.7	11.1	2
7	FRUITS, VEGETABLES, AND	12.3	9.5	7.8	9.1	5.9	3.0	27.6	27.9	19.5	6
23	MEAT PRODUCTS	9.2	9.2	6.1	3.8	3.8	3.4	10.2	10.2	8.2	6
24	DAIRY PRODUCTS	5.6	5.7	13.5	7.6	7.6	7.8	7.2	7.2	6.8	1
25	CANNED AND FROZEN FOODS	16.2	16.2	23.1	3.7	3.7	4.3	6.6	6.6	7.3	5
26	GRAIN MILL PRODUCTS	17.4	17.4	28.3	5.8	5.7	5.1	20.0	20.2	17.5	6
27	BAKERY PRODUCTS	14.6	14.6	24.0	10.1	10.0	8.4	4.3	4.3	4.4	8
28	SUGAR	6.8	6.8	6.8	7.8	7.8	7.4	13.2	14.2	6.4	9
29	CONFECTIONERY PRODUCTS	31.2	31.0	33.1	3.9	3.4	2.1	3.8	4.1	5.4	6
30	ALCOHOLIC BEVERAGES	6.6	6.7	1.7	2.7	2.7	1.6	7.9	7.9	8.6	3
31	SOFT DRINKS AND FLAVORI	31.6	31.6	26.7	4.9	4.6	3.5	7.2	7.2	6.7	6
32	FATS AND OILS	12.9	12.5	4.0	5.9	5.6	4.0	8.0	7.6	7.0	6
33	MISC FOOD PRODUCTS	4.2	4.2	16.0	13.3	13.2	12.6	4.1	3.3	3.1	9
34	TOBACCO PRODUCTS	36.1	36.1	40.6	11.5	11.4	11.8	1.1	1.2	1.7	7
35	BROAD AND NARROW FABRIC	18.9	19.0	11.0	5.4	5.3	5.3	7.3	7.3	6.9	6
36	FLOOR COVERINGS	19.7	19.1	19.7	19.8	19.1	15.7	13.3	13.3	12.7	9
38	KNITTING	21.9	21.8	19.6	10.6	10.6	10.4	11.6	11.6	10.8	6
39	APPAREL	13.1	13.1	21.0	3.8	3.8	3.9	4.0	4.1	3.8	9
40	HOUSEHOLD TEXTILES	22.4	22.4	14.5	3.6	3.6	3.5	4.7	4.7	4.9	6
45	HOUSEHOLD FURNITURE	49.2	48.8	41.3	3.9	3.9	2.1	7.9	8.0	7.2	6
49	PAPER PRODUCTS, NEC	21.4	21.4	12.0	5.3	5.2	4.1	6.4	6.4	3.7	9
52	NEWSPAPERS	10.8	10.7	6.4	3.0	2.9	2.1	5.4	5.3	2.4	6
53	PERIODICALS	31.2	31.1	33.0	2.5	2.5	3.7	12.4	12.5	11.3	5
66	DRUGS	6.9	6.8	4.7	2.6	2.8	3.0	10.8	10.4	10.3	4
67	CLEANING AND TOILET PRE	28.2	27.1	24.4	3.7	3.3	3.0	16.2	16.3	15.5	6
69	PETROLEUM REFINING AND	25.9	24.9	8.7	4.5	4.3	3.4	3.4	2.7	5.8	8
72	TIRES AND INNER TUBES	17.8	17.7	11.5	4.6	4.6	4.7	5.8	5.7	5.3	5
73	RUBBER PRODUCTS	41.5	41.7	40.1	5.5	4.2	1.7	6.7	6.5	4.8	6
74	LEATHER FOOTWEAR	34.3	34.3	26.9	2.5	2.5	2.3	16.9	16.4	13.9	6
77	OTHER LEATHER PRODUCTS	24.5	24.5	22.1	5.0	4.9	4.6	3.9	3.9	4.1	8
123	HOUSEHOLD APPLIANCES	38.4	38.4	32.9	2.5	2.5	2.5	5.0	5.2	2.7	6
125	RADIO AND TV RECEIVING	39.3	39.3	46.5	15.0	15.0	16.0	18.6	18.7	19.6	5
133	MOTOR VEHICLES AND PART	62.2	62.2	70.4	13.0	13.0	12.2	19.1	19.2	10.2	9
140	TRAILER COACHES	20.5	20.5	16.1	34.7	34.6	34.7	38.2	36.6	26.9	3
147	WATCHES AND SILVERWARE	48.3	48.3	44.6	8.0	7.8	5.6	14.0	14.2	14.9	8
148	TOYS, SPORTING GOODS, M	5.1	5.0	18.8	9.2	9.1	9.3	10.1	10.1	8.0	2
152	BUSES	11.6	11.5	3.1	13.3	13.2	11.3	5.5	5.5	5.2	3
155	AIRLINES	18.1	18.1	17.7	15.3	15.3	15.2	34.9	35.0	30.8	6
158	TELEPHONE AND TELEGRAPH	9.9	9.9	8.3	2.6	2.6	2.6	27.3	27.1	21.5	6
160	ELECTRIC UTILITIES	3.1	2.9	2.5	4.6	4.4	4.1	12.1	12.1	11.2	3
161	NATURAL GAS	20.6	20.5	16.4	17.6	17.5	16.6	4.4	4.3	4.9	8
162	WATER AND SEWER SERVICE	3.9	4.0	10.6	9.2	9.7	15.3	1.8	1.5	3.0	8
164	RETAIL TRADE	4.6	4.6	2.2	.9	.9	.8	31.8	31.6	28.4	6
165	CREDIT AGENCIES AND BRO	16.2	16.1	18.8	3.3	3.3	3.3	4.7	4.7	4.7	6
166	INSURANCE AND BROKER'S	26.7	26.7	29.1	9.9	9.7	8.1	2.6	2.8	1.1	9
167	OWNER-OCCUPIED DWELLING	3.2	3.1	2.6	4.0	4.0	3.7	6.4	6.2	5.6	3
168	REAL ESTATE	8.0	7.8	6.5	1.4	1.4	1.5	18.3	17.4	11.7	5
169	HOTEL AND LODGING PLACE	6.1	6.1	6.0	7.5	7.4	6.9	5.7	5.7	5.2	9
170	PERSONAL AND REPAIR SER	10.0	9.2	7.9	3.0	2.9	4.0	2.8	2.8	2.8	9
171	BUSINESS SERVICES	38.2	37.4	28.7	4.7	4.4	3.2	5.3	5.3	4.1	6
173	AUTO REPAIR	4.5	4.4	5.1	8.9	8.8	7.4	2.3	2.3	1.5	9
174	MOTION PICTURES AND AMU	19.1	16.8	12.3	7.6	4.5	1.6	5.0	5.0	5.2	6
175	MEDICAL SERVICES	20.3	20.1	17.4	2.0	1.8	1.2	9.1	9.1	8.7	6
176	PRIVATE SCHOOLS AND NON	15.6	15.6	16.4	12.1	11.9	10.6	10.8	10.7	14.6	6
177	POST OFFICE	6.9	6.9	9.5	2.7	2.7	3.9	2.5	2.5	2.7	8
	TOTAL WEIGHTED ERROR	17.4	17.2	17.3	6.0	5.9	5.4	9.6	9.5	8.1	

and declining weights.[1] Some sectors, however, showed a noticeable improvement. To name just one, sector 3, Fruits and vegetables, improved from 9.1 percent error, for no rho-adjustment, to 5.9 percent, with the rho-adjustment, to 3.0 percent when rho and the declining weights were applied to the impulse cross-section equations.

The rho-adjustment is naturally more effective for equations with highly serial correlated error terms than for equations with little or no auto-correlation problems. Nevertheless, the rho-adjustment while decreasing the forecast error of same sectors has no negative effect on any of the other sectors. We felt, therefore, that the rho-adjustment should be maintained. A few simulation tests were also conducted with the Aitken generalized least-squares transformation. This method, however, indicated no major advantage over the adjustment used in the model.

4. Effect of a Declining Weight Scheme

As explained in Chapter II, we have produced the PCE-data for 1947-1957. But we really did not want to assign to the early years of the time series the same importance as to the more recent data (1958-1971), which are based on more genuine PCE information. We decided, therefore, to attach weights to the individual regression years. The assigned weight of the two most recent years is 1.0 and it gets progressively smaller for the earlier years.

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[1] Because the declining weight scheme has the tendency of reducing the error terms of the most recent years of estimation, the combined application of both methods seems to be somewhat redundant.

The simulation results with 9 different weight schemes (declining exponentially at 0, 2, ..., 16% per year, respectively) are shown in Table III-4. The various rows of the matrix of errors reveal a non-linear relationship between the percent decline in weights and the RMSPE. The behavior of errors of a few sectors is depicted in Figure III-2. There is no particular pattern among the 55 largest PCE sectors. Only the total weighted RMSPE indicates that the six percent declining weight scheme produces the best overall forecast. Furthermore, with the six percent scheme, the forecast error of 41 products is smaller than without any weight scheme.

Without any real observable pattern it is quite difficult to draw any conclusions from this test. On the one hand, one can hardly say that the declining weight scheme is highly beneficial; on the other hand, considering the data problems with the early history and the fact that only 19 sectors would prefer a less than six percent weight scheme (out of which only 8 sectors have a significant smaller error with less than six percent) the six percent appeared to be the appropriate value for all items.

5. Short-Term Behavior of the Consumption Functions

We also have asked ourselves the question as to what the tests would have suggested had we chosen a different simulation period. For this purpose we have re-run the simulations shown in Table III-1 by estimating the same equations through 1967. Hence, the test period is now 1968-1970. The forecast results of the new simulations are shown

Table III-4:

SIMULATION TESTING OF DECLINING WEIGHT SCHEME

SEC#	OUTPUT SECTOR	IMP=CSD#0	IMP=CSDW2	IMP=CSDW4	IMP=CSDW6	IMP=CSD#8	IMP=CSW10	IMP=CSW12	IMP=CSW14	IMP=CSW16	WINNER
2	POULTRY AND EGGS	6.6	6.9	7.1	7.4	7.7	8.0	8.2	8.5	8.7	1
7	FRUITS, VEGETABLES, AND	6.2	4.6	3.3	2.7	3.2	4.2	5.3	6.4	7.4	4
23	MEAT PRODUCTS	3.8	3.5	3.4	3.4	3.4	3.4	3.3	3.3	3.1	9
24	DAIRY PRODUCTS	7.1	7.5	7.7	7.7	7.6	7.4	7.1	6.8	6.5	9
25	CANNED AND FROZEN FOODS	2.9	3.2	3.4	3.7	3.9	4.0	4.1	4.1	3.7	1
26	GRAIN MILL PRODUCTS	5.7	5.4	5.2	5.1	5.1	5.1	5.1	5.1	4.8	9
27	BAKERY PRODUCTS	9.5	9.2	8.7	8.2	7.6	6.9	6.2	5.5	4.8	9
28	SUGAR	7.8	7.7	7.5	7.4	7.3	7.2	7.1	7.1	7.0	9
29	CONFECTIONERY PRODUCTS	3.4	2.5	2.1	2.1	2.4	2.7	3.1	3.4	3.6	4
30	ALCOHOLIC BEVERAGES	2.7	1.9	1.6	1.8	2.2	2.6	2.9	3.0	3.1	3
31	SOFT DRINKS AND FLAVORI	4.6	4.1	3.7	3.5	3.4	3.4	3.4	3.5	3.4	9
32	FATS AND OILS	5.9	5.0	4.3	4.0	4.1	4.2	4.5	4.9	5.4	4
33	MISC FOOD PRODUCTS	12.1	12.0	11.9	11.6	11.2	10.6	9.7	8.3	6.4	9
34	TOBACCO PRODUCTS	10.6	10.9	11.1	11.3	11.3	11.3	11.3	11.1	10.9	1
35	BROAD AND NARROW FABRIC	5.4	5.4	5.3	5.3	5.3	5.3	5.4	5.5	5.8	6
36	FLOOR COVERINGS	19.1	17.9	16.8	15.7	14.8	14.1	13.5	13.1	12.7	9
38	KNITTING	10.6	10.5	10.5	10.4	10.3	10.1	10.0	9.9	9.8	9
39	APPAREL	3.8	3.8	3.8	3.9	3.9	3.9	3.9	3.9	3.9	3
40	HOUSEHOLD TEXTILES	3.6	3.3	3.3	3.5	4.4	4.5	4.6	4.6	4.7	3
45	HOUSEHOLD FURNITURE	3.4	2.7	2.2	2.0	1.7	1.7	2.0	2.5	2.9	6
49	PAPER PRODUCTS, NEC	4.3	4.1	3.8	3.7	3.5	3.4	3.3	3.3	3.3	9
52	NEWSPAPERS	2.9	2.6	2.3	2.1	2.1	2.3	2.6	2.8	2.2	5
53	PERIODICALS	4.2	3.1	3.1	3.5	3.9	4.1	3.9	3.6	3.2	3
66	DRUGS	2.8	2.8	2.9	3.0	3.1	3.3	3.5	3.6	3.8	2
67	CLEANING AND TOILET PRE	3.3	2.9	2.9	3.0	3.4	3.8	4.2	4.6	4.9	3
69	PETROLEUM REFINING AND	4.3	3.7	3.4	3.4	3.7	4.4	5.3	6.1	7.0	4
72	TIRES AND INNER TUBES	4.6	4.5	4.6	4.7	4.8	4.8	4.8	4.8	4.8	2
73	RUBBER PRODUCTS	4.2	2.2	1.7	1.7	2.3	3.3	4.3	5.2	6.0	4
76	LEATHER FOOTWEAR	2.7	2.5	2.3	2.3	2.3	2.4	2.5	2.6	2.8	5
77	UPPER LEATHER PRODUCTS	5.0	4.8	4.5	4.2	4.0	3.9	3.9	3.8	3.8	9
123	HOUSEHOLD APPLIANCES	2.5	2.5	2.5	2.5	2.6	2.6	2.7	2.7	2.7	4
125	RADIO AND TV RECEIVING	15.0	15.3	15.7	16.0	16.3	16.6	16.9	17.1	17.3	1
133	MOTOR VEHICLES AND PART	13.0	11.7	11.9	12.2	12.5	12.7	12.9	13.0	13.2	2
140	TRAILER COACHES	34.6	34.8	34.8	34.7	34.5	34.3	34.0	33.7	33.4	9
147	JEWELRY AND SILVERWARE	7.8	7.1	6.4	5.6	5.0	4.3	3.9	3.5	3.2	9
148	TOYS, SPORTING GOODS, M	7.5	7.7	7.9	8.1	8.2	8.2	8.2	8.1	7.9	1
152	BUSSES	11.7	11.0	10.4	9.8	9.3	8.7	8.2	7.7	7.3	9
155	AIRLINES	15.3	15.1	15.4	15.2	14.9	14.5	14.2	13.9	13.6	9
159	TELEPHONE AND TELEGRAPH	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	2.8	7
160	ELECTRIC UTILITIES	3.7	3.6	3.5	3.5	3.4	3.3	3.2	3.0	2.9	9
161	NATURAL GAS	16.0	15.9	15.7	15.5	15.0	14.4	13.7	12.9	12.0	9
162	WATER AND SEWER SERVICE	8.9	10.6	12.7	14.8	16.8	18.4	19.6	20.6	21.2	1
164	RETAIL TRADE	.9	.9	.8	.8	.8	.8	.7	.7	.8	8
165	CREDIT AGENCIES AND BRO	3.3	3.2	3.3	3.3	3.4	3.5	3.7	3.8	4.0	2
166	INSURANCE AND BROKER'S	8.4	8.0	7.6	7.2	6.9	6.6	6.4	6.3	6.2	9
167	OWNER-OCCUPIED DWELLING	2.0	2.0	2.1	2.1	2.2	2.2	2.2	2.3	2.3	2
168	REAL ESTATE	1.2	1.2	1.2	1.2	1.2	1.3	1.4	1.6	1.7	5
169	HOTEL AND LODGING PLACE	7.0	6.8	6.7	6.6	6.4	6.2	6.1	5.9	5.8	9
172	PERSONAL AND REPAIR SER	2.5	2.9	3.2	3.6	4.0	4.3	4.6	4.9	5.1	1
171	BUSINESS SERVICES	4.4	3.8	3.4	3.2	3.1	3.1	3.1	3.1	3.2	8
173	AUTO REPAIR	8.6	8.3	7.9	7.5	7.1	6.8	6.6	6.4	6.1	9
174	MOTION PICTURES AND AMU	4.5	3.0	1.7	1.5	2.4	3.5	4.5	5.5	6.3	4
175	MEDICAL SERVICES	1.8	1.5	1.3	1.2	1.2	1.2	1.3	1.3	1.3	6
176	PRIVATE SCHOOLS AND NON	10.9	11.0	10.8	10.4	9.7	9.0	8.1	7.3	6.6	9
177	POST OFFICE	2.7	2.9	3.2	3.4	3.9	4.2	4.5	4.9	5.1	1
	TOTAL WEIGHTED ERROR	5.4	5.1	5.1	5.0	5.0	5.1	5.1	5.1	5.1	

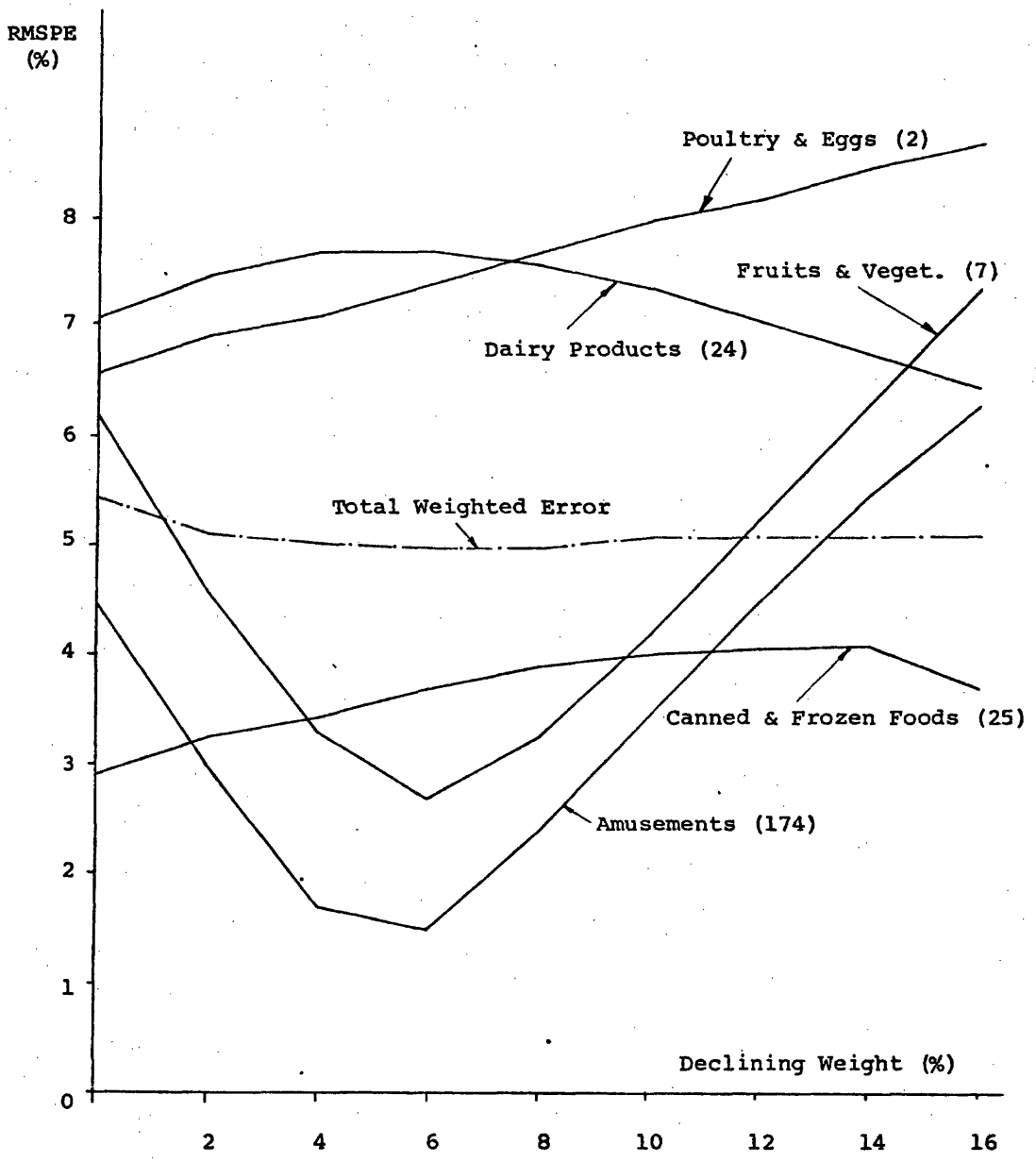

Figure III-2: Functional Relationship between Declining Weights and RMSPE

in Table III-5. Nearly all the RMSPE's have dropped noticeably. On the basis of the total weighted RMSPE, the performance of the five types of equations tested has almost reversed itself (compare columns 1-5 of Table III-1 with Table III-5). The impulse equation with the survey elasticity imposed produced now the least satisfactory forecast, and except for the choice equations, IMP-TS gives the best results. But even though the IMP-TS and the two habit equations show smaller forecast errors, the errors of all equations are not significantly different from each other. Even the imposition of the choice elasticities did not change appreciably the performance of the impulse and habit equations. In sum, simulations with shorter forecasting periods seem to suggest that the INFORUM model is indifferent to the type of equation used in short-term forecasting; but for the long-term a more sensible equation is called for. This conclusion might also explain why Houthakker and Taylor were satisfied with the performance of their habit-like equations which were tested by simulation for only two years (1961 and 1962).[1]

The search elasticity from estimating the equations through 1967 and simulating only 1968-70 are shown in the next to last column of Table III-5. As expected, these elasticities differ greatly from the ones found by simulating 1964-70 and which are shown in Table III-6, column 4. The original income elasticities stemming from the BLS-Survey are shown in column 3 of

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[1]Houthakker and Taylor (31), pp. 161-72.

Table III-5:

TESTING THE SHORT TERM BEHAVIOR OF THE CONSUMPTION FUNCTIONS

SEC#	OUTPUT SECTOR	IMP-TS	IMP-CS	IMP-CSAGE	HAB-TS	HAB-CS	SEARCH	IMP-CHOIC	HAB-CHOIC	ELAS-67	WINNER
2	POULTRY AND EGGS	2.9	2.7	3.2	2.9	3.6	1.2	2.6	3.5	.8	7
7	FRUITS, VEGETABLES, AND	6.7	3.4	3.1	6.9	7.9	1.4	6.8	10.9	.1	3
23	MEAT PRODUCTS	2.6	2.1	1.9	4.0	2.0	1.8	2.2	3.7	.3	3
24	DAIRY PRODUCTS	4.6	8.7	8.6	7.0	10.0	7.2	6.5	6.6	.1	1
25	CANNED AND FROZEN FOODS	3.8	7.5	7.2	9.9	1.5	3.7	5.1	3.2	.0	5
26	GRAIN MILL PRODUCTS	7.7	8.3	8.9	7.2	5.5	2.4	6.0	5.3	1.2	8
27	BAKERY PRODUCTS	4.0	6.6	6.5	8.3	10.1	4.5	4.8	5.0	.0	1
28	SUGAR	9.0	9.8	10.0	9.5	7.5	2.6	9.6	4.9	1.1	8
29	CONFECTIONERY PRODUCTS	2.2	3.7	3.9	1.8	3.6	1.3	2.1	5.7	.8	4
30	ALCOHOLIC BEVERAGES	4.7	4.1	4.3	12.0	7.0	3.5	4.2	7.8	.1	2
31	SOFT DRINKS AND FLAVORI	7.8	7.7	7.8	1.8	9.0	1.8	3.8	6.8	1.6	4
32	FATS AND OILS	7.6	3.4	3.2	7.5	1.7	3.1	5.0	2.2	.1	5
33	MISC FOOD PRODUCTS	2.4	7.6	7.3	17.9	3.6	6.0	5.4	3.9	.1	1
34	TOBACCO PRODUCTS	1.0	7.8	7.7	6.7	2.9	6.0	5.3	1.5	.0	1
35	BROAD AND NARROW FABRIC	11.6	11.7	11.1	4.9	7.6	5.0	9.7	9.9	.1	8
36	FLOOR COVERINGS	15.7	17.3	18.1	16.5	18.6	3.3	16.9	13.0	7.9	8
38	KNITTING	16.4	17.2	17.9	16.0	18.4	4.0	15.7	16.0	8.1	7
39	APPAREL	5.1	5.1	4.4	4.5	6.4	3.6	4.3	4.6	.1	7
40	HOUSEHOLD TEXTILES	2.9	4.0	4.6	3.6	5.5	1.9	2.2	2.8	1.6	7
45	HOUSEHOLD FURNITURE	2.4	2.7	2.9	3.9	2.3	2.4	2.5	2.7	.7	5
49	PAPER PRODUCTS, NEC	5.1	5.0	4.9	5.1	3.2	4.7	4.8	3.2	.2	8
52	NEWSPAPERS	2.5	3.7	3.7	4.0	3.2	2.6	3.1	2.8	1.1	1
53	PERIODICALS	6.0	6.9	6.9	10.8	2.2	5.2	6.8	1.0	.1	8
66	DRUGS	4.3	8.8	9.1	2.8	2.3	8.7	3.7	4.2	.6	5
67	CLEANING AND TOILET PRE	5.5	6.6	6.9	.9	4.0	1.5	3.7	2.4	2.3	4
69	PETROLEUM REFINING AND	3.7	4.3	4.3	2.4	1.9	1.6	4.0	3.3	1.5	5
72	TIRES AND INNER TUBES	10.8	9.6	9.7	9.0	14.0	3.6	7.5	7.8	2.2	7
73	RUBBER PRODUCTS	3.7	6.1	6.5	1.7	4.8	2.4	2.6	1.6	.0	8
76	LEATHER FOOTWEAR	3.4	3.5	3.4	6.5	2.7	3.5	3.5	2.0	.7	8
77	OTHER LEATHER PRODUCTS	9.7	8.5	7.8	4.3	10.2	3.7	7.0	7.1	.1	4
123	HOUSEHOLD APPLIANCES	3.0	7.8	7.7	2.7	5.4	2.6	2.6	2.4	1.6	8
125	RADIO AND TV RECEIVING	15.3	13.7	13.9	13.6	15.2	13.0	14.7	14.3	.0	4
133	MOTOR VEHICLES AND PART	17.9	16.1	16.1	18.9	11.6	14.7	15.7	12.9	.3	5
149	TRAILER COACHES	27.9	32.8	33.2	26.4	9.2	23.7	32.6	10.5	7.0	5
147	WATCHES AND SILVERWARE	4.7	6.3	6.5	9.7	4.5	.9	3.7	4.7	2.7	7
148	TOYS, SPORTING GOODS, M	6.7	2.6	2.3	10.8	7.2	2.1	2.1	6.9	.4	7
152	BUSES	1.6	7.6	6.5	4.6	8.1	1.6	4.0	7.4	1.1	1
155	AIRLINES	6.3	8.6	8.6	.6	19.7	5.7	7.9	30.4	3.9	4
156	TELEPHONE AND TELEGRAPH	5.6	5.5	5.6	.7	3.3	5.1	5.2	2.2	1.6	4
160	ELECTRIC UTILITIES	5.5	3.4	3.7	3.4	4.5	1.0	4.4	3.2	2.1	8
161	NATURAL GAS	1.3	4.0	3.7	1.8	1.0	1.9	3.8	1.8	.0	5
162	WATER AND SEWER SERVICE	2.0	3.3	3.1	1.2	2.7	1.8	3.1	3.6	.0	4
164	RETAIL TRADE	1.0	1.2	1.2	3.9	11.0	.8	.9	8.9	1.2	7
165	CREDIT AGENCIES AND BRO	4.7	4.5	4.5	6.4	4.9	4.5	4.9	5.9	1.3	3
166	INSURANCE AND BROKERS	1.3	7.5	6.9	2.4	1.0	1.2	4.8	2.6	.3	5
167	OWNER-OCCUPIED DWELLING	1.2	3.3	2.4	1.1	1.8	.4	.4	1.2	.5	7
168	REAL ESTATE	1.8	2.0	1.3	.7	3.2	1.7	2.1	3.5	1.7	4
169	HOTEL AND LODGING PLACE	2.9	8.3	7.7	11.1	4.2	2.0	6.0	2.7	.5	8
170	PERSONAL AND REPAIR SER	5.0	9.0	8.6	6.3	1.6	3.9	5.6	4.0	.1	5
171	BUSINESS SERVICES	7.8	2.9	2.9	11.0	1.6	2.9	4.4	2.0	1.0	5
173	AUTO REPAIR	.3	4.6	4.7	3.5	2.2	.3	2.4	.7	.0	1
174	MOTION PICTURES AND AMU	2.9	4.5	4.4	4.2	5.3	.7	1.0	2.6	.8	7
175	MEDICAL SERVICES	2.1	2.3	2.5	1.6	2.7	1.3	1.7	4.3	1.0	4
176	PRIVATE SCHOOLS AND NON	2.3	1.6	2.0	5.5	3.0	1.4	1.7	1.2	1.4	8
177	POST OFFICE	3.2	1.4	1.3	1.5	2.0	1.4	1.4	2.2	1.1	3
	TOTAL WEIGHTED ERROR	4.4	5.5	5.3	5.2	4.4	3.3	4.3	4.4	.9	

Table III-6:

PCE INCOME ELASTICITIES WITH PRICE-ELAS. AND %-TIME OF CHOICE EQUATION

SEC#	TITLE	HAB-TS	IMP-TS	IMP-SURV	SEARCH	CHOICE	PRI-ELAS	%-TIME
2	POULTRY AND EGGS	-.5070	.3420	.1950	.1950	.2000	-.0151	-1.7551
7	FRUITS, VEGETABLES, AND OTHER CROPS	-.2940	.2410	.4600	.2800	.3000	-.3068	-1.3568
23	MEAT PRODUCTS	.5960	.2230	.4500	.0500	.0500	-.1656	1.4149
24	DAIRY PRODUCTS	-.1500	-.5180	.2900	.0900	.0500	-.6614	-.3653
25	CANNED AND FROZEN FOODS	.6910	-.1660	.6050	.0050	.2500	.0000	2.2914
26	GRAIN MILL PRODUCTS	1.9120	.8250	.0100	.8100	.4500	.0000	2.1905
27	BAKERY PRODUCTS	-.0110	-.5480	.3300	.0300	.1000	-.0664	-.1425
28	SUGAR	-.9770	.6400	.0900	.6900	.1000	-.3621	-.8118
29	CONFECTIONERY PRODUCTS	.4240	.9780	.0900	.9900	1.0000	-.0024	-1.3343
30	ALCOHOLIC BEVERAGES	.2630	1.4570	1.4000	1.6000	1.4000	-3.2594	-2.6608
31	SOFT DRINKS AND FLAVORINGS	1.5150	1.2140	.4000	1.1000	1.0000	-.8287	1.2129
32	FATS AND OILS	.6400	.5380	.1600	.4600	.5000	-.0839	.6800
33	MISC FOOD PRODUCTS	1.2140	-.5110	.4000	.1000	.1000	-.0022	.0000
34	TOBACCO PRODUCTS	.4510	-.7460	.3500	.0500	.0000	-.1864	.0000
35	BROAD AND NARROW FABRICS	.2040	.6240	1.1600	.5600	.8500	-.0472	-1.0112
36	FLOOR COVERINGS	1.6010	3.0300	1.8500	2.8500	1.8500	-1.2148	-.4939
38	KNITTING	2.2300	2.8290	1.1900	2.3900	1.5000	.0000	.6372
39	APPAREL	.1290	-.0120	1.1900	.0900	1.0000	-.9047	-1.8618
40	HOUSEHOLD TEXTILES	1.3610	1.4310	1.1000	1.3600	1.3500	-.1312	-.0871
45	HOUSEHOLD FURNITURE	.2450	-.1000	.9600	.0800	.7000	-.6714	-.0807
49	PAPER PRODUCTS, NEC	.8510	-.2070	.4900	.0900	.2500	.0000	2.5896
52	NEWSPAPERS	.5270	.7840	.4900	.7900	.9000	.0000	-1.0312
53	PERIODICALS	.9630	1.2300	1.0000	1.1000	1.0000	-.5776	-.1145
65	DRUGS	2.4350	2.1960	.5400	2.2400	2.0000	-.1772	.6639
67	CLEANING AND TOILET PREPARATIONS	14.9850	1.2430	.3200	1.3200	1.4000	.0000	.7336
69	PETROLEUM REFINING AND RELATED PRODUCTS	.3880	.3260	.6000	.2600	.8000	-.0794	.6484
72	TIRES AND INNER TUBES	1.2030	1.5470	.6500	1.3500	1.0000	-.5341	.2400
73	RUBBER PRODUCTS	.1690	.0830	.7400	.0400	.1000	-.1534	.5320
76	LEATHER FOOTWEAR	-.0820	.6060	.7600	.6800	.7000	-.5407	-1.4715
77	OTHER LEATHER PRODUCTS	-.1790	.4050	1.1900	.6900	.9000	-.2805	.3152
123	HOUSEHOLD APPLIANCES	1.6540	1.6990	.5100	1.7100	1.7000	.0000	.0663
125	RADIO AND TV RECEIVING	4.6030	3.3610	.6100	4.0100	1.7000	-1.9788	1.3057
133	MOTOR VEHICLES AND PARTS	1.5630	1.0930	1.1300	1.5300	1.0000	.0000	1.3028
140	TRAILER COACHES	89.4550	12.7690	1.8000	11.2000	1.8000	-8.2398	2.1665
147	JEWELRY AND SILVERWARE	.8280	2.5040	1.4500	2.6600	2.0000	.0000	-2.4626
148	TOYS, SPORTING GOODS, MUSICAL INSTRUMENTS	1.0700	-.2670	.8300	.0300	.6000	.0000	2.9971
152	BOOKS	.2610	1.1580	.2000	1.1000	.5000	-.9583	.0000
155	AIRLINES	4.1770	4.3920	1.9000	4.6000	2.0000	-1.1254	1.7653
158	TELEPHONE AND TELEGRAPH	2.4700	1.6020	.8100	1.9100	1.5000	-.7139	.7849
160	ELECTRIC UTILITIES	1.5700	.6020	1.0000	.6000	.7000	-.1825	1.8972
161	NATURAL GAS	2.5660	-.8170	.7500	.0500	.7500	-.0037	.0000
162	WATER AND SEWER SERVICES	.3700	.1320	.7200	.0200	.7500	-.0185	.0000
164	RETAIL TRADE	.9380	1.3110	1.7200	1.2200	1.3500	-1.1479	-2.0740
165	CREDIT AGENCIES AND BROKERS	1.5210	1.2400	1.2500	1.5500	1.4500	-.7682	1.1973
166	INSURANCE AND BROKER'S AGENTS	1.0640	.2620	1.4100	.2100	1.0000	-.3696	.7232
167	OWNER-OCCUPIED DWELLINGS	1.8530	.1690	1.4100	.1100	.4500	.0000	1.8908
168	REAL ESTATE	1.4400	1.4900	1.4100	1.5100	1.4000	.0000	-.4859
169	HOTEL AND LODGING PLACES	1.3860	.6230	2.0000	.9000	1.5000	-.8275	.6183
170	PERSONAL AND REPAIR SERVICES	2.9400	.1590	1.1900	.1900	.5000	.0000	-.2231
171	BUSINESS SERVICES	.5440	.9380	1.0400	.8400	.7000	-1.2839	2.6538
173	AUTO REPAIR	.5380	-.0390	1.0400	.0400	.5000	.0000	.0000
174	MOTION PICTURES AND AMUSEMENTS	-.1950	.9520	1.6400	.8400	.6500	.0000	-2.5032
175	MEDICAL SERVICES	1.6900	.8660	.5900	.8900	.8000	.0000	.7668
176	PRIVATE SCHOOLS AND NONPROFIT ORGANIZATIO	-5.1100	.6510	2.3000	.6600	1.8000	-2.9505	1.4445

this table while columns 1 and 2 represent the unconstrained estimates of the two time series equations HAB-TS and IMP-TS, respectively. The many negative and very large entries of the two columns point to the difficulties one encounters by attempting to derive the income elasticity from time series data. Column 5 is our choice of the elasticity and the last two columns show the price elasticity in 1961 and the time trend term (as a percent of 1971 consumption) of the impulse equations.[1]

D. Conclusion of the Simulation

In this chapter we tested the performance of two different consumption functions, one with and one without lagged value of the dependent variable (auto-regressive term). The simulation testing with these two equations showed that for long-term forecasting the non-auto-regressive (IMPULSE) equations is superior. Nevertheless, for several sectors the auto-regressive (HABIT) equation proved to be the better consumption function. We decided, therefore, to use HABIT instead of IMPULSE for these sectors. The majority of equations produced a forecasting error of less than five percent which seem to indicate an overall satisfactory simulation performance of the 133 consumption equations used in the model. The test results also justified the use of cross-section income elasticities as the time series estimation of the income coefficient generally leads to unsatisfactory results. We allowed, however, the time series data to influence the cross-section estimate of the BLS-Survey whenever such a change could be justified.

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[1] At the time these elasticities were computed the 1971 data had become available. Although, the above simulations have not been revised, the fitted equations of selected industries shown in the appendix use this additional obyervation.

In testing the validity of using the "age-adjusted population", we found that the inclusion of this data improved the forecasting behavior of some equations, while it did not help in others and even enlarged the error of a few sectors. Consequently, we made the adjustment to the population variable only to equations where it reduced the simulation error. The post-regression auto-correlation adjustment was also found to be useful, but the full effect of it was less than expected. As it had no negative effect but improved the forecasting error of a few sectors appreciably, we decided to use the rho-adjustment for all equations. The same holds for the application of the declining-weight scheme and we use it as well. We know, of course, that both the rho-adjustment and declining-weight scheme are interrelated and may therefore have off-setting effects. The optimum declining weight scheme was found to be six percent.

The overall behavior of the consumption functions is probably best explained by the regression, simulation, and forecasting plots (Appendix III-b). Here we have shown the impulse and habit equations for selected sectors. These figures not only compare the actual with predicted value of the regression, but also have added on the forecast made with the equations out to 1985.

The top line of the graphs shows the chosen income elasticity with the BLS-elasticity in parenthesis, the price elasticity of 1961, the simulation fit for the years of 1965-71, the regression fit for the whole period of 1947-71 with the rho-statistics and last error of the regression. Also shown are the regression parameters. If the word "TIME" appears as a

label for the next-to-last regression coefficient, the equation is of the IMPULSE type; if "PCE(T-1)" appears in that position, the equation is HABITual. Furthermore, on these graphs we have shown in addition to the actual and predicted values of the regression also the explanatory variables. These graphs identify both the adequacy of some of the consumption equations and some of the problem areas. The bad equations of Table III-1a were purposely included.

In short, the simulation with the consumption functions has verified the adequacy of most of them in predicting personal consumption expenditures. A number of small changes to the original equation were required, however, which in turn improved their forecasting ability appreciably. As a final test, the PCE equations will be introduced to the forecasting model to determine the output effect of the prediction errors. This test, which is part of the simulation with the whole model, is described in Chapter VIII.

In this chapter we have used the root mean squared error criterion in testing the performance of the individual consumption equations. In the subsequent chapters, however, we have chosen to use an average error concept, for the average error translates more easily the performance of the model into direct value terms. Consequently, this measure is better understood by the users of the INFORUM model. The average error is reported in cumulative and absolute terms. Here the cumulative error is used as a check for forecasting biases, while the absolute error describes the average magnitude of the forecasting error.

APPENDIX III-a

EXPLANATION OF POST REGRESSION COEFFICIENT CHANGE PROCEDURE

EXPLANATION OF A POST REGRESSION COEFFICIENT CHANGE PROCEDURE

In viewing the regression results one often wishes that a certain variable had been left out (e.g. positive price term in the consumption function), or the size of one parameter is too large (e.g. $-a_5 \leq a_2$ for $a_5 < 0$) in comparison to other parameters of the equation. Without re-running the whole regression, one can easily adjust the remaining regression coefficients for the desired change by making use of the matrix of partial derivatives. For example, assume the following standard linear regression model:

$$(1) \quad Y_t = \beta_1 X_{1t} + \beta_2 X_{2t} + \ldots + \beta_n X_{nt} + \epsilon_t; \; t = 1,2, \ldots ,T.$$

where X_{1t} may or may not be used as a constant term. Next, if we assume that $E(\epsilon\epsilon') = \sigma_\epsilon^2 I$, we know that

$$(2) \quad b = (X'X)^{-1}X'y$$

is the best linear unbiased estimator of β in equation (1). Now assume that the $k^{\underline{th}}$ coefficient, b_k, is unreasonably different from the expected value of β_k say $b_k^* = E(\beta_k)$. Rather than completely re-running the regression with $(Y_t - b_k^* X_{kt})$ as the new dependent variable, one can make use of the partial derivatives of the regression coefficient with respect to the $k^{\underline{th}}$ coefficient is simply:

$$(3) \quad \frac{\partial b_j}{\partial b_k} = \frac{X^{-1}_{jk}}{X^{-1}_{kk}} = PD_j$$

where $X_{jk} = (X'X)_{jk} = X_j' X_k$, is the inner product of the $j^{\underline{th}}$ and $k^{\underline{th}}$

independent variable.[1]

Consequently, the estimated regression results of equation (1) are used only if $b_k \sim E(\beta_k)$, and we have

$$(4a)\quad \hat{Y}_t = b_1X_{1t} + b_2X_{2t} + \ldots + b_kX_{kt} + \ldots + b_nX_{nt}$$

Otherwise, we set $b_k^* = E(\beta_k)$ and get:

$$(4b)\quad \hat{Y}_t^* = (b_1 + \Delta b_k PD_1)X_{1t} + (b_2 + \Delta b_k PD_2)X_{2t} + \ldots$$
$$+(b_k + \Delta b_k)X_{kt} + \ldots + (b_n + \Delta b_k PD_n)X_{nt}$$

where $\Delta b_k = b_k^* - b_k$, $\hat{Y}_t^*$ is the constrained estimate of Y_t and $PD_k = 1$. Equation (4b) can, of course, be simplified when written in summation form.

$$(5)\quad \hat{Y}_t^* = \sum_{j=1}^{n} (b_j + \Delta b_k PD_j)X_{jt};\ t = 1,2, \ldots ,T.$$

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[1]For a proof of equation (3), see Almon (2), pp. 38-39.

APPENDIX III-b

REGRESSION AND SIMULATION PLOTS OF CHOICE PCE EQUATIONS

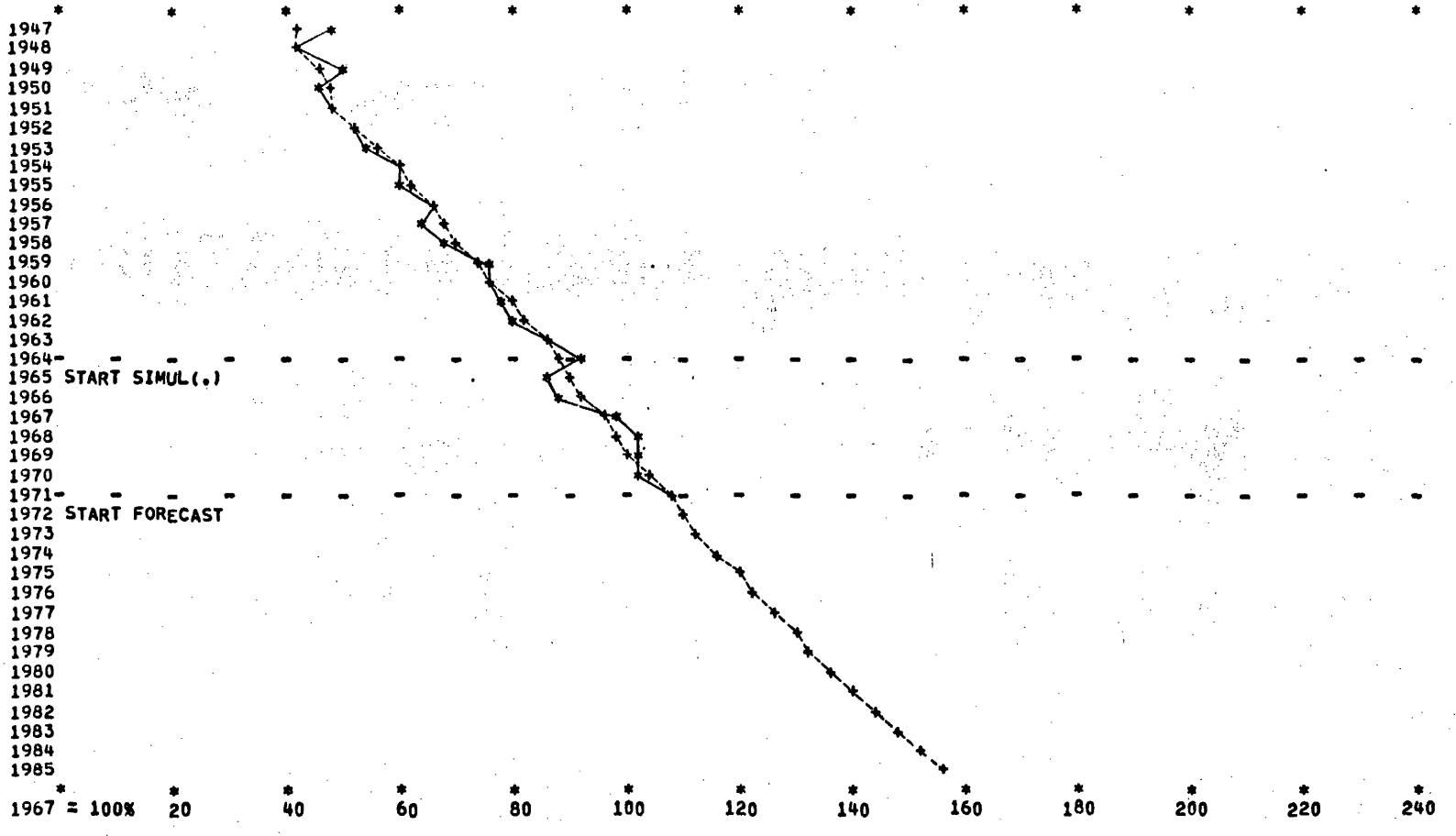
FORECAST TO 1985

I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 23 MEAT PRODUCTS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
.05000	-.16563	2.39605	2.47611	.08186	83.81885	109.57113	.00229	-14.94882	1.48919	-.00229	1.41487
(.45000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	13201.	13788.	15259.	15412.	16036.	16335.	17624.	18733.	17638.	17767.	20075.	20768.	20533.	20821.	21798.
PCE PREDIC (+)	13843.	14070.	14858.	15474.	16084.	16598.	17347.	17981.	18262.	18624.	19475.	20052.	20382.	20984.	21714.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.0317	1.1343	1.0232	.9923	.9667	.9773	.9062	.8777	.9781	1.0453	.9434	.9299	1.0000	.9659	.9131
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

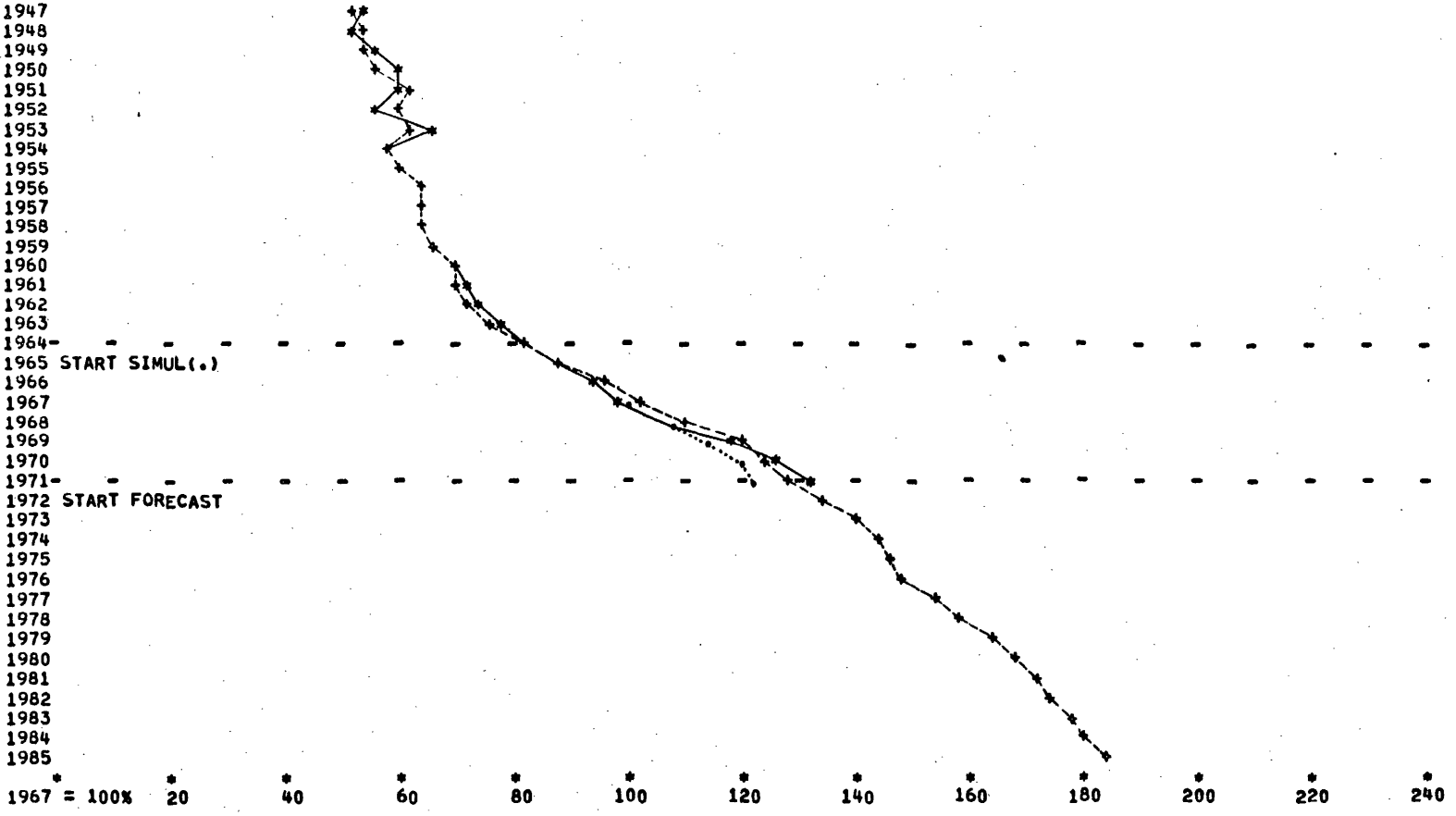


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 30 ALCOHOLIC BEVERAGES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.40000	-3.25245	2.98216	2.29765	.26004	400.95361	71.58299	.02096	-81.33783	-1.25139	-.00602	-2.66084
(1.40000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	4712.	4764.	4906.	5127.	5254.	5419.	5690.	6068.	6481.	6961.	7280.	7927.	8646.	9252.	9740.
PCE PREDIC (+)	4684.	4790.	4901.	5171.	5236.	5369.	5536.	6040.	6486.	7119.	7553.	8144.	8753.	9117.	9339.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.2048	1.1855	1.1761	1.1518	1.1430	1.1370	1.1285	1.1094	1.0996	1.0754	1.0575	1.0320	1.0000	.9834	.9797
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

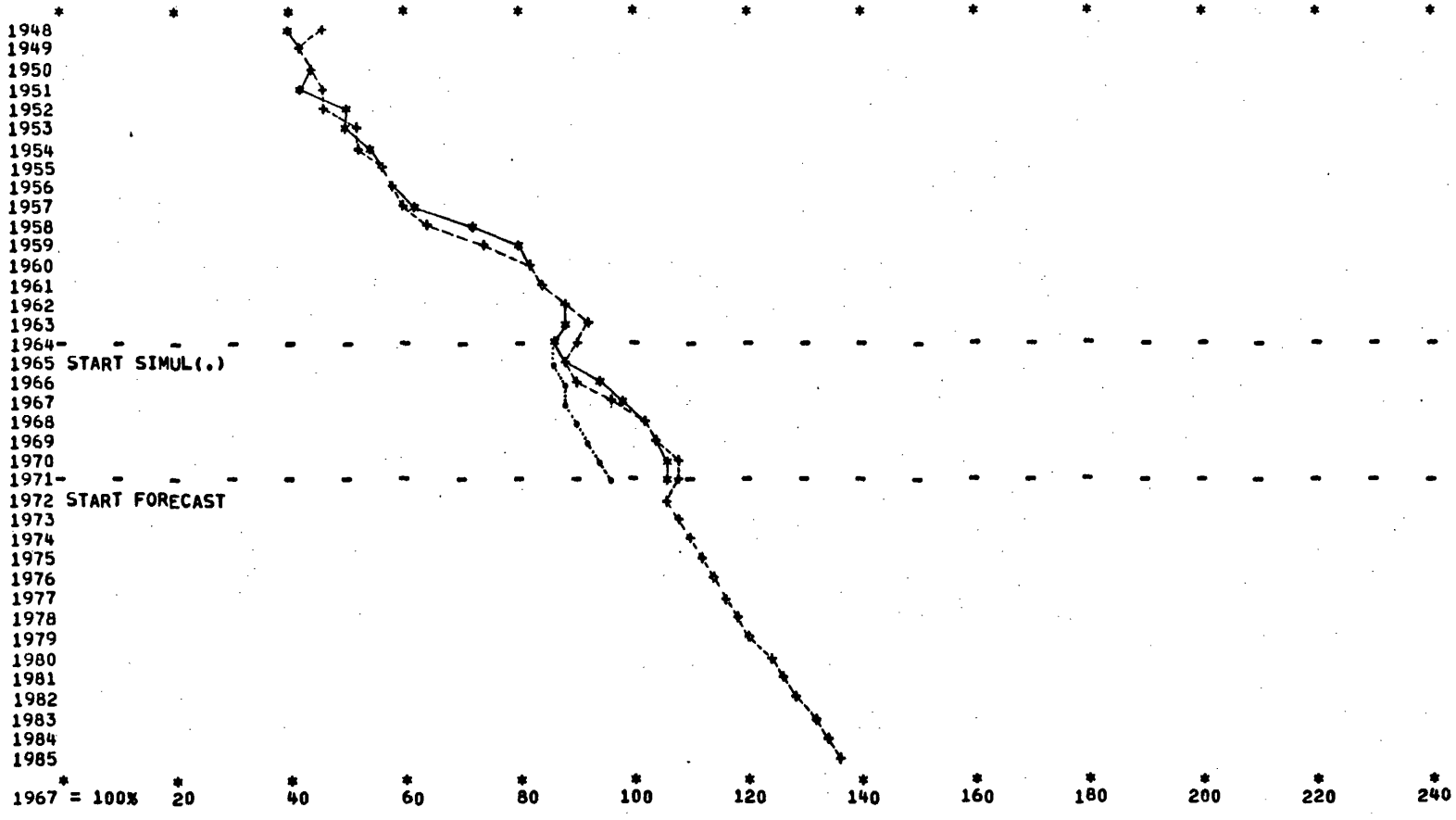


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 33 MISC FOOD PRODUCTS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	PCE(T-1)	DEL-INC	%TIME/PCE
.10000	-.00224	6.50820	2.97706	.33650	-90.62054	.77515	.00002	-.04297	.97770	-.00107	.00000
(.40000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	2770.	3213.	3549.	3670.	3784.	3976.	3910.	3833.	3939.	4173.	4421.	4581.	4683.	4696.	4713.
PCE PREDIC (+)	2736.	2891.	3333.	3668.	3794.	3904.	4091.	4027.	3948.	4051.	4282.	4526.	4683.	4777.	4803.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.2741	1.1924	1.0849	1.1048	1.0602	1.0239	1.0228	1.1171	1.0992	1.0590	1.0140	.9838	1.0000	1.0719	1.0603
DISPOSABLE INCOME	1839.0	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0
DIS-INCOME CHANGE	44.0	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0
POPULATION IN MILL.	169.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.
POPULATION AGE ADJ.	1.0208	1.0202	1.0176	1.0152	1.0124	1.0071	1.0063	1.0056	1.0022	1.0000	.9995	.9960	.9954	.9943	.9924

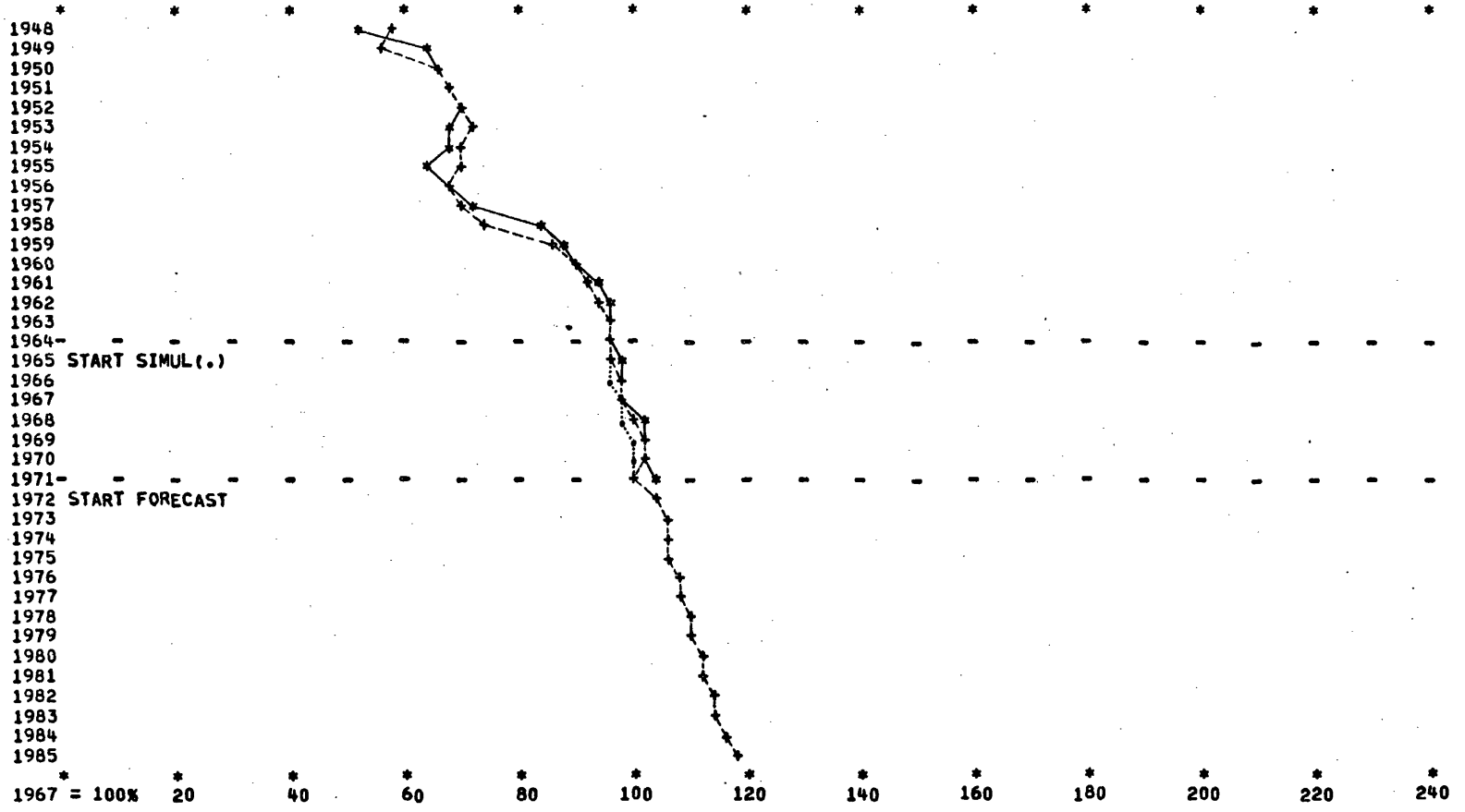


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 34 TOBACCO PRODUCTS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	PCE(T-1)	DEL-INC	%TIME/PCE
.00000	-.18641	1.07703	2.76686	.13864	176.59583	9.61300	.00000	-5.62701	.86656	.00000	.00000
(.35000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	4291.	5036.	5282.	5436.	5621.	5728.	5719.	5727.	5873.	5864.	5948.	6081.	6122.	5990.	6239.
PCE PREDIC (+)	4252.	4463.	5136.	5377.	5537.	5709.	5789.	5792.	5812.	5934.	5924.	6016.	6128.	6140.	6063.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.0278	1.0322	1.0232	1.0080	.9980	.9893	1.0059	1.0052	.9937	1.0002	1.0061	.9925	1.0000	1.0184	1.0020
DISPOSABLE INCOME	1839.0	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0
DIS-INCOME CHANGE	44.0	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0
POPULATION IN MILL.	169.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.
POPULATION AGE ADJ.	1.0251	1.0242	1.0209	1.0179	1.0151	1.0079	1.0069	1.0062	1.0025	1.0000	.9993	.9956	.9950	.9937	.9914

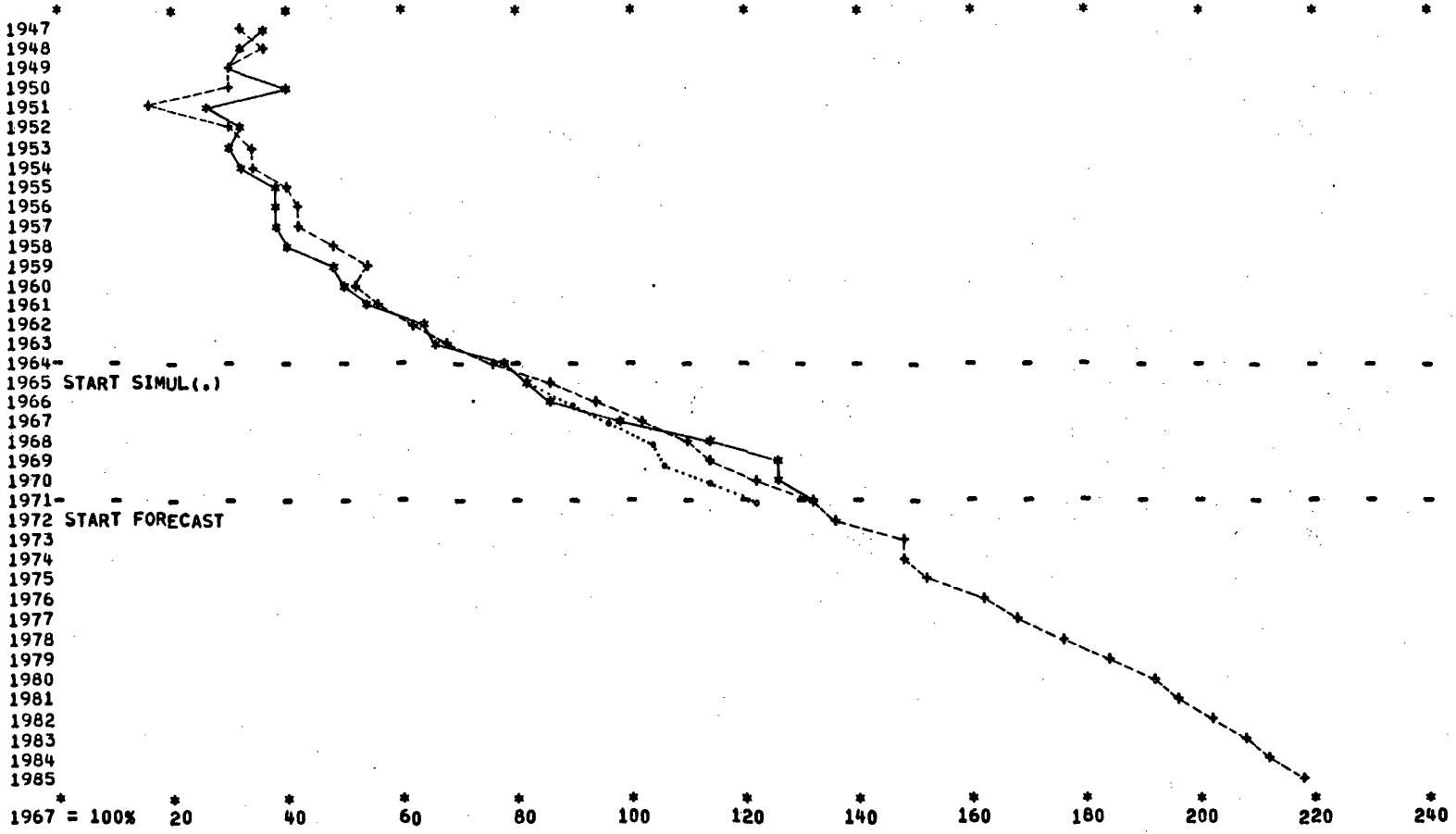


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 36 FLOOR COVERINGS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.85000	-1.21476	8.63323	6.78824	.52088	8.38861	1.13262	.00356	-3.37530	-.03906	.00266	-.49394
(1.85000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	490.	510.	606.	620.	676.	799.	830.	980.	1013.	1073.	1226.	1414.	1567.	1556.	1638.
PCE PREDIC (+)	533.	599.	673.	650.	708.	778.	837.	945.	1069.	1162.	1254.	1356.	1405.	1513.	1629.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.5068	1.3716	1.3548	1.3644	1.3237	1.3063	1.2562	1.2650	1.2019	1.1584	1.0768	1.0449	1.0000	.9395	.8702
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

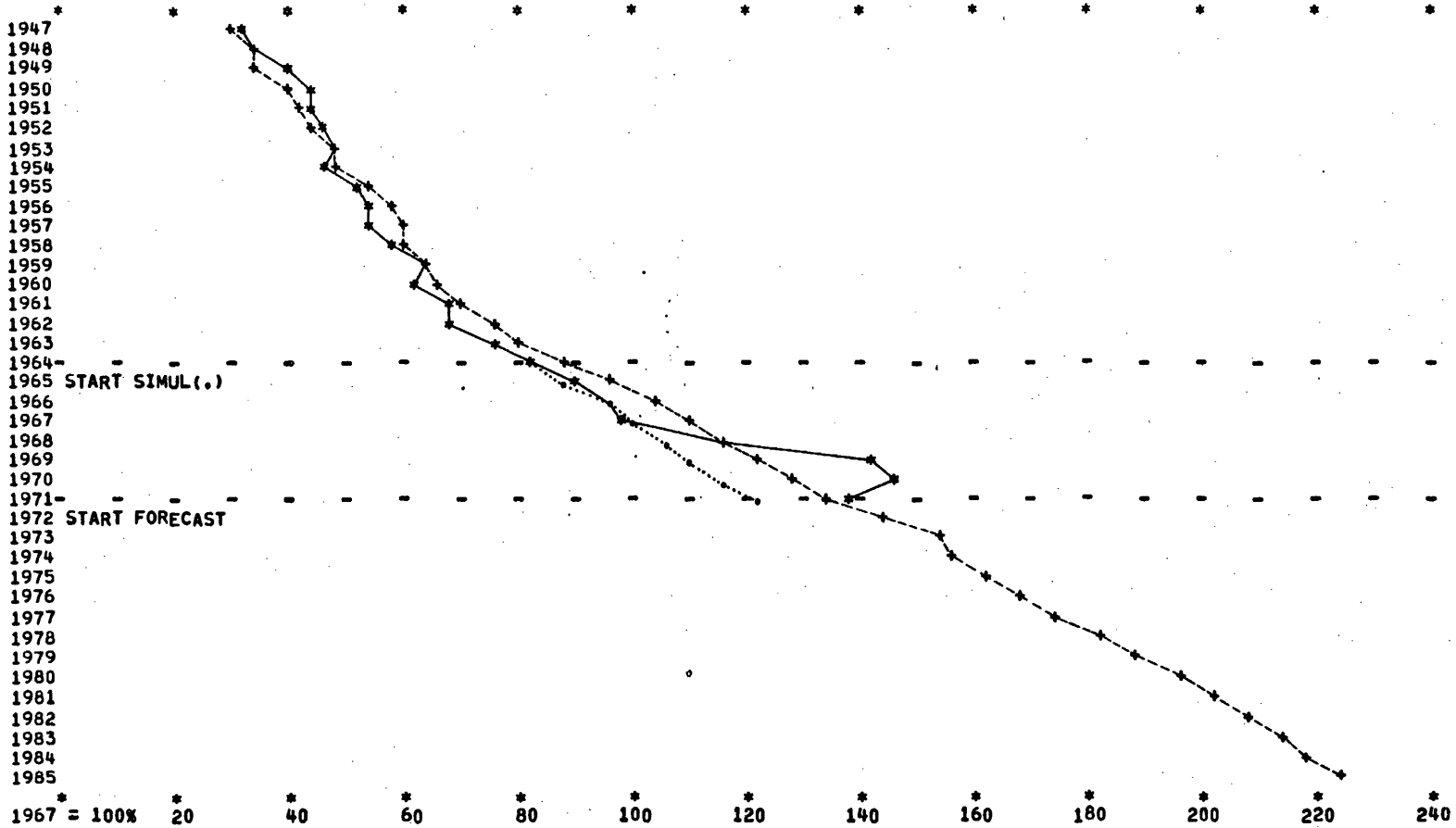


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 3_8 KNITTING

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.50000	.00000	10.70377	6.93707	.63821	30.75909	-1.37740	.00299	.00000	.04378	.00000	.63716
(1.19000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	197_0	1971
PCE ACTUAL (*)	575.	608.	665.	657.	70_0.	706.	791.	850.	927.	1002.	1027.	1210.	1467.	1503.	1423.
PCE PREDIC (+)	621.	633.	677.	698.	73_2.	784.	830.	913.	999.	1076.	1136.	1210.	1260.	1322.	1392.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.3670	1.3108	1.2875	1.2648	1.2491	1.2405	1.2080	1.1739	1.1570	1.1115	1.0677	1.0410	1.0000	.9450	.8591
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

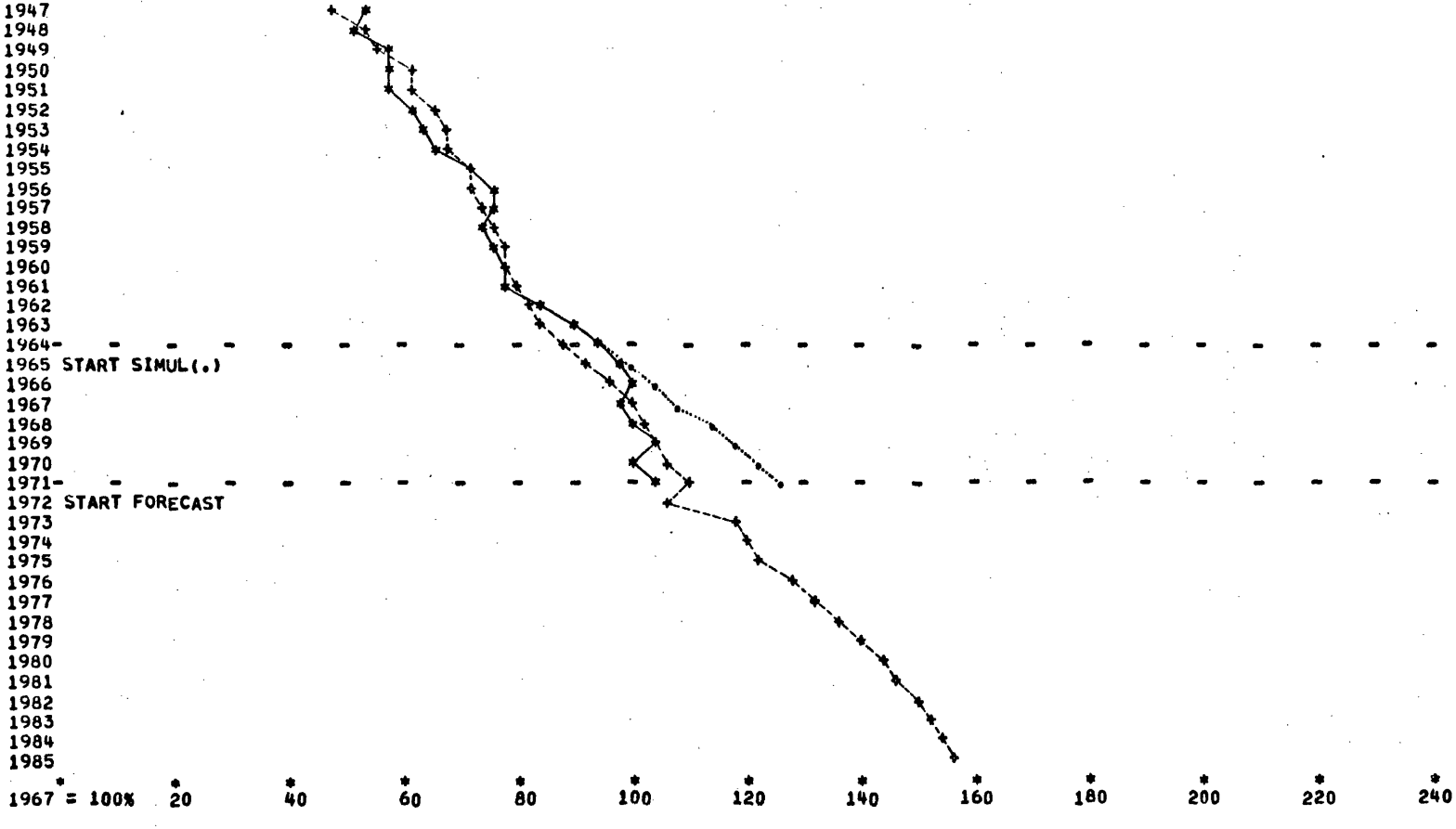


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 39 APPAREL

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.00000	-.90873	11.97973	3.58062	.69045	-1231.60962	51.39471	.03615	-60.90286	-1.49460	.00227	-1.86182
(1.19000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	12347.	11974.	12404.	12595.	12686.	13486.	14630.	15085.	15784.	16200.	15962.	16232.	16871.	16042.	16625.
PCE PREDIC (+)	12023.	12225.	12576.	12579.	12813.	13191.	13426.	14132.	14876.	15535.	15963.	16479.	16706.	17200.	17857.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.0855	1.0526	1.0464	1.0396	1.0298	1.0260	1.0239	1.0231	1.0179	1.0094	1.0026	1.0027	1.0000	.9889	.9723
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

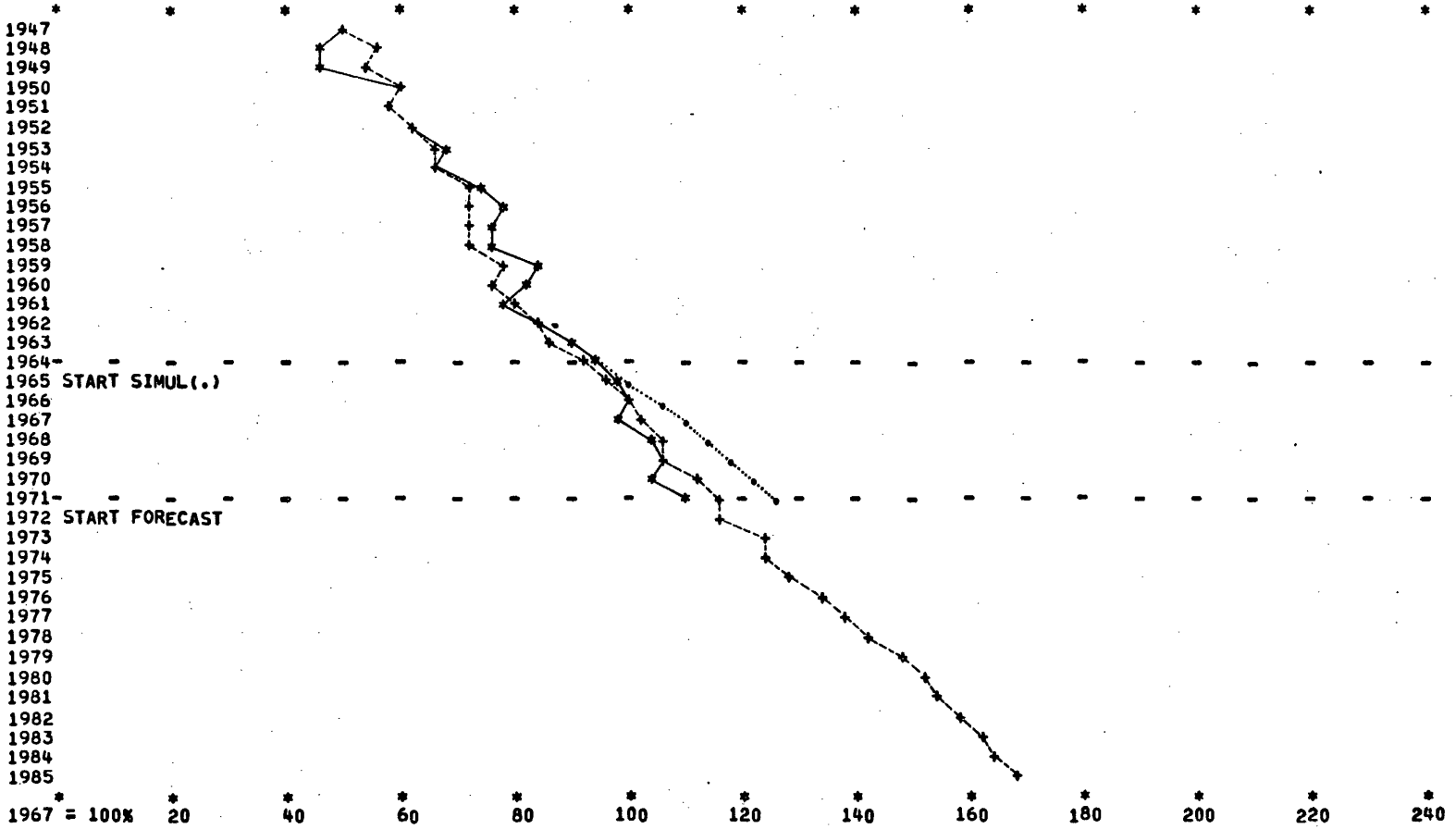


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 45 HOUSEHOLD FURNITURE

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
.70000 (.98000)	-.67143	10.46485	4.10235	.61012	-222.94568	16.13310	.00606	-11.08604	-.01697	.00715	-.08067

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	3009.	3003.	3351.	3234.	3074.	3332.	3530.	3714.	3884.	3960.	3912.	4103.	4182.	4094.	4353.
PCE PREDIC (+)	2838.	2883.	3065.	3048.	3149.	3288.	3369.	3642.	3824.	3942.	4005.	4164.	4211.	4403.	4575.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.0320	1.0111	1.0057	.9989	1.0006	1.0010	.9974	.9913	.9857	.9894	.9970	.9995	1.0000	.9817	.9709
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0246	1.0233	1.0197	1.0142	1.0123	1.0064	1.0054	1.0043	1.0020	1.0000	.9998	.9970	.9992	.9998	.9993

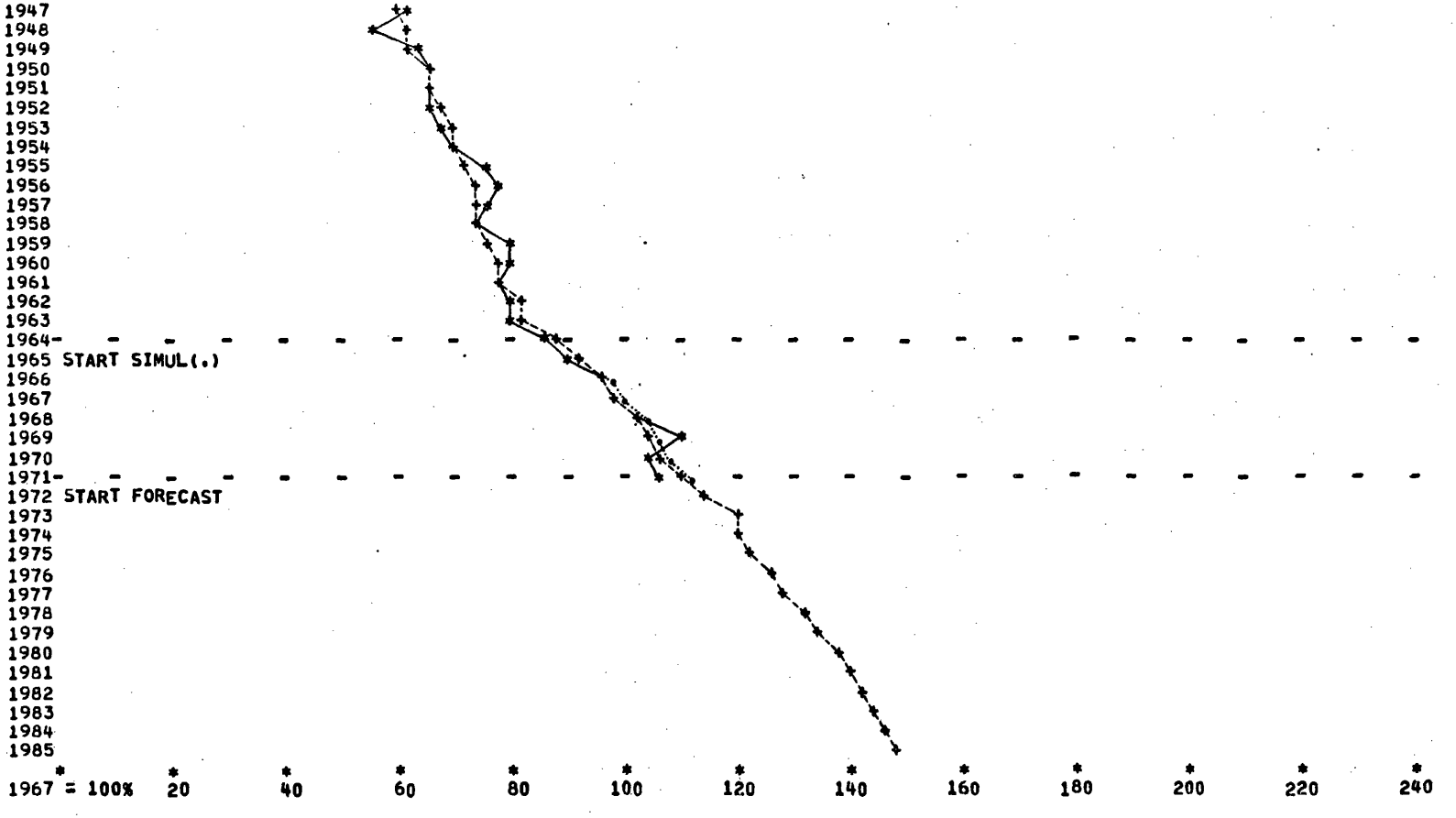


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 52 NEWSPAPERS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
.90000	.00000	2.78961	2.48582	.17925	-76.74487	-.02186	.00331	.00000	-.08570	.00000	-1.03121
(.49000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	1260.	1208.	1299.	1313.	1291.	1306.	1317.	1409.	1470.	1562.	1616.	1683.	1788.	1710.	1721.
PCE PREDIC (+)	1224.	1222.	1256.	1263.	1284.	1325.	1356.	1429.	1503.	1567.	1611.	1670.	1701.	1745.	1798.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	.9676	.9656	.9656	.9788	.9943	1.0070	1.0275	1.0303	1.0312	1.0185	1.0137	1.0055	1.0000	1.0134	1.0290
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

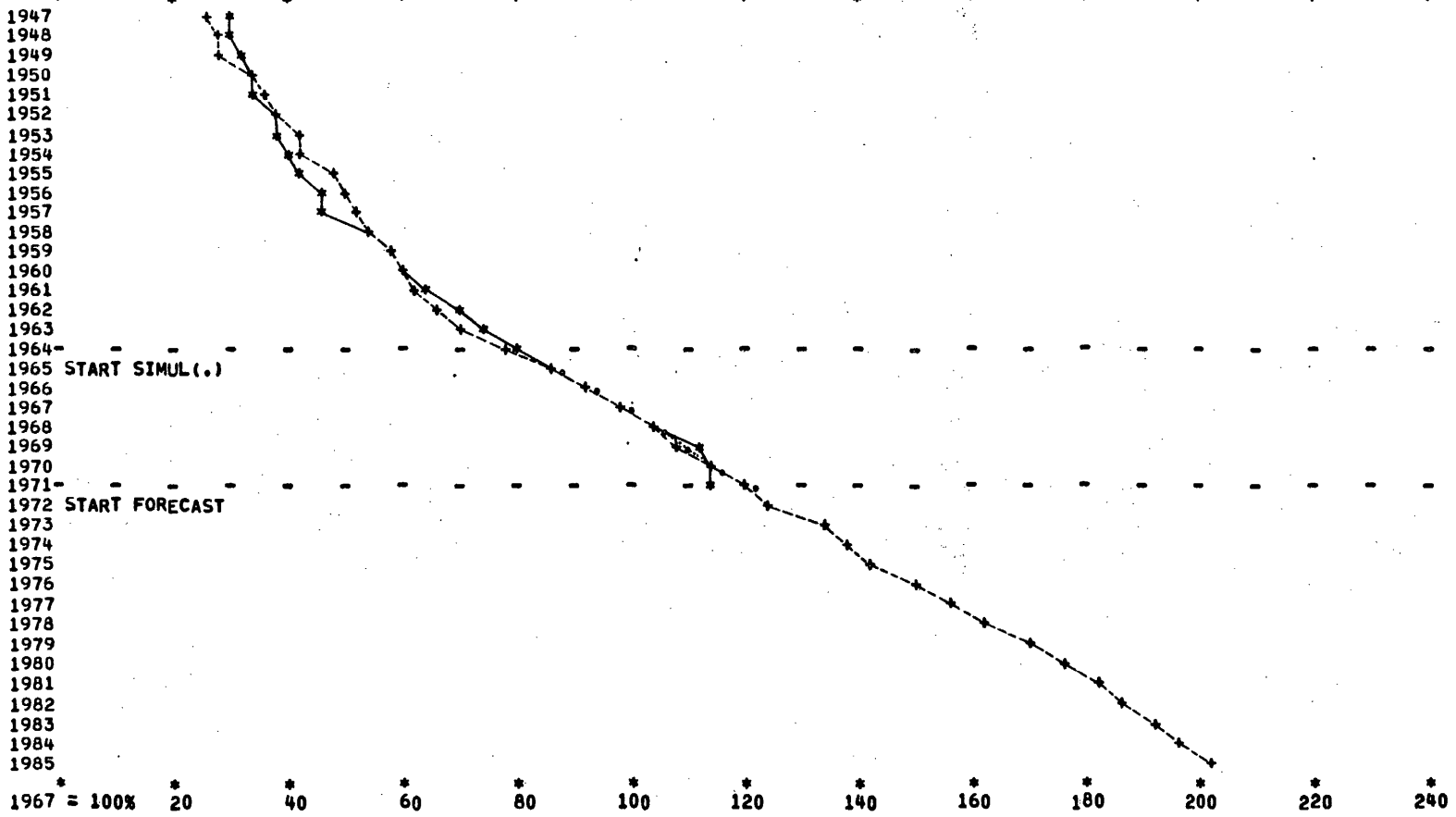


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 67 CLEANING AND TOILET PREPARATIONS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.40000 (.32000)	.00000	1.86460	3.38588	.62898	-282.21991	-6.02563	.01294	.00000	.20306	.00000	.73364

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	2371.	2683.	2963.	3049.	3243.	3481.	3762.	4028.	4304.	4623.	4957.	5200.	5565.	5782.	5732.
PCE PREDIC (+)	2648.	2699.	2895.	2983.	3133.	3363.	3561.	3924.	4296.	4632.	4897.	5218.	5437.	5707.	6014.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.1283	1.1243	1.1192	1.1023	1.0933	1.0785	1.0662	1.0645	1.0570	1.0412	1.0347	1.0163	1.0000	.9699	.9662
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

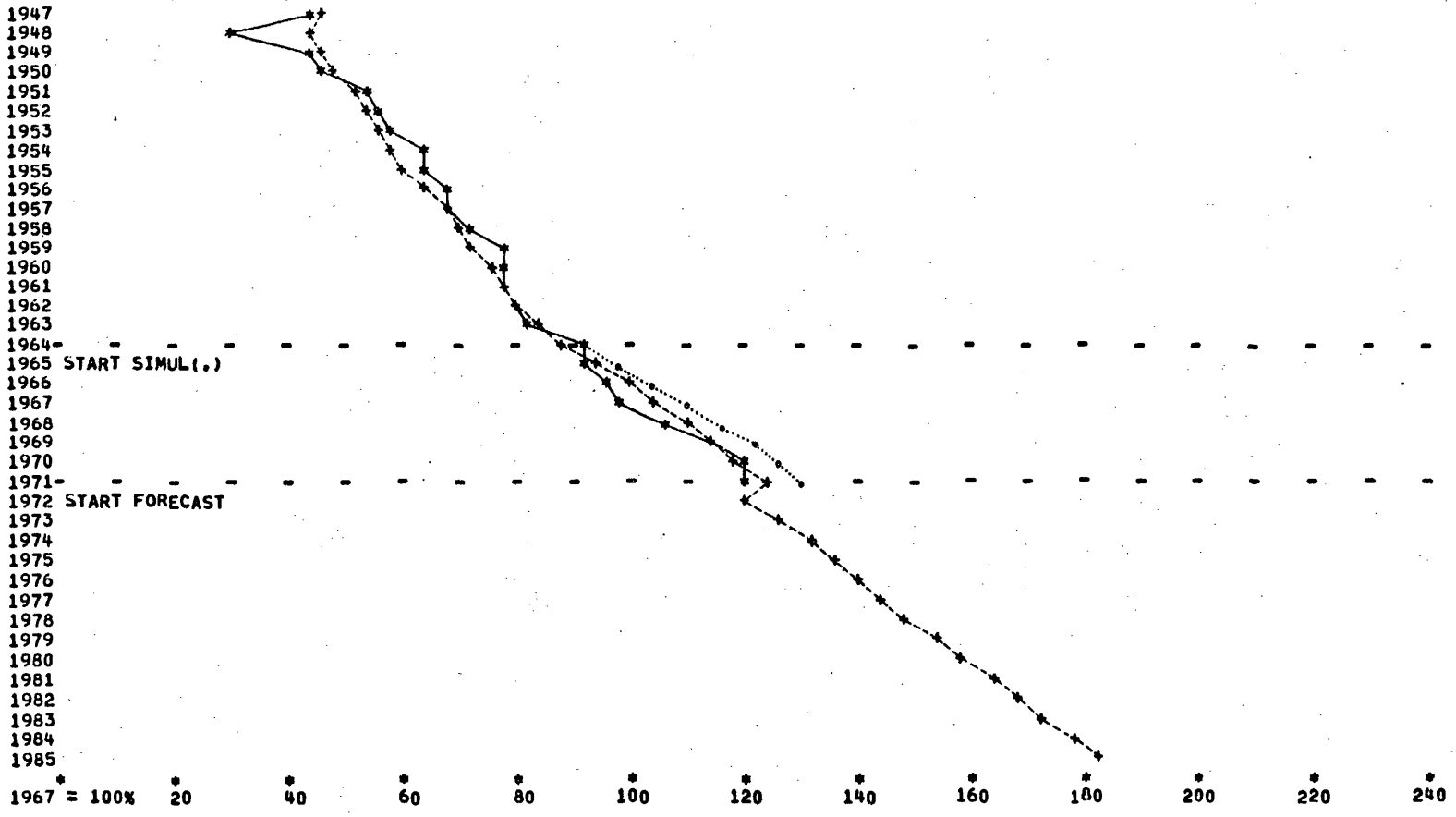


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 69 PETROLEUM REFINING AND RELATED PRODUCTS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
.80000	-.07938	7.68957	3.97490	.45053	-211.72461	11.60932	.01373	-2.17510	.29034	-.01373	.64836
(.68000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	5274.	5652.	5970.	6073.	6020.	6218.	6293.	7099.	7147.	7456.	7650.	8239.	8796.	9258.	9274.
PCE PREDIC (+)	5223.	5426.	5545.	5818.	5980.	6206.	6517.	6810.	7241.	7682.	8092.	8449.	8851.	9137.	9486.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.3815	1.2444	1.2185	1.2033	1.1954	1.1686	1.1378	1.0754	1.0947	1.1051	1.0955	1.0317	1.0000	.9609	.9739
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

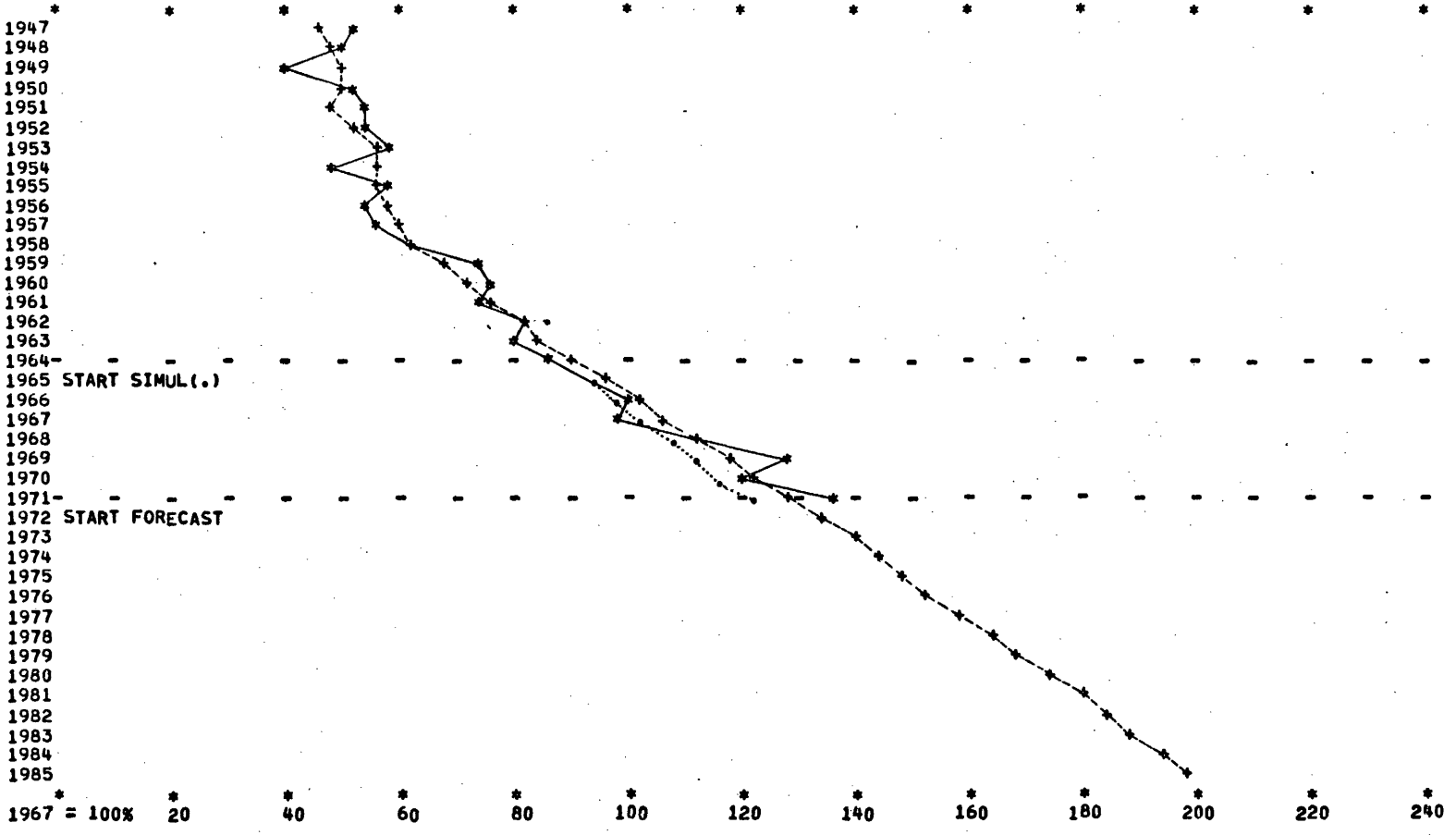


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 7_2 TIRES AND INNER TUBES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.00000	-.53609	5.64730	5.54556	.12192	146.77460	3.85183	.00331	-3.04469	.02503	-.00095	.24004
(.65000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	881.	974.	1186.	1201.	1162.	1292.	1269.	1355.	1493.	1573.	1568.	1761.	2013.	1896.	2159.
PCE PREDIC (+)	971.	996.	1085.	1157.	1206.	1297.	1338.	1435.	1531.	1612.	1683.	1768.	1861.	1913.	2012.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.3178	1.3001	1.2090	1.1371	1.1136	1.0497	1.0722	1.0458	1.0443	1.0574	1.0602	1.0488	1.0000	1.0175	.9813
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

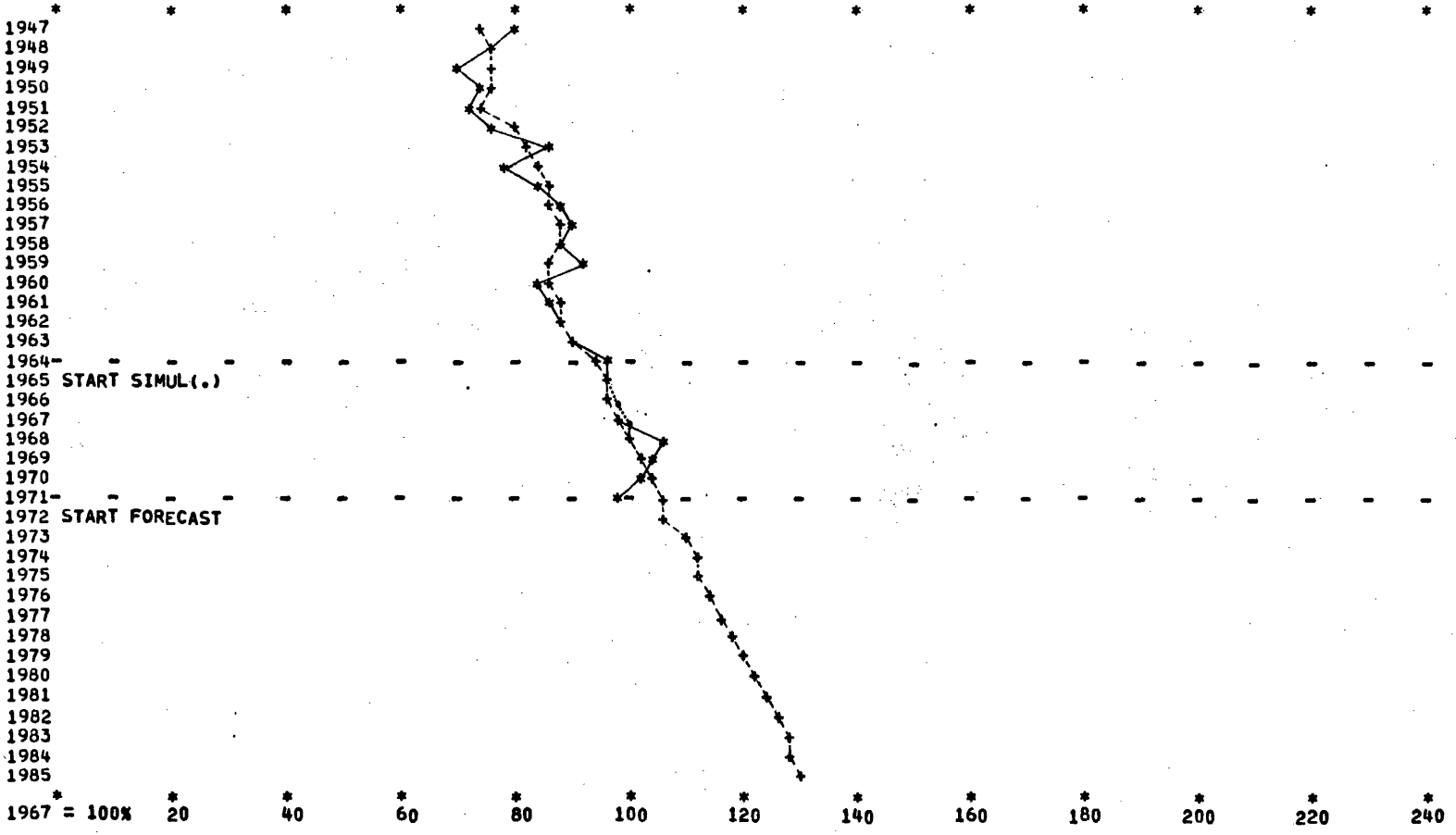


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 76 LEATHER FOOTWEAR

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
.70000 (.78000)	-.54970	2.68191	3.03660	.21705	-230.56693	11.10767	.00542	-8.51275	-.22859	-.00182	-1.47152

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	2903.	2849.	2986.	2743.	2765.	2872.	2905.	3074.	3106.	3175.	3200.	3410.	3345.	3267.	3170.
PCE PREDIC (+)	2824.	2848.	2804.	2802.	2826.	2848.	2915.	3021.	3109.	3135.	3189.	3231.	3271.	3333.	3400.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	.9223	.9059	.9501	.9614	.9547	.9574	.9447	.9344	.9403	.9792	.9874	.9977	1.0000	.9874	.9834
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0270	1.0266	1.0231	1.0210	1.0176	1.0089	1.0079	1.0077	1.0029	1.0000	.9987	.9937	.9910	.9883	.9852

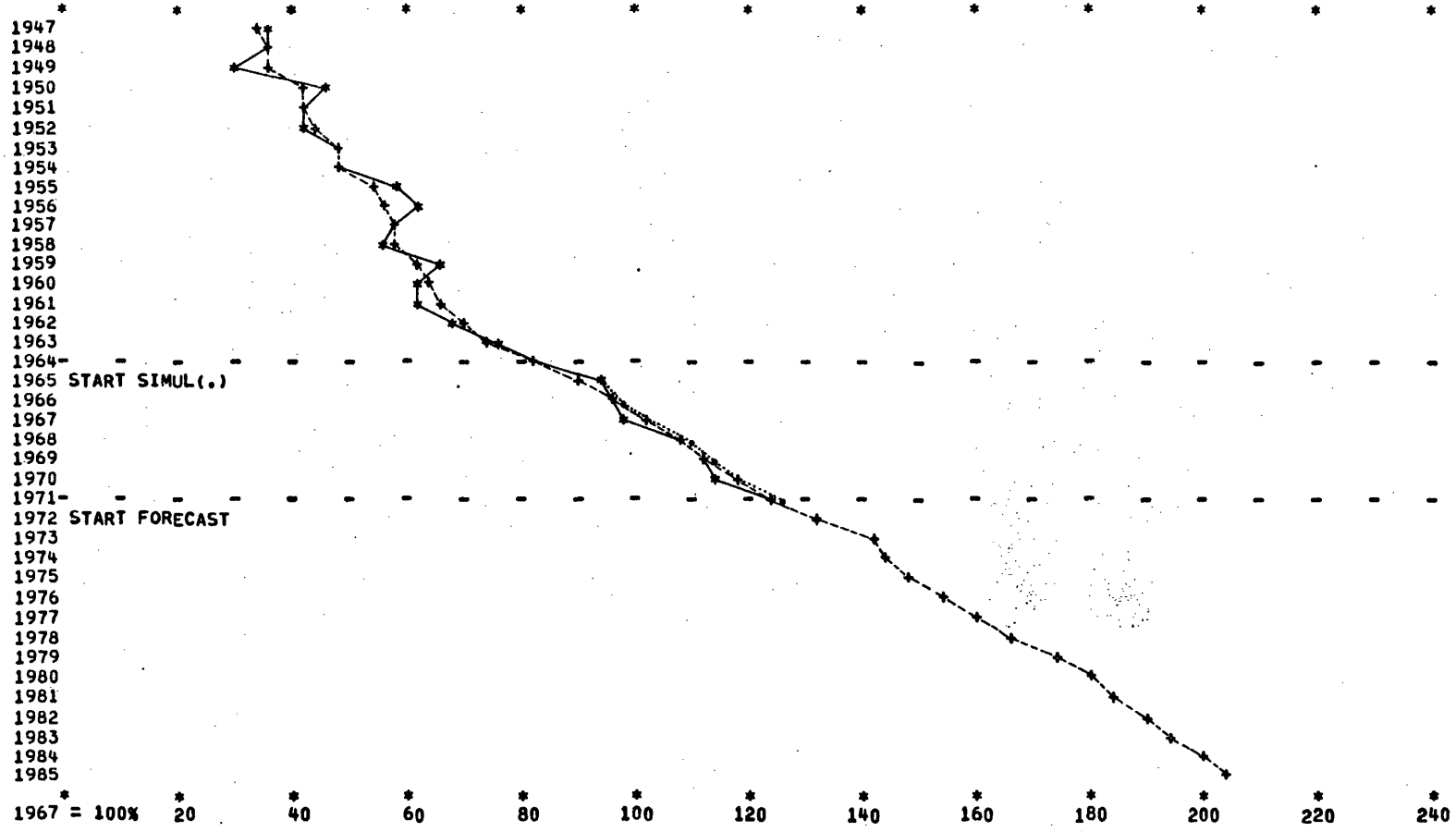


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 12_3 HOUSEHOLD APPLIANCES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.70000 (.51000)	.00000	1.94386	3.38281	.00768	-18.13049	-8.29207	.01145	.00000	.01033	.00000	.04632

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	2147.	2134.	2442.	2336.	2362.	2560.	2860.	3077.	3492.	3642.	3694.	4117.	4262.	4271.	4619.
PCE PREDIC (+)	2183.	2195.	2335.	2379.	2477.	2644.	2782.	3065.	3356.	3615.	3810.	4055.	4209.	4408.	4637.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.3259	1.3224	1.3083	1.2427	1.1998	1.1738	1.1368	1.1136	1.0794	1.0535	1.0411	1.0264	1.0000	.9836	.9659
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

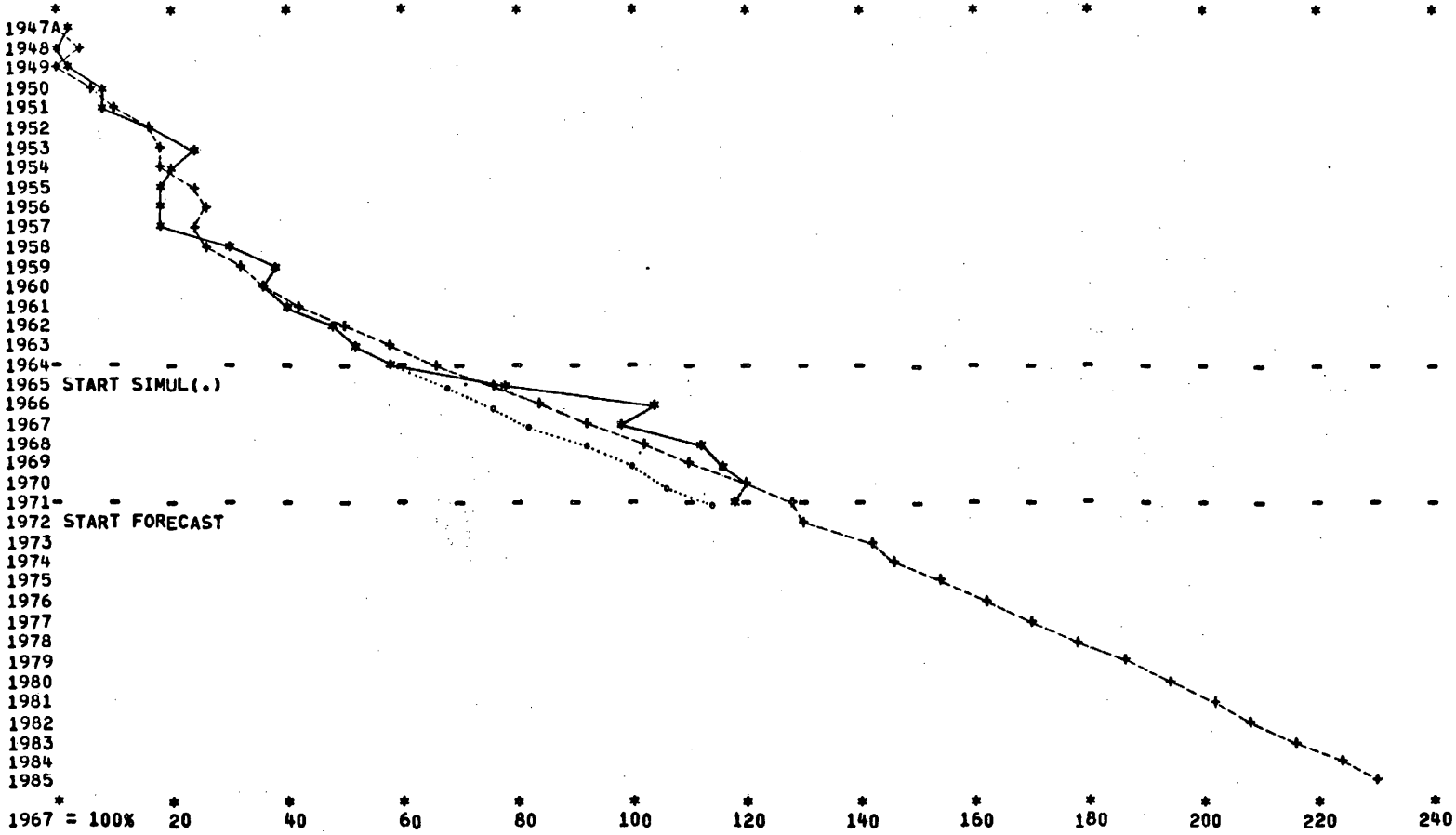


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 125 RADIO AND TV RECEIVING

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.70000	-1.97797	13.06398	11.00668	.46143	-273.19336	11.15586	.00615	-9.54871	.23755	.00245	1.30566
(.61000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	602.	983.	1232.	1178.	1269.	1518.	1650.	1875.	2467.	3289.	3156.	3548.	3699.	3403.	3768.
PCE PREDIC (+)	811.	853.	1068.	1186.	1360.	1636.	1843.	2131.	2418.	2695.	2926.	3240.	3516.	3799.	4041.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.5649	1.5593	1.5147	1.4699	1.4303	1.3587	1.3080	1.2777	1.2355	1.1859	1.1409	1.0803	1.0000	.9455	.9192
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

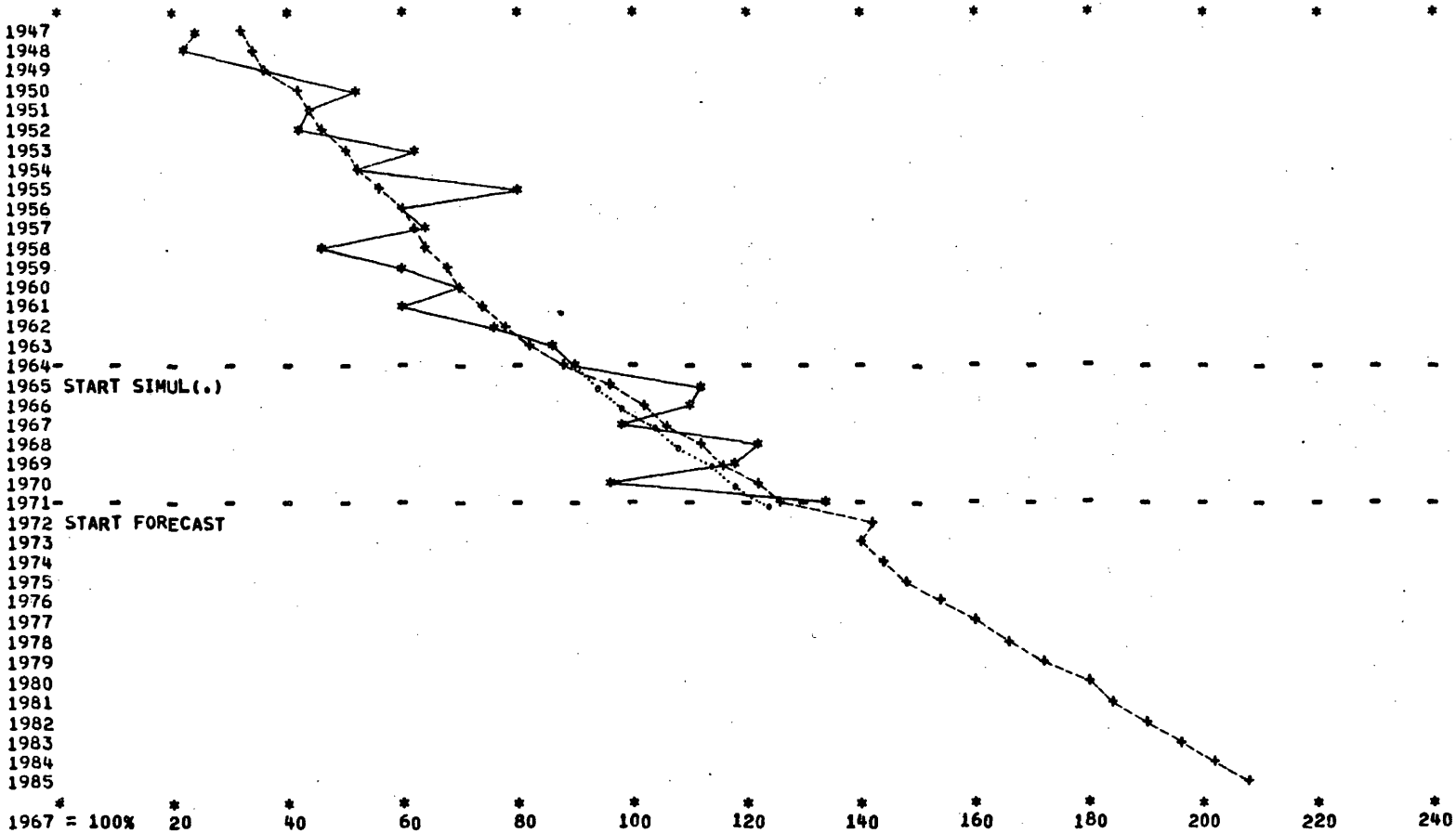


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 13_3 MOTOR VEHICLES AND PARTS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.00000	.00000	10.55532	10.97440	.02292	1249.99927	28.90481	.03283	.00000	1.64434	.00000	1.3_0276
(1.13000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	197_0	1971
PCE ACTUAL (*)	12746.	9050.	11769.	13918.	11669.	$15_063.$	16872.	17550.	21936.	21481.	19400.	23775.	23224.	18873.	26009.
PCE PREDIC (+)	12270.	12683.	13446.	13921.	14601.	15405.	16208.	17445.	18664.	19790.	20762.	21822.	22702.	23679.	24759.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.1453	1.1488	1.1545	1.1086	1.0969	1.0_788	1.0611	1.0462	1.0433	1.0231	1.0183	1.0151	1.0000	.9987	1.0281
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0232	1.0223	1.0189	1.0146	1.0129	1.0061	1.0052	1.0047	1.0021	1.0000	.9993	.9961	.9966	.9961	.9950

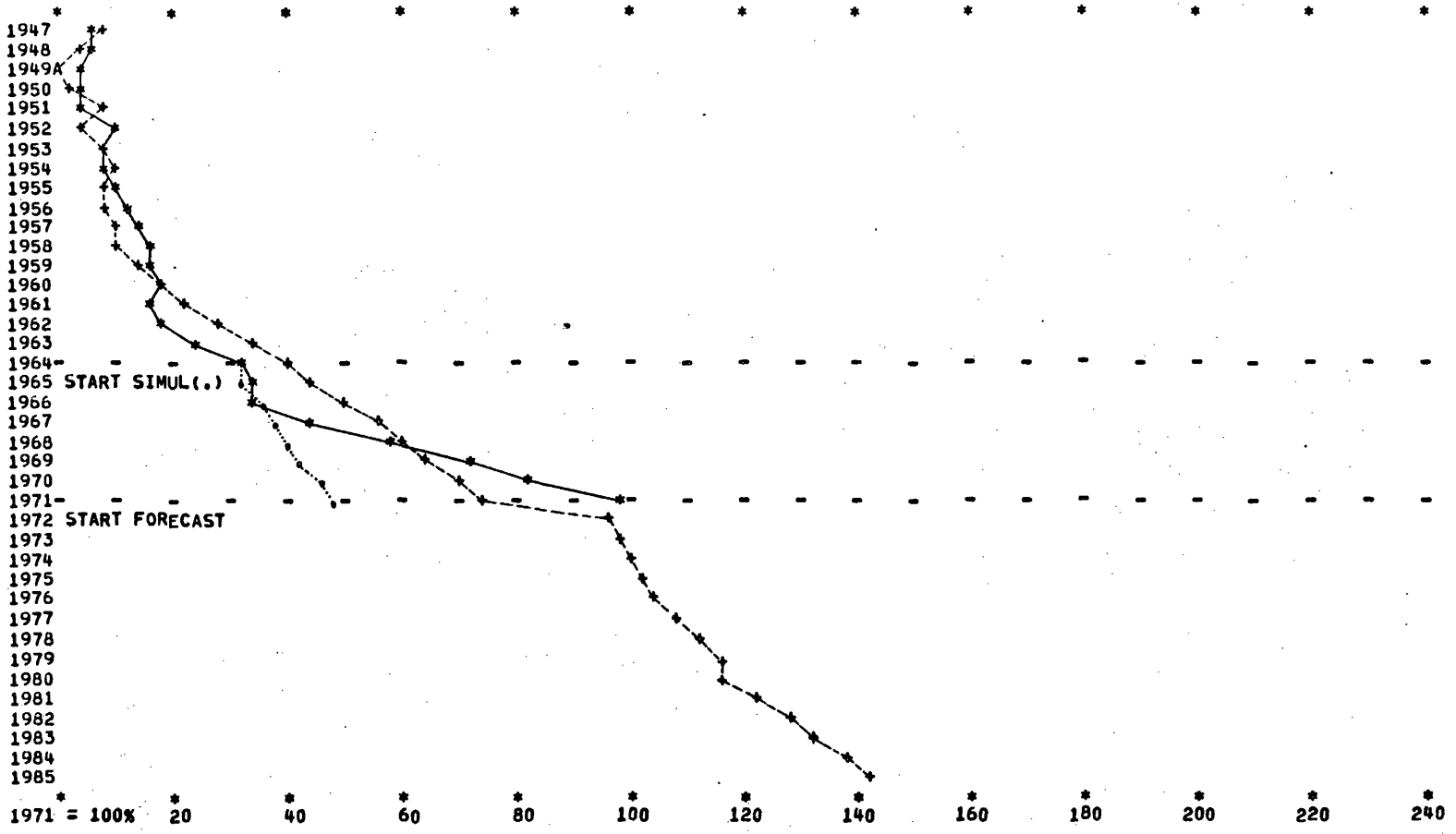


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 140 TRAILER COACHES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.80000	-8.20978	33.34552	23.61292	.79536	609.07465	19.75538	.00211	-16.90830	.26473	-.00211	2.16649
(1.80000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	377.	411.	428.	463.	412.	465.	653.	859.	894.	890.	1162.	1510.	1841.	2117.	2531.
PCE PREDIC (+)	262.	296.	379.	485.	590.	728.	906.	1022.	1158.	1300.	1424.	1532.	1647.	1788.	1921.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.1203	1.1266	1.1147	1.1038	1.0889	1.0668	1.0376	1.0272	1.0192	1.0105	1.0057	1.0023	1.0000	.9848	.9765
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

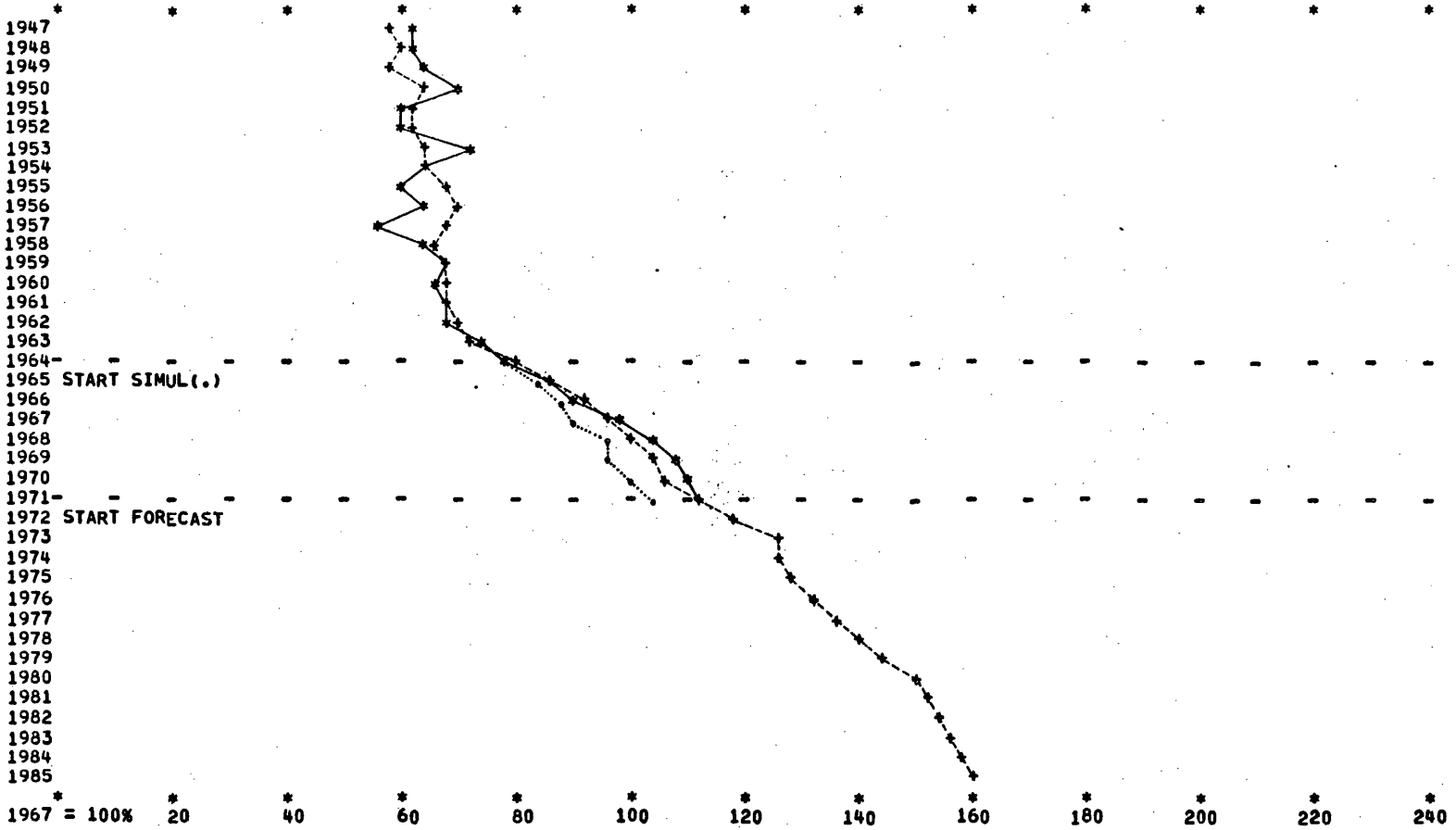


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 147 JEWELRY AND SILVERWARE

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
2.00000	.00000	6.94879	4.28497	.40990	12.57310	-7.74135	.00632	.00000	-.21730	.00000	-2.46257
(1.48000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	937.	1048.	1101.	1082.	1109.	1118.	1211.	1286.	1411.	1475.	1617.	1687.	1760.	1788.	1827.
PCE PREDIC (+)	1122.	1089.	1125.	1106.	1115.	1162.	1191.	1300.	1413.	1506.	1564.	1649.	1683.	1742.	1815.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	.9981	.9665	.9586	.9711	.9684	.9780	.9896	.9611	.9715	.9828	.9894	1.0144	1.0000	.9958	1.0047
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

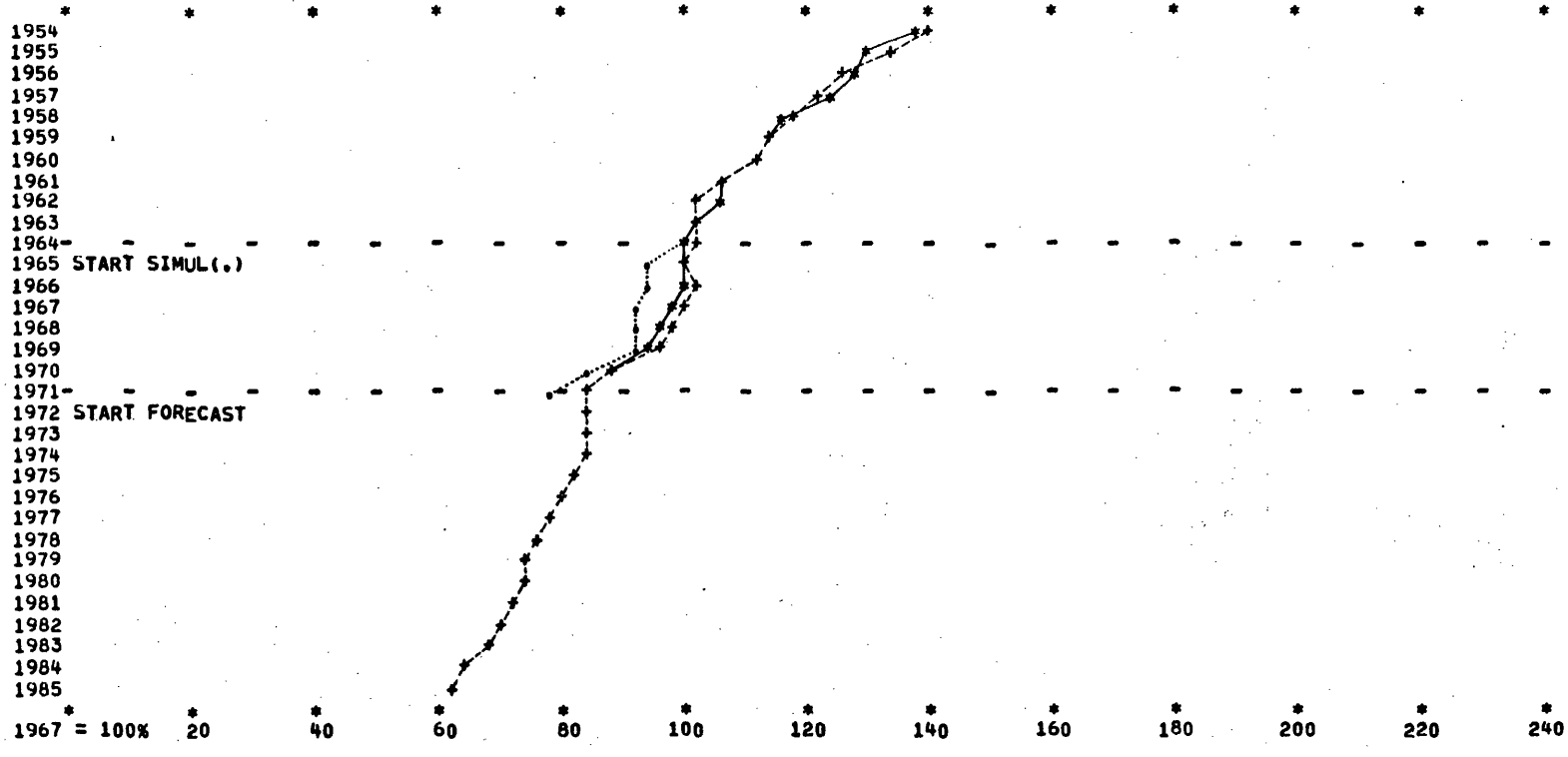


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (72-85) DATE 072573 PAGE

SECTOR NUMBER 152 BUSSES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	PCE(T-1)	DEL-INC	%TIME/PCE
.50000 (.20000)	-.95834	17.38417	1.20645	.09185	27.07236	19.69900	.00315	-18.20302	.27209	-.00433	.00000

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	3592.	3320.	3278.	3243.	3073.	3029.	2956.	2912.	2900.	2894.	2857.	2767.	2730.	2547.	2451.
PCE PREDIC (+)	3511.	3402.	3284.	3221.	3043.	2934.	2957.	2938.	2906.	2921.	2863.	2805.	2785.	2532.	2424.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	.7966	.8071	.8306	.8470	.8697	.8916	.8946	.9046	.9140	.9296	.9634	.9793	1.0000	1.0731	1.1139
DISPOSABLE INCOME	1657.0	1657.0	1678.0	1726.0	1714.0	1795.0	1839.0	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0
DIS-INCOME CHANGE	111.0	.0	21.0	48.0	-12.0	81.0	44.0	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0
POPULATION IN MILL.	152.	155.	158.	160.	163.	166.	169.	172.	175.	178.	181.	184.	187.	189.	192.
POPULATION AGE ADJ.	1.0212	1.0205	1.0172	1.0136	1.0122	1.0055	1.0046	1.0043	1.0019	1.0000	.9993	.9964	.9965	.9958	.9946

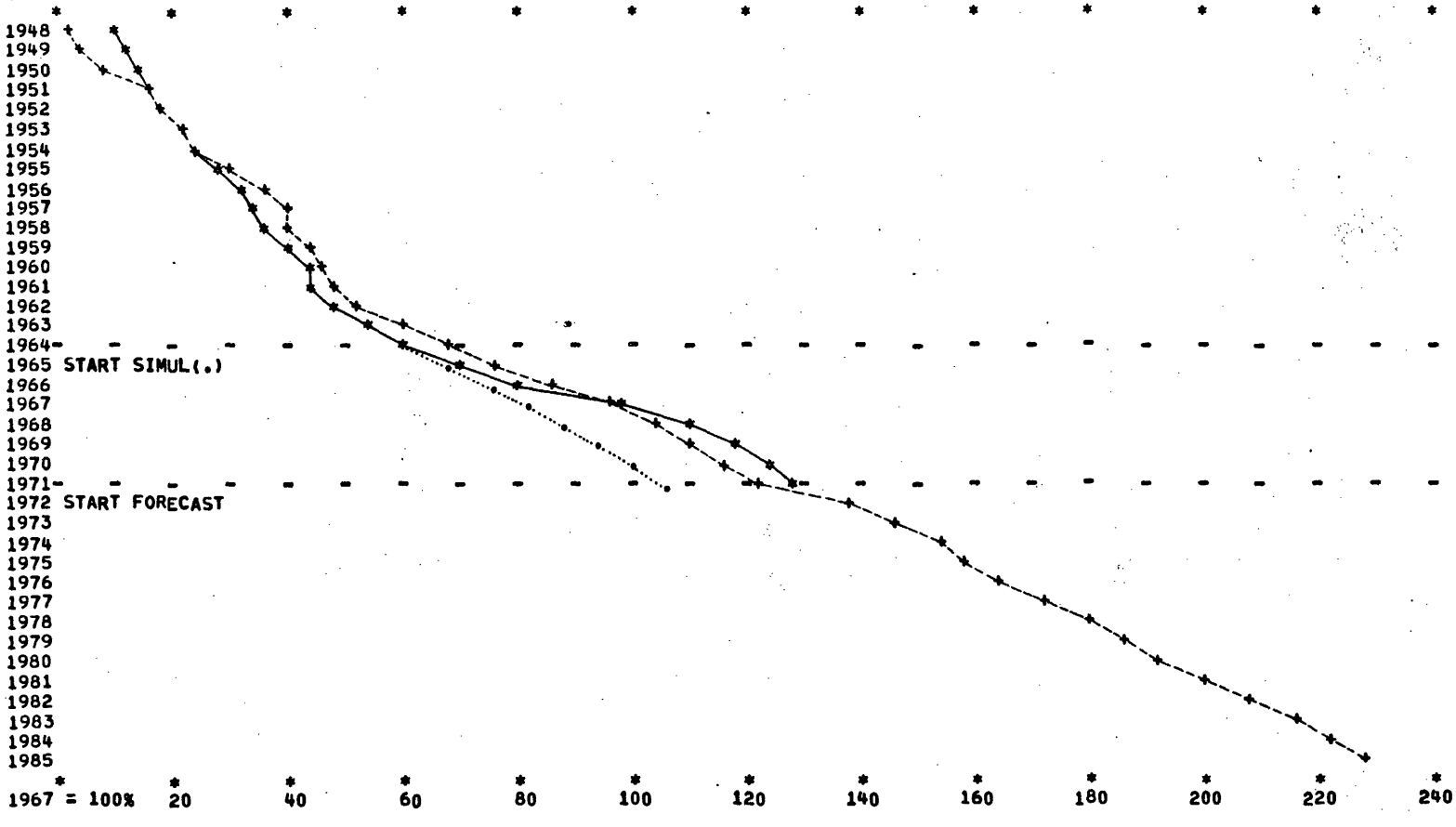


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 15_5 AIRLINES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
2.00000 (1.90000)	-1.12544	11.98960	8.34270	.87540	172.78000	3.49795	.00640	-6.03100	.27345	-.00248	1.76527

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	888.	914.	1036.	1099.	1122.	1221.	1367.	1526.	1764.	2017.	2482.	2738.	2962.	3121.	3208.
PCE PREDIC (+)	1013.	1041.	1108.	1165.	1211.	1298.	1506.	1689.	1917.	2182.	2413.	2615.	2755.	2885.	3035.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.0138	1.0417	1.0676	1.0996	1.1396	1.1731	1.1065	1.1023	1.0898	1.0401	.9963	.9802	1.0000	1.0233	1.0511
DISPOSABLE INCOME	1839.0	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0
DIS-INCOME CHANGE	44.0	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0
POPULATION IN MILL.	169.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.
POPULATION AGE ADJ.	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

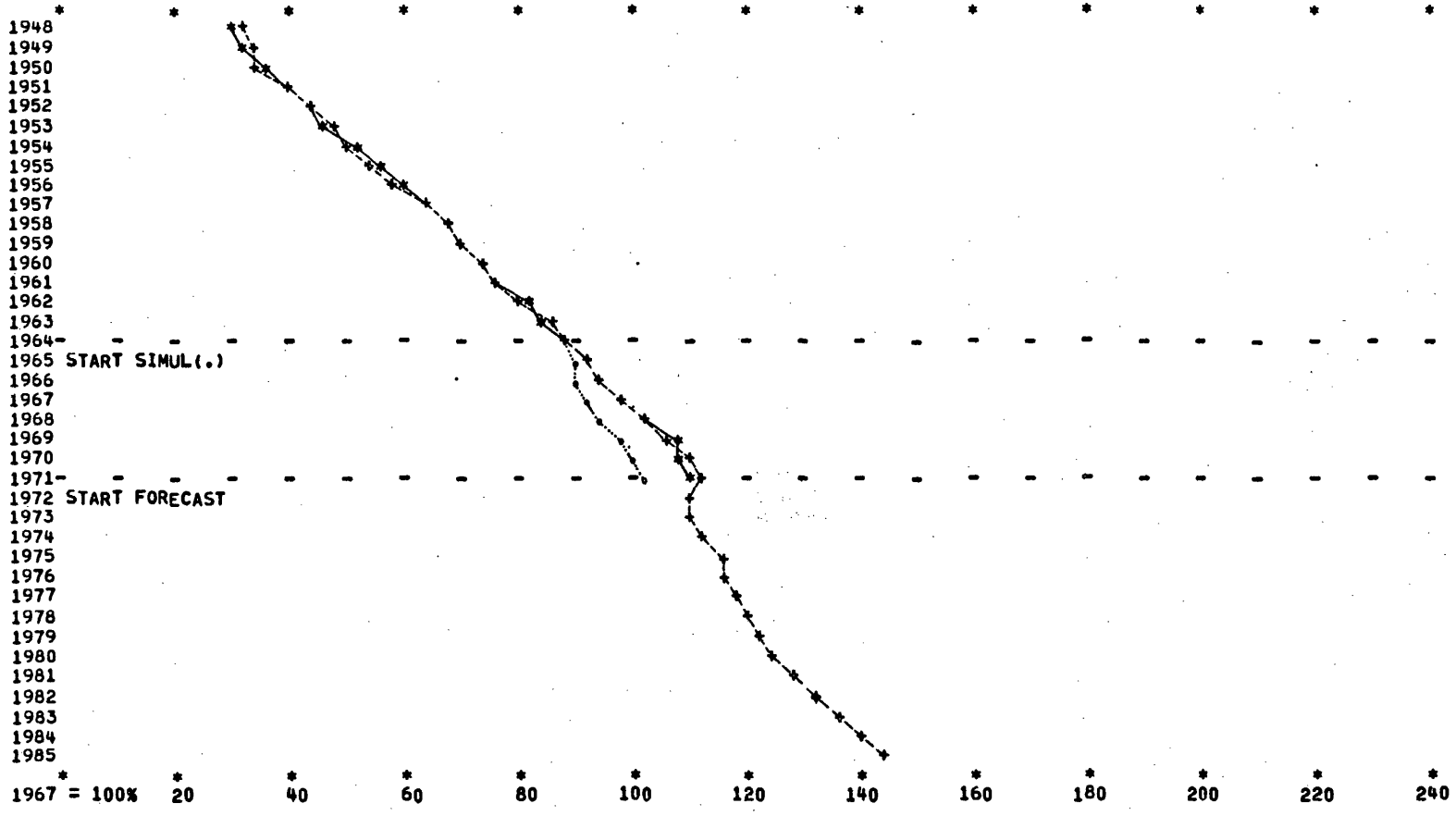


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 161 NATURAL GAS

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	PCE(T-1)	DEL-INC	%TIME/PCE
.75000	-.00366	3.98735	1.43137	.09269	-96.75604	.80980	.00036	-.06147	.95269	-.00728	.00000
(.75000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	197_0	1971
PCE ACTUAL (*)	2976.	3138.	3280.	3406.	3573.	3816.	3945.	4111.	4241.	4388.	4592.	4733.	4975.	5028.	5093.
PCE PREDIC (+)	3003.	3131.	3294.	3434.	3564.	3728.	3965.	4099.	4266.	4397.	4545.	4748.	4888.	5120.	5190.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	1.0286	1.0647	1.0866	1.1402	1.1448	1.1328	1.1209	1.1102	1.0988	1.0790	1.0499	1.0233	1.0000	1.0078	1.0409
DISPOSABLE INCOME	1839.0	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0
DIS-INCOME CHANGE	44.0	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0
POPULATION IN MILL.	169.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.
POPULATION AGE ADJ.	1.0162	1.0157	1.0139	1.0137	1.0108	1.0065	1.0057	1.0051	1.0019	1.0000	.9998	.9970	.9957	.9942	.9918

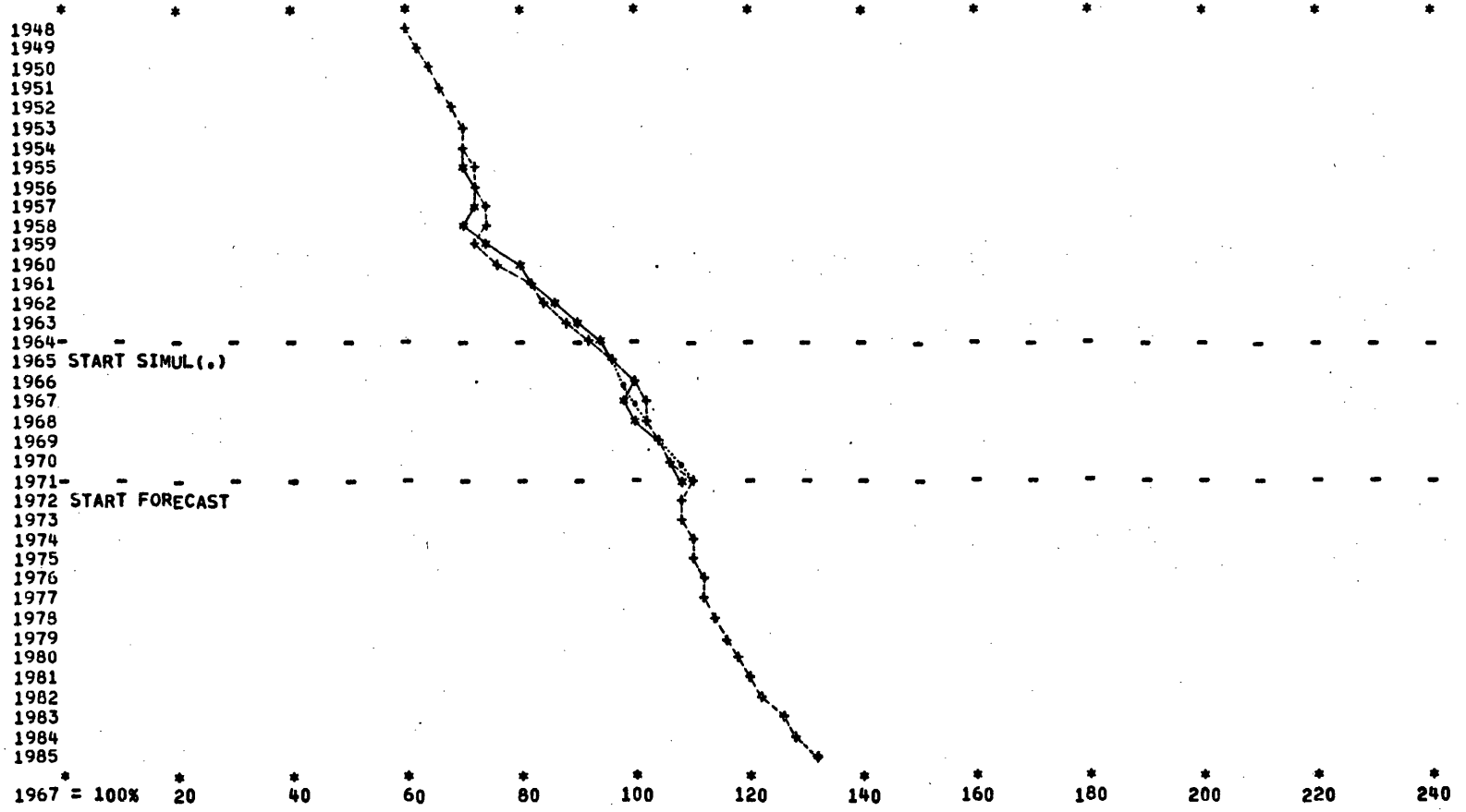


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 162 WATER AND SEWER SERVICES

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	PCE(T-1)	DEL-INC	%TIME/PCE
.75000	-.01851	2.47749	1.54228	.33336	-45.45792	.34364	.00027	-.18327	.92438	-.00206	.00000
(.72000)											

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	1474.	1418.	1513.	1624.	1678.	1774.	1840.	1917.	1971.	2019.	2018.	2053.	2112.	2178.	2186.
PCE PREDIC (+)	1524.	1503.	1467.	1547.	1661.	1721.	1809.	1894.	1971.	2022.	2065.	2073.	2099.	2160.	2231.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	.8364	.8649	.8858	.8995	.9122	.9262	.9504	.9474	.9605	.9680	.9688	.9777	1.0000	1.0284	1.0967
DISPOSABLE INCOME	1839.0	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0
DIS-INCOME CHANGE	44.0	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0
POPULATION IN MILL.	169.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.
POPULATION AGE ADJ.	1.0162	1.0157	1.0139	1.0137	1.0108	1.0065	1.0057	1.0051	1.0019	1.0000	.9998	.9970	.9957	.9942	.9918

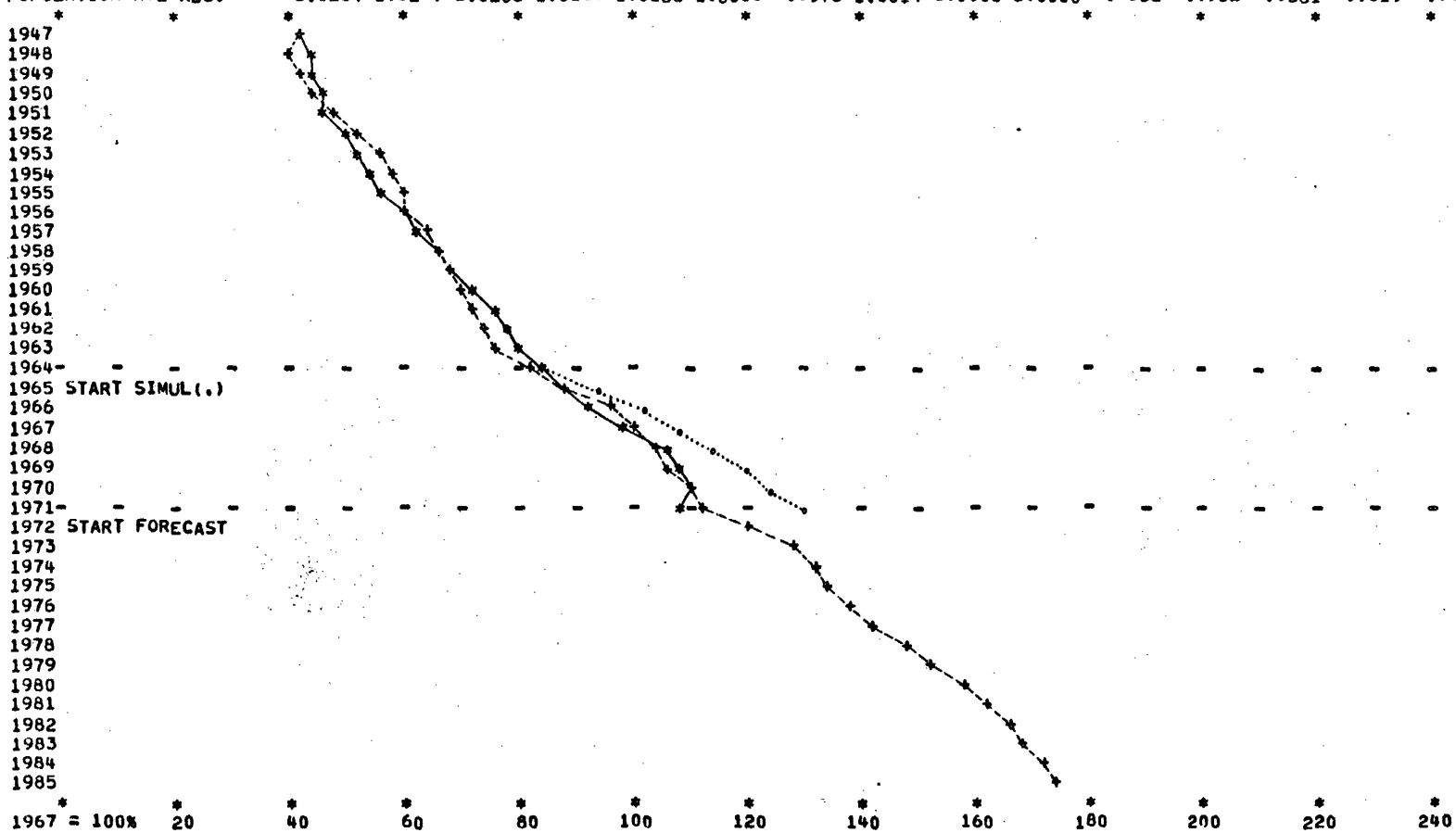


I*N*F*O*R*U*M PCE-EQUATION SIMULATION (65-71) AND FORECAST (7_2-85) DATE 072573 PAGE

SECTOR NUMBER 176 PRIVATE SCHOOLS AND NONPROFIT ORGANIZATIO

INCOM-ELAS	PRICE-ELAS	SIMFIT	REGFIT	RHO	LAST-ERR	CONSTANT	INCOME	PRICE	TIME	DEL-INC	%TIME/PCE
1.80000 (2.36000)	-2.95047	11.55527	2.86956	.74999	-572.75806	172.25739	.07128	-252.19657	1.45238	-.03015	1.44448

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
PCE ACTUAL (*)	11713.	12427.	12973.	13643.	14113.	14524.	14871.	15751.	16607.	17388.	18564.	19762.	20162.	20582.	20419.
PCE PREDIC (+)	12074.	12530.	12670.	13272.	13609.	13907.	14310.	15452.	16590.	17857.	18734.	19532.	19882.	20679.	20992.
DECLINING WEIGHTS	.9250	.9305	.9361	.9418	.9474	.9531	.9589	.9646	.9704	.9763	.9822	.9881	.9940	1.0000	1.0000
RELATIVE PRICE VARIABLE	.8625	.8620	.8741	.8766	.8844	.8966	.9118	.9226	.9403	.9534	.9668	.9806	1.0000	1.0086	1.0327
DISPOSABLE INCOME	1844.0	1831.0	1881.0	1883.0	1909.0	1968.0	2013.0	2123.0	2235.0	2331.0	2398.0	2486.0	2534.0	2603.0	2679.0
DIS-INCOME CHANGE	5.0	-13.0	50.0	2.0	26.0	59.0	45.0	110.0	112.0	96.0	67.0	88.0	48.0	69.0	76.0
POPULATION IN MILL.	172.	175.	178.	181.	184.	187.	189.	192.	195.	197.	199.	201.	203.	205.	207.
POPULATION AGE ADJ.	1.0234	1.0267	1.0203	1.0165	1.0158	1.0005	.9978	1.0014	1.0003	1.0000	.9966	.9902	.9861	.9819	.9806



CHAPTER V

SIMULATION WITH THE EMPLOYMENT EQUATIONS

In the two preceding chapters we discussed the forecasting performance of the consumption and investment equations. Since together they account for over 75 percent of total final demand, they play the most important role in forecasting with the model. Most of the remaining final demand components, such as construction expenditures by different agents, state and local government expenditures, imports and exports, and inventory changes, are also predicted via stochastically fitted equations; however, the testing of their forecasting behavior will be delayed until the simulation of the complete model is conducted. The remaining set of equations with major implication for the model deals with employment. The forecast accuracy of these equations is quite important, for they determine the potential growth of the economy.

A. Description of the Employment Equations

Once total final demand is known, the I-O system can be solved for outputs (See Figure I-2). As pointed out already, the only binding growth constraint in forecasting output is the labor input. Hence, as soon as the output is determined, the model checks whether or not the labor force is adequate to produce the predicted level of output. If not, the exogenous assumptions, in particular the disposable income forecast must be altered. But to determine the required labor force, the model must know the productivity of labor (output per manhour). That is, if the long-term growth of output were 5 percent

while the labor force is increasing at only 2 percent, the gap of 3 percent would have to be filled by gains in productivity. The employment or labor productivity equations are therefore of vital importance in the INFORUM model.

Productivity is expressed by the labor required to produce one unit of output.[1] A large number of different approaches seem to offer themselves for the estimation of this variable. Probably, the most obvious would be the use of production functions. An earlier version of the model had tried this approach unsuccessfully.[2] These equations were discarded because they had consistently wrong signs on the capital variable. We have tested therefore eight different productivity equations and evaluated the results by their regression and simulation behavior.

Basically, the equations use the following three variables: (1) the level of output to measure economies of scale; (2) change in output to account for cyclical patterns in productivity; (3) a time variable to measure the learning degree and higher skills of workers over time, or a variable measuring the newness of capital, for new equipment represents new technology and higher output per worker. Each equation is specified in exponential form.

Studies of the employment-output ratio of individual industries over time give evidence for a general slowdown in the productivity growth of the economy. To incorporate this trend into the model, we specify the above relationship

---

[1] Labor (L) refers to the employment of the $i^{\underline{th}}$ industry and includes the number of production workers (P) adjusted for changes in the average work week (H) and the number of non-production workers (N).

$$L_{it} = (H_{it}/H_{i,1969})\ P_{it} + N_{it}$$

[2] Similar problems are encountered by Nordhaus (42), p. 514.

also in the form of a logistic growth curve. Finally, we have included an equation which was recently used by Nordhaus in studying the current productivity slowdown.[1] The only difference between the Nordhaus and the standard INFORUM equation is that his equation uses a full employment measure of output rather than observed output.[2]

The resulting four different types of equations measure productivity as a function of: (1) change in output, (2) level of output, (3) full-employment output, and (4) logistic. Each equation is estimated and tested once with time and once with the average installation date (AID) of the stock of equipment. The AID-variable is a measure for the newness of capital and it should, therefore, have a positive effect on productivity. Since this variable replaces time, it is chosen to represent both the time trend and the effect from the newly installed equipment.[3] The resulting eight employment equations are listed in Table V-1. The expected signs of the regression parameters are also shown in this table.

---

[1] Nordhaus (48), pp. 493-546.

[2] Since full employment output is generally not observable, Nordhaus has developed a simple estimating technique. He regressed the i^{th} industry's actual output on the relative price level, the unemployment gap (difference between actual and full-employment unemployment), and aggregated output; then he calculates full employment output by setting the unemployment gap equal to zero.

[3] The derivation of the AID-variable follows from the "Two-Bucket Scheme" described in Chapter IV. If we let A_t represent this variable of the i^{th} sector in year t, then:

$$A_{1t} = (1 - s_t)A_{1,t-1} + (t - T)I_t$$

$$A_{2t} = (1 - s_t)A_{2,t-1} + s_tA_{1,t-1}$$

$$A_t = (A_{1t} + A_{2t})/K_t$$

where s_t is the depreciation rate, I_t the investment, and K_t the capital stock of that sector.

Table V-1:
Description of Employment Equations

$$X_t = a_1 C_t + a_2 T_t + a_3 Y_t + e_t$$

	X_t	C_t	T_t	Y_t
1. TIME-DQ	$\ln(L/Q)_t$	1 (+,-)	t (-)	$d\ln(Q_t)$ (-)
2. TIME-LQ	$\ln(L/Q)_t$	1 (+,-)	t (-)	$\ln(Q_t)$ (-)
3. AID-DQ	$\ln(L/Q)_t$	1 (+,-)	A_t (-)	$d\ln(Q_t)$ (-)
4. AID-LQ	$\ln(L/Q)_t$	1 (+,-)	A_t (-)	$\ln(Q_t)$ (-)
5. NORDH-TME	$\ln(L/Q^*)_t$	1 (+,-)	t (-)	$\ln(Q/Q^*)_t$ (+)
6. NORDH-AID	$\ln(L/Q^*)_t$	1 (+,-)	A_t (-)	$\ln(Q/Q^*)_t$ (+)
7. LOGIS-TME	$d\ln(L/Q)_t$	1 (+,-)	$(L/Q)_{t-1}$ (+,-)	$d\ln(Q_t)$ (-)
8. LOGIS-AID	$d\ln(L/Q)_t$	dA_t (-)	$(L/Q)_{t-1}$ (+,-)	$d\ln(Q_t)$ (-)

*) Full employment output

B. Aim of Simulation Tests

The overall aim of the simulation with the employment equations is, of course, to test the forecasting behavior of these equations.[1] At the same time, the simulation tests are used to select the best equation (or combination of equations) from the list of eight different types described above. Finally, the simulation is used to check the validity of imposing constraints on the OLS estimate of the parameters as well as the effect of a post-regression first order auto-correlation adjustment.

In short, the simulation with the employment equations should answer the following questions:

(1) What type or combination of different types of equations promises to give the best forecasting results?

(2) What can be learned from the overall forecasting behavior of these equations?

(3) What is the validity of imposing constraints on the OLS estimate of the parameters?

(i) Value of declining weight scheme[2]

---

[1] The logistic form of the equation was derived from

$$\frac{1}{c}\frac{dc}{dt} = b(a - c).$$

If we let (L/Q) stand for c and assume that it is a positive differentiable function, we get $\Delta \ln(L/Q)_t = a_1 + a_2(L/Q)_{t-1}$ for $dt = 1$. The output term has been added to measure cyclical fluctuations. In equation type 8 Δt has been replaced by ΔA_t.

[2] The declining weight scheme is explained in Chapter III. We use here the same five percent per year exponential rate.

(ii) Value of constraining the output elastitcity to:

$a_3(\Delta Q) > -0.5$ or $a_3(Q) > -1.0$.[1]

(4) What effect has the post-regression first order auto-correlation adjustments on the forecasting performance of the equations.

C. Analysis of the Simulation Tests

To select the best equation for each sector, we have estimated all eight different types for each of the 87 industries. In addition, two sub-sectors of trade (wholesale and retail), three sub-aggregated sectors (agriculture-mining, manufacturing, and services-transportation) and total employment are also estimated by the eight different equations. The testing of the equations proceeds in the following order: (1) all equations are estimated by our standard method with declining weights and parameter constraints; (2) the effect of the post-regression first order auto-correlation adjustment is tested; (3) the declining weight scheme is removed to test its effect; and (4) the parameter constraints are removed.

1. Standard Estimating Procedure

Table V-2 shows the regression and simulation results of the eight different types of equations. The types are listed across the top in the same order as explained in Table V-1 and the sectors are listed down the columns. The two columns *RF* and *SF* shown under each type refer to the regression fit--average absolute percentage error of the regression through 1966--and the simulation fit--average absolute percentage error of the simulation 1967-71--respectively. All equations were estimated by imposing the same 5 percent per year declining weight scheme used in the fitting of the consumption functions.

---

[1]This requirement was found useful, for a stronger output effect would demand a wide gyration of income to match a reasonable specification of total employment.

Table V-2:
Constrained Estimation with Declining Heights and Rho-Adjustment

SECT#	INDUSTRY	TIME•DQ (1)		TIME•LQ (2)		AID•DQ (3)		AID•LQ (4)		NORDH•TME (5)		NORDH•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
1	AGRICULTURE	4.1	3.0	2.9	1.9	2.6	1.8	2.3	1.1	3.9	3.1	2.4	1.8	3.0	7.3	2.0	6.1	8	4	4
2	MINING	3.7	19.0	4.0	19.0	4.1	23.2	4.6	23.2	3.9	18.5	4.5	22.7	4.6	12.3	4.7	9.2	1	8	8
3	PETROLEUM AND GAS	6.5	2.9	6.6	2.3	7.1	3.0	7.3	3.5	5.4	7.4	5.8	5.3	4.5	13.3	7.0	12.6	7	2	2
4	CONSTRUCTIO.	4.6	10.7	2.8	4.4	4.7	11.3	2.8	3.6	1.8	11.3	1.8	11.9	3.9	2.0	3.0	1.5	6	8	8
5	ORDNANCE	6.2	6.5	6.4	7.1	6.4	4.8	6.8	6.0	5.7	7.9	5.8	7.1	12.3	1.8	14.5	3.8	5	7	3
6	MEAT	3.8	7.1	3.0	3.6	4.0	9.0	3.0	3.7	2.2	4.6	2.1	5.8	4.4	2.7	4.6	3.3	6	7	2
7	DAIRY	5.9	3.2	1.8	2.5	3.7	6.0	1.1	4.1	2.8	2.5	3.3	.8	2.6	5.8	2.5	4.4	4	6	6
8	CANNED AND FROZEN FOOD	4.6	10.1	3.2	3.3	5.7	11.1	3.1	2.7	4.0	9.3	4.7	11.4	4.4	6.5	4.6	5.9	4	4	4
9	GRAIN MILL PRODUCTS	2.6	4.5	1.0	5.9	3.0	5.1	1.0	6.0	1.5	7.3	1.6	8.8	1.5	1.5	1.5	1.8	2	7	7
10	BAKERY	2.6	3.3	1.4	2.5	2.5	4.2	1.3	2.4	2.1	1.9	1.9	2.4	2.8	2.2	2.4	2.5	4	5	4
11	SUGAR	4.1	12.8	4.0	9.4	4.2	13.3	4.0	8.7	4.2	11.6	4.6	12.1	6.6	21.6	9.3	8.9	4	4	4
12	CANDY	2.2	5.2	2.3	7.3	3.0	6.8	3.5	8.0	2.1	6.4	3.6	8.2	2.4	4.5	2.1	3.5	5	8	8
13	BEVERAGES	2.5	4.3	2.1	1.8	2.2	4.2	2.3	2.1	2.0	4.6	2.0	2.0	3.4	10.2	2.9	7.4	6	2	2
14	MISC. FOOD PRODUCTS	2.1	2.6	.8	.4	2.4	4.6	.8	.3	1.4	3.7	1.3	6.2	1.2	3.6	1.3	2.5	4	4	4
15	TOBACCO	5.0	5.4	1.5	4.5	5.0	4.2	1.5	4.9	3.1	2.8	3.2	2.5	4.7	4.1	4.2	4.3	4	6	6
16	FABRICS AND YARNS	1.4	2.2	1.8	.7	2.0	.5	2.2	2.1	1.4	2.4	2.1	.8	1.4	5.0	1.6	2.7	5	3	2•
17	FLOOR COVERINGS	2.6	1.3	3.2	5.5	3.5	7.4	3.8	1.8	2.4	11.2	3.8	15.9	3.3	8.0	2.9	10.5	5	1	1•
18	MISC. TEXTILES	2.7	7.8	2.2	5.8	2.5	8.3	2.6	6.3	2.3	5.7	2.5	6.4	2.0	12.5	2.0	9.6	7	5	5•
19	KNIT FABRIC AND APPARE	4.1	12.6	3.3	4.6	6.9	4.3	5.0	5.2	3.9	5.1	7.2	2.9	4.5	17.1	4.6	13.0	2	6	2
20	APPAREL	2.1	2.4	1.4	4.9	2.1	2.2	1.4	5.3	1.0	1.5	1.0	1.8	1.9	4.4	1.7	4.9	6	5	5•
21	HOUSEHOLD TEXTILES AND	1.5	9.1	1.1	12.4	1.5	8.2	1.1	12.5	1.1	5.7	.9	3.8	1.1	13.6	1.5	11.6	6	6	6•
22	LOGGING AND LUMBER	3.0	6.6	2.6	7.3	3.6	7.0	3.2	8.0	2.7	7.3	3.2	7.9	1.7	5.0	1.9	4.7	7	8	8
23	PLYWOOD, MILLWORK, STR	2.4	2.5	2.5	.6	2.7	1.8	2.5	1.7	1.6	10.2	1.9	8.5	2.6	1.9	2.3	1.5	5	2	2•
24	WOODEN CONTAINERS	7.2	8.8	4.7	30.6	7.1	9.3	5.0	30.3	4.8	24.2	4.8	24.5	7.1	37.5	6.4	26.9	2	1	1•
25	HOUSEHOLD AND OFFICE F	3.5	1.3	3.3	1.3	3.9	2.2	3.8	1.7	3.1	1.5	3.6	1.8	2.5	5.8	2.8	4.5	7	2	5
27	PAPER AND PRODUCTS, EX	3.6	4.0	1.9	2.4	3.7	3.5	1.7	2.2	2.2	2.6	2.1	2.4	4.2	4.0	4.0	3.1	4	4	4
28	PAPER CONTAINERS	2.0	1.9	1.7	1.9	1.9	2.3	1.7	2.0	2.1	1.3	2.1	1.6	2.9	2.2	3.0	1.8	2	5	5
29	NEWSPAPERS	1.6	6.9	.6	.9	1.5	5.6	.8	1.5	1.7	2.8	1.5	1.7	2.3	2.9	1.2	1.2	2	2	2
30	PRINTING AND PUBLISHIN	4.3	3.3	1.6	3.1	4.0	4.7	1.8	2.4	1.7	2.2	1.3	3.4	3.6	2.0	3.2	1.2	6	8	5
31	INDUSTRIAL CHEMICALS	2.3	2.3	1.7	2.8	3.0	1.3	1.4	2.4	1.6	10.9	1.7	12.0	2.0	5.7	2.2	3.4	4	3	4•
32	AGRICULTURAL CHEMICALS	2.4	11.8	1.0	2.8	3.2	10.7	1.0	2.7	2.0	12.6	2.7	9.4	1.2	5.9	1.5	3.7	4	4	4•
33	CRUDE TALL AND FATTY A	4.4	3.6	4.9	3.6	4.8	3.3	5.1	3.3	4.9	3.9	4.9	3.1	5.7	8.5	2.9	16.0	8	6	1•
34	PLASTICS AND SYNTHETIC	1.4	6.2	1.4	7.0	1.7	8.9	1.3	6.1	1.6	3.2	1.2	3.0	2.8	6.6	2.7	6.0	6	6	6•
35	DRUGS	1.8	1.1	2.1	2.6	2.6	1.9	2.3	1.6	2.1	2.5	2.6	1.6	1.9	5.7	1.5	6.6	8	1	1•
36	CLEANING AND TOILET IT	1.0	4.1	.7	1.8	1.1	3.4	.8	2.6	1.1	3.3	1.0	1.9	.9	1.3	.9	2.2	2	7	7•
37	PAINTS AND ALLIED PROD	2.9	8.5	1.5	3.7	3.4	8.5	1.1	4.3	1.2	8.6	1.5	9.7	2.0	5.0	1.9	5.0	4	2	2•
38	PETROLEUM REFINING	2.8	8.2	3.7	7.3	4.4	21.3	5.0	15.6	3.8	7.9	5.2	21.7	5.8	2.4	6.9	6.3	1	7	7
39	TIRE AND TUBES	8.3	6.3	5.9	10.6	9.1	8.6	5.9	11.9	4.0	11.7	4.4	13.9	7.8	2.4	7.6	4.7	5	7	7
40	RUBBER PRODUCTS	2.7	10.2	2.8	7.5	2.5	13.2	2.4	10.2	2.4	4.7	2.5	8.2	4.1	9.3	4.5	8.7	2	5	5
41	PLASTIC PRODUCTS	4.0	12.9	4.1	6.3	4.0	13.3	4.1	4.6	3.2	7.6	2.9	7.7	5.0	28.7	4.8	13.6	6	4	4
42	LEATHER TANNING AND IN	3.4	3.9	3.2	4.4	3.6	6.1	3.6	7.5	3.6	4.9	3.8	7.4	4.6	7.2	4.2	8.3	2	1	1
43	SHOES AND OTHER LEATHE	2.3	2.3	1.8	2.9	2.3	1.8	1.9	2.7	1.9	3.8	1.9	3.3	2.6	9.8	2.5	11.9	2	3	3
44	GLASS AND GLASS PRODUC	3.9	5.5	2.2	3.5	3.3	5.2	2.2	3.7	2.2	1.0	2.3	.9	3.1	2.5	3.7	2.3	5	6	6•
45	STONE AND CLAY PRODUCT	1.0	3.4	.9	1.3	1.0	3.6	1.0	1.2	1.0	5.2	1.0	5.6	1.2	.9	1.3	.7	2	8	8•
46	IRON AND STEEL	.9	5.9	1.1	4.0	.8	5.7	1.2	3.5	1.1	4.4	1.1	4.0	1.6	2.1	1.5	3.3	3	7	7•
47	NON-FERROUS METALS	1.7	6.3	2.0	3.2	2.3	6.0	2.2	2.3	1.8	5.1	2.6	4.5	1.4	1.7	1.3	1.6	8	8	8•
48	METAL CONTAINERS	2.7	1.9	2.3	2.7	2.8	1.1	2.3	2.9	2.5	1.2	2.2	2.8	4.7	6.7	5.1	5.1	6	3	5

Table V-2: (cont.)

SEC#	INDUSTRY	TIME•DO (1)		TIME•LO (2)		AID•DO (3)		AID•LO (4)		NONDH•TME (5)		NONDH•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
49	PLUMBING AND HEATING	1.9	3.4	1.8	1.6	2.2	3.6	2.0	1.1	1.8	4.3	2.2	3.9	2.1	3.9	2.2	2.5	2	4	4•
50	STRUCTURAL METAL PRODU	4.7	4.6	4.4	3.1	4.8	5.4	4.5	2.9	4.0	3.2	4.3	4.0	9.0	7.4	7.9	12.2	5	4	5
51	STAMPINGS	.8	5.0	.8	5.7	.8	5.2	.7	5.6	1.1	6.0	1.2	6.1	1.0	5.7	.8	5.6	8	1	1•
52	HARDWARE,PLATING, FINE,	2.0	4.7	1.5	2.9	1.9	4.0	1.5	3.0	1.4	3.3	1.4	3.3	1.6	3.0	1.8	2.6	5	8	8•
53	ENGINE AND TURBINES	2.2	3.2	1.1	3.8	1.5	2.6	1.1	2.7	1.0	3.9	1.0	2.8	1.3	5.7	1.4	2.6	6	3	6•
54	FARM MACHINERY	4.2	4.4	2.2	5.7	3.5	4.1	2.1	4.5	1.6	1.8	1.7	1.6	1.8	2.0	2.0	2.6	5	6	6•
55	CONSTRUCTION,MINING,MAT	2.8	4.8	2.1	3.1	2.9	4.7	2.1	3.1	1.8	2.9	2.0	3.0	2.0	4.2	1.8	2.6	8	8	8•
56	METALWORKING MACHINERY	4.2	1.4	2.5	2.8	4.1	2.0	2.6	2.8	2.5	2.4	2.5	2.5	3.8	7.1	4.1	2.3	5	1	5
57	SPECIAL INDUSTRIAL MAC	5.3	1.8	4.5	2.6	4.8	2.0	4.7	4.6	3.8	2.2	4.0	2.3	7.5	11.5	7.0	8.6	5	1	5
58	GENERAL INDUSTRIAL MAC	2.0	1.1	1.8	4.4	1.9	1.1	1.8	5.9	2.0	2.7	2.1	2.8	2.1	4.9	2.0	4.1	4	3	3•
59	MISC. MACHINERY AND SM	5.7	3.0	3.0	15.3	5.3	3.0	3.1	16.4	2.7	8.0	2.6	8.2	3.8	15.0	4.0	8.1	6	3	3•
60	OFFICE AND COMPUTING M	4.1	6.4	3.1	6.4	4.1	7.5	3.1	6.4	2.9	10.3	2.9	11.0	3.3	9.0	3.5	8.8	6	2	2•
61	SERVICE INDUSTRY MACHI	1.7	1.9	2.0	3.1	3.1	2.5	3.0	3.2	1.2	6.2	2.9	9.6	1.6	1.3	1.6	1.9	5	7	7•
62	ELECTRIC MEASURING TR	2.3	2.3	1.8	2.7	2.1	2.3	1.8	3.0	1.7	2.9	1.9	3.1	2.2	5.5	1.9	4.8	5	1	5•
63	ELECTRIC APPARATUS AND	3.6	8.7	3.0	2.0	3.6	8.5	3.1	2.3	2.9	3.0	3.1	2.7	3.3	2.9	3.3	3.3	5	2	2•
64	HOUSEHOLD APPLIANCES	1.5	1.6	2.0	.8	1.6	1.4	2.4	2.7	1.6	5.2	2.9	6.5	2.0	4.9	2.0	2.5	1	2	2•
65	ELECTRIC LIGHTING AND	2.3	5.1	2.6	4.3	2.5	5.5	2.3	9.4	2.3	7.0	2.2	7.3	2.8	10.3	2.3	7.4	6	2	2•
66	RADIO, TV SETS AND PH	.9	15.2	1.0	10.8	1.2	8.3	1.3	5.9	1.3	14.9	1.6	7.9	1.0	12.6	1.6	4.9	1	8	8•
67	COMMUNICATION EQUIPMEN	4.4	9.0	3.0	3.2	4.7	7.9	3.1	4.0	3.4	6.5	3.8	4.9	3.0	3.5	3.0	2.1	8	8	8•
68	ELECTRONIC COMPONENTS	6.1	7.4	4.6	11.3	6.1	4.2	4.6	11.4	6.3	5.3	6.4	4.6	5.7	11.6	5.7	10.9	4	3	3•
69	BATTERIES, WIRES AND	4.7	10.5	4.5	2.5	5.7	10.1	4.4	4.9	4.5	7.9	5.0	7.4	5.7	1.5	5.0	1.8	4	7	4•
70	MOTOR VEHICLES AND PAR	3.7	11.0	4.0	11.2	4.4	11.3	4.7	10.9	3.6	11.1	4.7	11.1	5.6	2.6	4.1	2.8	5	7	8
71	AIRCRAFT AND PARTS	15.8	9.7	7.3	7.8	13.5	12.5	7.7	8.7	10.1	15.8	9.8	18.1	8.4	14.2	8.0	17.7	2	2	2
72	SHIPS AND BOATS	4.2	3.1	3.7	3.4	4.2	2.8	3.7	3.3	3.4	3.2	3.5	3.0	7.0	14.2	5.0	12.2	5	3	6
73	LOCOMOTIVES, RAILROADS	9.8	12.7	6.4	14.0	9.3	16.4	6.9	17.7	6.8	13.2	7.3	16.5	10.5	7.2	9.4	8.7	2	7	7
74	CYCLES, TRAILERS AND P	8.2	10.3	6.8	2.7	7.7	8.4	6.7	3.0	6.8	10.9	6.3	9.4	11.7	24.4	11.5	11.3	6	2	2
75	ENGR. AND SCIENT. INST	5.6	36.3	2.8	16.1	5.6	35.0	2.8	15.2	2.0	19.3	2.0	19.7	2.8	31.9	1.7	30.0	8	4	4•
76	MECH. MEASURING DEVICE	5.2	3.7	2.8	4.0	5.2	3.6	2.8	3.9	3.0	5.7	3.0	5.6	5.7	9.8	5.2	5.1	4	3	4
77	SURGICAL AND MEDICAL I	3.4	5.6	2.5	6.3	2.9	5.6	2.5	8.3	1.8	8.4	1.5	8.8	2.5	4.8	2.9	4.7	6	8	7
78	OPTICAL AND PHOTOGRAPH	3.9	9.7	2.5	3.1	3.4	4.2	2.4	4.1	2.8	3.7	2.3	3.2	2.1	15.8	2.1	12.4	7	2	6
79	MISC. MANUFACTURED PRO	2.7	1.7	3.3	3.9	2.9	2.7	3.5	5.0	1.8	2.9	2.0	3.8	4.4	10.9	4.2	12.2	5	1	1
80	RAILROADS	6.4	1.1	4.1	3.8	5.2	4.1	5.0	7.2	4.5	5.6	4.9	7.9	2.8	9.9	4.0	4.2	7	1	1
81	TRUCKING	2.1	1.9	1.7	.9	2.0	2.6	1.7	.8	3.1	2.3	2.7	2.8	3.0	3.0	2.7	1.7	2	4	4
82	OTHER TRANSPORT	2.7	5.8	2.4	7.6	2.6	5.8	2.4	7.4	2.8	7.2	2.8	7.1	3.0	4.3	3.0	5.4	4	7	7
83	AIRLINES	5.8	1.6	4.3	6.8	5.6	2.7	3.6	8.7	7.0	2.7	6.9	1.9	7.0	3.6	6.0	3.8	4	1	1
84	WHOLESALE AND RETAIL T	1.1	3.2	1.0	5.4	1.0	3.9	1.0	5.4	1.7	4.1	1.5	4.9	1.6	3.2	1.5	3.8	3	7	1
85	COMMUNICATION	2.1	9.7	2.1	9.2	2.7	10.5	2.5	10.5	2.0	10.2	2.6	11.2	2.5	5.4	3.2	5.0	5	8	7
86	FINANCE, INSURANCE AND	.5	1.3	.4	2.6	.5	1.6	.5	1.9	.6	2.4	.6	2.7	.9	1.2	.9	2.7	2	7	1
87	ELECTRIC UTILITIES	1.3	6.0	.7	6.2	1.8	13.6	.9	6.3	1.0	6.0	1.2	14.2	1.1	3.9	1.3	4.6	2	7	7
88	NAT. GAS, WATER AND SE	.9	7.3	.7	6.0	1.2	11.1	.8	7.4	.9	7.2	1.1	10.7	.5	7.3	.9	7.2	7	2	2
89	WHOLESALE TRADE	1.8	1.3	1.1	3.5	1.6	2.0	1.1	3.4	2.1	2.4	1.9	3.1	1.9	.9	1.8	.9	8	7	8
90	RETAIL TRADE	1.1	3.9	1.0	6.2	.9	4.4	1.0	6.2	1.6	5.1	1.4	5.7	1.6	4.4	1.4	5.5	3	1	1
91	AGRICULTURE, MINING, A	.8	4.7	.7	3.9	1.3	4.6	1.0	3.2	.7	5.5	1.0	7.2	.7	1.9	.7	2.2	5	7	7•
92	TOTAL MANUFACTURING	.9	1.2	.9	2.1	1.2	1.0	1.3	1.9	.9	2.4	1.3	2.5	.9	1.8	.8	1.6	8	3	1•
93	TRANSPORTATION AND SER	.6	3.3	.9	4.4	.6	3.3	.9	2.1	.8	2.4	.9	2.4	.5	.6	.5	.8	1	7	7•
94	TOTAL EQUIPMENT INVEST	.6	3.8	.8	3.5	.7	3.7	1.0	1.5	.9	5.7	1.2	5.6	.5	.8	.5	.9	8	7	7•
	NUMBER OF •INS	5	12	13	16	14	15	3	11	6	18	11	13	20	5	10	15	8	9	7	19	14	10	14	13	

Furthermore, the output elasticity was constrained to $a_3 > -0.5$ for equations using the first difference in output and to $a_3 > -1.0$ for the level of output by applying the post-regression adjustment discussed in Chapter III. Finally, in connecting the regression period with the simulation we used the post-regression auto-correlation adjustment explained above. The last three columns indicate the type of equation with: (1) the lowest regression error; (2) the lowest simulation error; and (3) the lowest combined (weighted) error when regression and simulation are equally weighted.

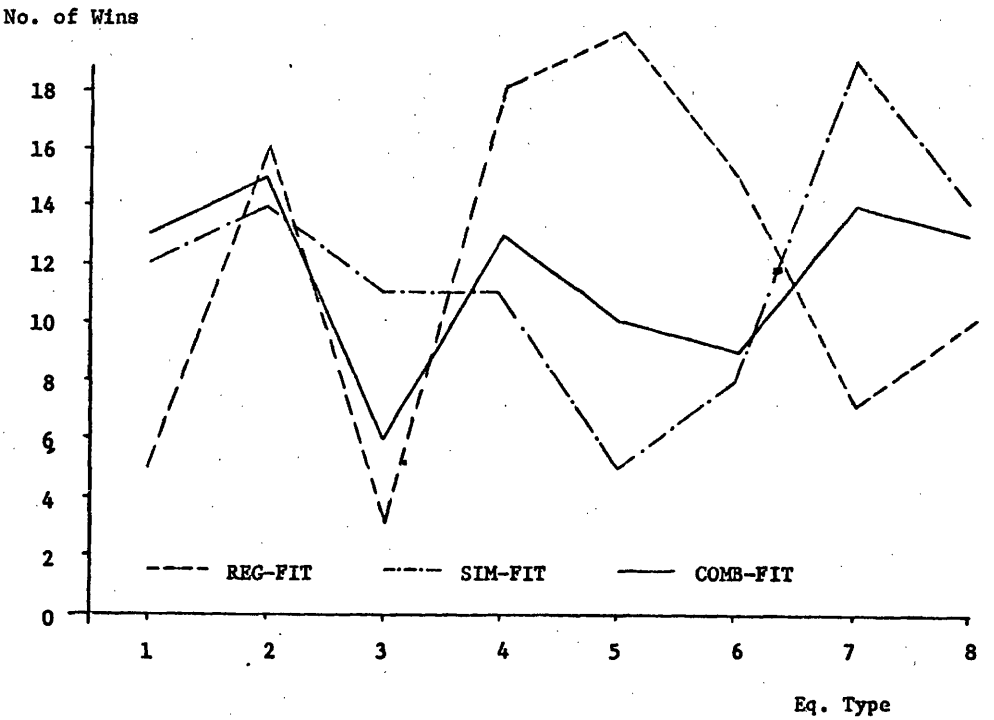


Figure V-1: Performance of Equations with Constaints, Declining Weights, and Rho-Adjustment

A summary of the results is shown in Figure V-1. On the vertical axis are the number of times one particular equation has registered the smallest error (regression error, simulation error, and combined error). The horizontal axis shows the equation type. The dashed line refers to the regression performance for the period 1952-1966 (except for sectors with an asterisk in the last column for which the regression period starts in 1957 due to lack of more data). The broken line shows the number of wins of the simulation. The solid line is the choice of the computer when the regression and simulation fits are given equal consideration. Although Figure V-1 should be self-explanatory, we can summarize the regression and simulation results as follows:

(1) The correlation between the regression and simulation performance of the equations is very low. That is, if the selection procedure were based on the regression fit (e.g. $\bar{R}^2$), as is common practice, one would choose Type 5. This equation, however, demonstrates very poor forecasting ability.

(2) Although the "COMB. FIT" performance is derived by assigning equal weights to the regression and simulation errors, the correlation between "COMB. FIT" and "SIM. FIT" is much higher than between "COMB. FIT" and "REG. FIT". This result suggests that the winning margins in the simulation error contest are on the average much larger than the ones of the regression errors.

(3) More precisely, only the Type 2 equation shows any consistency between regression and simulation fit. Most other types have a very mixed pattern. Type 1 has won only five regressions but twelve

simulations and ends up with 13 wins when based on the combined fit. The performance of Type 3 is quite similar to Type 1, but shows only six final wins. Type 4, on the other hand, fits the the data better and also receives 13 combined wins. The big loosers are the Nordhaus full employment equations. They show a spectacular regression performance but seem to freeze when asked to forecast. Types 5 and 6 combine for 35 regression wins but only 13 best simulations. The total combined wins of the Nordhaus equations are 19. Just the opposite performance is observed from the logistic growth curve equations. They account for only 14 regression wins but are on the top of the simulations with 33 wins and record 27 final selections.

(4) With reference to the different variables used in explaining productivity we found:

(a) Close to 60 percent of all equations perform better with the simple time-trend than with the newness of capital variable.

(b) Based on the exponential functions of time or AID (Types 1-4), the cyclical change in output variable (ΔQ) is less significant than the level of output variable (LQ), which is a measure for economies of scale.

(c) The two most successful equations are the exponential time-trend (Types 1-2) and the logistic growth curve equations. This is again proof for how difficult it is to enter the capital effect into a productivity equation.

(d) The logistic growth curve equations are best suited for estimating and forecasting the productivity slowdown.

(e) The above analysis verifies the importance of testing estimated equations before they are used in forecasting models. For the model builder it is not enough to specify the relationship, to collect data, and to estimate the parameters; but rather the testing of the behavioral performance is equally important.

As mentioned above, the simulation so far is conducted with the, by now, standard auto-correlation adjustment. Next we shall test the same equations when simulated without rho-adjustment.

2. Effect of Auto-Correlation Adjustment

Table V-3 is a duplicate of Table V-2, except the simulation is conducted without the auto-correlation adjustment. The validity of using this adjustment method has been established in Chapters III and IV. A quick comparison between Table V-2 and V-3 verifies these findings as, by and large, the simulation error *SF* in Table V-3 is smaller. Although this result is expected, the simulation testing of the investment equations has clearly shown that this method of correcting for auto-correlation is most effective in the early years of the forecast. We would therefore expect an even stronger reduction in forecast error from a shorter test period.

Table V-3:
Constrained Estimation with Declining Weights

SEC#	INDUSTRY	TIME•DO (1)		TIME•LG (2)		AID•DO (3)		AID•LG (4)		NORDH•TME (5)		NORDH•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
1	AGRICULTURE	4.1	4.8	2.9	3.9	2.6	1.7	2.3	1.2	3.9	3.7	2.4	1.9	3.0	7.4	2.0	6.1	8	4	4
2	MINING	3.7	18.9	4.0	18.9	4.1	23.1	4.6	23.1	3.9	18.4	4.5	22.6	4.6	11.2	4.7	6.3	1	8	8
3	PETROLEUM AND GAS	6.5	6.2	6.6	6.1	7.1	3.6	7.3	3.9	5.4	8.4	5.8	5.9	4.5	9.8	7.0	4.7	7	3	3
4	CONSTRUCTION	4.6	13.2	2.8	5.5	4.7	13.1	2.8	4.6	1.8	11.2	1.8	11.8	3.9	1.9	3.0	1.4	6	8	8
5	GMO•ANCE	6.2	7.2	6.4	7.9	6.4	5.4	6.8	6.7	5.7	8.8	5.8	7.8	12.3	5.6	14.5	12.7	5	3	3
6	MEAT	3.8	9.7	3.0	4.5	4.0	12.2	3.0	4.6	2.2	4.6	2.1	6.2	4.4	3.4	4.6	5.7	6	7	5
7	DAIRY	5.0	11.2	1.5	2.4	3.7	7.6	1.1	4.1	2.8	2.5	3.3	.7	2.6	6.1	2.5	3.7	4	6	6
8	CANNED AND FROZEN FOOD	4.6	13.3	3.2	4.2	5.7	15.6	3.1	3.6	4.0	9.5	4.7	12.3	4.4	6.9	4.6	9.8	4	4	4
9	GRAIN MILL PRODUCTS	2.6	6.4	1.0	5.9	3.0	7.5	1.0	6.1	1.5	7.3	1.6	8.8	1.5	1.6	1.5	1.9	2	7	7
10	BAKERY	2.6	3.0	1.4	2.9	2.5	4.1	1.3	2.7	2.1	1.3	1.9	1.6	2.8	2.0	2.4	2.3	4	5	5
11	SUGAR	4.1	13.3	4.0	9.8	4.2	13.8	4.0	9.2	4.2	12.1	4.6	12.6	6.6	22.7	9.7	11.4	4	4	4
12	CANDY	2.2	5.3	2.3	7.4	3.0	8.9	3.5	10.4	2.1	6.5	3.6	10.4	2.4	4.6	2.1	3.4	5	8	8
13	BEVERAGES	2.5	8.2	2.1	1.9	2.2	4.3	2.3	2.3	2.0	4.6	2.0	2.1	3.4	10.7	2.9	7.2	6	2	2
14	MISC. FOOD PRODUCTS	2.1	3.9	.8	.4	2.4	6.2	.8	.4	1.4	3.7	1.3	6.2	1.2	3.8	1.3	2.1	4	4	4
15	TOBACCO	5.0	6.4	1.5	4.4	5.0	5.2	1.5	4.9	3.1	2.3	3.2	2.1	4.7	4.6	4.2	4.0	4	6	6
16	FABRICS AND YARNS	1.4	2.8	1.8	1.1	2.0	1.4	2.2	2.0	1.4	2.7	2.1	1.4	1.4	5.0	1.6	2.1	5	2	2•
17	FLOOR COVERINGS	2.6	2.3	3.2	5.6	3.5	9.8	3.0	3.5	2.4	12.3	3.8	17.8	3.3	8.3	2.9	10.8	5	1	1•
18	MISC. TEXTILES	2.2	6.1	2.2	5.0	2.5	6.3	2.6	5.3	2.3	4.8	2.5	5.5	2.0	13.0	2.0	9.8	7	5	5•
19	KNIT FABRIC AND APPARE	4.1	12.5	3.3	4.2	6.9	1.8	5.0	6.7	3.9	5.3	7.2	2.9	4.5	17.1	4.6	12.5	2	3	2
20	APPAREL	2.1	2.5	1.4	4.9	2.1	2.4	1.4	5.3	1.0	1.5	1.0	1.8	1.9	4.6	1.7	4.9	6	5	5•
21	HOUSEHOLD TEXTILES AND	1.5	9.0	1.1	12.4	1.5	8.2	1.1	12.5	1.1	5.9	.9	3.8	1.1	13.9	1.5	11.8	6	6	6•
22	LOGGING AND LUMBER	3.0	7.6	2.6	7.6	3.6	8.5	3.2	8.8	2.7	7.8	3.2	8.9	1.7	5.0	1.9	4.8	7	8	7
23	METALOUS MILLWORK, STR	2.4	2.4	2.5	.6	2.7	1.7	2.5	1.7	1.6	10.2	1.9	8.5	2.6	2.3	2.3	1.9	5	2	2•
24	WOODEN CONTAINERS	7.2	8.7	4.7	30.5	7.1	9.3	5.0	30.6	4.8	24.6	4.8	24.9	7.1	37.6	6.4	28.5	2	1	1•
25	HOUSEHOLD AND OFFICE F	3.5	2.7	3.3	2.7	3.9	4.5	3.8	3.5	3.1	1.9	3.6	3.4	2.5	6.0	2.8	3.4	7	5	5
27	PAPER AND PRODUCTS, EX	3.6	5.4	1.9	2.4	3.7	4.4	1.7	2.2	2.2	3.9	2.1	3.0	4.2	4.8	4.0	3.5	4	4	4
28	PAPER CONTAINERS	2.0	2.0	1.7	1.9	1.9	2.3	1.7	2.0	2.1	1.7	2.1	1.7	2.9	2.2	3.0	1.8	2	5	2
29	NEWSPAPERS	1.6	7.5	.6	1.0	1.5	6.2	.8	1.7	1.7	3.9	1.5	2.3	2.3	4.4	1.2	1.7	2	2	2
30	PRINTING AND PUBLISHIN	4.3	3.9	1.6	3.5	4.0	5.8	1.8	2.9	1.7	2.1	1.3	3.5	3.8	2.7	3.2	1.5	6	8	5
31	INDUSTRIAL CHEMICALS	2.3	2.7	1.7	2.0	3.0	1.4	1.4	1.8	1.8	11.1	1.7	11.9	2.0	6.2	2.2	4.0	4	3	4•
32	AGRICULTURAL CHEMICALS	2.4	11.6	1.0	2.9	3.2	10.5	1.0	2.7	2.0	12.6	2.7	9.4	1.2	5.8	1.5	3.5	4	4	4•
33	GLUE, INK AND FATTY A	4.4	5.8	4.9	5.8	4.8	5.5	5.1	5.5	4.9	5.2	4.9	4.4	5.7	5.9	3.8	15.9	2	6	6•
34	PLASTICS AND SYNTHETIC	1.4	6.7	1.4	7.3	1.7	9.3	1.3	6.4	1.6	2.9	1.2	2.9	2.6	7.2	2.7	7.4	6	5	6•
35	DRUGS	1.5	1.0	2.1	2.5	2.6	2.5	2.3	1.4	2.1	2.4	2.6	1.5	1.9	6.1	1.5	6.8	8	1	1•
36	CLEANING AND TOILET IT	1.0	4.1	.7	1.0	1.1	3.5	.8	2.0	1.1	3.3	1.0	1.9	.9	1.3	.9	2.3	2	7	7•
37	PAINTS AND ALLIED PROD	2.8	10.6	1.5	3.7	3.4	11.5	1.1	4.3	1.2	8.6	1.5	9.6	2.0	4.6	1.9	4.7	4	2	2•
38	PETROLEUM REFINING	2.9	8.5	3.7	7.6	4.4	22.7	5.0	16.8	3.8	8.1	5.2	22.5	5.8	2.1	6.9	10.3	1	7	7
39	TIRE AND TUBES	8.3	9.6	5.9	12.8	9.1	11.3	5.9	13.8	4.0	11.9	4.4	14.4	7.8	4.8	7.6	12.0	5	7	7
40	RUBBER PRODUCTS	2.7	10.3	2.4	7.5	2.5	13.4	2.4	10.3	2.4	4.7	2.5	8.3	4.1	8.9	4.5	7.5	2	5	5
41	PLASTIC PRODUCTS	4.0	12.9	4.1	6.3	4.0	13.2	4.1	4.6	3.2	9.0	2.9	7.9	5.0	28.9	4.4	13.5	6	4	4
42	LEATHER TANNING AND IN	3.4	3.9	3.2	4.7	3.6	6.7	3.6	8.0	3.6	4.8	3.8	7.9	4.6	8.2	4.2	6.7	2	1	1
43	SHOES AND OTHER LEATHE	2.3	1.7	1.8	2.8	2.3	1.3	1.9	2.6	1.9	3.8	1.9	3.3	2.6	9.9	2.5	12.1	2	3	3
44	GLASS AND GLASS PRODUC	3.9	9.0	2.2	3.5	3.3	5.1	2.2	3.7	2.2	1.0	2.3	.3	3.1	3.0	3.7	1.6	5	6	6•
45	STONE AND CLAY PRODUCT	1.0	3.6	.9	1.3	1.0	3.8	1.0	1.3	1.0	5.4	1.0	5.8	1.2	1.1	1.3	.8	2	8	8•
46	IRON AND STEEL	.9	5.9	1.1	4.0	.8	5.7	1.2	3.5	1.1	4.5	1.1	4.1	1.6	2.2	1.5	3.3	3	7	7•
47	NONFERROUS METALS	1.7	6.6	2.0	3.5	2.3	6.7	2.2	2.2	1.0	5.3	2.6	4.8	1.4	1.7	1.3	1.6	8	6	8•
48	METAL CONTAINERS	2.7	2.0	2.3	2.8	2.8	1.4	2.3	2.9	2.5	1.1	2.2	2.8	4.7	7.7	5.1	6.2	6	5	5

Table V-3: (cont.)

SEC#	INDUSTRY	TIME•DU (1)		TIME•LG (2)		AID•DO (3)		AID•LG (4)		NORDM•TME (5)		NORDM•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
49	PLUMBING AND HEATING	1.9	4.0	1.8	2.2	2.2	4.5	2.0	1.8	1.8	5.1	2.2	5.4	2.1	3.5	2.2	1.5	2	8	8•
50	STRUCTURAL METAL PRODU	4.7	4.5	4.4	3.0	4.8	5.3	4.5	2.7	4.0	3.3	4.3	4.1	9.0	11.0	7.9	15.6	5	4	4
51	STAMPINGS	.8	5.0	.8	5.8	.8	5.2	.7	5.6	1.1	6.0	1.2	6.1	1.0	5.7	.A	5.5	4	1	1•
52	HARDWARE•HEATING• •INE	2.0	5.1	1.5	3.0	1.9	4.3	1.5	3.1	1.4	3.4	1.4	3.4	1.6	3.4	1.A	2.7	5	8	A•
53	ENGINE AND TURBINES	2.2	5.4	1.1	3.9	1.5	3.0	1.1	2.8	1.0	4.0	1.0	2.9	1.3	5.7	1.4	2.6	6	8	6•
54	FARM MACHINERY	4.2	3.2	2.2	6.7	3.5	3.5	2.1	5.5	1.6	2.3	1.7	1.8	1.8	1.4	2.0	3.5	5	7	7•
55	CONSTRUCTION•MINING•MAT	2.A	5.1	2.1	3.1	2.9	5.0	2.1	3.1	1.8	3.0	2.0	3.1	2.0	4.5	1.A	2.7	A	8	A•
56	METALWORKING MACHINERY	4.2	2.1	2.6	2.7	4.1	2.4	2.6	2.7	2.5	2.4	2.5	2.5	3.8	7.2	3.1	2.3	5	1	1
57	SPECIAL INDUSTRIAL MAC	5.3	2.6	4.5	3.1	4.8	2.0	4.7	5.2	3.6	2.3	4.0	2.7	7.5	13.9	7.4	10.4	5	3	5
58	GENERAL INDUSTRIAL MAC	2.0	1.3	1.A	4.3	1.9	1.2	1.8	5.9	2.0	2.5	2.1	2.6	2.1	6.4	2.0	5.9	4	3	3•
59	MISC. MACHINERY AND SM	5.7	2.1	3.0	15.6	5.2	2.5	3.1	16.7	2.7	7.6	2.6	8.1	3.8	14.9	4.0	7.8	6	1	3•
60	OFFICE AND COMPUTING M	4.1	6.7	3.1	5.9	4.1	7.6	3.1	5.9	2.9	10.3	2.9	11.0	3.3	9.7	3.5	9.0	6	4	2•
61	SERVICE INDUSTRY MACHI	1.7	1.9	2.0	3.1	3.1	2.7	3.0	3.1	1.2	6.2	2.9	10.0	1.6	1.4	1.6	2.3	5	7	7•
62	ELECTRIC MEASURING• TR	2.3	2.7	1.9	3.0	2.1	2.8	1.8	3.4	1.7	3.2	1.9	3.6	2.2	6.8	1.9	6.3	5	1	2•
63	ELECTRIC APPARATUS AND	3.6	9.2	3.0	2.1	3.6	8.9	3.1	2.3	2.9	3.0	3.1	2.0	3.3	2.1	3.3	2.1	5	8	2•
64	HOUSEHOLD APPLIANCES	1.5	1.6	2.0	.8	1.6	1.5	2.4	2.9	1.6	5.2	2.9	6.6	2.0	4.9	2.0	2.5	1	2	2•
65	ELECTRIC LIGHTING AND	2.3	4.3	2.6	4.0	2.5	4.7	2.3	9.0	2.3	6.7	2.2	7.0	2.8	9.8	2.3	7.6	6	2	1•
66	RADIO• TV•SETS AND PH	.9	15.0	1.0	10.9	1.2	7.6	1.3	5.8	1.3	14.9	1.6	7.9	1.0	12.6	1.6	3.0	1	A	A•
67	COMMUNICATION EQUIPMEN	4.4	10.2	3.0	3.4	4.7	9.3	3.1	4.2	3.4	8.3	3.8	7.0	3.0	3.5	3.0	2.1	8	8	8•
68	ELECTRONIC COMPONENTS	6.1	8.9	4.6	11.4	6.1	9.6	4.6	11.5	6.3	6.6	6.4	5.5	5.7	16.3	5.7	15.9	4	6	3•
69	BATTERIES• X-RAYS AND	4.7	13.0	4.5	3.4	5.7	13.8	4.4	5.1	4.5	10.0	5.0	10.5	5.7	2.0	5.0	.9	4	8	A•
70	MOTOR VEHICLES AND PAR	3.7	11.1	4.0	11.6	4.4	11.6	4.7	11.8	3.6	11.6	4.7	12.1	5.6	3.4	4.1	2.8	5	8	A
71	AIRCRAFT AND PARTS	15.A	11.9	7.3	8.4	13.5	15.2	7.7	9.4	10.1	22.4	9.8	22.8	8.4	13.9	8.0	26.5	2	2	2
72	SHIPS AND BOATS	4.2	3.1	3.7	3.4	4.2	2.7	3.7	3.2	3.4	3.2	3.5	2.9	7.0	14.7	5.0	11.8	5	3	6
73	LOCOMOTIVES• RAILROADS	9.9	14.1	6.4	14.4	9.3	15.8	6.9	18.4	6.8	13.7	7.3	17.2	10.5	6.2	9.4	10.6	2	7	7
74	CYCLES• TRAILERS AND P	8.2	10.1	6.8	2.8	7.7	8.3	6.7	3.1	6.8	10.8	6.3	9.4	11.7	27.9	11.5	12.6	6	2	2
75	ENGR. AND SCIENT. INST	5.6	35.3	2.8	16.3	5.6	33.6	2.8	15.4	2.0	19.3	2.0	19.7	2.8	30.8	1.7	30.3	8	4	4•
76	MEAS. MEASURING DEVICE	5.2	4.0	2.8	4.1	5.2	3.9	2.8	4.0	3.0	5.8	3.0	5.7	5.7	11.2	5.2	5.6	4	3	4
77	SURGICAL AND MEDICAL I	3.4	5.0	2.5	8.4	2.9	5.3	2.5	8.5	1.8	8.4	1.5	8.8	2.5	5.0	2.9	5.0	6	8	7
78	OPTICAL AND PHOTOGRAPH	3.9	10.5	2.5	3.4	3.4	4.2	2.4	4.6	2.8	3.6	2.3	3.3	2.1	15.9	2.1	12.1	7	6	6
79	MISC. MANUFACTURED PRO	2.7	1.8	3.3	4.0	2.9	3.0	3.5	5.2	1.8	3.3	2.0	4.4	4.4	11.7	4.2	13.0	5	1	1
80	RAILROADS	6.4	4.7	4.1	4.1	5.2	3.7	5.0	8.6	4.5	5.8	4.9	8.7	2.8	7.9	4.9	5.0	7	3	2
81	TRUCKING	2.1	2.2	1.7	.9	2.0	2.6	1.7	.8	3.1	2.6	2.7	3.0	3.0	4.0	2.7	2.0	2	4	4
82	OTHER TRANSPORT	2.7	6.1	2.4	8.3	2.6	6.1	2.4	8.0	2.8	8.0	2.8	7.9	3.0	5.0	3.A	6.5	8	7	7
83	AIRLINES	5.A	1.8	4.3	6.8	5.6	2.6	3.6	6.3	7.0	3.0	6.9	2.4	7.0	3.6	6.0	2.8	4	1	1
84	WHOLESALE AND RETAIL T	1.1	2.9	1.0	5.5	1.0	3.5	1.0	5.5	1.7	3.9	1.5	4.8	1.6	2.9	1.5	3.7	3	7	1
85	COMMUNICATION	2.1	10.1	2.1	9.4	2.7	11.2	2.5	11.2	2.0	10.4	2.6	11.6	2.5	5.1	3.2	5.2	5	8	A
86	FINANCE• INSURANCE AND	.5	1.3	.4	2.6	.4	1.7	.5	1.9	.6	2.3	.6	2.7	.9	1.2	.5	3.1	2	7	1
87	ELECTRIC UTILITIES	1.3	6.7	.7	6.9	1.8	15.3	.9	7.1	1.0	6.0	1.2	14.2	1.1	3.5	1.3	3.2	2	8	8
88	NAT. GAS• WATER AND SE	.9	7.5	.7	6.0	1.2	11.6	.8	7.4	.9	7.3	1.1	10.7	.5	7.3	.9	6.7	7	2	2
89	WHOLESALE TRADE	1.A	1.1	1.1	3.6	1.6	1.9	1.1	3.5	2.1	2.4	1.9	3.1	1.9	.9	1.A	.9	4	7	8
90	RETAIL TRADE	1.1	3.8	1.0	6.3	.9	4.3	1.0	6.3	1.6	4.7	1.4	5.5	1.6	4.0	1.4	5.5	3	1	1
91	AGRICULTURE• MINING• A	.8	4.8	.7	4.0	1.3	5.2	1.0	3.6	.7	5.6	1.0	7.4	.7	1.9	.7	2.2	5	7	7•
92	TOTAL MANUFACTURING	.9	1.2	.9	2.3	1.2	1.2	1.3	2.3	.9	2.5	1.3	2.8	.9	1.7	.A	1.7	8	3	1•
93	TRANSPORTATION AND SER	.5	3.5	.9	4.6	.5	3.8	.9	2.8	.8	2.7	.9	2.8	.5	.6	.5	.8	1	7	7•
94	TOTAL EQUIPMENT INVEST	.6	4.1	.8	4.1	.7	4.1	1.0	2.2	.9	6.2	1.2	6.5	.5	.8	.5	.8	8	8	8•
	NUMBER OF #1'S	5	11	12	16	10	15	3	11	6	19	11	12	20	8	10	15	7	9	7	15	13	10	21	16	

A summary of Table V-3 is shown in Figure V-2. To study the rho-adjustment sensitivity of the different types of equations we have to compare Figures V-1 and V-2. The dashed line represents again the regression fit and is, of course, the same in both figures. In general, the rho-adjustment seems to favor equations which use the time-trend variable instead of AID. This is particularly noticeable for Types 7 and 8. Without adjustment they receive 14 and 21 wins, but the respective ratio with adjustment is 19 to 14. The exponential time-trend equations (Types 1 and 2) also improve slightly with the adjustment. Together they report 26 wins, which is a five win improvement over the unadjusted equations.

3. Effect of Declining Weight Scheme

Next we remove the declining weight scheme from the regression to test its effect on the forecasting performance of the eight different types of equations. The regression and simulation results are shown in Table V-4. The overall performance pattern, which is summarized in Figure V-3, has changed little with the removal of the weighting scheme. However, there is a noticeable increase in correlation between the "COMB. FIT" and "SIM. FIT". This result can only be explained if the individual simulation errors of the different types of equations deviate from each other by more than before. A comparison between the simulation errors of Tables V-2 and V-4 seem to verify this statement. On the average, the "across-type" standard deviation of the simulation error is larger.

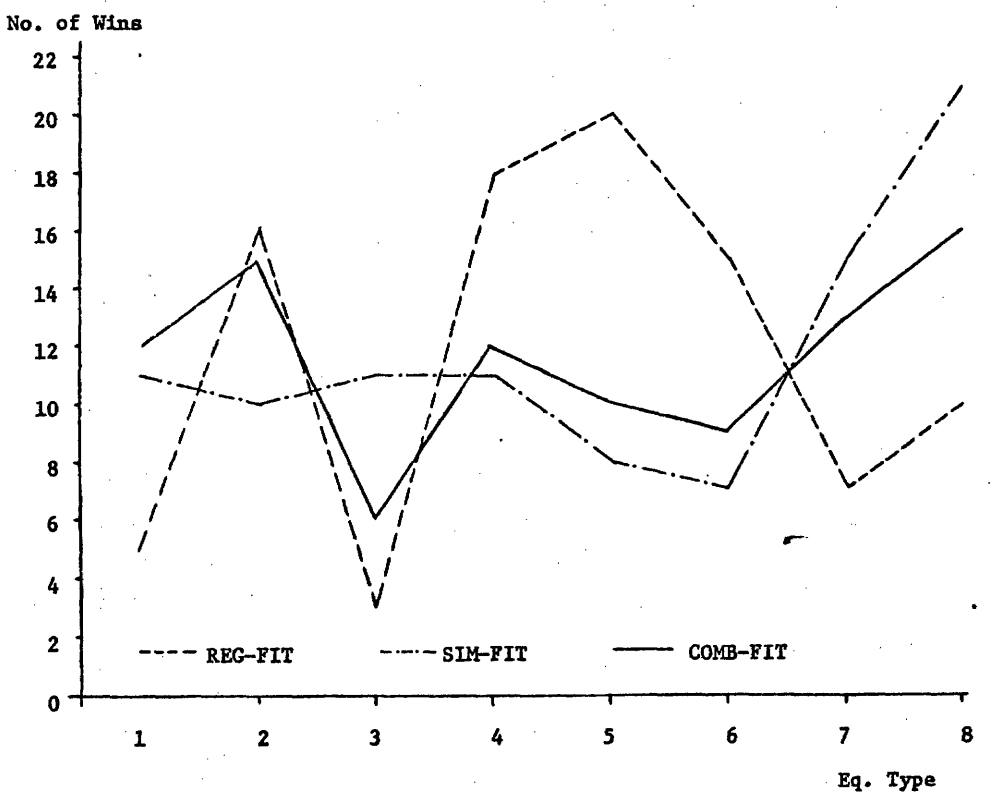


Figure V-2: Performance of Equations with Constraints and Declining Weights

Table V-4:
Estimation with Constrained Coefficients

SEC#	INDUSTRY	TIME*DQ (1)		TIME*LQ (2)		AID*DQ (3)		AID*LQ (4)		NORDH*TME (5)		NORDH*AID (6)		LOGIS*TME (7)		LOGIS*AID (8)		WINNER OF		
		RF	*SF*	*RF*	*SF*	*RF*	*SF*	*RF*	*SF*	*RF*	*SF*	*RF*	*SF*	*RF*	*SF*	*RF*	*SF*	*RF*	*SF*	COMB
1	AGRICULTURE	3.5	7.6	2.7	5.8	2.4	1.1	2.1	1.1	3.3	6.8	2.3	1.1	3.1	3.9	2.1	6.5	8	3	4
2	MINING	3.5	18.1	3.0	20.5	3.9	22.0	4.3	23.2	3.8	19.3	4.3	23.2	6.2	11.7	8.3	6.2	1	8	8
3	PETROLEUM AND GAS	6.1	12.1	5.9	12.3	6.6	9.8	6.6	10.0	5.5	12.3	5.9	9.8	4.5	11.1	7.5	11.8	7	3	7
4	CONSTRUCTION	4.3	15.7	2.9	7.4	4.4	16.2	2.8	6.8	1.7	11.5	1.7	12.1	4.4	1.8	3.2	3.6	6	7	7
5	.ORDNANCE	5.7	7.7	6.2	8.1	6.2	5.5	6.6	6.7	5.7	9.5	5.7	7.9	9.1	16.3	10.1	28.6	5	3	3
6	MEAT	3.6	8.8	3.1	3.7	3.9	12.0	3.1	4.2	2.2	4.1	2.0	5.1	4.4	2.7	5.1	6.9	6	7	5
7	DAIRY	4.4	13.9	1.6	1.9	3.7	8.9	1.1	3.8	2.9	2.4	3.4	1.0	2.8	5.0	2.6	3.4	4	6	2
8	CANNED AND FROZEN FOOD	4.2	16.1	2.8	6.2	5.2	19.6	2.8	5.6	4.0	12.2	4.8	14.2	4.4	6.9	5.2	11.5	4	8	8
9	GRAIN MILL PRODUCTS	2.5	7.8	1.0	5.9	2.7	9.2	1.0	6.0	1.5	7.2	1.6	8.9	1.7	1.5	1.7	1.6	2	7	7
10	BAKERY	2.6	1.9	1.4	3.8	2.5	2.8	1.3	3.6	1.9	1.8	1.7	1.4	2.7	3.6	2.3	1.9	4	6	6
11	SUGAR	4.1	13.3	4.0	9.9	4.2	13.5	3.9	9.5	4.3	11.8	4.5	12.2	4.9	26.2	5.5	17.2	4	4	4
12	CANDY	2.1	5.4	2.3	9.4	2.7	11.3	3.1	13.7	2.1	8.0	3.3	13.6	2.5	6.1	2.6	3.8	5	8	8
13	BEVERAGES	2.5	9.4	1.8	3.9	2.2	4.3	2.1	5.5	2.0	4.4	2.0	1.9	3.5	15.3	2.8	5.9	2	6	6
14	MISC. FOOD PRODUCTS	2.0	4.6	.8	.5	2.3	7.1	.8	.8	1.5	3.6	1.5	6.1	1.2	2.9	1.2	1.1	4	2	2
15	TOBACCO	4.9	3.6	1.5	4.6	4.9	3.5	1.5	4.9	3.0	2.0	3.2	2.1	4.8	7.6	4.4	4.3	4	5	5
16	FABRICS AND YARNS	1.3	3.4	1.7	3.8	2.0	2.3	2.2	1.5	1.3	3.3	2.1	2.3	1.5	4.5	1.5	1.9	5	4	8*
17	FLOOR COVERINGS	2.7	3.7	3.0	6.7	3.3	11.7	3.5	6.7	2.3	14.1	3.3	20.9	3.6	6.6	3.3	9.0	5	1	1*
18	MISC. TEXTILES	2.2	4.7	2.0	3.9	2.5	4.0	2.4	4.0	2.1	4.3	2.4	4.9	2.1	11.4	2.1	8.2	2	2	2*
19	KNIT FABRIC AND APPARE	4.4	10.2	3.3	3.3	4.1	5.2	4.2	10.5	4.1	2.7	6.4	9.4	4.2	24.2	5.4	9.6	2	5	2
20	APPAREL	2.0	2.9	1.5	4.6	2.1	2.8	1.4	5.2	1.0	1.7	1.0	1.8	2.2	5.2	1.9	5.0	5	5	5*
21	HOUSEHOLD TEXTILES AND	1.5	9.2	1.1	12.3	1.5	7.9	1.2	12.0	1.2	6.5	.9	4.6	1.4	13.6	1.5	11.2	6	6	6*
22	LOGGING AND LUMBER	2.8	9.7	2.7	9.3	3.2	11.1	3.1	10.8	2.7	9.5	3.1	10.9	1.8	4.6	1.8	5.3	8	8	8
23	PLYWOOD, MILLWORK, STR	2.3	2.4	2.4	.7	2.4	1.2	2.5	.5	1.6	10.0	1.8	8.4	2.5	2.0	2.6	3.6	5	4	4*
24	WOODEN CONTAINERS	7.1	11.5	4.8	28.3	7.1	12.2	4.9	27.1	4.6	22.5	4.5	25.9	8.7	40.3	6.2	28.1	6	1	1*
25	HOUSEHOLD AND OFFICE F	3.3	5.4	3.0	5.5	3.7	7.9	3.4	6.1	2.8	3.5	3.2	5.0	2.4	7.5	3.4	5.1	7	5	5
27	PAPER AND PRODUCTS, EX	3.4	7.6	1.9	2.3	3.5	6.9	1.0	2.8	2.1	5.4	2.1	4.5	3.8	11.2	3.5	6.7	4	2	2
28	PAPER CONTAINERS	2.0	1.7	1.7	1.6	1.9	2.1	1.7	1.7	2.1	2.0	2.0	1.9	2.9	4.8	2.8	2.5	2	2	2
29	NEWSPAPERS	1.7	6.8	.6	.9	1.6	5.2	.7	1.9	1.6	4.4	1.4	2.8	1.6	8.4	1.4	3.8	2	2	2
30	PRINTING AND PUBLISHIN	4.2	2.5	1.5	3.6	4.0	4.6	1.8	2.8	1.7	1.7	1.2	2.7	3.6	3.7	2.7	5.9	6	5	5
31	INDUSTRIAL CHEMICALS	2.1	3.3	1.6	1.4	2.7	2.6	1.4	1.4	1.8	10.8	1.7	12.0	2.0	5.3	2.1	3.5	4	4	4*
32	AGRICULTURAL CHEMICALS	2.3	11.2	.9	3.3	3.2	7.7	.9	2.8	2.0	12.2	2.7	9.0	1.2	5.9	1.5	3.0	4	4	4*
33	GLUE, INK, AND FATTY A	4.4	5.2	4.5	7.6	4.7	4.9	4.5	7.1	4.6	7.6	4.7	6.8	5.3	6.1	2.9	16.0	8	3	3*
34	PLASTICS AND SYNTHETIC	1.4	7.0	1.4	7.5	1.7	9.1	1.3	6.7	1.5	2.8	1.1	2.8	2.8	10.7	2.5	8.5	6	5	6*
35	DRUGS	1.8	1.2	2.1	3.0	2.4	3.5	2.2	1.7	2.1	4.0	2.5	1.6	1.9	4.9	1.6	6.2	8	1	1*
36	CLEANING AND TOILET IT	1.0	4.3	.7	1.8	1.1	3.4	.8	2.5	1.1	3.0	1.0	1.6	.9	1.3	.9	2.5	2	7	7*
37	PAINTS AND ALLIED PROD	2.6	11.6	1.5	3.2	3.2	12.9	1.1	4.0	1.2	9.0	1.5	9.9	2.0	4.5	1.8	4.4	4	2	2*
38	PETROLEUM REFINING	2.7	4.9	3.7	6.1	4.1	21.0	4.6	13.5	3.6	6.5	5.1	19.9	5.9	6.3	6.1	17.1	1	2	2
39	TIRE AND TUBES	8.1	5.3	5.7	13.2	8.8	7.2	5.8	14.0	4.0	11.9	4.4	14.0	7.9	3.2	9.8	18.0	5	7	7
40	RUBBER PRODUCTS	2.7	9.2	2.8	7.3	2.5	12.9	2.4	10.2	2.4	4.5	2.5	8.2	4.0	6.5	4.2	6.6	2	5	5
41	PLASTIC PRODUCTS	3.9	13.9	4.2	3.5	4.0	13.8	4.2	2.6	3.2	10.0	2.9	9.7	6.1	34.2	4.5	14.3	6	4	4
42	LEATHER TANNING AND IN	3.6	3.1	3.2	4.3	3.6	6.3	3.5	9.4	3.7	4.1	3.8	7.6	5.6	10.1	4.5	9.5	2	1	1
43	SHOES AND OTHER LEATHE	2.3	1.3	1.7	2.4	2.3	1.2	1.8	2.2	1.8	3.0	1.8	2.6	2.6	9.4	2.7	11.5	2	3	3
44	GLASS AND GLASS PRODUC	3.9	3.6	2.2	3.4	3.4	1.6	2.2	3.7	2.1	.9	2.3	1.0	3.1	2.0	3.4	2.7	5	5	5*
45	STONE AND CLAY PRODUCT	1.0	3.6	.9	1.7	1.0	3.9	1.0	1.9	1.0	5.2	1.0	5.7	1.4	.7	1.3	.8	2	7	7*
46	IRON AND STEEL	.9	5.7	1.1	3.9	.8	5.7	1.2	3.4	1.0	4.4	1.1	4.1	1.6	1.6	1.5	2.3	3	7	7*
47	NON-FERROUS METALS	1.8	7.2	2.0	4.8	2.3	7.7	2.1	2.4	1.8	5.9	2.6	5.4	1.5	1.6	1.4	1.4	8	8	8*
48	METAL CONTAINERS	2.7	1.7	2.3	2.7	2.9	2.3	2.3	2.7	2.3	1.0	2.2	2.5	4.3	12.3	4.6	12.0	6	5	5

Table V-4: (cont.)

SECT	INDUSTRY	TIME•DO (1)		TIME•LO (2)		AID•DO (3)		AID•LO (4)		NORDH•TME (5)		NORDH•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
49	PLUMBING AND HEATING	1.6	4.5	1.7	3.1	1.9	5.4	1.9	3.0	1.7	5.8	2.1	6.3	2.1	3.4	1.9	1.2	1	8	8•
50	STRUCTURAL METAL PRODU	4.7	4.5	4.5	2.1	4.9	5.2	4.5	2.2	4.3	3.4	4.6	2.9	8.3	20.1	6.6	27.2	5	2	2
51	STAMPINGS	.9	4.7	.8	5.8	.8	5.2	.7	5.6	1.1	6.1	1.1	6.2	.9	5.7	.8	5.6	4	1	1•
52	HARDWARE•PLATING• WIRE	2.0	7.0	1.6	3.1	2.0	5.1	1.6	3.1	1.4	3.5	1.5	3.6	1.9	2.9	1.9	2.8	5	8	8•
53	ENGINE AND TURBINES	2.1	9.3	1.1	3.9	1.4	4.3	1.1	2.8	1.0	4.1	1.0	2.8	1.3	4.1	1.4	2.4	6	8	6•
54	FARM MACHINERY	4.2	1.5	2.3	8.5	3.6	1.3	2.3	7.8	1.7	3.0	1.7	2.4	2.0	3.9	2.1	6.0	5	3	6•
55	CONSTRUCTIO•MINING•MAT	2.9	6.1	2.1	3.3	3.0	5.1	2.1	3.2	1.8	3.0	2.0	3.2	2.4	5.3	2.2	3.7	5	5	5•
56	METALWORKING MACHINERY	4.3	2.3	2.6	2.7	4.2	1.5	2.6	2.7	2.5	2.3	2.5	2.3	3.5	7.6	5.2	2.6	5	3	5
57	SPECIAL INDUSTRIAL MAC	5.2	6.4	4.7	2.8	4.7	1.8	4.8	4.9	3.8	2.4	4.1	3.3	6.9	16.2	6.9	14.0	5	3	5
58	GENERAL INDUSTRIAL MAC	2.0	1.7	1.8	3.8	2.0	1.4	1.8	5.3	2.0	2.5	2.1	2.5	2.4	5.8	2.4	5.4	4	3	3•
59	MISC• MACHINERY AND SM	5.6	3.0	3.0	14.7	5.1	3.3	3.1	16.5	2.7	8.0	2.6	8.1	4.0	16.9	3.9	7.9	6	1	3•
60	OFFICE AND COMPUTING M	4.1	6.1	2.8	5.4	4.0	7.1	2.8	5.3	2.8	10.8	2.8	11.6	3.7	9.2	3.7	7.3	6	4	2•
61	SERVICE INDUSTRY MACHI	1.7	2.7	2.0	4.0	3.2	4.5	2.8	3.0	1.1	6.5	2.8	11.2	1.6	1.5	1.6	2.0	5	7	7•
62	ELECTRIC MEASURING TR	2.3	2.2	1.8	3.1	2.1	4.1	1.8	3.4	1.6	3.1	1.9	3.6	2.4	6.1	2.2	6.5	5	1	1•
63	ELECTRIC APPARATUS AND	3.5	10.4	3.0	2.2	3.5	11.8	3.1	2.4	2.9	3.0	3.1	4.1	3.7	2.4	3.7	2.6	5	2	2•
64	HOUSEHOLD APPLIANCES	1.4	1.4	1.9	.5	1.7	2.2	2.4	1.7	1.6	5.7	2.8	7.8	2.0	3.8	2.1	1.8	1	2	2•
65	ELECTRIC LIGHTING AND	2.2	3.7	2.5	4.3	2.3	4.0	2.3	7.9	2.1	5.5	2.1	6.6	2.8	9.9	2.3	8.3	6	1	1•
66	RADIO• TV-SETS AND PH	.9	14.6	1.0	10.5	1.1	7.1	1.3	5.3	1.2	14.6	1.6	7.5	1.0	12.9	1.0	2.2	1	8	8•
67	COMMUNICATION EQUIPMEN	4.3	10.6	3.0	3.5	4.7	9.4	3.0	3.7	3.1	9.5	3.3	8.4	3.2	2.8	3.2	2.4	2	8	8•
68	ELECTRONIC COMPONENTS	6.0	6.5	4.7	13.1	6.0	4.6	4.7	13.1	5.3	5.4	6.4	5.0	6.3	16.4	6.5	18.1	4	3	3•
69	BATTERIES• X-RAYS AND	4.6	14.5	4.4	7.8	5.3	16.2	4.6	4.3	4.4	11.4	5.0	12.7	5.7	1.2	5.3	1.7	5	7	7•
70	MOTOR VEHICLES AND PAR	3.7	11.1	3.7	12.0	4.4	11.0	4.5	11.8	3.5	12.2	4.6	12.2	5.7	6.5	4.1	2.0	5	8	8
71	AIRCRAFT AND PARTS	15.1	23.2	7.2	9.2	12.1	25.5	7.6	10.1	8.9	30.3	9.1	29.6	8.6	13.8	15.2	38.6	2	2	2
72	SHIPS AND BOATS	4.2	3.1	3.6	3.3	4.2	3.0	3.7	3.2	3.6	3.2	3.5	3.0	6.0	18.6	4.5	3.8	5	3	6
73	LOCOMOTIVES• RAILROADS	9.7	12.4	6.5	13.3	9.5	13.8	7.2	16.8	6.9	12.5	7.4	15.5	9.3	12.7	11.0	6.2	2	8	8
74	CYCLES• TRAILERS AND P	8.0	13.2	6.4	5.5	7.5	9.8	6.5	5.0	6.8	12.0	6.3	9.3	15.6	35.9	10.6	17.4	6	2	2
75	ENGR• AND SCIENT• INST	5.5	.0	2.6	14.8	5.5	28.7	2.6	14.1	2.0	19.2	2.0	19.8	3.0	27.9	2.2	27.8	6	1	1•
76	MACH• MEASURING DEVICE	5.2	4.2	2.8	4.6	5.2	4.2	2.8	4.5	2.9	6.0	3.0	5.9	4.9	13.7	4.6	8.2	4	1	4
77	SURGICAL AND MEDICAL I	3.3	5.1	2.2	10.5	2.9	5.1	2.2	10.6	1.7	8.3	1.5	8.8	3.0	5.0	2.8	6.3	6	7	3
78	OPTICAL AND PHOTOGRAPH	3.6	9.9	2.4	3.4	3.2	3.8	2.3	4.9	2.6	4.5	2.3	3.2	2.2	13.9	2.3	9.7	7	6	6
79	MISC• MANUFACTURED PRO	2.7	2.0	3.2	4.9	2.9	3.3	3.3	5.9	1.9	4.4	2.2	5.7	4.4	13.2	4.3	15.5	5	1	1
80	RAILROADS	5.6	10.1	4.2	2.1	5.3	2.1	5.0	7.1	4.3	5.3	4.9	6.9	3.3	9.3	7.1	12.8	7	3	2
81	TRUCKING	2.1	1.9	1.7	1.5	2.0	2.2	1.7	1.5	2.9	4.7	2.6	5.0	2.9	8.4	2.7	4.7	4	4	4
82	OTHER TRANSPORT	2.6	7.0	2.3	10.0	2.6	6.9	2.3	9.6	2.7	10.0	2.7	9.8	3.2	4.9	2.6	9.9	2	7	7
83	AIRLINES	5.8	1.8	4.2	6.2	5.5	2.0	3.5	7.8	7.0	3.3	6.8	2.4	5.6	9.6	4.4	5.2	4	1	3
84	WHOLESALE AND RETAIL T	1.0	2.3	1.0	5.5	1.0	3.0	1.0	5.4	1.6	2.9	1.4	3.7	1.5	1.9	1.2	4.7	3	7	1
85	COMMUNICATION	1.9	10.4	1.9	10.4	2.3	12.0	2.3	12.0	1.9	10.5	2.4	12.1	2.9	7.1	3.9	3.8	1	8	8
86	FINANCE• INSURANCE AND	.5	1.4	.5	2.6	.5	2.0	.5	2.5	.6	2.1	.5	2.6	.9	.4	.8	4.5	2	7	7
87	ELECTRIC UTILITIES	1.1	7.0	.5	7.5	1.7	16.6	.8	8.9	1.0	6.8	1.2	14.9	1.0	4.7	1.5	4.6	2	8	7
88	NAT• GAS• WATER AND SE	.9	7.6	.7	5.7	1.1	11.8	.8	7.3	.9	7.6	1.1	11.1	.5	7.5	1.0	6.0	7	2	2
89	WHOLESALE TRADE	1.7	1.2	1.1	3.7	1.6	1.0	1.1	3.5	1.9	1.8	1.7	2.3	1.9	1.6	1.5	1.7	4	3	3
90	RETAIL TRADE	1.1	3.5	1.0	6.3	.9	4.0	1.0	6.2	1.6	4.0	1.4	4.8	1.6	2.4	1.2	6.2	3	7	7
91	AGRICULTURE• MINING• A	.7	5.1	.7	4.2	1.3	5.8	1.0	3.8	.7	5.8	.9	7.6	.8	1.9	.8	2.1	5	7	7•
92	TOTAL MANUFACTURING	.8	1.7	.9	2.6	1.1	1.5	1.3	2.9	.9	2.7	1.3	3.3	.9	1.8	.9	1.7	1	3	1•
93	TRANSPORTATION AND SER	.5	3.5	.9	4.8	.5	3.9	.8	3.7	.8	3.2	.9	3.7	.5	.6	.9	.9	1	7	7•
94	TOTAL EQUIPMENT INVEST	.6	4.3	.8	4.5	.7	4.6	.9	3.1	.6	6.4	1.1	6.9	.6	.9	.6	.9	8	7	7•
	NUMBER OF WINS	8	12	11	17	13	17	3	14	9	17	9	10	22	10	11	15	5	6	5	17	16	7	14	11	

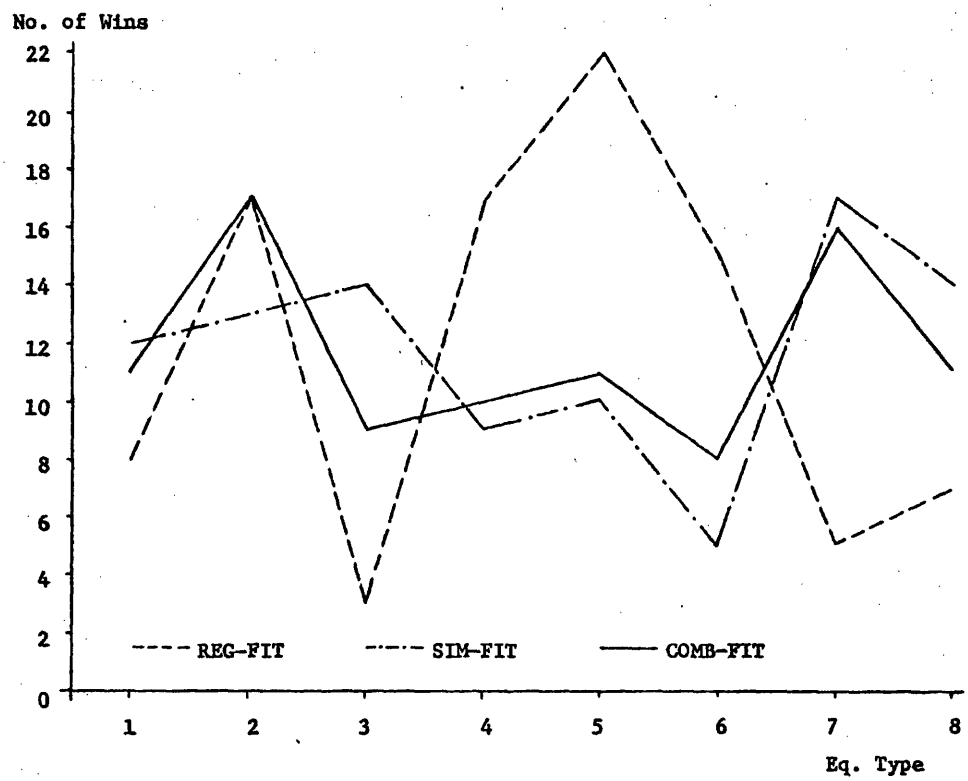


Figure V-3: Performance of Equations with Constrained Coefficient

4. Effect of Constrained Output Elasticity

To study the effect of constraining the output elasticity ($a_3(\Delta Q) > -0.5$ and $a_3(Q) > -1.0$) we have re-estimated the equations shown in Table V-2 without constraining the output coefficient a_3. Since the constraints were not binding in a number of sectors, some rows in Tables V-2 and V-5 are identical. We are therefore only interested in equations for which a_3 is binding. For example, in Agriculture only the coefficients of the logistic type equations (7 and 8) are initially bound and the simulation fit for the two equations improves slightly in Table V-2.

Table V-5:
Unconstrained Estimation with Declining Weights and Rho-Adjustment

SEC#	INDUSTRY	TIME•DO (1)		TIME•LO (2)		AID•DO (3)		AID•LO (4)		NORDH•TME (5)		NORDH•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
1	AGRICULTURE	4.1	3.6	2.9	1.9	2.6	1.8	2.3	1.1	3.9	3.1	2.4	1.8	2.9	7.7	2.1	6.4	8	4	4
2	MINING	3.7	19.0	4.0	19.0	4.1	23.2	4.6	23.2	3.9	18.5	4.5	22.7	4.6	12.3	4.7	9.2	1	8	8
3	PETROLEUM AND GAS	6.4	3.3	6.6	2.3	7.0	2.8	7.3	3.5	5.4	7.4	5.8	5.3	4.5	13.3	7.0	12.6	7	2	2
4	CONSTRUCTION	4.6	10.7	2.8	4.4	4.7	11.3	2.8	3.6	1.8	11.3	1.8	11.9	4.0	1.5	2.9	1.2	6	8	8
5	ORDNANCE	6.2	6.5	6.4	7.1	6.4	4.8	6.8	6.0	5.7	7.9	5.8	7.1	12.3	1.8	14.9	3.8	5	7	3
6	MEAT	3.8	7.2	3.0	3.6	4.1	9.7	3.0	3.7	2.2	4.6	2.1	5.8	2.9	4.6	3.1	4.0	6	2	2
7	DAIRY	4.4	9.9	1.8	2.5	3.4	6.7	1.1	4.1	2.8	2.5	3.3	.8	1.0	6.5	1.1	6.8	7	6	6
8	CANNED AND FROZEN FOOD	4.6	10.2	3.2	3.3	5.7	11.2	3.1	2.7	4.0	9.3	4.7	11.4	3.8	6.0	3.8	7.7	4	4	4
9	GRAIN MILL PRODUCTS	2.6	5.0	1.0	5.9	2.7	6.0	1.0	6.0	1.5	7.3	1.6	6.8	.9	5.3	.9	4.7	8	8	8
10	BAKERY	2.6	3.3	1.4	2.5	2.5	4.2	1.3	2.4	2.1	1.9	1.9	2.4	.9	1.8	1.0	1.9	7	7	7
11	SUGAR	4.1	12.8	4.0	9.4	4.2	13.3	4.0	8.7	4.2	11.6	4.6	12.1	6.4	19.7	8.1	8.5	4	8	4
12	CANDY	2.2	5.2	2.3	7.3	3.0	6.7	3.5	8.0	2.1	6.4	3.6	8.2	1.5	5.5	1.7	4.4	7	8	8
13	BEVERAGES	2.5	8.3	2.1	1.8	2.2	4.2	2.3	2.1	2.0	4.6	2.0	2.0	2.2	8.3	1.9	5.5	8	2	2
14	MISC. FOOD PRODUCTS	2.1	2.6	.8	.4	2.4	4.6	.8	.3	1.4	3.7	1.3	6.2	.7	3.0	.8	1.3	7	4	4
15	TOBACCO	5.0	5.4	1.5	4.5	5.0	4.2	1.5	4.9	3.1	2.8	3.2	2.5	2.7	5.1	2.3	5.5	4	6	6
16	FABRICS AND YARNS	1.4	2.2	1.8	.7	2.0	.5	2.2	2.1	1.4	2.4	2.1	.8	1.4	5.0	1.6	2.7	5	3	2
17	FLOOR COVERINGS	2.6	1.3	3.2	5.5	3.5	7.4	3.8	1.8	2.4	11.2	3.8	15.9	3.5	10.3	2.9	15.0	5	1	1
18	MISC. TEXTILES	2.2	7.8	2.2	5.8	2.5	8.3	2.6	6.3	2.3	5.7	2.5	6.4	2.0	12.5	2.0	9.6	7	5	5
19	KNIT FABRIC AND APPARE	4.1	12.6	3.3	4.6	6.9	4.3	5.0	5.2	3.9	5.1	7.2	2.9	3.7	16.2	3.9	11.5	2	6	2
20	APPAREL	2.1	2.4	1.4	4.9	2.1	2.3	1.4	5.3	1.0	1.5	1.0	1.8	1.9	4.4	1.7	4.9	6	5	5
21	HOUSEHOLD TEXTILES AND	1.5	9.1	1.1	12.4	1.5	8.2	1.1	12.5	1.1	5.7	.9	3.8	1.2	13.9	1.3	12.9	6	6	6
22	LOGGING AND LUMBER	3.0	6.6	2.6	7.3	3.6	7.0	3.2	8.0	2.7	7.3	3.2	7.9	1.7	5.0	1.9	4.7	7	8	8
23	PLYWOOD MILLWORK, STR	2.4	2.5	2.5	.6	2.7	1.8	2.5	1.7	1.6	10.2	1.9	8.5	2.7	2.6	2.3	2.5	5	2	2
24	WOODEN CONTAINERS	7.2	8.0	4.7	30.6	7.1	9.3	5.0	30.3	4.8	24.2	4.8	24.5	5.9	54.4	6.0	52.0	2	1	1
25	HOUSEHOLD AND OFFICE F	3.5	1.3	3.3	1.3	3.9	2.2	3.8	1.7	3.1	1.5	3.6	1.8	2.5	5.8	2.8	4.5	7	2	5
27	PAPER AND PRODUCTS, EX	3.6	4.0	1.7	2.4	3.7	3.5	1.7	2.2	2.2	2.6	2.1	2.4	3.7	5.1	3.4	3.7	4	4	4
28	PAPER CONTAINERS	2.0	1.9	1.7	1.9	1.9	2.3	1.7	2.0	2.1	1.3	2.1	1.6	2.9	2.2	3.0	1.8	2	5	5
29	NEWSPAPERS	1.6	6.9	.6	.9	1.5	5.6	.8	1.5	1.7	2.8	1.5	1.7	1.0	2.7	.7	1.0	2	2	2
30	PRINTING AND PUBLISHIN	4.3	3.3	1.6	3.1	4.0	4.7	1.8	2.4	1.7	2.2	1.3	3.4	2.7	6.9	2.5	6.1	6	5	5
31	INDUSTRIAL CHEMICALS	2.2	1.0	1.7	2.8	3.0	1.3	1.4	2.4	1.8	10.9	1.7	12.0	1.0	7.4	1.2	4.4	7	3	1
32	AGRICULTURAL CHEMICALS	2.4	11.8	1.0	2.8	3.2	10.7	1.0	2.7	2.0	12.6	2.7	9.4	1.0	2.2	1.1	2.8	8	7	7
33	OILS, SOAP AND FATTY A	4.4	3.6	4.9	3.6	4.8	3.3	5.1	3.3	4.9	3.9	4.9	3.1	5.7	8.5	7.9	17.2	8	6	1
34	PLASTICS AND SYNTHETIC	1.4	6.2	1.4	7.0	1.7	8.9	1.3	6.1	1.6	3.7	1.2	3.0	2.0	7.7	1.9	7.4	6	6	6
35	DRUGS	1.9	1.3	2.1	2.6	2.6	1.9	2.3	1.6	2.1	2.5	2.6	1.6	1.8	7.8	1.3	7.6	8	1	1
36	CLEANING AND TOILET IT	1.0	4.1	.7	1.8	1.1	3.4	.8	2.6	1.1	3.3	1.0	1.9	.9	1.7	.9	2.2	2	7	2
37	PAINTS AND ALLIED PROD	2.6	10.3	1.5	3.7	3.4	8.5	1.1	4.3	1.2	8.6	1.5	9.7	1.0	5.6	.9	5.8	8	2	2
38	PETROLEUM REFINING	2.7	8.4	3.7	7.3	4.4	21.3	5.0	15.6	3.8	7.9	5.2	21.7	4.3	7.1	5.7	2.3	1	8	8
39	TIRE AND TUBES	8.3	6.3	5.9	10.6	9.1	8.6	5.9	11.9	4.0	11.7	4.4	13.9	7.8	2.4	7.6	4.7	5	7	7
40	RUBBER PRODUCTS	2.7	10.2	2.4	7.5	2.5	13.2	2.4	10.2	2.4	4.7	2.5	8.2	4.1	9.3	4.5	8.7	2	5	5
41	PLASTIC PRODUCTS	4.0	13.4	4.1	6.3	4.0	13.3	4.1	4.6	3.2	7.6	2.9	7.7	4.4	32.6	4.5	11.8	6	4	4
42	LEATHER TANNING AND IN	3.4	3.9	3.2	4.4	3.6	6.1	3.6	7.5	3.6	4.9	3.8	7.4	4.6	7.5	4.2	8.4	2	1	1
43	SHOES AND OTHER LEATHE	2.3	2.3	1.8	2.9	2.3	1.8	1.9	2.7	1.9	3.6	1.9	3.3	2.6	9.8	2.5	11.9	2	3	3
44	GLASS AND GLASS PRODUC	3.9	5.5	2.2	3.5	3.3	5.2	2.2	3.7	2.2	1.0	2.3	.9	2.3	4.0	2.3	4.9	5	6	6
45	STONE AND CLAY PRODUCT	1.0	3.4	.9	1.3	1.0	3.6	1.0	1.2	1.0	5.2	1.0	5.6	1.2	.9	1.3	.7	2	8	8
46	IRON AND STEEL	.9	5.9	1.1	4.0	.8	5.7	1.2	3.5	1.1	4.4	1.1	4.0	1.6	2.1	1.5	3.3	3	7	7
47	NON-FERROUS METALS	1.7	6.3	2.0	3.2	2.3	6.0	2.2	2.3	1.8	5.1	2.6	4.5	1.4	1.7	1.3	1.6	8	8	8
48	METAL CONTAINERS	2.7	1.9	2.3	2.7	2.8	1.1	2.3	2.9	2.5	1.2	2.2	2.8	4.3	6.3	4.5	5.2	6	3	5

Table V-5: (cont.)

SEC#	INDUSTRY	TIME•DQ (1)		TIME•LQ (2)		AID•DQ (3)		AID•LQ (4)		NORDH•TME (5)		NORDH•AID (6)		LOGIS•TME (7)		LOGIS•AID (8)		WINNER OF		
		•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	•RF•	•SF•	COMB
49	PLUMBING AND HEATING	1.9	3.4	1.8	1.6	2.2	3.6	2.0	1.1	1.8	4.3	2.2	3.9	2.1	3.9	2.2	2.5	2	4	4
50	STRUCTURAL METAL PRODU	4.7	4.6	4.4	3.1	4.8	5.4	4.5	2.9	4.0	3.2	4.3	4.0	8.0	10.2	7.2	17.3	5	4	5
51	STAMPINGS	.8	5.0	.8	5.7	.8	5.2	.7	5.6	1.1	6.0	1.2	6.1	1.0	5.7	.9	5.6	4	1	1
52	HARDWARE•PLATING• WIRE	2.0	4.7	1.5	2.9	1.9	4.0	1.5	3.0	1.4	3.3	1.4	3.3	1.6	3.0	1.8	2.6	5	8	8
53	ENGINE AND TURBINES	2.2	3.2	1.1	3.8	1.5	2.6	1.1	2.7	1.0	3.9	1.0	2.8	1.3	5.7	1.4	2.6	6	3	6
54	FARM MACHINERY	4.2	4.4	2.2	5.7	3.5	4.1	2.1	4.5	1.6	1.8	1.7	1.6	1.8	2.0	2.0	2.6	5	6	6
55	CONSTRUCTION•MINING•MAT	2.9	4.8	2.1	3.1	2.9	4.7	2.1	3.1	1.8	2.9	2.0	3.0	2.0	4.2	1.8	2.6	8	8	8
56	METALWORKING MACHINERY	4.2	1.4	2.6	2.8	4.1	2.0	2.6	2.8	2.5	2.4	2.5	2.5	3.8	7.1	4.1	2.3	5	1	5
57	SPECIAL INDUSTRIAL MAC	5.3	1.8	4.5	2.6	4.8	2.0	4.7	4.6	3.8	2.2	4.0	2.3	7.5	11.5	7.4	8.6	5	1	5
58	GENERAL INDUSTRIAL MAC	2.0	1.1	1.8	4.4	1.9	1.1	1.8	5.9	2.0	2.7	2.1	2.8	2.1	4.9	2.0	4.1	4	3	3
59	MISC. MACHINERY AND SM	5.7	3.0	3.0	15.3	5.2	3.0	3.1	16.4	2.7	8.0	2.6	8.2	3.9	17.4	4.2	18.3	6	3	3
60	OFFICE AND COMPUTING M	4.1	6.4	3.1	6.4	4.1	7.5	3.1	6.4	2.9	10.3	2.9	11.0	2.2	15.7	2.4	17.4	7	2	2
61	SERVICE INDUSTRY MACHI	1.7	1.9	2.0	3.1	3.1	2.5	3.0	3.2	1.2	6.2	2.9	9.6	1.6	1.3	1.6	1.9	5	7	7
62	ELECTRIC MEASURING TH	2.3	2.3	1.8	2.7	2.1	2.3	1.8	3.0	1.7	2.9	1.9	3.1	2.2	5.5	1.9	4.8	5	1	3
63	ELECTRIC APPARATUS AND	3.6	8.7	3.0	2.0	3.6	8.5	3.1	2.3	2.9	3.0	3.1	2.7	3.3	2.9	3.3	3.3	5	2	2
64	HOUSEHOLD APPLIANCES	1.5	1.8	2.0	.8	1.6	1.4	2.4	2.7	1.6	5.2	2.9	6.5	2.0	5.3	2.0	2.9	1	2	2
65	ELECTRIC LIGHTING AND	2.3	5.1	2.6	4.3	2.5	5.5	2.3	9.4	2.3	7.0	2.2	7.3	2.8	10.3	2.9	7.4	6	2	2
66	RADIO• TV•SETS AND PH	.9	15.2	1.0	10.8	1.2	8.3	1.3	5.9	1.3	14.9	1.6	7.9	1.0	12.6	1.6	4.9	1	8	8
67	COMMUNICATION EQUIPMEN	4.4	9.0	3.0	3.2	4.7	7.9	3.1	4.0	3.4	6.5	3.8	4.9	3.0	3.5	3.0	2.1	8	8	8
68	ELECTRONIC COMPONENTS	6.1	7.4	4.6	11.3	6.1	4.2	4.6	11.4	6.3	5.3	6.4	4.6	5.7	11.6	5.7	10.9	4	3	3
69	BATTERIES• A•MATL AND	4.7	10.5	4.5	2.5	5.7	10.1	4.4	4.9	4.5	7.9	5.0	7.4	5.7	1.5	5.0	1.8	4	7	8
70	MOTOR VEHICLES AND PAR	3.7	11.0	4.0	11.2	4.4	11.3	4.7	10.9	3.6	11.1	4.7	11.1	5.6	2.6	4.1	2.8	5	7	8
71	AIRCRAFT AND PARTS	15.8	9.7	7.3	7.8	13.5	12.5	7.7	8.7	10.1	15.8	9.8	10.1	8.4	14.2	8.0	17.7	2	2	2
72	SHIPS AND BOATS	4.2	3.1	3.7	3.4	4.2	2.8	3.7	3.3	3.4	3.2	3.5	3.0	7.0	14.2	5.0	12.2	5	3	6
73	LOCOMOTIVES, RAILROADS	9.8	12.7	6.4	14.0	9.3	16.4	6.9	17.7	6.8	13.2	7.3	16.5	10.5	7.2	9.4	8.7	2	7	7
74	CYCLES, TRAILERS AND P	8.2	10.3	6.8	2.7	7.7	8.4	6.7	3.0	6.8	10.9	6.3	9.4	11.7	24.4	11.5	11.3	6	2	2
75	ENGR. AND SCIENT. INST	5.4	30.3	2.8	16.1	5.6	35.0	2.8	15.2	2.0	19.3	2.0	19.7	2.8	31.9	1.7	30.0	8	4	4
76	MECH. MEASURING DEVICE	5.1	3.5	2.8	4.0	5.2	3.6	2.6	3.9	3.0	5.7	3.0	5.0	3.2	15.3	2.8	10.6	8	1	4
77	SURGICAL AND MEDICAL I	3.4	5.6	2.5	8.3	2.9	5.6	2.5	8.3	1.8	8.4	1.5	8.8	2.1	3.8	2.8	3.7	6	8	7
78	OPTICAL AND PHOTOGRAPH	3.9	9.7	2.5	3.1	3.4	4.2	2.4	4.1	2.8	3.7	2.3	3.2	2.1	15.8	2.1	12.4	7	2	6
79	MISC. MANUFACTURED PRO	2.7	1.7	3.3	3.9	2.9	2.7	3.5	5.6	1.8	2.9	2.0	3.8	4.4	12.1	4.1	14.6	5	1	1
80	RAILROADS	6.4	1.1	4.1	3.8	5.2	4.1	5.0	7.2	4.5	5.6	4.9	7.9	2.8	9.9	4.9	4.1	7	1	1
81	TRUCKING	2.1	1.9	1.7	.9	2.0	2.6	1.7	.8	3.1	2.3	2.7	2.8	2.4	2.9	2.5	1.2	2	4	4
82	OTHER TRANSPORT	2.7	5.8	2.4	7.6	2.6	5.8	2.4	7.4	2.8	7.2	2.8	7.1	3.1	3.7	3.1	5.3	4	7	7
83	ASPECIOS	5.5	3.0	4.3	6.8	5.6	2.7	3.6	8.7	7.0	2.7	6.9	1.9	6.9	4.8	5.1	6.1	4	6	3
84	WHOLESALE AND RETAIL T	1.9	2.7	1.0	5.4	1.9	3.9	1.0	5.4	1.7	4.1	1.5	4.9	1.6	1.6	1.6	1.6	3	6	6
85	COMMUNICATION	2.1	9.7	2.1	9.2	2.7	10.5	2.5	10.5	2.0	10.2	2.6	11.2	2.5	9.4	3.2	9.0	5	8	7
86	FINANCE• INSURANCE AND	.5	1.1	.4	2.6	.5	1.6	.5	1.9	.6	2.4	.6	2.7	.8	.7	.5	2.4	2	7	7
87	ELECTRIC UTILITIES	1.3	6.0	.7	6.2	1.8	13.6	.9	6.3	1.0	6.0	1.2	14.2	1.1	3.9	1.3	4.4	2	7	7
88	NAT. GAS• WATER AND SE	.9	7.3	.7	6.0	1.2	11.1	.8	7.4	.9	7.2	1.1	10.7	.5	7.3	.8	7.4	7	2	2
89	WHOLESALE TRADE	1.8	1.1	1.1	3.5	1.4	2.0	1.1	3.4	2.1	2.4	1.9	3.1	1.8	1.9	1.8	1.5	8	1	1
90	RETAIL TRADE	1.0	3.6	1.0	6.2	.9	4.4	1.0	6.2	1.6	5.1	1.4	5.7	1.6	2.6	1.5	2.7	3	7	7
91	AGRICULTURE• MINING• A	.8	4.7	.7	3.9	1.3	4.6	1.0	3.2	.7	5.5	1.0	7.2	.7	1.9	.7	2.2	5	7	7
92	TOTAL MANUFACTURING	.9	1.2	.9	2.1	1.2	1.0	1.3	1.9	.9	2.4	1.3	2.5	.9	1.8	.8	1.6	8	3	1
93	TRANSPORTATION AND SER	.5	3.2	.9	4.4	.5	3.3	.9	2.1	.8	2.4	.9	2.4	.5	1.0	.4	.5	8	8	8
94	TOTAL EQUIPMENT INVEST	.6	3.8	.8	3.8	.7	3.7	1.0	1.5	.9	5.7	1.2	5.6	.5	.8	.5	.9	8	7	7
	NUMBER OF WINS	4	12	11	15	15	16	3	10	7	12	9	10	19	5	10	13	9	9	13	16	14	15	18	16	

The use of the constraints may also have its adverse effects. But more often than not it improves the forecasting results. For example, out of 15 strongly bound coefficients of Type 1, nine reported an improved simulation performance. The result is even better for Type 7 where out of 44 constrained equations, 30 simulation errors are lower.

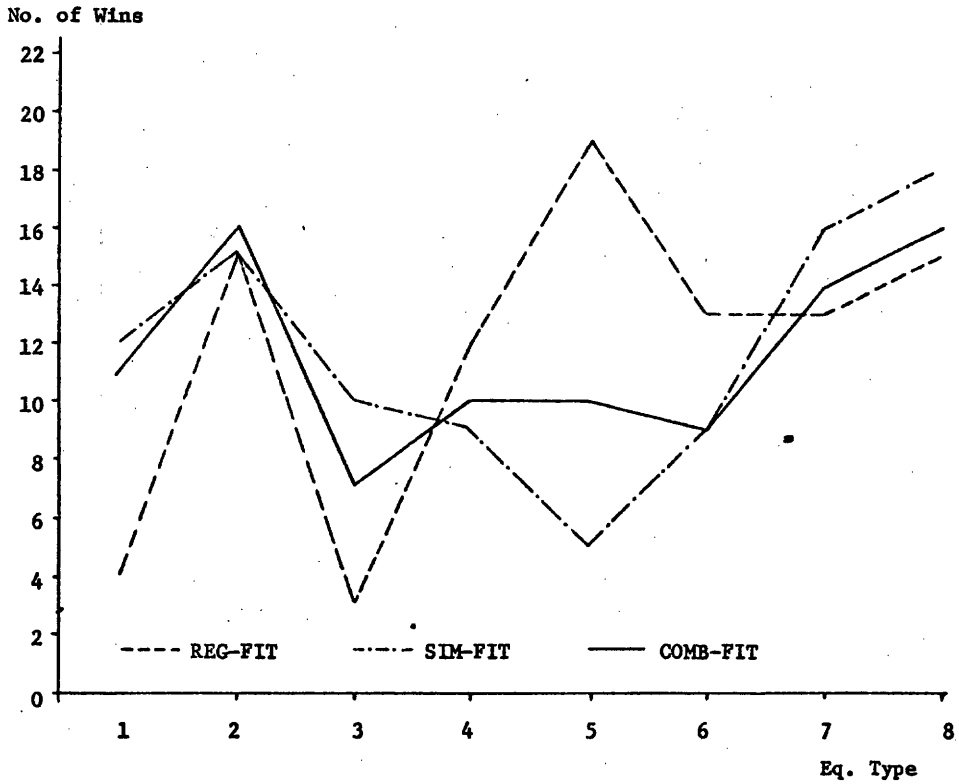


Figure V-4: Performance of Unconstrained Equations with Declining Weights and RHO-Adjustment

The results of Table V-5 are summarized in Figure V-4. The removal of the output coefficient constraint did not appreciably change the simulation performance of the equations. Consequently, the pattern between Figures V-1 and V-4 hardly changed. Only the logistic growth curve equations seem to indicate that Type 7 responds to the constraining more favorably than Type 8. In short, the results of the forecast simulation justify the a priori conditions of the parameter estimating procedure. Although the improvements are marginal in most cases, for particular industries we note sizable decreases in forecasting errors.

D. Choice Selection of Equations

In estimating these equations, we encountered a number of problems which were not as yet discussed. For example, for a number of equations the parameter estimates do not match the expected signs shown in Table V-1. In particular, the Type 8 "LOGIS*AID" estimate of a_1 is positive in most sectors. This result may be explained by the somewhat strange specification of the equation. The AID-term should probably be entered separately, but because of the relatively short time series, we reject this approach. Nevertheless, a number of different specifications failed as well and we decided against this equation. The Nordhaus full-employment equations are also rejected. This is because full employment output is not readily available in the model and also because of their relatively poor forecasting behavior. Hence, the final selection of equations contains only the first four types and Type 7.

Table V-6:
Choice Selection of Employment Equations

SECH	INDUSTRY	TIME*DQ (1) *RF*	*SF*	TIME*LQ (2) *RF*	*SF*	AID*DQ (3) *RF*	*SF*	AID*LQ (4) *RF*	*SF*	LOGIS*TME (5) *RF*	*SF*	WINNER&CHOICE *RF*	*SF*	*IT*	*US*	TIME CHCE *RF*	*RF*	RATIO-85	SECH
1	AGRICULTURE	4.1	3.0	2.9	1.9	2.6	1.8	2.3	1.1	3.0	7.3	4	4	4	4	4.8	2.2	1.071	1
2	MINING	3.7	19.0	4.0	19.0	4.1	23.2	4.6	23.2	4.6	12.3	1	5	5	5	7.2	8.5	.624	2
3	PETROLEUM AND GAS	6.5	2.9	6.6	2.3	7.1	3.0	7.3	3.5	4.5	13.3	5	2	2	2	8.1	8.4	1.012	3
4	CONSTRUCTION*E* AND O	4.6	10.7	2.8	4.4	4.7	11.3	2.8	3.6	3.9	2.0	4	5	5	2	7.8	3.6	1.062	4
5	CHEMANCE	6.2	6.5	6.4	7.1	6.4	4.8	6.8	6.0	12.3	1.8	1	5	3	5	8.2	12.3	.672	5
6	MEAT	3.8	7.1	3.0	3.6	4.0	9.0	3.0	3.7	4.4	2.7	2	5	2	5	5.3	4.0	.784	6
7	DAIRY	5.0	8.2	1.8	2.5	3.7	6.0	1.1	4.1	2.6	5.8	4	2	2	2	4.2	2.2	1.018	7
8	CANNED AND FROZEN FOOD	4.6	10.1	3.2	3.3	5.7	11.1	3.1	2.7	4.4	6.5	4	4	5	5	6.1	4.5	.740	8
9	GRAIN MILL PRODUCTS	2.6	4.5	1.0	5.9	3.0	5.1	1.0	6.0	1.5	1.5	2	5	5	5	3.7	1.6	.759	9
10	BAKERY	2.6	3.3	1.4	2.5	2.5	4.2	1.3	2.4	2.8	2.2	4	5	4	2	2.2	2.2	1.012	10
11	SUGAR	4.1	12.8	4.0	9.4	4.2	13.3	4.0	8.7	6.6	21.6	4	4	1	1	7.3	7.3	1.000	11
12	CANDY	2.2	5.2	2.3	7.3	3.0	6.8	3.5	8.0	2.4	4.5	1	5	5	5	3.4	5.7	.900	12
13	BEVERAGES	2.5	8.3	2.1	1.8	2.2	4.2	2.3	2.1	3.4	10.2	2	2	2	2	5.2	2.2	.951	13
14	MISC. FOOD PRODUCTS	2.1	2.6	.8	.4	2.4	4.5	.8	.3	1.2	3.6	4	4	4	4	1.6	.8	.936	14
15	TOBACCO	5.0	5.4	1.5	4.5	5.0	4.2	1.5	4.9	4.7	4.1	4	5	2	2	5.4	3.3	1.452	15
16	FABRICS AND YARNS	1.4	2.2	1.8	.7	2.0	.5	2.2	2.1	1.4	5.0	1	3	2	2	1.9	1.9	.926 *	16
17	FLOOR COVERINGS	2.6	1.3	3.2	5.5	3.5	7.4	3.8	1.8	3.3	8.0	1	1	1	1	3.3	3.3	1.000 *	17
18	MISC. TEXTILES	2.2	7.8	2.2	5.8	2.5	8.3	2.6	6.3	2.0	12.5	5	2	2	2	2.7	2.7	1.000 *	18
19	KNIT FABRIC AND APPARE	4.1	12.6	3.3	4.6	6.9	4.3	5.0	5.2	4.5	17.1	2	3	2	2	6.3	3.9	.872	19
20	APPAREL	2.1	2.4	1.4	4.9	2.1	2.2	1.4	5.3	1.9	4.4	4	3	3	1	2.4	2.4	1.000 *	20
21	HOUSEHOLD TEXTILES AND	1.5	9.1	1.1	12.4	1.5	8.2	1.1	12.5	1.1	13.6	2	3	3	3	3.7	3.2	.965 *	21
22	LOGGING AND LUMBER	3.0	6.6	2.6	7.3	3.6	7.0	3.2	8.8	1.7	5.0	5	5	5	5	5.1	3.4	.771	22
23	PLYWOOD, MILLWORK, STR	2.4	2.5	2.5	.6	2.7	1.8	2.5	1.7	2.6	1.9	1	2	2	2	2.6	2.5	.934 *	23
24	WOODEN CONTAINERS	7.2	8.8	4.7	30.6	7.1	9.3	5.0	30.3	7.1	37.5	2	1	1	1	8.8	8.8	1.000 *	24
25	HOUSEHOLD AND OFFICE F	3.5	1.3	3.3	1.3	3.9	2.2	3.8	1.7	2.5	5.8	5	2	2	3	6.4	6.4	.987	25
27	PAPER AND PRODUCTS, EX	3.6	4.0	1.9	2.4	3.7	3.5	1.7	2.2	4.2	4.0	4	4	3	1	1.4	1.4	1.000	27
28	PAPER CONTAINERS	2.0	1.9	1.7	1.9	1.9	2.3	1.7	2.0	2.9	2.2	2	2	2	2	2.3	2.0	.922	28
29	NEWSPAPERS	1.6	6.9	.6	.9	1.5	5.6	.8	1.5	2.3	2.9	2	2	5	1	2.9	2.9	1.000	29
30	PRINTING AND PUBLISHIN	4.3	3.3	1.6	3.1	4.0	4.7	1.8	2.4	3.8	2.0	2	5	5	3	3.3	2.8	1.064	30
31	INDUSTRIAL CHEMICALS	2.3	2.3	1.7	2.8	3.0	1.3	1.4	2.4	2.0	5.7	4	3	3	3	2.7	2.8	.966 *	31
32	AGRICULTURAL CHEMICALS	2.4	11.8	1.0	2.8	3.2	10.7	1.0	2.7	1.2	5.9	4	4	5	5	4.9	1.6	.686 *	32
33	GLUE, INK, AND FATTY A	4.4	3.6	4.9	3.6	4.8	3.3	5.1	3.3	5.7	8.5	1	4	1	4	5.9	6.6	.973 *	33
34	PLASTICS AND SYNTHETIC	1.4	6.2	1.4	7.0	1.7	8.9	1.3	6.1	2.8	6.6	4	4	1	1	2.9	2.9	1.000 *	34
35	DRUGS	1.8	1.1	2.1	2.6	2.6	1.9	2.3	1.6	1.9	5.7	1	1	1	1	1.9	1.9	1.000 *	35
36	CLEANING AND TOILET IT	1.0	4.1	.7	1.8	1.1	3.4	.8	2.6	.9	1.3	2	5	5	5	1.9	1.2	.704 *	36
37	PAINTS AND ALLIED PROD	2.8	8.5	1.5	3.7	3.4	8.5	1.1	4.3	2.0	5.0	4	2	5	5	4.8	3.1	.867 *	37
38	PETROLEUM REFINING	2.8	8.2	3.7	7.3	4.4	21.3	5.0	15.6	5.8	2.4	1	5	5	2	4.9	4.4	.914	38
39	TIRE AND TUBES	8.3	6.3	5.9	10.6	9.1	8.6	5.9	11.9	7.8	2.4	4	5	5	5	7.5	7.5	.739	39
40	RUBBER PRODUCTS (EXC.	2.7	10.2	2.4	7.5	2.5	13.2	2.4	10.2	4.1	9.3	2	2	2	2	4.8	3.5	.949	40
41	PLASTIC PRODUCTS	4.0	12.9	4.1	6.5	4.0	13.3	4.1	4.6	5.0	28.7	1	4	2	1	5.9	5.9	1.000	41
42	LEATHER TANNING AND IN	3.4	3.9	3.2	4.4	3.6	6.1	3.6	7.5	4.6	7.2	2	1	1	1	4.2	4.2	1.000	42
43	SHOES AND OTHER LEATHE	2.3	2.3	1.8	2.9	2.3	1.8	1.9	2.7	2.6	9.8	2	3	3	3	2.7	2.7	.993	43
44	GLASS AND GLASS PRODUC	3.9	5.5	2.2	3.5	3.3	5.2	2.2	3.7	3.1	2.5	2	5	5	1	4.7	4.7	1.000 *	44
45	STONE AND CLAY PRODUCT	1.0	3.4	.9	1.3	1.0	3.6	1.0	1.2	1.2	.9	2	5	5	2	1.4	1.2	.988 *	45
46	IRON AND STEEL	.9	5.9	1.1	4.0	.8	5.7	1.2	3.5	1.6	2.1	3	5	5	4	2.0	1.7	.933 *	46

Table V-6: (cont.)

SEC#	INDUSTRY	TIME•DD (1) •RF•	TIME•DD (1) •SF•	TIME•LQ (2) •RF•	TIME•LQ (2) •SF•	AID•DQ (3) •RF•	AID•DQ (3) •SF•	AID•LQ (4) •RF•	AID•LQ (4) •SF•	LOGIS•TME (5) •RF•	LOGIS•TME (5) •SF•	WINNER&CHOICE •RF•	WINNER&CHOICE •SF•	WINNER&CHOICE •IT•	WINNER&CHOICE •US•	TIME CHCE •RF•	TIME CHCE •RF•	RATIO-85	SEC#
47	NON-FERROUS METALS	1.7	6.3	2.0	3.2	2.3	6.0	2.2	2.3	1.4	1.7	5	5	5	4	2.8	2.5	.893 •	47
48	METAL CONTAINERS	2.7	1.9	2.3	2.7	2.8	1.1	2.3	2.9	4.7	6.7	4	3	3	3	3.0	3.2	.978	48
49	PLUMBING AND HEATING	1.9	3.4	1.8	1.6	2.2	3.6	2.0	1.1	2.1	3.9	2	4	4	4	2.6	2.1	1.084 •	49
50	STRUCTURAL METAL PRODU	4.7	4.6	4.4	3.1	4.8	5.4	4.5	2.9	9.0	7.4	2	4	4	4	5.4	5.4	.824	50
51	STAMPINGS	.8	5.0	.8	5.7	.8	5.2	.7	5.6	1.0	5.7	4	1	1	1	2.2	2.2	1.000 •	51
52	HARDWARE,PLATING, WIRE	2.0	4.7	1.5	2.9	1.9	4.0	1.5	3.0	1.6	3.0	2	2	2	2	2.4	2.2	.901 •	52
53	ENGINE AND TURBINES	2.2	3.2	1.1	3.8	1.5	2.6	1.1	2.7	1.3	5.7	4	3	4	4	3.8	1.7	.872 •	53
54	FARM MACHINERY	4.2	4.4	2.2	5.7	3.5	4.1	2.1	4.5	1.8	2.0	5	5	5	4	4.4	3.1	.920 •	54
55	CONSTRUCTION•MINING•MAT	2.8	4.8	2.1	3.1	2.9	4.7	2.1	3.1	2.0	4.2	5	2	4	2	3.5	2.7	.933 •	55
56	METALWORKING MACHINERY	4.2	1.4	2.6	2.8	4.1	2.0	2.6	2.8	3.8	7.1	2	1	2	3	5.1	5.0	1.005	56
57	SPECIAL INDUSTRIAL MAC	5.3	1.8	4.5	2.6	4.8	2.0	4.7	4.6	7.5	11.5	2	1	3	3	6.2	5.5	1.038	57
58	GENERAL INDUSTRIAL MAC	2.0	1.1	1.8	4.4	1.9	1.1	1.8	5.9	2.1	4.9	4	3	3	3	2.4	2.2	1.012 •	58
59	MISC. MACHINERY AND SM	5.7	3.0	3.0	15.3	5.2	3.0	3.1	16.4	3.8	15.0	2	3	3	3	6.3	5.8	.954 •	59
60	OFFICE AND COMPUTING M	4.1	6.4	3.1	6.4	4.1	7.5	3.1	6.4	3.3	9.0	2	2	1	3	4.6	4.7	.885 •	60
61	SERVICE INDUSTRY MACHI	1.7	1.9	2.0	3.1	3.1	2.5	3.0	3.2	1.6	1.3	5	5	5	5	2.0	2.1	.765 •	61
62	ELECTRIC MEASURING, TR	2.3	2.3	1.8	2.7	2.1	2.3	1.8	3.0	2.2	5.5	2	1	3	2	2.8	2.5	.945 •	62
63	ELECTRIC APPARATUS AND	3.6	8.7	3.0	2.0	3.6	8.5	3.1	2.3	3.3	2.9	2	2	2	4	4.9	3.2	.912 •	63
64	HOUSEHOLD APPLIANCES	1.5	1.6	2.0	.8	1.6	1.4	2.4	2.7	2.0	4.9	1	2	2	2	1.7	2.2	.901 •	64
65	ELECTRIC LIGHTING AND	2.3	5.1	2.6	4.3	2.5	5.5	2.3	9.4	2.8	10.3	4	2	2	1	3.5	3.5	1.000 •	65
66	RADIO-, TV-SETS AND PH	.9	15.2	1.0	10.6	1.2	8.3	1.3	5.9	1.0	12.6	1	4	4	4	5.1	2.0	.735 •	66
67	COMMUNICATION COMPONEN	4.4	9.0	3.0	3.2	4.7	7.9	3.1	4.0	3.0	3.5	2	2	2	5	5.7	2.9	.597 •	67
68	ELECTRONIC COMPONENTS	6.1	7.4	4.6	11.3	6.1	4.2	4.6	11.4	5.7	11.6	4	3	3	3	7.2	7.1	.929 •	68
69	BATTERIES, X-RAYS AND	4.7	10.5	4.5	2.5	5.7	10.1	4.4	4.9	5.7	1.5	4	5	5	5	6.8	5.8	.640 •	69
70	MOTOR VEHICLES AND PAR	3.7	11.0	4.0	11.2	4.4	11.3	4.7	10.9	5.6	2.6	1	5	5	5	5.8	6.0	.724	70
71	AIRCRAFT AND PARTS	15.8	9.7	7.3	7.8	13.5	12.5	7.7	8.7	8.4	14.2	2	2	2	2	16.5	8.0	.800	71
72	SHIPS AND BOATS	4.2	3.1	3.7	3.4	4.2	2.8	3.7	3.3	7.0	14.2	2	3	3	2	4.7	4.1	.958	72
73	LOCOMOTIVES, RAILROADS	9.8	12.7	6.4	14.0	9.3	16.4	6.9	17.7	10.5	7.2	2	5	5	2	12.6	9.0	1.407	73
74	CYCLES, TRAILERS AND P	8.2	10.3	6.8	2.7	7.7	8.4	6.7	3.0	11.7	24.4	4	2	2	2	12.2	9.0	.855	74
75	ENGR. AND SCIENT. INST	5.6	36.3	2.8	16.1	5.6	35.0	2.8	15.2	2.8	31.9	2	4	5	2	10.9	8.4	.754 •	75
76	MECH. MEASURING DEVICE	5.2	3.7	2.8	4.0	5.2	3.6	2.8	3.9	5.7	9.8	4	3	3	3	5.8	5.8	.979	76
77	SURGICAL AND MEDICAL I	3.4	5.6	2.5	8.3	2.9	5.6	2.5	8.3	2.5	4.8	2	5	5	1	4.2	4.2	1.000	77
78	OPTICAL AND PHOTOGRAPH	3.9	9.7	2.5	3.1	3.4	4.2	2.4	4.1	2.1	15.8	5	2	2	2	5.1	3.2	.934	78
79	MISC. MANUFACTURED PRO	2.7	1.7	3.3	3.9	2.9	2.7	3.5	5.0	4.4	10.9	1	1	1	1	2.7	2.7	1.000	79
80	RAILROADS	6.4	1.1	4.1	3.8	5.2	4.1	5.0	7.2	2.8	9.9	5	1	1	2	7.9	4.3	1.114	80
81	TRUCKING	2.1	1.9	1.7	.9	2.0	2.6	1.7	.8	3.0	3.0	2	4	2	2	2.5	2.0	.935	81
82	OTHER TRANSPORT	2.7	5.8	2.4	7.6	2.6	5.8	2.4	7.4	3.0	4.3	4	5	5	5	4.1	4.1	1.071	82
83	AIRLINES	5.8	1.6	4.3	6.8	5.6	2.7	3.6	8.7	7.0	3.6	4	1	1	5	8.2	10.0	.680	83
84	WHOLESALE AND RETAIL T	1.1	3.2	1.0	5.4	1.0	3.9	1.0	5.4	1.6	3.2	3	5	1	5	1.4	1.7	1.000	84
85	COMMUNICATION	2.1	9.7	2.1	9.2	2.7	10.5	2.5	10.5	2.5	5.4	1	5	5	5	4.8	4.7	.674	85
86	FINANCE, INSURANCE AND	.5	1.3	.4	2.4	.5	1.6	.5	1.9	.9	1.2	2	5	1	1	.8	.8	1.000	86
87	ELECTRIC UTILITIES	1.3	6.0	.7	6.2	1.8	13.6	.9	6.3	1.1	3.9	2	5	5	5	3.0	2.5	.668	87
88	NAT. GAS, WATER AND SE	.9	7.3	.7	6.0	1.2	11.1	.8	7.4	.5	7.3	5	2	2	1	3.2	3.2	1.000	88
89	WHOLESALE TRADE	1.8	1.3	1.1	3.5	1.6	2.0	1.1	3.4	1.9	.9	4	5	5	1	1.8	1.8	1.000	89
90	RETAIL TRADE	1.1	3.9	1.0	6.2	.9	4.4	1.0	6.2	1.6	4.4	3	1	1	1	2.2	2.2	1.000	90
	NUMBER OF •INS	15	12 15	33	21 24	3	13 14	27	14 8	11	29 28								

The regression and simulation results are shown in Table V-6 and are summarized in Figure V-5. The standard conditions are used in fitting and forecasting productivity with these equations. The four columns labeled "Winner & Choice" show the test results when based on: (1) regression fit *RF*, (2) simulation fit *SF*, (3) equally weighted regression and simulation performance (as picked by the computer) *IT*, and (4) the final judgmental choice, based on (1) through (3) combined with economic sensibility and long-term forecasting behavior *US*. However, a few of the so chosen equations still had wrong signs and required replacement by the next best equation. Furthermore, after a close examination of a forecast through 1985 with these equations we wished to introduce a different type equation in a number of industries. This selection is shown in the *US* column (*US* refers here to our preference).

The dashed line of Figure V-5 shows the performance of the logistic type equations. Despite the special fitting procedure, their regression results are poor. In only eleven cases is their regression fit the best. But they outperform the other equations in the simulation, with 29 wins they are the best of the five.[1] We are still somewhat suspicious of the logistic equations, especially when applied to industries where productivity increases had been unusually low in 1969-71. For such industries, the logistic often showed little or no further gain in productivity out to 1985. We discarded the

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[1] LOGIS must be fit to the first difference of ln(L/Q). To calculate (L/Q), one must know $(L/Q)_0$. When we take the actual $(L/Q)_0$ as the starting point the fit is usually very bad. We choose therefore the initial $(L/Q)_0$ to make the sum of the errors equal to zero. In effect, $(L/Q)_0$ become an additional parameter of the regression explaining the trend in productivity.

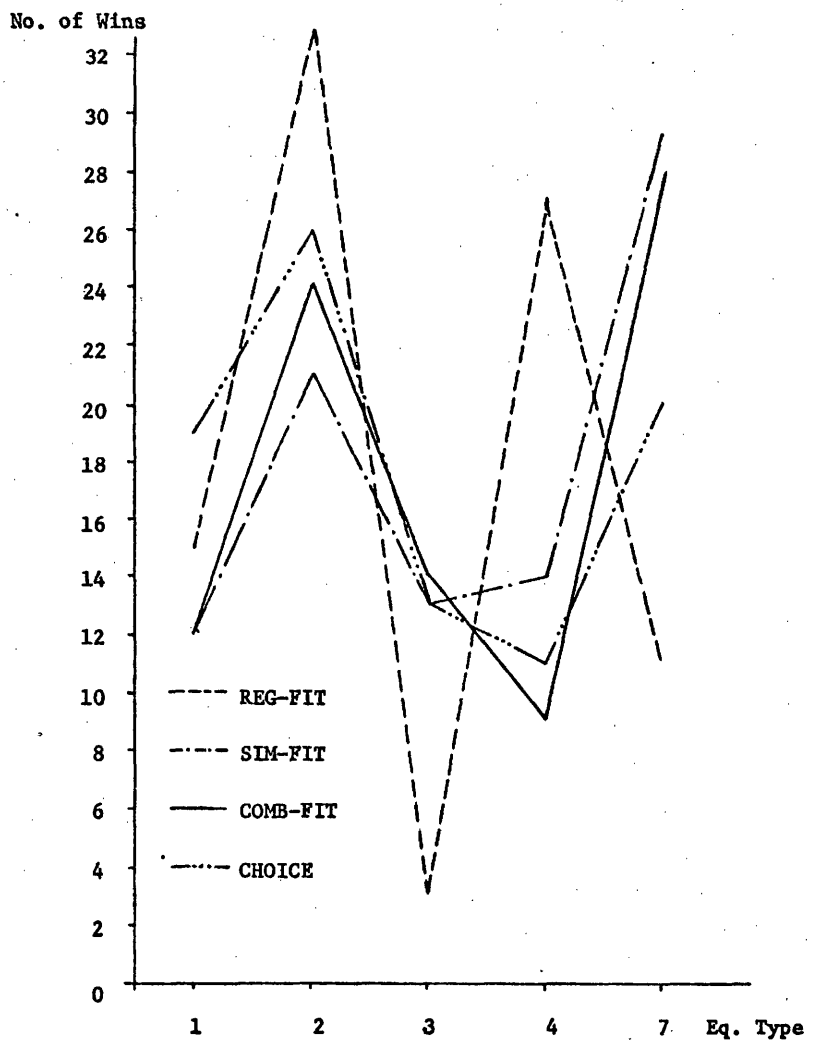

Figure V-5: Choice Selection of Employment Equations

logistic equation in these cases and chose the next best. In this way, nearly half of the logistics were thrown out. At the same time the logistic replaced some of the other *IT* selections with wrong sign problems so that twenty of them are used in the choice selection. The final choice vector contains 19 Type 1, 26 Type 2, 13 Type 3, 11 Type 4, and 20 logistic type equations.

All of these equations have the proper sign, satisfiy the imposed constraints, and give reasonable forecasting results. To get some idea of how different the forecast is with these chosen equations from, say, a forecast conducted with an equation of Type 1, we have used both of them for a forecast through 1985. The resulting regression errors of the TIME*DQ and CHOICE equations, when estimated for the whole time series through 1971, are shown in the two columns labeled "TIME" and "CHCE". The final column of Table 6, labeled "Ratio-85", reports the ratio of productivity predicted by the chosen equations to what would have been predicted by the TIME*DQ extrapolation. Only in 15 industries is the productivity forecast higher with the CHOICE equations; in eleven cases it is, of course, the same (as the same equation is used), and for the remaining is it, by and large, substantially lower.[1]

The appendix contains the estimates with plots of actual and predicted labor per unit of output for a small number of selected industries. Across

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[1]For a complete discussion of possible causes for this retardation in productivity, see Almon, Buckler, Horwitz and Reimbold (6).

the top are the regression and simulation fits measured in average absolute percentage error, an indication of whether or not the rho-adjustment is used in the simulation, the auto-correlation coefficient, the last residual of the regression, the constant term a_1 (except for Type 8 where it is the coefficient on ΔA), the trend coefficient a_2 measuring the declining man-hour requirements, and the cyclical or economy of scale parameter a_3. Also shown are the standard errors of these three parameters. Finally we have "RBAR*SQAR", the $\bar{R}^2$ of the regression and an indicator for whether the declining weight scheme is used.[1]

First we have shown the eight different ways of estimating productivity in agriculture. The eight equations fit the data quite well, but the simulation of Type 4 "AID*LQ" is clearly the best. We also note that for three equations (Types 2, 7, and 8) the output coefficient constraint is binding. Furthermore, the relatively low "RBAR*SQAR" of Types 7 and 8 suggest that the initial fit with $(L/Q)_0$ was much worse than the one with $(L/Q)_0^*$ shown by the plots. Next, we have chosen Dairy; the output constraint is binding in all eight equations and again all equations fit the data rather well. But Type 4 recorded the best regression while the Nordhaus-AID equation proves to be extremely accurate in forecast simulation. All coefficients have the correct sign except for Type 8, where we expected a_1 to be negative. We also note that the exponential ΔQ equations (Types 1 and 3) have a tendency of overpredicting productivity in this industry while the logistic type produced too much slowdown. The productivity in the following sector, Knit

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[1]Note, the "RBAR*SQAR" of the logistic type equations refers to the regression with the starting value of $(L/Q)_0$ while the plots and the "REG FIT" represent the fit of the final equation with $(L/Q)_0$.

fabrics and apparel, was again best predicted with the Nordhaus-AID equation, but Type 2 "TIME*LG" has clearly the overall edge. Type 8 has again the wrong sign on AID and so has Type 4. Sector 38, Petroleum refining, strongly favors the logistic. None of the other types is able to predict the slower growth in productivity of this sector. Particularly the AID-equations are completely misled by the strong investment boom of refineries. They invested only $280 million in 1966 but $668 million two years later when measured in 1969 constant dollars. The productivity of the automobile sector is quite cyclical. This is also demonstrated by the Nordhaus equations which measure the full employment (normal) output per man-hour. These equations also fit best the data and demonstrate extraordinary tracing ability. But to predict the slower growth in productivity we need again the logistic equations with their retardation characteristics. Sector 84, Wholesale and Retail, must be studied in conjunction with sectors 89, Wholesale, and 90, Retail. The best equations for measuring total productivity in Trade (sector 84) are Types 1 or 7. By using Type 1, on one hand, we found that we are predicting a healthy productivity gain for this big employment sector. On the other hand, by using Type 7 we end up with no growth at all. To solve this dilemma, we separate Wholesale from Retail and estimate their productivity individually. As expected, we find Type 7 best suited for the Wholesale sector and Type 1 is the winner in Retail. We are quite satisfied with the forecasting performance of these two equations. This result also suggests that even such closely related industries as Wholesale and Retail may have very different productivity prospects. Finally, in the largest employment sector (Finance, insurance, and services), types 1 and 7 seem to be a toss-up again. With Type 7,

however, the model predicts a negative productivity change in the eighties. Consequently, we use Type 1 for this sector. With this equation it achieves about 30 percent more productivity in 1985 than it would have with the logistic equation.

The coefficients of all CHOICE equations are significant at the 5 percent level. The output variable is entered only when it significantly contributed to the explanation of productivity. Hence, the zero output coefficient of some sectors.

E. Conclusion of the Simulation

Experience shows that the production function approach does not lend itself to the estimating of productivity equations. The INFORUM project, therefore, takes a different approach. We specify eight different equations for each of the 87 sectors and use the regression and simulation behavior of the individual equations in the selection procedure.

The test results, as well as difficulties in adopting some of the equations in the forecasting model, require us to discard three of them. The simulation behavior of the five remaining equations is quite adequate. Of the chosen selection (identified by the column labeled *US*) only four sectors show an error of greater than ten percent. It is also noteworthy that because of the general slowdown in the rate of productivity growth, the logistic type equations perform rather well.