AN INTERINDUSTRY FORECASTING MODEL FOR PRICES AND FACTOR INCOMES FOR THE U. S.

BY

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Chapter I Overview of the Model

I.1 Introduction

Forecasting factor incomes and prices within an input-output framework is the subject of this study. The addition of this work to an existing interindustry model of the U. S. economy was a major step in closing the model with respect to both prices and income. Before the work done in this study was available, the INFORUM model determined constant dollar (real) final demands and real output. Now, it becomes possible to use endogenous prices and income in this determination and to translate real product and final demands into nominal values. Furthermore, the closed model is internally consistent: nominal GNP evaluated from the product side will equal nominal GNP calculated from factor incomes.

There are two possible approaches to modelling prices and incomes. One method would be to use the interaction of demand and supply functions in the determination of a product's price and then calculate value added as the difference between the value of the output and the value of any intermediate goods used in the production of that final product. Value added would then be distributed among its various components such as labor, capital and taxes. The alternative method is to work in the other direction from incomes to prices. First, determine the various components of value added, and then obtain the price for each product by utilizing the input-output definition that the price per unit of output must equal the unit material costs plus unit value added. Logically, the two methods are equivalent. A shortage of capacity, for

example, that boosts the price of the product, can equally well be viewed as increasing the profit per unit.

Although the first method may appear to be a more simple approach to determine prices and incomes, there are two reasons why it is not. One is that the demand and supply functions imply that the price for each product is a function of the prices for other products. The specification of the demand curve for a product should include the prices of complementary and substitute goods while the supply function for a product should include all of the input prices. Since some prices will appear in more than one demand or supply function, the first method would require simultaneous estimation of every product's demand and supply functions, an extremely complex task. In addition, one of the goals of this model is to create the capability of replicating some of the tables in the National Income and Product Accounts (NIPA) produced by the Bureau of Economic Analysis (BEA). Since the NIPA do not report output prices, the first method is not possible if consistency with the NIPA is desired. However, the BEA does have readily available unpublished data on factor income by industry - called Gross Product Originating (GPO) - that is consistent with its GNP accounts.

For the above reasons, this study models prices by forecasting factor incomes and then determining prices. This decision immediately presents us with another problem. Prices relate, of course, to products; but GPO relates to industries, defined as a collection of establishments having the same primary product but producing perhaps numerous secondary products that are primary to other industries. This non-conformity between products and industries makes "bridging" between the two an important task to be accomplished in this study.

The sector definitions are dictated by the conventions used by the BEA in their unpublished GPO data, which is organized into sixty-four two-digit SIC industries. For this model, the industries are aggregated to a slightly more compact level of 42 industries. The aggregation was primarily in the service sectors where data on output and prices is scant. The ordering is shown in Figure I-1: thirty-seven private industries, four government sectors and the rest of the world. GPO for each industry can be thought of as divided among labor, capital and government, and there subdivided into a total of thirteen components:

Labor Compensation
1) Wages and Salaries
2) Wage Supplements

Return to Capital
3) Net Interest Payments
4) Corporate Capital Consumption Allowances
5) Noncorporate Capital Consumption Allowances
6) Business Transfer Payments
7) Corporate Profits
8) Proprietor Income
9) Corporate Inventory Valuation Adjustments
10) Noncorporate Inventory Valuation Adjustments
11) Rental Income

Taxes and subsidies
12) Indirect Business Taxes
13) Government Subsidies

The development of techniques for forecasting the various components by industry constitutes the main task of this study.

Order of Presentation

Before proceding, a brief account of the contents of the remaining work may aid the reader at this point. In the following section, the framework of the entire INFORUM model is described to make clear the overall structure into which this price-income sub-model will be

Figure I-1

GPO SECTOR	TITLE	SIC CODE
1	Farm & Agricultural Services	0100-0900
2	Crude Petroleum & Natural Gas	1300
3	Mining	1000-1200,1400
4	Contract Construction	1500-1700
5	Food & Tobacco	2000-2100
6	Textile Mill Products	2200
7	Apparel and Related Products	2300
8	Paper and Allied Products	2600
9	Printing and Publishing	2700
10	Chemical and Allied Products	2800
11	Petroleum and Related Industries	2900
12	Rubber & Misc Plastic Products	3000
13	Leather and Leather Products	3100
14	Lumber & Wood Products,ex Furn	2400
15	Furniture and Fixtures	2500
16	Stone, Clay, & Glass Products	3200
17	Primary Metal Industries	3300
18	Metal Products	3400
19	Trans Eq + Ord ex Motor Vehicles	3720-3790
20	Machinery, except Electrical	3500
21	Electrical Machinery	3600
22	Motor Vehicles and Equipment	3710
23	Instruments and Related Products	3800
24	Misc. Manufacturing industry	3900
25	Railroads	4000
26	Air Transportation	4500
27	Trucking and Other Transport	4100,4200,4400,4600,4700
28	Communciations	4800
29	Blank	
30	Electric, Gas, and Sanitary	4900
31	Wholesale and Retail Trade	5000-5900
32	Financial & Insurance Services	6000-6200,6700
33	Real Estate & Combinations Of	6500,6600
34	Hotels & Repair (not auto)	7000,7200,7600
35	Misc. Business Services	7300,8100,8400,8900
36	Auto Repair	7500
37	Motion Pictures & Amusements	7800-7900
38	Medical & Educational Services	8000,8200,8300,8600
39	Private Households	8800
40	Federal Gov't Enterprises	
41	State and Local Enterprises	
42	Blank	
43	Blank	
44	Federal Government General	
45	State and Local Gov't General	
46	Rest of the World	

inserted. This background is presented to enable the reader to understand better the context in which the price-income model must operate. A brief summary of previous INFORUM work on the development of price and income models (a more detailed discussion forms an appendix to this chapter) ends the chapter.

Chapter II deals with the technical but statistically essential "bridging" referred to above: the transformation of value added by product to value added by industry and vice-versa. Included in the presentation is a discussion of the statistical sources for the data on factor incomes.

Chapters III-V describe the estimation of the components of GPO by industry. Labor compensation is the topic of Chapter III. First, it discusses previous work and then the proper long-run implications and desired properties of the equations. The strategy for getting labor compensation by combining aggregate nominal hourly labor compensation (hlc), sectoral relative wages, and sectoral hours worked is then presented.

Chapter IV concerns the determination of the various components of the "return to capital": capital consumption allowances, net interest payments, corporate profits, proprietor income, business transfer payments, inventory valuation adjustments, and rental income. First, the rationale and framework for forecasting the total return to capital (defined as the sum of its components) and its relationship to profit income is discussed. Because of the similar nature of profit income (corporate profits and proprietor income) and the total return to capital, the framework of this model is to forecast the total return and all of its components except for corporate profits and proprietor

income. The last two are obtained as residuals. Next, the total return to capital and each component with a forecasting equation has a section which presents any previous work and the current forecasting methodology.

Chapter V shows the methods employed to forecast indirect business taxes snd nontax payments, and government subsidies. Indirect business taxes are subdivided into two components: federal excise taxes and all other indirect business taxes.

Chapter VI is "the proof of the pudding": a sample forecast for the period 1983-1995 is presented. That "base" run is used to examine the effects on sectoral factor rewards and prices of an increase in the rate of growth of the money supply. Chapter VI also brings the study to close with a summary and indications for future work.

I.2 Structure of the INFORUM model

This study grew out of a major effort which began in 1980 to expand the INFORUM model. At that time, the INFORUM model did not, in practice, determine income within the model: the present effort was undertaken to close the INFORUM model by developing a usable structure for integrating prices, income and the real side. Besides this study, the method of forecasting personal consumption expenditures[1] and investment in producer durable equipment[2] were revised to incorporate a variety of hitherto unused variables. In order to capture the importance of factor incomes and the complexity of a "closed" interindustry model, a description of the INFORUM model is required. Furthermore, the description will help make apparent the motivation for

this study. The major interrelations are graphically depicted in Figure I-2.

The model begins with the real side, on the top right portion of the figure. In this portion, all final demands and outputs are measured and forecasted in constant dollar units. On the first iteration for a particular year, an initial guess is made of personal income and product prices. Except for government expenditures, which are exogenously determined, all of the other final demands are forecasted with regression equations: personal consumption expenditures utilize relative prices, real disposable income and an array of demographic variables; equipment investment makes use of the growth in outputs, stocks of equipment and relative input prices; investment in structures employs outputs, interest rates, demographic variables and the stock of structures. Exports and imports both use foreign prices relative to domestic prices but exports also require foreign demand indices while imports use domestic demand. Taken together, these detailed sectoral equations give final demand by product. Output is then calculated by the input-output identity that requires output to equal the sum of output for intermediate use plus final demands:

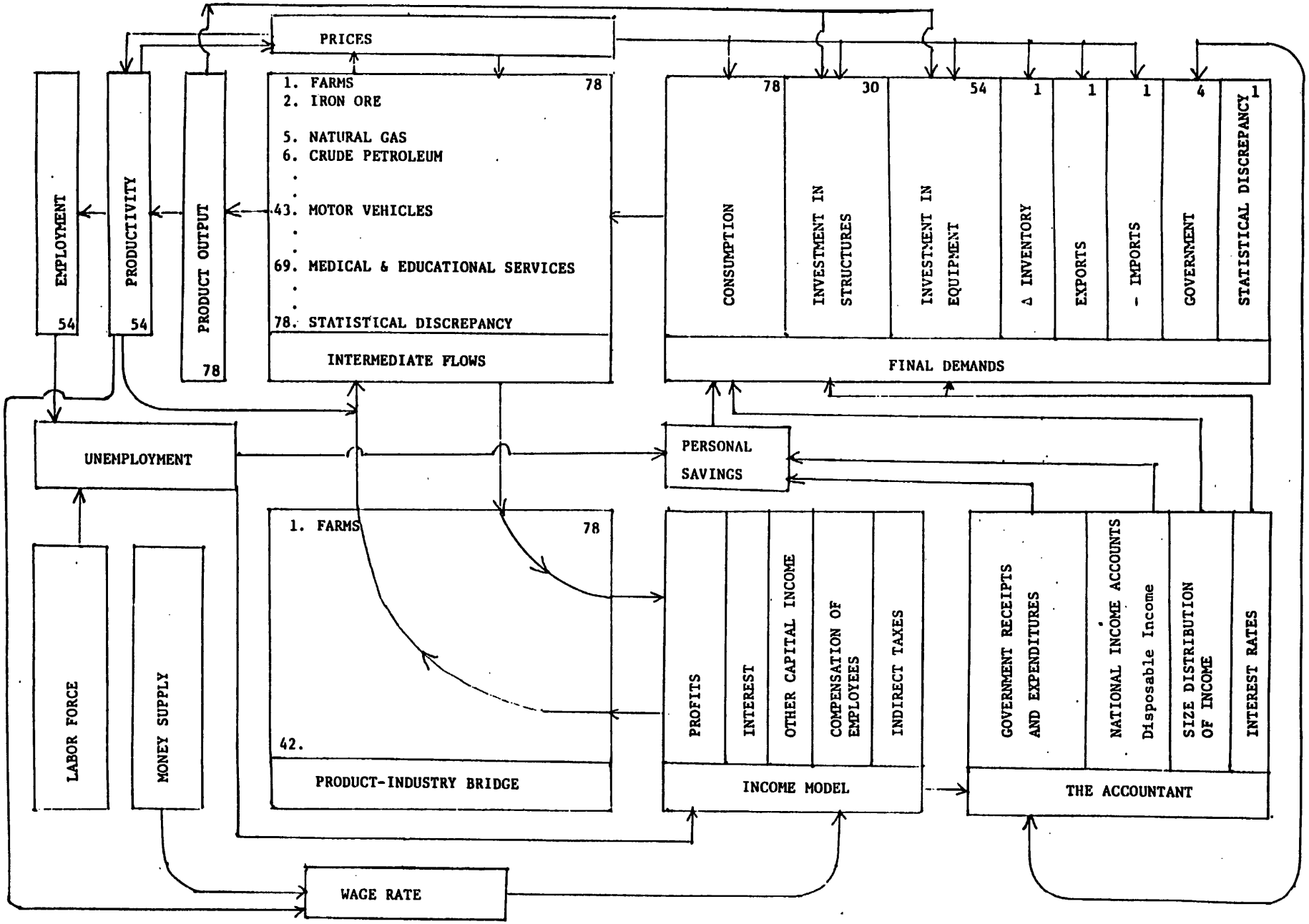
$$(1.1) \quad q = Aq + f$$

where f = column vector of final demands,
q = column vector of outputs,
A = matrix of input-output coefficients.

Those equations are then solved for real output.[3]

FIGURE I-1

INFORUM Framework



Only major connections are shown. Numbers indicate numbers of rows or columns

Productivity is forecasted with time trends and outputs; output and productivity are combined to derive employment by sector. Finally, employment is used in conjunction with independent labor force projections from the Bureau of Labor Statistics in order to calculate the unemployment rate. At this juncture, the real side has completed one iteration

Underneath the interindustry flow table, in the middle of the lower portion of the figure, is the product-to-industry table that distributes value added from products to industries defined on an establishment basis. A reconciliation is necessary because GPO is reported on an industry definition basis while the real side is based on a product definition basis. The essential definitional difference between an industry and a product sector is that an industry may produce more than one product. Therefore, an industry sector may be related by definition to more than one product or vice versa. Columns of the product-to-industry bridge table sum to product value added while rows sum to industry GPO. Real product outputs are distributed by their base year contribution to industry value added - the value added fraction - thereby yielding real value added weighted output (REVAWO):

$$(1.2)\quad REVAWO_i^t = \sum_{j=1}^{78} v_{ij}\ Q_j^t\ /\ Q_j^0$$

where v_{ij} is the bridge table cell in the i^{th} row and j^{th} column, and

Q_j^t is the real output for the j^{th} product in year t.

This REVAWO becomes than a major variable in the equations for nominal GPO in each inustry. The bridge table is then used in reverse to translate nominal GPO by industry to nominal value added by product.

More specifically, nominal GPO by industry in any year is distributed to products in proportion to each product's contribution to the industry's REVAWO in that year. Value added per unit of real output will then be used to calculate product prices as explained below. Consequently, the product-to-industry bridge table is a vital link between the real and nominal sides of the model. Chapter II focuses on this link.

The various pieces of GPO are forecasted using a mixture of variables coming from the real side and exogenous policy instruments. Sectoral labor compensation utilizes a relative wage structure; sectoral equations are combined with aggregate values to determine hourly labor compensation by industry. The return to capital (defined as the sum of depreciation, net interest payments, profit income, business transfer payments and inventory valuation adjustments) is forecasted with changes in output, import and export shares, unemployment, capital-labor ratios and a few sectoral specific variables. All of the components of the return to capital are then separately computed by sector except for profit income; corporate profits and proprietor income are determined as residuals. Indirect business taxes are functions of federal excise tax rates, output and the stock of structures. Chapters III-V describe these equations.

After passing GPO through the bridge table to determine nominal value added by product, prices are then calculated using the input-output identity that unit output price equals unit material costs plus unit value added. This identity is

(1.3) $p = pA + v$ where p = row vector of output prices, and
v = row vector of value added per unit of constant dollar output.

As in the case for real product outputs, the price equations are then solved.

With the determination of prices by product and the factor incomes by industry completed, the part of the model nicknamed the "Accountant" takes over. The Accountant uses the information generated by the real and GPO models and computes selected tables of the National Income and Product Accounts. In addition, transfer payments, personal and corporate tax payments and some minor components of income are computed in order to obtain a consistent estimate of disposable personal income.

Then another iteration of the entire model begins. The real side is resolved using the revised values of prices and personal income. GPO by industry and price are recomputed. Then the estimate of disposable income is revised. This process continues until the change in output from iteration to iteration is less than a specific tolerance level; usually the tolerance is that no product output changes by more than one percent between iterations.

The result is a forecast which is completely consistent. Nominal GNP calculated as the product of prices and final demands will equal nominal GNP as the sum of factor incomes. This consistency flows naturally from the input-output framework, and can be see by premultiplying (1.1) by p and postmultiplying (1.3) by q to give

(1.1') $pq = pAq + pf$ and

(1.3') $pq = pAq + vq$.

Taking the difference between those equations shows

$0 = pf - vq$, or that

(1.5) $pf = vq$.

The left side of (1.5) is the price of each product multiplied by the final demand for the product or nominal GNP on the product side. The right side is the value added per unit of output of each product multiplied by the output of the product or nominal GNP from the income side. Such consistency is a valuable aid to a long-term forecasting model since it provides a natural check within the model and reduces the amount of ad hoc adjustments to obtain a forecast.[4]

I.3 Survey of Previous Work Toward a Complete INFORUM Model

In order to highlight the rationale for the present study, a description of three previous Ph. D. dissertations which have attempted to deal with price and income determination follows. The first study was concerned with the forecast of disposable income, the second with price determination, and the third with integrated prices and factor incomes. This section briefly describes each study; a more detailed presentation of all three studies is in the appendix to this chapter.

Brian O'Connor in 1973 completed his work on forecasting disposable income.[5] O'Connor focused on factor rewards that were components of disposable income: labor compensation, net interest payments and profit income (corporate profits were required to obtain dividends). Each type of income was primarily forecasted as a function of a trend. This specification meant that those income components were not linked to the real side of the model. In addition, factor incomes were not integrated with prices. Since this study attempts to integrate the real, price and income portions of the INFORUM model, the O'Connor study was not used in the present work.

In 1976, David Gilmartin finished "Forecasting Prices in an Input-Output Framework."[6] Gilmartin developed a specification that allowed demand and supply effects to influence price. Price by product was specified as a function of a distributed lag of real output (demand effect) and of a distributed lag of unit labor costs (supply effect). For the purposes of the present work, the Gilmartin approach could not be used. Because the NIPA does not publish prices for products, there is no guarantee that another data source other than NIPA for prices would imply the GNP reported in the NIPA. Moreover, Gilmartin did not link factor incomes with prices, a prime motivation for this study.

The last effort was accomplished by David Belzer in 1978 and is described in "An Integration of Prices, Wages, and Income Flows in an Input-Output Model of the United States."[7] As its title indicates, Belzer's work was an important step forward since the INFORUM model had the capability to forecast real variables, prices and income within a consistent framework. The structure of the model was to allow the real side to forecast, then product prices were calculated, then value added and factor rewards were calcluated and finally, the prices and disposable income were fed back into the real side.

Though the work was an important step forward, its general framework is not duplicated in this study. Because of its size and breadth, the Belzer model required data from a variety of sources, sources that did not use the same definitional conventions. As a result, the Belzer model had many transformation procedures to move data from one definition to another definition. These procedures added an extra level of intricacy to an already complex model that was difficult to use. Even though this model was built with the capacity to run

simultaneously with the real side, its complexity and the requisite computer time made the simultaneous running of the entire model an impractical task. In practice, the simultaneous link between prices and the real side was severed; the real side was run over the length of a forecast, and then the price model was run using the real variables from the previous run. Those price forecasts were then fed back into the real side, and this procedure was repeated until the model converged. In additon, the link between prices and income was also severed: real disposable income was specified exogenously on the assumption that the federal government would adjust its expenditures in order to stabilize the overall unemployment rate. Therefore in practice, the model was not closed although the capability for having income determined endogenously was present.

The abandonment of most of the previous work on income amd price formation ought not be viewed as a disparagement of those efforts. Rather, the seemingly constant flux in models represents the difficult task of constructing forecasting models for nominal values. Each version can be viewed as a basis for future improvements. In addition, all of the previous studies suffered the common fate of most large scale models; the models worked as long as the builders operated them. The complexity and diversity of those studies made the integration and updating of the models a cumbersome task. New concerns and modelling desires could not often be easily implemented within the framework of the entire model. The new simplified structure ought to go a long way in the accomodation of the inexorable force of change.

One problem that was common to all of these earlier efforts and to the present study is that the best and most effective explanatory

instruments of nominal variables are probably other nominal variables. However, the use of endogenous nominal variables to forecast factor incomes and prices introduces the problem of simultaneanous determination into the model because any endogenous nominal variable presupposes the existence of the price it is supposed to eventually determine. These considerations indicate the practical response of relying on a mix of endogenous real variables and exogenous policy instruments, real and nominal, to predict incomes and prices. The efficacy of the estimated equations is limited by this solution.

Despite the foregoing discussion, the development of a nominal side to an integrated interindustry forecasting model of the United States is not an impossible task. In the following chapters, this researcher has tried to combine the dictates of economic theory with the restrictions of econometric modelling in the specification of the forecasting equations.

ENDNOTES

1. See Paul Devine, "A Cross-Sectional and Time Series Analysis of Consumption," unpublished Ph.D dissertation, Univerity of Maryland, 1983.

2. See Anthony Barbera, "A Study of the Determinants of Factor Demand by Industry," unpublished Ph. D. thesis, University of Maryland, 1982.

3. The actual solution is more involved than taking an inverse. The determination of equipment investment, imports, inventory changes and real output involves simultaneous relationships. An iterative procedure is used in the determination of these real variables.

4. The inclusion of imports increases the complexity of the proof but does not change the logic. Using the same notation as before, let

$A = D + M$,

where D = I-O matrix for domestic requirements, and
M = I-O matrix of requirements of imported goods.

Define,

r = vector of prices of imported goods, and
m = vector of domestic demand for imported goods.

Then

(1.5) $m = Mq + h$,

where h = vector of domestic demand for final imported goods.

Equations (1.1) and (1.3) now become

(1.1') $q = Dq + Mq + f - m$, and
(1.3') $p = pD + rM + v$.

Premultiplying 1.1' by p and postmultiplying 1.3' by q yields

(1.1'') $pq = pDq + pMq + pf - pm$, and
(1.3'') $pq = pDq + rMq + vq$

Solving for vq and substituting (1.5) gives the result

(1.4') $vq = p(f - h) - rMq$ or that

Nominal GNP = value of demand for domestic goods evaluated at domestic prices less the value of imported intermediate foreign goods evaluated in foreign prices.

5. Brian O'Connor, "An Income Side to an Input-Output Model of the United States," unpublished Ph.D. dissertation, University of Maryland, 1973.

6. David Gilmartin, "Forecasting Prices in an Input-Output Framework," unpublished Ph.D. dissertation, University of Maryland, 1976.

7. David Belzer, "An Integration of Prices, Wages and Income Flows in an Input-Output Model of the United States," unpublished Ph.D. dissertation, University of Maryland, 1978.

Appendix

Survey of Previous Work Toward a Complete INFORUM model

The model developed in this thesis is not the first attempt to deal with price and income determination in the INFORUM project. Three previous Ph.D. dissertations have tackled those two areas: one dealt with the determinaton of income, one with price formation, and one integrated prices and incomes. This appendix reviews the major results of these studies. During this review, explanations will be presented as to why much of the prior work is not incorporated into the new model.

O'Connor Income Model

In 1973, Brian O'Connor finished the first attempt to model the income side. The major focus of "An Income Side to an Input-Output Model of the United States" was to develop a method to determine disposable personal income. This accomplishment would serve to close the INFORUM model. At the same time of the O'Connor study, two other doctoral research projects were underway, modelling industry prices and wages, thereby restricting the scope of O'Connor's efforts. Consequently, simple procedures were devised to generate an actual forecast of the income model. Sectoral labor compensation per employee and gross profits were forecasted with time trends. The reliance on trends is not adequate for an integrated model; wages and incomes will have no effect on prices, nor is there any interaction between the real and nominal sections.

The most impressive contribution of the O'Connor model was the system to predict industry labor compensation by size class. The Bureau

of Labor Statistic's 1965 matrix that related industries with their occupational requirements (industry occupation matirx) was used to derive those labor compensation distributions for 54 industries. In addition, distributions for rental income, proprietor income, and interest income were also established. Those distributions were combined to make a more accurate forecast of federal personal income tax payments. This exercise was not repeated in this study for two reasons. First, the maintenance of these labor compensation distributions requires the projection of the industry-occupation matrix, an effort far beyond the scope of this study. Secondly, the distribution of income by size-class is forecasted as part of the determination of personal consumption expenditures, something that was not done at the time of the O'Connor model.

The O'Connor model was founded on published data classified on a company basis implying the industry incomes to be independent of the forecasted prices and input-output tables unless specific attention is paid to the reconciliation between the company and product definition of a sector. The present work developed a procedure to make the forecasts of value added by establishment based on the BEA's Gross Product Originating (GPO) series correspond to value added by product as defined by the 1972 input-output table.

Unfortunately, computer limitations forced the O'Connor model to be run independently from the real model. In order to obtain a forecast, first the real model was run. Then the income model was run using the previously forecasted variables from the real model. Then the real model was rerun with the new forecasts of income. This procedure was repeated until the output of the real side converged between the

iterations of the two models. The enormous strides in computer technology allowed the INFORUM model to be structured to seek a entire solution on a year by year basis.

Overall, the requirements of a consistent interindustry model dictated the development of a new framework. Though the industry-occupation matrix approach is appealing, the generation of the distribution of incomes to forecast PCE made this approach an unnecessary duplication. Consequently, nothing from the O'Connor model was utilized in the current effort.

Gilmartin Price Model

David Gilmartin completed a thesis in 1976 entitled "Forecasting Prices in an Input-Output Framework." Gilmartin sought to develop a method to forecast industry prices at the full level of detail of the INFORUM model. The model forecasted prices on a monthly basis. The spcification of the industry price equations included a measure of costs and a measure of demand pressure: in effect, the specification was a simple reduced form of the demand and supply relation for each product. The price equation took the form

$$P_t^i = a + \sum v_k^i \; UC_{t-k}^i + \sum w_k^i \; Q_{t-k}^i + \text{seasonal dummies}$$

where

P_t^i = gross output price for sector i in month t,
(source: BLS WPI and CPI data series)

UC_t^i = unit production costs for sector i in month t,
(to be defined below)

Q_t^i = real output for sector i in month t,
(source: FRB monthly output indices)

and v,w are distributed lag weights with the sums constrained to fall within a "reasonable" range.

Unit production costs were defined as the sum of unit material costs and unit labor costs. Therefore,

$$UC_t^i = \sum a_{ij} P_t^i + WL_t^i / Q_t^i ,$$

where

a_{ij} = industry requirement coefficients,

WL_t^i = sectoral wage bill calculated as the product of wage rates for production workers and total hours in each industry, (source: BLS Employment and Earnings Data).

The lag structures were estimated with polynomial distributions with a usual lag length were twelve months for the cost variable and twenty four months for the output variable. As mentioned above, the sum of the lag weights was constrained; the limits for the cost weights were 0.75 and 1.25 while the sum of the output weights was between -0.25 and 0.25.

The equations were estimated over the period 1954 to December, 1972 with the precise starting point determined by the industry data. Fifty industries lacked the requisite data for estimation.

The Gilmartin approach was not duplicated in this study for a variety of reasons, both methodological and practical. The model was designed to operate recursively in order to avoid simultaneity problems in the solution of output prices and material prices: no current values of unit cost were included in the specification of the price equation. The monthly structure is unduly cumbersome for a long-term model. Benefits from a monthly model decline as the length of the forecast increases, especially when the benefits are weighed against the

computational costs embedded in the design.

The specification of the price equation also leads to some problems. Due to a lack of capital stocks data, Gilmartin excluded the cost of capital from the cost variable. Labor compensation comprises approximately 60% of value added which leaves unaccounted for a rather large portion of value added. In addition, the empirical result that the sum of the lag weights on the cost variable did not equal one implies that the share of profits rose (fell) when the sum was greater (less) than one. This property led to rising profit shares in industries in recession years, an implication not borne out by experience for those industries.

Moreover, a nonzero coefficient sum on the output variable indicates increasing or decreasing returns to scale in the long-run. This is a curious implication for a demand variable. A more reasonable specification would allow for constant returns to scale in the long-run.

Moreover, the specification excludes monetary effects on industry prices. Gilmartin argued that the correct effect of monetary policy should be present in the movement of real output. Monetary policy ought to affect final demands via interest rate and real balance effects. Thus the model left the money-price link to the construction of the real side. This might be a more accurate view of the transmission of the long-run money-price relationship. In Chapter III, this researcher argues that the effects ought to present in the model and the simplest and most effective modelling method is to have the effect of monetary policy directly impact on value added.

Despite the stated deficiencies, the Gilmartin approach does have a strong intuitive appeal. The price equations are reduced forms of the

underlying demand and supply functions. The equilibrating force of demand and supply interactions is the preferred method of modelling price formation. Abstracting from the identification problems and specification errors, the methodolgical foundation of the Gilmartin model is strong. In this context, the Gilmartin approach could be used to determine prices by industry and then compute value added by solving "backwards" the input-output price definition. The resulting value added could then be further divided into its components by regression equations.

Unfortunately, there is a compelling argument against this design. One of the basic motivations for the revision of the INFORUM model is to forecast some of the NIPA tables. However, there is no data series for output prices by industry consistent with the national accounts. Furthermore, the construction of such a data series would require a series of input-output tables, data which does not exist. Therefore, that natural consistency of an interindustry model shown in the first chapter is incompatible with the "natural" method of price modelling given the state of U.S. data collection. The result is that prices will be determined more mechanically with the price definition depicted earlier by equation 1.3: unit price equals unit material costs plus unit value added.

Belzer Synthesis: An Integrated Income and Price Model

A Ph.D. thesis was completed in 1978 by David Belzer entitled "An Integration of Prices, Wages and Income Flows in an Input-Output Model of the United States." The important characteristic of the Belzer work is the overall scope and breadth of the study. The model was the first INFORUM attempt to integrate the real and nominal flows within the interindustry structure. Prices, factor rewards, tax receipts and disposable income were all unified into a consistent model of the U.S. economy. Great care was taken to forecast output prices, final demand deflators and consumer prices by industry. Most of the major components of value added flowed out of the solution of the model. Consequently, the INFORUM model became closed on the income and price side in a consistent manner for the first time. Since the model was large in scope, the precise specifications of the equations are reviewed, where relevant, in the following chapters; a general overview is presented here.

The structure of the entire model is different from the present one. The real side interacted with a quarterly price-wage model. Quarterly values were annualized in order to iterate to a solution. After a completed forecast of the real side, the income model computed the various components of value added. Real disposable income was calculated and compared with the series used in the forecast. If the assumed and calculated real disposable incomes were within a specified tolerance level, the forecast was finished. If not, the forecast was rerun with the calculated real disposable income fed back into the model.

The price-wage model was structured on a quarterly basis in order

to capture some of the price dynamics. Prices were calculated as the sum of unit material costs, unit labor costs, unit capital costs and unit indirect business taxes. Unit material costs were a mechanistic calculation involving the input-output coeffficient matrix, the share of imports matrix, import prices, and domestic prices. Unit labor costs were obtained by dividing wage indices by labor productivity indices. Wage indices were the product of aggregate wage change and sectoral relative wages. Changes in the consumer price index (CPI) and the unemployment rate were the key variables in the overall explanation of industry wages. Unit capital costs were a simple markup over unit labor costs, where the markups were a function of the unemployment rate, changes in output and the output-capital stock ratio. Indirect business taxes were divided into two categories - ad valorem and all other - and forecasted with two different methods. Ad valorem taxes were proportional to prices and treated as a diagonal flow of the input-output coefficient matrix. The remainder were constrained to equal with state and local expenditures.

Taking prices and the coefficient matrix from the forecast, the income model recalculated product value added. Product value added was then transformed to industry GPO with a procedure described in chapter two of this study. Industry labor compensation was computed using the hours data from the real side and the industry wage data from the price side. Labor compensation, depreciation, and indirect business taxes were deducted from the value added. Sectoral proprietor income used that remainder, the number of proprietors, and hourly employee compensation in its determination. Sectoral corporate profits, business transfer payments, inventory valuation adjustments, and net interest

payments were obtained as a residual.

A few features of the Belzer model have been retained in the current version the INFORUM model. The method of forecasting capital consumption allowances by constructing a historical depreciation series is maintained. The combination of aggregate and relative wage equations is also preserved though major modifications to the time interval and specification have been enacted. The Belzer price-wage model was a quarterly one. An annual solution interval is used in order to minimize computational burdens and minor instability problems. In addition, data restrictions constrained Belzer to estimate relative wage equations and transformation equations that related wages for production workers to labor compensation rates for all employees. This framework is unnecessary when the NIPA accounts for labor compensation and hours worked by employees are utilized. Finally, the deterministic approach to price formation was retained.

The complexity of the Belzer model was greatly simplified in the development of the model in this study. The redundant procedure of the recalculation of value added from product prices is eliminated for a more straightforward approach. All of the requisite information for the computation of industry prices exists upon the determination of all the components of GPO. More careful attention is given to the transmission mechanism of changes in the money supply to industry prices over the long-run in the present work.

Chapter II Statistical and Modelling Structure of GPO

Conceptually, the procedure for forecasting factor rewards and product prices is a straightforward task within an integrated interindustry model. One just forecasts factor rewards in making each product, sums the rewards for each product to obtain total value added, and then calculates the product prices from the basic input-output definition that price equals unit material costs plus unit value added ($p = pA + v$). In practice, this task is complicated by the fact that the structure of the real side is based on a product definition of a sector while the data for factor rewards is based on an industry definition. The structure for resolving the problems arising out of the use of both definitions in the same model is the topic of this chapter.

As noted before in Chapter one, the complicating feature in the construction of the model is the product versus industry definition. For this study, a product is a group of similar commodities or services as defined by a two or three-digit standard industrial classification (SIC). An industry is the collection of all producing locations or "establishments" sharing the same primary product. An establishment's primary product is that commodity or service which generates the most sales (in dollars). As an example, the cheese industry consists of all the establishments where cheese has the largest share of dollar volume of sales. An industry may produce more than one product, while a product is defined without regard to its origin of production. For instance, the cheese industry may include establishments which produce some other products such as ice cream or butter. In contrast, in the ice cream product sector, ice cream produced by the ice cream industry is packed in

with ice cream made by the cheese industry.

The data on factor rewards or Gross Product Originating (GPO) is reported on an industry basis by the Bureau of Economic Analysis (BEA). Consequently, those data conventions require that the modelling of factor rewards should be done at the industry level. In the interest of clarity, factor rewards or GPO data will always be referred to as "by industry".

The BEA also constructs the input-output table for the United States. The table is reported on a product-to-industry basis. However, this scheme is unsatisfactory as it confuses the effects of primary and secondary products. For example, a product-to-industry table will include as inputs into the cheese industry not only the inputs used for cheese but also the inputs used for ice cream made by establishments primarily engaged in making cheese. So, if one asks about the effect of a ten percent increase in consumer demand for cheese, a product-to-industry table will show an increase in the use of the inputs for cheese and the inputs for ice cream made in the cheese industry (such as sugar). In order to avoid this problem, the INFORUM staff "purifies" the table and transforms it to a product-to-product table. Therefore the real side of the model is grounded on the product definition basis.

The first two sections of the chapter deal with the resolution of the product-to-industry conflict in the model and in a forecast. Section one describes an accounting system which connects product output, product value added and GPO by industry. First, an ideal accounting system for an input-output model is presented to familiarize the readers with the basic system. Afterwards, the more complicated system designed to handle conflicts in data sources is presented. Transforming GPO by industry to value added by product is accomplished with the aid of a product-

to-industry bridge table. The forecasting structure for factor rewards by industry and prices by product is the subject of the second section. A short review of the procedures used by other large scale models is also presented and then the linking concept, real value added weighted output (REVAWO), is introduced.

The third and fourth sections of the chapter are concerned with data descriptions. The construction of the product-to-industry bridge table is the subject of the third section. The fourth section deals with the statistical sources underlying the GPO series. Finally, a summary ends the chapter.

II.1 The Accounting Scheme for the INFORUM Model

If the national income and product accounts (NIPA) and the input-output tables were always consistent, equally detailed and up-to-date, the accounting system could be the simple one presented in Figure II-1 for a four-product economy. Sales for use in other products and sales for final demand (the column labeled GNP) are shown in the first four rows of the table. The fifth row shows the total value added in making each product while the last three rows (6-8) show the distribution of the value added among labor, capital, and indirect business taxes.

Unfortunately, the U.S. national accounts and input-output tables are not consistent nor equally detailed nor up-to-date. All of these factors create various anomalies which force the accounting system to become more complex than the simple one in figure II-1. Recalling the discussion from the introduction, one of the major inconsistencies between the two sources of data is the product versus industry basis of the data.

Figure II-1 Simple Accounting System

Row		Intermediate				GNP	Output
1	Product 1	5	30	10	10	100	155
2	Product 2	15	40	20	5	50	130
3	Product 3	20	15	10	10	35	90
4	Product 4	10	15	15	10	25	75
5	Value Added	105	30	35	40		
6	Labor	60	16	20	20		
7	Capital	35	10	10	15		
8	Tax	10	4	5	5		

Consequently, there must be a method to reconcile value added by product with factor rewards (GPO) by industry. Additionally, the NIPA data is not internally consistent in that GNP as calculated as the sum of final demands does not equal the sum of industry GPO. That difference is the official statistical discrepancy. The accounting system must be capable of handling it as well.

The picture becomes yet more clouded when the problem of updating the input-output table is introduced. The publication of the official U.S. table arrives with a lag of at least five years. The 1977 table was published in the May, 1984 issue of the Survey of Current Business. In order to update the 1972 table to a 1977 basis in 1980, the staff at INFORUM used the NIPA final demands and the production statistics from the 1977 Census of Manufacturing. During that process it became clear that to reconcile the NIPA and production data was an impossible task. Because both sources must be used, that problem also had to be resolved. The most direct solution (and the adopted one) is to introduce an extra statistical discrepancy for personal consumption expenditures and for investment of

producers durable equipment as final demands. This unofficial statistical discrepancy must also be included in the accounting scheme. (The official 1977 table shows even a greater difference from the original 1977 NIPA than INFORUM had found necessary.)

The accounting scheme to handle the complications discussed above is shown in Figure II-2. Column H, labeled USD, shows the unofficial statistical discrepancy. Its first entry, a -10 for product 1, means that consistency with the NIPA requires a final demand for their product which is 10 units bigger than can be reconciled with production statistics for the product. In addition, a column labelled OSD has been added for the Official Statistical Discrepancy.

To transmit the effects of these two discrepancy columns to the factor income portion of the table, two rows (5 and 6) and two columns (E and F), labeled USD and OSD respectively, have been added to the intermediate flow table. The intermediate flows in these rows and columns are all zero, but not the final demands or factor payments. The OSD row has an entry of 4, the official statistical discrepancy, in the OSD column. The "unofficial" row, USD, has only an entry of +7 in the USD column. This +7 is the negative of the other entries. Thus the sum of the USD column is zero. Consequently, the sum of all final demands columns (GNP + USD + OSD) excluding the OSD row is GNP as reported in the NIPA. If we include the OSD row, we get gross product originating, GPO.

Output (Q) for each product is derived by adding across the product's row to obtain the total (shown in column J). Value added for the product is computed (in row 8) by subtracting from the output of the product the value of all products used in its production. For example, the second product had an output of 134; subtracting the value of all inputs -- 100

FIGURE II-2 Complex Accounting System

		Intermediate Flows						Final Demands					
	Buyers	A	B	C	D	E	F	G	H	I	J	K	L
	Sellers	1	2	3	4	USD	OSD	GNP	USD	OSD	Q		
1	Product 1	5	30	10	10	-	-	100	-10	0	145		
2	Product 2	15	40	20	5	-	-	50	+4	0	134		
3	Product 3	20	15	10	10	-	-	35	+3	0	93		
4	Product 4	10	15	15	10	-	-	25	-4	0	71		
5	USD	-	-	-	-	-	-	-	+7	0	7		
6	OSD	-	-	-	-	-	-	-	-	4	4		
7													
8	Value Added	95	34	38	36	7	4	VAA	GPO	LAB	CAP	TAX	SD
9													
10	Industry 1	70	5	4	6	0	0	85	93	55	28	10	-8
11	Industry 2	20	23	18	3	0	0	64	67	32	25	10	-3
12	Industry 3	5	6	16	27	0	0	54	54	30	20	4	0
13	SD	0	0	0	0	7	4	11	0	0	0	0	11

(the sum of column B from rows 1-4) -- yields a value added of 34. Note that the scheme forces the final demand for the statistical discrepancy "product" to equal its value added since there are no intermediate products used in its "production".

Value added by product must be allocated to the appropriate industries. This is accomplished with the product-to-industry bridge table (know as the V-matrix) consisting of the intersection of rows 10-13 with columns A-F in figure II-2. Looking across a row, the bridge table shows the distribution of value added by product for an industry while moving along a column indicates the portion of value added made by each industry for a product. For instance, row 10 indicates that the industry 1 receives from the production of the second product five units of value added.

The portion of column G headed by "VAA" shows the value added allocated for each industry. VAA is the sum of columns A-F for any row. Forexample, industry 1 has a VAA of 85 units. Gross product originating reported in the NIPA is shown in the adjacent column. Thus, industry 1 has a GPO of 93 units. Because of the previously mentioned inconsistiency of BEA data sources, VAA will not necessarily equal to GPO for an industry. The sum of all the industry differences between VAA and GPO will equal the official statistical discrepancy.

Finally, the distribution of factor rewards for each industry (the G-matrix) is shown in the rectangle formed by the intersection of rows 10-13 with columns I-L. Factor rewards such as labor compensation (LAB), the return to capital (CAP), and taxes (TAX) reported in the NIPA are shown in columns I-K. For example, industry 2 has 32 units of GPO going to labor, 25 units to capital, and 10 units for taxes. The last column

shows the difference between VAA and GPO for each industry. For instance, industry 2 has a difference of -3 which is defined as the statistical discrepancy (SD) for that industry. Note that the total statistical discrepancy for the industries will always equal the negative of the VAA for the statistical discrepancy "industry", as shown in the last row of the table.

Both the product-to-industry bridge table (V-matrix) and the distribution of factor incomes by industry (G-matrix) are utilized in order to relate factor income by industry to prices by product. That process is described in the next section.

II.2 The Forecasting Structure of GPO and Prices

This section describes the present forecasting procedure. Prior to that discussion, a brief treatment of contrasting solutions to the transformation from value added to prices is presented.

Non-INFORUM Models

There are two large scale input-output model that tackle this problem: the CANDIDE model of the Canadian economy and the Wharton Industry Forecasting Model. The reader is referred to the chapter III of the Belzer thesis for a summary of the two models.[1] Both models emphasize constant dollar GPO. Constant dollar GPO is made a function of real output. Then, the constant dollar GPO estimate is "inflated" by a definition of it own price (PVA), given by

$$PVA_t = \frac{P_t(I-A_t)}{P_0(I-A_0)}$$

with subscripts denoting time. This procedure requires the determination of price before that of GPO. Because this study is forecasting value added and then determining prices, this approach was rejected.

Belzer Model

The innovation of the Belzer model (previously discussed in Chapter 1) is that no constant dollar GPO is necessary in the forecast. First, prices are determined, then product value added is obtained as the difference bewteen nominal output and the intermediate use. Industry value added is then transformed to GPO in a series of steps characterized by the equation

$$GPO = R * VA,$$

with R as a matrix containing constant scalars to adjust for secondary products, redefinitions and the other types of reconciliations. The matrix is constructed so no value added is lost in the tranformation: nominal GNP is not altered by the adjustments. The Belzer alternative was not replicated in this study because it also determined prices before determining GPO.

INFORUM Model

The basic approach used in this study to forecast GPO by industry and then transform GPO by industry into prices by product is, in principle, quite straightforward. The components of GPO are forecasted as inflated shares of an artificial constant dollar variable, real value added weighted output (REVAWO). Nominal GPO by industry is then spread through the the product-to-industry bridge table in proportion to each product's

contribution to REVAWO.

The major link with the real side comes through the use of REVAWO. In theory, REVAWO is a very loose approximation of real gross product originating and is defined as

$$(2.1)\quad REVAWO_i^t = \sum_{j=1}^{78} v_{ij} \; Q_j^t \; / \; Q_j^0$$

where v_{ij} is the bridge table cell in the i^{th} row and j^{th} column, i.e. the value added in industry i attributable to its production of product j, and

Q_j^t is the real output of the j^{th} product in year t.

This definition[2] accounts for changes in the product mix within an industry sector. The weighting of the cells by the movement in product output relative to the base year allows products with significant changes in output to transmit the corresponding impact into industries which make that product. REVAWO is used in the calculation of nominal factor incomes and in the transformation of factor incomes to product value added.

All of the components of GPO are forecasted in the same format. The component's index (I) in any year is defined as

$$(2.2)\quad I_{ik}^t = (G_{ik}^t / REVAWO_i^t)/(G_{ik}^o / REVAWO_i^o)$$

For industry i, G_{ik}^t is the level of the kth component of GPO in year t. It is an entry in the G matrix described earlier. For instance, the Auto industry in 1978 had 26.5 billion dollars in labor compensation. Chapters III-V deal with the methods to forecast the index for the various components.

The forecasted level of any component is then equal to

$$(2.3)\quad G_{ik}^{t} = (I_{ik}^{t})(\,REVAWO_{i}^{t})\,(G_{ik}^{o}/REVAWO_{i}^{o})$$

Upon the completion of the calculation for all the factor incomes, GPO is calculated as the sum of all thirteen components, or

$$(2.4)\quad GPO_{i}^{t} = \sum_{k=1}^{13} G_{ik}^{t}$$

Sectoral gross product originating is the product of REVAWO and a weighted average of factor reward indices. That the weights are fixed does not imply that the factor shares of income by sector are constant: the relative shares depend on the factor indices.

The transformation from GPO by industry to value added by product is then accomplished via the equation

$$(2.5)\quad VA_{j}^{t} = \sum_{i=1}^{46} GPO_{i}^{t}(v_{ij}\, Q_{j}^{t}/Q_{j}^{o})/REVAWO_{i} \;*$$

Thus, gross product originating in an industry in future years is distributed to products made by the industry in proportion to each product's contribution to that industry's REVAWO in that future year. This step preserves the impact of the change in the product mix. After this step is completed, industry prices are calculated by using the definition $p = pA + v$.

The method described above may be applied to the forecast of the official statistical discrepancy. In most forecasts, however, the official statistical discrepancy is assumed to be zero.

However, the unofficial statistical discrepancy does not use the above system in the forecast. In each year of a forecast, the final demand unofficial statistical discrepancy for each product remains a fixed proportion of the total final demand for that product. For instance, if there was a four percent discrepancy in the constant dollar final demand for automobiles, that proportion is assumed to hold for every year in a forecast. After the distribution of real unofficial statistical discrepancy is determined, the nominal value of the statistical discrepancy for each product is calculated by multiplying each constant dollar discrepancy by its price (the price is either the price from the previous iteration or an initial guess). Adding those nominal values over products yields the aggregate nominal value for the unofficial statistical discrepancy. That aggregate total is then distributed among industries in proportion to each industry's base year share of the unofficial statistical discrepancy. For example, if the Auto repair industry (36) contributed to ten percent of the total unofficial statistical discrepancy in the base year, then the Auto repair industry is assumed to retain that share of the nominal aggregate total in the forecast. Note from figure II-2 that the net effect on GNP of the unofficial statistical discrepancy is zero by construction, so no special assumptions about its future values are needed.

II.3 The Product-to-Industry Bridge Table

The product-to-industry bridge table is important for two reasons. First, as discussed in the previous two sections, this table links the real side of the INFORUM model, which is based on the product definition

of a sector, with the factor income portion of the model, which is based on the industry definition of a sector. The second reason is that the product-to-industry bridge table is used by the staff of INFORUM to update the input-output table before the official table is published. The official tables are published approximately every five years, while the GPO series on factor incomes are available on an annual basis. Since 1980, the INFORUM model has used a 1977 input-output table which was updated from the 1972 official table. This update was accomplished by building the product-to-industry bridge table for 1972 and then converting it to a 1977 basis via the incorporation of the 1977 GPO industry estimates and an intial INFORUM estimate of output for that year based on the 1977 Census of Manufacturing production statistics. This conversion yielded value added by product for 1977 which was used to "balance" the 1977 input-output table.

The end result of this work is a product-to-industry bridge table that relates the forty-six GPO industries with the seventy-eight product sectors. Another result is the accounting for the official and unofficial statistical discrepancies discussed in section II.1.

A small hypothetical example of a bridge table is given by Figure II-3. Rows give the product composition of an industry's value added while columns give the distribution among industries for a particular product's value added. The agriculture industry has value added of 50 from the harvest of wheat (a primary product) and 3 from the making of ice cream (a secondary product from the manufacturing product sector). Adjustments outside of primary and secondary products are, in BEA's terms, simple "redistributions" of value added. Thus any construction performed by a manufacturing establishment's employees (called the force account) is

Figure II-3

	Product Sectors			
	Agri.	Cons.	Mfg.	Industry GPO
Gpo Sector				
Agriculture	50	0	3	53
Construction	0	80	0	80
Manufacturing	0	5	97	102
	50	85	100	235
	Product Value Added			

counted as part of the product "construction". For example, from Figure II-3, the manufacturing industry had a value added of 5 attributed to construction performed by manufacturing employees.

Now we will discuss the construction of the 1972 bridge table, used to convert product value-added to industry GPO. It utilized worksheet details from BEA's 1972 input-output study. Table II-1 shows reconcilations by type for eleven aggregates of the GPO sectors. The first column of the table shows the GPO estimates for 1972 industry value added, and it is the equivalent of the row totals from Figure II-3.

The primary and secondary products reconcilation is displayed in columns 2 and 3. Column 2 is simply the diagonals of Figure II-3. Primary products are the I-O commodities made by the corresponding GPO industries. For example, in 1972, all of the value-added attributable to the activity of mining by the mining industry is 17271 million dollars. Secondary products must be taken in account since industries may produce more than one product. At the I-O level, a product may be made by several industries. This implies that the GPO for an industry and the value added for its corresponding product will not be equal. The mining industry had 71 million dollars of value added from non-mining products (such as

TABLE II - 1

Composition of 1972 GPO by type of reallocation (in millions of dollars)

Industry	1972 GPO (1)	Primary Products (2)	Secondary Products (3)	Activity Changes (4)	Force Account (5)	MSO's (6)	Space Rental (7)	Statistical Discrepancy (8)
Agriculture (Ag)	35429.	33955.	60.	684.	0.	0.	1130.	0.
Mining (Min)	19004.	17271.	71.	2299.	210.	-1.	0.	-846.
Construction (Cons)	59364.	69187.	0.	-2276.	-7547.	0.	0.	0.
Manufacturing (Mfg)	292475.	290532.	0.	-3130.	1309.	-9231.	13192.	-197.
Transportation (Trans)	45596.	43661.	426.	256.	1304.	0.	469.	-520.
Utilities (Util)	58654.	54885.	30.	-548.	2860.	0.	1427.	0.
Trade	199484.	177033.	0.	13140.	79.	9232.	0.	0.
Finance (Fin)	169821.	189847.	265.	-1229.	0.	0.	-17825.	-1237.
Services (Ser)	136495.	147791.	181.	-11498.	521.	0.	0.	-500.
Government (Gov)	155388.	148422.	1795.	2300.	1264.	0.	1607.	0.
Rest of the World (Row)	10910.	10910.	0.	0.	0.	0.	0.	0.
Total	1182620.	1183094.	2828.	-2.	0.	0.	0.	-3300.

Source: Philip Ritz, "Definitions and Conventions of the 1972 Input-Output Study," Bureau of Economic Analysis Staff Paper, July 1980 and unpublished BEA work files.

crushed gravel and cut stone, which are manufactured products). A primary and secondary product matrix was used to distribute to industries the value added of the I-O sectors in the same proportion in which total output of the product was distributed.[3] The value added reconciled because of secondary products is generally very small, usually less than 2% of GPO.

Scrap metal is a peculiar secondary product. In the I-O accounting framework, scrap metal is a separate product sector. It is distributed throughout all of the GPO sectors. Since scrap metal is a small product sector, the value added is attributed to the ten largest producers, nine in the manufacturing sectors and railroads.

Column 4, labelled "activity changes", shows two types of reconciliations; those due to SIC reclassifications and those due to activity redefinitions (except force account construction, which is shown separately). There were only two reclassifications to be accomplished. One was Veterinary Services (SIC 0772) which is included in Agriculture in the GPO data but in Medical Services at the I-O level. This reclassification is shown by the addition of 684 million dollars of value added in the Agriculture industry row, and the corresponding negative 684 million dollars in part of the entry in the Services row. Similarily, Oil and Gas Well Drilling (SIC 1380) was moved from Construction at the I-O level to Crude Petroleum and Natural Gas in the GPO scheme. Both movements involve actual data on value added from the BEA work files.

For the second type of "activity change", activity redefinitions are employed by the BEA to achieve homogenous products. For instance, all of the value added stemming from restaurant activity in the Hotel industry (GPO sector 34) is moved from the Service industry in Table II-1 back to

the retail trade sector since that is the "home" of Eating and Drinking places (SIC 58). The sum of the activity changes column is zero.

One especially large redefinition involves construction work done by employees not in the construction industry (the force account). This is shown in column 5. At the GPO level, that construction (which includes maintenance and repair) is not reported as part of the construction sector as it is at the I-O level, but is included in the sector in which the activity took place (e.g. the 5 in the manufacturing row in Figure II-3). The largest force account redefinitions were for maintenance and repair of highways by state and local government employees and construction of oil and gas rigs and pipelines. The total amount redefined was about 11% of primary value added - 7547 million dollars - for the construction sector. Again, the column sum of the force account column is zero.

The source for these redefinitions is "Definitions and Conventions of the 1972 Input-Output Study, 1980."[4] This document lists all of the redefinitions - over 150 for the force account alone - and the output redefined. Since the data on the redefinitions was output, the value added for the redefinitions was assumed to be distributed in the same proportion as output.[5]

Column 6 portrays the adjustment for manufacturers' sales offices (MSO's) which are included in the wholesale trade in the GPO but are distributed throughout the manufacturing product sectors. The value added generated by a MSO is, for the most part, labor compensation. The Census of Wholesale Trade of 1972 has payroll data for MSO's by four digit wholesale SIC (i.e. the 5000's). Appendix E of this Census gave the correspondence between the wholesale SIC sectors and the manufacturing SIC sectors. In most cases, a single wholesale SIC matched many manufacturing

SICs. In those cases, the payroll was allocated on the basis of the distribution of the total value of shipments among those manufacturing SICs that corresponded with the wholesale SIC.

After accounting for the these factors, only space rental and statistical discrepancy remain to be reconciled. Unfortunately, no sufficiently detailed data source exists to allocate space rental which, as a product, is in Real estate, to the industries "producing" it. Therefore, the allocation of space rental was combined with the resolution of the statistical discrepancy.

At this point, the difference between industry GPO (Column 1 of Table II-1) and the sum of value added from primary products, secondary products, activity changes, force accounts and manufacturing sales offices (columns 2-6) would give the total discrepancy for each industry. Table II-2 shows this figure for each of the aggregated industry sectors from Table II-1. A positive total discrepancy meant that the GPO reported for that industry in 1972 was more than the sum of the value added allocated (VAA) for that industry in the same year. For example, the Agriculture industry had 1130 million dollars more of GPO than the sum of value added allocated to the products it made. From Table II-2, one can see that the manufacturing industries had the largest surplus of GPO while the Finance industry had the largest shortfall.

The reason that the finance sector had the largest shortfall is due to the treatment of space rental in the input-output table of the BEA. The rental activities of all industries are redefined to the Real estate industry (33) by the BEA. Consequently, the Real estate industry (33) will have all of the value added from rental activity performed anywhere in the economy.

Table II-2

Summary of the resolution of statistical discrepancy

	GPO less VAA	Space Rental	Stat. Disc.
Agriculture	1130	1130	0
Mining	-846	0	-846
Construction	0	0	0
Manufacturing	12995	13192	-197
Transportation	-51	469	-520
Utilities	1427	1427	0
Trade	0	0	0
Finance	-19062	-17825	-1237
Services	-500	0	-500
Government	1607	1607	0
Rest of the World	0	0	0
Total	-3300	0	-3300

In order to minimize the total number of industries with a discrepancy, space rental was distributed from the Real estate industry (33) to any industry with a shortfall of value added. This allocation was done at the level of 46 industries and the results are summarized in Table II-2. Therefore the Utility industry (28) received an allocation of 1427 million dollars in space rental to reduce its discrepancy to zero. The same type of adjustment was also done for every industry that had a shortfall of value added allocated. Consequently, the Agriculture industry (1) received 1130 million dollars of space rental and two government industries (Federal enterprises and State and lcoal enterprises) were allocated a total of 1607 million dollars to offset theri shortfall.

While the same reallocation of space rental was done for the industries in the transportation sector and the manufacturing sector, the table obscures some of the details. In each case, those aggregates in the table had some industries with surpluses and some with shortfalls, so the

space rental that was allocated represents the total shortfall of those industries. For example, the transportation sector has three industries: Railroads (25, Air Transportation (26, and Other transportation (27). Railroads had no shortfall, Air transportation had a shortfall of 469 million dollars and Other transportation had a surplus of 520 million dollars. Consequently, the first entry in the transportation row in Table II-2 is the difference between the 469 and 520 and the second entry in that row is the space rental allocated to the Air transportation industry.

Similarily, the manufacturing sector had two industries with a surplus, eleven with a shortfall, and eight where GPO equalled VAA. The total shortfall for those eleven industries was 13192 million dollars, the amount equal to the space rental allocated to those industries.

After these adjustments were completed, then the material for product-to-industry bridge table were at hand. The actual construction of the bridge table was a four-step process. First, the value added for each primary product was allocated to its corresponding GPO industry. Second, adjustments to the value added were made for secondary products were done as previously described. Third, that value added for each industry was adjusted for activity changes, the force account, manufacturing sales' offices, and space rental. The resulting bridge table is summarized in Table II-3.

As noted in section one, the statistical discrepancy for each industry is counted in the framework as a "factor" reward, so it is placed in the G matrix. For instance, the statistical discrepancy of the mining industry (846 million dollars) is taken out of the mining's industry row in the bridge table and regarded as a "payment" to the factor "statistical discrepancy" in the G matrix. At this juncture, the accounting framework

Table II - 3

Aggregated 1972 Product-to-Industry Bridgetable
(billions of dollars)

Industries	Products: Ag. min. Cons	Mfg	Trans. Util	Trade	Fin. Ser	Gov. ROW	GPO Total
Ag. Min. Cons	110.27	0.07	0.60	0.23	3.46	0.00	114.63
Mfg	1.54	277.93	0.01	0.00	13.19	0.00	292.67
Trans. Util	4.19	0.11	98.20	0.35	1.92	0.00	104.77
Trade	0.18	12.44	0.01	167.52	19.35	0.00	199.50
Fin. Serv	0.52	0.00	0.00	9.26	298.27	0.00	308.05
Gov. ROW	3.43	0.00	0.31	1.51	1.73	159.32	166.30
Total VA	120.13	290.55	99.13	178.87	337.92	159.32	1185.92

resembles the complex system pictured in Figure II-2 and described in the first section of this chapter.

This balanced product-to-industry bridge table was then used to update the 1977 input-output matrix. Independent output estimates from the 1977 Census were used to create a vector of product outputs. Each cell along an I-O column was moved by the growth in output. The rows, which represent GPO industries, were adjusted to conform to the 1977 BEA reported values for GPO by industry. The resulting column sums were then taken as the new estimates of value added by product consistent with the NIPA. The new vector of value added was used to help rebalance the input-output matrix for 1977.

II.4 Description of GPO series

In 1962, the BEA began to develop measures of the industrial origin of gross national product. This data is compiled for 64 two digit SIC industries. For each industry, there are series for thirteen components of GPO: wages and salaries, wage supplements, net interest payments, corporate capital consumption allowances, noncorporate capital consumption allowances, indirect business taxes, corporate profits, proprietor income, business transfer payments, corporate inventory valuation adjustments, noncorporate inventory valuation adjustments, rental income, and government subsidies. Though the data is assembled for 64 industries, the BEA feels that not all of the series are of publishable quality for all of the components, but all are available upon request. The July issue of the Survey of Current Business contains the annual updates and revisions to all of the components at various levels of industry disaggregation. The

following description of how the BEA makes these series is included here because of the central role they play in this study and of the fragmentary BEA descriptions.[6]

The largest component of GPO is labor compensation (wages and salaries plus wage supplements) which comprise approximately 60% of GNP from 1976-81. The sources of wages and salaries are state Unemployment Insurance agencies and the federal Office of Management and Budget (OMB). The state agencies report to the Department of Labor total employment and total payroll by three digit SIC industries on a quarterly basis. These reports do not cover all wage supplements, so the BEA estimates the remainder from several other sources. Wage supplements include a variety of programs: contributions to social insurance, health plans, life and unemployment insurance, and workman's compensation. Business contributions to wage supplements are derived from IRS tabulations of business tax returns while government contributions are taken from the OMB for federal employees and from Census surveys of state and local governments for their employees.

The return to capital is the second largest component of value added with a 30% share of GPO. The return to capital consists of net interest payments, corporate and noncorporate capital consumption allowances, corporate profits, proprietor income, business transfer payments, corporate and noncorporate inventory valuation adjustments and rental income. All of the components share the same data source, the annual IRS Statistics of Income. Most of these components are not tabulated with the BEA definitions in mind, and therefore some additional adjustments are required.

The first problem with all IRS data on industries is that the

industries are defined, not as a collection of establishments, but as a collection of companies. Thus profits earned by the chemical division of a steel company appear as profits in the steel industry. To deal with this problem, the BEA constructs a matrix depicting the distribution of a company's employment among industries defined on an establishment basis. Income of a particular type, say profits, is then allocated among a company's industries in the same proprotion as its employees. All income components are allocated to the appropriate two-digit SIC digit industries on that basis. This procedure is unnecessary for proprietor income and noncorporate capital consumption allowances since few proprietors own establishments in different industries. Therefore, the noncorporate series come directly from IRS tabulations.

More adjustments are needed for net interest payments. Net interest payments are defined as the sum of net monetary interest paid by business and net imputed interest paid. Net monetary interest paid is reported by the IRS by industry. Net imputed interest is imputed interest paid less imputed interest received. The values are calculated from Federal Reserve Board and Federal Deposit Insurance Corporation data. Imputed interest received is estimated as the value of free banking services received by all industries.

Business transfer payments arise from consumer bad debts, losses due to theft and payments for personal injury. The IRS is the source of data for bad debts while the other two have a variety of sources to allocate those payments on a industry basis.

Inventory valuation adjustments (IVA) are made by industry. Due to the widespread practice of FIFO (first-in, first-out) accounting by business, inventories are valued at original cost. For the expenditure

side of the national accoounts, the relevant investment in inventories is the change in inventories measured at the average price of the period, not the prices of the preceding period. So during times of inflation, the use of FIFO underestimates the value of inventories, and thus allows recorded profits to overstate the level of economic profits. The BEA constructs IVA to adjust for that bias in reported profits in order to measure economic profits. The primary source is Census establishment information on the book value of inventories and wholesale prices from the Bureau of Labor Statistics.

Rental income applies only to the real estate industry. For tenant occupied housing and mobile homes, rental income comes directly from the Annual Housing Survey. Owner-occupied housing requires an adjustment for imputed rent. For this adjustment, the BEA combines estimates for total units and mean contract rent from the Annual Housing Survey and internal estimates of the value of rental durables.

The industry allocation of indirect business taxes and nontaxes can be divided into three separate categories. Federal excise taxes and custom duties are identifiable by product. The windfall profits tax and the chemical cleanup (Superfund) tax are defined by the BEA as excise taxes. Property taxes are allocated on an industry basis by Census establishment data on property taxes paid. For other years, these payments are moved using IRS depreciable assets and adjusted to conform to the appropriate total. The remainder of the taxes, mainly sales taxes and various license fees, are either assigned to wholesale and retail trade or are allocated to the industries on the basis of sales.

Only a few industries receive government subsidies. The assignment of the subsidies to particular industries is made on the basis of a

specific program or legislation. Housing is the largest beneficiary of federal subsidies; Agriculture (1), Water transportation (27), Railroads (25) and Air carriers (26) receive the remainder. The subsidies are somewhat offset by the surpluses generated from many government enterprises. Lotteries, off track betting, highway tolls, public utilities and the Tennessee Valley Authority account for well over half of all government surpluses.

II.5 Summary

This chapter has dealt with the modelling structure of GPO. Because the real side of the model is based on a product definition basis while the GPO data is reported on an industry definition basis, a special structure is required to "bridge" the gap between the two types of definitions. A framework for translating GPO by industry into value added by product was described. The procedures for forecasting the index for each component of GPO - an important part of the structure - will be described in chapters III - V. The next chapter deals with the forecast of labor compensation, the largest component of GPO for most industries.

ENDNOTES

1. David Belzer "An Integration of Prices, Wages, and Income Flows in an Input-Output Model of the United States," unpublished Ph.D dissertation, University of Maryland, 1978. For a more detailed account of the CANDIDE model see M.C. McCraken, An Overview of CANDIDE model I/O, CANDIDE project Paper No. 1, Economic Council of Canada, for the Interdepartmental Committee (Ottawa, Information Canada, 1973). The Wharton model is described in Ross Preston, The Wharton Annual and Industry Forecasting Model. (Philadelphia, Economics Research Unit, University of Pennsylvannia, 1972).

2. As the name implies, real value added weighted output implies no changes in industry prices. This can easily seen by taking the column sums implied by equation (2.1).

$$VA_j^t = \sum_{i=1}^{46} v_{ij}\, Q_j^t / Q_j^0 = Q_j^t / Q_j^0 \sum_{n=1}^{46} v_{ij}$$

Recalling that the column sums are the base year value added,

$$VA_j^t = Q_j^t \; VA_j^0 / Q_j^0 \; .$$

Prices are calculated by multiplying the dual of the coefficient matrix by value added per unit of real output. For any product sector, this ratio is

$$VA_j^t / Q_j^t = (Q_j^t / Q_j^t)\,(VA_j^0 / Q_j^0) = VA_j^0 / Q_j^0 \; .$$

Thus, the entire vector of value added per unit of real output would remain unchanged; prices remain unaltered.

3. The matrix was an aggregated version of the matrix reported in Philip M. Ritz, "The Input-Output Structure of the U.S. Economy, 1972," Survey of Current Business vol. 59, no. 2 (February 1979) p.34-72

4. Philip M. Ritz, "Definitions and Conventions of the 1972 Input-Output Study," Bureau of Economic Analysis Staff Paper, July 1980.

5. A few of the force account redefinitions used the BEA work files.

6. The changes involved in the 1976 benchmark revisions have yet to be documented in written form. This section is based on telephone conversations with the individuals responsible for the components.

Appendix

The following pages contain a complete listing of the product-to-industry bridgetable for 1972. Each GPO industry is represented: product sectors with any type of reallocation are shown. The columns are the type of reallocation; rows correspond to product sectors. Statistical discrepancy is the last (78) product sector. The definitions of the columns are the same as Table II-1 with the of manufacturing sales offices (Mfg Branch). Total value added (V A) is the sum of the columns along a row: it is the entry updated to 1977 and used in the bridgetable for the model. All values are in millions of dollars.

Farms and agricultural services - GPO industry 1 - provides an example of the table. Seven product sectors have value added attributable to farm and agriculture establishments. The farm industry does some of its own trucking, hence the secondary product. The activity changes arise from a variety of accounting conventions used by the BEA. For instance, the largest activity change - 858 million - is the shifting of veterinary services from the medicine sector and industry to agriculture services. Other causes for activity changes arise from the resale of animals and supplies, landscaping services, and crop and livestock services performed in wholesale trade establishments. Space rental is included because of a dearth of value added in that sector.

OPO SECTOR 1 FARM & AGRICULTURAL SERVICES

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
1	AGRICULTURE, FORESTRY, FISHERY	33555.	0.	-204.	0.	0.	0.	33351.
9	FOOD & TOBACCO	0.	0.	4.	0.	0.	0.	4.
50	TRUCKING, HWY PASS TRANSIT	0.	60.	2.	0.	0.	0.	61.
59	WHOLESALE TRADE	0.	0.	7.	0.	0.	0.	7.
60	RETAIL TRADE	0.	0.	18.	0.	0.	0.	18.
63	REAL ESTATE	0.	0.	0.	0.	0.	1130.	1130.
66	BUSINESS SERVICES	0.	0.	0.	0.	0.	0.	0.
69	MEDICINE, EDUCATION, NPO	0.	0.	858.	0.	0.	0.	858.
TOTALS		33555.	60.	684.	0.	0.	1130.	35429.

OPO SECTOR 2 CRUDE PETROLEUM & NATURAL GAS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
5	NATURAL GAS EXTRACTION	3256.	0.	0.	0.	0.	0.	3256.
6	CRUDE PETROLEUM	7005.	0.	0.	0.	0.	0.	7005.
8	CONSTRUCTION	0.	0.	2340.	0.	0.	0.	2340.
17	PETROLEUM REFINING	0.	0.	0.	0.	-0.	0.	0.
27	OTHER NONFERROUS METALS	0.	1.	0.	0.	-0.	0.	1.
28	METAL PRODUCTS	0.	6.	0.	0.	-0.	0.	5.
29	ENGINES AND TURBINES	0.	4.	0.	0.	-0.	0.	4.
78	NIPA STATISTICAL DISCREPANCY	-216.	0.	0.	0.	0.	0.	-216.
TOTALS		10045.	11.	2340.	0.	-0.	0.	12396.

OPO SECTOR 3 MINING

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
2	IRON ORE MINING	556.	0.	0.	0.	0.	0.	556.
3	NONFERROUS METALS MINING	1319.	0.	0.	0.	0.	0.	1319.
4	COAL MINING	3010.	0.	0.	0.	0.	0.	3010.
7	NON-METALLIC MINING	2125.	0.	-41.	0.	0.	0.	2084.
8	CONSTRUCTION	0.	0.	0.	210.	0.	0.	210.
16	OTHER CHEMICALS	0.	7.	0.	0.	-0.	0.	7.
17	PETROLEUM REFINING	0.	11.	0.	0.	-1.	0.	10.
24	STONE, CLAY, GLASS	0.	42.	0.	0.	-0.	0.	42.
78	NIPA STATISTICAL DISCREPANCY	-630.	0.	0.	0.	0.	0.	-630.
TOTALS		6380.	60.	-41.	210.	-1.	0.	6608.

OPO SECTOR 4 CONTRACT CONSTRUCTION

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
1	AGRICULTURE, FORESTRY, FISHERY	0.	0.	77.	0.	0.	0.	77.
7	NON-METALLIC MINING	0.	0.	41.	0.	0.	0.	41.
8	CONSTRUCTION	69187.	0.	-4618.	-7547.	0.	0.	57022.
55	COMMUNICATIONS SERVICES	0.	0.	548.	0.	0.	0.	548.
59	WHOLESALE TRADE	0.	0.	61.	0.	0.	0.	61.
60	RETAIL TRADE	0.	0.	145.	0.	0.	0.	145.
64	OWNER-OCCUPIED HOUSING	0.	0.	657.	0.	0.	0.	657.
65	HOTELS, REPAIRS EXC AUTO	0.	0.	216.	0.	0.	0.	216.
66	BUSINESS SERVICES	0.	0.	597.	0.	0.	0.	597.
TOTALS		69187.	0.	-2276.	-7547.	0.	0.	59364.

OPO SECTOR 5 FOOD & TOBACCO

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
1	AGRICULTURE, FORESTRY, FISHERY	0.	2.	0.	0.	0.	0.	2.
8	CONSTRUCTION	0.	0.	0.	91.	0.	0.	91.
9	FOOD & TOBACCO	35258.	0.	-1870.	0.	-1108.	0.	32280.
13	PAPER	0.	1.	0.	0.	-0.	0.	1.
15	AGRICULTURAL FERTILIZERS	0.	5.	0.	0.	-0.	0.	5.
16	OTHER CHEMICALS	0.	63.	0.	0.	-1.	0.	62.
17	PETROLEUM REFINING	0.	1.	0.	0.	-0.	0.	1.
19	RUBBER PRODUCTS	0.	2.	0.	0.	-0.	0.	2.
20	PLASTIC PRODUCTS	0.	6.	0.	0.	-0.	0.	5.
28	METAL PRODUCTS	0.	13.	0.	0.	-0.	0.	13.
30	AGRICULTURAL MACHINERY	0.	0.	0.	0.	-0.	0.	0.
37	SERVICE INDUSTRY MACHINERY	0.	2.	0.	0.	-0.	0.	2.
74	SCRAPS AND USED	17.	0.	0.	0.	0.	0.	17.
TOTALS		35275.	96.	-1870.	91.	-1110.	0.	32482.

GPO SECTOR 6 TEXTILE MILL PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	41.	0.	0.	41.
10	TEXTILES, EXC. KNITS	6630.	0.	-712.	0.	-39.	0.	5879.
11	KNITTING	2389.	0.	0.	0.	-17.	0.	2372.
12	APPAREL, HOUSEHOLD TEXTILES	0.	355.	-70.	0.	-2.	0.	283.
13	PAPER	0.	9.	0.	0.	-0.	0.	9.
14	PRINTING & PUBLISHING	0.	1.	0.	0.	-0.	0.	1.
16	OTHER CHEMICALS	0.	17.	0.	0.	-0.	0.	17.
19	RUBBER PRODUCTS	0.	17.	0.	0.	-0.	0.	17.
20	PLASTIC PRODUCTS	0.	24.	0.	0.	-1.	0.	23.
21	SHOES AND LEATHER	0.	2.	0.	0.	-0.	0.	2.
24	STONE, CLAY, GLASS	0.	1.	0.	0.	-0.	0.	1.
28	METAL PRODUCTS	0.	0.	0.	0.	-0.	0.	0.
47	INSTRUMENTS	0.	2.	0.	0.	-0.	0.	2.
48	MISC. MANUFACTURING	0.	9.	0.	0.	-0.	0.	9.
63	REAL ESTATE	0.	0.	0.	0.	0.	881.	881.
74	SCRAPS AND USED	75.	0.	0.	0.	0.	0.	75.
TOTALS		9094.	439.	-782.	41.	-60.	881.	9613.

GPO SECTOR 7 APPAREL AND RELATED PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	13.	0.	0.	13.
10	TEXTILES, EXC. KNITS	0.	49.	0.	0.	-0.	0.	49.
11	KNITTING	0.	2.	0.	0.	-0.	0.	2.
12	APPAREL, HOUSEHOLD TEXTILES	9508.	0.	-15.	0.	-55.	0.	9438.
13	PAPER	0.	7.	0.	0.	-0.	0.	7.
14	PRINTING & PUBLISHING	0.	1.	0.	0.	-0.	0.	1.
16	OTHER CHEMICALS	0.	5.	0.	0.	-0.	0.	5.
19	RUBBER PRODUCTS	0.	4.	0.	0.	-0.	0.	4.
20	PLASTIC PRODUCTS	0.	6.	0.	0.	-0.	0.	6.
21	SHOES AND LEATHER	0.	10.	0.	0.	-0.	0.	10.
23	FURNITURE	0.	7.	0.	0.	-0.	0.	7.
28	METAL PRODUCTS	0.	0.	0.	0.	-0.	0.	0.
32	METALWORKING MACHINERY	0.	1.	0.	0.	-0.	0.	1.
46	OTHER TRANSP. EQUIP.	0.	1.	0.	0.	-0.	0.	1.
47	INSTRUMENTS	0.	3.	0.	0.	-0.	0.	3.
48	MISC. MANUFACTURING	0.	8.	0.	0.	-0.	0.	8.
63	REAL ESTATE	0.	0.	0.	0.	0.	604.	604.
TOTALS		9508.	104.	-15.	13.	-57.	604.	10157.

OPO SECTOR 8 PAPER AND ALLIED PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	50.	0.	0.	50.
9	FOOD & TOBACCO	0.	1.	0.	0.	-0.	0.	1.
10	TEXTILES, EXC. KNITS	0.	13.	0.	0.	-0.	0.	13.
12	APPAREL, HOUSEHOLD TEXTILES	0.	7.	0.	0.	-0.	0.	7.
13	PAPER	9321.	0.	0.	0.	-244.	0.	9077.
14	PRINTING & PUBLISHING	0.	78.	0.	0.	-1.	0.	77.
16	OTHER CHEMICALS	0.	37.	0.	0.	-1.	0.	36.
19	RUBBER PRODUCTS	0.	8.	0.	0.	-0.	0.	8.
20	PLASTIC PRODUCTS	0.	68.	0.	0.	-3.	0.	65.
22	LUMBER	0.	22.	0.	0.	-1.	0.	21.
23	FURNITURE	0.	3.	0.	0.	-0.	0.	3.
24	STONE, CLAY, GLASS	0.	45.	0.	0.	-0.	0.	44.
28	METAL PRODUCTS	0.	30.	0.	0.	-1.	0.	30.
32	METALWORKING MACHINERY	0.	1.	0.	0.	-0.	0.	1.
33	SPECIAL INDUSTRY MACHINERY	0.	1.	0.	0.	-0.	0.	1.
34	MISC NON-ELECTRICAL MACH.	0.	1.	0.	0.	-0.	0.	1.
35	COMPUTERS	0.	31.	0.	0.	-8.	0.	24.
36	OTHER OFFICE EQUIPMENT	0.	5.	0.	0.	-1.	0.	4.
37	SERVICE INDUSTRY MACHINERY	0.	1.	0.	0.	-0.	0.	1.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	20.	0.	0.	-0.	0.	20.
41	MISC ELECTRICAL EQ	0.	2.	0.	0.	-0.	0.	2.
47	INSTRUMENTS	0.	43.	0.	0.	-2.	0.	41.
48	MISC. MANUFACTURING	0.	12.	0.	0.	-0.	0.	12.
63	REAL ESTATE	0.	0.	0.	0.	0.	1787.	1787.
74	SCRAPS AND USED	88.	0.	0.	0.	0.	0.	88.
TOTALS		9409.	429.	0.	50.	-262.	1787.	11413.

OPO SECTOR 9 PRINTING AND PUBLISHING

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	16.	0.	0.	16.
10	TEXTILES, EXC. KNITS	0.	4.	0.	0.	-0.	0.	4.
12	APPAREL, HOUSEHOLD TEXTILES	0.	1.	0.	0.	-0.	0.	1.
13	PAPER	0.	67.	0.	0.	-2.	0.	65.
14	PRINTING & PUBLISHING	13812.	0.	0.	0.	-159.	0.	13653.
16	OTHER CHEMICALS	0.	2.	0.	0.	-0.	0.	2.
28	METAL PRODUCTS	0.	17.	0.	0.	-0.	0.	17.
32	METALWORKING MACHINERY	0.	1.	0.	0.	-0.	0.	1.
33	SPECIAL INDUSTRY MACHINERY	0.	3.	0.	0.	-0.	0.	3.
34	MISC NON-ELECTRICAL MACH.	0.	2.	0.	0.	-0.	0.	1.
36	OTHER OFFICE EQUIPMENT	0.	4.	0.	0.	-1.	0.	3.
47	INSTRUMENTS	0.	3.	0.	0.	-0.	0.	3.
48	MISC. MANUFACTURING	0.	9.	0.	0.	-0.	0.	9.
63	REAL ESTATE	0.	0.	0.	0.	0.	799.	799.
74	SCRAPS AND USED	132.	0.	0.	0.	0.	0.	132.
TOTALS		13944.	112.	0.	16.	-163.	799.	14708.

GPO SECTOR 10 CHEMICAL AND ALLIED PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
6	CRUDE PETROLEUM	0.	5.	0.	0.	0.	0.	5.
8	CONSTRUCTION	0.	0.	0.	118.	0.	0.	118.
9	FOOD & TOBACCO	0.	45.	0.	0.	-1.	0.	43.
10	TEXTILES, EXC. KNITS	0.	133.	0.	0.	-1.	0.	132.
12	APPAREL, HOUSEHOLD TEXTILES	0.	7.	0.	0.	-0.	0.	7.
13	PAPER	0.	11.	0.	0.	-0.	0.	11.
14	PRINTING & PUBLISHING	0.	3.	0.	0.	-0.	0.	3.
15	AGRICULTURAL FERTILIZERS	1612.	0.	0.	0.	-16.	0.	1596.
16	OTHER CHEMICALS	20081.	0.	-23.	0.	-362.	0.	19696.
17	PETROLEUM REFINING	0.	16.	0.	0.	-1.	0.	15.
19	RUBBER PRODUCTS	0.	10.	0.	0.	-0.	0.	10.
20	PLASTIC PRODUCTS	0.	211.	0.	0.	-8.	0.	203.
24	STONE, CLAY, GLASS	0.	26.	0.	0.	-0.	0.	26.
25	FERROUS METALS	0.	2.	0.	0.	-0.	0.	2.
27	OTHER NONFERROUS METALS	0.	7.	0.	0.	-0.	0.	7.
28	METAL PRODUCTS	0.	6.	0.	0.	-0.	0.	5.
32	METALWORKING MACHINERY	0.	1.	0.	0.	-0.	0.	1.
33	SPECIAL INDUSTRY MACHINERY	0.	2.	0.	0.	-0.	0.	2.
34	MISC NON-ELECTRICAL MACH.	0.	10.	0.	0.	-0.	0.	10.
37	SERVICE INDUSTRY MACHINERY	0.	2.	0.	0.	-0.	0.	1.
39	ELEC INDL APP & DISTRIB EQ	0.	2.	0.	0.	-0.	0.	1.
40	HOUSEHOLD APPLIANCES	0.	1.	0.	0.	-0.	0.	1.
43	MOTOR VEHICLES	0.	0.	0.	0.	-0.	0.	0.
47	INSTRUMENTS	0.	92.	0.	0.	-5.	0.	87.
48	MISC. MANUFACTURING	0.	12.	0.	0.	-0.	0.	12.
TOTALS		21693.	604.	-23.	118.	-396.	0.	21996.

GPO SECTOR 11 PETROLEUM AND RELATED INDUSTRIES

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
7	NON-METALLIC MINING	0.	17.	0.	0.	0.	0.	17.
8	CONSTRUCTION	0.	0.	0.	37.	0.	0.	37.
9	FOOD & TOBACCO	0.	1.	0.	0.	-0.	0.	1.
10	TEXTILES, EXC. KNITS	0.	0.	0.	0.	-0.	0.	0.
12	APPAREL, HOUSEHOLD TEXTILES	0.	0.	0.	0.	-0.	0.	0.
13	PAPER	0.	2.	0.	0.	-0.	0.	2.
15	AGRICULTURAL FERTILIZERS	0.	11.	0.	0.	-0.	0.	11.
16	OTHER CHEMICALS	0.	40.	0.	0.	-1.	0.	39.
17	PETROLEUM REFINING	7913.	0.	0.	0.	-633.	0.	7280.
19	RUBBER PRODUCTS	0.	0.	0.	0.	-0.	0.	0.
20	PLASTIC PRODUCTS	0.	6.	0.	0.	-0.	0.	6.
24	STONE, CLAY, GLASS	0.	23.	0.	0.	-0.	0.	23.
28	METAL PRODUCTS	0.	0.	0.	0.	-0.	0.	0.
78	NIPA STATISTICAL DISCREPANCY	-80.	0.	0.	0.	0.	0.	-80.
TOTALS		7833.	101.	0.	37.	-634.	0.	7337.

OPO SECTOR 12 RUBBER & MISC. PLASTIC PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	25.	0.	0.	25.
9	FOOD & TOBACCO	0.	1.	0.	0.	-0.	0.	1.
10	TEXTILES, EXC. KNITS	0.	24.	0.	0.	-0.	0.	24.
11	KNITTING	0.	2.	0.	0.	-0.	0.	2.
12	APPAREL, HOUSEHOLD TEXTILES	0.	19.	0.	0.	-0.	0.	19.
13	PAPER	0.	19.	0.	0.	-0.	0.	19.
14	PRINTING & PUBLISHING	0.	5.	0.	0.	-0.	0.	5.
16	OTHER CHEMICALS	0.	104.	0.	0.	-2.	0.	102.
17	PETROLEUM REFINING	0.	1.	0.	0.	-0.	0.	1.
19	RUBBER PRODUCTS	4607.	0.	0.	0.	-28.	0.	4579.
20	PLASTIC PRODUCTS	4567.	0.	0.	0.	-183.	0.	4384.
21	SHOES AND LEATHER	0.	6.	0.	0.	-0.	0.	6.
22	LUMBER	0.	2.	0.	0.	-0.	0.	2.
23	FURNITURE	0.	18.	0.	0.	-1.	0.	18.
24	STONE, CLAY, GLASS	0.	49.	0.	0.	-0.	0.	48.
27	OTHER NONFERROUS METALS	0.	2.	0.	0.	-0.	0.	2.
28	METAL PRODUCTS	0.	33.	0.	0.	-1.	0.	33.
31	CONSTR, MINING, OILFIELD EQ	0.	3.	0.	0.	-0.	0.	3.
32	METALWORKING MACHINERY	0.	48.	0.	0.	-1.	0.	47.
33	SPECIAL INDUSTRY MACHINERY	0.	12.	0.	0.	-0.	0.	12.
41	MISC ELECTRICAL EQ	0.	2.	0.	0.	-0.	0.	2.
42	TV SETS, RADIOS, PHONOGRAPHS	0.	1.	0.	0.	-0.	0.	0.
43	MOTOR VEHICLES	0.	16.	0.	0.	-1.	0.	15.
44	AEROSPACE	0.	12.	0.	0.	-0.	0.	12.
46	OTHER TRANSP. EQUIP.	0.	3.	0.	0.	-0.	0.	2.
47	INSTRUMENTS	0.	3.	0.	0.	-0.	0.	3.
48	MISC. MANUFACTURING	0.	27.	0.	0.	-0.	0.	27.
TOTALS		9174.	412.	0.	25.	-218.	0.	9393.

OPO SECTOR 13 LEATHER AND LEATHER PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	3.	0.	0.	3.
10	TEXTILES, EXC. KNITS	0.	1.	0.	0.	-0.	0.	1.
12	APPAREL, HOUSEHOLD TEXTILES	0.	8.	0.	0.	-0.	0.	8.
14	PRINTING & PUBLISHING	0.	1.	0.	0.	-0.	0.	1.
16	OTHER CHEMICALS	0.	1.	0.	0.	-0.	0.	1.
19	RUBBER PRODUCTS	0.	1.	0.	0.	-0.	0.	1.
20	PLASTIC PRODUCTS	0.	2.	0.	0.	-0.	0.	2.
21	SHOES AND LEATHER	2402.	0.	0.	0.	-110.	0.	2292.
24	STONE, CLAY, GLASS	0.	1.	0.	0.	-0.	0.	1.
47	INSTRUMENTS	0.	1.	0.	0.	-0.	0.	1.
48	MISC. MANUFACTURING	0.	4.	0.	0.	-0.	0.	4.
78	NIPA STATISTICAL DISCREPANCY	-117.	0.	0.	0.	0.	0.	-117.
TOTALS		2285.	20.	0.	3.	-110.	0.	2198.

GPO SECTOR 14 LUMBER & WOOD PRODUCTS, EX FURN

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	43.	0.	0.	43.
13	PAPER	0.	11.	0.	0.	-0.	0.	11.
16	OTHER CHEMICALS	0.	2.	0.	0.	-0.	0.	2.
20	PLASTIC PRODUCTS	0.	10.	0.	0.	-0.	0.	10.
22	LUMBER	8962.	0.	0.	0.	-214.	0.	8748.
23	FURNITURE	0.	25.	0.	0.	-1.	0.	24.
24	STONE, CLAY, GLASS	0.	2.	0.	0.	-0.	0.	2.
25	FERROUS METALS	0.	3.	0.	0.	-0.	0.	3.
28	METAL PRODUCTS	0.	23.	0.	0.	-0.	0.	23.
43	MOTOR VEHICLES	0.	2.	0.	0.	-0.	0.	2.
46	OTHER TRANSP. EQUIP.	0.	3.	0.	0.	-0.	0.	3.
48	MISC. MANUFACTURING	0.	3.	0.	0.	-0.	0.	3.
63	REAL ESTATE	0.	0.	0.	0.	0.	751.	751.
TOTALS		8962.	84.	0.	43.	-217.	751.	9623.

GPO SECTOR 15 FURNITURE AND FIXTURES

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	23.	0.	0.	23.
10	TEXTILES, EXC. KNITS	0.	5.	0.	0.	-0.	0.	5.
12	APPAREL, HOUSEHOLD TEXTILES	0.	3.	0.	0.	-0.	0.	3.
13	PAPER	0.	1.	0.	0.	-0.	0.	1.
14	PRINTING & PUBLISHING	0.	3.	0.	0.	-0.	0.	3.
19	RUBBER PRODUCTS	0.	2.	0.	0.	-0.	0.	2.
20	PLASTIC PRODUCTS	0.	22.	0.	0.	-1.	0.	21.
22	LUMBER	0.	21.	0.	0.	-0.	0.	20.
23	FURNITURE	4634.	0.	0.	0.	-129.	0.	4505.
24	STONE, CLAY, GLASS	0.	19.	0.	0.	-0.	0.	19.
28	METAL PRODUCTS	0.	14.	0.	0.	-0.	0.	14.
30	AGRICULTURAL MACHINERY	0.	0.	0.	0.	-0.	0.	0.
31	CONSTR, MINING, OILFIELD EQ	0.	1.	0.	0.	-0.	0.	1.
32	METALWORKING MACHINERY	0.	2.	0.	0.	-0.	0.	2.
34	MISC NON-ELECTRICAL MACH.	0.	4.	0.	0.	-0.	0.	3.
35	COMPUTERS	0.	1.	0.	0.	-0.	0.	1.
37	SERVICE INDUSTRY MACHINERY	0.	3.	0.	0.	-1.	0.	2.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	1.	0.	0.	-0.	0.	1.
39	ELEC INDL APP & DISTRIB EQ	0.	1.	0.	0.	-0.	0.	1.
40	HOUSEHOLD APPLIANCES	0.	9.	0.	0.	-0.	0.	9.
41	MISC ELECTRICAL EQ	0.	2.	0.	0.	-0.	0.	2.
42	TV SETS, RADIOS, PHONOGRAPHS	0.	0.	0.	0.	-0.	0.	0.
43	MOTOR VEHICLES	0.	1.	0.	0.	-0.	0.	1.
44	AEROSPACE	0.	3.	0.	0.	-0.	0.	3.
47	INSTRUMENTS	0.	9.	0.	0.	-0.	0.	9.
48	MISC. MANUFACTURING	0.	12.	0.	0.	-0.	0.	12.
TOTALS		4634.	137.	0.	23.	-132.	0.	4662.

GPO SECTOR 16 STONE, CLAY, & GLASS PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
7	NON-METALLIC MINING	0.	85.	0.	0.	0.	0.	85.
8	CONSTRUCTION	0.	0.	0.	85.	0.	0.	85.
10	TEXTILES, EXC. KNITS	0.	4.	0.	0.	-0.	0.	4.
13	PAPER	0.	9.	0.	0.	-0.	0.	9.
14	PRINTING & PUBLISHING	0.	0.	0.	0.	-0.	0.	0.
16	OTHER CHEMICALS	0.	9.	0.	0.	-0.	0.	9.
17	PETROLEUM REFINING	0.	8.	0.	0.	-1.	0.	7.
19	RUBBER PRODUCTS	0.	10.	0.	0.	-0.	0.	10.
20	PLASTIC PRODUCTS	0.	21.	0.	0.	-1.	0.	20.
21	SHOES AND LEATHER	0.	1.	0.	0.	-0.	0.	1.
22	LUMBER	0.	3.	0.	0.	-0.	0.	2.
24	STONE, CLAY, GLASS	9891.	0.	0.	0.	-97.	0.	9794.
25	FERROUS METALS	0.	6.	0.	0.	-0.	0.	6.
28	METAL PRODUCTS	0.	20.	0.	0.	-0.	0.	20.
30	AGRICULTURAL MACHINERY	0.	1.	0.	0.	-0.	0.	1.
32	METALWORKING MACHINERY	0.	5.	0.	0.	-0.	0.	5.
34	MISC NON-ELECTRICAL MACH.	0.	12.	0.	0.	-0.	0.	11.
40	HOUSEHOLD APPLIANCES	0.	7.	0.	0.	-0.	0.	6.
41	MISC ELECTRICAL EQ	0.	11.	0.	0.	-1.	0.	9.
43	MOTOR VEHICLES	0.	2.	0.	0.	-0.	0.	2.
44	AEROSPACE	0.	3.	0.	0.	-0.	0.	3.
47	INSTRUMENTS	0.	4.	0.	0.	-0.	0.	4.
48	MISC. MANUFACTURING	0.	0.	0.	0.	-0.	0.	0.
TOTALS		9891.	220.	0.	85.	-101.	0.	10095.

OPO SECTOR 17 PRIMARY METAL INDUSTRIES

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	337.	0.	0.	337.
13	PAPER	0.	4.	0.	0.	-0.	0.	4.
14	PRINTING & PUBLISHING	0.	5.	0.	0.	-0.	0.	5.
15	AGRICULTURAL FERTILIZERS	0.	14.	0.	0.	-0.	0.	13.
16	OTHER CHEMICALS	0.	70.	23.	0.	-1.	0.	92.
17	PETROLEUM REFINING	0.	1.	0.	0.	-0.	0.	1.
20	PLASTIC PRODUCTS	0.	15.	0.	0.	-1.	0.	14.
23	FURNITURE	0.	4.	0.	0.	-0.	0.	3.
24	STONE, CLAY, GLASS	0.	8.	0.	0.	-0.	0.	8.
25	FERROUS METALS	14056.	0.	0.	0.	-259.	0.	13797.
26	COPPER	944.	0.	0.	0.	-336.	0.	609.
27	OTHER NONFERROUS METALS	4375.	0.	0.	0.	-126.	0.	4249.
28	METAL PRODUCTS	0.	579.	0.	0.	-10.	0.	569.
30	AGRICULTURAL MACHINERY	0.	7.	0.	0.	-0.	0.	6.
31	CONSTR.MINING.OILFIELD EQ	0.	2.	0.	0.	-0.	0.	2.
32	METALWORKING MACHINERY	0.	59.	0.	0.	-1.	0.	58.
33	SPECIAL INDUSTRY MACHINERY	0.	15.	0.	0.	-0.	0.	15.
34	MISC NON-ELECTRICAL MACH.	0.	52.	0.	0.	-1.	0.	52.
36	OTHER OFFICE EQUIPMENT	0.	6.	0.	0.	-1.	0.	5.
37	SERVICE INDUSTRY MACHINERY	0.	5.	0.	0.	-1.	0.	4.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	20.	0.	0.	-0.	0.	20.
39	ELEC INDL APP & DISTRIB EQ	0.	2.	0.	0.	-0.	0.	2.
41	MISC ELECTRICAL EQ	0.	36.	0.	0.	-4.	0.	32.
43	MOTOR VEHICLES	0.	34.	0.	0.	-1.	0.	32.
44	AEROSPACE	0.	9.	0.	0.	-0.	0.	9.
46	OTHER TRANSP. EQUIP.	0.	4.	0.	0.	-0.	0.	3.
47	INSTRUMENTS	0.	1.	0.	0.	-0.	0.	1.
48	MISC. MANUFACTURING	0.	2.	0.	0.	-0.	0.	2.
57	GAS UTILITY	0.	8.	0.	0.	0.	0.	8.
63	REAL ESTATE	0.	0.	0.	0.	0.	1246.	1246.
74	SCRAPS AND USED	371.	0.	0.	0.	0.	0.	371.
TOTALS		19746.	959.	23.	337.	-744.	1246.	21567.

OPO SECTOR 18 METAL PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	90.	96.	0.	0.	186.
12	APPAREL, HOUSEHOLD TEXTILES	0.	11.	0.	0.	-0.	0.	11.
13	PAPER	0.	32.	0.	0.	-1.	0.	31.
14	PRINTING & PUBLISHING	0.	24.	0.	0.	-0.	0.	24.
16	OTHER CHEMICALS	0.	19.	0.	0.	-0.	0.	19.
19	RUBBER PRODUCTS	0.	1.	0.	0.	-0.	0.	1.
20	PLASTIC PRODUCTS	0.	43.	0.	0.	-2.	0.	41.
22	LUMBER	0.	8.	0.	0.	-0.	0.	8.
23	FURNITURE	0.	46.	0.	0.	-1.	0.	45.
24	STONE, CLAY, GLASS	0.	13.	0.	0.	-0.	0.	13.
25	FERROUS METALS	0.	46	0.	0.	-1.	0.	45.
26	COPPER	0.	1.	0.	0.	-0.	0.	0.
27	OTHER NONFERROUS METALS	0.	10.	0.	0.	-0.	0.	10.
28	METAL PRODUCTS	19905.	0.	0.	0.	-349.	0.	19556.
29	ENGINES AND TURBINES	0.	14.	0.	0.	-0.	0.	14.
30	AGRICULTURAL MACHINERY	0.	16.	0.	0.	-0.	0.	15.
31	CONSTR, MINING, OILFIELD EQ	0.	33.	0.	0.	-2.	0.	31.
32	METALWORKING MACHINERY	0.	217.	0.	0.	-3.	0.	213.
33	SPECIAL INDUSTRY MACHINERY	0.	45.	0.	0.	-1.	0.	44.
34	MISC NON-ELECTRICAL MACH.	0.	125.	0.	0.	-2.	0.	124.
35	COMPUTERS	0.	5.	0.	0.	-1.	0.	4.
36	OTHER OFFICE EQUIPMENT	0.	2.	0.	0.	-0.	0.	1.
37	SERVICE INDUSTRY MACHINERY	0.	49.	0.	0.	-10.	0.	39.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	43.	0.	0.	-1.	0.	42.
39	ELEC INDL APP & DISTRIB EQ	0.	17.	0.	0.	-0.	0.	17.
40	HOUSEHOLD APPLIANCES	0.	45.	0.	0.	-1.	0.	45.
41	MISC ELECTRICAL EQ	0.	24.	0.	0.	-3.	0.	21.
43	MOTOR VEHICLES	0.	41.	0.	0.	-1.	0.	40.
44	AEROSPACE	0.	33.	0.	0.	-0.	0.	33.
46	OTHER TRANSP. EQUIP.	0.	11.	0.	0.	-1.	0.	10.
47	INSTRUMENTS	0.	42.	0.	0.	-2.	0.	39.
48	MISC. MANUFACTURING	0.	27.	0.	0.	-0.	0.	27.
74	SCRAPS AND USED	308.	0.	0.	0.	0.	0.	308.
TOTALS		20213.	1044.	90.	96.	-384.	0.	21059.

GPO SECTOR 19 TRANS EQ + ORD EX MOTOR VEH

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	40.	0.	0.	40.
12	APPAREL, HOUSEHOLD TEXTILES	0.	3.	0.	0.	-0.	0.	3.
14	PRINTING & PUBLISHING	0.	0.	0.	0.	-0.	0.	0.
20	PLASTIC PRODUCTS	0.	14.	0.	0.	-1.	0.	13.
22	LUMBER	0.	5.	0.	0.	-0.	0.	5.
23	FURNITURE	0.	5.	0.	0.	-0.	0.	5.
24	STONE, CLAY, GLASS	0.	1.	0.	0.	-0.	0.	1.
25	FERROUS METALS	0.	10.	0.	0.	-0.	0.	9.
27	OTHER NONFERROUS METALS	0.	0.	0.	0.	-0.	0.	0.
28	METAL PRODUCTS	0.	73.	0.	0.	-1.	0.	72.
29	ENGINES AND TURBINES	0.	104.	0.	0.	-2.	0.	102.
30	AGRICULTURAL MACHINERY	0.	22.	0.	0.	-1.	0.	22.
31	CONSTR, MINING, OILFIELD EQ	0.	41.	0.	0.	-2.	0.	39.
32	METALWORKING MACHINERY	0.	5.	0.	0.	-0.	0.	5.
33	SPECIAL INDUSTRY MACHINERY	0.	22.	0.	0.	-0.	0.	22.
34	MISC NON-ELECTRICAL MACH.	0.	61.	0.	0.	-1.	0.	60.
35	COMPUTERS	0.	3.	0.	0.	-1.	0.	2.
37	SERVICE INDUSTRY MACHINERY	0.	7.	0.	0.	-2.	0.	6.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	91.	0.	0.	-2.	0.	89.
39	ELEC INDL APP & DISTRIB EQ	0.	44.	0.	0.	-0.	0.	43.
41	MISC ELECTRICAL EQ	0.	0.	0.	0.	-0.	0.	0.
43	MOTOR VEHICLES	0.	35.	0.	0.	-1.	0.	33.
44	AEROSPACE	9869.	0.	0.	0.	-24.	0.	9845.
45	SHIPS, BOATS	2022.	0.	-38.	0.	-5.	0.	1979.
46	OTHER TRANSP. EQUIP.	1639.	0.	-46.	0.	-126.	0.	1467.
47	INSTRUMENTS	0.	52.	0.	0.	-3.	0.	49.
48	MISC. MANUFACTURING	0.	6.	0.	0.	-0.	0.	6.
74	SCRAPS AND USED	41.	0.	0.	0.	0.	0.	41.
TOTALS		13571.	606.	-84.	40.	-172.	0.	13961.

GPO SECTOR 20 MACHINERY, EXCEPT ELECTRICAL

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	9.	109.	0.	0.	118.
12	APPAREL, HOUSEHOLD TEXTILES	0.	2.	0.	0.	-0.	0.	2.
13	PAPER	0.	5.	0.	0.	-0.	0.	5.
16	OTHER CHEMICALS	0.	16.	0.	0.	-0.	0.	16.
19	RUBBER PRODUCTS	0.	5.	0.	0.	-0.	0.	5.
20	PLASTIC PRODUCTS	0.	20.	0.	0.	-1.	0.	20.
22	LUMBER	0.	2.	0.	0.	-0.	0.	2.
23	FURNITURE	0.	13.	0.	0.	-0.	0.	13.
24	STONE, CLAY, GLASS	0.	32.	0.	0.	-0.	0.	32.
25	FERROUS METALS	0.	123.	0.	0.	-2.	0.	120.
26	COPPER	0.	3.	0.	0.	-1.	0.	2.
27	OTHER NONFERROUS METALS	0.	8.	0.	0.	-0.	0.	8.
28	METAL PRODUCTS	0.	378.	0.	0.	-7.	0.	371.
29	ENGINES AND TURBINES	2448.	0.	0.	0.	-54.	0.	2394.
30	AGRICULTURAL MACHINERY	2325.	0.	0.	0.	-74.	0.	2251.
31	CONSTR, MINING, OILFIELD EQ	3517.	0.	0.	0.	-171.	0.	3345.
32	METALWORKING MACHINERY	4180.	0.	0.	0.	-65.	0.	4114.
33	SPECIAL INDUSTRY MACHINERY	2963.	0.	0.	0.	-58.	0.	2905.
34	MISC NON-ELECTRICAL MACH.	7231.	0.	-35.	0.	-95.	0.	7101.
35	COMPUTERS	2789.	0.	0.	0.	-682.	0.	2107.
36	OTHER OFFICE EQUIPMENT	611.	0.	0.	0.	-142.	0.	470.
37	SERVICE INDUSTRY MACHINERY	3279.	0.	0.	0.	-672.	0.	2608.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	204.	0.	0.	-4.	0.	199.
39	ELEC INDL APP & DISTRIB EQ	0.	110.	0.	0.	-1.	0.	109.
40	HOUSEHOLD APPLIANCES	0.	212.	0.	0.	-2.	0.	210.
41	MISC ELECTRICAL EQ	0.	54.	0.	0.	-6.	0.	48.
43	MOTOR VEHICLES	0.	269.	0.	0.	-10.	0.	259.
44	AEROSPACE	0.	39.	0.	0.	-0.	0.	39.
45	SHIPS, BOATS	0.	5.	0.	0.	-0.	0.	5.
46	OTHER TRANSP. EQUIP.	0.	47.	0.	0.	-3.	0.	44.
47	INSTRUMENTS	0.	63.	0.	0.	-3.	0.	60.
48	MISC. MANUFACTURING	0.	42.	0.	0.	-0.	0.	42.
63	REAL ESTATE	0.	0.	0.	0.	0.	1876.	1876.
74	SCRAPS AND USED	23.	0.	0.	0.	0.	0.	23.
TOTALS		29366.	1652.	-26.	109.	-2055.	1876.	30922.

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OPO SECTOR 21 ELECTRICAL MACHINERY

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	91.	0.	0.	91.
10	TEXTILES, EXC. KNITS	0.	2.	0.	0.	-0.	0.	2.
13	PAPER	0.	2.	0.	0.	-0.	0.	2.
14	PRINTING & PUBLISHING	0.	0.	0.	0.	-0.	0.	0.
16	OTHER CHEMICALS	0.	13.	0.	0.	-0.	0.	13.
20	PLASTIC PRODUCTS	0.	22.	0.	0.	-1.	0.	21.
23	FURNITURE	0.	12.	0.	0.	-0.	0.	12.
24	STONE, CLAY, GLASS	0.	16.	0.	0.	-0.	0.	16.
25	FERROUS METALS	0.	43.	0.	0.	-1.	0.	42.
26	COPPER	0.	6.	0.	0.	-2.	0.	4.
27	OTHER NONFERROUS METALS	0.	51.	0.	0.	-1.	0.	50.
28	METAL PRODUCTS	0.	196.	0.	0.	-3.	0.	193.
29	ENGINES AND TURBINES	0.	19.	0.	0.	-0.	0.	19.
32	METALWORKING MACHINERY	0.	33.	0.	0.	-1.	0.	32.
33	SPECIAL INDUSTRY MACHINERY	0.	56.	0.	0.	-1.	0.	55.
34	MISC NON-ELECTRICAL MACH.	0.	81.	0.	0.	-1.	0.	80.
35	COMPUTERS	0.	203.	0.	0.	-50.	0.	153.
36	OTHER OFFICE EQUIPMENT	0.	5.	0.	0.	-1.	0.	4.
37	SERVICE INDUSTRY MACHINERY	0.	165.	0.	0.	-34.	0.	131.
38	COMMUNIC EQ, ELECTRONIC COMP	10593.	0.	0.	0.	-226.	0.	10367.
39	ELEC INDL APP & DISTRIB EQ	5042.	0.	0.	0.	-42.	0.	5001.
40	HOUSEHOLD APPLIANCES	2632.	0.	0.	0.	-31.	0.	2601.
41	MISC ELECTRICAL EQ	4300.	0.	0.	0.	-455.	0.	3845.
42	TV SETS, RADIOS, PHONOGRAPHS	1153.	0.	0.	0.	-348.	0.	804.
43	MOTOR VEHICLES	0.	101.	0.	0.	-4.	0.	97.
44	AEROSPACE	0.	54.	0.	0.	-0.	0.	54.
46	OTHER TRANSP. EQUIP.	0.	4.	0.	0.	-0.	0.	4.
47	INSTRUMENTS	0.	199.	0.	0.	-11.	0.	188.
48	MISC. MANUFACTURING	0.	18.	0.	0.	-0.	0.	18.
63	REAL ESTATE	0.	0.	0.	0.	0.	1858.	1858.
74	SCRAPS AND USED	92.	0.	0.	0.	0.	0.	92.
TOTALS		23812.	1301.	0.	91.	-1213.	1858.	25849.

GPO SECTOR 22 MOTOR VEHICLES AND EQUIPMENT

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	50.	0.	0.	50.
12	APPAREL, HOUSEHOLD TEXTILES	0.	9.	0.	0.	-0.	0.	9.
16	OTHER CHEMICALS	0.	2.	0.	0.	-0.	0.	2.
19	RUBBER PRODUCTS	0.	4.	0.	0.	-0.	0.	4.
20	PLASTIC PRODUCTS	0.	0.	0.	0.	-0.	0.	0.
22	LUMBER	0.	2.	0.	0.	-0.	0.	2.
23	FURNITURE	0.	1.	0.	0.	-0.	0.	1.
24	STONE, CLAY, GLASS	0.	7.	0.	0.	-0.	0.	7.
25	FERROUS METALS	0.	67.	0.	0.	-1.	0.	66.
26	COPPER	0.	1.	0.	0.	-0.	0.	0.
27	OTHER NONFERROUS METALS	0.	10.	0.	0.	-0.	0.	9.
28	METAL PRODUCTS	0.	175.	0.	0.	-3.	0.	172.
29	ENGINES AND TURBINES	0.	37.	0.	0.	-1.	0.	36.
30	AGRICULTURAL MACHINERY	0.	30.	0.	0.	-1.	0.	29.
31	CONSTR, MINING, OILFIELD EQ	0.	13.	0.	0.	-1.	0.	13.
32	METALWORKING MACHINERY	0.	40.	0.	0.	-1.	0.	39.
34	MISC NON-ELECTRICAL MACH.	0.	40.	0.	0.	-1.	0.	40.
35	COMPUTERS	0.	1.	0.	0.	-0.	0.	1.
37	SERVICE INDUSTRY MACHINERY	0.	22.	0.	0.	-4.	0.	17.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	40.	0.	0.	-1.	0.	40.
39	ELEC INDL APP & DISTRIB EQ	0.	45.	0.	0.	-0.	0.	44.
40	HOUSEHOLD APPLIANCES	0.	15.	0.	0.	-0.	0.	15.
41	MISC ELECTRICAL EQ	0.	101.	0.	0.	-11.	0.	90.
42	TV SETS, RADIOS, PHONOGRAPHS	0.	1.	0.	0.	-0.	0.	0.
43	MOTOR VEHICLES	20628.	0.	-352.	0.	-752.	0.	19524.
44	AEROSPACE	0.	7.	0.	0.	-0.	0.	7.
45	SHIPS, BOATS	0.	0.	0.	0.	-0.	0.	0.
46	OTHER TRANSP. EQUIP.	0.	30.	0.	0.	-2.	0.	28.
47	INSTRUMENTS	0.	41.	0.	0.	-2.	0.	38.
48	MISC. MANUFACTURING	0.	1.	0.	0.	-0.	0.	1.
63	REAL ESTATE	0.	0.	0.	0.	0.	2328.	2328.
74	SCRAPS AND USED	144.	0.	0.	0.	0.	0.	144.
TOTALS		20772.	742.	-352.	50.	-782.	2328.	22758.

OPO SECTOR 23 INSTRUMENTS AND RELATED PRODUCTS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	25.	27.	0.	0.	52.
10	TEXTILES, EXC. KNITS	0.	1.	0.	0.	-0.	0.	1.
13	PAPER	0.	23.	0.	0.	-1.	0.	22.
14	PRINTING & PUBLISHING	0.	4.	0.	0.	-0.	0.	4.
16	OTHER CHEMICALS	0.	49.	0.	0.	-1.	0.	48.
19	RUBBER PRODUCTS	0.	4.	0.	0.	-0.	0.	4.
20	PLASTIC PRODUCTS	0.	18.	0.	0.	-1.	0.	17.
21	SHOES AND LEATHER	0.	2.	0.	0.	-0.	0.	2.
23	FURNITURE	0.	13.	0.	0.	-0.	0.	13.
24	STONE, CLAY, GLASS	0.	4.	0.	0.	-0.	0.	4.
28	METAL PRODUCTS	0.	37.	0.	0.	-1.	0.	36.
31	CONSTR, MINING, OILFIELD EQ	0.	3.	0.	0.	-0.	0.	3.
32	METALWORKING MACHINERY	0.	15.	0.	0.	-0.	0.	15.
33	SPECIAL INDUSTRY MACHINERY	0.	10.	0.	0.	-0.	0.	10.
34	MISC NON-ELECTRICAL MACH.	0.	13.	0.	0.	-0.	0.	13.
35	COMPUTERS	0.	5.	0.	0.	-1.	0.	4.
36	OTHER OFFICE EQUIPMENT	0.	32.	0.	0.	-7.	0.	24.
37	SERVICE INDUSTRY MACHINERY	0.	3.	0.	0.	-1.	0.	2.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	63.	0.	0.	-1.	0.	62.
39	ELEC INDL APP & DISTRIB EQ	0.	41.	0.	0.	-0.	0.	40.
40	HOUSEHOLD APPLIANCES	0.	3.	0.	0.	-0.	0.	3.
41	MISC ELECTRICAL EQ	0.	49.	0.	0.	-5.	0.	44.
42	TV SETS, RADIOS, PHONOGRAPHS	0.	1.	0.	0.	-0.	0.	1.
43	MOTOR VEHICLES	0.	13.	0.	0.	-0.	0.	12.
44	AEROSPACE	0.	16.	0.	0.	-0.	0.	16.
47	INSTRUMENTS	7080.	0.	0.	0.	-385.	0.	6696.
48	MISC. MANUFACTURING	0.	8.	0.	0.	-0.	0.	8.
63	REAL ESTATE	0.	0.	0.	0.	0.	547.	547.
TOTALS		7080.	430.	25.	27.	-406.	547.	7703.

OPO SECTOR 24 MISC. MANUFACTURING INDUSTRY

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	14.	0.	0.	14.
10	TEXTILES, EXC. KNITS	0.	3.	0.	0.	-0.	0.	3.
12	APPAREL, HOUSEHOLD TEXTILES	0.	5.	15.	0.	-0.	0.	19.
13	PAPER	0.	3.	0.	0.	-0.	0.	3.
14	PRINTING & PUBLISHING	0.	19.	0.	0.	-0.	0.	19.
16	OTHER CHEMICALS	0.	28.	0.	0.	-1.	0.	28.
19	RUBBER PRODUCTS	0.	14.	0.	0.	-0.	0.	14.
20	PLASTIC PRODUCTS	0.	49.	0.	0.	-2.	0.	47.
21	SHOES AND LEATHER	0.	5.	0.	0.	-0.	0.	5.
22	LUMBER	0.	5.	0.	0.	-0.	0.	5.
23	FURNITURE	0.	15.	0.	0.	-0.	0.	15.
24	STONE, CLAY, GLASS	0.	16.	0.	0.	-0.	0.	16.
25	FERROUS METALS	0.	1.	0.	0.	-0.	0.	1.
27	OTHER NONFERROUS METALS	0.	0.	0.	0.	-0.	0.	0.
28	METAL PRODUCTS	0.	25.	0.	0.	-0.	0.	24.
32	METALWORKING MACHINERY	0.	2.	0.	0.	-0.	0.	2.
33	SPECIAL INDUSTRY MACHINERY	0.	16.	0.	0.	-0.	0.	16.
34	MISC NON-ELECTRICAL MACH.	0.	2.	0.	0.	-0.	0.	1.
36	OTHER OFFICE EQUIPMENT	0.	8.	0.	0.	-2.	0.	6.
37	SERVICE INDUSTRY MACHINERY	0.	0.	0.	0.	-0.	0.	0.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	10.	0.	0.	-0.	0.	10.
39	ELEC INDL APP & DISTRIB EQ	0.	3.	0.	0.	-0.	0.	3.
41	MISC ELECTRICAL EQ	0.	7.	0.	0.	-1.	0.	6.
44	AEROSPACE	0.	3.	0.	0.	-0.	0.	3.
45	SHIPS, BOATS	0.	2.	0.	0.	-0.	0.	2.
46	OTHER TRANSP. EQUIP.	0.	5.	0.	0.	-0.	0.	5.
47	INSTRUMENTS	0.	17.	0.	0.	-1.	0.	17.
48	MISC. MANUFACTURING	4317.	0.	-131.	0.	-7.	0.	4179.
63	REAL ESTATE	0.	0.	0.	0.	0.	515.	515.
TOTALS		4317.	264.	-116.	14.	-15.	515.	4979.

OPO SECTOR 25 RAILROADS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	747.	0.	0.	747.
46	OTHER TRANSP. EQUIP.	0.	0.	46.	0.	0.	0.	46.
49	RAILROADS	9406.	0.	0.	0.	0.	0.	9406.
50	TRUCKING, HWY PASS TRANSIT	0.	22.	0.	0.	0.	0.	22.
52	AIR TRANSPORT	0.	54.	0.	0.	0.	0.	54.
61	EATING & DRINKING PLACES	0.	0.	7.	0.	0.	0.	7.
65	HOTELS, REPAIRS EXC AUTO	0.	1.	0.	0.	0.	0.	1.
74	SCRAPS AND USED	48.	0.	0.	0.	0.	0.	48.
TOTALS		9454.	76.	53.	747.	0.	0.	10330.

GPO SECTOR 26 AIR TRANSPORTATION

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	24.	0.	0.	24.
52	AIR TRANSPORT	7442.	0.	0.	0.	0.	0.	7442.
60	RETAIL TRADE	0.	0.	71.	0.	0.	0.	71.
61	EATING & DRINKING PLACES	0.	0.	14.	0.	0.	0.	14.
63	REAL ESTATE	0.	0.	0.	0.	0.	469.	469.
65	HOTELS, REPAIRS EXC AUTO	0.	7.	0.	0.	0.	0.	7.
66	BUSINESS SERVICES	0.	2.	0.	0.	0.	0.	2.
68	MOVIES AND AMUSEMENTS	0.	0.	7.	0.	0.	0.	7.
TOTALS		7442.	9.	93.	24.	0.	469.	8037.

GPO SECTOR 27 TRUCKING AND OTHER TRANSPORTATION

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
1	AGRICULTURE, FORESTRY, FISHERY	0.	0.	29.	0.	0.	0.	29.
8	CONSTRUCTION	0.	0.	0.	515.	0.	0.	515.
49	RAILROADS	0.	55.	0.	0.	0.	0.	55.
50	TRUCKING, HWY PASS TRANSIT	22301.	0.	-2.	0.	0.	0.	22299.
51	WATER TRANSPORT	2512.	0.	-6.	0.	0.	0.	2506.
52	AIR TRANSPORT	0.	106.	0.	0.	0.	0.	106.
53	PIPELINE	1164.	0.	0.	0.	0.	0.	1164.
54	TRANSPORTAION SERVICES	806.	0.	0.	0.	0.	0.	806.
59	WHOLESALE TRADE	0.	3.	85.	0.	0.	0.	88.
60	RETAIL TRADE	0.	170.	1.	0.	0.	0.	171.
61	EATING & DRINKING PLACES	0.	0.	1.	0.	0.	0.	1.
66	BUSINESS SERVICES	0.	7.	0.	0.	0.	0.	7.
78	NIPA STATISTICAL DISCREPANCY	-520.	0.	0.	0.	0.	0.	-520.
TOTALS		28263.	341.	110.	515.	0.	0.	27229.

GPO SECTOR 28 COMMUNCIATIONS

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	51.	0.	0.	51.
55	COMMUNICATIONS SERVICES	28411.	0.	-548.	0.	0.	0.	27863.
63	REAL ESTATE	0.	0.	0.	0.	0.	1427.	1427.
TOTALS		23411.	0.	-548.	51.	0.	1427.	29841.

GPO SECTOR 30 ELECTRIC, GAS, AND SANITARY UTILITIES

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
6	CRUDE PETROLEUM	0.	15.	0.	0.	0.	0.	15.
8	CONSTRUCTION	0.	0.	0.	2809.	0.	0.	2908.
15	AGRICULTURAL FERTILIZERS	0.	6.	0.	0.	-0.	0.	6.
17	PETROLEUM REFINING	0.	1.	0.	0.	-0.	0.	1.
25	FERROUS METALS	0.	8.	0.	0.	-0.	0.	8.
56	ELECTRIC UTILILITIES	17807.	0.	0.	0.	0.	0.	17807.
57	GAS UTILITY	7153.	0.	0.	0.	0.	0.	7153.
58	WATER AND SANITATION	1514.	0.	0.	0.	0.	0.	1514.
TOTALS		26474.	30.	0.	2809.	-0.	0.	29313.

OPO SECTOR 31 WHOLESALE AND RETAIL TRADE

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
1	AGRICULTURE, FORESTRY, FISHERY	0.	0.	98.	0.	0.	0.	98.
8	CONSTRUCTION	0.	0.	0.	79.	0.	0.	79.
9	FOOD & TOBACCO	0.	0.	1867.	0.	1109.	0.	2976.
10	TEXTILES, EXC. KNITS	0.	0.	712.	0.	40.	0.	752.
11	KNITTING	0.	0.	0.	0.	17.	0.	17.
12	APPAREL, HOUSEHOLD TEXTILES	0.	0.	70.	0.	58.	0.	128.
13	PAPER	0.	0.	0.	0.	249.	0.	249.
14	PRINTING & PUBLISHING	0.	0.	0.	0.	161.	0.	161.
15	AGRICULTURAL FERTILIZERS	0.	0.	0.	0.	16.	0.	16.
16	OTHER CHEMICALS	0.	0.	0.	0.	371.	0.	371.
17	PETROLEUM REFINING	0.	0.	0.	0.	636.	0.	636.
19	RUBBER PRODUCTS	0.	0.	0.	0.	28.	0.	28.
20	PLASTIC PRODUCTS	0.	0.	0.	0.	205.	0.	205.
21	SHOES AND LEATHER	0.	0.	0.	0.	111.	0.	111.
22	LUMBER	0.	0.	0.	0.	216.	0.	216.
23	FURNITURE	0.	0.	0.	0.	133.	0.	133.
24	STONE, CLAY, GLASS	0.	0.	0.	0.	100.	0.	100.
25	FERROUS METALS	0.	0.	0.	0.	265.	0.	265.
26	COPPER	0.	0.	0.	0.	339.	0.	339.
27	OTHER NONFERROUS METALS	0.	0.	0.	0.	129.	0.	129.
28	METAL PRODUCTS	0.	0.	0.	0.	377.	0.	377.
29	ENGINES AND TURBINES	0.	0.	0.	0.	58.	0.	58.
30	AGRICULTURAL MACHINERY	0.	0.	0.	0.	76.	0.	76.
31	CONSTR, MINING, OILFIELD EQ	0.	0.	0.	0.	176.	0.	176.
32	METALWORKING MACHINERY	0.	0.	0.	0.	72.	0.	72.
33	SPECIAL INDUSTRY MACHINERY	0.	0.	0.	0.	62.	0.	62.
34	MISC NON-ELECTRICAL MACH.	0.	0.	35.	0.	100.	0.	135.
35	COMPUTERS	0.	0.	0.	0.	743.	0.	743.
36	OTHER OFFICE EQUIPMENT	0.	0.	0.	0.	156.	0.	156.
37	SERVICE INDUSTRY MACHINERY	0.	0.	0.	0.	725.	0.	725.
38	COMMUNIC EQ, ELECTRONIC COMP	0.	0.	0.	0.	236.	0.	236.
39	ELEC INDL APP & DISTRIB EQ	0.	0.	0.	0.	44.	0.	44.
40	HOUSEHOLD APPLIANCES	0.	0.	0.	0.	34.	0.	34.
41	MISC ELECTRICAL EQ	0.	0.	0.	0.	485.	0.	485.
42	TV SETS, RADIOS, PHONOGRAPHS	0.	0.	0.	0.	349.	0.	349.
43	MOTOR VEHICLES	0.	0.	352.	0.	771.	0.	1123.
44	AEROSPACE	0.	0.	0.	0.	24.	0.	24.
45	SHIPS, BOATS	0.	0.	38.	0.	5.	0.	43.
46	OTHER TRANSP. EQUIP.	0.	0.	0.	0.	133.	0.	133.
47	INSTRUMENTS	0.	0.	0.	0.	416.	0.	416.
48	MISC. MANUFACTURING	0.	0.	131.	0.	7.	0.	138.
51	WATER TRANSPORT	0.	0.	6.	0.	0.	0.	6.
59	WHOLESALE TRADE	79621.	0.	-573.	0.	0.	0.	79048.
60	RETAIL TRADE	83825.	0.	-3899.	0.	0.	0.	79926.
61	EATING & DRINKING PLACES	13587.	0.	1419.	0.	0.	0.	15006.
65	HOTELS; REPAIRS EXC AUTO	0.	0.	2807.	0.	0.	0.	2807.
66	BUSINESS SERVICES	0.	0.	4273.	0.	0.	0.	4273.
67	AUTOMOBILE REPAIRS	0.	0.	5771.	0.	0.	0.	5771.
68	MOVIES AND AMUSEMENTS	0.	0.	35.	0.	0.	0.	35.
TOTALS		177033.	0.	13140.	79.	9232.	0.	199484.

OPO SECTOR 32 FINANCIAL & INSURANCE SERVICES

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
62 FINANCE & INSURANCE	43083.	0.	0.	0.	0.	0.	43083.
63 REAL ESTATE	0.	89.	0.	0.	0.	4189.	4278.
66 BUSINESS SERVICES	0.	176.	0.	0.	0.	0.	176.
TOTALS	43083.	265.	0.	0.	0.	4189.	47537.

OPO SECTOR 33 REAL ESTATE & COMBINATIONS OFF

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
63 REAL ESTATE	6766.	0.	-571.	0.	0.	0.	65725.
64 OWNER-OCCUPIED HOUSING	58454.	0.	-657.	0.	0.	0.	57797.
78 NIPA STATISTICAL DISCREPANCY	-1237.	0.	0.	0.	0.	0.	-1237.
TOTALS	123513.	0.	-1229.	0.	0.	0.	122284.

OPO SECTOR 34 HOTELS & REPAIR (NOT AUTO)

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8 CONSTRUCTION	0.	0.	0.	21.	0.	0.	21.
60 RETAIL TRADE	0.	0.	1096.	0.	0.	0.	1096.
1 EATING & DRINKING PLACES	66296.	0.	-2771.	0.	0.	0.	3995.
63 REAL ESTATE	0.	181.	0.	0.	0.	0.	181.
65 HOTELS; REPAIRS EXC AUTO	17066.	0.	-3335.	0.	0.	0.	13731.
66 BUSINESS SERVICES	0.	0.	63.	0.	0.	0.	63.
TOTALS	23832.	181.	-4946.	21.	0.	0.	19088.

OPO SECTOR 35 MISC. BUSINESS SERVICES

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8 CONSTRUCTION	0.	0.	0.	97.	0.	0.	97.
59 WHOLESALE TRADE	0.	0.	419.	0.	0.	0.	419.
60 RETAIL TRADE	0.	0.	284.	0.	0.	0.	284.
63 REAL ESTATE	0.	0.	571.	0.	0.	0.	571.
65 HOTELS; REPAIRS EXC AUTO	0.	0.	68.	0.	0.	0.	68.
66 BUSINESS SERVICES	43356.	0.	-4934.	0.	0.	0.	38422.
TOTALS	43356.	0.	-3591.	97.	0.	0.	39862.

OPO SECTOR 36 AUTO REPAIR

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8 CONSTRUCTION	0.	0.	0.	9.	0.	0.	9.
60 RETAIL TRADE	0.	0.	319.	0.	0.	0.	319.
67 AUTOMOBILE REPAIRS	12125.	0.	-5771.	0.	0.	0.	6354.
TOTALS	12125.	0.	-5452.	9.	0.	0.	6682.

OPO SECTOR 37 MOTION PICTURES & AMUSEMENTS

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8 CONSTRUCTION	0.	0.	0.	36.	0.	0.	36.
60 RETAIL TRADE	0.	0.	484.	0.	0.	0.	484.
61 EATING & DRINKING PLACES	0.	0.	758.	0.	0.	0.	758.
65 HOTELS, REPAIRS EXC AUTO	0.	0.	5.	0.	0.	0.	5.
68 MOVIES AND AMUSEMENTS	6731.	0.	-83.	0.	0.	0.	6648.
78 NIPA-STATISTICAL DISCREPANCY	-500.	0.	0.	0.	0.	0.	-500.
TOTALS	6231.	0.	1163.	36.	0.	0.	7430.

OPO SECTOR 38 MEDICAL & EDUCATIONAL SERVICES

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8 CONSTRUCTION	0.	0.	0.	358.	0.	0.	358.
60 RETAIL TRADE	0.	0.	1481.	0.	0.	0.	1481.
61 EATING & DRINKING PLACES	0.	0.	424.	0.	0.	0.	424.
65 HOTELS, REPAIRS EXC AUTO	0.	0.	239.	0.	0.	0.	239.
68 MOVIES AND AMUSEMENTS	0.	0.	41.	0.	0.	0.	41.
69 MEDICINE, EDUCATION, NPO	57124.	0.	-858.	0.	0.	0.	56266.
TOTALS	57124.	0.	1328.	358.	0.	0.	58810.

OPO SECTOR 39 PRIVATE HOUSEHOLDS

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
72 DOMESTIC SERVANTS	4623.	0.	0.	0.	0.	0.	4623.
TOTALS	4623.	0.	0.	0.	0.	0.	4623.

OPO SECTOR 40 FEDERAL GOVERNMENT ENTERPRISES

Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8 CONSTRUCTION	0.	0.	0.	21.	0.	0.	21.
61 EATING & DRINKING PLACES	0.	0.	147.	0.	0.	0.	147.
63 REAL ESTATE	0.	0.	0.	0.	0.	844.	844.
70 FED & S&L GOVT ENTERPRISES	7714.	0.	0.	0.	0.	0.	7714.
TOTALS	7714.	0.	147.	21.	0.	844.	8726.

OPO SECTOR 41 STATE & LOCAL ENTERPRISES

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	0.	31.	0.	0.	31.
24	STONE, CLAY, GLASS	0.	5.	0.	0.	-0.	0.	5.
49	RAILROADS	0.	13.	0.	0.	0.	0.	13.
50	TRUCKING, HWY PASS TRANSIT	0.	12.	0.	0.	0.	0.	12.
51	WATER TRANSPORT	0.	132.	0.	0.	0.	0.	132.
52	AIR TRANSPORT	0.	142.	0.	0.	0.	0.	142.
55	COMMUNICATIONS SERVICES	0.	1.	0.	0.	0.	0.	1.
56	ELECTRIC UTILILITIES	0.	5.	0.	0.	0.	0.	5.
58	WATER AND SANITATION	0.	0.	0.	0.	0.	0.	0.
60	RETAIL TRADE	0.	1285.	0.	0.	0.	0.	1285.
61	EATING & DRINKING PLACES	0.	74.	0.	0.	0.	0.	74.
62	FINANCE & INSURANCE	0.	15.	0.	0.	0.	0.	15.
63	REAL ESTATE	0.	0.	0.	0.	0.	763.	763.
67	AUTOMOBILE REPAIRS	0.	99.	0.	0.	0.	0.	99.
68	MOVIES AND AMUSEMENTS	0.	12.	0.	0.	0.	0.	12.
70	FED & S&L GOVT ENTERPRISES	6287.	0.	0.	0.	0.	0.	6287.
TOTALS		6287.	1795.	0.	31.	-0.	763.	8876.

OPO SECTOR 44 FEDERAL GOVERNMENT INDUSTRY

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	709.	212.	0.	0.	921.
76	GOVERNMENT INDUSTRY	49133.	0.	0.	0.	0.	0.	49133.
TOTALS		49133.	0.	709.	212.	0.	0.	50054.

OPO SECTOR 45 STATE AND LOCAL GOVERNMENT INDUSTRY

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
8	CONSTRUCTION	0.	0.	1444.	1010.	0.	0.	2454.
76	GOVERNMENT INDUSTRY	85278.	0.	0.	0.	0.	0.	85278.
TOTALS		85278.	0.	1444.	1010.	0.	0.	87732.

OPO SECTOR 46 REST OF THE WORLD

	Product Sector	Primary Products	Secondary Products	Activity Changes	Force Account	Mfg Branch	Space Rental	Total V A
75	REST OF THE WORLD INDUSTRY	10901.	0.	0.	0.	0.	0.	10901.
TOTALS		10901.	0.	0.	0.	0.	0.	10901.

Chapter III Labor Compensation

III.1 Overview

Labor or employee compensation, as noted before, is the single largest component of value added, approximately 60% of GNP. The size implies a greater impact on relative prices and inflation than any other component of value added. Moreover, personal income is fundamentally composed of labor income. Therefore, two of the links with the real side, prices and personal income, are closely tied with employee compensation. As a result, the performance of the model as a whole will hinge on the development of a satisfactory procedure for forecasting total labor compensation by industry.

Employee compensation is composed of two components, wages and salaries, and wage supplements. Consequently the hourly compensation rate will exceed the hourly wage rate. For the purposes of this study, the term "pay-rate" will refer to the hourly labor compensation for employees.

The structure for forecasting employee compensation combines aggregate and sectoral pay-rate equations to provide predictions of sectoral pay-rates. Two aggregate equations for the manufacturing and non-manufacturing pay-rates are combined with sectoral relative pay-rate estimates to determine hourly employee compensation by industry. Relative sectoral pay-rates are defined as the industry pay-rate relative to either the manufacturing or non-manufacturing pay-rate. The resulting measures of sectoral pay-rates are adjusted for changes in

employee productivity (from the real side of the model) and are therby converted into indices that can be used with real value added weighted output (REVAWO) to forecast total employee compensation as was described in the first section of the previous chapter.[1]

The theoretical specification and results of estimating the aggregate equations are reported in section III.2. These equations are "assigned" the task of transmitting the appropriate long-run effects of monetary policy and changes in productivity into prices. In addition, the rationale for rejecting a Phillips-curve specification is presented.

The topic of section III.3 is the form and estimation of the sectoral equations. The dependent variables in these equations are indices of relative hourly employee compensation: industry pay-rate relative to the appropriate aggregate measure. Each industry's relative pay-rate is affected by the unemployment rate, the inflation rate and that industry's share of total employment.

From the perspective of the modeller, the relative pay-rate approach offers some practical advantages over the direct method of estimating average pay-rate by industry. In directly forecasting hourly compensation by industry, one is also implicitly forecasting relative pay-rates among industries. Rather than discovering, by calculation, the implications of a set of equations for relative pay-rates, the relative pay-rate approach allows direct control over the relative pay-rate characteristics.

Another advantage the two-stage framework offers the modeller is a "division of labor." Important long-run macro properties can be imposed on aggregate equations more easily than on a large number of industry equations. Not only is the data more conveniently used at the aggregate

level, but the implications of the coefficients for a forecast of inflation are more readily discernible for the aggregate equations. The industry equations are then free to concentrate on the impact of change in labor markets on relative compensation rates, both over the cycle and in trend. For a model with many equations, this division of labor is very important in building the model since it greatly simplifies the task; instead of monitoring many equations and tracing their overall effects, only a few equations need be scrutinized to get reasonable macro-economic properties.

The final point in favor of the relative approach is that it is has proven to be a reliable forecasting tool. The previous version of the INFORUM model utilized this approach with success. The relative pay-rate concept for forecasting employee compensation presented in this chapter is based on the previous work accomplished by David Belzer and described in the third chapter of his thesis[2]

But this study is not a replication of Belzer's work. Major differences in this study occur in the specification of the aggregate pay-rate equations and in the definition of sectoral pay-rates. Belzer used a specification for the aggregate equations that was very similar to a Phillips curve. For reasons discussed below, the Phillips-curve specification is rejected and an alternative specification is developed which allows monetary variables to affect inflation over the long-run. At the industry level, Belzer was constrained by data considerations to use relative wage equations for production workers and then transform those wages to employee compensation for all employees. That transformation procedure added another level of complexity to the model. This study is not bound by the same data considerations that constrained

Belzer, so that the focus can be on pay-rates by industry for all employees, thereby simplifying the structure of the INFORUM model.

III.2 Aggregate Hourly Labor Compensation

This section describes the specification and estimation results for the two aggregate pay-rate equations. The requirements of long-term forecasting mandated that the specifications differ considerably from those most commonly encountered in the literature of wage determination. First, the rationale for this divergence will be developed. During this exposition, the general requirements and constraints for the equations should become apparent. Then, the estimation results for the manufacturing sector and the non-manufacturing sector will be presented.

In order that the INFORUM model give plausible answers to long-term policy questions, the model must be constructed with certain appropriate long-run properties in mind. The aggregate pay-rate equations are prime examples of this requirement. The two equations, in essence, determine the level of employee compensation throughout the entire model. Employee compensation is the single largest determinant of industry prices and personal income, two important links with the real side. Therefore, the criterion of reasonable long-run effects is very important in this instance.

Four basic long-run properties should be present in the forecast of the INFORUM model. First, real wage and productivity growth ought to be related: increases in productivity are passed on, in part, to higher real wages. Second, the growth of prices must reflect the growth in the money supply. More specifically, in the long-term, the level of prices

should reflect the movement of the money supply divided by real GNP. Third, unemployment rates in the remote past should not have, as they do in the conventional Phillips curve specification, the same impact on current real wages as do more recent unemployment rates. Fourthly, changes in tax rates (income or FICA) should be able to affect the gross, as well as the net, pay-rate.

When taken together, the four properties indicate that the rate of change in the nominal hourly pay-rate should equal the inflation rate plus the economy-wide productivity growth rate plus any other factors (such as the effect of taxes). Then the general form of a pay-rate equation with the four properties is

$$(3.1) \quad W = p + prod + f(u,t,z)$$

where W = growth in the nominal pay-rate,

p = inflation rate,

prod = growth in productivity,

u = growth in the unemployment rate,

t = growth in a tax variable, and

z = growth in other variables.

From (3.1), the implementation of the first property is clear. The coefficient for productivity growth should be one: a two percent increase in productivity is transmitted as two percent increase in the nominal hourly pay-rate. Note that this property means that productivity is "neutral" with respect to factor shares: a change in productivity should not affect labor's or capital's share of income.

However, the rationale and implementation procedure for the other three variables do not jump out from (3.1) as did the productivity argument. Each other characteristic requires a relatively short discussion.

Effect of Money

Any attempt to model the growth of prices in the long-run must address the issue of the influence of money on inflation. Without a mechanism allowing growth in the appropriate measure of money to affect the growth in the price level, the model is severely limited in the macro questions it can tackle. The method employed here is to enter the money supply directly into the aggregate compensation equations. Those equations are not strucutral equations but reduced forms of the actual transmission process.

One remarkable feature of the U.S. economy is the virtual constancy of the velocity of money as defined as the ratio of nominal GNP to M2 over the last twenty years. This stability is shown by Figure III.1. In order to compare the two common measures of velocity - the velocity of M1 and M2 - the velocities are shown as indexes of their 1977 values. While the M1 velocity of money has increased at a steady rate, the M2 velocity has no trend and has not fluctuated by more than eight percent from its lowest to its highest values. Coupling this fact with the quantity theory of money implies that the long-run inflation rate ought to approximately equal the difference between the growth in money supply and the growth in real GNP. From 1960-1980, the average annual growth rates for M2, real GNP and the GNP deflator were 7.84 (M2), 3.30 (real GNP) and 4.54 (GNP deflator). Thus the inflation rate implied by the long-run constant velocity, 4.57, differs from the actual rate of 4.54

FIGURE III.1

Two indexes of the velocity of money

IV1 = index of GNP / M1 (1977 = 100)

IV2 = index of GNP / M2 (1977 = 100)

DATE	IV1	IV2
	IS	IS +
60	60.52	107.97
61	61.41	104.73
62	64.56	104.69
63	66.15	101.95
64	68.04	101.01
65	70.71	101.26
66	73.96	103.92
67	75.26	102.76
68	76.82	103.56
69	78.38	105.37
70	79.41	106.64
71	80.73	103.24
72	82.90	100.98
73	86.43	102.67
74	89.00	104.54
75	91.87	103.20
76	96.40	101.16
77	100.00	100.00
78	104.25	103.65
79	108.16	106.71
80	110.77	107.26
	IS	IS +

by 0.03 per year, not a bad prediction for so simple a model.

The design of the precise mechanism which allows the money supply to influence inflation has two possible general solutions. One method might be to attempt to replicate the actual transmission process of monetary growth to price growth. This translates into allowing changes in the money supply to affect real final demands which, in turn, affect output. In the case of an increasing money supply, this increase would translate into a higher demand for real output. But constraints on physical capacity might prevent producers from meeting the demand for their products. Excess demand cannot be satisfied; market pressures force prices upwards. Inflation is the result.

Unfortunately, this chain of events is forged with two weak modelling links. The first weak link is the effect of the money supply on final demands. The INFORUM project has had little success in such endeavors except in the few sectors which are sensitive to interest rates, such as construction of single family housing and new automobile sales. These sectors are not large enough to have the overall requisite effect on final demand. A more serious difficulty is the "control" problem: there is no guarantee that, even if the effect could be modelled, the desired influence on prices would result. The correct size of the effect for a particular demand of any product is not easy to evaluate within the context of a large interindustry model.

The other weak link is the capacity constraint. Physical capacity is difficult to quantify. In order to use a measure of physical capacity in a forecast, one must forecast that measure as well -- not an easy task. Finally, one would have to discover how capacity pressures affect prices. Within the interindustry model, prices are determined by

definition from the ratio of nominal value added to real output. Do the capacity constraints serve to decrease real output or to increase value added? And even if some effects on real output were found, it would be difficult to ensure that they produced plausible macro-economic responses to changes in the money supply.

There is another possible capacity constraint, the constraint of human capital. The increase in final demands caused by monetary expansion will increase the demand for labor, especially labor with those skills already in demand and therefore already employed. Additional output cannot be produced until the workers can be found. Therefore, wages of employed workers are bid up. Increases in wages are then eventually passed onto prices. But note: in this scenario, an increase in money affects wages before it affects either output, employment or prices. All of the preceding discussion points to the direct inclusion of money into the determination of aggregate compensation rates to create quasi-reduced- form equations.

In the literature of wage determination, there are two instances of empirical work estimating the quasi-reduced-form equation indicated by the above analysis. In 1972, in "A Neo-classical Approach to the Determination of Prices and Wages for the Canadian Economy," Agarwala et al presented a small model of inflation and wage determination for the Canadian economy.[3] The innovation of the paper was the point that since prices and wages are only two aspects of inflation in the long-run, reliance on a strict Phillips curve formulation for a forecast of inflation is unwarranted. As a consequence, the money wage ought to be determined as the product of the real wage and the price level where real wages are a function of productivity and the degree of unionization

and prices are estimated as a function of lagged growth in money and unemployment.

The other instance of money in a wage equation can be found in Michael Wachter's "The Changing Cyclical Responsiveness to Wage Inflation".[4] Although the main focus of the paper was to investigate the shifting of the Phillips curve over time, Wachter did test the effectiveness of an aggregate demand variable in a wage equation by estimating a variety of equations with either changes in prices or changes in M1. Wachter found that there was not much difference in the two types of equations except that the influence of the monetary variable was less than that of the changes in the nonfarm GNP deflator.[5] The reduced influence of M1 was attributed to two factors: the lag structure and use of M1 instead of another monetary measure.[6]

In the INFORUM model, money will affect prices via a four-step process. The first step is to allow some measure of monetary growth to influence directly the growth in aggregate pay-rates. Quite naturally, pay-rates influence the level of employee compensation (step 2) which, in turn, affects value added (step 3). Finally, value added determines prices via the equation $p = pA + v$.

The excess growth in the money supply - the growth in money that exceeds the growth of real GNP - is fully passed through to pay-rates. Because the monetary influence on inflation is a long-run effect, the variable should enter with a distributed lag where the sum of the coefficients for the lag equals one. This distributed lag will allow short-run fluctuations in the ratio of M2 to GNP.

Note that the inclusion of a long-run monetary effect obviates the need for a long-run price effect on pay-rates. This bypasses the

complex issue of simultaneity bewteen wages and prices: does price growth cause wage growth or is the reverse true? Causation is not an issue here; the structure of the model imposes the solution that wage growth "causes" price growth. However, to the extent there is a short-run effect of inflation on pay-rates, a cost-of-living variable might be included in the list of "other" variables for equation (3.1).

Unemployment

The dispute over the existence of the Phillips curve has yet to be resolved. A recent survey of the inflation-unemployment tradeoff literature by Santomero and Seater[7] concludes that serious theoretical and methodological difficulties destroy any foundation to the Phillips curve. The lack of micro-economic underpinings, ignorance over the formation of expectations and flaws in empirical technique (i.e. serial correlation and simultaneous equation bias) lead the authors to proclaim "there appears to be no long-run tradeoff between inflation and unemployment."[8] In contrast to this conclusion, the recent works of Eckstein and Girola[9], and Sachs[10], estimate a Phillips-type relationship for the U.S. economy over an 87-year period. Both papers deal with the simultaneous equation bias by including a price equation in the formulation of the Phillips curve; serial correlation and mulitcollinearity seemed to pose no difficulty. Though the authors use different estimation techniques, the same general result is apparent: a long-run tradeoff between inflation and changes in aggregate demand does exist but the influence of changes in aggregate demand on inflation has diminished.[11]

The relevant issue for this study is not whether or not a Phillips curve may be estimated but the appropriateness of the Phillips curve specification for long-term analysis. In particular, the conventional specification has an unsatifactory long-run implication for wage determination: unemployment rates from distant and near past have an equal impact on the level of real wages. To see this property, let us examine a simple version of the Phillips-curve relation such as

$$(3.2) \quad W_t - W_{t-1} = a + b\,U_t + c\,(P_t - P_{t-1}) ,$$

where subscripts refer to the time period and W,U, and P are logarithms of wages, the unemployment rate and the price level. The solution of the difference equation is

$$(3.3) \quad W_T = W_0 + aT + b \sum_{j=0}^{T} U_j + c\,(P_T - P_0)$$

Consider the case in which $P_T = P_0$ so that $W_T - W_0$ is the change in real wage. Then,

$$(3.4) \quad W_T - W_0 = a\,T + b \sum_{j=0}^{T} U_j$$

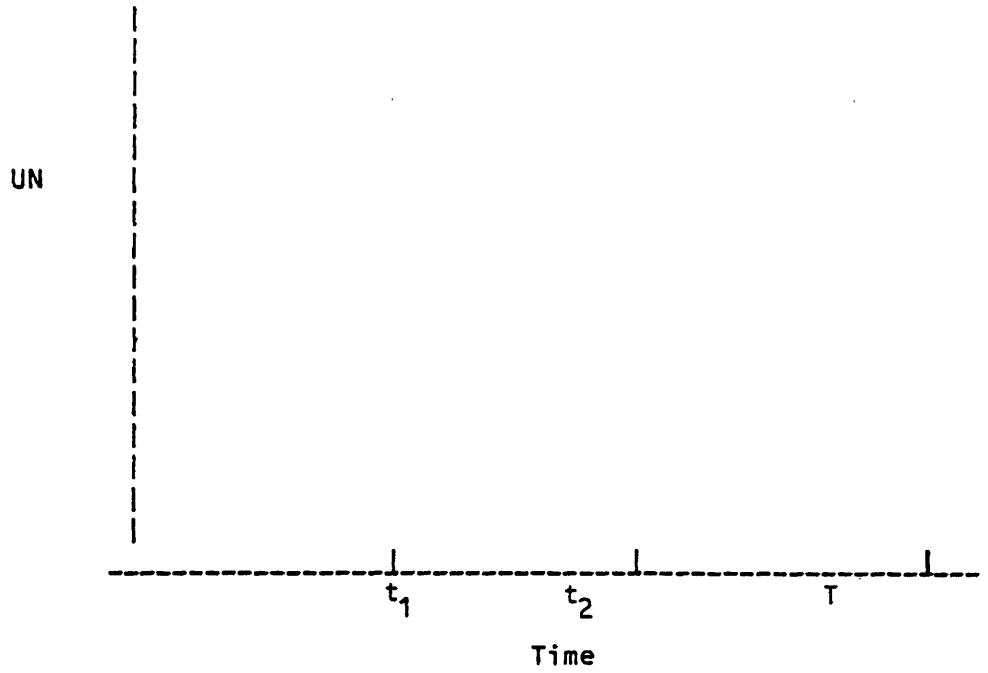
According to (3.4), the change in the wage over the period can be decomposed into a trend term, and the unweighted sum of past unemployment rates. Two serious implications are imbedded in equation (3.4): first, there is an inexorable change to wages as implied by the constant term (a), and secondly, real wage change depends on the unweighted sum of unemployment rates. Both implications are

inappropriate for long-term forecasting.

The inclusion of a constant term into the specification introduces an unwanted trend: wages will always change by, at least, that constant term. For example, imagine that an economy is on the verge of the steady state as envisioned by Ricardo, Mill and other classical economists. Furthermore, imagine that there will be no unemployment and no change in the money supply, a true nirvana for all. One would expect no change in real wages, but a model utilizing equation (3.2) would forecast a constant change in wages equal to the constant term. Perhaps the constant term is attempting to capture the effect of productivity change. However, productivity change is easily introduced into such an equation. Fortunately, a simple solution to this problem is the suppression of the constant term in the estimation.

Equation (3.4) also shows that the conventional Phillips-curve specification implies an inappropriate long-run affect of unemployemnt on real wage changes. The undesirableness stems from the indiscriminate treatment of past unemployment rates: unemployment from ten years ago has the same impact on the current wage rate as the contemporary unemployment rate. Another hypothetical example should serve to illustrate the point. Suppose there are two economies identical in almost every respect except that one experiences some small, very infrequent stochastic shocks. Imagine the unemployment histories of those economies are depicted by Figure III.2. The only difference between the two situations is a slight disturbance over the interval t_1 to t_2. Finally, assume for whatever reason, that both economies have the same final level of prices at time T. From equation (3.3), the change in real wages would differ between the two economies by the

FIGURE III.2
Graph of Hypothetical Example



difference in the unemployment history regardless of the length of the interval, real wages will differ whether the interval (t_1, t_2) is two weeks, two years or two decades ago. Short-run deviations from the past should not have an equal impact in the determination of long-run variables as recent influences.

The undesirable characteristic is due solely to the specification: it is not inherent to the tradeoff relationship. The flaw can be avoided by using lagged values of the unemployment rate or the unemployment rate as a first difference. For example, substituting the change in the unemployment rate into equation (3.2) yields

$$(3.2') \quad W_t - W_{t-1} = a + b(U_t - U_{t-1}) + c(P_t - P_{t-1})$$

Solving for W_T and letting $P_t = P_0$ gives

$$(3.4') \quad W_T - W_0 = aT + b(U_T - U_0)$$

Note that the change in real wages is now attributable to a time trend and the overall change in the unemployment rate, not the unweighted sum of past unemplyment rates as implied by the conventional Phillips-curve specification.

Employer and Employee Taxes

The impact of social security and personal income taxes upon compensation rates rests on a positive elasiticity of the labor supply with respect to compensation. A positive elasticity implies that an increase in taxes will increase the rate of before-tax compensation because of a reduction in the quantity of labor supplied at any given pay-rate. The elasticity is an empirical issue; income and substitution effects of a tax change work in opposite directions. For an individual, a decrease in a tax rate reduces the gap between the gross and net earnings. The influence of a higher real wage on the work - leisure decision has a dual effect. The increased opportunity cost of leisure (substitution effect) induces a shift from leisure towards work. On the other hand, income has grown, permitting the individual to expand consumption of all goods including leisure. Consequently, the overall effect is theoretically ambiguous.

Empirical evidence supporting a positive elasticity of labor is not overwhelming. Rosen, in a short review of the literature[12] notes that

the general results are that prime age males are relatively insensitive to small changes in wages while the supply of hours worked of other groups are much more sensitive. Rosen cautions that the results are probably lower bounds since the studies neglected to investigate the effect of tax changes on retirement decisions, and investment in human capital. A study by Hausman performed after the Rosen survey, confirms those general results of the survey though Hausman finds a large income effect for prime age males.[13]

Extending the analysis from the individual response to a tax change to the aggregate response does not simplify the situation. James Gwartney and Richard Stroup[14] point out that aggregate real disposable income does not change by the same amount of the tax change. The tax change does not, in itself, alter the technical production possibilities of the economy. For instance, if a tax cut is coupled with an equal reduction in the provision of public goods and services, the precise effect depends on the private valuation of the public goods. If citizen's valuation of the foregone public goods exceeds the value of the available private goods, then real "psychic" income declines. Therefore, the income effect reinforces the substitution effect and the quantity of labor supplied will increase. Of course, the opposite effect is possible: the private goods available may be valued more highly than the foregone public goods, thereby increasing aggregate real income and the income and substitution effects will move in opposite directions, thus having an ambiguous effect on the supply of labor.

However, this analysis leads to an a priori expectation of a positive elasticity of the labor supply with respect to social security tax changes. Social security is a transfer program: tax revenues

collected from workers are simply disbursed to retired persons. Therefore, real aggregate income is not altered by changes in the tax rate, especially if the taxpayers view the change as a quid pro quo for future benefits. From the above analysis, a zero change in real aggregate income implies no income effect for the economy. Since the substition effect is the only remaining effect, the overall response is unambiguous: the overall supply of labor will be reduced in response to an increase in the tax rate. A reduced supply of labor implies an increase in the before-tax pay-rate. The precise magnitude of the increase depends on the amount of the labor supply shift and the slope of the demand for labor function.

One may note that the preceding analysis implicitly assumes that the benefits are proportional (or viewed as proportional) to the contributions. If that is not true, as has been the case in recent years where tax rates were increased and benefits reduced, then taxpayers and workers may not view the change as an equitable trade-off. The main point of this discussion is to show that social security tax changes can affect the before-tax pay-rate.

Some research indicates there is some tax effect on compensation rates. Gordon, in a study covering the period 1954-1970[15], found that employees shifted forward fourteen percent of their taxes while employers shifted backwards to employees more than the amount of the tax. Belzer [16] found that changes in the social security tax rate were not evenly borne by employees and employers: employers shifted back to employees. Moreover, Belzer also found an extremely weak link between changes in hourly pay-rates and changes in the effective income tax rate. The link was so weak that the income tax variable was dropped.

Specification and Results for the Present Model

Using the same convention in defining all variables in terms of growth rates, the preceding discussion implies the specification should resemble

$$(3.5) \quad W - prod = b_1 M(t) + b_2 U + b_3 tax + b_4 Z$$

where W = growth in the nominal pay-rate,

prod = growth in productivity,

M(t) = a distributed lag of the growth in M2 to real GNP,

U = growth rate in the unemployment rate,

tax = growth in a tax rate, and

Z = other variables.

Equation (3.5) embodies all of the desired long-run properties discussed above. Because the growth in productivity is subtracted from the growth in the nominal pay-rate, all changes in productivity will be directly transfered into pay-rate changes. As long as the sum of the coefficients for the distributed lag equals one, any excess growth in the money supply will be eventually transmitted into pay-rates.

Aggregate pay-rate equations were specified for the manufacturing sector and the non-manufacturing sector. Further breakdowns of the manufacturing sector into durable and nondurable manufacturing or the nonmanufacturing sector into various subcategories such as services, transportation and government proved to be unmanageable. For some of

those categories, it was not possible to implement the desire long-run properties with any measure of success. Since one of the rationales for the aggregate equations is to allow for simple implementation of the desired long-term properties, only equations for manufacturing and nonmanufacturing sectors were used.

The availability and quality of data helped to determine the actual choice of variables in the specification of the two aggegrate pay-rate equations. Hourly employee compensation indices were constructed for all sectors, including the manufacturing and non-manufacturing aggregates. Total compensation of employees is published by the Bureau of Economic Analysis on a two digit SIC code basis. Total compensation equals wage and salary payments, employer and employee contributions to social insurance, and to various private insurance and benefit plans. Dividing the total compensation series by total hours worked by full and part-time employees published in table 6.12 of NIPA gave hourly compensation rates.[17] The rates were constructed over the period 1955 to 1980 and normalized to equal unity in the base year of the model, 1977.

A slight difficulty arises in the appropriate measure of productivity for both equations. Ideally, labor productivity is measured as real net product per hour. Unfortunately, there is no series on the division of real GNP between the manufacturing and non-manufacturing sectors. Therefore, productivity is measured as real GNP less real military spending per civilian job. To avoid introducing short-run cyclical effects, the actual variable in both equations is the percent change in the three year average.

The monetary variable is the growth in the ratio of M2 to real GNP. M2 is used because its velocity has been more stable than the velocity

of M1.

Import prices - especially oil - have an important impact on the cost of living. As seen with the creation of OPEC, large exogenous price shocks can be experienced in the United States. This indicates that some measure of import prices ought to be included in the pay-rate equations. Import prices are exogenous in the model, so no confusing feedback loop is introduced by their use. Exchange rate fluctuations and the use of imports as intermediate goods create a high correlation between the nominal price of imports in the U.S. and U.S. prices: the correlation coefficient between the NIPA import deflator and the PCE deflator is approximately 0.8. However, exchange rate fluctuations are caused, in part, by differential rates of inflation between the trading countries. This leads to the adopted practice of adjusting the growth in import prices for domestic inflation by subtracting the growth in M2 to real GNP ratio from the growth in import prices.

What is the best way to measure unemployment? Since the characteristics of the labor force have been changing over the past decades, presumably the overall unemployment rate is not capturing those effects: an unemployment of six percent in 1960 meant more prime age males were looking for jobs than did a six percent rate in 1980. Gordon and others[19] have tried to adjust the unemployment rate for the changing characteristics of the labor force with a variety of measures. However, all of those measures, including the unemployment rate of males twenty five and over - the "prime age male" rate - cannot, at present, be generated by the INFORUM model. Therefore, the overall unemployment rate is used. In tests, the difference in performance between the overall unemployment rate and the "prime age male" unemployment was

negligible.

The tax variable is the growth in the statutory social security tax rate paid by the employer and the employee. This specification allows for a differential impact for a given increase; an one percentage point increase in the tax rate from five to six percent will have a larger impact on gross hourly labor compensation than an increase from ten to eleven percent.

The estimated equation for manufacturing hourly compensation rates is depicted in Figure III.3. The five year distributed lag of the growth in the M2 to GNP ratio is used to implement the desired long-run property of monetary growth on inflation. The lag coefficients were constrained to lie on a line and to sum to one. Approximately half of the effect is transmitted through the first two years of the lag structure with the remaining half occuring in the remaing three years of the lag. Even though all of the coefficients are constrained, the statistics indicate that all of the variables (taken as a whole) are important in the explanation of the dependent variable.

Social security tax rate changes have a small and positive effect on hourly compensation rates. Since the dependent variable includes employer and employee contributions to social insurance, a coefficient of less than one indicates that less than all of the increase is shifted forward into gross pay-rates. The precise magnitude will depend on the size of the tax rates. According to these estimates for example, an increase from a 13.5 percent tax rate to 14 percent will raise gross pay-rates by 0.24 percent but reduce net pay-rates by about 0.35 percent.

Finally, changes in real import prices have a moderate positive

FIGURE III.3

Manufacturing Hourly Pay-rate Equation

Dependent Variable (DEP) =

$\underline{\%}$ Mfg. $HLC_t\%$ - 1.0 $\underline{\%}$ $PROD_t$

Equation

$$DEP = \underset{(3.91^*)}{0.265} * \underline{\%}\ (M2/GNP)_{t-1}$$

$$+ \underset{(7.27^*)}{0.232} * \underline{\%}\ (M2/GNP)_{t-2}$$

$$+ \underset{(7.15^*)}{0.202} * \underline{\%}\ (M2/GNP)_{t-3}$$

$$+ \underset{(4.66^*)}{0.170} * \underline{\%}\ (M2/GNP)_{t-4}$$

$$+ \underset{(2.57^*)}{0.134} * \underline{\%}\ (M2/GNP)_{t-5}$$

$$+ \underset{(1.20)}{0.064} * (\ \underline{\%}\ (\text{Social Security Tax Rate})_t\ )$$

$$+ \underset{(1.89)}{0.085} * (\ \underline{\%}\ (\text{Import DFL})_t - \underline{\%}\ (M2/GNP)_{t-1})$$

$$+ \underset{(2.16^*)}{0.103} * (\ \underline{\%}\ (\text{Import DFL})_{t-1} - \underline{\%}\ (M2/GNP)_{t-2})$$

Period of estimation: 1960-1980

$R^2 = 0.708$ $\quad RBAR^2 = 0.550$ $\quad DW = 0.739$ $\quad AAPE = 53.75$

$\underline{\%}$ = percentage change

t statistics in parathensis, * significicant at the 5% level
** significant at the 10% level

effect on compensation growth. Summing the coefficients on the two variables indicates an elasticity of hourly compensation to changes in import prices of approximately 18 percent. For example, a doubling of the imported price of oil will yield a 18 % growth in the hourly compensation of the manufacturing sector, all other influences held constant.

Conspicuous by their absence are an intercept and the unemployment rate. No intercept is estimated for the reasons stated above, otherwise the long-run transmission process for the excess growth in the money supply is augmented by the value of the intercept. The growth in unemployment was tested but it came in the equation with a positive sign. Forecasting purposes and intuition indicate a positive influence to be an unreasonable effect: the positive coefficient will cause compensation to increase during a recession while a boom will force compensation to decline. Therefore, increases in the unemployment rate would serve to increase the average pay-rate of the manufacturing sector in a forecast.

Given the constraints imposed on the equation from economic theory and forecasting purposes, the overall fit of the equation is good. The independent variables explain 71% of the variation in the dependent variable, 55% after adjustment for degrees of freedom. All but two of the coefficients are significant at the five percent level, with the remaining significant at the ten percent confidence level. Serial correlation is present but efforts to correct for it with the Hildreth-Lu procedure did not appreciablely change the results. The last descriptive statistic, the AAPE, represents the average annual absolute percentage error. The AAPE is relatively large due in part to

the volatility and magnitudes of the series. However, when the AAPE is calculated using the actual and predicted levels implied by the equation of the manufacturing pay-rate, the AAPE is reduced from fifty-four percent to approximately three (2.65) percent. Plots of the implied levels from the estimated equation and the actual levels are portrayed in Figures III.4A and III.4B. The values predicted by the equation are shown by the dotted lines, actual values by the solid lines. The equation captures most of the turning points but completely underpredicts the boom years of 1968-1971. The equation does not have many short-run cyclical variables, a fact which may account for that miss.

Rather than duplicate the specification used for the manufacturing sector, a new approach is used to model the monetary transmission process for the nonmanufacturing sector. Excess money growth is still passed through to hourly compensation but by the inclusion of a lag of the manufacturing compensation growth. Figure III.5 portrays the resulting equation. The dependent variable is the growth in nonmanufacturing pay-rate less the growth in productivity. Growth in the manufacturing pay-rate less productivity growth enters with a lag structure of two years. The coefficients are all positive, lie on a straight line and are constrained to equal unity. This constraint maintains the long-run property of money in the model. The growth in unemployment rate has the expected sign and has a significant influence in the determination of nonmanufacturing compensation. Social security tax changes have a slightly larger effect on the nonmanufacturing sector than the manufacturing one, an effect that might be explained by the

FIGURE III. 4A

Actual percent change in manufacturing pay-rate less the growth in productivity and M2 to real GNP
vs
Predicted percent changes

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
60	1.86	1.16	0.70
61	-0.10	-2.12	2.02
62	-2.51	-3.91	1.40
63	-1.21	-0.42	-0.79
64	-2.71	-1.74	-0.97
65	-3.08	-1.87	-1.21
66	-0.12	1.38	-1.50
67	2.30	2.26	0.03
68	1.23	-1.12	2.35
69	2.43	0.48	1.95
70	4.33	1.09	3.23
71	1.77	0.96	0.82
72	-6.77	-5.96	-0.82
73	-1.43	-0.99	-0.44
74	2.61	2.81	-0.21
75	1.73	1.23	0.50
76	-1.70	-2.57	0.87
77	3.60	2.96	0.63
78	1.16	2.36	-1.20
79	2.81	1.79	1.02
80	4.39	4.38	0.01
	IS *	IS +	IS A-P *

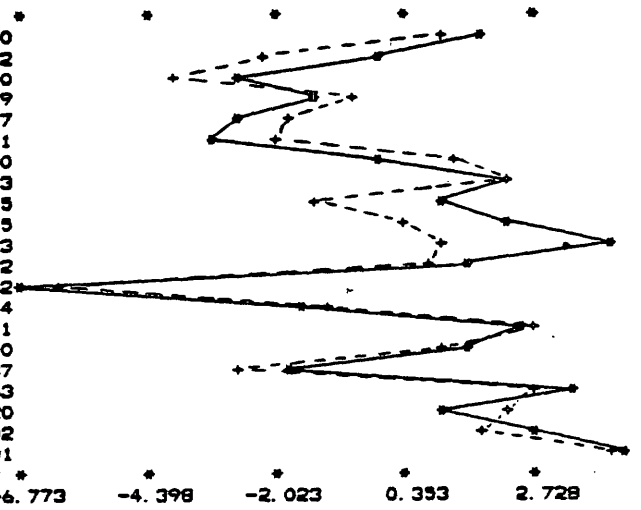


FIGURE III. 4B

Actual level in manufacturing pay-rate
vs
Predicted level

DATE	ACTUAL IS *	PREDIC IS +
60	36.70	36.22
61	37.75	37.04
62	39.20	38.25
63	40.35	40.00
64	42.00	41.80
65	42.87	43.85
66	44.80	46.52
67	47.05	48.68
68	50.42	50.65
69	53.95	52.78
70	57.57	54.77
71	61.10	57.37
72	64.42	60.70
73	69.07	65.89
74	76.45	73.92
75	85.52	83.16
76	92.32	91.01
77	100.05	98.72
78	108.22	107.29
79	118.67	116.18
80	131.22	126.11
	IS *	IS +

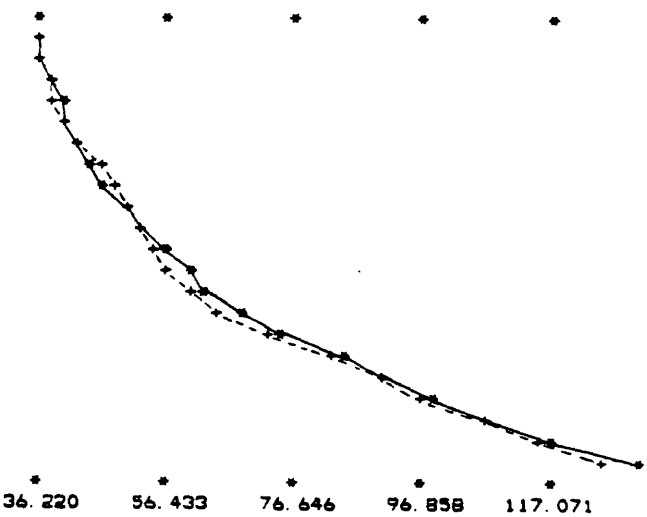


FIGURE III.5

Non-manufacturing Hourly Pay-rate Equation

Dependent Variable (DEP) = $\underline{\%}$ Non-Mfg HLC_t - 1.0 $\underline{\%}$ $PROD_t$

Equation

$$DEP = \underset{(5.01^{*})}{0.671} * (\underline{\%} (\text{Mfg. HLC})_t - \underline{\%}\ PROD_t)$$

$$+ \underset{(1.80^{**})}{0.235} * (\underline{\%} (\text{Mfg. HLC})_{t-1} - \underline{\%}\ PROD_{t-1})$$

$$+ \underset{(1.96^{**})}{0.094} * (\underline{\%} (\text{Mfg. HLC})_{t-2} - \underline{\%}\ PROD_{t-2})$$

$$+ \underset{(-2.01^{**})}{-0.025} * (\underline{\%}\ \text{Unemployment Rate})$$

$$+ \underset{(1.82^{**})}{0.062} * (\underline{\%} (\text{Social Security Tax Rate}_t))$$

$$+ \underset{(2.52^{*})}{0.072} * (\underline{\%} (\text{Social Security Tax Rate}_{t-1}))$$

Period of estimation: 1960-80

$R^2 = 0.8582$ $RBAR^2 = 0.811$ DW = 1.152 AAPE = 12.72

$\underline{\%}$ = percentage change

t statistics in paranthesis, * significant at the 5% level,
** significant at the 10% level.

larger share of workers in the nonmanufacturing sector who are more sensitive to FICA taxes. An intercept is also suppressed for the same reason as before.

Compared to the other aggregate equation, the nonmanufacturing performs very well. The fit as measured by the adjusted R^2 is good (0.8110) with serial correlation less of a problem. The AAPE for the estimated equation is approximately thirteen percent which is reduced to 1.3 percent when the calculation is performed for the level of pay-rates instead of the growth in pay-rates less productivity change. Figures III.6a and III.6b show the plots of actual levels versus predicted levels implied by the estimated equation. The plots show that the equation systematically misses the period from 1970 through 1976. A dummy variable for the Nixon wage-price freeze was tested but it was found to be insignificant. Excepting that one interval, the equation tracks the major turning points.

III.3 Relative Pay-Rates in Individual Industries

The approach applied here in determining compensation by industry is to focus on relative pay-rates by industry. By focusing on sectoral pay-rates, long-run trend influences and short-run cyclical effects can be easily modelled. Pay-rates by industry are obtained as the product of the aggregate rate and the relative sectoral pay-rate.

In this study, relative pay-rates are affected by a sectoral specific variable, the share of total employment accounted for by that industry, and by several economy-wide variables: the growth in the personal consumption expenditures deflator, the unemployment rate, and

FIGURE III. 6A

Actual growth in non-manufacturing pay-rate
less the growth in productivity

vs.

Predicted Growth

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
60	2. 92	2. 90	0. 02
61	2. 42	3. 25	-0. 82
62	3. 15	3. 23	-0. 09
63	2. 60	3. 26	-0. 66
64	3. 74	3. 82	-0. 08
65	2. 74	1. 43	1. 31+
66	4. 72	3. 79	0. 93
67	4. 78	4. 62	0. 16
68	6. 92	5. 87	1. 04
69	6. 48	6. 69	-0. 21
70	7. 83	5. 92	1. 91
71	6. 77	6. 08	- 0. 69
72	6. 61	6. 09	0. 52
73	6. 46	7. 07	-0. 60
74	8. 17	8. 81	-0. 64
75	8. 20	9. 31	-1. 10
76	8. 38	9. 19	-0. 81
77	7. 09	8. 69	-1. 60
78	7. 83	8. 12	-0. 29
79	8. 71	8. 90	-0. 18
80	9. 06	9. 26	-0. 20
	IS *	IS +	IS A-P *

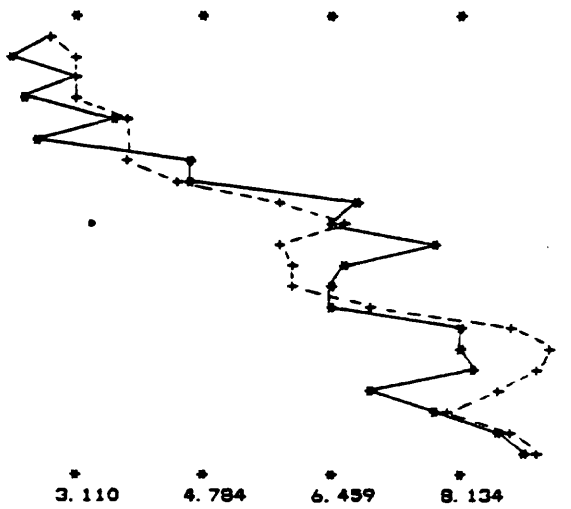


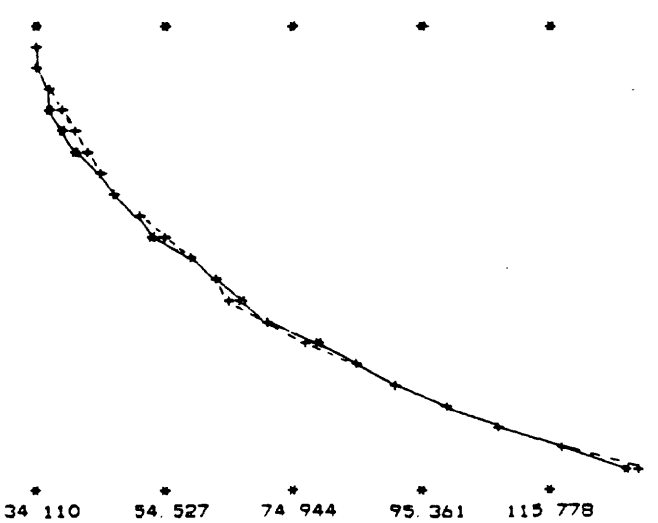
FIGURE III. 6B

Level of the non-manufacturing pay-rate

vs.

Predicted level

DATE	ACTUAL IS *	PREDIC IS +
60	34. 11	34. 15
61	35. 26	35. 64
62	36. 77	37. 49
63	38. 15	39. 18
64	40. 12	41. 32
65	41. 86	43. 03
66	44. 44	45. 46
67	47. 17	48. 14
68	50. 85	51. 62
69	54. 47	55. 30
70	58. 96	58. 97
71	63. 08	62. 73
72	67. 52	66. 66
73	72. 50	71. 42
74	79. 32	78. 11
75	86. 06	85. 63
76	93. 25	92. 69
77	100. 00	100. 51
78	108. 74	108. 98
79	118. 97	118. 98
80	130. 01	130. 07
	IS *	IS +



the proportion of teenagers in the overall civilian labor force. Before discussing the precise specification and results of the sectoral pay-rate equations, a short review of the work on "wage" determination by industry is presented.

Relative pay-rates in other studies

The first work which utilized the relative wage framework was published by Michael Wachter in 1970.[18] Wachter developed a model in which manufacturing industries are divided into two groups: a high-wage, noncompetitive sector and a low-wage, competitive sector. The high-wage industries attempt to maintain a wage premimum over the other industries. Employers in the high-wage industries maintain a labor queue from which they hire. As aggregate demand increases, low-wage industries lose workers to the higher wage industries, forcing the low-wage industries to bid up wages. Since the high-wage industries hire from a queue, there is no need for them to raise wages until the queue becomes unacceptably small. Therefore, lowering levels of unemployment will narrow the wage structure while increasing unemployment widens the gap between the high and low-wage industries. This suggest Wachter's main hypothesis that high-wage industries are positively affected, if at all, by fluctuations in aggregate demand while low-wage industries are negatively correlated with the unemployment rate.

Empirical testing of this model was accomplished within the framework of a Cobb-Douglas function for the level of wages[19]:

$$(3.6)\quad W = a\, V^{b1}\, U^{b2}\, W^{*b3} \qquad a, b1, b3 > 0,\ b2 < 0\ ,$$

where V is value added, U is aggregate unemployment and W* is a proxy for wages paid in other industries. Some manipulation and the addition of a distributed lag on prices and unemployment to capture some of the dynamics of the wage-price spiral yields,

$$(3.7)\quad \log W / W^{*} = \log a_0 + a_1 \log V / V + a_2\, \text{Time} + \sum_{k=0}^{3} a_3\, U_{t-k} + \sum_{k=0}^{3} a_4\, P_{t-k} + a_5\, KW + e$$

(where KW is a dummy for the Korean War)

Wachter estimated the equation for the period 1947-1967 using annual data for nineteen two-digit SIC manufacturing sectors. He constrained the lag structure on prices and unemployment to be identical across all sectors, and the results confirmed his hypothesis. Industries with high measures of concentration and unionization rates were positively correlated with the unemployment rate.

David Belzer modified Wachter's model into a structure more accomodating to the needs of long-term interindustry forecasting.[20] Belzer postulated a general model for the wage of an industry as

$$(3.8)\quad RW_t = g(\log P, U, S) + (1-a)\, RW_{t-1}$$

with RW referring to the relative pay-rate, P to a distributed lag of the growth in the CPI, U to unemployment and S a vector of industry specific variables. Working with Bureau of Labor Statistics series on hourly earnings indices for production workers, Belzer tested a specification derived from equation 3.8 for one hundred two-digit SIC industries. Coefficients for the lagged dependent variable frequently fell outside the zero to one range, thereby implying destablization in the long-run.[21] The equation was modified by dropping the lagged dependent variable and a negotiations variable which had a neglible influence on relative wages. The final form[22] of equation was

$$(3.9)\quad RW_t = a_0 + a_1 P + a_2 \sum_{k=0}^{2} UNEM25_{t-k} + a_3 TIME + a_4 \log EMP$$

where P = distributed lag on inflation with the weights specified as 0.5,0.33 amd 0.17 for t to t-2,

UNEM25 = unemployment rate for males 25 years and older, and

EMP = industry's share of total employment.

The time trend was included to allow for "target" wage differentials to change overtime and to capture shifts in the skill mix of the labor force. The change in employment served three purposes: to account for short-run changes in earnings due to overtime, to reflect short-run labor supply inelasticity for an industry, and to represent the effects of a changing employment mix within an industry. In order to economize on degrees of freedom, weights were specified for the lag on prices; experimentation gave the pattern.

Belzer found that twice as many sectors had negative price terms as

had positive price terms.[23] However, he noted that the magnitudes of the positive coefficients were much greater than the negative ones. Additionally, collinearity between the unemployment terms and prices may have meant the influence of prices were moderated by the effect of unemployment.

The unemployment rate was the most powerful influence in the equations. A positive sign on the unemployment rate implies that as unemployment increases the wages in that industry fall (or do not rise as quickly) as the average wage or as unemployment decreases, wages increase more quickly than the average wage. This procyclical behavior was most evident in the textile and service industries, all basically non-union, low-wage sectors. Strongly unionized industries - such as motor vehicles, steel, and trucking - had negative signs on the unemployment rate, thus indicating that their wages (relative to the average) are "protected" during downturns in economic activity. Time trend effects were largest in the manufacturing, mining and transportation sectors, a result attributed to union aggressiveness at the bargaining table.[24] Suprisingly, the sector specific term, the change in industry employment, performed very weakly. Only twelve sectors out of the hundred had statistically significant signs. Seven of the sectors exhibit a positive coefficient indicating the overtime or demand for high-wage labor effect.

The major focus of the remaining studies on relative wages, however, has been the influence of different factors at a specific point in time. Moreover, a primary concern has been the influence and extent of concentration, either industrial or labor union, on the wage structure.

The arguments presented in those studies concerning the effect of industry concentration on wage determination can be condensed into three types. First, the high correlation between profits and concentration indicate that highly concentrated industries divide the monopoly profits with labor. Second, highly-concentrated industries can typically pass on their costs to their customers, thereby reducing resistance in those industries to large wage increases. Finally, a high degree of concentration and strong labor unions within an industry is a common occurence, giving unions more power to raise wages.

While the effect of industrial concentration on value added exists, it is not necessary to use as an explanatory variable in a forecasting context because the time profile of industry concentration probably resembles either a constant term or a slow moving trend. Thus, any effect of market structure is likely to be indistinguishable from other variables. Furthermore, a recent cross-sectional study comparing the effects of concentration and unionization on wage differentials for 1958 and 1967 concludes that, if changes in labor quality are included, then market power was found to be correlated with high wages in 1958 but not in 1967.[25] As a consequence, no explicit influence of market power was included in the relative pay-rate equations.

Specification and Results for the Present Model

This study adapted the Belzer methodology with some modifications. A major modification involves the definition and construction of the dependent variable. Because of limitation on data availability, Belzer used hourly earnings indices for production workers provided by the

Bureau of Labor Statistics. In his forecast, the model adjusted for the compensation of nonproduction workers with regression equations. In the present study, by combining NIPA series on total employee compensation and hours worked by all employees, average hourly earnings indices by two-digit SIC industries for all employees are computed. This method eliminates any need for further adjustment of the forecasted variables.

Other modifications came in the specification of the relative pay-rate equation. The specification for a particular industry in the present model

$$(3.10)\quad RW^t = b_0 + b_1\, PC20^t + b_2\, P^t + b_3 \sum_{j=0}^{2} UN^{t-j} + b_4\, EMPSHARE$$

where RW = industry hourly employee compensation rate relative to the appropriate aggregate pay-rate,

PC20 = teenage share of the labor force,

UN = inverse of the overall unemployment rate,

PSHARE = industry's share of hourly adjusted employment, and

P = rate of growth of the PCE deflator.

This specification was used for thirty-seven private sectors and eight government sectors over 1956-80.

One noteworthy feature of the relative wage or pay-rate formulation is that the a priori sign on any coefficient of a variable not specific to a particular industry can be either positive or negative since a variable cannot possibly raise or lower all relative pay-rates within an industry aggregate. For instance, the teenage share of the labor force (PC20) is included as a crude measure of the skill of the labor force. An increasing proportion of teenagers in the labor force has opposing

influences: a larger share of relatively unskilled labor is available while more highly skilled labor becomes more scarce. Consequently, the coefficient accompanying PC20 may have a positive effect for industries requiring skilled labor and a negative influence in the lower skilled industries.

This reasoning extends to the unemployment and inflation variables. Strongly unionized industries will have a positive sign, since their pay-rate will not decline (relative to the average) during an increase in unemployment. Conversely, nonunionized sectors, where wages are more responsive to labor market conditions, should exhibit a negative sign since an increase in unemployment will increase the supply of available labor and depress their wages relative to the average. Inflation, measured as a distributed lag of the growth in the PCE deflator with weights of 0.5, 0.33 and 0.17, can either raise or lower an industry's pay-rate depending on the union strength in negotiating escalator clauses.

To add to the stability of the model, the unemployment rate is entered as its inverse. The ensuing nonlinear relationship permits the unemployment rate to have a different impact on an industry's pay-rate depending on overall economic conditions. A given one percent change in the unemployment rate will have a larger impact when the reciprocal of that rate is small rather than large.

Industry share of total employment is the only sector specific variable. It is included to capture the demand conditions within an industry, but it also may have either sign. Contraction in some industries works by laying off the low-wage workers , thus driving up average pay-rate for the remaining employees, which increases their

pay-rate relative to the average. Expansion in those industries occurs by increasing the employment of low-wage workers, thereby lowering average pay-rate relative to the aggregate. In those industries, the expected sign of the coefficient is negative. On the other hand, the industries which, to expand have to attract workers from other industries, would exhibit a positive coefficient on the unemployment rate variable.

The results of the estimation procedure are displayed in Table III.1. The second column shows the results for the teenage share of the labor force (PC20). Overall, PC20 is a strong explanatory variable, significant in twenty-seven of the thirty-eight of the private sectors, and five of eight in the public sectors. Among the thirty-eight industries in the private sector, twenty have a positive coefficient for PC20 and eighteen have negative ones. As expected, the high-skilled industries such as Autos (22), Mining (3), Communications (28) and Utilities (30) have strong positive influences, while Agriculture (1), Wholesale and Retail trade (31) and most of the finance and service sectors have a their relative pay-rate reduced as the teenage share of the civlian labor force increases. The performance of PC20 is, in part, due to the high correlation with a time trend.

The inverse of the unemployment rate was not so strong a variable as Belzer found. Twelve sectors had the same sign throughout the lag; nine of these had negative coefficients. Of these nine, two were low-wage sectors, Agriculture (1) and Wholesale and Retail (31) trade. Another anomaly is the positive coefficient for the the Transportation equipment manufacturing sector excluding motor vehicles (19), a

TABLE III-1

INDUSTRY RELATIVE PAY-RATE EQUATIONS

	SECTOR	INTERCEPT	PC20	UN	UN(T-1)	UN(T-2)	PRICE	AMPSHR	RSQ	RBRSQ	AAPE	D-W
34	HOTELS	1.628	-2.534	0.129	0.095	0.064	-0.185	-0.166	0.617	0.489	0.796	1.220
		(7.807)	(-4.729)	(1.322)	(0.931)	(1.250)	(-0.470)	(-2.391)				
35	MISC. BUS.	1.454	-3.425	0.014	0.099	-0.081	-0.140	-0.031	0.991	0.988	0.463	1.311
		(89.631)	(-10.53)	(0.229)	(1.610)	(-2.626)	(-0.746)	(-4.612)				
36	AUTO REPAIR	1.152	0.569	-0.044	0.115	0.062	-0.192	-0.368	0.862	0.815	0.821	1.153
		(25.948)	(1.165)	(-0.407)	(0.987)	(1.129)	(-0.684)	(-3.541)				
37	AMUSEMENTS	2.034	-3.099	0.122	-0.122	0.014	-0.609	-0.722	0.943	0.924	1.536	0.710
		(4.605)	(-3.544)	(0.473)	(-0.526)	(0.082)	(-0.618)	(-1.531)				
38	HEALTH & EDU	0.631	2.165	-0.197	0.125	-0.033	-0.021	0.019	0.958	0.944	0.979	0.845
		(18.956)	(2.471)	(-1.826)	(1.105)	(-0.612)	(-0.061)	(1.819)				
39	PERS. SERV.	1.000	-0.803	0.034	0.041	-0.084	0.023	0.020	0.783	0.711	1.523	0.912
		(4.039)	(-0.451)	(0.196)	(0.242)	(-0.999)	(0.036)	(0.798)				
40	FED. ENT.	0.827	7.204	-0.724	0.255	0.010	-0.898	-0.406	0.970	0.960	1.469	1.115
		(6.135)	(11.628)	(-4.379)	(1.517)	(0.104)	(-1.943)	(-2.824)				
41	S&L ENT.	0.590	8.669	-0.141	0.037	0.131	-0.891	-0.443	0.933	0.911	1.314	1.407
		(6.247)	(8.260)	(-0.801)	(0.227)	(1.700)	(-2.408)	(-2.162)				
44	FED IND.	1.337	1.623	-0.582	0.410	0.038	-1.897	-0.060	0.785	0.713	2.692	0.469
		(5.586)	(1.126)	(-2.049)	(1.247)	(0.241)	(-2.143)	(-2.261)				
45	S&L IND.	0.346	4.924	-0.083	0.333	0.148	-1.727	0.019	0.933	0.910	1.393	0.971
		(5.506)	(2.123)	(-0.420)	(2.187)	(1.730)	(-4.660)	(0.991)				
47	FED. CIV.	1.338	-3.447	-0.092	1.891	0.353	-5.075	0.025	0.873	0.831	5.174	0.691
		(1.480)	(-1.033)	(-0.126)	(2.581)	(0.937)	(-2.672)	(0.085)				
48	FED. MIL.	1.285	2.177	-0.490	-0.022	-0.092	-0.638	-0.112	0.993	0.990	1.264	1.127
		(15.065)	(3.498)	(-3.984)	(-0.155)	(-1.347)	(-1.645)	(-7.989)				
49	S&L EDUC.	0.459	0.082	0.100	0.261	0.119	-1.892	0.081	0.959	0.945	1.075	1.068
		(13.765)	(0.044)	(0.723)	(2.286)	(1.755)	(-7.470)	(3.871)				
50	S&L OTH.	0.770	8.394	-0.481	0.228	0.110	-0.369	-0.085	0.873	0.831	1.511	0.983
		(3.952)	(4.016)	(-1.842)	(1.181)	(1.170)	(-0.634)	(-1.386)				

* WAGE RELATIVE TO NONMANUFACTURING WAGE

TABLE III-1

INDUSTRY RELATIVE PAY-RATE EQUATIONS

	SECTOR	INTERCEPT	PC20	UN	UN(T-1)	UN(T-2)	PRICE	AMPSHR	RSQ	RBRSQ	AAPE	D-W
17	PRI. METALS	1.274	-2.166	0.204	-0.389	-0.187	1.884	-0.114	0.953	0.937	1.070	1.675
		(15.569)	(-3.979)	(1.686)	(-3.478)	(-3.091)	(7.290)	(-3.145)				
18	FAB. METALS	0.858	-0.137	-0.351	-0.000	-0.003	0.151	0.109	0.510	0.346	0.495	1.314
		(10.280)	(-0.564)	(-2.992)	(-0.001)	(-0.114)	(1.015)	(2.065)				
19	TRANS EQ.	1.023	0.847	0.232	0.067	0.171	-0.000	-0.146	0.764	0.685	1.772	0.874
		(5.093)	(0.471)	(0.744)	(0.312)	(1.491)	(-0.000)	(-1.729)				
20	NON-ELECT.	1.118	0.768	0.185	0.038	-0.016	0.278	-0.098	0.710	0.614	0.463	1.569
		(25.028)	(3.474)	(2.045)	(0.704)	(-0.487)	(1.649)	(-4.090)				
21	ELECT. MACH.	0.983	0.798	-0.346	0.061	0.183	-0.894	0.010	0.665	0.554	0.974	1.187
		(16.364)	(1.613)	(-2.450)	(0.538)	(3.084)	(-3.563)	(0.277)				
22	AUTOS	0.543	2.059	-0.414	0.122	0.041	1.717	0.175	0.943	0.924	1.255	2.022
		(7.127)	(3.570)	(-2.259)	(0.829)	(0.535)	(5.001)	(2.332)				
23	INSTRUMENTS	1.312	-0.106	-0.023	0.064	0.129	-0.757	-0.398	0.968	0.958	0.460	1.440
		(27.451)	(-0.455)	(-0.313)	(1.108)	(4.417)	(-4.136)	(-4.978)				
24	MISC. MFG.	0.734	0.774	-0.158	0.225	0.125	-0.283	0.412	0.775	0.700	1.019	0.761
		(4.836)	(1.194)	(-1.230)	(1.799)	(1.868)	(-0.777)	(2.063)				
25	RAILROADS	1.167	-2.333	-0.085	-0.506	-0.155	2.303	-0.014	0.911	0.881	1.528	1.822
		(8.493)	(-1.802)	(-0.503)	(-2.941)	(-1.646)	(6.320)	(-0.331)				
26	AIR TRANS.	0.706	0.899	-0.141	-0.273	-0.154	-0.110	0.652	0.912	0.882	1.680	1.119
		(14.775)	(0.737)	(-0.820)	(-1.633)	(-1.586)	(-0.236)	(2.539)				
27	OTHER TRANS.	1.121	-1.113	0.024	-0.292	-0.130	0.630	-0.007	0.894	0.859	0.641	1.602
		(8.080)	(-2.790)	(0.347)	(-4.320)	(-3.682)	(3.620)	(-0.133)				
28	COMMUN.	1.037	2.124	-0.145	-0.478	-0.139	1.435	-0.177	0.946	0.928	1.368	1.131
		(9.184)	(3.638)	(-0.962)	(-3.096)	(-1.864)	(3.973)	(-2.092)				
30	UTILITIES	1.160	2.166	-0.207	-0.180	0.006	-0.162	-0.362	0.976	0.968	0.496	1.666
		(11.063)	(6.523)	(-2.841)	(-9.123)	(0.205)	(-1.364)	(-4.023)				
31	TRADE	1.858	-1.012	-0.130	-0.038	-0.041	-0.051	-0.035	0.979	0.972	0.339	1.345
		(13.229)	(-3.947)	(-2.431)	(-0.902)	(-1.937)	(-0.500)	(-4.720)				
32	FIN. SERV.	1.142	-0.784	0.013	-0.072	0.085	-1.100	0.001	0.933	0.910	0.696	1.265
		(20.549)	(-1.753)	(0.151)	(-0.854)	(1.970)	(-4.558)	(0.065)				
33	REAL ESTATE	0.759	-1.649	0.182	-0.034	0.018	0.014	0.331	0.796	0.728	0.960	1.288
		(9.772)	(-3.727)	(1.739)	(-0.330)	(0.309)	(0.042)	(4.026)				

TABLE III-1

INDUSTRY RELATIVE PAY-RATE EQUATIONS

	SECTOR	INTERCEPT	PC20	UN	UN(T-1)	UN(T-2)	PRICE	AMPSHR	RSQ	RBRSQ	AAPE	D-W
1	AGRIC.	1.743	-4.402	-0.019	-0.090	-0.195	1.419	-0.206	0.980	0.973	1.538	1.402
		(7.614)	(-2.671)	(-0.107)	(-0.584)	(-2.118)	(3.969)	(-7.084)				
2	CRUDE PETRO.	0.857	0.342	-0.093	-0.055	-0.059	-0.734	0.410	0.791	0.721	1.316	1.549
		(5.073)	(0.225)	(-0.576)	(-0.341)	(-0.657)	(-1.053)	(2.539)				
3	MINING	0.589	1.904	0.033	-0.348	-0.061	2.083	0.316	0.957	0.943	1.193	1.719
		(5.748)	(2.243)	(0.248)	(-2.637)	(-0.740)	(6.385)	(3.627)				
4	CONS.	1.209	0.841	-0.205	0.321	0.107	-1.445	-0.048	0.775	0.700	1.446	0.856
		(8.754)	(1.238)	(-1.175)	(1.984)	(1.256)	(-3.899)	(-1.624)				
5	FOOD	1.075	0.640	-0.084	-0.049	0.002	-0.350	-0.047	0.958	0.943	0.346	1.748
		(18.931)	(2.084)	(-2.021)	(-1.185)	(0.118)	(-2.899)	(-3.674)				
6	TEXTILES	0.686	1.438	0.095	0.084	-0.054	0.527	0.125	0.908	0.877	0.375	2.218
		(21.113)	(7.096)	(2.176)	(1.961)	(-2.447)	(4.590)	(7.148)				
7	APPAREL	0.661	-0.663	-0.118	0.556	-0.026	0.442	0.221	0.887	0.849	1.272	0.803
		(3.174)	(-0.976)	(-0.702)	(3.604)	(-0.307)	(0.626)	(2.168)				
8	PAPER	1.273	1.099	-0.013	-0.115	-0.009	-0.279	-0.442	0.970	0.960	0.464	1.741
		(12.991)	(4.385)	(-0.220)	(-1.900)	(-0.272)	(-1.015)	(-4.273)				
9	PUBLISH.	1.767	-0.295	-0.191	0.396	0.130	-2.367	-0.477	0.856	0.808	1.279	0.810
		(4.687)	(-0.384)	(-1.176)	(2.451)	(1.419)	(-5.114)	(-1.880)				
10	CHEMICALS	1.182	1.027	-0.032	-0.096	0.025	0.051	-0.227	0.974	0.965	0.253	1.782
		(21.637)	(7.862)	(-1.015)	(-2.854)	(1.463)	(0.701)	(-5.033)				
11	PETRO. REFIN	1.345	-3.289	0.098	-0.425	-0.110	1.497	-0.389	0.825	0.766	1.257	1.419
		(11.917)	(-3.664)	(0.721)	(-3.206)	(-1.554)	(5.150)	(-2.074)				
12	RUBBER	1.306	-1.677	-0.073	0.226	0.007	-0.808	-0.140	0.951	0.934	0.842	0.929
		(41.599)	(-2.047)	(-0.576)	(2.093)	(0.124)	(-3.616)	(-1.221)				
13	LEATHER	0.876	0.166	-0.070	0.420	0.004	-0.189	0.289	0.928	0.903	0.937	1.153
		(6.838)	(0.190)	(-0.593)	(3.766)	(0.063)	(-0.480)	(2.070)				
14	LUMBER	0.599	2.365	-0.028	0.013	-0.072	1.627	0.101	0.965	0.954	0.854	1.434
		(7.999)	(5.234)	(-0.287)	(0.136)	(-1.406)	(7.206)	(1.889)				
15	FURNITURE	0.897	-1.985	-0.322	0.364	-0.025	0.162	0.552	0.880	0.840	0.910	1.225
		(8.842)	(-4.277)	(-2.202)	(3.228)	(-0.445)	(0.517)	(2.760)				
16	STONE, ETC.	0.986	0.574	0.010	-0.091	-0.046	0.377	-0.058	0.832	0.776	0.711	0.949
		(9.987)	(1.421)	(0.120)	(-1.091)	(-1.052)	(1.633)	(-0.656)				

high-wage and unionized industry. It is possible that the collinearity with the price variable moderates those perverse effects. On the other hand, summing the coefficients indicates that Autos (22), Non-electrical machinery (20) and other transportation (27) - mainly trucking and Utilities (30) have a positive net effect of unemployment. The service sectors and public education (49) have the expected net negative sign for unemployment.

Column 6 of Table 3.1 displays the effect of inflation on relative compensation. The lag structure was the same as that used by Belzer. As Belzer found, the negative coefficients dominated the positive ones by a two-to-one margin, 33 to 13. Again, the thirteen sectors benefitting from escalator clauses gain at a much higher rate than the losers. Autos (22), Railroads (25) and Communications (28) led those sectors with large, significant coefficients. The other sectors which did not always have statistically significant variables, included all of the service, government and trade sectors exhibiting the response of low-wage sectors.

In a stark contrast with Belzer's study, the sector specific variable of the sectoral share of employment showed a significant influence on relative pay-rate. Thirty of forty-six sectors had a significant effect; twenty-seven sectors had a negative influence, nineteen had a positive one. The variable seems to capture the intraindustry employment mix. Air Transportation (26) and Real Estate (33) led the list of industries of high-wage demand pull. Not suprisingly, the trade and service sectors expand and contract with low-wage employees. The discrepancy between this study and the earlier one by Belzer might be traced to the different data sources of hourly

employee compensation: Belzer mixed estimates from the Bureau of Labor Statistics and the Bureau of Economic Analysis while this study relied soley on BEA estimates. Additionally, Belzer excluded non-production workers in his equations while this study includes those workers.

In order to show the variety of the sectors and to give the reader a feel for the difficulties in the estimation process, the following four pages contain plots for eight sectors. The sectors range from manufacturing industries to the public sector.

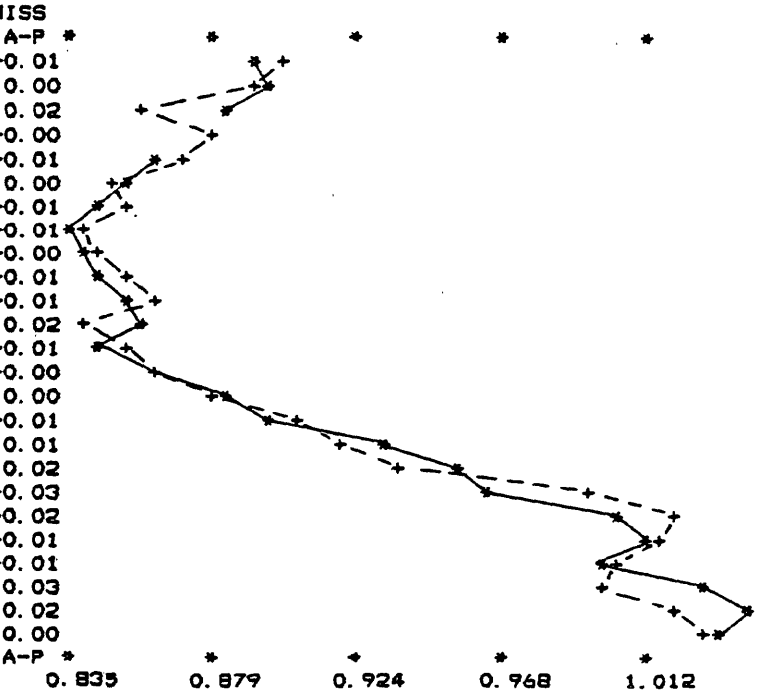
The first two sectors portrayed are the Mining (3) and Textile (6) industries. Mining, which excludes crude petroleum and natural gas drilling, starts far below the manufacturing aggregate and ends above the average. Good escalator clauses insulated miners very well from the ravages of inflation. On the other hand, Textiles had a slight decline over the quarter century. An increased supply and use of unskilled labor as measured by the teenage share of the labor force (PC20) and textile's share of total employment (EMPSHARE) help explain the decline.

The next pair equations are some of the best, but for different reasons. Primary Metals (17) exhibit countercyclical behavior but mostly a strong upward trend captured by PC20 and EMPSHARE. Serial correlation is not much of a problem and the adjusted R^2 is a good 0.937. Conversely, Fabricated Metal Products (18) has a low adjusted coefficient of determination of less than 35 percent. Fabricated Metal Products has one of the most stable relative pay-rate series: relative pay-rates bounce within a tight band between 1.00 and 0.97, so there is little variation to explain. Yet, on average, the equation misses by less than half a percent!

Utilites (30) and Real Estate (33) show similar histories.

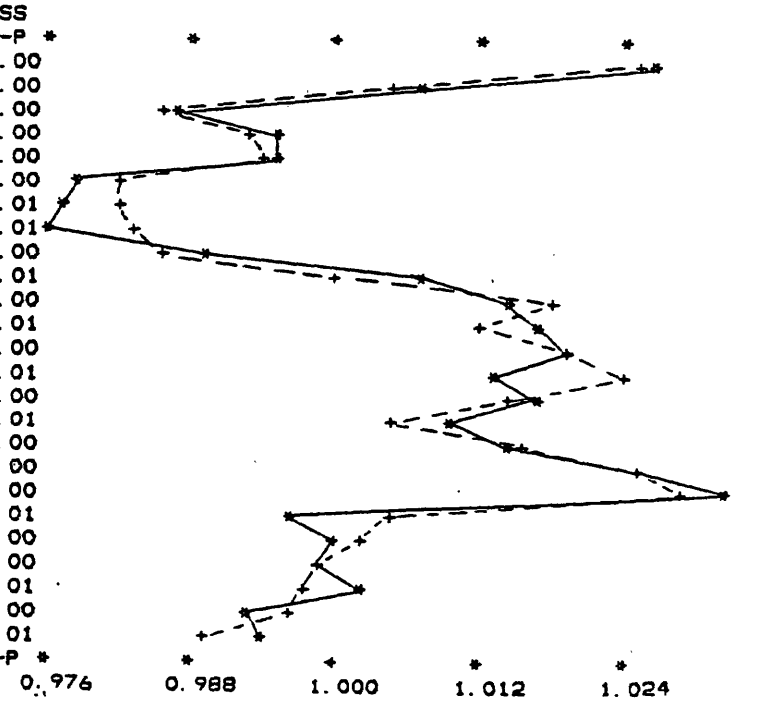
RELATIVE PAY RATE EQUATION
FOR
MINING (3)

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	0.90	0.90	-0.01
57	0.90	0.90	0.00
58	0.88	0.86	0.02
59	0.88	0.88	-0.00
60	0.87	0.87	-0.01
61	0.85	0.85	0.00
62	0.84	0.85	-0.01
63	0.84	0.84	-0.01
64	0.84	0.85	-0.00
65	0.85	0.85	-0.01
66	0.85	0.87	-0.01
67	0.86	0.84	0.02
68	0.85	0.85	-0.01
69	0.86	0.87	-0.00
70	0.88	0.88	0.00
71	0.90	0.91	-0.01
72	0.94	0.92	0.01
73	0.96	0.94	0.02
74	0.96	1.00	-0.03
75	1.00	1.02	-0.02
76	1.01	1.02	-0.01
77	1.00	1.01	-0.01
78	1.03	1.00	0.03
79	1.04	1.02	0.02
80	1.04	1.03	0.00
	IS *	IS +	IS A-P *



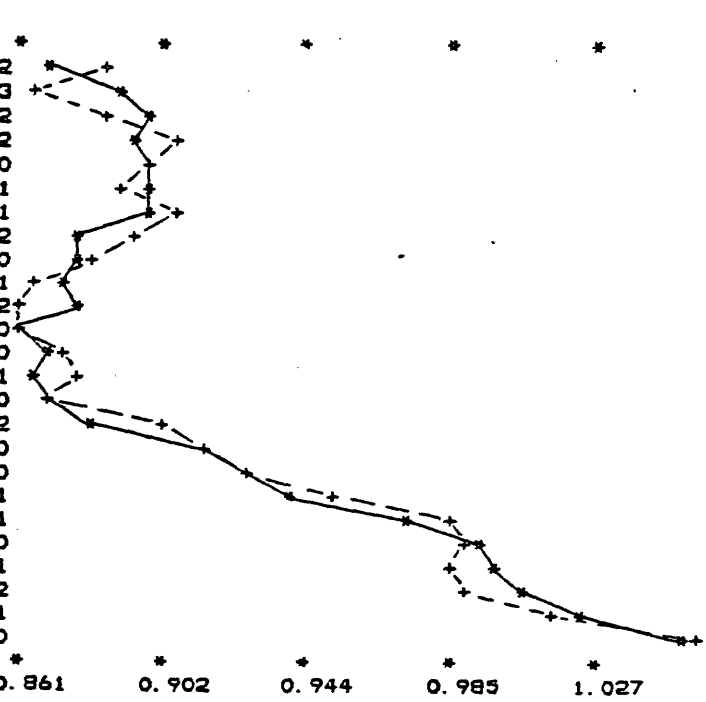
RELATIVE PAY RATE EQUATION
FOR
TEXTILES (6)

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	1.03	1.03	0.00
57	1.01	1.01	0.00
58	0.99	0.99	0.00
59	1.00	0.99	0.00
60	1.00	0.99	0.00
61	0.98	0.98	-0.00
62	0.98	0.98	-0.01
63	0.98	0.98	-0.01
64	0.99	0.99	0.00
65	1.01	1.00	0.01
66	1.02	1.02	-0.00
67	1.02	1.01	0.01
68	1.02	1.02	0.00
69	1.01	1.02	-0.01
70	1.02	1.01	0.00
71	1.01	1.00	0.01
72	1.01	1.02	-0.00
73	1.02	1.03	-0.00
74	1.03	1.03	0.00
75	1.00	1.01	-0.01
76	1.00	1.00	-0.00
77	1.00	1.00	0.00
78	1.00	1.00	0.01
79	0.99	1.00	-0.00
80	0.99	0.99	0.01
	IS *	IS +	IS A-P *



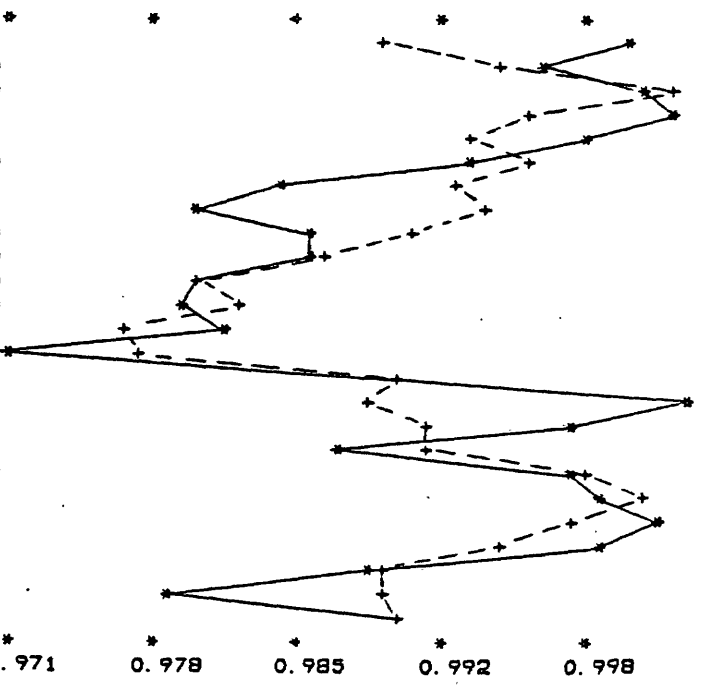
RELATIVE PAY RATE EQUATION
FOR
PRIMARY METALS (17)

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	0.87	0.89	-0.02
57	0.89	0.87	0.03
58	0.90	0.89	0.02
59	0.89	0.91	-0.02
60	0.90	0.90	0.00
61	0.90	0.89	0.01
62	0.90	0.91	-0.01
63	0.88	0.90	-0.02
64	0.88	0.88	-0.00
65	0.88	0.87	0.01
66	0.88	0.86	0.02
67	0.86	0.86	0.00
68	0.87	0.88	-0.00
69	0.87	0.88	-0.01
70	0.87	0.87	0.00
71	0.88	0.90	-0.02
72	0.92	0.92	0.00
73	0.93	0.93	0.00
74	0.94	0.95	-0.01
75	0.97	0.99	-0.01
76	0.99	0.99	0.00
77	1.00	0.99	0.01
78	1.01	0.99	0.02
79	1.02	1.02	0.01
80	1.05	1.06	-0.00
	IS *	IS +	IS A-P *



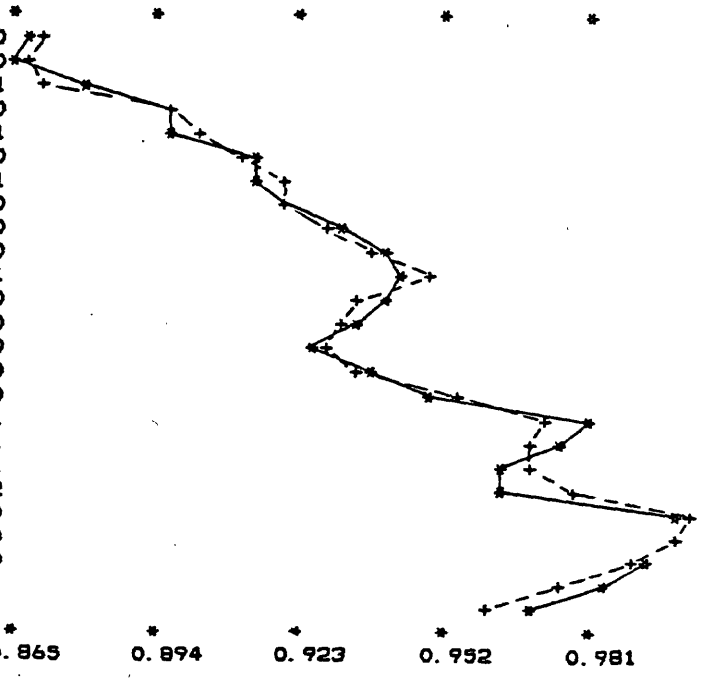
RELATIVE PAY RATE EQUATION
FOR
FABRICATED METALS

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	1.00	0.99	0.01
57	1.00	0.99	0.00
58	1.00	1.00	-0.00
59	1.00	1.00	0.01
60	1.00	0.99	0.01
61	0.99	1.00	-0.00
62	0.98	0.99	-0.01
63	0.98	0.99	-0.01
64	0.99	0.99	-0.00
65	0.99	0.99	-0.00
66	0.98	0.98	-0.00
67	0.98	0.98	-0.00
68	0.98	0.98	0.00
69	0.97	0.98	-0.01
70	0.99	0.99	-0.00
71	1.00	0.99	0.01
72	1.00	0.99	0.01
73	0.99	0.99	-0.00
74	1.00	1.00	-0.00
75	1.00	1.00	-0.00
76	1.00	1.00	0.00
77	1.00	0.99	0.01
78	0.99	0.99	-0.00
79	0.98	0.99	-0.01
80	0.99	0.99	0.00
	IS *	IS +	IS A-P *



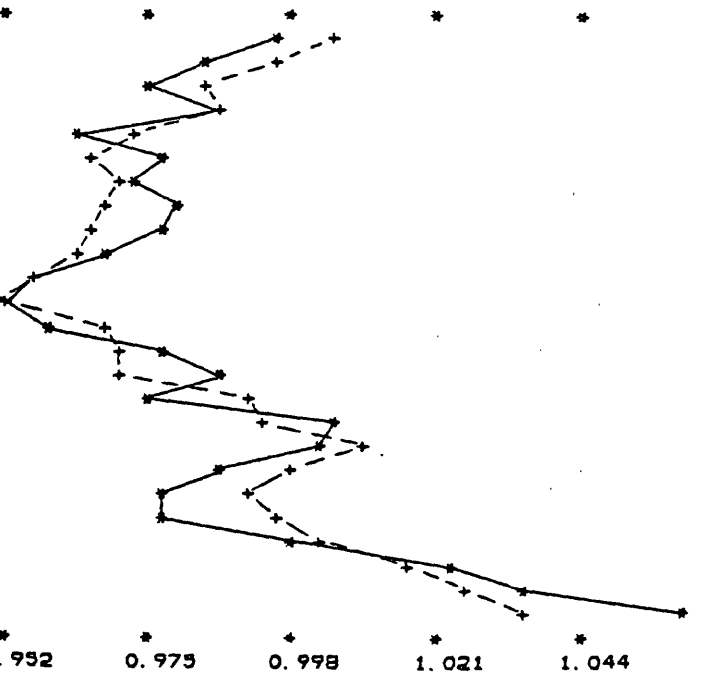
RELATIVE PAY RATE EQUATION
FOR
UTILITIES (30)

	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	0.87	0.87	-0.00
57	0.87	0.87	-0.00
58	0.88	0.87	0.01
59	0.90	0.90	-0.00
60	0.90	0.90	-0.01
61	0.92	0.91	0.00
62	0.92	0.92	-0.01
63	0.92	0.92	0.00
64	0.93	0.93	0.00
65	0.94	0.94	0.00
66	0.94	0.95	-0.01
67	0.94	0.94	0.00
68	0.94	0.93	0.00
69	0.93	0.93	-0.00
70	0.94	0.94	0.00
71	0.95	0.96	-0.00
72	0.98	0.97	0.01
73	0.98	0.97	0.01
74	0.97	0.97	-0.01
75	0.96	0.98	-0.02
76	1.00	1.00	-0.00
77	1.00	1.00	-0.00
78	0.99	0.99	0.00
79	0.99	0.98	0.01
80	0.97	0.96	0.01
	IS *	IS +	IS A-P *



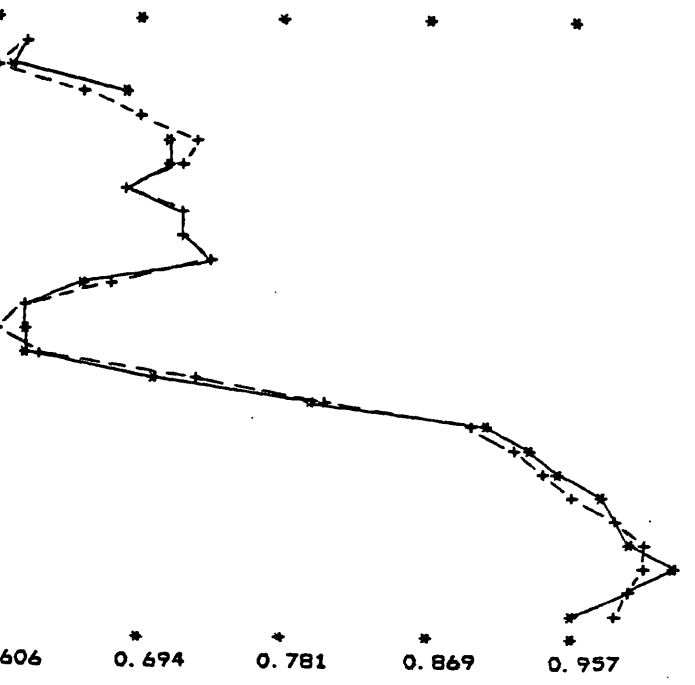
RELATIVE PAY RATE EQUATION
FOR
REAL ESTATE (33)

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	1.00	1.01	-0.01
57	0.99	1.00	-0.01
58	0.98	0.99	-0.01
59	0.99	0.99	0.00
60	0.96	0.97	-0.01
61	0.98	0.97	0.01
62	0.97	0.97	0.00
63	0.98	0.97	0.01
64	0.98	0.97	0.01
65	0.97	0.96	0.00
66	0.96	0.96	-0.00
67	0.95	0.95	0.00
68	0.96	0.97	-0.01
69	0.98	0.97	0.01
70	0.99	0.97	0.02
71	0.98	0.99	-0.01
72	1.01	0.99	0.01
73	1.00	1.01	-0.01
74	0.99	1.00	-0.01
75	0.98	0.99	-0.01
76	0.98	1.00	-0.02
77	1.00	1.00	-0.00
78	1.02	1.02	0.01
79	1.04	1.03	0.01
80	1.06	1.04	0.02
	IS *	IS +	IS A-P *



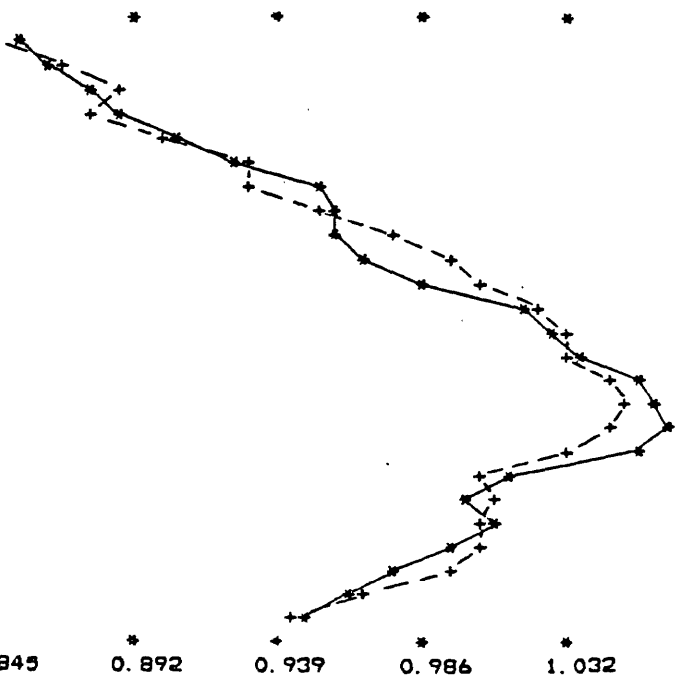
RELATIVE PAY RATE EQUATION
FOR
MILITARY (48)

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	0.63	0.62	0.00
57	0.62	0.61	0.01
58	0.69	0.67	0.02
59	0.69	0.70	-0.00
60	0.72	0.73	-0.01
61	0.72	0.73	-0.01
62	0.69	0.69	-0.00
63	0.72	0.72	0.00
64	0.73	0.73	0.00
65	0.74	0.75	-0.01
66	0.67	0.68	-0.01
67	0.63	0.63	-0.00
68	0.63	0.61	0.02
69	0.63	0.63	-0.00
70	0.71	0.73	-0.02
71	0.80	0.81	-0.01
72	0.91	0.90	0.01
73	0.94	0.93	0.01
74	0.95	0.94	0.01
75	0.98	0.96	0.02
76	0.99	0.98	0.00
77	1.00	1.00	-0.00
78	1.02	1.01	0.01
79	0.99	1.00	-0.01
80	0.96	0.99	-0.03
	IS *	IS +	IS A-P *



RELATIVE PAY RATE EQUATION
FOR
PUBLIC EDUCATION (49)

DATE	ACTUAL IS *	PREDIC IS +	MISS IS A-P *
56	0.86	0.85	0.01
57	0.87	0.87	-0.01
58	0.88	0.89	-0.01
59	0.89	0.88	0.01
60	0.91	0.90	0.00
61	0.93	0.93	-0.00
62	0.95	0.93	0.02
63	0.96	0.96	0.01
64	0.96	0.98	-0.02
65	0.97	1.00	-0.02
66	0.99	1.01	-0.02
67	1.02	1.03	-0.00
68	1.03	1.03	-0.00
69	1.04	1.03	0.00
70	1.06	1.05	0.01
71	1.06	1.05	0.01
72	1.07	1.05	0.02
73	1.06	1.04	0.02
74	1.02	1.01	0.01
75	1.00	1.01	-0.01
76	1.01	1.01	0.00
77	1.00	1.01	-0.01
78	0.98	1.00	-0.02
79	0.96	0.97	-0.01
80	0.95	0.95	0.00
	IS *	IS +	IS A-P *



Utilities are strongly countercylical and reached a peak in 1976. The equation tracts the zig-zag upward trend with EMPSHARE and PC20 doing most of the work. Real estate shows the huge boom of the recent past, with burgeoning commissions increasing the relative pay-rate. The industry share of employment captures the growth very well.

The last pair of plots portray two government sectors that have been in the policy spotlight. Military personel (48) has one of the strongest growth trends; this trend was required by the shift to the volunteer army. Interestingly, the share of employment and teenage share of the labor force have opposite effects. Relative compensation of teachers in public schools follows the baby boom generation through school with a peak in 1972 and a downslide thereafter. The series is slightly countercyclical with the coefficient of EMPSHARE mirroring the "brain drain" from education with a positive coefficient.

Overall, the aggregate variables coupled with the industry variable do a reasonable job explaining the variation in relative hourly labor compensation by industry. Coupling these equations with the aggregate functions gives long and short-run creditability to the forecast of employee compensation.

Summary

A dual approach for forecasting employee compensation is discussed in this chapter. As a consequence, careful scrutiny to the specification of the aggregate pay-rate equations in relation to the long-run implications of wage determination and inflation is warranted. The result is that the conventional formulation of the Phillips curve is

eschewed and the long-run influence of money on inflation is implemented directly into the equations. A beneficial side effect is the avoidance of the problem of simultaneity between prices and wages.

Chapter IV Return to Capital

The term "return to capital" is used here to mean value added not paid to labor in wages or benefits, or to government in taxes, or received from the goverment in subsidies. Thus, the return to capital is composed of nine GPO categories: net interest payments, corporate capital consumption allowances, noncorporate capital consumption allowances, corporate profits, proprietor income, business transfer payments, corporate inventory valuation adjustments, noncorporate inventory valuation adjustments, and rental income. The conglomeration, as a whole, has comprised about 30% of GNP for the last thirty years, a share which has remained fairly constant.

Despite its relatively constant share of value added, the mix of the return to capital has changed dramatically over the past thirty years. Table 4.1 displays the components' share of return to capital at ten year intervals from 1950 to 1980. Though corporate profit and proprietor income have declined dramatically in importance, they are still nearly half the total. On the opposite side, net interest payments and depreciation have taken up the gap left by profits. Net interest has been the most rapidly growing component of the return to capital; its relative size has increased eightfold since 1950. Depreciation allowances grew rapidly until the 1970's and have levelled off to about thirty percent of the return to capital in 1980. This shift is not solely due to increased borrowing and investment; net interest and depreciation are also accounting phenomena and are untaxed flows. Government legislation on taxation may affect the amount and

Table IV - 1

Composition (in percentages) of the Return to Capital

	1950	1960	1970	1980
Net Interest	2.612	6.505	14.386	20.956
Depreciation	16.127	24.883	29.541	29.463
a) Corp.	8.360	15.236	19.906	20.383
b) Non-Corp.	7.766	9.648	9.635	9.080
Profit Income	76.618	55.586	48.024	46.194
a) Corporate	39.183	28.323	24.240	27.642
b) Proprietor	37.434	28.263	23.784	18.553
Rental Income	9.544	10.940	9.146	8.474
Business Trans.	0.743	1.199	1.439	1.353
Inv. Val. Adj.	-5.643	-0.114	-2.536	-6.441
a) Corp.	-4.627	-0.125	-2.345	-5.960
b) Non-Corp.	-1.016	0.012	-0.191	-0.481

timing of both net interest payments and depreciation allowances. Firms may have some latitude to "offset" taxable profit income by accelerating debt or depreciation.

The choice between debt and equity financing, or between corporate or non-corporate organization, strongly influences the distribution among its components but has little effect on the total return to capital. In order not to have the total return to capital dependent on our modelling of these choices, the total return is forecasted first. This procedure allows us to obtain one component as a residual. Since profit income is half of the return to capital, modelling both would be redundant; forecasting the return to capital, in essence, determines corporate profits and proprietor income. Therefore, forecasting equations for the return to capital and all of its components except for

corporate profits and proprietor income are developed; profit-type income is determined as a residual.

The first section of this chapter deals with the total return to capital and its role as a stabilizing agent in a forecast. Also included in the first section is a discussion of previous work on the return to capital. Section 2 concerns the specification and estimation of depreciation equations. For the remaining components of the return to capital, the specification of the equations is different from that of the total return or depreciation equations. Total return and depreciation are each forecasted by sector without reference to aggregate controls. Though sectoral data is available for net interest payments, business transfer payments and inventory valuation adjustment, each of those components is forecasted in the aggregate. The aggregate value is then distributed throughout the industries on the basis of sectoral share equations. This procedure was used because in each case, variables that were too good to pass-up were available at the aggregate level but not at the sectoral level. For example, the stock of inventories is a major determinant of inventory valuation adjustments but this value is not available by holder in the forecast. Consequently, better forecasts could be obtained by spreading macro totals than by using sectoral equations. Sections 3-5 describe this procedure for each component. Rental income is the topic of the section 6.

IV.1 Total Return to Capital

The return to capital is composed of two qualitatively different types of components; those that are relatively insensitive to movement in economic activity and others that are more volatile. Net interest and depreciation are "creatures" of the past; both are predetermined by past investment and financing decisions and are relatively unaffected by current economic conditions. Rental income seems to retain a steady ten percent of the return to capital, regardless of the state of the economy.

Conversely, the other components - profit income, business transfer payments, and inventory valuation adjustments - are much more sensitive to current economic activity. Profits, the largest component of all nine, are closely tied to the business cycle: profits soar during a boom and plummet with a recession.

This movement is a key stabilizing force in the model. In the beginning of a boom, profits rise more quickly than the other components (except, possibly, inventory valuation adjustments) or labor compensation. Approximately half of the increase in corporate profits is taxed away by the government. Of the remaining amount, only that portion returned to individuals as dividends finds its way to personal income. In addition, the recipients of dividends are in high marginal tax brackets and have high marginal propensities to save, further withdrawing purchasing power from the economy. Consequently, the percentage of profits reaching personal income is less than the percentage of labor compensation reaching personal income. In addition, the increase in profits will increase inflation which decreases real

income. Thus, the size of disposable income relative to total GNP is reduced, thereby restraining the growth in share of personal consumption expenditures in GNP. The restraint on personal consumption expenditures dampens the overall growth in final demands, and the boom subsides.

An analagous reaction occurs in times of slack activity. During a recession, profits, and therefore inflation, drop more quickly than labor compensation. The decline in real disposable income is stemmed, thereby averting a continuing recession.

The upshot is that even though the return to capital is the variable to be forecasted, any substantial deviations from the trend will be caused by the movements in profit income. Consequently, the specification of a return to capital equation must resemble that of a profits equation in its cyclical components. Before turning to the industry specification used in this study, a review of the relevant work in the explanaton and forecasting of the return to capital is presented with a focus on profit income.

Profits and the Return to Capital in other models

Neither the Wharton annual industry model nor the Brookings' quarterly industry model have regression equations for the return to capital or corporate profits. The Wharton model has price equations and determines corporate profits as a residual in the aggregate.[1] Brookings also determines corporate profits as residual but at a sectoral level.[2] In the Brookings model, prices are determined, and then by working backward from the definition of price shown in chapter I, nominal gross product originating is computed by sector. Proprietor income is forecasted in first-difference form as a function of changes in labor

compensation and the change in nominal gross product originating less the other components of value added. Corporate profits are then determined as a residual. The general approach of Wharton and Brookings model is prohibited by the structure of the INFORUM model; for the reasons presented in Chapter I, the determination of value added for the model must precede that of price.

Lawrence Officer, in a quarterly model of the Canadian economy, eschews the residual approach and directly estimates all the components of value added.[3] All the components by sector are added together to obtain value added. Officer assumes a modified markup procedure for pricing behavior on the part of the firm, implying profits are determined as a percentage of total value added. The same specification is used for both corporate profits and entrepreneurial income,

$$PI_t = a + b\ VA_t + c\ (VA_t - VA_{t-1}) + d \sum_{j=0}^{3} WT_t + e\ PRT_t$$

where PI_t = the level of corporate profits or entrepreneurial income in millions of dollars,

VA_t = nominal value added,

WT_t = a four quarter distributed lag of wage rates,

PRT_t = productivity, measured as real value added per employee.

The first difference in value added is included to capture short-run deviations from the long-run markup rate. Productivity is also included as a cyclical term. Wages are expected to enter with negative signs as a squeeze on profits. Because profit income is a determinant of current value added, two stage least-squares was used to estimate the equations

by sector.

Officer obtained good fits but his formulation has drawbacks as well as advantages. On the positive side, the change in value added as an explanatory variable is useful, because changes, especially unexpected ones, in output and value added are more likely to affect profits than contractual aggreements such as labor compensation. While the change in value added captures short-run cyclical behavior, the inclusion of the productivity term is an attempt to measure the long-run cyclical behavior of profits, a sensible modification. Perhaps the productivity of capital, as embodied as the capital to labor ratio, might be a more effective variable.

On the negative side, the assumption that value added (VA) is already known is inappropriate for the structure of this model. Moreover, Officer's specification relates the level of corporate profits, to among other varaibles, wage rates. During a boom, profits and wages both increase but the magnitudes of the changes are different; profits are more volatile. Even though wages and profits both increase, the shares of income going to labor and capital will change. This suggests the dependent variable ought to be corporate profits as a share of output. In addition, the differing units of measurement on the variables makes the interpretation of the coefficients difficult. For instance, though the equation explains the level of nominal corporate profits, real productivity is used as one of the additive variables. Finally, collinearity between the productivity and wage terms can be expected.

The previous version of the INFORUM price-income model built by David Belzer[4] forecasted the return to capital in the wage-price

quarterly submodel. Belzer forecasted the return to capital as markup (m) over labor compensation or,

$$m = \frac{p\,X}{wL} = \frac{w\,L + r\,K}{w\,L} = 1 + \frac{r\,K}{w\,L}$$

where p = price index of real GPO,

X = real GPO less indirect business taxes,

w = hourly pay-rate of labor

L = hours worked by labor,

r = rate of return per unit of capital,

K = units of capital

Starting with a CES production function, Belzer derived[5] the following basic long-run formulation,

$$(4.1) \quad \log \frac{r\,K}{w\,L} = a_0 + a_1 \log \frac{w}{r} + a_2 \text{ Time}$$

The time trend served to measure the bias in technical change; a positive value indicates labor-saving technical change while a negative value shows capital-augmenting technical change.

However, demand effects and deviations of actual labor productivity from the cost-minimizing level of productivity could have disrupted the long-run formulation. In addition, there was no allowance for short-run wage dynamics. Therefore, equation (4.1) was modified by Belzer to allow for those short-run effects,

$$(4.2)\quad \log (p\,X / w\,L)_t = a_0 + a_1 \log (w/r)_t + a_2\ \text{Time} + a_3\ \text{Demand} + a_4 \log (L^*/L)_t + a_5 \log (w_t/w_{t-1})$$

where L^* was the "equilibrium" labor input for X_t.

The dependent variable was defined as the return to capital without inventory valuation adjustment (IVA) which was excluded on the assumption that business's ignored the effect of IVA on profits. Actual implementation of equation (4.2) led to the dropping of the wage-rental ratio and the growth in the wage rate variable. The demand variable was measured as the real output to real capital stock ratio for the manufacturing sectors. For the manufacturing sectors, demand was represented as either the unemployment rate or the three year growth in the moving average of real sectoral output. Equilibrium hours (L^*) was approximated by a "kinked" time trend and output; two time trends were in the equation with one starting in 1958, the other in 1964.

Given the obstinancy of the return to capital data to curve fitting, the Belzer formulation gave good results. On the whole, the equation performed better for manufacturing sectors than for nonmanufacturing sectors. The wholesale and retail trade sectors could not be adequately fit by this specification. The change in the WPI was included for both sectors, drastically improving the fit. The productivity variable (L^* / L) seemed to give the most trouble with the largest incidence of perversely large positive signs, implying that in a forecast labor producitivty gains accrued to capital not labor.

The Belzer formulation has some strong advantages. First, it linked the specification of the return to capital variable with a

cost-minimizing production function. Secondly, the formulation includes a proxy measure of technical progress, the time trend. Finally, the specification did the best job of fitting the data of any reviewed or encountered.

Despite the impressive results, the Belzer specification was not carried over to this study. The major objection is to the formulation of the dependent variable. Labor compensation in the denominator puts the entire burden of forecasting GPO on labor compensation. The pay-rate equations would be, in effect, forecasting the level of the return to capital. This is not a good method to minimize the risk of forecasting errors since an error in a pay-rate forecast leads to more error in the same direction elsewhere.

Another fault is the neglect of the stabilization function for the model that profit income can provide. The sectoral demand measures may be thought of as implicitly providing that function, but the importance of the stabilizing influence merits explicit attention.

The remaining research on profit income or the return to capital has focussed almost exclusively on the role of advertising and market structure on profitability. Within an interindustry framework, advertising and market structure are not apt to prove useful variables. One of the major purposes for advertising is to lure customers from one brand or manufacturer to another brand. For example, the advertising campaign promoting Miller beer aims to lure beer drinkers from the other brands along with attracting new beer consumers. To that end, an advertising variable makes little sense at this level of aggregation, since all the same competing firms are included in the industry definition. Even if an advertising variable were significant, such a

variable would be little help in forecasting because it would have to be forecasted itself.

Four reasons - two theoretical and two empirical - lead one to expect that a market structure variable such as the concentration ratio would be ineffective. The underlying justification for such a variable is that high levels of concentration (however defined) cause high levels of profitability. On the theoretical side, there is no consensus as to whether the coexistence of high profits and high levels of concentration imply that direction of causation. Critics argue that concentration may be the result of high profits, not the reverse, if economies of scale are present.[6] In addition, the use of the concentration ratio as a measure of industry concentration has also been questioned. The four-firm or eight-firm concentration ratio only provides information about the top four or eight firms in the industry without including the remaining firms in the industry. For instance, a four-firm concentration ratio of 0.80 shows that no firm outside the top four can have twenty percent of sales or capacity . But the ratio cannot say whether there are two or two hundred firms in the rest of the market. Economic theory indicates that average profits per firm would behave differently with fringe of two firms than with a fringe of two hundred firms.

Besides the theoretical objections, two more empirically based criticisms demonstrate the ineffectiveness of the application of concentration ratios to return to capital equations. At the level of aggregation for the model - two digit SIC - the concentration ratio may have little effect. For example, the steel industry may be highly concentrated but the primary metal industry is probably less

concentrated. Louis and Frances Espositio in a study published in 1977[7] estimated profitability as a function of the concentration ratio equations at the four, three and two digit SIC categories. They found that the statistical significance of the concentration ratio rapidly diminished as the level of aggregation increased.

Finally, the time series of a concentration ratio for an industry is quite likely to resemble a constant or a time trend. Consequently, any effect of concentration would probably be captured by the intercept or trend term.

Forecasting the Return to Capital in the present study

The real side of the INFORUM model in conjunction with the product-to-industry bridge generates real value added weighted output (REVAWO) by industry. This fact suggests that the appropriate dependent variable for forecasting purposes is the real return of capital per unit of REVAWO. The numerator, the real return to capital, is obtained by dividing the return to capital in nominal terms by an aggregate price deflator, the GNP deflator. Using any price measure to forecast an element of value added - a determinant of prices - introduces the issue of simultaneity between prices and value added in a forecast. Appendix A of this chapter demonstrates that the iterative solution handles the simultaneity problem.

By combining elements of microeconomic theory and the dictates of long-run forecasting, the following industry specification was estimated:

$$(4.3)\quad \log \frac{\text{Return to Cap.}}{\text{DFL} * \text{REVAWO}} = b_0 + b_1\ \text{QTRD} + b_2 \frac{K}{L} + b_3\ UN^{-1} + b_4\ \text{Time} + b_5\ \text{SPEC}$$

where DFL = aggregate output deflator,

QTRD = deviation in "normal" output defined as the difference between real output in the current period and the moving average of real output of the previous three years.

output,

K = industry capital stock in real dollars,

L = hourly adjusted employment for that industry,

UN = total unemployment rate, and

SPEC = an optional variable specific to the particular industries (see below).

The deviation in the trend in output term is meant to capture the effect of the unanticipated growth in output on profits. Therefore, its coefficient is expected to be positive.

The capital-labor ratio is included as a proxy for the utilization of capital. Ideally, when the utilization of capital is increased by, say, overtime for labor or multiple shifts, then the capital-labor ratio should decline and capital's return should increase since it is becoming more productive. Consequently, the expected sign on this variable is negative. The capital stock is generated by the INFORUM investment equations and attempts to measure the actual level of the physical stock

of equipment.[8]

From the sign of the capital-labor ratio, one might be tempted to make an inference concerning the elasticity of substitution between capital and labor. In fact, for a perfectly competitive industry with only two factors of production and constant returns to scale, one can show that the sign on the coefficient of the capital-labor ratio is determined by the elasticity of substitution.[9] In that situation, an industry with an elasticity of substitution between capital and labor that is less than one will experience a decrease in capital's share of GPO with an increase in the capital-labor ratio. An elasticity of substitution that is greater than one and an increase in the capital-labor ratio combine to increase capital's share of GPO. However in this study, there are three "factors" of GPO production - labor, capital, and indirect business taxes - not two, thus rendering invalid the hypothesized relationship. A simple example will demonstrate this result. Suppose that, due to a tax increase, a perfectly competitive industry experiences an increase in the indirect business tax share of GPO. That increase means that either capital's share of GPO or labor's share of GPO must change regardless of the elasticity of substitution between capital and labor. That does not imply however, any change in the return to capital per unit of REVAWO. The inclusion of indirect business taxes as a separate factor of production severs the link between the elasticity of substitution, the capital-labor ratio and capital's share of GPO.

In order to generate the stabilizing influence of profits, the inverse of the unemployment rate is included. The inverse is used to accentuate the asymmetry of the influence. Accordingly, the sign is

expected to be positive; a falling unemployment rate will increase profits. Technical change and the influence of market structure (if any) is captured by the time trend. Consequently, its coefficient can have either sign since technical change could either enhance or reduce capital's share of income.

The industry variable is tailored to the specific needs of a sector. The initial specification called for a foreign trade variable: either import share of total output, export share of total output, or the net trade share of total output. However, these variables had to be dropped from the specifications for most of the sectors because of wrong signs or insignificance. For instance, a postive sign associated with the import share of output for the textile industry implies that the real return to capital for the textile industry is increased as a result of an increased use (measured as a share of domestic output) of imported textiles. There are a few sectors where the impact of foreign trade had a significant influence in the expected direction on the return to capital: Mining (3), Publishing and printing (9), Fabricated metal products (18) and Autos (22). These sectors retained the foreign trade measures. Mining has the net trade share; Autos have the import share; Printing and publishing, and Fabricated metal products have the export shares. In addition, Transportation equipment except autos has the growth in military and space expenditures on equipment, since it is the major producer of aircraft, missiles and rockets.

Petroleum refining and natural gas (11) had the characteristic of a negative total return to capital for 1960-1964 and 1972. Huge "paper" losses were incurred, as the vertically integrated oil companies shifted profits from refining to drilling. By doing so, the companies could

TABLE IV - 2

INDUSTRY RETURN TO CAPITAL EQUATIONS

	INTERCEPT	QTRD	KLR	INVUN	TIME	DUM	SPEC	RSQ	RBRSQ	AAPE	D-W
1 FARMS	3.831	-0.019	-0.018	0.188	0.017	0.312		0.723	0.630	1.045	1.616
	(8.31)	(-3.49)	(-1.87)	(0.42)	(1.79)	(4.07)		0.991	0.988	4.161	1.981
2 CRUDE PETROLEUM	-4.827	0.002	0.006	-2.357	0.118	9.981		0.997	0.994	0.445	2.342
	(-2.54)	(0.46)	(1.05)	(-4.22)	(5.56)	(5.04)		0.999	0.999	1.388	2.054
3 MINING	7.343	0.017	0.055	-0.841	-0.067	-0.728	0.068	0.818	0.740	2.827	1.816
	(6.83)	(1.62)	(1.22)	(-0.81)	(-2.66)	(-4.39)	(2.29)	0.985	0.979	8.114	1.718
4 CONSTRUCTION	1.702	0.007	0.005	-0.840	0.021			0.876	0.845	1.195	1.901
	(7.55)	(2.05)	(0.21)	(-2.69)	(4.69)			0.994	0.992	3.425	1.424
5 FOOD AND TOBACCO	5.493	-0.016	0.091	-0.226	-0.047			0.222	0.028	2.507	1.212
	(3.51)	(-1.15)	(0.99)	(-0.29)	(-1.20)			0.983	0.978	8.067	1.591
6 TEXTILES	4.260	0.008	0.016	2.055	-0.023			0.688	0.610	2.668	1.194
	(3.49)	(1.21)	(0.19)	(1.93)	(-0.66)			0.989	0.986	7.492	1.554
7 APPAREL	3.062	0.008	0.015	0.461	-0.008			0.290	0.113	3.303	1.865
	(5.38)	(1.14)	(0.05)	(0.51)	(-0.36)			0.981	0.976	8.911	1.691
8 PAPER	4.673	0.011	0.025	-0.188	-0.028			0.505	0.381	1.585	0.779
	(7.52)	(1.98)	(1.03)	(-0.40)	(-1.52)			0.993	0.991	5.731	1.118
9 PUBLISHING	3.154	0.012	0.033	-0.133	-0.014		0.732	0.546	0.394	1.454	2.443
	(5.41)	(2.57)	(0.39)	(-0.29)	(-0.81)		(2.20)	0.994	0.992	4.631	2.182
10 CHEMICALS	7.921	0.004	0.057	-0.339	-0.078			0.931	0.914	1.564	1.748
	(17.09)	(1.11)	(3.07)	(-0.79)	(-6.19)			0.989	0.986	7.087	0.967
11 PETROLEUM REFINING*	-0.194	-0.446	0.635	108.915	-0.361	-23.122		0.817	0.757	116.	2.155
	(-0.00)	(-1.11)	(0.71)	(1.94)	(-0.17)	(-2.81)		0.930	0.907	118.	2.344
12 RUBBER	7.241	0.024	0.224	3.618	-0.134			0.851	0.813	4.590	2.007
	(12.09)	(4.03)	(5.18)	(3.20)	(-7.37)			0.933	0.916	14.073	1.919

* Negative values for the return to capital for this sector prevented the use of logarithms. Instead, the dependent variable is the real purchasing power of capital per unit of real output.

TABLE IV - 2

INDUSTRY RETURN TO CAPITAL EQUATIONS

	INTERCEPT	QTRD	KLR	INVUN	TIME	DUM	SPEC	RSQ	RBRSQ	AAPE	D-W
13 LEATHER	4.263	0.020	0.311	1.866	-0.043			0.196	-.006	7.931	2.407
	(1.43)	(1.30)	(0.52)	(0.72)	(-0.61)			0.931	0.914	19.019	2.186
14 LUMBER	1.037	0.002	-0.017	0.474	0.035			0.671	0.589	2.526	1.392
	(1.45)	(0.50)	(-0.40)	(0.56)	(2.12)			0.987	0.984	8.443	1.610
15 FURNITURE	1.627	0.006	-0.567	-0.495	0.042			0.664	0.580	3.513	1.606
	(0.83)	(0.62)	(-1.44)	(-0.29)	(0.89)			0.969	0.962	11.570	1.441
16 STONE ETC...	4.649	0.009	-0.065	-1.891	-0.002			0.702	0.627	2.729	1.659
	(6.35)	(1.49)	(-1.21)	(-2.50)	(-0.10)			0.980	0.975	7.691	1.788
17 PRIMARY METALS	1.711	-0.019	-0.147	1.843	0.062			0.796	0.745	2.659	1.388
	(2.87)	(-3.62)	(-5.18)	(3.02)	(3.89)			0.958	0.947	13.268	1.587
18 FAB. METALS	2.918	0.016	0.138	2.002	-0.037		0.263	0.499	0.332	3.512	1.859
	(4.94)	(2.59)	(1.09)	(1.33)	(-1.54)		(2.62)	0.965	0.953	10.874	1.636
19 TRANS EQ.	8.073	0.049	0.595	-6.144	-0.099		-0.005	0.621	0.495	6.866	2.194
	(5.79)	(4.47)	(3.50)	(-3.96)	(-3.79)		(-0.61)	0.691	0.588	15.184	0.788
20 NON-ELECTRICAL MACH	3.733	-0.002	-0.025	0.649	-0.007			0.362	0.202	2.871	1.246
	(7.32)	(-0.41)	(-0.38)	(0.80)	(-0.57)			0.997	0.971	9.053	1.232
21 ELECT. MACH.	2.523	0.005	-0.098	0.827	0.015			0.335	0.169	4.449	1.611
	(2.31)	(0.73)	(-0.92)	(0.61)	(0.59)			0.973	0.960	12.783	1.602
22 AUTOS	-1.139	0.021	0.093	1.873	0.046		0.077	0.822	0.762	5.233	1.920
	(-0.30)	(3.18)	(1.47)	(1.47)	(1.00)		(1.94)	0.947	0.929	16.953	2.184
23 INSTRUMENTS	7.481	-0.005	0.098	5.615	-0.088			0.950	0.937	2.714	2.315
	(13.33)	(-1.23)	(3.21)	(7.42)	(-7.29)			0.978	0.973	9.224	2.612
24 MISC. MFG. IND.	6.550	0.002	0.732	0.982	-0.090			0.445	0.306	3.146	2.478
	(5.87)	(0.41)	(1.94)	(0.67)	(-2.36)			0.976	0.970	10.689	2.702
25 RAILROADS	1.541	-0.001	-0.037	0.327	0.044			0.774	0.717	2.217	1.356
	(0.82)	(-0.06)	(-1.84)	(0.44)	(1.16)			0.987	0.984	6.762	1.268

TABLE IV - 2

INDUSTRY RETURN TO CAPITAL EQUATIONS

	INTERCEPT	QTRD	KLR	INVUN	TIME	DUM	SPEC	RSQ	RBRSQ	AAPE	D-W
26 AIR TRANSPORTATION	5.321	0.029	0.006	-3.277	-0.032			0.789	0.736	2.875	1.955
	(9.07)	(4.43)	(1.42)	(-2.66)	(-3.39)			0.973	0.966	8.989	1.892
27 TRUCKING ETC...	3.471	0.001	-0.012	0.230	-0.001			0.569	0.461	1.379	0.797
	(8.91)	(0.33)	(-0.88)	(0.45)	(-0.08)			0.997	0.996	4.601	0.866
28 COMMUNICATIONS	5.233	0.002	-0.004	0.696	-0.022			0.910	0.887	1.056	0.804
	(13.92)	(0.20)	(-0.12)	(2.01)	(-2.92)			0.998	0.998	4.086	1.551
30 UTILITIES	4.937	0.009	-0.005	-1.229	-0.007			0.652	0.565	1.560	0.709
	(13.33)	(1.92)	(-1.04)	(-2.59)	(-0.69)			0.993	0.991	6.086	0.727
31 TRADE	4.511	0.002	0.213	0.030	-0.027			0.885	0.856	0.782	1.581
	(30.56)	(0.74)	(3.75)	(0.15)	(-7.00)			0.999	0.998	2.485	1.335
32 FIN. SERV.	4.316	0.004	0.139	2.189	-0.028			0.531	0.414	3.481	0.929
	(5.03)	(0.15)	(1.14)	(2.06)	(-1.68)			0.972	0.965	10.841	1.073
33 REAL ESTATE	3.377	0.003	-0.014	0.067	0.010			0.598	0.497	0.786	0.498
	(24.03)	(0.82)	(-1.42)	(0.28)	(4.05)			0.997	0.996	3.096	0.525
34 HOTELS	2.440	0.007	-0.119	-0.339	0.024			0.802	0.752	0.493	1.860
	(14.39)	(2.86)	(-6.31)	(-1.95)	(6.46)			0.999	0.999	1.757	1.651
35 MISC. BUS. SER.	3.919	-0.007	-0.056	0.451	0.006			0.797	0.746	0.839	1.153
	(23.24)	(-2.12)	(-3.17)	(1.77)	(0.08)			0.997	0.997	3.080	1.104
36 AUTO REPAIR	3.767	0.002	0.001	-0.194	0.001			0.272	0.090	0.464	1.480
	(40.88)	(1.30)	(0.30)	(-1.12)	(0.79)			0.999	0.999	1.784	1.483
37 AMUSEMENTS	3.542	0.029	-0.047	-0.132	0.005			0.224	0.031	2.521	1.349
	(6.07)	(1.67)	(-1.07)	(-0.22)	(0.81)			0.985	0.981	8.167	0.899
38 HEALTH AND EDUC.	4.686	0.005	-0.046	1.332	-0.023			0.949	0.937	1.051	1.182
	(22.32)	(0.76)	(-0.80)	(4.17)	(-6.56)			0.997	0.996	3.232	1.136

offset those profits against oil depletion allowances. To deal with these negative numbers, the dependent variable for this sector was not in logarithms but in normal shares.

.Table IV - 2 displays the results of the sectoral estimation. Before turning to the results of any equation, one should note that a low R^2 does not necessarily indicate an unsatisfactory equation. For instance, if the dependent variable is constant, the R^2 is zero but the equation's ability to predict the total return to capital when given REVAWO is perfect. For this reason, the R^2 and the three other descriptive statistics are also calculated for the total return and are reported underneath their values for the estimated equation.

The equations, for the most part, fit well and there is little evidence of serious serial correlation. Overall, the time trend and the inverse of the unemployment rate seem to be the most forceful influences. The domination of negative coefficients (23 to 14) on the time trend indicates that technical change has been operating to lower the return to capital per unit of REVAWO. Instruments (23), Mining (3), Rubber (12), and Chemicals (10) have the strongest negative trends while Crude Petroleum (2), Primary metals (17) and Construction (4) move against the negative trend with the most strength. Collinearity between the trend and the capital-labor ratio may be the culprit may serve to induce the negative time trends. For twenty-four sectors, the coefficients for the two variables have opposite signs.

Conversely, the unemployment rate comes in with the desired positive effect in twenty-two cases although only eight of those sectors have significant coefficients at the ten percent level. Yet, those twenty-two sectors will exert an important stabilizing influence on the

entire model during a forecast. Textiles (6), Autos (22), Electrical Machinery (21) and Financial Services (32) have the strongest stabilizing influence.

However, the unemployment rate comes in with the undesired negative effect for fifteen industries of which seven have significant coefficients at the ten percent level. There are two possible reasons that may explain the negative coefficients. One is that the stabilizing argument for the unemployment rate assumes that an industry's price reflects market conditions; upswings in demand increase price while downswings serve to reduce price. For two industries, Air transportation (26) and Utilities (30), that assumption is not true for the estimation period. Both industries were tightly regulated over that period, thereby restraining the profit movements in both industries. In fact, price regulation may serve to move profits counter-cyclically. For example, during a surge in economic activity, the price of inputs for an electric or gas utility may rise but the legal price that the utility may charge remains unchanged until the appropriate regulatory agency approves the rate increase. Until that rate increase goes into effect, the utility's profits will suffer. If there is a sufficient time lag between the rate request and the subsequent approval by the regulatory agency, the rate hike may be approved during the economic downturn in the cycle, thus improving profits.

The second reason may be found in industries that use a large proportion of raw materials in their production process. Generally the prices of raw materials tend to fluctuate more over the business cycle than the prices of the finished products that embody them. This implies that those industries will experience a profit "squeeze" during an

upswing and a profit boom during the downturn. The above reason may explain the negative coefficient for the Food and Tobacco (5), Furniture (15) and Stone, Clay and Glass (16) industries.

The capital-labor ratio occurs with the expected negative sign for sixteen industries while twenty-one industries have a positive influence. Six industries with positive coefficients are statistically significant at the ten percent level while five sectors had negative and significant coefficients. The unexpected positive signs for the capital to labor ratio are offset by negative time trends in seventeen of the twenty-one sectors. Without exception, the impact of this variable appears to be rather small.

Finally, the least effective variable is the deviation from normal output term; it is only significant at the 10% level in nine instances. At least, the coefficients are only negative for eight sectors. Collinearity between the unemployment rate and the output term may cause this result.

The sectoral specific variables are all of the correct sign, and except for autos, are all significant. The share of imports for autos was retained in order to maintain more credible forecasts.

Upon inspection of the capital share series, three sectors had dummy variables included in the equation to adjust for extraordinary circumstances. Both the Crude petroleum (2) and Mining (3) sectors experienced a reversal in a downward trend in capital's share of value added at the same time OPEC became dominant in the crude oil market. Consequently, a non-OPEC intercept dummy equal to one in years prior to the emergence of OPEC in 1973 and zero thereafter is included for both sectors. Agriculture (1) had a huge jump in its return to capital in

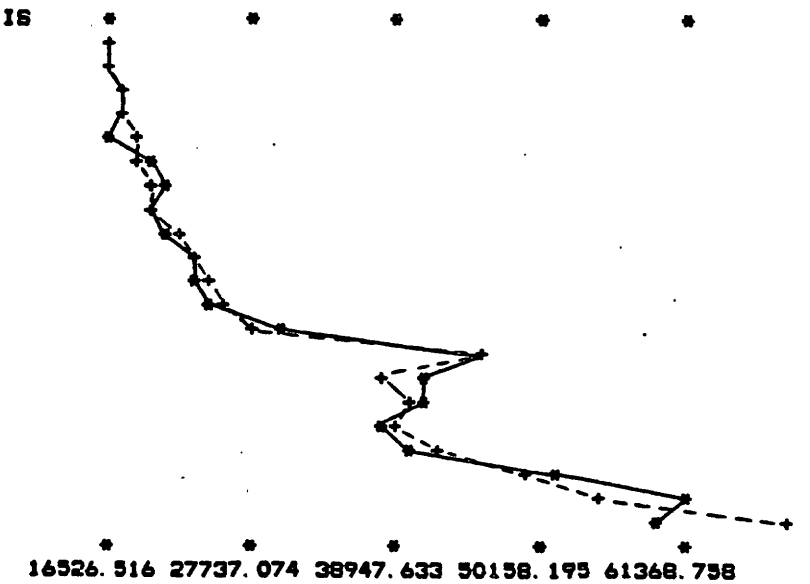
1973 due to the Russian grain deal. Since this deviation is a one-time occurrence, or at least is an unpredictable one, the year was "dummied out", thereby improving the estimates of the other coefficients.

To give some idea of the task involved in fitting reasonable forecasting equations to the return to capital, plots of eight sectors are presented in the next four pages. The plots show actual current-price levels of the return to capital and the predicted levels. While three of the eight sectors have little variation from a trend in their levels - Wholesale and Retail trade, Real Estate (in billions instead of millions of dollars) and Misc. Business Services - the others have a more volatile nature. Agriculture (1) fits the levels well except for a two large misses in the last two years; the average miss is 12.7 percent. The plot of the Mining (3) sector reflects the shift to coal because of the oil embargo. The plots of the Primary Metal (17) and Autos (22) sectors experience large swings and the equations, while not actually predicting the magnitude of the change, do capture the turning points.

One final point should be mentioned before turning to the discussion of the components of the return to capital. The forecasting specification for the return to capital reported above was not the only specification that was tested. During the testing of the entire model, it became apparent that the the twin goals of equations that fit the data well and of equations that had reasonable forecasting properties were not necessarily compatible. More than four general types of equations were estimated with each type having at least five permutations. The first type which had its dependent variable defined as the return to capital per unit of REVAWO was rejected because the

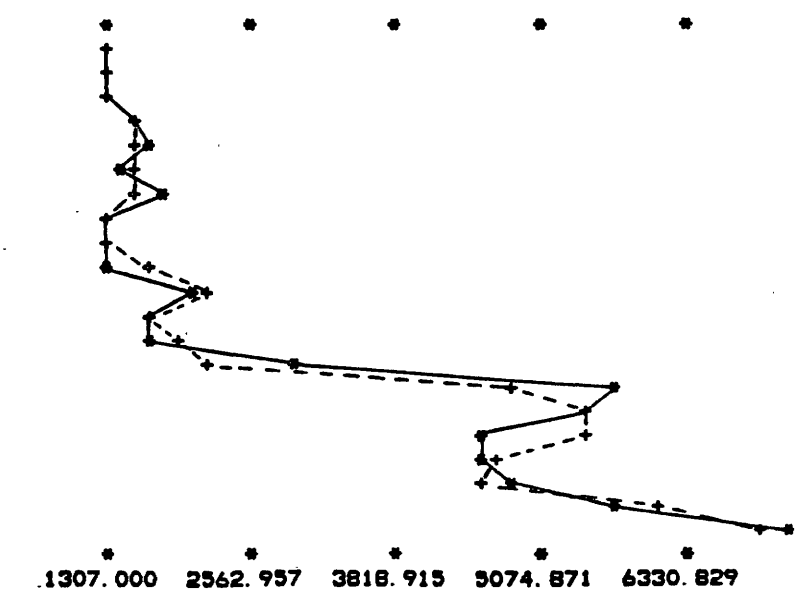
ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
AGRICULTURE (1)

DATE	ACTUAL IS *	PREDIC IS +
60	17063.00	16526.52
61	17568.00	17179.81
62	18043.00	17780.65
63	17866.00	17853.86
64	17131.00	19214.83
65	19922.00	19825.06
66	21463.00	20847.62
67	20496.00	20623.49
68	21180.00	22166.32
69	23777.00	23746.27
70	24104.00	24955.95
71	25444.00	25821.23
72	30328.00	28549.36
73	46348.00	46347.84
74	41552.00	38441.82
75	42192.00	40950.97
76	38573.00	39019.93
77	40882.00	42971.93
78	52088.00	49553.18
79	61771.00	55487.98
80	59415.00	69216.16
	IS *	IS +



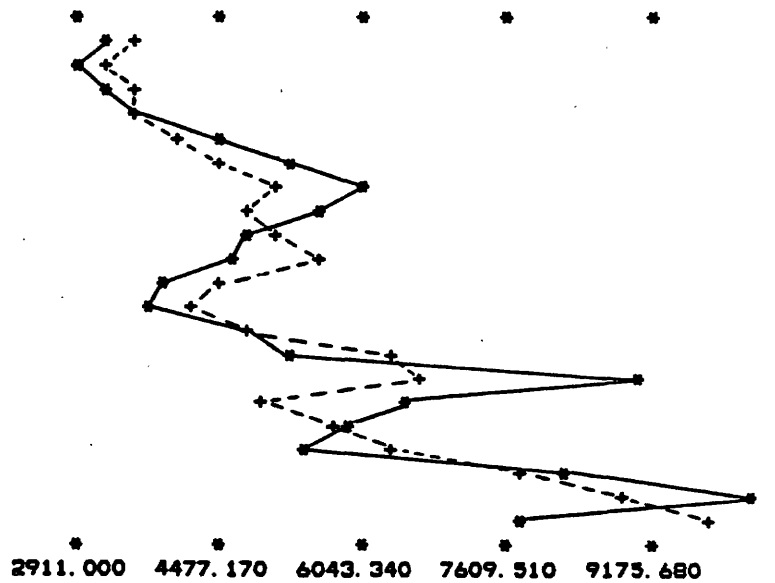
ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
MINING (3)

DATE	ACTUAL IS *	PREDIC IS +
60	1399.00	1389.31
61	1371.00	1403.00
62	1357.00	1342.64
63	1612.00	1645.71
64	1758.00	1636.33
65	1539.00	1638.70
66	1832.00	1561.18
67	1316.00	1328.43
68	1427.00	1381.83
69	1307.00	1724.18
70	2093.00	2193.58
71	1692.00	1723.78
72	1760.00	2006.61
73	3054.00	2243.92
74	5721.00	4891.45
75	5570.00	5474.36
76	4657.00	5538.95
77	4655.00	4732.29
78	4895.00	4672.30
79	5804.00	6102.12
80	7210.00	7070.97
	IS *	IS +



ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
PRIMARY METALS (17)

DATE	ACTUAL IS *	PREDIC IS +
60	3339.00	3545.55
61	2911.00	3240.87
62	3230.00	3602.10
63	3685.00	3595.94
64	4576.00	4012.81
65	5382.00	4620.84
66	6081.00	5250.38
67	5703.00	4866.00
68	4868.00	5249.46
69	4676.00	5617.14
70	3928.00	4485.49
71	3777.00	4191.61
72	4841.00	4871.28
73	5350.00	6452.04
74	9163.00	6809.70
75	6526.00	5073.55
76	5948.00	5835.84
77	5475.00	6504.77
78	8283.00	7893.88
79	10272.00	9000.15
80	7872.00	9846.01
	IS *	IS +



ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
AUTOS (22)

DATE	ACTUAL IS *	PREDIC IS +
60	3656.00	4601.83
61	3235.00	3085.44
62	4901.00	5487.34
63	6001.00	5239.68
64	5911.00	5401.82
65	7740.00	8798.66
66	7014.00	7535.23
67	5902.00	5061.60
68	7777.00	7156.55
69	7132.00	7003.99
70	3740.00	3341.65
71	7449.00	5514.05
72	8167.00	6626.44
73	8091.00	9873.51
74	2793.00	5286.45
75	5131.00	4324.56
76	9814.00	9317.71
77	12699.00	14376.51
78	12725.00	8556.76
79	8021.00	8394.96
80	4446.00	5541.78
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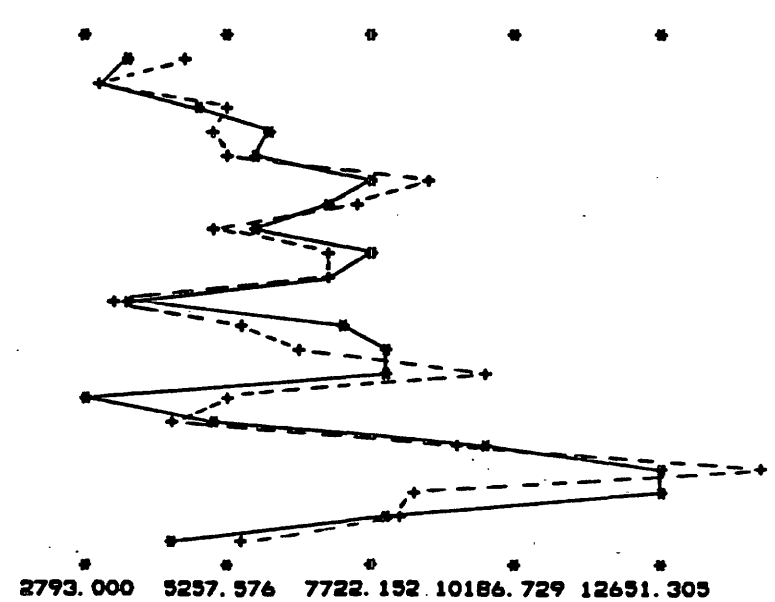
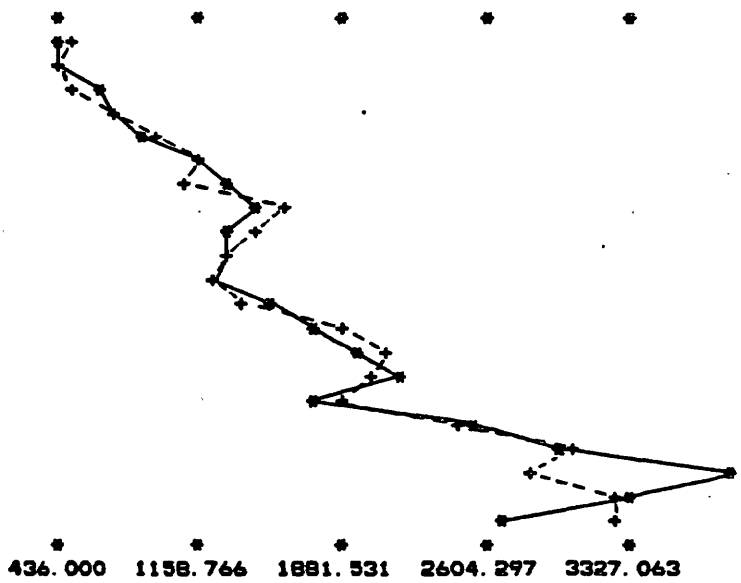


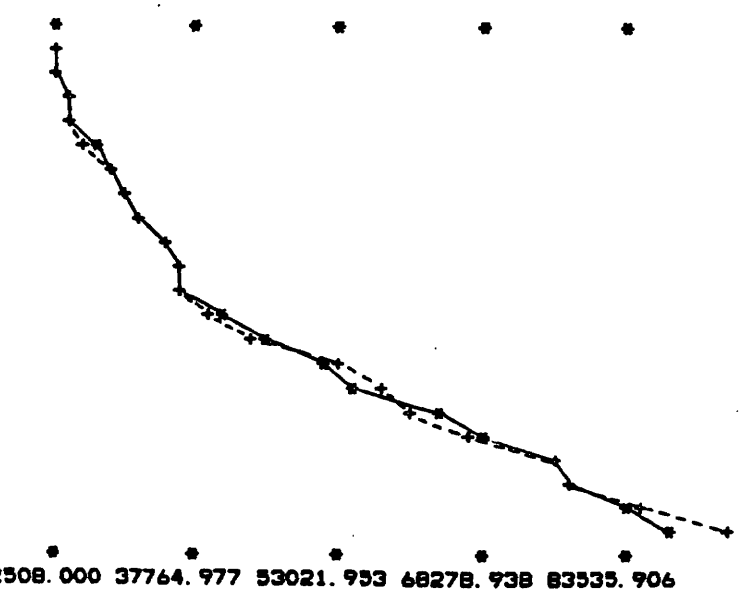
ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
AIR TRANSPORTATION (26)

DATE	ACTUAL IS *	PREDIC IS +
60	436.00	521.95
61	486.00	476.36
62	664.00	536.09
63	774.00	793.01
64	934.00	977.44
65	1215.00	1160.93
66	1350.00	1133.54
67	1448.00	1595.83
68	1307.00	1496.58
69	1354.00	1332.87
70	1234.00	1279.24
71	1576.00	1444.94
72	1804.00	1886.76
73	1980.00	2169.56
74	2225.00	2053.04
75	1772.00	1936.43
76	2533.00	2481.71
77	3026.00	3054.33
78	3833.00	2877.33
79	3334.00	3320.12
80	2683.00	3263.94
	IS *	IS +



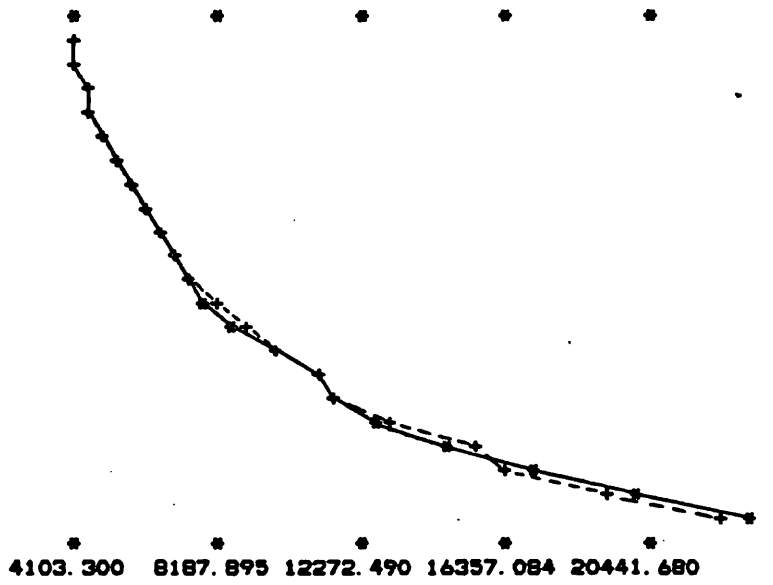
ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
WHOLESALE AND RETAIL TRADE (31)

DATE	ACTUAL IS *	PREDIC IS +
60	22508.00	23288.57
61	22676.00	22834.21
62	24152.00	24362.35
63	24168.00	24886.20
64	27296.00	26353.04
65	28970.00	28658.34
66	30486.00	31408.35
67	32292.00	31804.98
68	35654.00	34766.10
69	37270.00	36462.95
70	37066.00	37062.54
71	41440.00	39404.99
72	46369.00	45236.32
73	51611.00	53528.54
74	54810.00	58836.70
75	65010.00	60894.63
76	69184.00	67318.28
77	76663.00	76271.81
78	78065.00	77589.97
79	84291.00	85581.36
80	89086.00	94215.81
	IS *	IS +



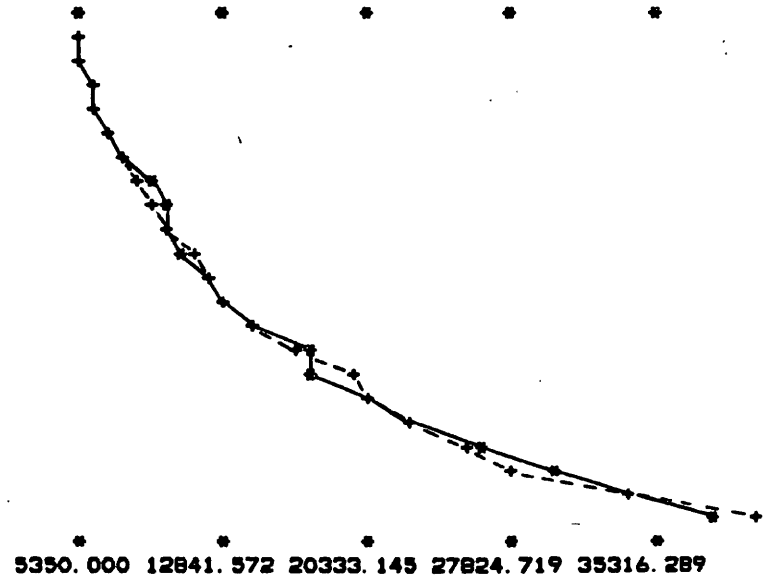
REAL ESTATE (33)
ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
REAL ESTATE (33)

DATE	ACTUAL IS *	PREDIC IS +
60	4103.30	4205.25
61	4322.70	4340.81
62	4650.70	4645.15
63	4908.90	4732.09
64	5208.50	5005.54
65	5573.00	5467.21
66	5976.40	5928.69
67	6339.00	6269.56
68	6683.30	6790.53
69	7178.50	7353.57
70	7506.10	7620.43
71	8176.60	8489.57
72	8968.00	9026.96
73	9914.60	9948.82
74	11073.10	11217.91
75	11795.10	11841.87
76	13025.00	13397.63
77	15004.80	15636.94
78	17332.60	16759.77
79	20075.40	19358.31
80	23300.90	22563.87
	IS *	IS +



ACTUAL LEVELS OF RETURN TO CAPITAL
VERSUS PREDICTED LEVELS FOR
MISC. BUSINESS SERVICES (35)

DATE	ACTUAL IS *	PREDIC IS +
60	5350.00	5700.69
61	5905.00	5861.30
62	6260.00	6374.19
63	6806.00	6725.65
64	7487.00	7281.05
65	8293.00	7974.40
66	9177.00	9020.24
67	10045.00	9570.77
68	10233.00	10537.91
69	11309.00	11792.87
70	12114.00	12158.56
71	13390.00	12859.01
72	14849.00	14702.24
73	17410.00	17012.05
74	18018.00	19912.49
75	20498.00	20548.09
76	22802.00	22830.00
77	26964.00	26060.11
78	30240.00	28559.29
79	34061.00	34279.01
80	38575.00	40560.40
	IS *	IS +



ENDNOTES

1. Ross Preston, The Wharton Annual and Industry Forecating Model, (Philadelphia: Economics Research Unit, Univerisity of Pennslyvannia, 1972).

2. Michael McCarthy, "Analysis of Non-Wage Income Components," The Brookings Model: Some further results, ed. James Duesenberry, G. Fromm, L. Klein and E. Kuh. (Chicago: Rand McNally, 1969) pp. 154-162

3. Lawrence Officer, Supply Relationships in the Canadian Economy, (East Lansing, Michigan: Michigan State University, 1972) pp. 18-31

4. David Belzer, "An Integaration Of Price, Wage and Income Flows in an Input-Output Model of the United States," unpublished Ph.D. dissertation, University of Maryland, 1978.

5. See Belzer, Ibid., p. 317-320 for a complete derivation.

6. For a concise description of the controversy see Almarin Phillips, "A Critique of Empirical Studies of the Relation Between Market Structure and Profitability," Journal of Industrial Economics, Vol. 24, No. 4, June 1976, pp. 241-249

7. Francis Esposito and Louis Esposito, "Aggregation and the Concentration-Profitability Relationship," Southern Economic Journal, Vol. 44, No. 2, October 1977, pp. 323-332.

8. See Anthony Barbera, "A Study of the Determinants of Factor Demand by Industry," unpublished Ph.D. dissertation, University of Maryland, 1982.

9. A typical proof can be found in R.G.D. Allen, Macro-Economic Theory, (New York City; St. Martin's Press, 1967) pp. 48-49

10. In fact, CCA does not quite equal accounting depreciation but the difference is less than one percent of the total. Capital consumption allowances contain depreciation of employees' autos reimbursed by business, unrepairable damage caused by accidents to fixed capital, and depreciation of mining exploration, shafts and wells, while accounting depreciation does not. On the other hand, accounting depreciation includes amortization of intangible assets, depreciation of films and assets of foreign branches, and allowances for audit but capital consumption does not.

11. Gary Fromm and Lawrence Klein, "The Complete Model: A First Approximation," The Brookings Quarterly Econometric Model of the United States, ed. James Duesenberry, G. Fromm, L. Klein and E. Kuh. (Chicago: Rand McNally, 1965) pp. 706-707

12. McCarthy, op cit pp. 154-162

13. The residual sector had the growth in investment and the current level of investment as explanatory variables.

14. Preston, op_cit pp. 94-98

15. See Belzer, op_cit, pp. 240

16. See Clopper Almon, Margaret Buckler, Lawrence Horwitz and Thomas Reimbold, 1985: Interindustry Forecasts of the American Economy, (Lexington, Mass. : Lexington Books, 1974) pp. 86-89

17. Belzer op_cit pp. 80

18. The fourth section of Chapter II has more detail.

19. Prior to the adopting of the Belzer specification, a log-linear function was tested with actual depreciation regressed on synthetic depreciation. Though the equations fit well, they had inappropriate forecasting properties: elasticities ranging from a low of 0.334 for Instruments to a high of 1.707 for Crude petroleum were estimated. Only a handful of sectors had elasticities close to unity. Similar results were obtained for a linear function.

20. The statistics are computed by transforming the errors from the equation to errors in terms of the levels of depreciaton.

21. Belzer, op_cit p. 246

22. Brian O'Connor, "An Income Side to an Input-Output Model of the United States," (unpublished Ph.D. dissertation, University of Maryland, 1973) p. 72-73

23. Belzer, op_cit p. 246-250

24. Ibid p. 249-250

25. Ibid, p. 250

26. The savings rate of proprietors is assumed to equal the overall personal savigs rate: personal savings divided by disposable income less transfers to foreigners.

27. Net recepients of interest payments are not creating value added by convention. The value added necessary to make the net interest payments is created elsewhere.

28. Officer, op_cit, pp. 40-42

29. Belzer, op_cit pp. 255-260

30. Belzer, op_cit pp. 252

31. O'Connor, op cit. p. 76

32. Belzer, op cit. p. 250

APPENDIX IV-A

Allowing the return to capital to be a linear function of a price deflator implies that a portion of value added by product is also a function of the price variable. Naturally, two issues spring from the formulation. First, given that the model is solved iteratively for any forecast year, will value added by product converge to a solution? Secondly, if a stable solution exists for value added, will that solution be independent of the first guess of prices? Since product prices are a linear function of value added, if value added is independent of the initial prices, then final prices will converge and be independent of the initial prices. Consequently, the analysis will focus on the behavior of value added over the iterations of a forecast year.

Though the equations in the price model are estimated at the industry level, the model may, for convienence in this appendix, be thought to forecast the return to capital by product. All variables are defined in terms of products, not industries. Let

v = row vector (1xn) of total value added per unit of real output,

p = row vector of prices,

d = row vector of labor compensation and indirect business taxes per unit of real output,

w = column vector (nx1) of output shares of total output, such that the output deflator DFL = pw,

s = row vector of the real capital per unit of real output, and

A = direct requirements matrix.

Adopting the convention that subscripts refer to iterations, the interindustry price definition is

$$(1) \quad p_k = p_k A + v_k$$

or

$$(2) \quad p_k = v_k (I-A)^{-1} .$$

Total value added for an iteration is

$$(3) \quad v_k = d + p_{k-1} ws = d + v_{k-1}(I-A)^{-1} ws.$$

Solving equations (2) and (3) for p_k yields,

$$(4) \quad p_k = \sum_{j=1}^{k} d(w\ s\ (I-A)^{-1})^{j-1} + (w\ s\ (I-A)^{-1})^{k-1} DFL_0\ s$$

From (4), independence and convergence will occur if all of the elements of $(w\ s\ (I-A)^{-1})^{k-1}$ move towards zero as k approaches infinity.

In order to show that all of those elements go to zero as k approaches infinity, the concept of a l-norm of a matrix (or vector) needs to be introduced. The l-norm of a matrix (B) is the largest column sum of the absolute values of its elements or

$$||B|| = \max_j \sum_{i=1}^{n} ||B_{ij}||.$$

One can show that if $||B|| < 1$ then all of the elements of B^k will go to zero as k approaches infinity.[1]

Using Schwarz's inequality[2] that $||bc|| < ||b||\ ||c||$, where b and c are arbitrary vectors, we now have

(5) $||w\ s\ (I-A)^{-1}|| < ||w||\ \ ||s(I-A)^{-1}||$.

Since $\sum w = 1$ and w is a column vector,

(6) $||w|| = 1$.

Recalling that in the base year all prices are one by definition,

(7) $p = 1 = v(I-A)^{-1}$, where 1 is the unit vector.

Since v > s for every product, it follows that

(8) $s(I-A)^{-1} < v(I-A)^{-1} = 1$,

and

(9) $||s(I-A)^{-1}|| < 1$.

Substituting the results of (6) and (9) into equation (5) yields .sk 1

(10) $||ws\ (I-A)^{-1}|| < ||w||\ \ ||s(I-A)^{-1}||$, or

(11) $||ws(I-A)^{-1}|| < (1)\ (1) = 1$.

For the base year of the model, $||s(I-A)^{-1}|| = 0.905$, so all of the elements of $ws(I-A)^{-1}$ matrix do go to zero as k approaches infinity.

Pushing the analysis further, suppose that value added by product was a function of product prices not an aggregate index, would forecasted value added still converge and exhibit independence? In order to answer this question, the definition of value added must be changed to

(3') $v_k = d + p_{k-1} S$,

where S is a diagonal matrix with the diagonals equal to the real return to capital per unit of real output.

Solving the system as in the previous case, the analogous equations to (3) and (4) are

$$(4') \quad p_k = \sum_{j=1}^{k} (S(I-A)^{-1})^{j-1} + (S(I-A)^{-1})^{k-1} p_0 S$$

Convergence and independence depend on the movement of the elements in the $S(I-A)^{-1}$ matrix.

The $||S|| < 1$ since it is, by definition, a diagonal matrix of real shares. However, $||(I-A)^{-1}|| > 1$ since the diagonals of $(I-A)^{-1}$ are typically greater than one. Consequently, there is no guarantee of convergence, because there is no guarantee that all the elements of $S(I-A)^{-1}$ are less than one. Whether those elements are less than one will depend on the share of the real return to capital by product (S). As a practical matter, the shares for Agriculture (1), Real estate (63), and the Rest of the world (75) are large enough to insure that all of the elements are not less than one.

The difference in the two results about stability stems from the use of the weights for the aggregate price index. In the deflator instance, the output shares modify the impact of a large share of the return to capital. When the return to capital is a function of product prices, the weights are in essence, unity, which will allow no damping effect of repeated multiplication.

NOTES

1. For a proof see Clopper Almon, Matrix Methods in Economics, (Reading, Mass.: Addison-Wesley Publishing Co., 1967), p.27-28 or Alpha Chang, Fundamental Methods of Mathematical Economics, (New York: McGraw-Hill, 1967), p.125-26.

2. For a proof, see Almon, Ibid. or Evan Nering, Elementary Linear Algebra, (Phildelphia: W.B. Saunders Co., 1974), p. 283-84.

APPENDIX IV - B

For the purposes of forecasting total depreciation, investment in structures by industry is required to be consistent with the estimates reported by NIPA. The NIPA reports purchases of structures by type of structures (Tables 5.4 and 5.5). For certain sectors, there is a direct link between purchases by type of structures and industry purchases of structures. Table B1 displays the industries and the NIPA purchase types.

Table B1

Industry	NIPA Category
Agriculture (1)	Farms
Railroads (25)	Railroads
Communications (28)	Telephone and Telegraph
Utilities (30)	Electric Light and Power, Gas

Investment in plants and structures is available in the Annual Survey of Manufacturers for the manufacturing sectors. The other sectors have the construction data reported in a variety of sources. The Bureau of Labor Statistics in 1979 published Capital Stock Estimates for Input-Output Industries: Methods and Data which contained investment in structures by industry for 1947-1974.

The industries not displayed in Table B1 had two problems to be corrected before those series could be used in the estimation:

Table B2

Group	Industries	NIPA definitions
2	Crude Petro. (2) Mining (3)	Petroleum Pipelines Petroleum and natural gas Mining exploration, shafts, and wells
3	All manufacturing (sectors 5-24)	Industrial
4	Construction (4) Air Trans. (26) Other Trans. (27) Trade (31) Fin. Serv. (32) Real Estate (33) Misc. Bus. (35) Auto Repair (36) Amusements (37) Health & Educ. (38)	Commercial, Religous Educational, Hospitals and Institutional

consistency with the NIPA estimates and extensions of the data through 1980. From the definitions of the types of structures in the NIPA, a group of industries can be linked to a group of NIPA construction categories. For instance, the two industries, Crude Petroleum and Natural Gas (2), and Mining (3), did all of the construction portrayed by the NIPA group of types, Petroleum pipelines, Petroleum and natural gas, and Mining exploration, shafts and wells. Table B2 shows the concordance between the industry categories and NIPA structure types.

The industry series were scaled so the sum of industry group equaled the total for the NIPA group. Regressions were estimated with the industry estimates as the dependent variables and the NIPA group as the independent variable. Those estimated equations are shown in Table B3. Estimates for 1975-1980 were obtained from simulation of the equations over that period.

Table B3

```
CONS2 = 1460.002 +    0.664 * NIPA GROUP2
         (7.867)     (6.324)       RBSQ = 0.600 DW = 0.730

CONS3 = -1460.002 +   0.336 * NIPA GROUP2
         (0.252)     (5.606)       RBSQ = 0.539 DW = 1.629

CONS4 =  -26.868 +    0.026 * NIPA GROUP4
        (-2.083)    (20.208)       RBSQ = 0.940 DW = 2.133

CONS5 =   23.646 +    0.093 * NIPA GROUP3
         (0.706)    (12.086)       RBSQ = 0.848 DW = 0.488

CONS6 =  -19.325 +    0.029 * NIPA GROUP3
        (-2.100)    (13.672)       RBSQ = 0.877 DW = 0.959

CONS7 =  -19.325 +    0.029 * NIPA GROUP3
        (-2.100)    (13.672)       RBSQ = 0.877 DW = 0.959

CONS8 =   -2.193 +    0.042 * NIPA GROUP3
        (-0.218)    (18.326)       RBSQ = 0.928 DW = 0.809

CONS9 =   -1.858 +    0.060 * NIPA GROUP3
        (-0.061)     (8.660)       RBSQ = 0.740 DW = 0.674

CONS10 =  -61.210 +    0.123 *  NIPA GROUP3
         (-3.219)    (28.111)       RBSQ = 0.968 DW = 1.467

CONS11 =  109.191 +    0.079 *  NIPA GROUP3
          (2.684)     (8.498)       RBSQ = 0.733 DW = 0.988

CONS12 =  -51.782 +    0.037 *  NIPA GROUP3
         (-3.149)     (9.768)       RBSQ = 0.784 DW = 0.624

CONS13 =   -1.701 +    0.003 *  NIPA GROUP3
         (-1.326)    (11.831)       RBSQ = 0.842 DW = 1.470

CONS14 =   19.359 +    0.021 *  NIPA GROUP3
          (1.463)     (6.762)       RBSQ = 0.632 DW = 0.700

CONS15 =  -15.293 +    0.017 *  NIPA GROUP3
         (-2.065)     (9.820)       RBSQ = 0.786 DW = 0.915

CONS16 =   36.713 +    0.032 *  NIPA GROUP3
          (2.410)     (9.201)       RBSQ = 0.763 DW = 0.775

CONS17 =  136.943 +    0.086 *  NIPA GROUP3
          (3.090)     (8.440)       RBSQ = 0.730 DW = 0.966

CONS18 =   -5.813 +    0.049 *  NIPA GROUP3
         (-0.473)    (17.513)       RBSQ = 0.922 DW = 1.299
```

Table B3 continued

CONS19 =	-15.478 +	0.044 *	NIPA GROUP3	
	(-0.767)	(9.420)	RBSQ = 0.771	DW = 1.173
CONS20 =	-76.765 +	0.095 *	NIPA GROUP3	
	(-3.803)	(20.533)	RBSQ = 0.942	DW = 1.298
CONS21 =	-53.275 +	0.075 *	NIPA GROUP3	
	(-4.095)	(25.258)	RBSQ = 0.961	DW = 1.504
CONS22 =	39.121 +	0.045 *	NIPA GROUP3	
	(1.008)	(5.083)	RBSQ = 0.489	DW = 0.850
CONS23 =	-31.054 +	0.028 *	NIPA GROUP3	
	(-3.822)	(15.210)	RBSQ = 0.899	DW = 1.350
CONS24 =	-9.901 +	0.013 *	NIPA GROUP3	
	(-1.719)	(9.651)	RBSQ = 0.780	DW = 0.711
CONS26 =	-37.358 +	0.016 *	NIPA GROUP4	
	(-2.421)	(10.546)	RBSQ = 0.809	DW = 1.079
CONS27 =	166.286 +	0.034 *	NIPA GROUP4	
	(3.217)	(6.703)	RBSQ = 0.628	DW = 1.010
CONS31 =	215.891 +	0.219 *	NIPA GROUP4	
	(2.369)	(24.354)	RBSQ = 0.958	DW = 1.475
CONS32 =	-231.919 +	0.147 *	NIPA GROUP4	
	(-2.063)	(13.248)	RBSQ = 0.870	DW = 1.607
CONS33 =	-456.041 +	0.223 *	NIPA GROUP4	
	(-2.136)	(10.585)	RBSQ = 0.810	DW = 2.201
CONS35 =	-21.016 +	0.015 *	NIPA GROUP4	
	(-1.313)	(9.183)	RBSQ = 0.762	DW = 1.029
CONS36 =	-54.156 +	0.033 *	NIPA GROUP4	
	(-2.122)	(13.108)	RBSQ = 0.868	DW = 2.898
CONS37 =	-120.736 +	0.059 *	NIPA GROUP4	
	(-2.120)	(10.749)	RBSQ = 0.815	DW = 1.390
CONS38 =	445.181 +	0.287 *	NIPA GROUP4	
	(3.004)	(19.636)	RBSQ = 0.937	DW = 0.723

Chapter V Indirect Business Taxes and Government Subsidies

The government piece of value added is the subject of this chapter. It comes in two sorts: (1) indirect business taxes and nontax charges, and (2) government subsidies. Indirect business taxes and nontax charges comprise nine percent of GNP; government subsidies, a meager two-tenths of a percent.

Since neither component is large, simple forecasting procedures are developed for both. Indirect business taxes are, for the most part, composed of federal excise taxes, property taxes, franchise fees, and state and local sales taxes. Because of data imitations at the industry level, indirect business taxes by industry are divided into two categories: federal excise taxes and all other taxes. Federal excise taxes are forecasted as functions of output or personal consumption expenditures depending on the legislated tax base. Since the residual category of all other taxes is dominated by sales and property taxes, it is made a function of output and the capital stock of the industry. The first section describes the estimation and forecasting structure for indirect business taxes. Section 2 describes government subsidies and the rationale for exogenously specifying them throughout a forecast.

V.1 Indirect Business Taxes

Indirect business taxes and nontax accruals are tax liabilities that are incurred by business and other liablilities that are "convenient" to treat as taxes. Indirect business taxes include excise,

property, sales, black lung, and hazardous waste taxes, and the windfall profits tax on crude oil. Nontaxes include such categories as rents, royalties, fines and fees paid by business to the government. The distribution of indirect business taxes and nontaxes by type of liability is shown in Table V-1. State and local liabilities have the largest share of the total. Sales and property taxes share the lead for the largest single component. Federal excise taxes are the next in size, followed by custom duties.

As the Table V-1 shows, there is a wide diversity of sources for indirect business tax receipts. The distribution of taxes by industry is available from the BEA upon request. The best method of modelling this component by industry might be to develop equations for the major categories of these taxes. However, data restrictions block this approach. First, on the state and local level, the identification of a single statutory tax rate over all of the jurisdictions would be extremely difficult. For example, in order to obtain a property tax rate for the U.S. data for property taxes by locality would be necessary. Secondly, the task of constructing and forecasting the appropriate tax base by category would also be extremely difficult. A final consideration is that the BEA must perform a great deal of prorating to obtain annual tax payments by category for each industry. The data, therefore, have a considerable margin of error.

As a consequence of the above considerations a simplified approach is employed here. Sectoral detail for federal excise taxes is quite reliable and is available from the BEA. Consequently, excise tax equations are estimated for those industries where excise taxes are relatively important such as Communications (28), and Trade (31). Since

Table V - 1

1981 Distribution by Type of Indirect Business Taxes

(Billions of Dollars)

Indirect business taxes and nontax accruals	251.29	
Federal	58.53	(23.3%)
Excise taxes	44.15	(17.6%)
Custom duties	8.59	(3.4%)
Nontaxes	5.80	(2.3%)
State and Local	192.76	(76.7%)
Sales taxes	90.42	(36.0%)
Property taxes	75.09	(29.9%)
Motor vehicle licences	2.62	(1.0%)
Severence taxes	7.54	(3.0%)
Other taxes	6.82	(2.7%)
Nontaxes	10.27	(4.1%)

Source: Table 3.4, Survey of Current Business, July, 1982.

the residual tax receipts by industry represent, for the most part, sales and property taxes, they are forecasted as a function of output and the capital stock which is intended as a proxy for property values.

The above approach is different from that used in other large scale models. For example, the Wharton industry model had equations for only indirect business tax receipts in the aggregate.[1] Industry detail was retained in the Brookings quarterly model by combining aggregate equations by major categories with industry share equations.[2] The industry share equations were a function of the sector's share of output and share of capital consumption allowances. In the Brookings model, capital consumption allowances were included as a proxy for property values.

Belzer modified the Brookings specification to the dictates of the INFORUM model.[3] Equations in the aggregate were developed for state and

local general taxes, and property taxes. Share equations by industry were developed to distribute the total for property and sales taxes with the shares being a function of a time trend and with industry share of output. Excise taxes were estimated for the major products and were directly allocated to the appropriate industry to complete the calculation of sectoral indirect business taxes.

Forecasting Excise Taxes

Federal excise taxes are attributed to approximately two-thirds of the industries: 21 of the 37 sectors have them. However, in most cases, those taxes do not amount to more than five percent of all indirect business tax liabilities for a sector. Only seven sectors - Food and Tobacco (5), Petroleum refining (11), Rubber products (11), Motor vehicles (22), Air transportation (26), Communication (28), and Trade (31), have excise tax liabilities over five percent of their indirect business taxes. For those seven sectors, excise tax equations have been estimated.

There are two types of excise taxes: ad valorem and those specified as dollars per physical unit. Three sectors have excise taxes legislated in ad valorem terms, Motor Vehicles (22), Air Transportation (26), and Communications (28). For each sector, a synthetic excise tax series is calculated as the product of the statutory tax rate and the industry's output. The logarithm of the synthetic tax series is regressed against the logarithm of the actual series. Note that the synthetic tax series is not expected to equal the actual tax receipts, an appropriate forecasting property would be that the elasticity of actual receipts to synthetic receipts should be unity. In a forecast,

the unitary elasticity would imply that any growth in the synthetic tax series would be transmitted to actual tax receipts; a ten percent growth in the synthetic series would mean a ten percent increase in the actual tax receipts. Table V-2A displays the results for those three equations. Each equation has an elasticity of about unity. Any variation from one is caused by the use of an approximation of the actual tax base.

The sectors which have taxes set in dollar terms per physical unit have their equations displayed in Table V-2B. These sectors have the logarithm of actual tax receipts as a function of a variable in real terms - either personal consumption expenditures, output, or imports. Again, we would like to find and do find that the elasticities are again close to unity; a given increase in the tax base boosts the tax receipts by the same percentage. One equation to note is the one for tobacco. The elasticity for the rate base is as close to unity as can be expected. Overall, both sets of equations fit reasonably well with good long-run forecasting properties.

A special set of sectors have taxes resembling excise taxes: Crude petroleum (2), Mining (3), Chemicals (10) and Real estate (33). The windfall profits tax on crude petroleum extraction falls mainly on the Crude petroleum (2) industry though a small portion is passed on to the recipients of royalty income in the Real estate (33) sector. The black lung tax falls on coal mining, and the chemical cleanup (Superfund) tax falls mainly on the Chemical (10) industry. All of the taxes are specified differently: windfall profits approximate an ad valorem tax on a portion of the price, Superfund tax is legislated per physical unit and the black lung tax is split into an ad valorem part and a physical

Table V - 2A

Ad Valoreum Federal Excise Taxes

Sector and Taxable Item	Equation Results
22 Motor Vehicles	Tax = -3.966 + 1.155 * TRUCK (-1.80) (4.67) $RBAR^2$ = 0.722 D-W = 1.49
26 Air Transportation	Tax = -3.07 + 1.325 * Fly (-2.91) (2.19) $RBAR^2$ = 0.849 D-W = 1.17
28 Telelphone use	Tax = -1.237 + 1.160 * Talk (-1.59) (1.51) $RBAR^2$ = 0.895 D-W = 2.05

t values for the slope coefficients are calculated for the hypothesis that the coefficient is different from one.

Variable definitions

(all variables are in logarithms)

TRUCK = synthetic excise tax for truck chassis obtained by taking the excise tax rate multiplied by nominal output of the motor vehicle industry,

FLY = synthetic excise tax for personal air travel obtained by the excise tax mulitplied by the nominal output of the air transportation industry,

TALK = synthetic excise tax for telephone use obtained by multiplying the excise tax rate by the nominal output of the communications industry,

Table V - 2B

Dollars per physical unit tax

Sector and Taxable Item		Equation Results
5	Alcohol	Tax = -1.48 + 0.957 * PCEALC (-4.52) (1.33) $RBAR^2$ = 0.978 D-W = 0.984
5	Tobacco	Tax = -2.10 + 1.016 * PCETOB (-5.87) (0.43) $RBAR^2$ = 0.974 D-W = 1.559
11	Gasoline	Tax = 0.35 + 0.963 * Q11 (0.60) (0.50) $RBAR^2$ = 0.894 D-W = 0.431
12	Tires	Tax = -2.08 + 0.835 * Q12 (-3.35) (2.69) $RBAR^2$ = 0.902 D-W = 1.03
31	Custom Duties	Tax = -7.33 + 1.332 * IMP77$ (-6.96) (0.42) $RBAR^2$ = 0.775 D-W = 0.830

t values for the slope coefficients are calculated for the hypothesis that the coefficient is different from one.

Variable definitions

(all variables are in logarithms)

PCEAL = personal consumption of alcohol, on and off premises, in 1977 dollars,

PCETOB = personal consumption of tobacco in 1977 dollars,

Q11 = output in 1977 dollars for the petroleum refining industry,

Q12 = output in 1977 dollars for tires,

IMP72 = total merchandise imports in 1977 dollars

tax. No equations could be estimated for any of these taxes because all became effective in 1980 or 1981. Therefore, a stop-gap procedure is to maintain the ratio of tax receipts to nominal output in the last observed year for the legislated duration of the tax.

Non-excise indirect tax equations

The sectoral forecasting equation for the remaining indirect business taxes is given by

$$(5.1)\quad \log \frac{\text{Remaining IBT}}{\text{Nominal Output}} = a + b \log \frac{\text{Nom. Cap. Stock}}{\text{Nominal Output}} + c\ \text{Time}$$

where Nom. Cap. Stock = nominal capital stock defined as the same capital stock used in the depreciation equations in Chapter IV.

Nominal capital stock is used as a proxy for property values. The time trend is included to capture any trend in shifting tax bases or tax rates.

Letting IBT stand for remaining indirect business taxes, K for the capital stock and Q for output, the solution of (5.1) for IBT is,

$$(5.2)\quad IBT = K^{b}\, Q^{1-b}\, (e^{a + c\ \text{Time}})$$

Therefore, the elasticity of the remaining indirect business taxes with respect to output is equal to 1-b.

Table V-3 presents the results for that set of equations. For the most part, the specification works well for the residual categories of indirect business taxes. The nominal capital stock to nominal output

TABLE V - 3

SECTORAL INDIRECT BUSINESS TAX EQUATIONS

SECTOR NUMBER	SECTOR NAME	INTER CEPT	CAPITAL STOCK TO OUTPUT	TIME	RSQ	RBSQ	D-W	AAPE
1	AGRICULTURE	0.7032 (0.4476)	0.3320 (1.2533)	-0.0152 (-1.7131)	0.640	0.599	0.571	12.19
2	CRUDE PETROLEUM	5.3793 (4.8619)	-0.3476 (-3.2086)	-0.0297 (-3.2821)	0.374	0.305	1.487	2.21
3	MINING	0.5822 (0.8749)	0.2303 (2.3009)	-0.0081 (-1.8833)	0.735	0.705	1.489	6.08
4	CONSTRUCTION	-4.3817 (-4.5826)	0.4074 (1.0766)	0.0545 (7.8697)	0.864	0.849	0.290	31.24
5	FOOD AND TOBACCO	-13.9705 (-6.3219)	3.1337 (5.8594)	0.0820 (6.4835)	0.702	0.669	0.649	243.03
6	TEXTILES	-8.3270 (-4.9682)	1.0841 (2.7115)	0.0712 (7.4956)	0.799	0.776	0.266	88.86
7	APPAREL	-6.3233 (-8.0515)	0.9804 (3.9537)	0.0450 (12.6866)	0.928	0.920	0.558	5.91
8	PAPER	-4.1564 (-1.5991)	0.3178 (0.6215)	0.0465 (3.5045)	0.614	0.571	0.234	62.78
9	PUBLISHING	-3.9534 (-3.6942)	0.5563 (2.3043)	0.0296 (4.9832)	0.596	0.551	0.284	90.36
10	CHEMICALS	-5.4138 (-1.8930)	0.5626 (0.9666)	0.0518 (3.6173)	0.566	0.518	0.209	107.52
11	PETROLEUM REFIN.	-7.8182 (-13.7047)	1.1883 (18.2193)	0.0562 (10.4944)	0.956	0.952	1.753	41.83
12	RUBBER	-6.7291 (-2.1517)	0.9075 (1.3941)	0.0562 (3.1905)	0.466	0.407	0.847	117.64

TABLE V - 3

SECTORAL INDIRECT BUSINESS TAX EQUATIONS

SECTOR NUMBER	SECTOR NAME	INTER CEPT	CAPITAL STOCK TO OUTPUT	TIME	RSQ	RBSQ	D-W	AAPE
13	LEATHER	-4.4851 (-11.4134)	0.7102 (3.1596)	0.0343 (12.0341)	0.942	0.936	0.894	10.57
14	LUMBER	-4.2455 (-2.5577)	0.6019 (1.8147)	0.0353 (3.3027)	0.500	0.445	0.339	1229.48
15	FURNITURE	-2.8980 (-6.0655)	0.8291 (5.0722)	0.0090 (4.0580)	0.665	0.628	0.826	67.55
16	STONE, ETC...	-7.6133 (-2.3145)	1.0164 (1.5729)	0.0603 (4.1621)	0.677	0.641	0.252	147.18
17	PRIMARY METALS	-9.2288 (-5.6382)	1.1007 (4.2534)	0.0801 (6.8627)	0.753	0.726	0.255	60.99
18	FAB. METALS	-9.0904 (-7.4138)	1.6864 (6.5153)	0.0630 (8.2360)	0.811	0.790	0.856	195.73
19	TRANS EQ.	-3.6952 (-5.2725)	0.8043 (3.4013)	0.0183 (4.4994)	0.633	0.592	0.572	601.70
20	NON-ELECT. MACH.	-3.0413 (-1.5877)	0.8660 (2.0219)	0.0074 (0.7070)	0.297	0.218	0.356	255.10
21	ELECT. MACH.	4.5896 (1.4271)	-0.3919 (-0.4741)	-0.0483 (-3.1166)	0.427	0.363	0.534	184.18
22	AUTOS	-1.9790 (-0.7845)	1.8253 (5.1503)	-0.0373 (-1.7135)	0.932	0.920	0.966	88.93
23	INSTRUMENTS	-4.5446 (-4.0446)	0.9654 (3.3565)	0.0225 (4.7228)	0.554	0.505	0.468	77.49
24	MISC. MFG. IND.	1.0309 (0.2529)	0.1395 (0.1371)	-0.0202 (-0.9386)	0.252	0.169	0.374	225.57
25	RAILROADS	4.1085 (4.7890)	-0.1042 (-0.8540)	-0.0354 (-7.8412)	0.949	0.943	1.919	3.23

TABLE V - 3

SECTORAL INDIRECT BUSINESS TAX EQUATIONS

SECTOR NUMBER	SECTOR NAME	INTER CEPT	CAPITAL STOCK TO OUTPUT	TIME	RSQ	RBSQ	D-W	AAPE
26	AIR TRANSPORTATION	-3.0774 (-2.0140)	0.6329 (2.9085)	0.0137 (1.4028)	0.348	0.276	1.300	25.14
27	TRUCKING ETC...	1.1741 (2.5482)	0.2358 (2.7940)	-0.0151 (-6.7417)	0.926	0.918	1.558	2.48
28	COMMUNICATIONS	-2.7600 (-0.9127)	0.6282 (1.3849)	0.0251 (3.1067)	0.635	0.595	0.497	2.46
30	UTILITIES	-10.7567 (-6.5759)	1.6386 (7.4502)	0.0676 (7.9445)	0.778	0.753	0.532	3.17
31	TRADE	-5.2799 (-1.9764)	1.7069 (2.8188)	0.0355 (2.8725)	0.315	0.239	0.478	1.65
32	FIN. SERV.	0.5548 (1.8517)	0.2750 (2.7642)	-0.0001 (-0.1117)	0.348	0.275	2.460	1.35
33	REAL ESTATE	1.9846 (2.3770)	0.8222 (2.5015)	-0.0166 (-3.0613)	0.345	0.272	0.489	2.03
34	HOTELS	-2.6511 (-2.5387)	0.0997 (0.3921)	0.0466 (10.2378)	0.855	0.839	0.236	11.68
35	MISC. BUS. SER.	-2.0400 (-1.1021)	0.2027 (0.3049)	0.0164 (3.4285)	0.422	0.357	0.327	35.17
36	AUTO REPAIR	-4.0103 (-2.2220)	0.2824 (0.8428)	0.0501 (6.6115)	0.832	0.813	0.361	18.92
37	AMUSEMENTS	2.3269 (3.3018)	0.2480 (1.8285)	-0.0171 (-6.8606)	0.904	0.894	1.467	1.45
38	HEALTH AND EDUC	0.3231 (0.2391)	0.1096 (0.5984)	-0.0224 (-2.6705)	0.872	0.858	1.655	6.50

ratio is significant for twenty-six sectors while the time trend is significant for twenty-eight sectors. The signs of the coefficients are generally in the acceptable range. Three sectors have a negative elasticity between the capital stock and indirect business taxes, but only Crude petroleum (2) has a significant coefficient. Property taxes are a major portion of this residual indirect business tax for Crude petroleum and are probably "counted" in the Real estate (33) sector. In a forecast, the two sectors with insignificant coefficients - Railroads (25) and Electrical machinery (21) - have those coefficients set to zero.

V.2 Government Subsidies (less surplus of government enterprises)

Government subsidies are the smallest component of GPO, comprising less than two-tenths of a percent of GNP. Government subsidies consist of two pieces, actual subsidies from legislated programs and surpluses earned by any government enterprises. Seven private industries receive federal subsidies: Agriculture (1), Transportation equipment except autos (19), Railroads (25), Air transportation (26), Other transportation (27), Financial services (32), and Real estate (33). Real estate receives slightly less than half (46%) of all subsidies for a variety of programs such as rental supplements, rural housing grants, and interest supplements. Maritime interests receive subsidies in two sectors: building ships (sector 19) and operating them (sector 27). Railroads (25) and Agricultural (1) receive direct payments, while the insurance industry (32) has federal backing of some flood insurance payments.

Surplus from government enterprises is a slightly misleading title, since government enterprises can be run at an operating deficit so that the "surplus" may be negative. At the federal level, "surpluses" are created by the Postal Service, Commodity Credit Corporation, Federal Housing Administration, Tennesseee Valley Authority , Federal Deposit Insurance Corporation and the Federal Savings and Loan Insurance Corporation. State and local governments generate surpluses from an even more disparite group of activities: utilities, tolls and parking fees, liquor stores, public transit, air and water terminals, housing and urban renewal, state lotteries, and off-track betting.

Government subsidies, and to a slight degree surpluses, are political programs subject to frequent change in the rules of eligibility and methods of administration which do not lend themselves to modelling work. Consequently, no equations are specified for this small component of valued added. Government subsidies are specified as a constant share of REVAWO for each sector for forecasting purposes.

ENDNOTES

1. Ross Preston, The Wharton Annual and Industry Forecating Model, (Philadelphia: Economics Research Unit, Univerisity of Pennslyvannia, 1972).

2. Michael McCarthy, "Analysis of Non-Wage Income Components," The Brookings Model: Some Further Results, ed. James Duesenberry, G. Fromm, L. Klein and E. Kuh. (Chicago: Rand McNally, 1969) pp. 178-181

3. David Belzer, "An Integration Of Price, Wage and Income Flows in an Input-Output Model of the United States," unpublished Ph.D. dissertation, University of Maryland, 1978, pp. 376-386

BASE RUN

TABLE VI-7. FORECAST CONTROLS & RESULTS

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
Gross National Product, GNPZ	2659.17	3166.49	3508.85	3884.75	4241.05	4595.90	5441.38	6444.03	7524.05	9568.71
Sum of VA by category:	2659.17	3166.50	3508.85	3884.76	4241.06	4595.90	5441.39	6444.04	7524.05	9568.72
Statistical discrepancy	3.90	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Labor compensation	1607.74	1893.36	2106.45	2325.30	2539.48	2749.48	3233.44	3819.22	4405.53	5384.05
Indirect business taxes	212.16	244.46	263.42	286.86	312.33	336.02	398.84	421.65	503.50	643.08
Subsidies	-4.61	-4.99	-5.53	-6.02	-6.46	-6.82	-7.85	-9.06	-10.31	-12.07
Return to capital	839.97	1031.97	1144.51	1278.62	1395.71	1517.23	1816.96	2212.22	2625.33	3553.66
Net interest	179.82	254.90	285.24	306.71	329.26	352.93	403.64	458.49	516.82	611.07
Corp. capital consump. allow.	158.26	168.14	175.74	189.28	204.34	220.44	254.66	294.70	345.64	425.04
Noncorp. cap. consump. allow.	69.98	76.02	80.48	86.75	94.25	101.54	114.32	127.82	143.96	168.99
Business transfer payments	10.45	13.62	14.84	15.99	17.83	19.90	23.07	26.51	31.27	42.31
Corporate profits	261.50	307.98	338.63	386.57	427.07	473.63	574.81	717.95	882.30	1387.07
Proprietor income	144.02	172.98	192.09	241.88	271.21	297.75	380.93	507.50	630.74	865.99
Corp. inventory valuation adj.	-45.29	-32.42	-20.24	-33.06	-39.33	-44.48	-42.61	-46.12	-67.02	-115.27
Noncorp. inven. valuation adj.	-3.68	-3.12	-1.19	-3.31	-3.41	-3.72	-4.25	-4.41	-6.19	-7.90
Rental income	64.90	73.88	78.92	87.80	94.49	99.25	112.40	129.80	147.81	176.35
Gross National Product Deflator	1.79	2.15	2.25	2.40	2.58	2.77	3.15	3.54	4.02	5.04
COMPENSATION PER MAN-HOUR INDEXES										
Manufacturing	131.10	155.20	166.03	178.76	193.71	209.04	237.43	269.45	304.83	374.69
Non-manufacturing	128.30	151.65	163.46	177.03	191.65	206.75	237.56	271.75	307.40	373.09
LABOR PRODUCTIVITY (GNP/JOBS)	20.11	20.02	20.34	20.52	20.64	20.70	20.89	21.11	21.27	21.31
ENERGY PRICE INDEXES										
Domestic crude oil ($/bbl)	21.20	28.07	28.00	29.00	30.90	33.25	37.60	41.60	46.69	54.99
Foreign crude oil ($/bbl)	31.37	32.80	28.01	29.01	30.91	33.26	37.61	41.61	46.71	55.01
FINANCIAL VARIABLES										
AAA Corporate bond rate	11.94	13.79	11.56	9.98	9.75	10.12	9.77	9.97	9.88	10.39
Commercial paper rate	12.29	11.90	10.30	9.55	9.65	10.20	9.60	10.16	9.75	10.73
M2 (billions of current$)	1585.32	1908.00	2066.92	2239.06	2425.55	2627.56	3083.47	3618.49	4246.33	5398.15
Ratio of M2 to real GNP	1.08	1.30	1.34	1.40	1.49	1.60	1.79	2.00	2.28	2.85
Ratio of M2 to nominal GNP	0.60	0.60	0.59	0.58	0.57	0.57	0.57	0.56	0.56	0.56
Savings rate	5.82	6.54	9.08	9.88	10.03	10.10	9.89	10.64	10.98	10.57
Gross National Product, 1977$	2077.90	2072.19	2180.61	2258.57	2298.71	2315.77	2418.11	2543.44	2614.45	2652.46
PCE	1291.37	1338.98	1407.89	1449.55	1468.62	1484.62	1557.08	1631.92	1666.51	1679.90
Residential structures	72.59	61.24	83.46	92.74	89.50	85.82	85.50	90.38	89.05	79.51
Non-residential structures	77.56	66.10	72.45	80.03	87.26	87.29	88.79	94.85	94.65	89.40
Producers' durable equipment	168.31	164.89	175.63	187.67	197.22	199.63	202.98	219.00	230.80	231.72
Inventory change	-0.32	2.75	9.62	15.34	12.06	8.58	13.28	16.35	13.82	7.28
Exports of goods & services	256.18	237.82	230.16	232.97	235.14	234.73	247.51	270.16	289.64	326.76
Imports of goods & services	208.42	224.52	231.61	238.30	242.53	246.88	260.09	280.59	291.11	312.80
Government Purchases	420.61	424.90	432.99	438.55	451.42	461.95	483.02	501.34	521.07	550.67
Federal	156.24	169.12	170.97	170.30	176.94	183.58	196.86	207.39	217.72	233.22
Defense	101.02	114.26	122.55	127.89	133.00	138.11	148.33	155.81	163.28	174.50
Non-defense	55.22	54.87	48.42	42.41	43.94	45.47	48.52	51.58	54.43	58.72
State and local	264.37	255.78	262.01	268.25	274.48	278.38	286.17	293.96	303.35	317.45
Education	106.97	105.45	106.04	106.63	107.22	107.99	109.54	111.09	113.05	115.98
Other	157.40	150.33	155.98	161.62	167.26	170.38	176.63	182.87	190.31	201.47
Unemployment rate	7.14	8.06	7.10	5.86	6.03	6.86	6.09	4.58	4.80	6.79
Spending rate	91.40	90.76	88.55	87.80	87.66	87.58	87.85	87.11	86.80	87.26
Govt transfer share of income	13.23	12.29	13.24	13.08	13.34	13.63	13.73	13.53	13.81	14.80
Federal deficit, NIPA	-57.67	-206.28	-178.15	-160.56	-176.85	-205.77	-242.73	-253.26	-319.98	-465.53

BASE RUN

TABLE VI-8. PRICE INDEXES AND FINANCIAL VARIABLES

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
IMPLICIT DEFLATORS (1972 = 100.)										
Gross National Product	1.79	2.15	2.25	2.40	2.58	2.77	3.15	3.54	4.02	5.04
Personal consumption expenditures	1.80	2.08	2.18	2.33	2.50	2.69	3.05	3.43	3.91	4.93
Residential structures	2.07	2.48	2.62	2.82	3.05	3.30	3.79	4.31	4.98	6.40
Non-residential structures	2.13	2.57	2.72	2.91	3.15	3.42	3.94	4.47	5.18	6.67
Producers' durable equipment	1.90	2.17	2.26	2.40	2.57	2.76	3.14	3.48	3.89	4.79
Exports, merchandise	2.33	2.76	2.84	3.02	3.26	3.52	3.96	4.39	4.99	6.45
Imports, merchandise	3.53	3.58	3.59	3.83	4.17	4.53	5.19	5.77	6.60	8.62
Federal defense	1.79	2.11	2.21	2.35	2.55	2.77	3.14	3.46	3.97	5.45
Federal non-defense	1.79	2.12	2.24	2.41	2.61	2.82	3.22	3.61	4.14	5.40
State & local education	1.95	2.35	2.46	2.62	2.83	3.06	3.50	3.91	4.52	5.95
State & local other govt	1.92	2.28	2.40	2.57	2.77	2.99	3.42	3.85	4.41	5.59
COMPENSATION PER MAN-HOUR INDEXES										
Manufacturing	131.10	155.20	166.03	178.76	193.71	209.04	237.43	269.45	304.83	374.69
Non-manufacturing	128.30	151.65	163.46	177.03	191.65	206.75	237.56	271.75	307.40	373.09
LABOR PRODUCTIVITY (GNP/JOBS)	20.11	20.02	20.34	20.52	20.64	20.70	20.89	21.11	21.27	21.31
ENERGY PRICE INDEXES										
Domestic crude oil ($/bbl)	21.20	28.07	28.00	29.00	30.90	33.25	37.60	41.60	46.69	54.99
Foreign crude oil ($/bbl)	31.37	32.80	28.01	29.01	30.91	33.26	37.61	41.61	46.71	55.01
FINANCIAL VARIABLES										
AAA Corporate bond rate	11.94	13.79	11.56	9.98	9.75	10.12	9.77	9.97	9.88	10.39
Commercial paper rate	12.29	11.90	10.30	9.55	9.65	10.20	9.60	10.16	9.75	10.73
Mortgage rate	12.25	14.61	11.60	9.63	9.83	10.44	10.15	10.31	10.44	10.61
Interest rate on Federal debt										
Average rate paid by S&L govt	6.93	8.91	8.87	8.23	7.24	6.77	6.59	6.59	6.67	6.96
Average rate received by S&L govt	11.05	11.03	9.44	8.72	8.60	8.85	8.44	8.66	8.67	9.06
Real rate of interest (ex ante)	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57
M2 (billions of current$)	1585.32	1908.00	2066.92	2239.06	2425.55	2627.56	3083.47	3618.49	4246.33	5398.15
Ratio of M2 to real GNP	1.08	1.30	1.34	1.40	1.49	1.60	1.79	2.00	2.28	2.85
Ratio of M2 to nominal GNP	0.60	0.60	0.59	0.58	0.57	0.57	0.57	0.56	0.56	0.56
Savings rate	5.82	6.54	9.08	9.88	10.03	10.10	9.89	10.64	10.98	10.57
Federal surplus or deficit, NIPA	-57.67	-206.28	-178.15	-160.56	-176.85	-205.77	-242.73	-253.26	-319.98	-465.53
Social insurance funds	-12.39	-31.05	-26.59	-23.65	-29.24	-38.68	-45.44	-40.77	-58.27	-139.72
Other funds	-45.28	-175.23	-151.56	-136.90	-147.61	-167.09	-197.29	-212.49	-261.71	-325.81

BASE RUN

TABLE VI-9. GNP, NNP, NATIONAL INCOME, PERSONAL INCOME (1.7)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
Gross National Product	2659.17	3166.49	3508.85	3884.75	4241.05	4595.90	5441.38	6444.03	7524.05	9568.71
-: Capital consumption allowances with capital consumption adj.	293.20	358.81	320.90	347.53	376.21	405.41	463.50	528.10	604.78	723.20
=: Net National Product	2365.96	2807.68	3187.95	3537.23	3864.84	4190.49	4977.88	5915.93	6919.27	8845.51
-: Indirect business tax and nontax liability	213.00	258.80	263.42	286.86	312.33	336.02	398.84	421.65	503.50	643.08
Business transfer payments	11.39	13.70	7.80	15.99	17.83	19.90	23.07	26.51	31.27	42.31
Statistical discrepancy	3.90	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+: Subsidies less current surplus of govt enterprises	5.48	7.80	5.53	6.02	6.46	6.82	7.85	9.06	10.31	12.07
=: National Income	2117.15	2473.80	2915.48	3240.69	3541.44	3841.73	4564.20	5477.26	6395.29	8172.79
-: Corporate profits with IVA and capital consumption adj.	181.62	160.80	301.33	335.11	368.00	408.08	508.47	645.42	787.44	1241.80
Net interest	187.70	264.90	285.24	306.71	329.26	352.93	403.64	458.49	516.82	611.07
Contributions for social insur.	203.98	255.74	284.40	316.54	349.83	382.68	459.24	553.27	650.26	818.72
Wage accruals less disbursements	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
+: Govt transfer payments to person	285.85	360.62	388.06	425.50	474.62	527.94	632.88	744.70	891.41	1211.45
Personal interest income	263.42	371.10	414.55	443.09	472.48	514.14	614.61	726.25	851.08	1073.84
Personal dividend income	55.92	67.00	76.51	87.12	98.99	112.30	145.28	187.65	240.99	358.16
Business transfer payments	11.39	13.70	7.80	15.99	17.83	19.90	23.07	26.51	31.27	42.31
Error										
=: Personal Income	2160.61	2604.97	2931.62	3254.19	3558.46	3872.49	4608.87	5505.38	6455.70	8187.13
ADDENDEA FOR CHK										
rental income w/o cca yrixca	65.25	70.50	78.92	87.80	94.49	99.25	112.40	129.80	147.81	176.35
cca, ri cayri	-32.38	-36.30	-42.74	-46.35	-49.95	-53.56	-60.77	-67.98	-75.19	-86.00
yri	32.87	34.20	36.18	41.45	44.54	45.69	51.63	61.83	72.62	90.35

BASE RUN

TABLE VI-10. PERSONAL INCOME - SOURCES AND DISPOSITION (2.1)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
Personal Income	2160.61	2604.97	2931.62	3254.19	3558.46	3872.49	4608.87	5505.38	6455.70	8187.13
Wage and salary disbursments	1356.15	1581.39	1759.49	1939.47	2117.37	2290.01	2687.42	3167.67	3646.69	4441.26
Other labor income	127.25	153.49	170.97	189.66	207.17	224.51	264.94	313.93	361.77	443.92
Proprietors' income w. IVA&CCADJ	116.27	120.30	186.03	231.83	259.86	285.23	366.66	491.88	612.39	844.93
Farm	19.39	19.00	31.28	35.38	39.19	42.72	46.96	58.43	68.08	77.66
Nonfarm	96.88	101.30	154.75	196.45	220.68	242.51	319.70	433.45	544.31	767.27
Rental income of persons w. CCADJ	32.87	34.20	36.18	41.45	44.54	45.69	51.63	61.83	72.62	90.35
Dividends	55.92	67.00	76.51	87.12	98.99	112.30	145.28	187.65	240.99	358.16
Personal interest income	263.42	371.10	414.55	443.09	472.48	514.14	614.61	726.25	851.08	1073.84
Transfer payments	297.24	374.32	395.86	441.48	492.45	547.83	655.95	771.21	922.68	1253.76
Federal	246.21	310.88	332.70	362.96	404.16	449.12	536.93	629.98	753.27	1023.87
State and local	39.64	49.74	55.36	62.54	70.46	78.81	95.95	114.72	138.14	187.58
Business transfer payments	11.39	13.70	7.80	15.99	17.83	19.90	23.07	26.51	31.27	42.31
:-Pers contrib to social insurance	88.69	97.01	108.16	120.09	134.59	147.40	177.80	215.23	252.71	319.27
Error										
-:Personal tax and nontax payments	336.32	397.30	447.84	495.16	546.83	600.06	724.27	885.99	1061.70	1373.12
Federal income taxes	250.73	292.40	333.92	368.97	408.22	448.69	542.79	666.13	800.90	1039.67
=: Disposable Income	1824.28	2207.67	2483.78	2759.02	3011.63	3272.43	3884.60	4619.39	5394.00	6814.01
-: Personal Outlays										
Consumption expenditures	1668.58	2000.11	2195.05	2427.42	2638.32	2866.86	3413.39	4029.10	4686.74	5942.41
Interest paid by consumers to businesses	49.88	58.60	57.92	62.92	68.57	74.35	86.16	102.02	117.51	144.76
Personal transfer payments to foreigners (net)	0.80	0.80	0.95	1.11	1.26	1.42	1.73	2.04	2.35	2.81
=: Personal Savings	106.23	144.49	225.60	272.59	301.93	330.67	384.27	491.56	592.28	720.35
ADDENDA:										
Disposable Income (1972$), Total	1013.55	1059.03	1141.42	1185.20	1202.76	1216.91	1272.45	1344.93	1378.32	1381.99
Per capita	4452.16	4563.68	4877.37	5017.57	5045.13	5057.83	5195.80	5399.15	5447.89	5350.34
Population (mid-period, millions)	227.65	232.06	234.02	236.21	238.40	240.60	244.90	249.10	253.00	258.30
Personal savings as % of disposable personal income (less interest paid to business and transfer payments to foreigners)	5.82	6.54	9.08	9.88	10.03	10.10	9.89	10.64	10.98	10.57
Total taxes / Personal income	15.57	15.25	15.28	15.22	15.37	15.50	15.71	16.09	16.45	16.77
Federal Deficit, NIPA	-57.67	-206.28	-178.15	-160.56	-176.85	-205.77	-242.73	-253.26	-319.98	-465.53
DI72RL										
TRASHR - Trasfer share of income	13.23	12.29	13.24	13.08	13.34	13.63	13.73	13.53	13.81	14.80
SPENDR - Spending rate	91.40	90.76	88.55	87.80	87.66	87.58	87.85	87.11	86.80	87.26

BASE RUN

TABLE VI-11. FEDERAL GOVERNMENT RECEIPTS & EXPENDITURES (3.2)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
RECEIPTS	540.54	591.33	708.61	787.07	866.92	951.10	1148.99	1389.22	1660.56	2214.01
Personal tax and non-tax receipts	257.53	300.20	344.91	381.18	421.53	463.13	559.94	686.63	824.87	1069.81
Corporate profits tax	70.08	32.56	91.32	102.37	109.66	120.73	146.31	174.91	212.07	353.45
Indirect business tax and nontax accruals	38.86	50.00	39.91	43.46	47.32	50.91	60.42	63.88	76.28	97.43
Contributions for social insurance	174.07	208.58	232.47	260.06	288.42	316.32	382.31	463.80	547.34	693.32
EXPENDITURES	598.21	797.62	886.76	947.62	1043.78	1156.87	1391.72	1642.48	1980.55	2679.54
Purchases of Goods and Services	191.78	255.63	281.18	300.82	339.69	378.74	463.00	550.89	665.72	903.89
National defense	126.51	172.43	202.21	226.27	256.50	285.95	350.03	416.85	505.06	683.68
Compensation of employees	53.23	67.20	79.12	86.46	95.90	101.55	118.35	143.65	170.73	182.31
Other	73.28	105.23	123.09	139.82	160.60	184.40	231.68	273.20	334.33	501.37
Nondefense	65.26	83.20	78.96	74.54	83.19	92.79	112.97	134.03	160.66	220.21
Compensation of employees	29.65	32.60	34.73	36.90	40.67	44.84	53.85	62.80	73.77	96.77
Other	35.61	50.60	44.23	37.64	42.52	47.95	59.12	71.23	86.89	123.44
Transfer Payments	252.97	358.65	382.56	416.30	461.53	510.74	606.88	708.68	842.94	1136.84
To persons	246.21	310.88	332.70	362.96	404.16	449.12	536.93	629.98	753.27	1023.87
Old age benefits	118.59	149.46	158.05	171.53	187.77	204.68	239.76	277.28	322.14	414.72
Hospital & medical	35.58	49.13	54.55	62.06	71.08	80.93	102.88	128.34	160.03	227.25
Unemployment	15.76	18.31	17.40	14.92	17.52	21.40	22.11	18.56	23.00	43.23
Retirement: Fed civ & RR	20.29	25.62	27.47	30.16	33.30	36.72	44.00	52.22	62.68	85.12
Vet life insur,workmen comp.	2.06	2.18	2.25	2.41	2.59	2.78	3.16	3.56	4.05	5.10
Military retirement	12.48	15.55	16.88	18.76	20.93	23.29	28.31	33.95	41.09	56.34
Veterans benefits	13.77	18.68	21.72	25.16	28.71	32.28	39.30	46.72	55.69	74.80
Food stamps	8.21	10.65	11.20	12.14	13.33	14.69	17.74	21.32	25.96	35.98
Other	19.47	21.30	23.17	25.82	28.93	32.33	39.66	48.02	58.63	81.33
To foreigners	6.76	47.76	49.86	53.34	57.37	61.62	69.95	78.70	89.67	112.97
Grants-in-Aid to S&L Govt	88.67	83.70	103.22	111.33	119.44	127.56	143.78	160.00	196.00	250.00
Net Interest Paid	53.14	85.00	106.17	106.46	111.22	128.62	168.77	215.90	271.20	387.43
Interest paid	67.21	107.80	121.42	120.14	124.63	142.68	182.19	230.07	285.64	403.18
Interest received	14.08	22.80	15.25	13.68	13.41	14.05	13.42	14.17	14.44	15.75
Subsidies less Current Surplus of Govt Enterprises	11.66	14.60	13.59	12.67	11.85	11.17	9.25	6.98	4.64	1.34
Surplus or Deficit (-), NIPA	-57.67	-206.28	-178.15	-160.56	-176.85	-205.77	-242.73	-253.26	-319.98	-465.53
Social insurance funds	-12.39	-31.05	-26.59	-23.65	-29.24	-38.68	-45.44	-40.77	-58.27	-139.72
Other funds	-45.28	-175.23	-151.56	-136.90	-147.61	-167.09	-197.29	-212.49	-261.71	-325.81
Debt of Federal Government	936.70	1210.65	1381.27	1542.76	1733.02	1952.52	2502.10	3083.37	3775.43	5149.20
Debt from Federal loans	170.70	200.58	202.46	204.34	206.21	208.09	211.85	215.61	219.36	225.00

BASE RUN

TABLE VI-12. OUTPUT BY PRODUCING SECTOR (1977$)

		1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
1	AGRICULTURE, FORESTRY, FISHERY	137.82	136.34	142.80	146.47	147.19	147.08	153.98	159.21	163.82	167.48
	MINING	80.15	84.98	82.34	84.52	84.99	84.48	86.74	90.22	91.59	92.02
2	IRON ORE MINING	3.20	2.50	2.46	2.55	2.57	2.57	2.59	2.61	2.58	2.48
3	NONFERROUS METALS MINING	3.27	2.98	3.19	3.40	3.46	3.33	3.40	3.64	3.69	3.72
4	COAL MINING	19.63	20.87	21.55	22.42	23.07	23.58	25.41	27.40	28.95	30.93
5	NATURAL GAS EXTRACTION	19.73	19.61	19.35	19.47	19.12	18.50	18.29	18.65	18.14	16.57
6	CRUDE PETROLEUM	27.16	32.24	28.55	29.10	29.01	28.72	28.93	29.35	29.44	29.40
7	NON-METALLIC MINING	7.17	6.78	7.23	7.59	7.76	7.79	8.13	8.57	8.79	8.92
8	CONSTRUCTION	100.65	89.27	99.89	106.47	108.84	108.03	110.05	115.74	116.42	112.77
	NON-DURABLES	671.63	669.02	696.85	717.49	721.75	722.96	757.87	792.01	810.94	823.11
9	FOOD & TOBACCO	217.62	215.89	223.12	227.78	228.27	228.60	239.70	246.40	251.35	253.67
10	TEXTILES, EXC. KNITS	36.55	34.93	37.10	38.34	38.59	38.83	40.83	43.22	43.98	43.73
11	KNITTING	8.67	9.21	9.83	9.86	9.92	9.76	10.25	10.63	10.67	10.83
12	APPAREL, HOUSEHOLD TEXTILES	39.77	42.71	45.31	46.49	46.50	46.98	49.93	52.62	53.33	53.25
13	PAPER	51.88	50.17	52.24	54.27	54.94	55.14	58.01	61.02	62.58	63.47
14	PRINTING & PUBLISHING	52.10	49.28	51.51	54.04	55.19	55.50	57.88	60.22	61.39	61.17
15	AGRICULTURAL FERTILIZERS	13.39	12.77	13.18	13.54	13.52	13.42	14.16	14.94	15.60	16.32
16	OTHER CHEMICALS	107.71	109.66	115.20	119.19	120.00	120.16	127.91	137.33	142.85	148.18
17	PETROLEUM REFINING	98.81	97.08	99.09	101.62	101.92	101.58	103.49	106.20	107.81	109.64
18	FUEL OIL	25.35	24.58	24.31	24.64	24.26	24.13	24.77	25.29	25.81	26.43
19	RUBBER PRODUCTS	14.80	15.42	16.18	16.78	16.96	17.03	17.72	18.75	19.28	19.87
20	PLASTIC PRODUCTS	23.79	25.01	26.84	28.21	28.71	28.88	31.02	33.80	35.57	37.36
21	SHOES AND LEATHER	6.55	6.90	7.24	7.36	7.23	7.08	6.99	6.88	6.55	5.64
	DURABLES	707.84	702.45	761.13	796.84	815.26	824.18	870.22	941.73	975.92	1000.75
22	LUMBER	41.48	38.00	43.23	46.23	45.64	44.69	45.55	47.47	47.51	45.32
23	FURNITURE	16.71	16.97	18.23	18.80	19.07	19.55	20.35	21.70	22.04	21.37
24	STONE, CLAY, GLASS	32.26	30.57	34.50	36.97	37.79	37.48	38.96	41.71	42.67	42.56
25	FERROUS METALS	59.04	51.95	52.76	54.06	55.06	55.79	57.23	58.76	58.52	57.19
26	COPPER	9.17	8.11	8.42	9.03	9.12	8.70	8.80	9.24	9.28	9.02
27	OTHER NONFERROUS METALS	32.57	31.65	33.37	35.00	36.01	36.40	38.52	41.81	43.70	45.32
28	METAL PRODUCTS	83.31	83.18	89.55	94.05	96.99	98.17	103.19	110.77	113.70	115.12
	NON-ELEC MACHINERY	142.01	135.45	143.98	153.17	159.40	161.61	169.13	184.67	195.58	204.91
29	ENGINES AND TURBINES	10.62	10.46	11.51	12.08	12.48	12.67	13.57	15.01	15.89	17.24
30	AGRICULTURAL MACHINERY	11.27	10.84	12.02	12.78	13.55	13.66	13.58	14.67	15.49	17.10
31	CONSTR, MINING, OILFIELD EQ	17.76	17.06	17.10	18.16	18.55	18.13	18.43	19.32	20.25	20.91
32	METALWORKING MACHINERY	15.66	13.22	14.33	15.21	15.61	15.57	14.91	15.55	15.69	14.69
33	SPECIAL INDUSTRY MACHINERY	9.78	8.15	8.50	9.14	9.37	9.19	8.99	9.24	9.31	9.03
34	MISC NON-ELECTRICAL MACH.	36.15	33.33	36.14	38.16	39.40	39.36	40.14	43.37	44.72	45.49
35	COMPUTERS	25.91	28.40	28.99	31.46	33.80	36.23	41.87	48.58	54.63	60.53
36	OTHER OFFICE EQUIPMENT	3.09	2.86	3.06	3.11	3.18	3.22	3.36	3.60	3.75	3.81
37	SERVICE INDUSTRY MACHINERY	11.77	11.14	12.32	13.07	13.48	13.58	14.28	15.32	15.84	16.10
	ELECTRICAL MACHINERY	107.34	106.97	114.43	121.31	127.55	128.88	139.21	153.91	165.17	179.40
38	COMMUNIC EQ, ELECTRONIC COMP	55.30	57.07	61.09	65.34	70.00	71.56	79.52	89.31	98.04	109.68
39	ELEC INDL APP & DISTRIB EQ	20.31	18.51	20.00	21.12	21.81	21.58	21.90	23.81	24.75	25.49
40	HOUSEHOLD APPLIANCES	10.29	10.17	10.43	10.97	11.41	11.67	12.31	13.09	13.75	14.44
41	ELEC LIGHTING & WIRING EQ	14.94	15.03	16.58	17.31	17.57	17.09	17.78	19.34	19.81	20.33
42	TV SETS, RADIOS, PHONOGRAPHS	6.50	6.18	6.33	6.56	6.76	6.99	7.69	8.35	8.83	9.46
	TRANSPORTATION EQ	138.76	154.98	174.44	176.77	175.59	179.46	192.43	210.18	212.65	213.21
43	MOTOR VEHICLES	78.23	88.93	102.65	103.79	100.72	102.00	109.80	120.91	118.90	114.19
44	AEROSPACE	41.85	46.41	50.57	51.24	52.25	53.88	57.51	61.81	64.79	69.29
45	SHIPS, BOATS	9.49	9.61	10.15	10.43	10.83	11.44	12.44	13.46	14.27	14.87
46	OTHER TRANSP. EQUIP.	9.18	10.04	11.07	11.31	11.79	12.14	12.67	13.99	14.69	14.86

BASE RUN

TABLE VI-12. OUTPUT BY PRODUCING SECTOR (1977$)

		1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
47	INSTRUMENTS	28.00	27.53	29.72	31.86	33.19	33.68	36.13	39.35	41.99	44.67
48	MISC. MANUFACTURING	17.20	17.08	18.51	19.59	19.83	19.77	20.73	22.17	23.09	22.66
	TRANSPORTATION	137.00	134.43	140.88	145.04	147.13	148.43	154.89	164.08	169.18	180.30
49	RAILROADS	23.75	21.87	22.79	23.32	23.39	23.20	23.82	24.75	25.03	24.97
50	TRUCKING, HWY PASS TRANSIT	63.12	62.38	65.41	67.66	68.88	69.43	72.48	76.35	78.61	80.60
51	WATER TRANSPORT	15.41	14.93	15.37	15.70	15.88	15.96	16.83	18.07	19.01	21.11
52	AIR TRANSPORT	28.22	29.07	30.94	31.82	32.39	33.22	34.96	37.83	39.26	46.13
53	PIPELINE	3.65	3.59	3.69	3.80	3.83	3.83	3.94	4.08	4.18	4.32
54	TRANSPORTAION SERVICES	2.84	2.58	2.67	2.74	2.77	2.78	2.87	3.00	3.08	3.18
	UTILITIES	216.88	225.19	236.65	247.02	253.80	258.43	276.91	297.41	311.13	325.38
55	COMMUNICATIONS SERVICES	77.92	84.08	89.02	94.02	98.28	101.78	111.33	120.90	129.44	139.76
56	ELECTRIC UTILILITIES	75.80	79.22	83.40	86.73	88.97	90.38	96.61	102.81	107.73	113.48
57	GAS UTILITY	51.64	50.91	52.86	54.13	54.03	53.49	55.25	58.87	58.49	56.32
58	WATER AND SANITATION	11.50	10.98	11.37	12.14	12.52	12.79	13.72	14.83	15.47	15.82
59	WHOLESALE TRADE	181.26	185.65	196.32	204.42	208.58	210.60	221.81	236.11	244.85	252.41
60	RETAIL TRADE	189.80	197.03	208.97	214.83	216.70	218.99	229.50	240.83	244.66	244.40
61	EATING & DRINKING PLACES	86.80	91.13	96.64	99.44	100.52	101.69	107.91	113.80	116.56	118.28
62	FINANCE & INSURANCE	130.67	129.82	135.66	141.16	143.60	144.66	151.64	158.81	162.81	164.55
63	REAL ESTATE	165.44	157.71	166.46	172.19	174.14	173.84	177.72	183.69	185.50	181.75
64	OWNER-OCCUPIED HOUSING	151.83	157.58	166.25	174.44	181.90	184.77	194.45	205.81	215.05	218.02
	SERVICES	472.16	492.90	524.64	548.47	563.11	572.99	611.60	654.27	681.58	710.43
65	HOTELS, REPAIRS EXC AUTO	45.24	44.13	45.75	46.64	46.86	46.77	48.33	49.80	49.87	48.15
66	BUSINESS SERVICES	194.52	204.83	221.76	235.79	245.94	252.52	274.62	300.14	318.90	340.93
67	AUTOMOBILE REPAIRS	42.82	42.83	45.44	46.78	47.15	46.92	48.84	51.63	53.05	54.65
68	MOVIES AND AMUSEMENTS	22.80	24.54	25.82	26.25	26.37	26.95	27.68	29.30	30.00	31.68
69	MEDICINE, EDUCATION, NPO	166.78	176.57	185.87	193.00	196.79	199.83	212.13	223.39	229.77	235.02
70	FED & S&L GOVT ENTERPRISES	29.23	27.96	29.07	30.23	30.64	30.78	32.18	33.85	34.35	34.19
71	NON COMPETITIVE IMPORTS										
72	DOMESTIC SERVANTS	5.16	5.25	5.53	5.14	4.64	4.50	4.07	3.68	2.78	1.22
73	UNIMPORTANT INDUSTRY	8.72	8.47	8.93	9.33	9.55	9.64	10.12	10.78	11.17	11.51
74	SCRAP AND USED	3.27	3.88	3.76	3.98	4.44	4.77	5.28	5.91	6.65	7.82
75	REST OF THE WORLD INDUSTRY	37.07	29.33	32.73	33.79	34.45	33.68	34.11	33.63	34.58	26.52
76	GOVERNMENT INDUSTRY	220.29	213.76	214.42	215.52	217.14	218.76	222.00	225.23	230.30	237.90
77	INFORUM STAT. DISCREPANCY	15.36	15.24	15.90	17.03	17.89	17.84	17.87	18.81	19.46	19.17
78	NIPA STAT. DISCREPANCY	-2.97	-1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

BASE RUN

TABLE VI-13. HOURLY ADJUSTED EMPLOYMENT (MILLIONS OF JOBS)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
TOTAL PRIVATE SECTOR JOBS	86.79	87.25	90.86	93.59	94.72	95.10	98.65	103.14	105.16	106.06
AGRIC, MINING, CONSTRUCTION	9.92	9.62	10.17	10.68	10.97	11.06	11.60	12.44	12.96	13.46
1 AGRICULTURE(1)	3.37	3.37	3.36	3.39	3.36	3.30	3.28	3.26	3.22	3.14
2 CRUDE OIL & GAS (5-6)	0.56	0.66	0.64	0.68	0.71	0.73	0.80	0.89	0.96	1.07
3 MINING (2-4,7)	0.51	0.60	0.63	0.67	0.69	0.71	0.77	0.85	0.91	0.99
4 CONSTRUCTION (8)	5.49	4.99	5.54	5.94	6.21	6.33	6.75	7.45	7.86	8.26
NON-DURABLE GOODS	8.15	7.92	7.87	7.83	7.67	7.48	7.38	7.30	7.07	6.63
5 FOOD, TOBACCO (9)	1.76	1.69	1.65	1.62	1.55	1.49	1.44	1.36	1.28	1.16
6 TEXTILES (10)	0.63	0.60	0.56	0.53	0.51	0.49	0.47	0.46	0.43	0.39
7 KNITTING (11)	0.23	0.21	0.21	0.20	0.19	0.17	0.16	0.15	0.13	0.11
8 APPAREL & HHLD TEXTILES (12)	1.29	1.25	1.25	1.26	1.22	1.19	1.17	1.14	1.09	0.99
9 PAPER (13)	0.69	0.65	0.66	0.66	0.66	0.64	0.64	0.64	0.62	0.59
10 PRINTING (14)	1.28	1.28	1.27	1.30	1.31	1.31	1.35	1.38	1.39	1.36
11 AGRICULTURAL FERTILIZER (15)	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12 OTHER CHEMICALS (16)	1.05	1.01	1.00	0.99	0.97	0.94	0.92	0.92	0.89	0.84
13 PETROLEUM REFINING (17)	0.20	0.19	0.19	0.18	0.18	0.18	0.17	0.16	0.16	0.15
14 RUBBER & PLASTIC PROD (19-20)	0.71	0.73	0.76	0.78	0.78	0.77	0.78	0.82	0.82	0.82
15 FOOTWEAR & LEATHER (21)	0.24	0.24	0.24	0.24	0.24	0.23	0.22	0.20	0.19	0.16
DURABLE GOODS	12.24	11.79	12.16	12.40	12.49	12.41	12.51	12.92	12.97	12.67
16 LUMBER (22)	0.68	0.62	0.67	0.70	0.68	0.66	0.65	0.65	0.63	0.58
17 FURNITURE (23)	0.47	0.45	0.46	0.46	0.45	0.45	0.45	0.45	0.44	0.40
18 STONE, CLAY & GLASS (24)	0.67	0.63	0.68	0.71	0.72	0.71	0.71	0.75	0.75	0.72
19 IRON & STEEL (25)	0.71	0.65	0.64	0.64	0.63	0.63	0.61	0.60	0.58	0.54
20 NON-FERROUS METALS (26-27)	0.42	0.40	0.40	0.41	0.41	0.41	0.41	0.42	0.43	0.41
21 METAL PRODUCTS (28)	1.63	1.60	1.67	1.74	1.79	1.80	1.86	1.97	2.00	1.99
22 ENGINES & TURBINES (29)	0.13	0.12	0.13	0.13	0.13	0.13	0.14	0.14	0.15	0.15
23 AGRICULTURAL MACHINERY (30)	0.15	0.13	0.14	0.14	0.14	0.14	0.13	0.12	0.12	0.12
25 METALWORKING MACHINERY (32)	0.37	0.33	0.35	0.37	0.37	0.37	0.37	0.38	0.39	0.37
27 SPECIAL IND MACH (33)	0.21	0.20	0.20	0.20	0.19	0.19	0.19	0.18	0.18	0.17
28 MISC NONELEC MACH (31,34)	1.06	1.01	1.02	1.05	1.07	1.06	1.05	1.10	1.11	1.10
29 COMPUTERS, OFFICE EQ (35-36)	0.42	0.44	0.42	0.42	0.42	0.43	0.43	0.44	0.44	0.40
30 SERVICE INDUSTRY MACH (37)	0.17	0.16	0.17	0.17	0.17	0.17	0.18	0.18	0.19	0.18
31 COMMUNIC EQ, ELECTRON COMP (38)	1.10	1.15	1.19	1.23	1.29	1.29	1.36	1.46	1.53	1.58
32 ELEC APP & DISTRIB EQ (39)	0.36	0.33	0.33	0.33	0.33	0.32	0.31	0.31	0.31	0.29
33 HOUSEHOLD APPLIANCES (40)	0.17	0.16	0.15	0.15	0.14	0.14	0.13	0.13	0.12	0.11
34 ELEC LIGHT & WIRING EQ (41)	0.37	0.35	0.37	0.38	0.38	0.37	0.37	0.39	0.40	0.39
35 TV SETS, RADIOS, PHONOGRAPH (42)	0.10	0.09	0.08	0.08	0.07	0.06	0.06	0.05	0.05	0.04
36 MOTOR VEHICLES (43)	0.77	0.78	0.82	0.80	0.77	0.75	0.74	0.73	0.69	0.62
37 AEROSPACE (44)	0.67	0.73	0.80	0.81	0.83	0.85	0.91	0.98	1.03	1.11
38 SHIPS & BOATS (45)	0.21	0.21	0.22	0.22	0.22	0.23	0.25	0.26	0.27	0.27
39 OTHER TRANSP EQ (46)	0.23	0.21	0.21	0.21	0.21	0.20	0.19	0.20	0.19	0.17
40 INSTRUMENTS (47)	0.71	0.65	0.66	0.68	0.68	0.67	0.66	0.66	0.65	0.61
41 MISC MANUFACTURING (48)	0.42	0.39	0.39	0.38	0.37	0.36	0.35	0.35	0.35	0.32
TRANSPORTATION	3.20	3.07	3.12	3.15	3.13	3.09	3.08	3.12	3.09	3.06
42 RAILROADS (49)	0.52	0.49	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.40
43 AIR TRANSPORT (52)	0.46	0.46	0.48	0.48	0.48	0.48	0.48	0.50	0.50	0.54
44 TRUCKING, OTH TRANS(50-51,53-54)	2.22	2.12	2.16	2.19	2.18	2.15	2.15	2.18	2.16	2.11

BASE RUN

TABLE VI-13. HOURLY ADJUSTED EMPLOYMENT (MILLIONS OF JOBS)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
UTILITIES	2.20	2.23	2.27	2.31	2.31	2.30	2.33	2.36	2.35	2.27
45 COMMUNICATIONS SERVICES (55)	1.36	1.38	1.39	1.41	1.41	1.40	1.40	1.40	1.37	1.30
46 ELECTRIC UTILITIES (56)	0.57	0.58	0.60	0.61	0.62	0.61	0.63	0.64	0.65	0.64
47 GAS, WATER & SANITATION (57,58)	0.26	0.27	0.27	0.28	0.28	0.29	0.30	0.32	0.33	0.33
48 WHOLESALE & RETAIL TRADE (59,60)	22.65	22.96	24.12	24.87	25.13	25.29	26.35	27.57	28.07	28.17
FINANCE, INSURANCE, REAL EST.	5.71	5.87	6.06	6.31	6.43	6.48	6.78	7.12	7.32	7.48
49 FINANCE & INSURANCE (62)	4.18	4.25	4.41	4.56	4.62	4.62	4.79	4.96	5.02	4.99
50 REAL ESTATE (63)	1.53	1.62	1.65	1.75	1.81	1.86	1.99	2.16	2.30	2.50
SERVICES	20.83	21.95	23.24	24.22	24.79	25.21	26.83	28.54	29.58	30.56
51 HOTELS, REPAIRS EXC. AUTO (65)	3.48	3.45	3.60	3.68	3.72	3.73	3.89	4.05	4.09	4.01
52 BUSINESS SERVICES (66)	5.43	5.77	6.23	6.61	6.87	7.03	7.60	8.26	8.72	9.23
53 AUTO REPAIR (67)	0.85	0.86	0.90	0.93	0.93	0.93	0.97	1.03	1.06	1.09
54 MOVIES & AMUSEMENTS (68)	1.08	1.18	1.24	1.26	1.27	1.30	1.33	1.41	1.44	1.51
55 MEDICINE, EDUC, NPO (69)	9.99	10.68	11.27	11.73	12.00	12.21	13.03	13.80	14.27	14.71
DOMESTIC SERVANTS	1.89	1.86	1.84	1.82	1.80	1.79	1.78	1.77	1.76	1.74
CIVILIAN GOVERNMENT	16.55	16.29	16.39	16.52	16.67	16.82	17.10	17.39	17.80	18.42
FEDERAL DEFENSE	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
FEDERAL NON-DEFENSE	1.24	0.95	0.93	0.93	0.95	0.98	1.03	1.08	1.13	1.20
STATE & LOCAL EDUCATION	6.85	6.94	6.99	7.03	7.08	7.12	7.21	7.30	7.39	7.53
STATE & LOCAL OTHER	5.89	5.74	5.79	5.83	5.88	5.92	6.01	6.10	6.34	6.70
FEDERAL GOVT ENTERPRISES	0.91	0.95	0.97	0.99	1.01	1.03	1.05	1.08	1.10	1.13
STATE & LOCAL GOVT ENTERPRISES	0.71	0.74	0.76	0.77	0.79	0.81	0.84	0.87	0.88	0.90
TOTAL CIVILIAN JOBS	103.34	103.54	107.25	110.11	111.39	111.91	115.75	120.53	122.96	124.47
TOTAL CIVILIAN EMPLOYMENT	99.32	101.34	103.65	106.30	107.38	107.69	111.12	115.48	117.35	118.02
MULTIPLE JOB HOLDERS	4.02	2.20	3.60	3.81	4.01	4.22	4.64	5.05	5.61	6.45
MILITARY JOBS	2.10	2.14	2.14	2.15	2.15	2.15	2.15	2.15	2.15	2.15
CIVILIAN UNEMPLOYMENT RATE	7.14	8.06	7.10	5.86	6.03	6.86	6.09	4.58	4.80	6.79
LABOR PRODUCTIVITY										
GNP / CIVILIAN JOBS	20.11	20.02	20.34	20.52	20.64	20.70	20.89	21.11	21.27	21.31
(GNP-GOVT) / PRIVATE JOBS	18.28	18.09	18.47	18.70	18.76	18.75	18.89	19.09	19.19	19.06

BASE RUN

TABLE VI-14. DOMESTIC PRODUCERS' PRICES BY SECTOR (1977=100)

		1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
1	AGRICULTURE, FORESTRY, FISHERY	134.35	164.69	164.21	175.28	190.30	204.01	221.66	248.16	279.62	346.02
	MINING										
2	IRON ORE MINING	116.37	137.23	140.33	149.51	160.63	173.89	197.91	219.98	252.53	331.38
3	NONFERROUS METALS MINING	107.92	129.31	130.94	139.31	149.77	162.66	185.25	207.05	238.36	315.32
4	COAL MINING	107.70	129.07	130.67	139.02	149.36	161.97	184.35	206.41	236.98	310.83
5	NATURAL GAS EXTRACTION	187.27	297.62	324.36	354.43	416.56	496.99	641.99	673.54	933.88	1743.08
6	CRUDE PETROLEUM	247.37	327.54	326.72	338.39	360.56	387.98	438.74	485.41	544.92	641.77
7	NON-METALLIC MINING	111.76	134.27	136.85	145.64	156.74	170.20	194.31	217.07	250.39	330.77
8	CONSTRUCTION	133.42	168.98	185.18	200.13	220.09	242.02	288.36	334.98	401.05	535.46
	NON-DURABLES										
9	FOOD & TOBACCO	129.85	156.42	159.99	170.18	185.04	200.05	221.86	251.25	291.82	386.34
10	TEXTILES, EXC. KNITS	131.36	155.04	158.41	167.88	179.22	191.59	213.89	238.33	269.84	340.67
11	KNITTING	131.74	149.90	152.14	160.15	169.49	179.55	198.85	220.16	245.47	301.07
12	APPAREL, HOUSEHOLD TEXTILES	127.29	142.30	144.78	152.91	162.85	171.94	188.35	205.68	228.59	277.09
13	PAPER	133.94	161.67	168.28	177.86	189.57	203.06	227.73	250.93	283.83	359.63
14	PRINTING & PUBLISHING	133.78	163.50	176.17	185.31	196.39	208.79	235.93	265.28	301.08	372.08
15	AGRICULTURAL FERTILIZERS	130 99	165.67	173.63	184.39	200.49	220.34	248.59	269.44	319.17	456.66
16	OTHER CHEMICALS	135.24	167.79	174.31	184.87	199.79	217.67	243.60	266.53	310.36	423.71
17	PETROLEUM REFINING	193.08	237.24	230.91	242.27	259.71	280.24	317.92	352.35	400.15	493.69
18	FUEL OIL	182.51	217.85	209.03	216.45	228.76	243.45	268.46	288.97	320.05	379.82
19	RUBBER PRODUCTS	125.41	150.41	157.29	167.48	180.27	193.78	218.06	242.88	276.53	349.05
20	PLASTIC PRODUCTS	126.07	152.96	159.65	169.80	182.85	197.21	221.80	245.61	281.19	363.71
21	SHOES AND LEATHER	116.32	134.06	138.47	146.85	157.06	168.75	193.45	219.20	249.84	315.11
	DURABLES										
22	LUMBER	132.38	155.37	160.28	172.53	185.39	198.51	221.70	249.86	282.98	353.04
23	FURNITURE	132.66	149.45	153.75	163.30	173.86	185.40	203.90	224.09	249.65	304.57
24	STONE, CLAY, GLASS	135.28	158.89	167.45	177.71	189.65	202.65	225.81	248.62	281.06	357.28
25	FERROUS METALS	142.45	166.20	169.81	182.76	197.39	212.46	238.73	265.74	298.60	374.31
26	COPPER	125.14	142.85	147.09	157.35	169.37	182.31	206.01	229.80	260.04	327.66
27	OTHER NONFERROUS METALS	139.32	161.72	166.17	178.65	192.47	206.89	232.43	259.23	291.56	364.63
28	METAL PRODUCTS	131.14	151.29	153.75	163.00	174.78	187.71	210.54	232.82	261.12	323.39
	NON-ELEC MACHINERY										
29	ENGINES AND TURBINES	130.20	150.80	154.38	163.96	175.18	187.42	209.30	230.59	256.62	313.63
30	AGRICULTURAL MACHINERY	131.21	154.06	158.28	168.46	180.34	193.26	216.97	240.50	268.63	327.46
31	CONSTR, MINING, OILFIELD EQ	130.96	152.53	156.39	166.21	177.64	189.95	212.46	234.90	261.59	317.35
32	METALWORKING MACHINERY	130.36	151.71	155.08	164.43	175.14	186.84	208.18	229.86	254.80	305.21
33	SPECIAL INDUSTRY MACHINERY	131.37	152.92	156.68	166.25	177.34	189.41	211.47	233.64	260.16	316.29
34	MISC NON-ELECTRICAL MACH.	129.91	150.66	154.12	163.55	174.40	186.17	207.53	229.00	254.42	307.24
35	COMPUTERS	135.64	161.65	168.08	179.29	192.12	205.91	232.26	260.41	293.29	359.05
36	OTHER OFFICE EQUIPMENT	129.84	152.78	158.27	168.59	180.72	193.87	218.80	244.04	275.03	340.91
37	SERVICE INDUSTRY MACHINERY	130.16	151.09	155.52	165.30	176.73	189.00	211.66	234.79	262.50	319.63
	ELECTRICAL MACHINERY										
38	COMMUNIC EQ, ELECTRONIC COMP	127.07	145.74	151.74	160.89	171.12	181.72	200.89	222.65	247.36	296.56
39	ELEC INDL APP & DISTRIB EQ	129.41	148.66	154.25	163.72	174.34	185.40	205.34	227.32	252.71	304.28
40	HOUSEHOLD APPLIANCES	128.77	149.07	154.57	164.29	175.47	187.18	208.35	231.21	258.49	315.15
41	ELEC LIGHTING & WIRING EQ	128.31	148.16	153.89	163.54	174.50	186.08	206.95	229.53	256.26	311.29
42	TV SETS, RADIOS, PHONOGRAPHS	142.73	172.74	182.05	195.42	210.63	226.43	256.79	290.63	330.61	411.16
	TRANSPORTATION EQ										
43	MOTOR VEHICLES	127.41	152.56	159.80	168.96	179.82	196.10	227.07	248.67	269.39	309.92
44	AEROSPACE	132.93	156.57	168.15	180.46	200.17	223.19	258.11	280.31	333.33	533.27
45	SHIPS, BOATS	131.64	154.18	163.51	175.18	193.16	213.93	245.87	267.39	314.89	485.66
46	OTHER TRANSP. EQUIP.	130.19	150.51	158.52	169.76	186.33	205.09	234.69	255.56	297.53	441.53

BASE RUN

TABLE VI-14. DOMESTIC PRODUCERS' PRICES BY SECTOR (1977=100)

		1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
47	INSTRUMENTS	130.78	154.43	160.05	169.96	180.88	192.98	216.82	244.67	273.23	329.50
48	MISC. MANUFACTURING	133.51	158.44	162.68	173.89	194.60	223.86	291.80	320.57	399.06	708.60
	TRANSPORTATION										
49	RAILROADS	137.35	157.44	159.64	168.95	179.57	191.59	209.98	227.38	248.69	304.15
50	TRUCKING, HWY PASS TRANSIT	125.41	147.33	152.71	162.71	172.64	183.54	204.80	226.38	248.60	296.26
51	WATER TRANSPORT	129.48	150.87	156.32	165.99	176.71	188.77	212.22	235.60	263.31	324.32
52	AIR TRANSPORT	129.03	145.10	155.32	162.68	172.23	184.41	205.51	225.31	249.09	306.37
53	PIPELINE	128.22	150.32	155.39	165.32	175.27	186.49	208.47	229.37	252.30	303.97
54	TRANSPORTAION SERVICES	124.11	145.82	153.46	164.70	175.24	186.53	209.71	234.08	258.55	310.82
	UTILITIES										
55	COMMUNICATIONS SERVICES	119.05	133.48	138.81	146.86	154.10	160.52	176.37	193.47	210.64	249.19
56	ELECTRIC UTILILITIES	135.05	155.05	160.34	167.90	178.90	192.19	216.20	233.87	265.04	345.66
57	GAS UTILITY	156.32	213.36	228.81	244.29	276.32	316.41	386.05	402.61	518.25	870.00
58	WATER AND SANITATION	127.99	144.97	150.58	155.66	165.72	176.65	193.18	205.78	228.28	281.09
59	WHOLESALE TRADE	128.19	146.89	153.24	163.21	175.85	189.03	214.82	240.68	273.48	337.78
60	RETAIL TRADE	128.68	146.72	153.25	163.10	175.61	188.72	214.40	239.96	272.62	337.05
61	EATING & DRINKING PLACES	128.75	148.95	155.22	165.13	178.04	191.42	215.23	241.82	275.50	346.54
62	FINANCE & INSURANCE	123.93	148.99	161.45	174.81	186.88	199.64	230.03	265.89	299.70	358.66
63	REAL ESTATE	120.59	141.90	149.26	160.96	171.82	183.41	209.37	239.02	272.55	343.18
64	OWNER-OCCUPIED HOUSING	120.68	141.09	148.80	161.62	172.67	183.95	210.55	243.01	279.73	355.64
	SERVICES										
65	HOTELS, REPAIRS EXC AUTO	138.41	163.92	175.57	189.80	205.05	221.11	254.91	291.56	333.84	421.22
66	BUSINESS SERVICES	128.32	151.72	159.85	171.34	183.55	196.03	221.19	248.71	278.97	337.77
67	AUTOMOBILE REPAIRS	123.67	146.94	154.17	164.90	177.75	192.24	220.50	247.44	280.29	345.36
68	MOVIES AND AMUSEMENTS	126.98	149.65	160.60	170.13	180.35	193.23	219.27	251.42	280.72	343.65
69	MEDICINE, EDUCATION, NPO	132.28	155.45	165.53	178.54	192.49	206.90	236.68	268.49	304.86	376.32
70	FED & S&L GOVT ENTERPRISES	124.69	150.59	157.71	164.19	177.40	191.70	213.61	231.99	264.42	337.53
71	NON COMPETITIVE IMPORTS	127.00	153.00	161.00	169.00	177.00	188.80	212.40	236.00	266.40	312.00
72	DOMESTIC SERVANTS	120.63	147.03	158.56	172.25	186.56	200.75	231.34	265.10	299.10	363.43
73	UNIMPORTANT INDUSTRY	133.50	157.65	163.36	174.44	188.02	202.78	229.38	255.91	292.09	377.86
74	SCRAP AND USED	132.24	155.86	160.92	170.40	181.48	194.67	218.35	241.77	267.20	325.09
75	REST OF THE WORLD INDUSTRY	134.11	190.01	180.26	183.75	188.56	203.69	217.62	240.57	249.50	258.91
76	GOVERNMENT INDUSTRY	122.14	150.23	165.01	175.45	189.81	202.66	229.36	261.53	297.38	341.68
77	INFORUM STAT. DISCREPANCY	124.94	144.04	148.12	159.80	173.77	188.54	218.06	246.03	281.81	373.54
78	NIPA STAT. DISCREPANCY	131.45	157.41	164.21	175.28	190.30	204.01	221.66	248.16	279.62	346.02
	IMPLICIT DEFLATORS (1977=100)										
	Gross National Product	127.84	154.06	160.91	172.00	184.50	198.46	225.03	253.36	287.79	360.75
	Personal consumption expenditures	129.21	149.65	156.21	167.11	179.75	193.05	219.16	246.57	280.94	353.95
	COMPENSATION PER MAN-HOUR INDEXES										
	Manufacturing	131.10	155.20	166.03	178.76	193.71	209.04	237.43	269.45	304.83	374.69
	Non-manufacturing	128.30	151.65	163.46	177.03	191.65	206.75	237.56	271.75	307.40	373.09

BASE RUN

TABLE VI-15. LABOR COMPENSATION BY INDUSTRY, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	1607.74	1893.36	2106.45	2325.31	2539.48	2749.48	3233.44	3819.22	4405.53	5384.05
1 FARM & AGRICULTURAL SERVICES	16.56	19.37	20.69	22.97	25.11	27.01	31.34	35.95	40.63	50.42
MINERALS	28.05	40.00	42.62	49.13	55.30	61.73	77.75	98.37	121.13	169.12
2 CRUDE PETROL. & NAT. GAS	13.90	20.05	21.11	24.35	27.29	30.36	39.04	50.45	62.81	86.20
3 MINING	14.15	19.95	21.51	24.78	28.01	31.37	38.71	47.92	58.32	82.92
4 CONTRACT CONSTRUCTION	84.67	95.17	114.99	131.38	147.07	160.73	195.74	244.06	290.98	354.79
NON-DURABLES	154.07	177.66	191.31	205.52	218.51	230.27	259.77	293.52	324.55	375.10
5 FOOD & TOBACCO	34.18	39.00	41.19	43.37	45.07	46.83	51.64	55.35	58.75	65.62
6 TEXTILE MILL PRODUCTS	12.35	13.39	13.33	13.59	14.00	14.27	15.26	16.46	17.14	18.45
7 APPAREL AND RELATED PRODUCTS	14.69	16.58	17.46	18.93	20.18	21.00	22.98	25.24	27.35	30.28
8 PAPER AND ALLIED PRODUCTS	16.22	18.17	19.90	21.59	23.08	24.53	27.96	31.84	35.30	41.40
9 PRINTING AND PUBLISHING	23.12	27.66	31.52	34.48	37.66	40.49	47.71	56.61	65.42	76.58
10 CHEMICAL AND ALLIED PRODUCTS	29.37	33.52	35.79	38.33	40.64	42.86	48.30	54.96	60.94	71.55
11 PETROLEUM AND RELATED INDUSTRI	7.48	8.77	9.08	9.78	10.37	11.02	12.15	13.32	14.42	17.45
12 RUBBER & MISC PLASTIC PRODUCTS	13.69	17.07	19.26	21.39	23.24	24.82	29.02	34.61	39.82	47.98
13 LEATHER AND LEATHER PRODUCTS	2.98	3.49	3.78	4.05	4.28	4.44	4.76	5.13	5.41	5.79
DURABLES	286.13	319.74	349.61	384.96	419.23	452.05	515.05	602.37	685.80	824.87
14 LUMBER & WOOD PRODUCTS, EX FURN	12.09	12.32	13.76	15.42	16.43	17.22	18.79	20.95	22.86	26.35
15 FURNITURE AND FIXTURES	7.24	8.04	8.69	9.42	10.17	11.07	12.22	13.87	15.37	16.97
16 STONE, CLAY, & GLASS PRODUCTS	14.74	16.14	18.55	20.91	22.76	24.25	27.81	32.83	37.00	44.37
17 PRIMARY METAL INDUSTRIES	34.55	38.08	39.76	43.90	47.47	50.98	57.64	65.66	72.27	88.46
18 METAL PRODUCTS	35.18	40.85	45.28	50.69	56.43	61.91	72.35	85.57	98.63	123.25
19 TRANS EQ + ORD EX MOTOR VEH	31.72	35.10	39.98	44.10	48.32	53.43	63.25	77.50	91.02	109.95
20 MACHINERY, EXCEPT ELECTRICAL	60.46	66.84	72.42	80.89	88.17	94.54	107.42	127.38	145.16	173.16
21 ELECTRICAL MACHINERY	44.69	51.34	56.40	61.48	67.76	72.76	83.62	98.44	115.15	141.29
22 MOTOR VEHICLES AND EQUIPMENT	24.08	27.50	29.19	30.45	31.82	34.20	36.49	39.49	42.40	48.77
23 INSTRUMENTS AND RELATED PROD.	14.65	16.37	18.08	19.92	21.67	23.09	26.09	30.10	34.03	39.24
24 MISC. MANUFACTURING IND..	6.74	7.17	7.50	7.80	8.23	8.59	9.36	10.58	11.91	13.06
TRANSPORTATION	70.45	80.09	86.94	94.88	101.22	108.44	124.08	142.02	156.54	188.92
25 RAILROADS	16.15	17.60	18.26	19.70	20.99	22.41	24.91	27.29	29.79	36.65
26 AIR TRANSPORTATION	13.85	16.22	18.24	19.74	20.89	22.67	25.96	30.33	33.30	39.42
27 TRUCKING AND OTHER TRANSPORT	40.45	46.27	50.45	55.44	59.34	63.35	73.21	84.41	93.45	112.85
28 COMMUNICATIONS	36.10	41.46	43.98	47.93	51.54	55.70	63.90	71.03	77.95	95.52
30 ELECTRIC, GAS, AND SANITARY	21.68	25.63	28.13	30.69	33.13	35.79	41.72	48.20	54.69	67.97
31 WHOLESALE AND RETAIL TRADE	265.52	314.45	352.36	391.71	428.03	465.43	554.30	656.23	755.70	938.10
FIN, INSUR, REAL ESTATE	93.34	112.96	128.35	145.19	158.72	172.42	209.45	254.11	294.87	360.59
32 FINANCIAL & INSURANCE SERVICES	75.57	90.61	104.04	116.56	126.32	136.23	163.85	195.60	223.39	263.93
33 REAL ESTATE & COMBINATIONS OFF	17.77	22.35	24.32	28.63	32.40	36.19	45.60	58.51	71.48	96.66
SERVICES	245.94	303.75	347.21	393.22	435.45	478.15	584.57	709.23	832.03	1041.77
34 HOTELS & REPAIR(NOT AUTO)	25.39	28.94	32.70	36.77	40.29	43.69	52.52	63.63	73.51	87.99
35 MISC. BUSINESS SERVICES	74.59	94.09	109.80	127.06	142.79	157.41	195.96	244.31	291.06	371.57
36 AUTO REPAIR	8.01	9.41	10.59	11.79	12.88	13.90	16.52	20.02	23.34	28.75
37 MOTION PICTURES & AMUSEMENTS	11.02	13.97	15.87	17.63	19.16	20.86	24.79	29.89	34.33	42.35
38 MEDICAL & EDUCATIONAL SERVICES	120.70	149.68	169.51	191.07	211.72	233.18	285.32	341.53	401.42	506.70
39 PRIVATE HOUSEHOLDS	6.23	7.67	8.73	8.90	8.62	9.11	9.46	9.85	8.37	4.41
GOVERNMENT	305.24	363.08	400.25	427.72	466.18	501.77	575.77	664.12	770.66	916.91
40 FED. GOV'T ENTERPRISES	19.03	22.82	24.87	26.20	28.69	31.16	35.24	38.69	44.59	55.93
41 STATE & LOCAL GOV'T ENTERPRISES	13.40	15.06	16.53	17.70	19.06	20.61	23.66	27.18	30.72	36.43
44 FED GOV'T GENERAL ADMINIST.	82.88	99.80	113.86	123.36	136.57	146.39	172.20	206.45	244.50	279.08
45 STATE & LOCAL GENERAL ADMINIST.	189.93	225.40	244.99	260.46	281.86	303.61	344.67	391.80	450.85	545.47
46 REST OF THE WORLD										

BASE RUN

TABLE VI-16. INDEXES OF AVERAGE HOURLY COMPENSATION

		1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
	ALL INDUSTRIES										
1	FARM & AGRICULTURAL SERVICES	1.40	1.64	1.75	1.94	2.13	2.33	2.72	3.15	3.60	4.60
	MINERALS										
2	CRUDE PETROL. & NAT. GAS	1.30	1.61	1.74	1.89	2.04	2.21	2.59	3.00	3.43	4.26
3	MINING	1.36	1.63	1.67	1.81	1.98	2.16	2.44	2.75	3.12	4.08
4	CONTRACT CONSTRUCTION	1.22	1.51	1.65	1.75	1.88	2.01	2.29	2.59	2.93	3.40
	NON-DURABLES										
5	FOOD & TOBACCO	1.30	1.55	1.68	1.80	1.95	2.11	2.41	2.73	3.09	3.81
6	TEXTILE MILL PRODUCTS	1.31	1.50	1.56	1.68	1.81	1.94	2.18	2.46	2.76	3.35
7	APPAREL AND RELATED PRODUCTS	1.30	1.52	1.59	1.71	1.88	2.02	2.24	2.51	2.87	3.46
8	PAPER AND ALLIED PRODUCTS	1.34	1.59	1.72	1.86	2.01	2.17	2.50	2.85	3.23	4.02
9	PRINTING AND PUBLISHING	1.27	1.52	1.74	1.87	2.02	2.17	2.49	2.89	3.32	3.96
10	CHEMICAL AND ALLIED PRODUCTS	1.32	1.56	1.68	1.81	1.97	2.15	2.46	2.79	3.18	3.96
11	PETROLEUM AND RELATED INDUSTRI	1.36	1.65	1.74	1.89	2.06	2.24	2.57	2.92	3.29	4.24
12	RUBBER & MISC PLASTIC PRODUCTS	1.31	1.59	1.73	1.86	2.03	2.19	2.50	2.86	3.27	3.97
13	LEATHER AND LEATHER PRODUCTS	1.33	1.54	1.65	1.77	1.94	2.08	2.34	2.66	3.04	3.66
	DURABLES										
14	LUMBER & WOOD PRODUCTS, EX FURN	1.34	1.51	1.55	1.67	1.83	1.97	2.19	2.44	2.75	3.46
15	FURNITURE AND FIXTURES	1.33	1.56	1.65	1.77	1.95	2.11	2.36	2.64	3.02	3.69
16	STONE, CLAY, & GLASS PRODUCTS	1.34	1.56	1.65	1.78	1.92	2.08	2.36	2.66	3.00	3.73
17	PRIMARY METAL INDUSTRIES	1.38	1.66	1.74	1.90	2.07	2.25	2.57	2.91	3.28	4.22
18	METAL PRODUCTS	1.30	1.54	1.64	1.75	1.91	2.07	2.34	2.61	2.96	3.73
19	TRANS EQ + ORD EX MOTOR VEH	1.41	1.52	1.62	1.76	1.91	2.05	2.31	2.66	3.02	3.62
20	MACHINERY, EXCEPT ELECTRICAL	1.31	1.52	1.63	1.77	1.92	2.07	2.37	2.71	3.07	3.77
21	ELECTRICAL MACHINERY	1.32	1.53	1.66	1.75	1.90	2.06	2.33	2.60	2.98	3.65
22	MOTOR VEHICLES AND EQUIPMENT	1.30	1.48	1.50	1.59	1.74	1.90	2.08	2.25	2.58	3.30
23	INSTRUMENTS AND RELATED PROD.	1.28	1.55	1.70	1.82	1.97	2.14	2.47	2.84	3.25	3.98
24	MISC. MANUFACTURING IND.	1.32	1.51	1.60	1.70	1.84	1.98	2.21	2.49	2.85	3.42
	TRANSPORTATION										
25	RAILROADS	1.36	1.60	1.66	1.80	1.96	2.14	2.45	2.74	3.08	4.02
26	AIR TRANSPORTATION	1.30	1.52	1.64	1.75	1.87	2.01	2.29	2.58	2.84	3.47
27	TRUCKING AND OTHER TRANSPORT	1.29	1.54	1.65	1.78	1.92	2.08	2.40	2.73	3.05	3.81
28	COMMUNICATIONS	1.29	1.47	1.54	1.66	1.78	1.94	2.22	2.48	2.77	3.60
30	ELECTRIC, GAS, AND SANITARY	1.27	1.49	1.59	1.68	1.81	1.96	2.21	2.45	2.76	3.45
31	WHOLESALE AND RETAIL TRADE	1.30	1.52	1.62	1.74	1.89	2.04	2.33	2.63	2.98	3.68
	FIN, INSUR, REAL ESTATE										
32	FINANCIAL & INSURANCE SERVICES	1.29	1.52	1.68	1.81	1.95	2.09	2.43	2.80	3.16	3.77
33	REAL ESTATE & COMBINATIONS OFF	1.38	1.63	1.76	1.94	2.13	2.31	2.72	3.20	3.69	4.60
	SERVICES										
34	HOTELS & REPAIR(NOT AUTO)	1.41	1.62	1.76	1.92	2.09	2.26	2.61	3.03	3.46	4.20
35	MISC. BUSINESS SERVICES	1.30	1.54	1.67	1.81	1.97	2.11	2.44	2.79	3.15	3.81
36	AUTO REPAIR	1.27	1.47	1.58	1.71	1.86	2.01	2.29	2.61	2.96	3.55
37	MOTION PICTURES & AMUSEMENTS	1.29	1.50	1.62	1.77	1.93	2.04	2.38	2.69	3.04	3.71
38	MEDICAL & EDUCATIONAL SERVICES	1.29	1.50	1.61	1.73	1.88	2.04	2.33	2.64	3.00	3.67
39	PRIVATE HOUSEHOLDS	1.21	1.47	1.59	1.72	1.87	2.01	2.31	2.65	2.99	3.63
	GOVERNMENT										
40	FED. GOV'T ENTERPRISES	1.21	1.38	1.47	1.52	1.63	1.75	1.93	2.07	2.34	2.85
41	STATE & LOCAL GOV'T ENTERPRISES	1.25	1.35	1.45	1.52	1.60	1.70	1.87	2.07	2.31	2.68
44	FED GOV'T GENERAL ADMINIST.	1.22	1.53	1.71	1.82	1.97	2.12	2.44	2.76	3.16	3.76
45	STATE & LOCAL GENERAL ADMINIST.	1.22	1.41	1.53	1.62	1.73	1.85	2.07	2.34	2.66	3.07
46	REST OF THE WORLD										

BASE RUN

TABLE VI-17. TOTAL RETURN TO CAPITAL BY INDUSTRY, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	839.97	1031.97	1144.51	1278.62	1395.71	1517.23	1816.96	2212.23	2625.33	3553.67
1 FARM & AGRICULTURAL SERVICES	59.41	74.76	74.96	81.68	90.07	95.87	104.15	121.85	138.49	166.30
MINERALS	66.67	91.74	87.99	93.18	102.95	114.73	137.71	186.76	234.88	356.89
2 CRUDE PETROL. & NAT. GAS	59.46	85.48	81.75	86.89	96.60	108.33	130.99	180.03	227.54	347.72
3 MINING	7.21	6.26	6.24	6.29	6.35	6.40	6.72	6.74	7.34	9.17
4 CONTRACT CONSTRUCTION	25.97	28.02	37.54	43.72	48.23	51.46	61.68	73.75	86.98	115.91
NON-DURABLES	62.74	88.41	101.24	113.89	127.33	143.64	174.04	214.91	282.76	466.62
5 FOOD & TOBACCO	15.95	21.70	23.04	25.47	31.21	37.38	45.46	61.49	90.93	172.69
6 TEXTILE MILL PRODUCTS	4.31	4.39	5.29	6.20	6.29	6.41	7.91	10.52	11.46	12.56
7 APPAREL AND RELATED PRODUCTS	2.27	3.02	3.46	3.80	3.89	4.14	5.07	6.13	6.76	8.09
8 PAPER AND ALLIED PRODUCTS	7.08	9.61	11.01	12.22	12.95	13.84	16.70	19.40	22.83	30.82
9 PRINTING AND PUBLISHING	7.82	9.19	11.25	12.10	11.94	11.94	13.78	15.84	18.21	23.44
10 CHEMICAL AND ALLIED PRODUCTS	14.89	24.55	28.44	31.50	35.49	41.40	49.25	54.82	75.62	143.71
11 PETROLEUM AND RELATED INDUSTRI	8.78	13.99	16.64	20.40	23.44	26.29	33.10	43.23	53.24	71.11
12 RUBBER & MISC PLASTIC PRODUCTS	1.10	1.19	1.18	1.17	1.11	1.12	1.23	1.43	1.44	1.45
13 LEATHER AND LEATHER PRODUCTS	0.55	0.78	0.92	1.02	1.03	1.11	1.54	2.06	2.27	2.74
DURABLES	63.15	79.02	99.48	112.93	122.89	141.28	189.94	231.44	271.66	440.60
14 LUMBER & WOOD PRODUCTS, EX FURN	6.97	7.73	10.26	12.27	12.80	13.34	16.08	20.71	24.08	28.83
15 FURNITURE AND FIXTURES	1.23	1.03	1.30	1.44	1.26	1.30	1.19	1.46	1.22	0.80
16 STONE, CLAY, & GLASS PRODUCTS	3.35	3.27	5.09	5.79	5.75	5.34	5.24	5.82	6.14	6.99
17 PRIMARY METAL INDUSTRIES	7.87	6.48	6.81	8.78	10.48	11.50	13.51	18.30	20.29	20.78
18 METAL PRODUCTS	7.41	8.67	8.10	8.04	7.74	7.89	9.62	12.20	13.18	14.50
19 TRANS EQ + ORD EX MOTOR VEH	1.67	5.96	9.05	9.23	13.55	20.13	28.27	25.93	42.41	148.51
20 MACHINERY, EXCEPT ELECTRICAL	13.42	14.12	15.39	17.62	19.10	20.21	22.87	28.44	32.62	37.83
21 ELECTRICAL MACHINERY	12.63	11.93	13.79	16.75	17.99	17.85	20.63	27.43	29.80	31.05
22 MOTOR VEHICLES AND EQUIPMENT	4.45	13.99	23.03	24.61	23.40	28.73	44.04	55.55	50.67	35.00
23 INSTRUMENTS AND RELATED PROD.	1.96	2.51	2.82	3.53	3.63	3.76	5.33	8.89	10.44	11.69
24 MISC. MANUFACTURING IND.	2.19	3.33	3.84	4.87	7.20	11.23	23.17	26.70	40.80	104.63
TRANSPORTATION	23.49	26.28	29.62	32.46	34.72	37.12	42.68	50.44	56.52	67.72
25 RAILROADS	4.23	3.85	4.37	4.82	5.04	5.14	5.73	7.02	7.51	8.12
26 AIR TRANSPORTATION	2.68	2.79	3.25	2.95	3.00	3.44	3.66	3.74	3.96	5.20
27 TRUCKING AND OTHER TRANSPORT	16.58	19.64	22.00	24.69	26.69	28.54	33.30	39.68	45.05	54.41
28 COMMUNICATIONS	26.30	31.70	34.83	39.54	42.78	45.77	54.59	66.30	75.65	89.18
30 ELECTRIC, GAS, AND SANITARY	36.58	44.46	49.14	52.84	56.12	59.48	69.63	77.64	87.58	112.35
31 WHOLESALE AND RETAIL TRADE	89.09	107.69	114.65	123.87	133.73	145.79	171.96	198.79	232.13	294.84
FIN, INSUR, REAL ESTATE	247.78	294.14	332.20	382.81	422.05	453.37	545.87	677.08	808.63	1033.21
32 FINANCIAL & INSURANCE SERVICES	14.77	17.86	20.41	24.55	26.11	27.29	34.25	46.33	53.96	62.14
33 REAL ESTATE & COMBINATIONS OFF	233.01	276.28	311.79	358.26	395.94	426.08	511.62	630.75	754.67	971.07
SERVICES	89.07	109.87	123.89	139.63	149.69	160.49	190.29	232.68	263.93	315.59
34 HOTELS & REPAIR(NOT AUTO)	14.58	17.46	20.47	22.69	24.02	25.55	30.58	36.24	40.43	49.62
35 MISC. BUSINESS SERVICES	38.57	49.22	54.43	62.43	69.53	76.09	90.80	111.69	131.08	161.62
36 AUTO REPAIR	7.71	9.42	10.58	11.57	12.46	13.34	15.70	18.64	21.69	28.09
37 MOTION PICTURES & AMUSEMENTS	4.41	5.67	6.90	6.70	6.38	7.17	7.97	10.75	11.10	12.50
38 MEDICAL & EDUCATIONAL SERVICES	23.79	28.10	31.50	36.24	37.31	38.34	45.25	55.37	59.62	63.76
46 REST OF THE WORLD	49.71	[illegible] 89	58.97	62.06	[illegible] 15	68.2[illegible]	74.41	[illegible] 30.58	86 [illegible]	94.45

BASE RUN

TABLE VI-18. CORPORATE PROFITS, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	261.50	307.98	338.63	386.57	427.07	473.63	574.81	717.95	882.30	1387.07
1 FARM & AGRICULTURAL SERVICES	0.78	1.10	0.99	1.10	1.21	1.31	1.45	1.76	2.02	2.30
MINERALS	45.53	68.04	63.59	68.16	77.83	88.84	107.97	150.12	190.88	294.79
2 CRUDE PETROL. & NAT. GAS	42.82	67.04	62.99	68.05	77.97	89.54	109.80	153.64	195.64	301.16
3 MINING	2.71	1.00	0.59	0.12	-0.14	-0.70	-1.83	-3.52	-4.76	-6.37
4 CONTRACT CONSTRUCTION	4.88	5.07	7.01	8.37	8.86	9.25	10.87	13.27	16.15	22.68
NON-DURABLES	33.40	46.06	56.59	66.67	78.20	90.31	109.08	139.79	202.58	386.43
5 FOOD & TOBACCO	10.20	12.10	12.95	13.47	18.66	23.41	28.22	42.38	72.38	160.66
6 TEXTILE MILL PRODUCTS	2.51	2.47	3.24	3.93	3.68	3.18	3.26	5.30	5.98	6.67
7 APPAREL AND RELATED PRODUCTS	1.62	1.37	1.86	1.75	1.77	1.85	2.00	2.40	2.54	3.16
8 PAPER AND ALLIED PRODUCTS	3.50	4.89	6.02	7.62	8.36	9.03	10.94	12.88	16.01	23.86
9 PRINTING AND PUBLISHING	5.80	6.13	7.61	7.98	7.63	7.30	7.89	8.78	10.05	13.73
10 CHEMICAL AND ALLIED PRODUCTS	7.56	13.70	16.18	19.42	23.10	28.44	34.21	37.18	57.09	125.40
11 PETROLEUM AND RELATED INDUSTRI	1.79	4.91	8.17	11.90	14.42	16.47	21.63	29.46	36.90	50.78
12 RUBBER & MISC PLASTIC PRODUCTS	0.02	-0.06	-0.14	-0.14	-0.17	-0.20	-0.28	-0.34	-0.39	-0.46
13 LEATHER AND LEATHER PRODUCTS	0.41	0.56	0.69	0.74	0.74	0.83	1.22	1.75	2.03	2.63
DURABLES	28.29	27.52	43.25	44.61	46.76	57.73	83.82	103.21	122.17	270.34
14 LUMBER & WOOD PRODUCTS, EX FURN	2.67	2.86	4.40	5.39	5.30	5.11	6.12	8.82	10.32	12.30
15 FURNITURE AND FIXTURES	0.76	0.42	0.74	0.69	0.50	0.50	0.16	0.24	-0.07	-0.41
16 STONE, CLAY, & GLASS PRODUCTS	1.15	0.57	1.85	2.31	1.91	1.17	0.19	0.22	0.13	0.29
17 PRIMARY METAL INDUSTRIES	2.29	-1.42	-2.14	-0.97	0.22	0.60	0.23	3.01	3.72	1.54
18 METAL PRODUCTS	4.49	4.39	4.27	2.78	1.99	1.47	1.26	2.08	1.97	2.01
19 TRANS EQ + ORD EX MOTOR VEH	2.60	5.11	7.31	7.71	13.00	20.11	26.29	24.97	41.11	160.72
20 MACHINERY, EXCEPT ELECTRICAL	7.92	4.11	5.37	5.35	5.79	5.17	3.23	5.18	5.71	6.15
21 ELECTRICAL MACHINERY	7.36	2.31	2.81	4.15	3.23	0.34	-3.69	-3.63	-9.98	-22.42
22 MOTOR VEHICLES AND EQUIPMENT	-4.39	5.41	14.01	11.88	7.38	12.16	28.57	35.46	29.04	14.69
23 INSTRUMENTS AND RELATED PROD.	2.36	2.36	2.72	2.98	3.06	3.35	4.55	8.04	9.52	11.02
24 MISC. MANUFACTURING IND.	1.07	1.40	1.90	2.35	4.40	7.77	16.89	18.82	30.71	84.46
TRANSPORTATION	3.23	3.81	5.75	6.79	7.61	8.39	9.34	11.94	12.29	15.57
25 RAILROADS	1.76	1.05	1.95	2.63	2.94	3.03	3.11	4.93	4.60	5.41
26 AIR TRANSPORTATION	-1.08	-1.40	-1.23	-1.78	-1.88	-1.68	-1.98	-2.64	-3.29	-3.51
27 TRUCKING AND OTHER TRANSPORT	2.55	4.16	5.02	5.95	6.55	7.04	8.21	9.65	10.97	13.67
28 COMMUNICATIONS	7.31	6.64	5.21	7.86	8.92	10.53	12.70	15.62	14.56	9.40
30 ELECTRIC, GAS, AND SANITARY	10.59	15.71	14.65	17.11	18.11	22.46	29.66	35.13	41.67	63.71
31 WHOLESALE AND RETAIL TRADE	50.45	52.50	45.61	57.54	60.76	65.00	76.02	85.08	101.69	125.18
FIN, INSUR, REAL ESTATE	34.76	33.14	43.66	52.21	60.10	57.58	64.43	82.22	92.36	100.27
32 FINANCIAL & INSURANCE SERVICES	32.03	28.85	31.38	34.84	37.05	37.85	44.40	56.62	61.40	64.74
33 REAL ESTATE & COMBINATIONS OFF	2.73	4.29	12.28	17.37	23.05	19.73	20.03	25.60	30.96	35.53
SERVICES	11.16	13.38	15.40	17.27	17.90	19.48	22.88	29.34	32.00	37.27
34 HOTELS & REPAIR(NOT AUTO)	2.24	2.60	3.05	3.71	3.82	4.01	4.88	5.94	6.55	8.15
35 MISC. BUSINESS SERVICES	4.60	5.91	6.47	7.49	8.31	9.01	10.53	13.00	15.03	18.26
36 AUTO REPAIR	0.62	0.78	0.89	1.02	1.12	1.21	1.45	1.77	2.09	2.89
37 MOTION PICTURES & AMUSEMENTS	1.48	1.85	2.51	2.15	1.75	2.34	2.54	4.22	3.70	3.39
38 MEDICAL & EDUCATIONAL SERVICES	2.22	2.25	2.48	2.91	2.92	2.92	3.48	4.41	4.62	4.56
46 REST OF THE WORLD	31.13	35.00	36.93	38.86	40.80	42.73	46.60	50.46	53.94	59.15

BASE RUN

TABLE VI-19. PROPRIETORS' INCOME BY INDUSTRY, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	144.02	172.98	192.09	241.88	271.21	297.75	380.93	507.50	630.74	865.99
1 FARM & AGRICULTURAL SERVICES	32.23	45.34	40.71	45.51	50.03	54.27	59.94	72.83	83.72	95.16
MINERALS	3.15	4.41	4.08	4.32	4.91	5.55	6.65	9.15	11.60	18.02
2 CRUDE PETROL. & NAT. GAS	2.71	4.24	3.99	4.31	4.93	5.67	6.95	9.72	12.38	19.05
3 MINING	0.44	0.16	0.10	0.02	-0.02	-0.11	-0.30	-0.57	-0.77	-1.04
4 CONTRACT CONSTRUCTION	13.01	13.53	18.69	22.32	23.63	24.68	28.99	35.42	43.11	60.55
NON-DURABLES	1.19	0.77	0.61	0.72	0.63	0.57	0.37	0.61	1.16	3.00
5 FOOD & TOBACCO	0.19	0.22	0.24	0.25	0.34	0.43	0.52	0.78	1.32	2.93
6 TEXTILE MILL PRODUCTS	0.06	0.06	0.07	0.09	0.08	0.07	0.07	0.12	0.14	0.15
7 APPAREL AND RELATED PRODUCTS	0.23	0.20	0.27	0.25	0.26	0.27	0.29	0.35	0.37	0.46
8 PAPER AND ALLIED PRODUCTS	0.09	0.13	0.15	0.20	0.22	0.23	0.29	0.34	0.42	0.63
9 PRINTING AND PUBLISHING	0.48	0.51	0.63	0.66	0.64	0.61	0.66	0.73	0.84	1.15
10 CHEMICAL AND ALLIED PRODUCTS	-0.03	-0.05	-0.05	-0.06	-0.08	-0.10	-0.12	-0.13	-0.20	-0.44
11 PETROLEUM AND RELATED INDUSTRI	0.03	0.08	0.14	0.20	0.24	0.28	0.37	0.50	0.63	0.88
12 RUBBER & MISC PLASTIC PRODUCTS	0.11	-0.41	-0.88	-0.90	-1.11	-1.28	-1.77	-2.17	-2.47	-2.90
13 LEATHER AND LEATHER PRODUCTS	0.02	0.03	0.04	0.04	0.04	0.04	0.06	0.09	0.11	0.14
DURABLES	2.33	2.09	3.06	3.53	4.02	4.77	7.39	9.13	13.05	29.73
14 LUMBER & WOOD PRODUCTS, EX FURN	0.92	0.98	1.51	1.85	1.82	1.76	2.10	3.03	3.54	4.22
15 FURNITURE AND FIXTURES	0.12	0.07	0.12	0.11	0.08	0.08	0.03	0.04	-0.01	-0.07
16 STONE, CLAY, & GLASS PRODUCTS	0.16	0.08	0.25	0.32	0.26	0.16	0.03	0.03	0.02	0.04
17 PRIMARY METAL INDUSTRIES	0.02	-0.01	-0.02	-0.01	0.00	0.01	0.00	0.03	0.03	0.01
18 METAL PRODUCTS	0.26	0.25	0.25	0.16	0.11	0.08	0.07	0.12	0.11	0.12
19 TRANS EQ + ORD EX MOTOR VEH	0.03	0.05	0.07	0.07	0.13	0.20	0.26	0.24	0.40	1.58
20 MACHINERY, EXCEPT ELECTRICAL	0.37	0.19	0.25	0.25	0.27	0.24	0.15	0.24	0.27	0.29
21 ELECTRICAL MACHINERY	0.08	0.03	0.03	0.05	0.04	0.00	-0.04	-0.04	-0.11	-0.25
22 MOTOR VEHICLES AND EQUIPMENT	0.01	-0.01	-0.02	-0.02	-0.01	-0.02	-0.04	-0.05	-0.05	-0.03
23 INSTRUMENTS AND RELATED PROD.	0.08	0.08	0.09	0.10	0.10	0.11	0.15	0.27	0.32	0.37
24 MISC. MANUFACTURING IND.	0.30	0.39	0.53	0.65	1.22	2.15	4.68	5.22	8.52	23.45
TRANSPORTATION	3.89	6.34	7.66	9.07	9.99	10.73	12.52	14.73	16.74	20.85
25 RAILROADS										
26 AIR TRANSPORTATION	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03
27 TRUCKING AND OTHER TRANSPORT	3.88	6.32	7.65	9.05	9.98	10.71	12.50	14.70	16.71	20.82
28 COMMUNICATIONS	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
30 ELECTRIC, GAS, AND SANITARY	0.60	0.90	0.84	0.98	1.03	1.28	1.69	2.01	2.38	3.65
31 WHOLESALE AND RETAIL TRADE	26.32	27.39	23.79	30.01	31.69	33.90	39.65	44.37	53.03	65.27
FIN, INSUR, REAL ESTATE	10.36	12.39	26.16	47.91	62.81	74.69	120.55	190.95	262.38	401.90
32 FINANCIAL & INSURANCE SERVICES	5.82	5.24	5.71	6.29	6.69	7.01	12.12	18.25	20.41	22.90
33 REAL ESTATE & COMBINATIONS OFF	4.54	7.15	20.45	41.62	56.12	67.68	108.43	172.30	241.97	379.00
SERVICES	50.94	59.83	66.50	77.50	82.45	87.30	103.17	128.30	143.55	167.86
34 HOTELS & REPAIR(NOT AUTO)	5.96	6.92	8.13	9.88	10.17	10.68	12.98	15.81	17.44	21.69
35 MISC. BUSINESS SERVICES	24.21	31.10	34.06	39.46	43.74	47.44	55.45	68.47	79.16	96.18
36 AUTO REPAIR	2.78	3.49	3.99	4.57	4.99	5.39	6.49	7.90	9.32	12.93
37 MOTION PICTURES & AMUSEMENTS	0.47	0.58	0.79	0.68	0.55	0.74	0.80	1.33	1.17	1.07
38 MEDICAL & EDUCATIONAL SERVICES	17.53	17.73	19.53	22.92	23.01	23.05	27.45	34.78	36.46	35.99
46 REST OF THE WORLD										

BASE RUN

TABLE VI-20. NET INTEREST PAYMENTS BY INDUSTRY, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	179.82	254.90	285.24	306.71	329.26	352.93	403.64	458.49	516.82	611.07
1 FARM & AGRICULTURAL SERVICES	13.78	15.19	18.71	19.20	21.08	20.89	20.75	21.28	22.56	29.05
MINERALS	1.85	4.40	5.51	5.70	5.30	5.31	6.30	7.37	9.32	13.83
2 CRUDE PETROL. & NAT. GAS	0.94	3.05	4.00	4.10	3.71	3.42	3.98	4.63	6.05	9.70
3 MINING	0.91	1.36	1.51	1.60	1.59	1.89	2.31	2.73	3.26	4.14
4 CONTRACT CONSTRUCTION	2.08	2.94	4.16	3.48	4.36	4.13	5.30	5.90	6.59	8.57
NON-DURABLES	8.42	15.72	16.94	17.28	18.88	21.75	28.27	33.36	37.57	36.65
5 FOOD & TOBACCO	1.89	3.73	4.34	4.81	5.35	5.97	6.89	7.44	6.83	0.00
6 TEXTILE MILL PRODUCTS	0.50	0.61	0.71	0.69	0.81	1.18	2.29	2.54	2.54	2.84
7 APPAREL AND RELATED PRODUCTS	0.42	0.96	1.33	1.40	1.49	1.52	2.10	2.54	3.05	4.06
8 PAPER AND ALLIED PRODUCTS	0.76	1.54	1.52	1.24	1.18	1.34	1.76	2.00	2.31	2.56
9 PRINTING AND PUBLISHING	0.13	0.58	0.80	0.86	0.81	0.92	1.59	2.07	2.56	3.45
10 CHEMICAL AND ALLIED PRODUCTS	2.00	3.80	4.04	3.96	4.21	4.77	5.61	6.76	8.20	8.73
11 PETROLEUM AND RELATED INDUSTRI	2.12	3.30	2.74	2.79	3.31	4.16	5.72	7.40	9.03	11.14
12 RUBBER & MISC PLASTIC PRODUCTS	0.51	1.00	1.24	1.33	1.51	1.67	2.06	2.43	2.91	3.81
13 LEATHER AND LEATHER PRODUCTS	0.09	0.20	0.21	0.21	0.21	0.21	0.24	0.19	0.14	0.05
DURABLES	9.08	16.68	20.11	26.22	31.86	35.41	43.98	55.65	64.12	76.58
14 LUMBER & WOOD PRODUCTS, EX FURN	0.73	1.04	1.34	1.46	1.50	1.65	1.97	2.36	2.70	3.38
15 FURNITURE AND FIXTURES	0.16	0.25	0.32	0.37	0.41	0.44	0.60	0.73	0.87	1.14
16 STONE, CLAY, & GLASS PRODUCTS	0.48	0.90	1.09	1.12	1.32	1.55	2.07	2.28	2.64	3.45
17 PRIMARY METAL INDUSTRIES	2.45	4.23	5.77	6.43	6.89	7.34	9.06	10.72	12.14	15.68
18 METAL PRODUCTS	0.89	1.61	1.94	2.48	2.97	3.52	4.57	5.47	6.52	8.37
19 TRANS EQ + ORD EX MOTOR VEH	0.25	0.62	0.94	0.85	1.00	0.78	0.79	0.66	0.57	0.04
20 MACHINERY, EXCEPT ELECTRICAL	0.83	3.11	3.60	4.21	4.71	5.79	8.28	10.02	11.79	15.26
21 ELECTRICAL MACHINERY	1.12	2.24	2.32	3.18	4.03	5.11	8.00	9.95	11.40	13.35
22 MOTOR VEHICLES AND EQUIPMENT	1.53	1.56	1.48	4.56	7.36	7.59	6.81	11.36	13.07	14.51
23 INSTRUMENTS AND RELATED PROD.	0.14	0.31	0.41	0.50	0.51	0.39	0.56	0.70	0.74	0.85
24 MISC. MANUFACTURING IND.	0.49	0.80	0.90	1.04	1.17	1.26	1.28	1.41	1.69	0.56
TRANSPORTATION	4.14	5.43	6.10	5.91	6.24	6.51	7.35	8.32	9.42	11.26
25 RAILROADS	1.11	0.81	0.77	0.24	0.13	0.08	0.07	0.06	0.05	0.02
26 AIR TRANSPORTATION	0.78	1.21	1.41	1.53	1.66	1.70	1.92	2.19	2.53	3.20
27 TRUCKING AND OTHER TRANSPORT	2.25	3.41	3.92	4.14	4.46	4.73	5.36	6.07	6.84	8.05
28 COMMUNICATIONS	5.27	9.57	12.93	13.84	14.42	14.15	15.98	18.98	21.86	27.71
30 ELECTRIC, GAS, AND SANITARY	14.53	18.23	22.57	23.80	26.75	26.02	27.64	30.07	33.18	38.89
31 WHOLESALE AND RETAIL TRADE	8.94	15.73	17.62	21.28	22.80	26.21	31.69	37.62	44.36	55.29
FIN, INSUR, REAL ESTATE	86.80	116.81	121.97	129.40	134.04	146.21	164.23	181.65	203.03	237.32
32 FINANCIAL & INSURANCE SERVICES	-31.63	-26.62	-27.90	-28.68	-30.93	-32.33	-40.43	-50.14	-54.40	-60.66
33 REAL ESTATE & COMBINATIONS OFF	118.43	143.43	149.87	158.09	164.97	178.54	204.66	231.79	257.43	297.98
SERVICES	6.35	13.30	16.57	17.41	19.19	20.85	24.32	28.15	32.61	40.62
34 HOTELS & REPAIR(NOT AUTO)	2.51	3.82	4.90	4.57	5.21	5.71	6.70	7.68	8.92	11.37
35 MISC. BUSINESS SERVICES	1.49	2.41	2.89	3.22	3.60	3.96	4.81	5.83	7.01	9.03
36 AUTO REPAIR	0.95	1.39	1.68	1.74	1.89	2.05	2.37	2.73	3.12	3.79
37 MOTION PICTURES & AMUSEMENTS	0.63	0.93	1.10	1.12	1.10	1.10	1.16	1.23	1.36	1.74
38 MEDICAL & EDUCATIONAL SERVICES	0.78	4.76	6.00	6.75	7.40	8.02	9.29	10.67	12.19	14.69
46 REST OF THE WORLD	18.58	20.89	22.04	23.20	24.35	25.51	27.81	30.12	32.20	35.31

BASE RUN

TABLE VI-21. CORPORATE CAPITAL CONSUMPTION ALLOWANCE, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	158.26	168.14	175.74	189.28	204.34	220.44	254.66	294.70	345.64	425.04
1 FARM & AGRICULTURAL SERVICES	2.30	2.39	2.65	2.89	3.23	3.53	4.01	4.73	5.50	7.25
MINERALS	15.25	13.61	13.38	13.33	13.50	13.78	15.15	17.79	21.07	28.53
2 CRUDE PETROL. & NAT. GAS	11.61	9.78	9.37	9.07	8.93	8.81	9.15	10.50	12.18	16.88
3 MINING	3.64	3.83	4.01	4.25	4.57	4.97	5.99	7.29	8.89	11.65
4 CONTRACT CONSTRUCTION	4.06	4.92	5.11	6.17	7.51	8.82	10.76	11.80	13.59	15.87
NON-DURABLES	24.15	27.85	28.50	30.05	31.80	33.45	36.37	40.35	44.95	52.17
5 FOOD & TOBACCO	5.49	6.47	6.94	7.63	8.26	8.93	10.25	11.63	12.92	15.53
6 TEXTILE MILL PRODUCTS	1.19	1.19	1.19	1.37	1.60	1.86	2.13	2.35	2.56	2.62
7 APPAREL AND RELATED PRODUCTS	0.35	0.41	0.43	0.48	0.52	0.56	0.62	0.71	0.81	0.89
8 PAPER AND ALLIED PRODUCTS	3.23	3.38	3.33	3.40	3.50	3.64	3.96	4.24	4.58	4.98
9 PRINTING AND PUBLISHING	1.57	2.01	2.11	2.30	2.55	2.81	3.24	3.72	4.25	4.79
10 CHEMICAL AND ALLIED PRODUCTS	6.55	7.80	8.02	8.35	8.78	9.10	9.53	10.42	11.55	13.41
11 PETROLEUM AND RELATED INDUSTRI	4.85	5.59	5.44	5.34	5.28	5.17	5.12	5.58	6.35	7.81
12 RUBBER & MISC PLASTIC PRODUCTS	0.89	0.95	0.98	1.10	1.23	1.29	1.43	1.62	1.86	2.06
13 LEATHER AND LEATHER PRODUCTS	0.03	0.05	0.06	0.07	0.08	0.09	0.08	0.08	0.08	0.08
DURABLES	33.33	37.21	39.35	43.44	47.59	52.38	59.98	68.88	82.03	98.92
14 LUMBER & WOOD PRODUCTS, EX FURN	2.14	2.36	2.65	3.10	3.58	4.07	4.86	5.41	6.31	7.60
15 FURNITURE AND FIXTURES	0.33	0.32	0.31	0.34	0.36	0.39	0.40	0.43	0.47	0.44
16 STONE, CLAY, & GLASS PRODUCTS	1.87	1.77	1.85	2.08	2.31	2.53	2.87	3.08	3.38	3.67
17 PRIMARY METAL INDUSTRIES	3.88	4.03	4.09	4.09	4.22	4.43	4.78	5.07	5.32	5.56
18 METAL PRODUCTS	2.82	2.74	2.80	3.06	3.41	3.68	4.17	4.72	5.42	6.14
19 TRANS EQ + ORD EX MOTOR VEH	1.22	1.64	1.90	2.15	2.37	2.60	2.99	3.53	4.13	5.11
20 MACHINERY, EXCEPT ELECTRICAL	7.03	8.18	8.45	9.02	9.73	10.62	12.33	13.88	16.38	19.51
21 ELECTRICAL MACHINERY	5.61	7.76	8.48	9.93	11.25	12.99	16.62	21.46	29.02	41.65
22 MOTOR VEHICLES AND EQUIPMENT	7.30	7.20	7.57	8.26	8.74	9.23	8.83	8.88	8.67	5.70
23 INSTRUMENTS AND RELATED PROD.	0.20	0.29	0.29	0.33	0.36	0.39	0.43	0.43	0.45	0.43
24 MISC. MANUFACTURING IND.	0.93	0.92	0.96	1.08	1.25	1.44	1.70	1.99	2.49	3.11
TRANSPORTATION	9.59	8.60	8.58	8.79	9.01	9.56	10.80	12.18	13.86	16.42
25 RAILROADS	1.82	1.95	2.01	2.08	2.14	2.24	2.47	2.66	2.90	3.25
26 AIR TRANSPORTATION	2.96	2.92	3.02	3 14	3.16	3.36	3.64	4.09	4.61	5.43
27 TRUCKING AND OTHER TRANSPORT	4.81	3.73	3.56	3.57	3.71	3.95	4.69	5.43	6.35	7.74
28 COMMUNICATIONS	13.70	15.10	16.14	17.42	18.86	20.39	25.06	30.72	38.06	50.68
30 ELECTRIC, GAS, AND SANITARY	13.32	11.31	11.35	11.74	12.10	12.29	12.67	13.56	14.16	15.92
31 WHOLESALE AND RETAIL TRADE	20.08	21.44	22.97	25.18	27.76	30.35	36.72	43.58	51.54	63.20
FIN, INSUR, REAL ESTATE	10.46	12.34	13.27	14.45	15.68	17.09	20.59	24.34	29.10	36.33
32 FINANCIAL & INSURANCE SERVICES	6.98	8.42	9.16	10.07	10.98	12.10	15.19	18.56	22.86	29.60
33 REAL ESTATE & COMBINATIONS OFF	3.48	3.91	4.11	4.39	4.69	4.98	5.40	5.78	6.24	6.73
SERVICES	12.01	13.37	14.43	15.82	17.30	18.82	22.55	26.75	31.79	39.75
34 HOTELS & REPAIR(NOT AUTO)	1.86	1.90	1.96	2.07	2.20	2.34	2.68	3.00	3.34	3.79
35 MISC. BUSINESS SERVICES	4.66	5.42	6.03	6.79	7.68	8.66	11.04	13.50	16.53	21.11
36 AUTO REPAIR	2.77	3.11	3.30	3.56	3.77	3.97	4.56	5.27	6.08	7.20
37 MOTION PICTURES & AMUSEMENTS	1 47	1.64	1.76	1.91	2.05	2.17	2.37	2.81	3.38	4.59
38 MEDICAL & EDUCATIONAL SERVICES	1.25	1.30	1.39	1.50	1.60	1.67	1.90	2.17	2.47	3.06
46 REST OF THE WORLD										

BASE RUN

TABLE VI-22. NONCORPORATE CAPITAL CONSUMPTION ALLOWANCE, BILLION

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	69.98	76.02	80.48	86.75	94.25	101.54	114.32	127.82	143.96	168.99
1 FARM & AGRICULTURAL SERVICES	10.31	10.73	11.89	12.96	14.50	15.84	17.98	21.22	24.65	32.50
MINERALS	2.37	2.10	2.06	2.04	2.06	2.10	2.29	2.68	3.17	4.30
2 CRUDE PETROL. & NAT. GAS	1.89	1.59	1.52	1.48	1.45	1.43	1.49	1.71	1.98	2.75
3 MINING	0.49	0.51	0.53	0.57	0.61	0.66	0.80	0.97	1.19	1.55
4 CONTRACT CONSTRUCTION	2.19	2.66	2.76	3.33	4.05	4.76	5.80	6.36	7.33	8.56
NON-DURABLES	0.48	0.59	0.62	0.66	0.72	0.78	0.86	0.97	1.10	1.25
5 FOOD & TOBACCO	0.06	0.07	0.08	0.08	0.09	0.10	0.11	0.13	0.14	0.17
6 TEXTILE MILL PRODUCTS	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
7 APPAREL AND RELATED PRODUCTS	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.08	0.09
8 PAPER AND ALLIED PRODUCTS										
9 PRINTING AND PUBLISHING	0.19	0.25	0.26	0.29	0.32	0.35	0.40	0.46	0.53	0.59
10 CHEMICAL AND ALLIED PRODUCTS	0.18	0.22	0.22	0.23	0.25	0.26	0.27	0.29	0.32	0.38
11 PETROLEUM AND RELATED INDUSTRI										
12 RUBBER & MISC PLASTIC PRODUCTS										
13 LEATHER AND LEATHER PRODUCTS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DURABLES	0.85	0.92	1.00	1.14	1.29	1.46	1.72	1.95	2.30	2.79
14 LUMBER & WOOD PRODUCTS, EX FURN	0.44	0.49	0.54	0.64	0.74	0.84	1.00	1.11	1.30	1.56
15 FURNITURE AND FIXTURES	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
16 STONE, CLAY, & GLASS PRODUCTS	0.06	0.06	0.06	0.07	0.08	0.08	0.10	0.10	0.11	0.12
17 PRIMARY METAL INDUSTRIES	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
18 METAL PRODUCTS	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.08
19 TRANS EQ + ORD EX MOTOR VEH	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
20 MACHINERY, EXCEPT ELECTRICAL	0.11	0.13	0.13	0.14	0.15	0.17	0.20	0.22	0.26	0.31
21 ELECTRICAL MACHINERY	0.02	0.03	0.03	0.04	0.05	0.05	0.07	0.09	0.12	0.17
22 MOTOR VEHICLES AND EQUIPMENT										
23 INSTRUMENTS AND RELATED PROD.										
24 MISC. MANUFACTURING IND.	0.14	0.14	0.15	0.17	0.20	0.23	0.27	0.31	0.39	0.49
TRANSPORTATION	2.69	2.10	2.00	2.02	2.09	2.23	2.64	3.06	3.57	4.35
25 RAILROADS										
26 AIR TRANSPORTATION	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.08
27 TRUCKING AND OTHER TRANSPORT	2.65	2.06	1.96	1.97	2.04	2.18	2.58	2.99	3.49	4.26
28 COMMUNICATIONS	0.16	0.18	0.19	0.21	0.23	0.25	0.30	0.37	0.46	0.61
30 ELECTRIC, GAS, AND SANITARY	0.32	0.28	0.28	0.29	0.30	0.30	0.31	0.33	0.35	0.39
31 WHOLESALE AND RETAIL TRADE	3.80	4.06	4.35	4.76	5.25	5.74	6.95	8.25	9.75	11.96
FIN. INSUR. REAL ESTATE	38.73	43.52	45.74	48.80	52.18	55.45	60.18	64.48	69.70	75.27
32 FINANCIAL & INSURANCE SERVICES	0.21	0.26	0.28	0.31	0.33	0.37	0.46	0.57	0.70	0.90
33 REAL ESTATE & COMBINATIONS OFF	38.51	43.26	45.46	48.49	51.84	55.08	59.72	63.92	69.01	74.37
SERVICES	8.06	8.89	9.60	10.54	11.58	12.65	15.28	18.15	21.59	27.01
34 HOTELS & REPAIR(NOT AUTO)	2.09	2.13	2.20	2.32	2.47	2.62	3.00	3.36	3.74	4.25
35 MISC. BUSINESS SERVICES	3.60	4.19	4.65	5.24	5.93	6.69	8.52	10.42	12.76	16.29
36 AUTO REPAIR	0.54	0.61	0.64	0.69	0.74	0.78	0.89	1.03	1.19	1.40
37 MOTION PICTURES & AMUSEMENTS	0.82	0.92	0.98	1.06	1.15	1.21	1.32	1.57	1.89	2.57
38 MEDICAL & EDUCATIONAL SERVICES	1.01	1.06	1.13	1.22	1.30	1.36	1.54	1.76	2.01	2.49
46 REST OF THE WORLD										

BASE RUN

TABLE VI-23. BUSINESS TRANSFER PAYMENTS, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	10.45	13.62	14.84	15.99	17.83	19.90	23.07	26.51	31.27	42.31
1 FARM & AGRICULTURAL SERVICES	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04
MINERALS	0 08	0.12	0.14	0.15	0.16	0.19	0.22	0.23	0.28	0.40
2 CRUDE PETROL. & NAT. GAS	0.03	0.03	0.04	0.04	0.05	0.06	0.08	0.09	0.11	0.17
3 MINING	0.05	0.09	0.10	0.10	0.11	0.13	0.14	0.14	0.17	0.23
4 CONTRACT CONSTRUCTION	0.91	1.28	1.42	1.61	1.77	1.97	2.43	2.94	3.53	4.70
NON-DURABLES	0.79	0.96	1.16	1.43	1.55	1.63	2.01	2.55	2.94	3.39
5 FOOD & TOBACCO	0.26	0.25	0.30	0.38	0.40	0.40	0.51	0.68	0.77	0.83
6 TEXTILE MILL PRODUCTS	0.04	0.06	0.08	0.10	0.11	0.12	0.15	0.19	0.23	0.25
7 APPAREL AND RELATED PRODUCTS	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.13	0.16	0.22
8 PAPER AND ALLIED PRODUCTS	0.05	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.05
9 PRINTING AND PUBLISHING	0.12	0.18	0.21	0.24	0.26	0.28	0.34	0.42	0.50	0.63
10 CHEMICAL AND ALLIED PRODUCTS	0.10	0.15	0.23	0.33	0.36	0.37	0.46	0.64	0.71	0.65
11 PETROLEUM AND RELATED INDUSTRI	0.13	0.19	0.20	0.21	0.23	0.27	0.31	0.33	0.40	0.60
12 RUBBER & MISC PLASTIC PRODUCTS	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.08	0.10	0.13
13 LEATHER AND LEATHER PRODUCTS	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.02
DURABLES	0.78	0.88	0.98	1.11	1.22	1.32	1.58	1.91	2.24	2.83
14 LUMBER & WOOD PRODUCTS, EX FURN	0.09	0.14	0.13	0.12	0.14	0.18	0.20	0.20	0.26	0.45
15 FURNITURE AND FIXTURES	0.02	0.02	0.03	0.04	0.04	0.04	0.05	0.06	0.07	0.09
16 STONE, CLAY, & GLASS PRODUCTS	0.05	0.07	0.08	0.09	0.10	0.11	0.13	0.16	0.18	0.23
17 PRIMARY METAL INDUSTRIES	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.00
18 METAL PRODUCTS	0.09	0.12	0.13	0.13	0.15	0.16	0.19	0.21	0.25	0.35
19 TRANS EQ + ORD EX MOTOR VEH	0.07	0.08	0.09	0.11	0.12	0.12	0.15	0.20	0.22	0.25
20 MACHINERY, EXCEPT ELECTRICAL	0.13	0.16	0.19	0.21	0.23	0.25	0.30	0.36	0.43	0.54
21 ELECTRICAL MACHINERY	0.09	0.11	0.12	0.15	0.16	0.17	0.21	0.26	0.31	0.37
22 MOTOR VEHICLES AND EQUIPMENT	0.12	0.10	0.13	0.15	0.16	0.16	0.21	0.28	0.31	0.33
23 INSTRUMENTS AND RELATED PROD.	0.03	0.04	0.05	0.06	0.06	0.06	0.07	0.10	0.11	0.11
24 MISC. MANUFACTURING IND.	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	0.09
TRANSPORTATION	0.59	0.07	0.08	0.16	0.10	0.11	0.13	1.03	0.93	0.25
25 RAILROADS	0.05	0.07	0.08	0.09	0.10	0.11	0.13	0.14	0.17	0.23
26 AIR TRANSPORTATION	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01
27 TRUCKING AND OTHER TRANSPORT	0.54	0.00	0.00	0.06	0.00	0.00	0.00	0.87	0.74	0.00
28 COMMUNICATIONS	0.22	0.30	0.34	0.39	0.44	0.49	0.60	0.73	0.88	1.18
30 ELECTRIC, GAS, AND SANITARY	0.22	0.29	0.31	0.33	0.37	0.41	0.47	0.53	0.63	0.88
31 WHOLESALE AND RETAIL TRADE	2 81	5.32	5.87	6.19	7.03	7.88	8.86	9.50	11.40	16.34
FIN, INSUR, REAL ESTATE	2.20	2.43	2.56	2.65	2.97	3.34	3.76	3.99	4.73	6.70
32 FINANCIAL & INSURANCE SERVICES	1.49	1.81	1.85	1.82	2.04	2.35	2.59	2.59	3.09	4.75
33 REAL ESTATE & COMBINATIONS OFF	0.71	0.63	0.71	0.83	0.93	1.00	1.18	1.40	1.64	1.95
SERVICES	1.83	1.95	1.95	1.96	2.19	2.54	2.97	3.08	3.69	5.61
34 HOTELS & REPAIR(NOT AUTO)	0.23	0.32	0.36	0.40	0.44	0.49	0.58	0.68	0.81	1.09
35 MISC. BUSINESS SERVICES	0.31	0.37	0.38	0.39	0.44	0.49	0.56	0.61	0.73	1.08
36 AUTO REPAIR	0.17	0.11	0.10	0.06	0.05	0.04	0.02	0.00	0.00	0.06
37 MOTION PICTURES & AMUSEMENTS	0.06	0.10	0.11	0.12	0.14	0.15	0.18	0.19	0.23	0.35
38 MEDICAL & EDUCATIONAL SERVICES	1.05	1.04	1.00	0.98	1.12	1.36	1.63	1.61	1.92	3.04
46 REST OF THE WORLD										

BASE RUN

TABLE VI-24. CORPORATE IVA BY INDUSTRY, BILL. $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	-44.92	-32.32	-20.25	-32.86	-39.24	-44.45	-42.54	-46.00	-66.85	-114.87
1 FARM & AGRICULTURAL SERVICES										
2 CRUDE PETROL. & NAT. GAS	-0.52	-0.25	-0.16	-0.15	-0.45	-0.58	-0.45	-0.25	-0.77	-1.91
3 MINING	-1.02	-0.68	-0.59	-0.36	-0.36	-0.42	-0.39	-0.30	-0.62	-0.97
4 CONTRACT CONSTRUCTION	-0.97	-2.00	-1.35	-1.31	-1.63	-1.81	-2.06	-1.63	-2.78	-4.21
5 FOOD & TOBACCO	-2.12	-1.14	-1.79	-1.15	-1.89	-1.85	-1.04	-1.52	-3.41	-7.39
6 TEXTILE MILL PRODUCTS										
7 APPAREL AND RELATED PRODUCTS	-0.42	-0.02	-0.55	-0.21	-0.30	-0.21	-0.13	-0.07	-0.25	-0.78
8 PAPER AND ALLIED PRODUCTS	-0.55	-0.35	-0.04	-0.26	-0.34	-0.43	-0.28	-0.11	-0.54	-1.26
9 PRINTING AND PUBLISHING	-0.48	-0.45	-0.37	-0.21	-0.26	-0.32	-0.34	-0.33	-0.50	-0.87
10 CHEMICAL AND ALLIED PRODUCTS	-1.46	-1.07	-0.19	-0.72	-1.11	-1.41	-0.70	-0.34	-1.99	-4.24
11 PETROLEUM AND RELATED INDUSTRI	-0.14	-0.07	-0.05	-0.03	-0.05	-0.06	-0.05	-0.04	-0.07	-0.09
12 RUBBER & MISC PLASTIC PRODUCTS	-0.46	-0.32	-0.07	-0.27	-0.39	-0.43	-0.28	-0.20	-0.56	-1.19
13 LEATHER AND LEATHER PRODUCTS	-0.01	-0.07	-0.10	-0.05	-0.07	-0.08	-0.08	-0.08	-0.11	-0.18
14 LUMBER & WOOD PRODUCTS, EX FURN	-0.02	-0.13	-0.32	-0.29	-0.27	-0.26	-0.18	-0.24	-0.35	-0.69
15 FURNITURE AND FIXTURES	-0.18	-0.07	-0.24	-0.13	-0.15	-0.16	-0.07	-0.07	-0.14	-0.40
16 STONE, CLAY, & GLASS PRODUCTS	-0.43	-0.18	-0.11	-0.19	-0.23	-0.25	-0.15	-0.04	-0.32	-0.80
17 PRIMARY METAL INDUSTRIES	-0.82	-0.37	-0.90	-0.76	-0.87	-0.88	-0.59	-0.54	-0.94	-2.00
18 METAL PRODUCTS	-1.17	-0.46	-1.30	-0.60	-0.93	-1.07	-0.69	-0.46	-1.15	-2.55
19 TRANS EQ + ORD EX MOTOR VEH	-2.48	-1.53	-1.27	-1.66	-3.04	-3.65	-2.19	-3.65	-4.00	-19.03
20 MACHINERY, EXCEPT ELECTRICAL	-2.94	-1.75	-2.57	-1.56	-1.77	-2.01	-1.61	-1.44	-2.19	-4.18
21 ELECTRICAL MACHINERY	-1.64	-0.54	-0.01	-0.73	-0.75	-0.81	-0.52	-0.65	-0.93	-1.79
22 MOTOR VEHICLES AND EQUIPMENT	-0.11	-0.28	-0.15	-0.24	-0.23	-0.39	-0.33	-0.37	-0.37	-0.22
23 INSTRUMENTS AND RELATED PROD.	-0.85	-0.55	-0.72	-0.43	-0.45	-0.53	-0.43	-0.63	-0.68	-1.06
24 MISC. MANUFACTURING IND.	-0.75	-0.35	-0.60	-0.45	-1.05	-1.61	-1.66	-1.09	-2.97	-7.25
25 RAILROADS	-0.51	-0.03	-0.44	-0.21	-0.26	-0.31	-0.05	-0.78	-0.21	-0.80
26 AIR TRANSPORTATION	-0.03	-0.01	-0.02	-0.01	-0.01	-0.02	-0.01	-0.00	-0.01	-0.05
27 TRUCKING AND OTHER TRANSPORT	-0.10	-0.04	-0.10	-0.06	-0.05	-0.06	-0.04	-0.03	-0.05	-0.13
28 COMMUNICATIONS	-0.37	-0.10	0.01	-0.20	-0.09	-0.04	-0.06	-0.12	-0.17	-0.40
30 ELECTRIC, GAS, AND SANITARY	-3.00	-2.25	-0.86	-1.40	-2.53	-3.28	-2.82	-4.00	-4.79	-11.09
31 WHOLESALE AND RETAIL TRADE	-20.47	-16.48	-4.87	-18.54	-18.96	-20.47	-24.54	-26.02	-34.86	-37.28
32 FINANCIAL & INSURANCE SERVICES	-0.07	-0.05	-0.04	-0.05	-0.03	-0.04	-0.04	-0.07	-0.06	-0.06
33 REAL ESTATE & COMBINATIONS OFF	-0.15	-0.12	-0.00	-0.14	-0.07	-0.08	-0.08	-0.10	-0.16	-0.32
34 HOTELS & REPAIR(NOT AUTO)	-0.19	-0.15	-0.08	-0.17	-0.19	-0.19	-0.15	-0.15	-0.23	-0.46
35 MISC. BUSINESS SERVICES	-0.26	-0.15	-0.05	-0.15	-0.15	-0.14	-0.12	-0.13	-0.15	-0.30
36 AUTO REPAIR	-0.06	-0.03	-0.01	-0.04	-0.04	-0.05	-0.04	-0.03	-0.05	-0.09
37 MOTION PICTURES & AMUSEMENTS	-0.51	-0.34	-0.34	-0.32	-0.34	-0.52	-0.40	-0.60	-0.61	-1.17
38 MEDICAL & EDUCATIONAL SERVICES	-0.04	-0.02	-0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06
46 REST OF THE WORLD										

BASE RUN

TABLE VI-25. NON-CORPORATE IVA BY INDUSTRY, BILL. $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	-3.68	-3.12	-1.19	-3.31	-3.41	-3.72	-4.25	-4.41	-6.19	-7.90
1 FARM & AGRICULTURAL SERVICES										
2 CRUDE PETROL. & NAT. GAS	-0.01	-0.00	-0.00	-0.00	-0.01	-0.01	-0.01	-0.01	-0.03	-0.08
3 MINING	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
4 CONTRACT CONSTRUCTION	-0.19	-0.38	-0.26	-0.25	-0.31	-0.35	-0.40	-0.31	-0.54	-0.82
5 FOOD & TOBACCO	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.04
6 TEXTILE MILL PRODUCTS										
7 APPAREL AND RELATED PRODUCTS										
8 PAPER AND ALLIED PRODUCTS										
9 PRINTING AND PUBLISHING	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.03
10 CHEMICAL AND ALLIED PRODUCTS	-0.02	-0.01	-0.00	-0.01	-0.02	-0.03	-0.02	-0.01	-0.07	-0.19
11 PETROLEUM AND RELATED INDUSTRI										
12 RUBBER & MISC PLASTIC PRODUCTS										
13 LEATHER AND LEATHER PRODUCTS										
14 LUMBER & WOOD PRODUCTS, EX FURN										
15 FURNITURE AND FIXTURES	-0.00	-0.00	-0.01	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.01
16 STONE, CLAY, & GLASS PRODUCTS										
17 PRIMARY METAL INDUSTRIES	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
18 METAL PRODUCTS	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.00	-0.01	-0.02
19 TRANS EQ + ORD EX MOTOR VEH	-0.02	-0.02	-0.01	-0.02	-0.03	-0.04	-0.02	-0.04	-0.04	-0.18
20 MACHINERY, EXCEPT ELECTRICAL	-0.03	-0.02	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.03	-0.06
21 ELECTRICAL MACHINERY	-0.02	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.04
22 MOTOR VEHICLES AND EQUIPMENT										
23 INSTRUMENTS AND RELATED PROD.	-0.02	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
24 MISC. MANUFACTURING IND.	-0.02	-0.01	-0.01	-0.01	-0.03	-0.04	-0.05	-0.03	-0.10	-0.28
25 RAILROADS										
26 AIR TRANSPORTATION										
27 TRUCKING AND OTHER TRANSPORT										
28 COMMUNICATIONS										
30 ELECTRIC, GAS, AND SANITARY										
31 WHOLESALE AND RETAIL TRADE	-2.83	-2.28	-0.67	-2.56	-2.61	-2.82	-3.38	-3.58	-4.79	-5.11
32 FINANCIAL & INSURANCE SERVICES	-0.07	-0.05	-0.04	-0.04	-0.03	-0.03	-0.03	-0.05	-0.04	-0.03
33 REAL ESTATE & COMBINATIONS OFF	-0.16	-0.14	-0.00	-0.17	-0.09	-0.10	-0.11	-0.14	-0.24	-0.52
34 HOTELS & REPAIR(NOT AUTO)	-0.11	-0.08	-0.05	-0.10	-0.11	-0.11	-0.08	-0.09	-0.13	-0.26
35 MISC. BUSINESS SERVICES	-0.03	-0.02	-0.01	-0.02	-0.02	-0.02	-0.01	-0.01	-0.02	-0.03
36 AUTO REPAIR	-0.06	-0.04	-0.01	-0.04	-0.05	-0.05	-0.04	-0.03	-0.05	-0.10
37 MOTION PICTURES & AMUSEMENTS	-0.02	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.02	-0.02	-0.03
38 MEDICAL & EDUCATIONAL SERVICES	-0.01	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02
46 REST OF THE WORLD										

BASE RUN

TABLE VI-26. GOVERNMENT SUBSIDIES TO BUSINESS, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	-4.61	-4.99	-5.53	-6.02	-6.46	-6.82	-7.85	-9.06	-10.31	-12.07
1 FARM & AGRICULTURAL SERVICES	-1.20	-1.31	-1.45	-1.56	-1.64	-1.73	-2.01	-2.29	-2.60	-3.10
MINERALS										
2 CRUDE PETROL. & NAT. GAS										
3 MINING										
4 CONTRACT CONSTRUCTION										
NON-DURABLES										
5 FOOD & TOBACCO										
6 TEXTILE MILL PRODUCTS										
7 APPAREL AND RELATED PRODUCTS										
8 PAPER AND ALLIED PRODUCTS										
9 PRINTING AND PUBLISHING										
10 CHEMICAL AND ALLIED PRODUCTS										
11 PETROLEUM AND RELATED INDUSTRI										
12 RUBBER & MISC PLASTIC PRODUCTS										
13 LEATHER AND LEATHER PRODUCTS										
DURABLES	-0.29	-0.34	-0.39	-0.42	-0.45	-0.49	-0.58	-0.69	-0.80	-0.95
14 LUMBER & WOOD PRODUCTS, EX FURN										
15 FURNITURE AND FIXTURES										
16 STONE, CLAY, & GLASS PRODUCTS										
17 PRIMARY METAL INDUSTRIES										
18 METAL PRODUCTS										
19 TRANS EQ + ORD EX MOTOR VEH	-0.29	-0.34	-0.39	-0.42	-0.45	-0.49	-0.58	-0.69	-0.80	-0.95
20 MACHINERY, EXCEPT ELECTRICAL										
21 ELECTRICAL MACHINERY										
22 MOTOR VEHICLES AND EQUIPMENT										
23 INSTRUMENTS AND RELATED PROD.										
24 MISC. MANUFACTURING IND.										
TRANSPORTATION	-1.70	-1.76	-1.94	-2.09	-2.21	-2.32	-2.64	-3.06	-3.44	-4.01
25 RAILROADS	-1.30	-1.33	-1.46	-1.57	-1.65	-1.73	-1.96	-2.26	-2.53	-2.93
26 AIR TRANSPORTATION	-0.09	-0.10	-0.12	-0.12	-0.13	-0.14	-0.17	-0.20	-0.23	-0.27
27 TRUCKING AND OTHER TRANSPORT	-0.30	-0.33	-0.36	-0.39	-0.42	-0.45	-0.51	-0.60	-0.68	-0.81
28 COMMUNICATIONS										
30 ELECTRIC, GAS, AND SANITARY										
31 WHOLESALE AND RETAIL TRADE										
FIN, INSUR, REAL ESTATE	-2.99	-3.30	-3.66	-4.03	-4.35	-4.61	-5.31	-6.15	-7.01	-8.16
32 FINANCIAL & INSURANCE SERVICES	-0.12	-0.13	-0.15	-0.16	-0.17	-0.18	-0.21	-0.25	-0.28	-0.33
33 REAL ESTATE & COMBINATIONS OFF	-2.86	-3.17	-3.51	-3.86	-4.18	-4.43	-5.10	-5.91	-6.73	-7.83
SERVICES										
34 HOTELS & REPAIR(NOT AUTO)										
35 MISC. BUSINESS SERVICES										
36 AUTO REPAIR										
37 MOTION PICTURES & AMUSEMENTS										
38 MEDICAL & EDUCATIONAL SERVICES										
40 FEDERAL GOVERNMENT ENTERPRISES	-1.31	-1.41	-1.55	-1.70	-1.80	-1.90	-2.20	-2.55	-2.87	-3.31
41 STATE & LOCAL GOVT. ENTERPRISES	2.88	3.14	3.46	3.77	3.99	4.23	4.89	5.68	6.41	7.47
46 REST OF THE WORLD										

BASE RUN

TABLE VI-27. INDIRECT BUSINESS TAXES BY INDUSTRY, BILLION $

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
ALL INDUSTRIES	212.16	244.46	263.42	286.86	312.33	336.02	398.84	421.65	503.50	643.08
1 FARM & AGRICULTURAL SERVICES	2.90	4.32	4.53	4.86	5.25	5.56	6.14	6.94	7.81	9.66
MINERALS	16.74	39.30	37.28	40.19	44.22	48.92	58.66	20.70	24.96	34.20
2 CRUDE PETROL. & NAT. GAS	15.46	38.06	35.98	38.76	42.65	47.21	56.62	18.27	22.08	30.33
3 MINING	1.28	1.24	1.30	1.44	1.57	1.71	2.04	2.43	2.89	3.87
4 CONTRACT CONSTRUCTION	4.22	6.31	7.63	9.46	11.57	13.79	18.93	25.16	33.70	50.48
NON-DURABLES	20.94	24.64	29.96	32.75	35.37	38.20	44.34	52.18	61.11	78.12
5 FOOD & TOBACCO	9.69	10.84	11.60	12.65	13.63	14.65	16.81	19.23	21.11	23.98
6 TEXTILE MILL PRODUCTS	0.54	0.72	0.77	0.95	1.20	1.51	2.00	2.58	3.30	4.32
7 APPAREL AND RELATED PRODUCTS	0.28	0.33	0.35	0.40	0.47	0.52	0.62	0.77	0.96	1.24
8 PAPER AND ALLIED PRODUCTS	1.01	1.72	1.91	2.17	2.43	2.72	3.47	4.36	5.48	7.84
9 PRINTING AND PUBLISHING	0.61	0.85	0.93	1.06	1.21	1.36	1.67	2.07	2.55	3.34
10 CHEMICAL AND ALLIED PRODUCTS	2.09	3.85	4.30	4.90	5.43	6.17	7.78	10.02	13.19	20.49
11 PETROLEUM AND RELATED INDUSTRI	5.37	4.80	8.44	8.76	8.94	9.04	9.39	10.00	10.65	11.84
12 RUBBER & MISC PLASTIC PRODUCTS	1.28	1.45	1.58	1.77	1.95	2.10	2.47	3.00	3.68	4.82
13 LEATHER AND LEATHER PRODUCTS	0.06	0.07	0.08	0.09	0.11	0.12	0.14	0.16	0.19	0.25
DURABLES	10.00	11.62	11.50	12.90	14.72	16.48	19.84	24.01	29.66	39.39
14 LUMBER & WOOD PRODUCTS, EX FURN	0.55	0.73	0.85	1.00	1.15	1.30	1.59	1.92	2.33	3.04
15 FURNITURE AND FIXTURES	0.19	0.18	0.19	0.21	0.24	0.26	0.29	0.33	0.39	0.43
16 STONE, CLAY, & GLASS PRODUCTS	0.69	1.02	1.13	1.36	1.63	1.92	2.51	3.12	3.99	5.48
17 PRIMARY METAL INDUSTRIES	1.87	2.58	2.79	3.06	3.51	4.04	5.14	6.52	8.27	11.53
18 METAL PRODUCTS	1.12	1.11	1.16	1.36	1.68	1.95	2.45	3.08	4.03	5.31
19 TRANS EQ + ORD EX MOTOR VEH	0.54	0.84	0.97	1.11	1.29	1.47	1.82	2.31	2.94	4.31
20 MACHINERY, EXCEPT ELECTRICAL	1.50	1.74	1.81	1.97	2.17	2.38	2.79	3.23	3.87	4.81
21 ELECTRICAL MACHINERY	1.02	1.05	1.15	1.24	1.33	1.35	1.47	1.67	1.78	2.00
22 MOTOR VEHICLES AND EQUIPMENT	1.95	1.77	0.83	0.89	0.94	0.91	0.64	0.49	0.39	0.17
23 INSTRUMENTS AND RELATED PROD.	0.33	0.39	0.40	0.45	0.52	0.60	0.75	0.91	1.14	1.50
24 MISC. MANUFACTURING IND.	0.23	0.21	0.23	0.25	0.28	0.31	0.39	0.44	0.53	0.82
TRANSPORTATION	5.66	4.90	6.55	7.13	7.66	8.39	9.87	11.85	13.76	17.59
25 RAILROADS	0.77	0.74	0.76	0.79	0.82	0.84	0.88	0.92	0.95	1.05
26 AIR TRANSPORTATION	2.48	1.81	3.33	3.69	4.03	4.57	5.58	7.02	8.43	11.31
27 TRUCKING AND OTHER TRANSPORT	2.41	2.35	2.47	2.65	2.81	2.98	3.42	3.91	4.38	5.23
28 COMMUNICATIONS	6.51	7.07	8.66	9.51	10.35	9.47	11.58	14.16	17.30	23.07
30 ELECTRIC, GAS, AND SANITARY	10.65	6.55	6.69	6.98	7.18	7.27	7.55	8.76	9.43	10.96
31 WHOLESALE AND RETAIL TRADE	72.63	71.07	77.03	83.77	91.89	99.43	122.10	149.85	184.12	235.88
FIN, INSUR, REAL ESTATE	53.84	57.63	61.08	65.18	68.47	71.14	78.19	80.80	88.21	98.00
32 FINANCIAL & INSURANCE SERVICES	7.71	8.29	9.19	10.22	10.97	11.71	13.94	16.67	19.28	23.27
33 REAL ESTATE & COMBINATIONS OFF	46.14	49.35	51.89	54.97	57.50	59.43	64.24	64.13	68.93	74.73
SERVICES	8.07	10.98	12.44	14.05	15.59	17.30	21.56	27.15	33.34	45.62
34 HOTELS & REPAIR(NOT AUTO)	2.77	4.14	4.78	5.54	6.28	7.10	9.25	11.98	15.17	21.69
35 MISC. BUSINESS SERVICES	1.29	2.13	2.47	2.87	3.27	3.68	4.72	6.04	7.52	10.27
36 AUTO REPAIR	0.83	1.15	1.32	1.52	1.71	1.91	2.47	3.21	4.08	5.83
37 MOTION PICTURES & AMUSEMENTS	2.38	2.68	2.90	3.07	3.21	3.42	3.76	4.37	4.86	5.83
38 MEDICAL & EDUCATIONAL SERVICES	0.80	0.89	0.96	1.05	1.12	1.19	1.36	1.54	1.71	2.00
39 PRIVATE HOUSEHOLDS										
GOVERNMENT	0.00	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.09	0.10
40 FED. GOV'T ENTERPRISES	0.00	0.06	0.07	0.07	0.07	0.07	0.07	0.08	0.09	0.10
41 STATE & LOCAL GOV'T ENTERPRISES										
44 FED GOV'T GENERAL ADMINIST.										
45 STATE & LOCAL GENERAL ADMINIST.										
46 REST OF THE WORLD										

M2 GROWTH 10%

TABLE VI-28. FORECAST CONTROLS & RESULTS

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
Gross National Product, GNPZ	2659.17	3166.49	3522.25	3934.17	4335.02	4737.28	5721.72	6961.54	8404.20	11325.18
Sum of VA by category:	2659.17	3166.50	3522.25	3934.17	4335.03	4737.29	5721.73	6961.55	8404.21	11325.19
Statistical discrepancy	3.90	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Labor compensation	1607.74	1893.36	2111.95	2349.41	2588.06	2826.79	3381.88	4120.00	4925.21	6371.01
Indirect business taxes	212.16	244.46	264.41	290.11	319.26	347.05	419.52	451.69	552.13	741.35
Subsidies	-4.61	-4.99	-5.54	-6.08	-6.52	-6.93	-7.89	-9.05	-10.22	-11.89
Return to capital	839.97	1031.97	1151.43	1300.73	1434.22	1570.39	1928.22	2398.91	2937.09	4224.72
Net interest	179.82	254.90	285.26	306.79	329.40	353.14	404.07	459.25	518.03	612.84
Corp. capital consump. allow.	158.26	168.14	176.52	191.63	210.67	230.25	273.14	318.51	382.48	495.69
Noncorp. cap. consump. allow.	69.98	76.02	80.76	87.91	96.93	105.77	121.80	138.04	159.55	197.68
Business transfer payments	10.45	13.62	14.77	15.95	17.71	19.61	23.78	28.45	35.06	51.35
Corporate profits	261.50	307.98	342.51	398.00	447.33	496.78	643.76	828.89	1076.54	1807.54
Proprietor income	144.02	172.98	194.81	248.85	287.09	315.99	411.98	562.67	720.02	1052.49
Corp. inventory valuation adj.	-45.29	-32.42	-21.50	-33.34	-47.29	-49.91	-62.06	-67.84	-107.99	-189.50
Noncorp. inven. valuation adj.	-3.68	-3.12	-1.37	-3.24	-4.17	-4.14	-5.63	-6.65	-9.07	-12.91
Rental income	64.90	73.88	79.68	88.18	96.55	102.90	117.37	137.59	162.47	209.55
Gross National Product Deflator	1.79	2.15	2.25	2.40	2.61	2.82	3.29	3.81	4.52	6.05
COMPENSATION PER MAN-HOUR INDEXES										
Manufacturing	131.10	155.20	166.05	179.33	195.26	212.68	248.83	293.41	346.36	454.71
Non-manufacturing	128.30	151.65	163.62	178.00	193.40	210.24	247.58	293.72	344.80	446.74
LABOR PRODUCTIVITY (GNP/JOBS)	20.11	20.02	20.35	20.55	20.64	20.73	20.88	21.08	21.22	21.27
ENERGY PRICE INDEXES										
Domestic crude oil ($/bbl)	21.20	28.07	28.00	29.00	30.90	33.25	37.60	41.60	46.69	54.99
Foreign crude oil ($/bbl)	31.37	32.80	28.01	29.01	30.91	33.26	37.61	41.61	46.71	55.01
FINANCIAL VARIABLES										
AAA Corporate bond rate	11.94	13.79	11.19	9.44	9.38	9.68	9.10	9.07	9.41	9.91
Commercial paper rate	12.29	11.90	9.14	8.22	8.86	8.95	8.22	8.37	8.59	9.60
M2 (billions of current$)	1585.32	1908.00	2108.67	2330.44	2575.53	2846.40	3476.60	4246.33	5186.48	7001.01
Ratio of M2 to real GNP	1.08	1.30	1.36	1.44	1.56	1.70	2.01	2.33	2.80	3.72
Ratio of M2 to nominal GNP	0.60	0.60	0.60	0.59	0.59	0.60	0.61	0.61	0.62	0.61
Savings rate	5.82	6.54	9.02	9.31	9.86	9.90	9.24	9.54	10.10	9.97
Gross National Product, 1977$	2077.90	2072.19	2187.63	2292.00	2324.97	2346.16	2430.07	2552.01	2601.30	2617.57
PCE	1291.37	1338.98	1409.58	1465.85	1477.92	1497.26	1557.04	1629.86	1649.45	1641.57
Residential structures	72.59	61.24	85.51	100.60	95.71	91.55	91.19	97.38	92.84	80.03
Non-residential structures	77.56	66.10	73.15	84.00	91.40	91.98	90.80	97.43	95.60	87.45
Producers' durable equipment	168.31	164.89	177.12	194.41	205.49	208.73	208.59	219.82	228.85	227.30
Inventory change	-0.32	2.75	12.13	20.38	14.08	10.18	13.34	17.75	12.40	4.66
Exports of goods & services	256.18	237.82	228.23	230.77	233.83	232.65	245.21	267.19	287.71	324.87
Imports of goods & services	208.42	224.52	231.09	242.57	244.92	248.17	259.14	278.79	286.64	299.02
Government Purchases	420.61	424.90	432.99	438.55	451.42	461.95	483.02	501.34	521.07	550.67
Federal	156.24	169.12	170.97	170.30	176.94	183.58	196.86	207.39	217.72	233.22
Defense	101.02	114.26	122.55	127.89	133.00	138.11	148.33	155.81	163.28	174.50
Non-defense	55.22	54.87	48.42	42.41	43.94	45.47	48.52	51.58	54.43	58.72
State and local	264.37	255.78	262.01	268.25	274.48	278.38	286.17	293.96	303.35	317.45
Education	106.97	105.45	106.04	106.63	107.22	107.99	109.54	111.09	113.05	115.98
Other	157.40	150.33	155.98	161.62	167.26	170.38	176.63	182.87	190.31	201.47
Unemployment rate	7.14	8.06	6.86	4.59	4.93	5.73	5.55	4.12	5.08	7.88
Spending rate	91.40	90.76	88.61	88.37	87.78	87.77	88.46	88.16	87.62	87.79
Govt transfer share of income	13.23	12.29	13.21	12.93	13.16	13.43	13.76	13.66	14.09	15.29
Federal deficit, NIPA	-57.67	-206.28	-172.55	-139.05	-150.65	-175.67	-190.24	-171.74	-227.86	-329.91

M2 GROWTH 10%

TABLE VI-29. PRICE INDEXES AND FINANCIAL VARIABLES

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
IMPLICIT DEFLATORS (1972 = 100.)										
Gross National Product	1.79	2.15	2.25	2.40	2.61	2.82	3.29	3.81	4.52	6.05
Personal consumption expenditures	1.80	2.08	2.18	2.33	2.53	2.73	3.19	3.71	4.39	5.91
Residential structures	2.07	2.48	2.63	2.81	3.07	3.34	3.94	4.62	5.58	7.63
Non-residential structures	2.13	2.57	2.72	2.90	3.16	3.45	4.08	4.77	5.79	7.92
Producers' durable equipment	1.90	2.17	2.27	2.41	2.60	2.83	3.34	3.84	4.46	5.88
Exports, merchandise	2.33	2.76	2.85	3.02	3.28	3.57	4.16	4.78	5.67	7.84
Imports, merchandise	3.53	3.58	3.60	3.83	4.20	4.59	5.45	6.24	7.41	10.30
Federal defense	1.79	2.11	2.21	2.34	2.55	2.79	3.27	3.72	4.51	6.54
Federal non-defense	1.79	2.12	2.24	2.41	2.62	2.85	3.35	3.88	4.66	6.47
State & local education	1.95	2.35	2.46	2.61	2.84	3.09	3.65	4.20	5.08	7.13
State & local other govt	1.92	2.28	2.41	2.57	2.79	3.03	3.56	4.14	4.94	6.67
COMPENSATION PER MAN-HOUR INDEXES										
Manufacturing	131.10	155.20	166.05	179.33	195.26	212.68	248.83	293.41	346.36	454.71
Non-manufacturing	128.30	151.65	163.62	178.00	193.40	210.24	247.58	293.72	344.80	446.74
LABOR PRODUCTIVITY (GNP/JOBS)	20.11	20.02	20.35	20.55	20.64	20.73	20.88	21.08	21.22	21.27
ENERGY PRICE INDEXES										
Domestic crude oil ($/bbl)	21.20	28.07	28.00	29.00	30.90	33.25	37.60	41.60	46.69	54.99
Foreign crude oil ($/bbl)	31.37	32.80	28.01	29.01	30.91	33.26	37.61	41.61	46.71	55.01
FINANCIAL VARIABLES										
AAA Corporate bond rate	11.94	13.79	11.19	9.44	9.38	9.68	9.10	9.07	9.41	9.91
Commercial paper rate	12.29	11.90	9.14	8.22	8.86	8.95	8.22	8.37	8.59	9.60
Mortgage rate	12.25	14.61	11.60	9.37	9.67	10.31	9.71	9.68	10.01	10.18
Interest rate on Federal debt										
Average rate paid by S&L govt	6.93	8.91	8.83	7.98	6.99	6.38	6.22	5.97	6.17	6.84
Average rate received by S&L govt	11.05	11.03	9.36	8.29	8.43	8.55	8.11	8.08	8.44	9.37
Real rate of interest (ex ante)	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57
M2 (billions of current$)	1585.32	1908.00	2108.67	2330.44	2575.53	2846.40	3476.60	4246.33	5186.48	7001.01
Ratio of M2 to real GNP	1.08	1.30	1.36	1.44	1.56	1.70	2.01	2.33	2.80	3.72
Ratio of M2 to nominal GNP	0.60	0.60	0.60	0.59	0.59	0.60	0.61	0.61	0.62	0.61
Savings rate	5.82	6.54	9.02	9.31	9.86	9.90	9.24	9.54	10.10	9.97
Federal surplus or deficit, NIPA	-57.67	-206.28	-172.55	-139.05	-150.65	-175.67	-190.24	-171.74	-227.86	-329.91
Social insurance funds	-12.39	-31.05	-25.54	-18.59	-22.30	-29.62	-40.87	-36.44	-61.71	-169.67
Other funds	-45.28	-175.23	-147.01	-120.46	-128.36	-146.05	-149.37	-135.31	-166.15	-160.24

M2 GROWTH 10%

TABLE VI-30. GNP, NNP, NATIONAL INCOME, PERSONAL INCOME (1.7)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
Gross National Product	2659.17	3166.49	3522.25	3934.17	4335.02	4737.28	5721.72	6961.54	8404.20	11325.18
-: Capital consumption allowances with capital consumption adj.	293.20	358.81	321.96	351.06	385.28	419.53	489.52	562.10	657.13	822.25
=: Net National Product	2365.96	2807.68	3200.29	3583.11	3949.74	4317.76	5232.21	6399.44	7747.08	10502.93
-: Indirect business tax and nontax liability	213.00	258.80	264.41	290.11	319.26	347.05	419.52	451.69	552.13	741.35
Business transfer payments	11.39	13.70	7.80	15.95	17.71	19.61	23.78	28.45	35.06	51.35
Statistical discrepancy	3.90	1.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+: Subsidies less current surplus of govt enterprises	5.48	7.80	5.54	6.08	6.52	6.93	7.89	9.05	10.22	11.89
=: National Income	2117.15	2473.80	2926.91	3283.40	3619.60	3958.37	4797.19	5928.81	7170.66	9722.81
-: Corporate profits with IVA and capital consumption adj.	181.62	160.80	303.94	346.26	380.30	425.81	557.97	734.65	940.71	1588.04
Net interest	187.70	264.90	285.26	306.79	329.40	353.14	404.07	459.25	518.03	612.84
Contributions for social insur.	203.98	255.74	285.20	319.87	356.41	393.38	480.61	597.45	727.51	970.49
Wage accruals less disbursements	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18	-0.18
+: Govt transfer payments to person	285.85	360.62	387.99	423.56	475.37	531.64	658.23	801.38	1001.17	1454.70
Personal interest income	263.42	371.10	413.04	438.64	466.24	505.83	597.79	699.86	823.40	1043.42
Personal dividend income	55.92	67.00	76.62	87.83	100.06	114.20	150.22	199.06	263.35	415.38
Business transfer payments	11.39	13.70	7.80	15.95	17.71	19.61	23.78	28.45	35.06	51.35
Error										
=: Personal Income	2160.61	2604.97	2938.14	3276.65	3613.04	3957.50	4784.73	5866.39	7107.55	9516.47
ADDENDEA FOR CHK										
rental income w/o cca yrixca	65.25	70.50	79.68	88.18	96.55	102.90	117.37	137.59	162.47	209.55
cca, ri cayri	-32.38	-36.30	-42.74	-46.35	-49.95	-53.56	-60.77	-67.98	-75.19	-86.00
yri	32.87	34.20	36.94	41.84	46.60	49.34	56.61	69.62	87.28	123.55

M2 GROWTH 10%

TABLE VI-31. PERSONAL INCOME - SOURCES AND DISPOSITION (2.1)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
Personal Income	2160.61	2604.97	2938.14	3276.65	3613.04	3957.50	4784.73	5866.39	7107.55	9516.47
Wage and salary disbursments	1356.15	1581.39	1764.03	1959.53	2158.00	2354.49	2810.50	3416.52	4076.27	5253.75
Other labor income	127.25	153.49	171.61	191.92	211.23	230.94	277.76	339.71	405.15	527.65
Proprietors' income w. IVA&CCADJ	116.27	120.30	188.57	238.83	274.92	302.96	396.28	544.84	698.88	1026.70
Farm	19.39	19.00	31.35	35.05	41.50	44.86	52.81	65.92	80.03	97.19
Nonfarm	96.88	101.30	157.22	203.78	233.43	258.10	343.47	478.93	618.85	929.51
Rental income of persons w. CCADJ	32.87	34.20	36.94	41.84	46.60	49.34	56.61	69.62	87.28	123.55
Dividends	55.92	67.00	76.62	87.83	100.06	114.20	150.22	199.06	263.35	415.38
Personal interest income	263.42	371.10	413.04	438.64	466.24	505.83	597.79	699.86	823.40	1043.42
Transfer payments	297.24	374.32	395.79	439.51	493.08	551.24	682.01	829.83	1036.23	1506.05
Federal	246.21	310.88	332.52	360.95	404.23	451.62	557.92	677.55	846.10	1229.82
State and local	39.64	49.74	55.47	62.61	71.14	80.01	100.30	123.83	155.07	224.88
Business transfer payments	11.39	13.70	7.80	15.95	17.71	19.61	23.78	28.45	35.06	51.35
:-Pers contrib to social insurance	88.69	97.01	108.62	121.62	137.29	151.69	186.61	233.23	283.18	380.20
Error										
-:Personal tax and nontax payments	336.32	397.30	448.73	501.42	558.68	614.93	753.70	947.22	1171.40	1583.81
Federal income taxes	250.73	292.40	334.56	373.88	417.36	459.90	565.07	712.62	884.20	1198.68
=: Disposable Income	1824.28	2207.67	2489.41	2775.23	3054.36	3342.57	4031.03	4919.17	5936.15	7932.66
-: Personal Outlays										
Consumption expenditures	1668.58	2000.11	2203.61	2446.71	2685.01	2940.99	3572.68	4333.94	5204.57	7020.15
Interest paid by consumers to businesses	49.88	58.60	57.91	63.44	70.54	76.78	91.06	111.11	133.44	174.98
Personal transfer payments to foreigners (net)	0.80	0.80	0.95	1.11	1.26	1.42	1.73	2.04	2.35	2.81
=: Personal Savings	106.23	144.49	224.58	258.28	301.29	330.76	372.37	469.40	599.31	790.58
ADDENDA:										
Disposable Income (1972$), Total	1013.55	1059.03	1141.92	1190.82	1208.60	1224.68	1263.57	1327.21	1351.46	1342.31
Per capita	4452.16	4563.68	4879.49	5041.36	5069.62	5090.11	5159.54	5328.04	5341.73	5196.69
Population (mid-period, millions)	227.65	232.06	234.02	236.21	238.40	240.60	244.90	249.10	253.00	258.30
Personal savings as % of disposable personal income (less interest paid to business and transfer payments to foreigners)	5.82	6.54	9.02	9.31	9.86	9.90	9.24	9.54	10.10	9.97
Total taxes / Personal income	15.57	15.25	15.27	15.30	15.46	15.54	15.75	16.15	16.48	16.64
Federal Deficit, NIPA	-57.67	-206.28	-172.55	-139.05	-150.65	-175.67	-190.24	-171.74	-227.86	-329.91
DI72RL										
TRASHR - Trasfer share of income	13.23	12.29	13.21	12.93	13.16	13.43	13.76	13.66	14.09	15.29
SPENDR - Spending rate	91.40	90.74	88.61	88.37	87.78	87.77	88.46	88.16	87.62	87.79

M2 GROWTH 10%

TABLE VI-32. FEDERAL GOVERNMENT RECEIPTS & EXPENDITURES (3.2)

	1980	1982	1983	1984	1985	1986	1988	1990	1992	1995
RECEIPTS	540.54	591.33	711.45	799.63	889.70	980.12	1215.66	1515.79	1879.60	2651.52
Personal tax and non-tax receipts	257.53	300.20	345.58	386.18	430.89	474.67	582.87	734.44	910.53	1233.55
Corporate profits tax	70.08	32.56	92.57	106.44	116.25	127.42	168.76	211.66	273.02	482.90
Indirect business tax and nontax accruals	38.86	50.00	40.06	43.95	48.37	52.58	63.56	68.43	83.65	112.31
Contributions for social insurance	174.07	208.58	233.24	263.06	294.19	325.45	400.47	501.26	612.41	822.75
EXPENDITURES	598.21	797.62	884.00	938.68	1040.35	1155.80	1405.89	1687.53	2107.46	2981.43
Purchases of Goods and Services	191.78	255.63	280.58	301.03	345.39	386.64	478.37	584.55	742.27	1058.82
National defense	126.51	172.43	201.65	226.85	262.50	293.58	362.04	441.65	562.70	797.13
Compensation of employees	53.23	67.20	78.48	87.56	101.89	107.93	121.22	147.61	182.67	194.73
Other	73.28	105.23	123.17	139.30	160.61	185.65	240.82	294.03	380.03	602.40
Nondefense	65.26	83.20	78.93	74.18	82.89	93.06	116.33	142.90	179.57	261.69
Compensation of employees	29.65	32.60	34.66	36.62	40.19	44.62	54.86	66.32	81.64	113.83
Other	35.61	50.60	44.27	37.56	42.70	48.44	61.47	76.58	97.93	147.86
Transfer Payments	252.97	358.65	382.47	414.35	462.14	514.16	631.02	762.48	946.74	1365.23
To persons	246.21	310.88	332.52	360.95	404.23	451.62	557.92	677.55	846.10	1229.82
Old age benefits	118.59	149.46	158.33	171.72	189.44	207.63	250.20	298.60	360.62	495.54
Hospital & medical	35.58	49.13	54.64	62.12	71.73	82.12	107.44	138.37	179.43	272.07
Unemployment	15.76	18.32	16.65	12.53	14.10	17.66	20.42	18.60	27.70	56.39
Retirement: Fed civ & RR	20.29	25.62	27.52	30.19	33.59	37.25	45.92	56.27	70.24	101.89
Vet life insur,workmen comp.	2.06	2.18	2.26	2.41	2.62	2.83	3.30	3.84	4.55	6.11
Military retirement	12.48	15.55	16.91	18.78	21.12	23.64	29.58	36.63	46.12	67.52
Veterans benefits	13.77	18.68	21.77	25.19	28.99	32.78	41.10	50.44	62.54	89.72
Food stamps	8.21	10.65	11.21	12.15	13.44	14.90	18.52	22.99	29.11	43.10
Other	19.47	21.30	23.22	25.85	29.19	32.81	41.44	51.81	65.80	97.47
To foreigners	6.76	47.76	49.95	53.40	57.91	62.54	73.10	84.92	100.64	135.41
Grants-in-Aid to S&L Govt	88.67	83.70	103.22	111.33	119.44	127.56	143.78	160.00	196.00	250.00
Net Interest Paid	53.14	85.00	104.12	99.36	101.60	116.43	143.52	173.47	217.59	305.66
Interest paid	67.21	107.80	119.21	112.09	114.61	129.81	156.17	186.26	231.46	322.08
Interest received	14.08	22.80	15.09	12.73	13.01	13.38	12.66	12.79	13.87	16.42
Subsidies less Current Surplus of Govt Enterprises	11.66	14.60	13.57	12.56	11.74	10.96	9.17	6.99	4.82	1.69
Surplus or Deficit (-), NIPA	-57.67	-206.28	-172.55	-139.05	-150.65	-175.67	-190.24	-171.74	-227.86	-329.91
Social insurance funds	-12.39	-31.05	-25.54	-18.59	-22.30	-29.62	-40.87	-36.44	-61.71	-169.67
Other funds	-45.28	-175.23	-147.01	-120.46	-128.36	-146.05	-149.37	-135.31	-166.15	-160.24
Debt of Federal Government	936.70	1210.65	1369.41	1524.43	1693.46	1888.87	2338.34	2830.39	3400.20	4384.18
Debt from Federal loans	170.70	200.58	202.46	204.34	206.21	208.09	211.85	215.61	219.36	225.00

Chapter VI Forecasts with the Model

A motivating force behind this study was to create the ability to make a consistent long-term forecast using an interindustry framework. The first five chapters portray the construction of the "nominal" side of the INFORUM model; this chapter displays the final results. A sample forecast for the period of 1982-1995 is presented along with an alternative run of the model.

The size and scope of an input-output model permits one to investigate the effect of an external shock on a host of different variables. Vectors by product of real output, personal consumption expenditures (PCE), employment, value added and prices are available from a forecast. Moreover, the distribution of any product by the supplier or purchaser is also available. Overall, the scope of the INFORUM model allows for more than 5000 forecasted variables.

Because of the breadth of a typical forecast, only a relatively small fraction of variables can be analyzed while keeping the exposition to a manageable size. The focus of this chapter will be on the "nominal" variables: prices, wages, and all the other components of gross product originating (GPO). Space limitations preclude the inclusion of most real variables into the analysis except in those instances where they offer some special insight. Additionally, the emphasis will be on the long-run trends, not short-term fluctuations.

The first section presents a sample "base" forecast. This forecast was made to illustrate the characteristics of the the price and income model and does not represent a typical INFORUM forecast. Included in the presentation is a discussion of the assumptions necessary to

Table VI - 1

Base Run Average Annual Growth Rates
for Key Exogenous Variables

	82-86	86-95	82-95
Federal Spending	2.05	2.66	2.47
Defense	4.74	2.60	3.26
Nondefense	-4.70	2.84	0.52
State and Local Spending	2.12	1.46	1.67
Education	0.52	0.79	0.71
Other	3.12	1.86	2.26
Population	0.90	0.80	0.82
Labor Force	1.07	1.07	1.07
M2	8.00	8.00	8.00

rates. Other local spending is expected to grow more rapidly because of the shifting mix of spending between federal and local governments.

Population and labor force comprise two of the other major exogenous factors which require assumptions. The labor force is assumed to grow at a constant rate. Based on the projected lower birth rates for the U.S. the population growth is assumed to slow. Finally. an annual eight percent increase in M2 is assumed throughout the base run.

In order to reveal more fully the workings of the model rather than the preconceptions of the model operator, the number of overrides involving endogenous variables is minimized. In fact, only four overrides are necessary to generate a reasonable forecast. The construction of single family housing is moderated to reflect the actual U.S. experience in the early 1980's. Crude oil prices, foreign and domestic, are overridden to reflect world market conditions: no growth up to 1986 followed by an annual average increase of five percent to the

generate a forecast. This is followed by an overview of the base forecast in the aggregate and at the industry level. A discussion of prices by industry for the base forecast is saved for the end of the section since all product prices are interdependent; the price of an auto is dependent not only on the value added but its material costs which are output prices of other products. Section two contrasts a forecast based on a ten percent growth of M2 with the eight percent growth rate assumption used in the base forecast. The study ends with a summary and directions for future study.

VI.1 The Base Forecast

A "base" run of the model is a forecast that is used as a reference point in the comparision of the impacts of changes in key variables in the model. Combining reasonable assumptions about future economic activity with forecasting equations and the interindustry requirements matrix generates the base forecast. The assumptions can be divided into two categories: assumptions concerning exogenous variables and overrides of endogenous variables.

The major assumptions for the growth in the exogenous variables are shown in Table VI-1. Real government expenditures are split into federal defense and nondefense spending, state and local education, and state and local other spending. The U.S. commitment to a strong military defense is reflected in a continued growth in real expenditures while nondefense spending is assumed to grow from 1986-95 on the basis of social security and health outlays. At the state and local level, real education expenditures are assumed to grow at the current low

end of the forecast in 1995. For oil, the consistency between prices and value added is preserved by solving the input-output price identity "backwards" for value added by subtracting from the nominal sales of crude oil all nominal material costs. This new value added is then fed back through the product-to-industry bridge obtaining GPO by industry. Finally, any difference between the "fixed" GPO and that forecasted by the model is attributed to corporate profits and proprietor income in the oil industry.

The third override deals with the aggregate net interest payments. During the course of runnning the entire model, it was found that aggregate net interest payments had a tendency to grow more slowly than the return to capital. This tendency was exagerated by a forecast of lower interest rates. Because net interest payments had been the most rapidly growing component of the return to capital and since the return to capital was not performing out of line with past experience, this tendency in the model was definitely at odds with the history of net interest. Even though the forecast typically has lower interest rates than the economy has faced in the past five years, this slow growth tendency also exists if the interest rates are high in the forecast. Furthermore, because of the recursive nature of the dependent variable in the aggregate net interest payment equations, any inadequate growth in that component will be transmitted to the future (see equation 4.7 and the subsequent discussion in chapter IV). In addition, net interest payments are an important component of personal income which itself is a prime explanatory variable for personal consumption expenditures (PCE). A slow growth in personal income will translate into a slow growth of PCE which will retard GNP and help to begin a downturn in the forecast.

Therefore, as a provisional procedure, aggregate net interest payments were constrained to have a floor of a five percentage point difference with the return to capital. For example, if the return to capital grew at a nine percent rate, then net interest in the aggregate had to grow by at least four percent.

The last override concerns the forecast of net interest payments for the Finance (32) industry. The Finance industry is a net lender which means its net interest payments are negative (borrowers have postive net interest payments by convention). However, the equation for the Finance industry generates postive net interest payment in the forecast, thus implying that industry is a net borrower. This result occurred because of a postive coefficient on the trend term for the net interest payment equation for the Finance industry. Consequently, in this forecast that coefficient was set to zero.

Complete results for the base forecast are displayed in the tables at the of this chapter. Tables VI-7 to VI-11 give aggregate results and tables VI-12 to VI-27 show industry forecasts. At the aggregate level, table VI-2 provides a convenient summary of those tables. Over the entire foreacast, real GNP grows moderately at an annual rate of almost two percent, while nominal GNP grows at a yearly rate of eight and a half percent. However, this is not a steady rate: the model predicts a slowdown from the rapid real growth of 2.8 percent over the period of 1982-86 to only 1.5 over the period 1986-1995. As a result, the base forecast exhibits a business cycle, which is evidenced by the movement in the overall unemployment rate. From a starting point of eight percent in 1982, model unemployment reaches in 1984 a low of 5.9, then rises to 6.9 by 1986. By 1990, the unemployment rate is down to 4.6 but

Table VI - 2

Base Run Average Annual Growth Rates
for Selected Aggregate Variables

	82-86	86-95	82-95
Real GNP	2.77	1.51	1.90
Productivity	0.84	0.32	0.48
Labor Compensation	9.32	7.47	8.04
Return to Capital	9.64	9.46	9.51
Indirect Business Taxes	7.95	7.21	7.44
Nominal GNP	9.31	8.15	8.50
GNP Deflator	6.33	6.65	6.55

climbs to 6.79 in 1995. This slowdown in economic activity in the 1990's can be traced to a sluggish movement in real PCE over the same period which itself is primarily due to the slow growth in real disposable income. Personal tax payments grow faster in that period than does personal income, causing the slowdown in the growth in disposable income. The slow growth in net interest payments also contributes to the slow growth in personal income.

Over the length of the forecast, inflation (as measured as the increase in the GNP deflator) averages about 6.5 percent per year with a range of 5.6 in 1990 to 8.6 in 1995. Inflation predicted by the excess growth in the money supply (growth in M2 less the growth in real GNP) for 1982-1995 is 6.1 percent, which is very close to 6.55 of the model. In the subperiod of 1986-95, the difference between the excess M2 growth and the GNP deflator is only 0.16 percentage points. The inverse of the

Table VI - 3

Distribution of Value Added between
Labor, Capital and Indirect Business Taxes

	1982	1986	1990	1995
Labor	59.8	59.8	59.3	56.3
Capital	32.6	33.0	34.3	37.1
Taxes	7.7	7.3	6.5	6.7

velocity of money is relatively stable, starting at 0.6 and declining to 0.56. Thus, the desired effect of money growth on the inflation rate discussed in chapter III is evident in the forecast.

Turning to aggregate measures of value added, the return to capital exhibits a robust growth rate of approximately 9.5 percent with very little year-to-year variation. Of its components, corporate profits and proprietor income enjoy the most growth and net interest payments and noncorporate depreciation allowances are the slowest growers. The persistent slow growth in net interest stands in sharp contrast to the experience of the last twenty years, it is apparent that the override did not provide stronger growth in this component. Modelling net interest in a more satisfactory fashion is one direction for future work. Growth in labor compensation slackens from 9.32 percent per year from 1982-86 to about 7.5 over the rest of the forecast. Growth in indirect business taxes also slackens but only by less than a percent. Most of the slowdown in the growth of indirect business taxes is attributable to the legislated end of the windfall profits tax.

The large growth in return to capital alters the distribution of income. Table VI-3 displays the distribution of value added between labor compensation (Labor), the return to capital (Capital), and

indirect business taxes (Taxes). Capital is the "winner" with an overall gain of five percentage points at the expense of the other two components. Most of capital's gain up to 1990 comes by displacing indirect business taxes while leaving labor's share constant. After 1990, capital's share increases at the expense of labor's share of GPO.

The three percentage point shift in the distribution of GPO from labor to capital is not consistent with past trends. The increase in capital's share of GPO can be traced to nine sectors: Crude oil (2), Other Mining (3), Food and Tobacco (5), Chemicals (10), Petroleum refining (11), Transportation equipment except for motor vehicles (19), Instruments (23), Miscelleanous manufacturing (24) and Finance (32). Those sectors's share of the total return to capital changes from thirty-eight percent in 1977 to fifty-seven percent in 1995. In each industry, growth in investment in producer durable equipment (PDE) outstrips employment growth, implying a rapid increase in the capital-to-labor ratio. That increase combined with a positive coefficient in each industry's return to capital equation serves to increase the return to capital in each sector. From the discussion in Chapter IV, the capital-labor ratio was included in the equation as a proxy for the utilization of capital; highly utilized capital meant more labor per unit of capital and higher returns to capital, so its sign was expected to be negative. So the unexpected shift in capital's share of GPO is the result of an unexpected sign in the return to capital equations.

However, that shift in the distribution of factor income is not pervasive throughout all industries. Twenty-one out of the thirty-seven industries experience a growth in capital's share value added. Of those

Table VI - 4

Distribution of Value Added for Selected Industries

		1982	1986	1990	1995
4	Construction				
	labor	73.5	71.1	71.2	68.1
	capital	21.6	22.8	21.5	22.2
	taxes	4.9	6.1	7.3	9.7
10	Chemicals				
	labor	54.1	47.4	45.9	30.4
	capital	39.6	45.8	45.8	61.0
	taxes	6.2	6.8	8.4	8.7
22	Automobiles				
	labor	32.3	45.0	41.3	58.1
	capital	63.6	53.6	58.2	41.7
	taxes	4.1	1.4	0.5	0.2
28	Communications				
	labor	51.7	50.2	46.9	46.0
	capital	39.5	41.3	43.8	42.9
	taxes	8.8	8.5	9.4	11.1
31	Trade				
	labor	63.8	65.5	65.3	63.9
	capital	21.8	20.5	19.8	20.1
	taxes	14.4	14.0	14.9	16.1

twenty-one industries, fourteen are in the manufacturing sector. Of the sixteen industries where labor's share increases, eleven are in nonmanufacturing enterprises which tend to be labor intensive. Most industries exhibit only a minor shift in the share of value added in either direction. Table VI-4 displays the distribution of income for five industries: Construction (4), Chemicals (10), Autos (22), Communications (28), and Wholesale and Retail Trade (31). The Chemicals industry (10) experiences a large shift in the distribution of income from 1990 to 1995. This is largely due to an increase in its capital-labor ratio which itself is due to increasing investment and

improving productivity. This change in the capital-labor ratio is in dramatic contrast with the Chemical's industry history. Consequently, this unusual forecast stemming from the investment functions causes the return to capital equation for the Chemical industry to predict the large shift in the income distribution in that industry. This points to problems with the investment function for the Chemical industry, not with the return to capital equation.

In contrast, the automobile industry exhibits the opposite trend with a large growth in labor's share from 1990-95. Over that period, the model forecasts a slowdown in economic activity which causes the consumer demand for cars to fall at an annual rate of 2.3 percent. The drop in demand reduces the return to capital through the unexpected change in output variable (QTRND) in the return to capital equation, thereby bolstering labor's share of value added.

At the sectoral level, the following general trends in the components of value added are evident in the base forecast. The agricultural, manufacturing and transportation sectors show a less than average growth in hourly pay-rates and labor compensation. Mining, construction, trade, finance and service sectors have a larger than average growth for both labor variables. The picture is different for the return to capital and its various components. The manufacturing sectors exhibit a higher than average growth rate for the forecast but no other group does. The following analysis is a summary of tables VI-12 through VI-27 located at the end of this chapter.

Agriculture and Mining

These three sectors exhibit markedly different patterns in the base forecast. Agriculture (1) lags behind the rest of the economy by two to four points in growth rates for the return to capital and its components except for depreciation allowances and business transfer payments. A solid growth rate in investment by the Agriculture industry is the cause of the increased depreciation rate; and, since it increases the capital-to-labor ratio, it also slows the growth in the return to capital. A decline in the level of employemnt helps to offset a better than average increase in hourly pay-rates, thus slowing the growth rate for labor compensation.

Within the mining sector, the two industries are quite similar in the forecast of labor variables. Crude petroleum (2) and other mining (3) experience robust pay-rate and labor compensation increases. In fact, the total labor compensation for both sectors quadruples by 1995. However, the other components of value added show a more divergent forecast. From 1982-86, the two industries grow slowly: the return to capital and indirect business taxes grow significantly less than the economy average. This is an expected result for the forecast, since the price of oil is assumed to remain constant until 1986, and is then assumed to increase 5.6 percent per annum. During that period, both mining sectors show a "boom"; profits, net interest payments and depreciation allowances grow two to three percentage points faster than the average. In addition, the legislated demise of the windfall profits tax lowers indirect business tax share of GPO and increases capital's share.

Contract Construction

Construction is the beneficiary of a small but persistent growth in real demands. A rapidly growing labor bill is the result a forecasted decline in labor productivity coupled with a slightly offsetting effect of less than average increases in hourly pay-rates (6.2 compared to the nonmanufacturing annual average of 6.9).

In addition the return to capital also grows more rapidly than the economywide average. Profit income and depreciation exhibit a boom from 1982-86 and then slow down to the pace of the economy. Because of the growth in real final demands, investment by the construction industry grows at a faster pace than the economywide average. This translates into a higher growth in depreciation for construction. Moreover, the increase in investment increases the borrowing variables (RELBOR) in construction's net interest equation, so net interest payments also increase.

Manufacturing

Current popular thought indicates that the "smokestack" industries in particular, and the manufacturing sector as a whole, should expect a bleak future. The base forecast does not substantiate that outlook. Manufacturing industries outpace the economy in profit growth. Of course, there are industries that grow less than average; but the overall forecast is encouraging. Table VI-5 displays per annum growth rates over the forecast period for labor compensation (Labor), return to capital (Capital), and corporate profits (Profits) for a sample of five manufacturing industries.

The Rubber products (12) and Electrical machinery (21) sectors show

Table VI - 5

Annual Average Growth Rates of Labor Compensation (Labor), Return to Capital (Capital), and Corporate Profits (Profits) for 1982-1995

		Labor	Capital	Profits
6	Textiles	12.22	8.09	7.64
12	Rubber products	7.95	1.52	-15.67
17	Primary Metal Products	6.48	8.96	8.34
21	Electrical Machinery	7.78	7.36	-16.64
22	Autos	4.41	7.05	7.68

losses over the forecast from a combination of a large increase in net interest payments and low growths in the return to capital, not a reasonable forecast over an extended period. The return to capital for both industries grows slowly because of the forecasted downturn from 1990-95 which makes the unexpected changes in output (QTRND) variable in both equations negative, thus slowing the growth in the return to capital. The slow growth in the Rubber products industry is plausible given its history; its average growth in the return to capital for the 1970-80 period was 0.7 percent. However, the Electrical machinary industry's forecasted growth is about five percentage points slower than the annual growth rate for the previous ten years (a forecasted 7.4 rate opposed to the actual 12.0 rate).

In contrast, a strong growth in consumer demand is forecasted for the motor vehicle industry through 1990. This growth translates into energetic increases in the return to capital for the Auto industry (22) via the QTRND variable. A growing auto industry increases its demand for steel, which in an interindustry model, means a rebound for the Primary metals industry (17) as well.

Transportation and Utilities

All of the sectors in this grouping tend to grow less rapidly than the rest of the economy. Each sector is close to the economy average for pay-rate and labor compensation growth but the return to capital growth is reduced by the downturn predicted for 1990-95.

In particular, Air transportation (26) and Communications (28) are forecasted to have recurrent losses. Increases in investment by the Communications (28) industry are financed, in the forecast, by increased borrowing, which in turn increases its net interest payments. Since profits are calculated as a residual, losses in the communications industry can be traced to an increasing burden in net interest payments. The slow growth in real disposable income causes a dramatic drop in the demand for air transportation services, which through the QTRND variable in the return to capital equation slows the growth in the return to capital. Since none of the other components with forecasting equations show any moderation in growth rates, the result is similar to the fate of the Communications industry; the residual component - corporate profits - suffer.

Wholesale and Retail trade

The trade (31) sector is one of the most important sectors in the model. Wholesale and retail establishments employ approximately twenty-seven percent of the labor force and produce seven percent of total real output. In the base forecast, this sector behaves smoothly with most components growing close to the economy average. Labor in the trade sector is forecasted to continue its 1970-80 trend to experience

higher-than-average growth rates when compared to counterparts in the rest of the economy. Because this industry is labor intensive, that labor component growth will moderate the growth in capital's share of GPO.

Retail trade enjoys a sanguine sales forecast as real output is expected to grow at a slightly higher rate than the average for the other sectors. This implies a better-than-average increase in sales taxes which is reflected in the movement of its indirect business taxes.

That sanguine sales forecast moves PDE investment by the trade industry at a higher-than-average rate. Therefore, net interest payments and depreciation grow more robustly. Since the return to capital grows at a more moderate pace than those two components, profits are "squeezed".

Finance and Real Estate

Each of these sectors - Finance (32) and Real estate (33) - have a unique forecast. Both exhibit a greater-than-average expansion in pay-rates and labor compensation which is a continuation of their past trends.

More interesting is the behavior of the return to capital and its components, since return to capital has seventy-five percent of industry GPO. Real estate (33) experiences a strong growth in profit income; corporate profits and proprietor income grow at an annual rate of eighteen percent from 1986-95, a rate higher than the actual twelve percent growth over 1970-80. The slow growth in net interest payments and depreciation allowances combined with a steady growth in the return to capital produces this result.

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In contrast to the performance of the Real estate industry in the forecast, the Finance (32) industry shows a constant and moderate annual growth in its components of the return to capital. Since this industry is forecasted to have a strong growth in investment, capital consumption allowances grow at the fastest rate (over nine percent). Profit income and net interest payments lag behind with an annual average growth of about 4.5 percent.

Services

Since the service industries are labor intensive, a focus on pay-rates and labor compensation is appropriate. In the course of the forecast, there is a shift in real demand towards the service sectors. This growth in demand is translated into an increased demand for labor which ought to increase pay-rates and labor compensation more quickly than the economy average. Without exception, each of the service sectors exhibits this expected response.

The increase in demand for services spills over to increase investment by those sectors. Therefore depreciation allowances also grow more rapidly as do net interest payments. That increase in investment increases those industries' capital-to-labor ratios. Since the service industries have a negative coefficient in their return to capital equations, the return to capital grows relatively slowly. Thus, profit income is "squeezed" between the return to capital and the faster growing depreciation allowances and net interest payments. As in the case with the trade sector, all service sectors experience a healthy growth in indirect business taxes.

Relative prices by product

For the sake of brevity, the analysis is presented by comparing relative prices: sectoral price changes in comparision with changes in the GNP deflator. Prices for a product within an input-output framework are the sum of unit material costs and unit value added. Thus the previous discussion on sectoral value added will shed some light on relative prices. Even though there is not a one-to-one correspondence between industry and product, those industries experiencing a greater than average growth in their major components of value added also will exhibit an increase in the relative prices of their primary products.

Prices of agricutural products, wholeseale and retail trade services, and transportation services uniformly grew at a slower rate than the GNP deflator. Moreover, most of the manufactured durable goods lag behind the national rate except for Aerospace (44), Boats (45), Other transportation equipment (46), and Miscellaneous manufacturing (48). About half of the nondurable goods lag as well, including textile products.

On the other hand, the mining sector enjoys a relative price increase over nearly every sector. Natural gas (5) with a per annum rate of almost fourteen percent over 1986-95 leads the pack. The only exception is the crude petroleum sector which is assumed to grow at 5.6 percent during the later years of the forecast. Contract construction (8) and Real estate (63) also have an increase in their relative prices.

Not suprisingly, only the gas utilities are forecasted to have an increase in relative prices while the other types of utilities are expected to decline. Finally, the service industries also split in their relative positions: Hotels (35) and Health (69) gain while the

others lose.

VI.2 Alternate Forecast

The alternative run uses the same forecasting equations and interindustry requirement matrix as the base run. All of the major assumptions are also unchanged except for the assumption about the money supply growth: M2 is presumed to increase at an annual rate of ten percent in the alternative forecast, an increase of two points over the base assumption. Thus the alternative forecast displays the long-run tendencies of the model for a change in the money supply.

Theoretically, one would desire that money be neutral with respect to the real side in the long-term. However, during the short-run, an increase in the money supply might be expected to stimulate the economy. After the increase "works through" the economy, a slowdown could be expected in response to the higher inflation rates. Clearly, this depends on the precise structure of expectations, but that scenario is not unreasonable. Furthermore, in the long-term the major effect should be to increase the inflation rate by two percentage points.

Table VI-6 summarizes the information from the alternative forecast contained in tables VI-28 through VI-35 at the end of this chapter. Note that Table VI-6 portrays the same variables as those shown in Table VI-2 for the base forecast (the growth rates in parenthesis are the rates from Table VI-2). Comparing the growth rates, the annual average increases in real GNP and real output are similar but the alternative forecast exhibits a slightly lower rate. The exacerbation of the

Table VI - 6

Alternative Run Average Annual Growth Rates
for Selected Aggregate Variables

	82-86	86-95	82-95
Real GNP	3.10	1.22	1.79
	(2.77)	(1.51)	(1.90)
Productivity	0.87	0.29	0.47
	(0.84)	(0.32)	(0.48)
Labor Compensation	10.02	9.02	9.33
	(9.32)	(7.47)	(8.04)
Return to Capital	10.50	11.00	10.84
	(9.64)	(9.46)	(9.51)
Indirect Business Taxes	8.76	8.43	8.54
	(7.95)	(7.21)	(7.44)
Nominal GNP	10.08	9.68	9.80
	(9.31)	(8.15)	(8.50)
GNP Deflator	6.78	8.48	7.96
	(6.33)	(6.65)	(6.55)

business cycle is also evident. From 1982-86, the alternative forecast grows at 0.4 points faster than the base case. But starting in 1986, the ten percent growth rate in M2 slows the economy by 0.3 percentage points on an annual basis. Tracking the unemployment rate yields the same result: up to 1990 the alternate run experiences lower unemployment but by 1995 the unemployment rate is a full point higher than the base case rate. Overall, productivity is unaffected by the change in monetary growth.

Looking at the nominal side, the inflation rate increased from 1986-1995 by 1.83 percentage points over the base case which is close to the expected increase of two percentage points. This slight difference

could be attributed to the different real rates of growth between the two runs. Moreover, the difference between the excess M2 growth (growth in M2 less the growth in real GNP) and the inflation for the alternate forecast is a slight three-tenths of a percentage point for the entire forecast. The inverse of the velocity of money is virtually stable, moving from 0.60 in 1982 to 0.61 by the last year of the forecast.

Though the growth rates for the components of value added are greater for the alternative forecast, the distribution of factor rewards remains unchanged in the aggregate. For example, in 1995, labor's share of GPO is 56.3 percent which is the same as it is in the base forecast.

As one would expect, the extra growth in the money supply is also neutral with respect to the distribution of GPO by industry. Of the thirty-seven private industries, only three have their distribtion between labor, capital and taxes shifted by more than two percentage points over the entire forecast: Primary metals (17), Transportation equipment not autos (19), and Autos (22). Labor's share increases in the Primary metals industry while capital's share gains in the other two. In the Transportation equipment industry, a continued growth in output, even in the face of the downturn in the last five years, bolsters the return to capital through the unexpected change in output (QTRND) variable. In addition, this sector has a negative sign on the inverse of the unemployment rate in its return to capital equation, so a downturn would tend to increase the growth in the return to capital. The story is different for the auto industry. Though the industry is suffers during the downturn, labor is hurt via layoffs, so the growth in the return to capital only slightly outgrows labor compensation, but at a pace fast enough to skew the distribution of GPO toward capital.

Labor gains in Primary metals stem from the slower growth in the return to capital. The forecasted downturn works with the QTRND and unemployment rate variables to slow the growth in the rewards to capital.

Finally, an increase in the growth rate of money ought not to affect relative prices. A product whose price was growing faster than the GNP deflator in the base run ought to outpace the GNP deflator in the alternative run. This is borne out remarkably well in the alternative forecast. Comparing the growth in a product price to the growth in the GNP deflator over the length of the forecast, 1982-95, the average difference before a product's relative price growth in the base and alternative run is only seven-hundreths of a percent. For example, the price of Furniture (23) grew faster than the GNP deflator in the alternative forecast 0.062 percentage points faster than it did in the base forecast.

VI.3 Summary and Directions for Future Work

This study develops a model to forecast the distribution of industry value added by component within an interindustry framework. Industry value added and product prices are linked in a simple procedure that insures the model is internally consistent; nominal GNP from nominal final demands will always equal nominal GNP from factor incomes. Furthermore, the model allows for the movements in the money supply to affect inflation in the long-run.

The model is constructed by forecasting fourteen components of

value added by industry. Labor compensation is generated by combining aggregate pay-rate equations with sectoral relative pay-rate equations. Capital income by industry is forecasted with behavioral equations. After the major components of capital income are derived by separate methods, profit income is obtained as a residual. Finally, indirect business taxes are divided into excise taxes and all other types of taxes with each category generated by industry. A common modelling device is to make the actual component of value added a function of a "synthetic" series for that component.

From the presentation of the base run, the direction for future work is apparent. The return to capital and net interest payments need special attention, attention beyond the goal of correcting undesirable signs or individual equations. Because these two components of GPO play an important role in the model, the discussion will also bring to light some of the inherent intricacies involved in interindustry modelling.

At the outset of this study, the return to capital was thought to play an important role in stabilizing the model during a forecast. Essentially, the return to capital through its profit component was to outpace the growth in nominal personal income during an economic upswing, thereby restraining the growth in real disposable income. The slowdown in real disposable income would lead to a slower growth in personal consumption expenditures, the major final demand component of GNP. Therefore, the return to capital equations had to not only fit the historical series in a reasonable manner and make economic sense but also provide a stabilization function in the model.

Recalling the discussion from Chapter IV, the search for a specification for the return ot capital equation that led to a seemingly

reasonable forecast was quite time consuming. When the specification adapted in this dissertaion was used, initial simulations with no interaction between the real and income side indicated no serious problems. However, once the equations were introduced into the entire model with all of its interactions unhindered, an improbable shift in the distribution of factor rewards occurred in the last five years of the forecast. Thus, reasonable equations that met all of the criteria did not perform well in the context of the whole model.

From the discussion of the first section, that shift occurred primarily in eight industries. Each of those industries experienced a large growth in the capital-to-labor ratio and each had a positive coefficient on that variable in its return to capital equation. The natural impulse is to immediately point to the positive coefficient as the culprit. However, there were other industries, such as Fabricated metal products (18), that had a similar pattern of signs and magnitudes in the equation as the other eight industries but that did not experience an increase in capital's share of GPO. That indicates that there is something more behind that shift than the positive coefficient on the capital-to-labor ratio.

Tracking the offender beyond this point is not an easy task. For instance, are the capital-to-labor ratios for those eight industries thought to be growing too fast in relation to their historical trends or because of their undesirable effects? If they are out of line with experience, is the movement of the capital stock or the movement in employment to blame? Suppose that one can say that in the Chemical industry (10) it is the the movement in the capital stock that is causing the trouble. The growth in the capital stock must come from the

growth in investment. But investment in producer durable equipment is specified as a function of the changes in the Chemical industry's output and the relative price of capital, labor and energy. So, does investment grow too rapidly because of the change in output or because of some peculiar price? If the answer is that the output of the Chemical industry grew rapidly because of an increased demand for fertilizer induced by an increased consumer demand for food, then the cause for that jump in consumer demand must be traced. Most likely, the jump was caused by an increase in real personal income, thereby implying that the return to capital is not growing as fast as it should, just the opposite conclusion one would be expecting to find. And this example assumes that any estimated equation used to forecast any of the variables in that causal chain had all the proper signs etc.... A similar chain of reasoning must be followed for every possible cause for all eight industries.

In contrast to the return to capital, the role of net interest payments in the model was not fully understood. Basically, net interest payments were treated as any other component of the return to capital with no attention paid to any stabilization properties. Of course care was taken in modelling because of net interest payments are a large portion of the return to capital and any large error in net interest's forecast would also reflect in the forecast of profits. Therefore the focus of the estimation of net interest payments equations was to develop a specification that met the dictates of economic common sense and that explained the past. The final equation more than adequately met those requirements. However, the aggregate equation's forecasting performance is disappointing, as shown by the previous discussion in

section one of this chapter. Additionally, because net interest is important in the determination of personal income, a poor performance in its forecast forbodes an overall poor forecast. If net interst payments had grown at a rate more consistent with the past, say eight to nine percent instead of the five to six percent in the model, the forecasted downturn from 1990-1995 would have certainly been much less severe.

The main point of this discussion is not to impress the reader with the difficulites in modelling but to demonstrate that unintended and unforeseen properties can "creep" into the model even though steps have been taken to avoid such an event. Equations that fit the data and that made economic sense did not forecast in a reasonable manner within such an integrated framework.

As a consequence, perhaps the function of the return to capital and net interest payments in a forecast ought to be re-evualated. Maybe too much emphasis on stabilization is being placed on their "shoulders". One suggestion is that the return to capital , net interest payments and the decision to invest could be more strongly linked together in a more consistent manner with each playing a role in the stabilization of the model.

Currently, real investment in equipment of an industry is not directly related to the financial position of that industry. Real investment occurs regardless of an industry's ability to finance that investment. A more satisfying structure would have any growth in real investment for an industry linked to the profit and net interest position of that industry.

There are other avenues for future work as well. The scope of this study limited its focus to inculcating only a few long-term

relationships into the model. One long-term relationship which was not addressed was the interaction between pay-rates, employment and labor force participation. Another relationship left unexplored is that between the distribution of personal income by size and the distribution of factor incomes by industry. If profits are forecasted to decline over a twenty year period, what does that imply about the distribution of personal income? Finally, short-run charactersistics were explicitly ignored, a field rich with possibilties.

Just as this model is a second attempt to integrate the real and nominal portions of an input-output model, so will there be other attempts. However, the generality and simplicity of the framework ought to provide a springboard for future improvements.