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Labor Force Macroeconomics in Egypt: Structure of a General Equilibrium Model*

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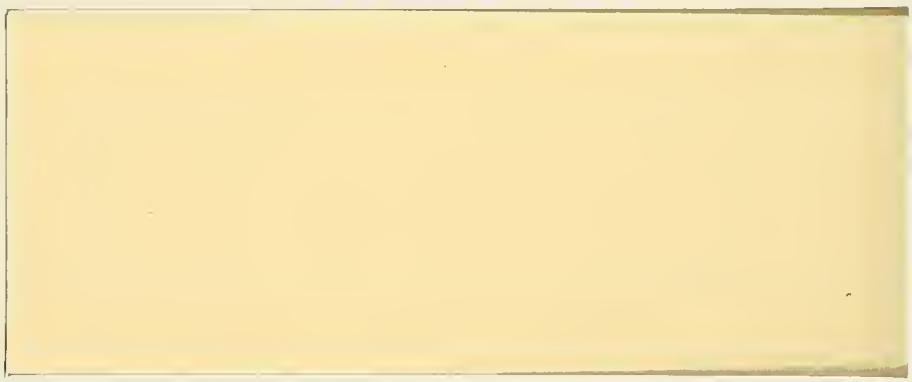

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Introduction.

Since the mid-1970's Egypt has experienced major changes in its economic and political structure. The most salient economic developments are in the availability of manpower (especially at skilled occupation levels), expanded policy stimulus to private sector activity and restructuring of the war economy toward a more growth-oriented system. These changes are bound to have a significant impact in the medium run, especially when the new aspirations toward economic growth of Egyptian policymakers collide with structural limitations in Labor-Supply, balance of payments and savings' availability. In the light of these develoments an important question imposes itself, namely, what are the substitution possibilities available to the Egyptian economic structure that will allow it to fulfill its growth ambitions within its constraints?

To answer this question, a computable general equilibrium model is built around a social accounting matrix (SAM) set up by a team of economists from Cairo University, MIT, and the Egyptian Ministry of Planning. This paper aims to describe in detail this model with its structural equations, factor constraints, and data basis. Section I describes the general features of the model; section II details the production, factor demands and income generation blocks of the model; section III presents the closure imposed on the structure. The data basis generated for the specific needs of this model is presented in section IV. Finally, section V presents a consistency run of the model.

A General Equilibrium Model for Egypt

The model presented in this paper follows closely a computable general equilibrium model built by the Planning Methods Project of the joint Cairo University/M.I.T. Research Program. Since the details of the model are available in Eckaus, McCarthy and Mohie-Eldin (1979) (henceforth ECM), we will limit ourselves in this section to outline the general features of the model and its mechanism without going into the details of its structural equations. Section II will take up its detailed presentation of the structural equations that differentiate out model from the E.C.M. model.

Table 1 presents the basic equations of the model in very stylized form. Its mechanisms are fairly straightforward. Output is determined in the material balance equations (e.q. (1). This in turn determines the level of value added and factor demands. Value added, in turn, determines incomes, consumption, and government tax revenue (equations (2), (3), (4) and (5)). Output prices are cost-determined in e.q. (5) with consumption in turn determined by value added and all other terms in equation (1) determined exogenously. A new level of output is established. A savings investment balance will determine equilibrium output. Corresponding to this output are factor demands. These are matched with factor constraints to determine factor returns. These in turn feed back into output prices (via P_i^V in equation 5) leading to new incomes, consumptions, factor demands, etc. General equilibrium is obtained when the savings investment balance holds and factor markets clear simultaneously. Figure 1 presents a flow-chart of the model. Details are left to E.C.M. (79).

Before we move to present our model a few basic features of the E.C.M. model -- many of which will carry over into our story -- are worth mentioning. The value added "production functions" are Cobb-Douglas

Table 1

Material Balance

$$X = AX + C + G + E + I + \Delta s \tag{1}$$

Value Added

$$V = P(K, L, X) \tag{2}$$

Incomes

$$Y_j = \sum_{i}^{12} \alpha_{ij} P_i^V V_i (1 - t_j) + S_j \qquad \begin{matrix} i = 1, \ldots, 12 \\ j = 1, \ldots, 6 \end{matrix} \tag{3}$$

Consumption

$$C_i = \sum_{j}^{6} C_{ij}(Y_j) \qquad i = 1, \ldots, 12 \tag{4}$$

Price Determination

Price of Value Added $\qquad P^V = g(w, r)$

Price of output $\qquad P_i = vP_i^V + \sum_{j}^{12} \alpha_{ji} P_j + t_i P_i + P^* mi \tag{5}$

Government Expenditures & Revenue

$$R = \sum_{i} t_i P_i \sum\sum_{ij} t_{ji} V_i$$

$$E = G + \sum_{j} S_j \tag{6}$$

Foreign Trade

$$\text{Exports} = \sum_{i}^{12} P_i \bar{E}_i \qquad i$$

$$\text{Imports} = \sum_{i} P^* m_i x_i + \sum_{j} C_{mj} \tag{7}$$

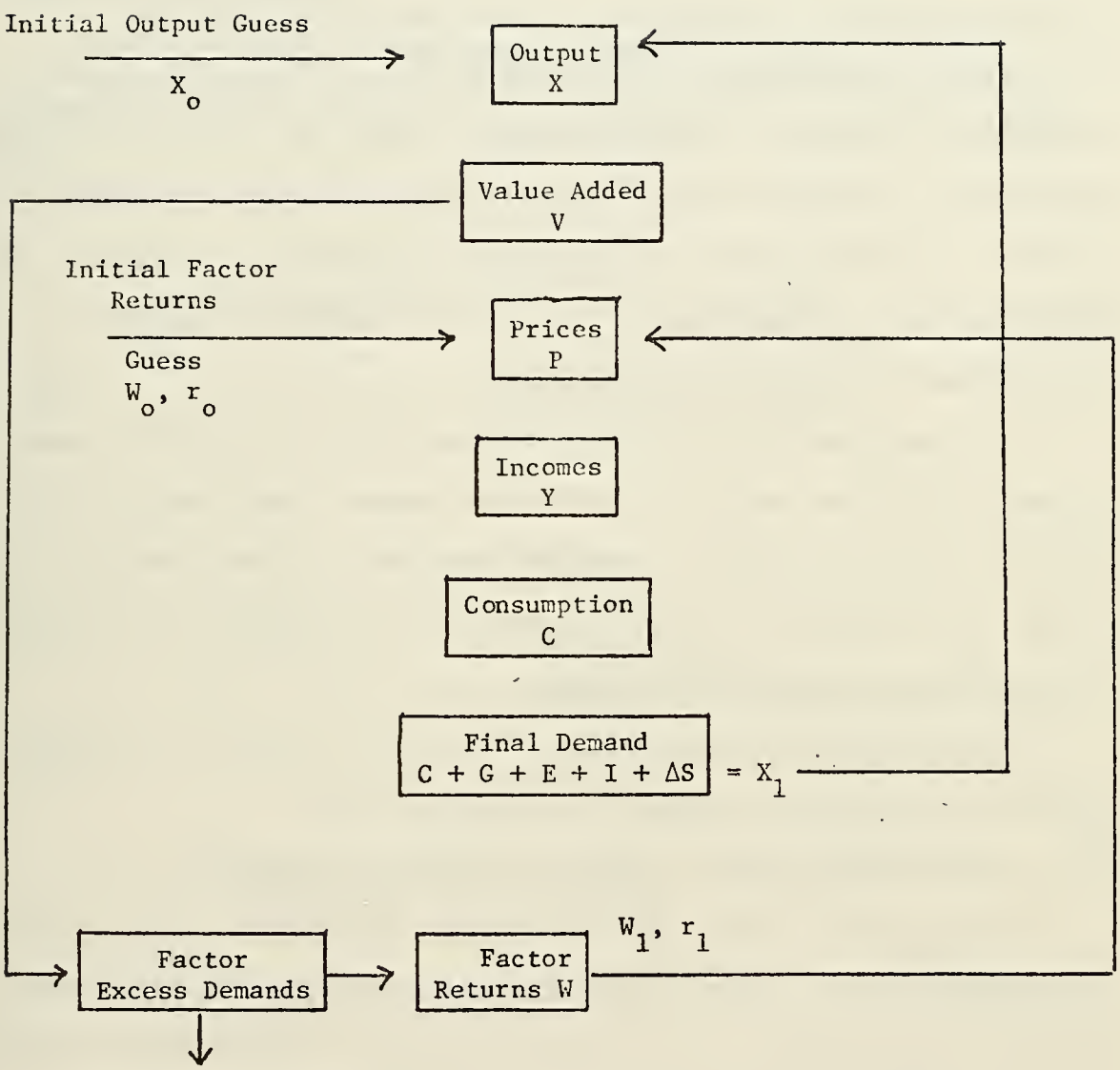
Factor Market Constraints

$$\sum_{i} L_i^D (W/P) = \bar{L}$$

$$\sum K_i (r/P) = \bar{K} \tag{8}$$

The model has 12 sectors built around an input-output matrix. Consumers are divided into six groups by size distribution of income and sector (three for the urban sector and three for the rural sector.) Factors are Capital, Land, and Labor. Production is for most sectors divided between private sector, production and public sector production.

FIGURE 1


Initial Output Guess
X_o
Output
X
Value Added
V
Initial Factor
Returns
Guess
W_o, r_o
Prices
P
Incomes
Y
Consumption
C
Final Demand
C + G + E + I + ΔS
= X_1
Factor
Excess Demands
Factor
Returns W
W_1, r_1

functions with their implications of fixed factor shares and unit elasticities of substitution. This feature will be changed in the model presented in this paper as explained below. Money does not enter the model explicitly. Government deficit (determined endogenously) is presumably financed by money creation. No money demand equations are specified. The inflation rate is endogenous, i.e. the price determination equations are not homogeneous of 0 degree in nominal values.

As a consequence of this lack of homogeneity, the savings investment balance is attained through forced savings imposed in part through factor returns. Foreign savings is determined endogenously; since real exports are fixed, it is implicitly assumed that the nominal exchange rate (for exports only) will move to keep them constant.

With this brief exposition of the E.C.M. model section II below will outline the differences between this model and ours.

II. Factor Substitution in a General Equilibrium Framework

For our model to answer questions about substitution possibilities in the Egyptian system, a basic reformulation of the value added production function is introduced. In this section we present new production functions introduced and their implications for income determination and factor demands.

II - A: The Production Function

As in the E.C.M. model, our model is built around a twelve sector imput-output matrix and its production functions are assumed to be with fixed coefficients in value added and intermediates:

$$X_i = vV_i + \Sigma\alpha_{ji} X_i + m_i X_i \qquad \text{(II-1)}$$

i.e. value added is a fixed proportion of output along with domestic and imported intermediates.

Real value added is "produced" according to a two level C.E.S. production function (as opposed to a Cobb-Douglas in the E.C.M. model), i.e.

$$V_i = \{\beta_i^L L_i^{-\lambda i} + \beta_i^k K_i^{-\lambda i} + \beta_i^T T_i^{-\lambda i}\}^{-1/\lambda i} \qquad \text{(II-2)}$$

where L_i = a labor aggregate (explained below) in i

K_i = capital stock in i

T_i = land in i

$\lambda_i = \frac{1-\sigma_i^v}{\sigma_i^v}$ where σ_i^v is the elasticity of factor substitution in value added.

β_i^L, β_i^k, β_i^T = distribution parameters

corresponding to this production function is a cost function that will determine the "price" of value added.

$$P_i^v = [b_i^L W_i^{(1-\sigma_i^v)} + b_i^k R_i^{(1-\sigma_i^v)} + b_i^T Z_i^{(1-\sigma_i^v)}]^{\frac{1}{1-\sigma_i^v}} \qquad \text{(II-3)}$$

where

W_i = is the unit cost of the labor aggregate input (defined below) in i.

R_i = the rental rate on capital in i

Z_i = the rental rate on land in i

These two functions provide the first level of the C.E.S. functions for value added. The second level appears with the production of the labor aggregate L_i. It is assumed that only a labor aggregate enters the production function for value added. This aggregate is "produced" by combining -- in a C.E.S. production function -- three types of labor -- skilled, blue collar, and unskilled.

thus;

$$L_i = [\gamma_i^1 \ell_{i1}^{-\mu i} + \gamma_i^2 \ell_{i2}^{-\mu i} + \gamma_i^3 \ell_{i3}^{-\mu i}]^{-1/\mu i} \qquad \text{(II-4)}$$

with;

ℓ_{i1} = skilled labor in i

ℓ_{i2} = blue collar labor in i

ℓ_{i3} = unskilled labor in i

$\mu_i = \frac{1-\sigma_i^\ell}{\sigma_i^\ell}$ where σ_i is the elasticity of substitution between the various labor inputs

$\gamma_i^1 \gamma_i^2, \gamma_i^3$ = are distribution coefficients

Again corresponding to this "production function" a cost function will determine the cost of the labor aggregate W_i i.e:

$$W_i = [g_i^1 (w)_{1i}^{(1-\sigma_i^\ell)} + g_i^2 w_{21}^{(1-\sigma_i^\ell)} + g_i^3 w_{3i}^{1-\sigma_i^\ell}]^{1/1-\sigma_2^\ell} \qquad \text{(II-5)}$$

The cost of this labor aggregate W_i will enter the cost function in (II-3) to determine the price of value added P_i^v.

II-B: Factor Demands

Coupled with these cost equations, factor demand equations are derived along neoclassical lines.

$$K_i = \beta_{ik}^{v\,\sigma_i^v} \left[\frac{R_i}{P_i^v}\right]^{-\sigma_i^v} v_i X_i$$

$$T_i = \beta_{iT}^{v\,\sigma_i^v} \left[\frac{Z_i}{P_i^v}\right]^{-\sigma_i^v} \cdot v_i X_i$$

$i = 1, \ldots, 12$

(II-6-A)

$$R_j^i = \gamma_j^{\ell\,\sigma_i^\ell} \left[\frac{W_i}{w_{ji}}\right]^{-\sigma_i^\ell} \cdot \beta_{iL}^{v\,\sigma_i^v} \left[\frac{W_i}{P_i^v}\right]^{\sigma^v} \cdot v_i X_i \qquad \text{(II-6-B)}$$

$j = 1, 2, 3 \qquad i = 1, \ldots, 12$

It is worth noting that demand for the three types of labor embodies the two stages of the aggregate C.E.S. functions in (II-2) and (II-4), i.e. the first stage calculates the demand for the labor aggregate L_i and the second stage calculates with this given L_i the demand for the individual skills.

II - C: Income Generation

As was mentioned in Table 1 the E.C.M. model divides consumers into six income groups, the grouping being made according to the size distribution of income. Now the distribution of value added around factors in both the E.C.M. model and our model is straightforward, the only difference being that with Cobb-Douglas production functions (in the E.C.M. version) factor shares are constant; in the model presented here because of the C.E.S. functions factor shares are variable. Their derivative with respect to real factor returns -- as is known for C.E.S.'s -- will be positive or negative depending on whether the elasticity of substitution is greater or smaller than unity. It is worth noting here that labor shares in value added will depend for these derivatives on both intra-factor and intra-skill elasticities of substitutions, i.e.

$$\alpha_{ji} = \gamma_j^{\sigma_i^{\ell}} \left[\frac{W_i}{w_{ji}}\right]^{(\sigma_i^{\ell}-1)} \cdot \beta_{iL}^{\sigma_i^{v}} \left[\frac{W_i}{P_i^{v}}\right]^{(1-\sigma_i^{v})}$$

where α_{ji} is the share in V.A. of the j^{th} skill group in the i^{th} industry. Now contrary to the E.C.M. model we have no data on the mapping from the functional income distribution to the size distribution. A simple rule was therefore adopted to generate this mapping. It was assumed that land and capital incomes accrue to the various income groups in the same proportions as those in the E.C.M. mapping. As for labor, it was assumed

that skilled labor income went to the top 10% income groups, blue collar to the middle 30% income group, and unskilled labor income to the bottom 60% income groups. Labor value added accruing to each income group in the E.C.M. model was used to calibrate the distribution in our model. The parameters of the mapping were assumed constant. Income for the k^{th} income group is thus:

$$Y_k = \sum_{i}^{12} \sum_{j}^{3} w_{ji} R^d_{ji} \xi^L_{jik} + \sum_{i}^{12} R_i K^d_i \xi^k_i + \sum_{i}^{11} T_i Z_i \xi^T_i$$

or;

$$Y_k = \Big[\sum_{j=1}^{12} v_j X_j \; \xi^k_{jk} \; R_j \; \beta^{\sigma^v_j}_{jk} \Big[\frac{R_j}{P^v_j}\Big]\Big]^{-\sigma^v_j}$$

$$+ \sum_{j}^{12} \xi^T_{jk} \; Z_j \; \beta^{\sigma^v_j}_{jT} \Big[\frac{Z_j}{P^v_j}\Big]^{-\sigma^v_j} v_j X_j$$

$$+ \sum_{j=1}^{12} \sum_{h=1}^{3} \Big[\xi^n_{jk} \; w_{nj} \; \gamma^{\sigma^l_i}_j \Big[\frac{W_j}{w_{nj}}\Big]^{\sigma^l_j}$$

$$\cdot \beta^{\sigma^v_i}_{il} \Big[\frac{W_j}{P^v_j}\Big]\Big]^{-\sigma^v_j}$$

where;

ξ^k_{jk} = share of re k-th income class in profit income in re j-th sector.

ξ^T_{jk} = shave of re k-th income class in rent income in the j-th sector.

ξ^n_{jk} = share of re k-th income class in type n labor income in sector j.

III. Model Closure.

As is clear from the nature of computable general equilibrium models of the E.C.M. type, the closure of the model will markedly affect the results of the comparative macro-statics performed. By closure we mean the specification of which factors will be constrained in the model since this choice will determine which nominal factor returns will move to equate supply and demand. The homogeneity of the model rules out any unemployment in the constrained factors. On the other hand, not constraining a factor implies a fixed nominal return to it, and therefore, if prices go up, a decreased real return. In this model, after various experiments, we settled on the following constraints.

i) Unskilled Labor: In view of observed recent increases in wages, (mainly nominal but also real) we decided to constrain the supply of unskilled labor. Perfect labor mobility is assumed between the agricultural sectors and the non-industrial sectors, (construction, housing, transportation, services). The industrial sectors (textiles, intermediate and capital goods industries and oil production) are constrained separately with perfect labor mobility among them. Wage differentials among sectors (within each of the two groups above) are kept fixed. This is to represent institutional barriers to wage equalization via labor mobility that the model cannot handle. Note that the differential between the two groups of unskilled workers (agricultual/non-industrial and industrial) can vary.

ii) For blue collar workers, we chose to constrain their supply in the agricultural and the food processing sectors (with full mobility and fixed wage differentials). A separate constraint was imposed for the industrial

sectors (defined above) and one for services and transportation. In view of the important role migration has played in the availability of labor for the construction and housing sectors,** we chose to isolate their blue collar workers by assuming no mobility between the rest of the economy and these two sectors.

iii) White Collar Workers -- The 1961/62 nationalization and employment drive led to an overstaffing of firms with white collar workers.* This--along with the education policy of Egypt, stressing academic and university training--led us not to constrain white collar employment in activities where the public sector predominates (all of the industrial sectors, transport, communication, and services). This lack of a supply constraint does pose a problem in terms of the political economy of Egypt. Most white collar workers will remain with a fixed nominal wage and thus (as the model results show) a decreasing real wage. However, given that white collar workers constitute a sizable portion of the politically vocal strata, such a decrease in their real wage seems dubious. Some experiments can be performed to capture this point. Regarding other sectors, we constrain white collar workers in agriculture (again with free mobility and fixed wage differentials). Finally, following the argument for blue collar workers, construction and housing have their labor supplies constrained separately.

*See R. Mabro and S. Radwan: The Industrialization of Egypt: 1939-1979, Clarendon Press, Oxford, 1973.

**See Eckaus and Mohie-Eldin.

iv) Capital -- capital has proven to be the most difficult factor to pin down since data for capital stocks and capacity utilization are very poor in Egypt.* We have therefore assumed that there is no constraint on capital in agriculture, it being of a rather traditional nature and easily reproducible.

In the rest of the economy evidence suggests that there was unutilized capacity until around 1973. We therefore proceeded as follows. Using educated guesses for capital-output ratios, we computed capital in use in the 12 sectors (along with base year profit rates), and assumed unused capacity to be 18.1% in industry and 8.0% in the remaining non-agricultural sectors** (these somewhat low figures take into account the drive for increased production after 1973 and presumably the increase in capacity used). We then constrained the capital stock in the public sector portion of all non-agricultural sectors, with fixed profit differentials and full mobility (which in the context of the public sector seems plausible).

As for the service sector, we chose not to constrain its capital since the concept of capital in that sector (which includes the Suez Canal and tourism) is not well defined.

v) Land --we have normalized the base year rent on land at unity and therefore land is measured in normalized units. It represents cropped acreage (as opposed to actual acreage) since crop rotation constraints have not been taken into consideration. We thus impose only a constraint on total land use in agriculture.

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*See Mabro and Radwan, (76)

**See Mabro and Radwan, (76) and Radwan (74)

IV. Data Base.

1 - Labor

Obviously the extension of the model to a more detailed picture of the Egyptian economy requires expanding its data base. This data collected from various sources (discussed below) did not match our twelve sector classification (see Table 1). The sectors in which the data on employment by skills, capital (when available) and wages by skill are classified are listed on the left-hand side of Table 2 (below). Now based on the E.C.M. twelve sector aggregation (for details see E.C.M. (79)) the mapping from the nine sectors of official publications into our twelve sectors is shown in Table 2. This mapping is based on labor value added weights (since it is going to be used to distribute employment among sectors). The numbers in parentheses indicate that some of our twelve sectors drew their labor from more than one of the (official publication) left-hand sectors in the proportions shown. The data on total employment by sector was taken from "AL TAWAZOFF WAL OJOUR for 1975" published by CAPMAS.

This first mapping provided us with employment by sector for our twelve sectors. Next a skill proportions matrix[1] was used to break down total employment by sector into employment by skill level (skilled, blue collar and unskilled) by sector.

Finally the breakdown of employment by skill and by sector into private sector employment and government sector employment was done according to the respective shares in total labor value. The resulting final distribution of labor is shown in Table 3.

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[1]Provided in an unpublished document of the World Bank

TABLE 2

Official Classification	Model Classification
Agriculture	Staple Food N-Staple Food Cotton Other Agriculture
Manufacturing	Food Processing Textile Industry Other Industry (.8)
Gas and Electricity	Other Industry (.2)
Construction	Construction Housing (.7)
Mining	Crude Oil and Products
Transportation and Communication	Transportation and Communication
Trading Finance Services	Services Housing (.3)

TABLE 3A
THE BASE PERIOD EMPLOYMENT MATRIX
PRIVATE SECTOR IN 0,000 UNITS

Sector	White Collar	Blue Collar	Unskilled
Staple Food	1.159685	1.632348	71.327423
Non-Staple Food	2.459472	3.462008	152.154388
Cotton	0.831700	1.170799	51.996399
Other Agriculture	1.782300	2.508599	110.176193
Food Processing Industry	0.126670	2.284715	8.418262
Textile Industry	0.159477	2.885838	10.633100
Other Industry	0.302428	2.175154	7.577731
Construction	2.211554	3.541041	3.979243
Crude Oil and Products	0.089849	0.134120	0.665247
Transportation and Communication	0.308776	1.188485	1.133301
Housing	2.698134	5.873165	3.196939
Other Services	19.041611	75.777512	14.072956

TABLE 3B
THE BASE PERIOD EMPLOYMENT MATRIX
GOVERNMENT SECTOR IN 0,000 UNITS

Sector	White Collar	Blue Collar	Unskilled
Staple Food	0.117614	0.165551	7.233969
Non-Staple Food	0.208928	0.294091	12.925243
Cotton	0.0	0.0	0.0
Other Agriculture	0.0	0.0	0.0
Food Processing Industry	0.51730	0.935984	3.448731
Textile Industry	0.367723	6.654156	24.517792
Other Industry	1.186272	8.532043	29.723648
Construction	5.560145	8.902656	10.004355
Crude Oil and Products	0.376951	0.562680	2.790952
Transportation and Communication	4.645824	17.881912	17.051590
Housing	0.060564	0.131834	0.071761
Other Services	37.851471	150.632690	27.974625

TABLE 4

WAGES BY SKILL/SECTOR (00 LE)

Sectors	White Collar	Blue Collar	Unskilled
Staple Food	7.068000	3.500000	1.599999
Non-Staple Food	6.786999	3.500000	1.599999
Cotton	5.795500	3.500000	1.599999
Other Agriculture	7.000000	3.500000	3.000000
Food Processing Industry	10.065000	5.879999	3.000000
Textile Industry	10.033998	5.879999	3.000000
Other Industry	12.113000	6.099999	3.299999
Construction	6.960400	4.000000	2.000000
Crude Oil and Products	10.501999	6.000000	3.500000
Transportation and Communication	9.001000	4.500000	2.500000
Housing	5.606999	4.500000	2.500000
Other Services	6.000000	3.750000	2.750000

TABLE 5

TOTAL CAPITAL IN THE TWELVE SECTORS

Staple Food	723.44995
Non-Staple Food	2016.12012
Cotton	373.64990
Other Agriculture	696.00000
Food Processing Industry	913.19995
Textile Industry	885.00000
Other Industry	5568.00000
Construction	318.00000
Crude Oil and Products	1522.50000
Transportation and Communication	1154.00000
Housing	1420.00000
Other Services	4677.00000

TABLE 6
CAPITAL STOCKS
AND CAPITAL OUTPUT RATIOS

Capital Output Ratios	Sectors	Capital in the Private Sector	Public Sector
1.59	Staple Food	618.53979	104.91000
1.59	Non-Staple Food	1718.26929	297.85059
1.59	Cotton	373.64990	0.0
1.5	Other Agriculture	696.00000	0.0
0.6	Food Processing Industry	794.46533	118.73444
1.0	Textile Industry	597.62744	287.37231
4.0	Other Industry	1037.55786	4530.44141
0.5	Construction	99.28339	218.71660
2.5	Crude Oil and Products	270.99023	1251.50952
2.0	Transportation and Communication	71.63484	1082.36499
10.0	Housing	1266.63867	153.36115
1.5	Other Services	4129.18750	547.80908

TABLE 7

RATES OF RETURN ON CAPITAL BY SECTOR

Sectors	Private Capital	Government Capital
Staple Food	0.14298	0.14298
Non-Staple Food	0.17123	0.17123
Cotton	0.16867	0.0
Other Agriculture	0.11453	0.0
Food Processing Industry	0.11791	0.11791
Textile Industry	0.18443	0.18443
Other Industry	0.06511	0.06511
Construction	0.38406	0.38406
Crude Oil and Products	0.19896	0.19896
Transportation and Communication	0.24114	0.24114
Housing	0.05868	0.05869
Other Services	0.15881	0.15881

TABLE 8

CAPITAL LABOR AND LABOR LABOR
ELASTICITIES OF SUBSTITUTION

Sector	$\sigma_{K/L}$	$\sigma_{L/L}$
Staple Food	1.3	3.0
Non-Staple Food	1.3	3.0
Cotton	1.4	3.0
Other Agriculture	1.3	3.0
Food Processing Industry	.53	3.0
Textile Industry	.52	3.0
Other Industry	.79	3.0
Construction	1.2	3.0
Crude Oil and Products	.45	3.0
Transportation and Communication	.2	3.0
Housing	1.6	3.0
Other Services		

V. The Consistency Run

Tables below show the values for the main production, consumption, and government deficit figures resulting from a (Base) consistency run. The figures are self-explanatory and do not need comment.

Income Groups		Gross Income YH	Disposable Income YD	Gross Expenditures YET	Net Expenditures YE	SHAT
Urban Bottom	60% 1	1042.02881	1020.94849	1117.65747	1008.95874	504.94702
Urban Middle	30% 2	1125.99316	1046.39355	1144.59253	1044.99292	522.49634
Urban Top	10% 3	1304.99316	1134.89404	932.09497	861.49512	430.74878
Rural Bottom	60% 4	720.36646	729.55762	659.71899	576.49219	288.49854
Rural Middle	30% 5	533.31714	528.03369	384.98486	329.36035	165.19914
Rural Top	10% 6	501.78442	485.72314	313.34058	286.50537	143.59940

HOUSEHOLD CONSUMPTION BY CLASSES

Income Groups / Commodities By Sector		Urban Bottom 60%	Urban Middle 30%	Urban Top 10%	Rural Bottom 60%	Rural Middle 30%	Rural Top 10%
	1	21.994	13.500	5.300	22.592	7.093	4.495
	2	179.443	186.600	110.700	113.902	65.607	53.170
	3	1.600	0.300	0.400	1.600	0.600	0.500
	4	14.286	16.400	11.800	7.195	4.253	1.223
	5	324.307	275.100	140.400	234.431	100.424	70.677
	6	79.764	97.200	55.100	38.122	30.783	25.626
	7	95.514	99.100	60.300	45.068	23.166	19.536
	8	0.0	0.0	0.0	0.0	0.0	0.0
	9	21.885	18.400	9.400	11.793	4.692	2.795
	10	29.940	45.399	170.799	7.784	6.259	4.685
	11	16.653	39.400	55.300	4.392	3.846	8.271
	12	208.089	223.199	152.699	78.031	63.199	76.108
Imports	13	15.487	30.400	89.300	11.584	19.439	18.651

1

COMMODITY PRICES AND OUTPUT

	FINAL OUTPUT	PRICES
STAPLE FOOD	454.674316	0.999997
NON-STAPLE FOOD	1266.88110	0.999998
COTTON	235.012787	1.000000
OTHER AGRICULTURE	463.503174	1.000002
FOOD PROCESSING IND	1521.09741	0.999991
TEXTILE INDUSTRY	884.662354	0.999998
OTHER INDUSTRIES	1391.70288	0.999997
CONSTRUCTION	635.993896	0.999998
CRUDE OIL AND PRODUCTS	608.948730	0.999998
TRANSPORT AND COMM	576.867187	1.000004
HOUSING	141.856384	0.999999
OTHER SERVICES	3117.40088	1.000000

	PVT CAP.. DEMAND	LAND DEMAND	COV. CAPITAL DEMAND
STAPLE FOOD	618.095703	72.490784	104.834824
NON-STAPLE FOOD	1716.75244	165.257095	297.587402
COTTON	373.669434	46.866531	0.0
OTHER AGRICULTURE	695.254639	160.573975	0.0
FOOD PROCESSING IND	793.991455	0.0	118.663834
TEXTILE INDUSTRY	597.398437	0.0	287.262207
OTHER INDUSTRIES	1037.33374	0.0	4529.47266
CONSTRUCTION	99.282181	0.0	218.713989
CRUDE OIL AND PRODUCTS	270.967529	0.0	1251.40308
TRANSPORT AND COMM	71.618317	0.0	1082.11548
HOUSING	1265.35596	0.0	153.205826
OTHER SERVICES	4128.39062	0.0	547.703369

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FACTOR SHARES IN BASE PERIOD

	WHITE COLLAR	BLUE COLLAR	UNSKILLED	CAPITAL	LAND	
STAPLE FOOD	0.02847937	0.01985063	0.39652425	0.32653862	0.25099999	
NON-STAPLE FOOD	0.02246951	0.01631061	0.32770157	0.42868131	0.22600001	
COTTON	0.02386196	0.02028612	0.41185236	0.31198287	0.23199999	
OTHER AGRICULTURE	0.02848424	0.02004588	0.40246993	0.18219483	0.36699998	
FOOD PROCESSING IND	0.01092421	0.11547381	0.21707922	0.65694928	0.0	
TEXTILE INDUSTRY	0.01603007	0.16998541	0.31955349	0.49479616	0.0	
OTHER INDUSTRIES	0.03169177	0.11478710	0.21633476	0.63732475	0.0	
CONSTRUCTION	0.21296901	0.19596374	0.11010706	0.48083365	0.0	
CRUDE OIL AND PRODUCTS	0.01513065	0.01290370	0.03733548	0.93500447	0.0	
TRANSPORT AND COMM	0.09822983	0.18902361	0.10013700	0.61307871	0.0	
HOUSING	0.11543298	0.20166039	0.06098320	0.62251455	0.0	
OTHER SERVICES	0.16659760	0.41436720	0.05643283	0.36257505	0.0	
TOTALS FOR ALL SECTORS	0.08772850	0.19673854	0.18585962	0.45593005	**********	

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GOVERNMENT SECTOR

	EXPENDITURE	REVENUE	NET
PUBLIC UNDERTAKING	0.0	1413.6682	1413.6682
CONVENTIONAL	1716.8879	1323.2307	-393.6572
TRADE	1449.2097	1236.4536	-212.7561
TOTAL	3166.0977	3973.3525	807.2549

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OTHER IMPORTANT VARIABLES

	FINAL
EXPORTS	1286.0078
IMPORTS	1939.2773
IMPORTS-EXPORTS	653.2695
INVESTMENT	1566.9827
STOCKS	112.9996
TOTAL INVESTMENT	1679.9822
PRIVATE SAVINGS	393.1589
PRICE DIFFERENCE	176.0092
GOVT. SAVINGS	807.2549
DOMESTIC SAVINGS	1200.4138

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FORTRAN FORMULATION
OF G.E.M.

```
       REAL KAP,KAPG                                                          GEM00010
       REAL LAB                                                               GEM00020
      REAL KAPIT,KAPITP,KAPITG                                                GEM00030
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13)       GEM00040
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),         GEM00050
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                         GEM00060
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),S8K(13),       GEM00070
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)                    GEM00080
     6,YO(14),SECT(14,13),SME(13,6)                                           GEM00090
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),           GEM00100
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),        GEM00110
     3XE(12),XINV(12),XDST(12),                                               GEM00120
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CL8(12),WAGE(12),RENT(12)          GEM00130
     7,KAP(12)                                                                GEM00140
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),       SHAT(6)      GEM00150
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                     GEM00160
      COMMON   TK(12),     TLAND(4),TL,LAB(12),TLAB1                          GEM00170
      DIMENSION     X(11 ),W(550),F(11),AJINV(11,11 )                        GEM00180
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)                GEM00190
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),           GEM00200
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)         GEM00210
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),                GEM00220
     4PAROLG(12,3),COELLG(12,3),PINC(12,6)                                    GEM00230
C                                                                             GEM00240
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),                    GEM00250
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),            GEM00260
     3VACAPG(12),CAPOT(12),KAPIT(12),KAPITP(12),KAPITG(12),                   GEM00270
     4TVACAP(12),RATP(12),RATG(12)                                            GEM00280
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                        GEM00290
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)                    GEM00300
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                      GEM00310
     9SHSKI(12,3),SHSKIG(12,3)                                                GEM00320
C-----                                                                        GEM00330
C-----NUMC:NUMBER OF CONSTRAINTS IN MODEL                                     GEM00340
C-----MAXFUN:MAX NUMBER OF ITERARIONS FOR NSOIA                               GEM00350
C-----ACC:CONVERGENCE CRITERION FOR ABOVE                                     GEM00360
C-----                                                                        GEM00370
      DATA NUMC/11/                                                           GEM00380
C                                                                             GEM00390
C THE ORIGINAL NUMBER FOR STEP WAS 0.1                                        GEM00400
C                                                                             GEM00410
      DATA DMAX/0.3/,STEP/0.10/                                               GEM00420
      DATA ACC/.001/,MAXFUN/200/,IPRINT/1/                                    GEM00430
      M=12                                                                    GEM00440
      L=13                                                                    GEM00450
      N1=12                                                                   GEM00460
      CALL WRITE                                                              GEM00470
      CALL REED                                                               GEM00480
C     RELATING TO THE EXPORT SECTOR THE PRICE                                 GEM00490
C     DIFFERENTIAL AND GOVERNMENT EXPORTS .                                   GEM00500
      Z(1,26)=17                                                              GEM00510
      Z(2,26)=51                                                              GEM00520
      Z(3,26)=100                                                             GEM00530
      Z(1,27)=34                                                              GEM00540
      Z(2,27)=55                                                              GEM00550
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      Z(3,27)=155                                                       GEM00560
      Z(1,24)=78                                                        GEM00570
      Z(2,24)=26                                                        GEM00580
      Z(3,24)=0                                                         GEM00590
      Z(13,24)=146                                                      GEM00600
      Z(13,26)=800                                                      GEM00610
      Z(13,27)=976                                                      GEM00620
      Z(24,27)=0                                                        GEM00630
      Z(24,26)=0                                                        GEM00640
      ZT(24)=893                                                        GEM00650
C                                                                       GEM00660
C                                                                       GEM00670
C                                                                       GEM00680
C FACTOR AVAILABILITIES , C.E.S COEFFICIENTS ,INITIAL                   GEM00690
C  WAGES ALL COMPUTED IN HE SUBROUTINE PARAMS .                         GEM00700
C                                                                       GEM00710
      CALL PARAMS                                                       GEM00720
      CALL RATIO                                                        GEM00730
C                                                                       GEM00740
C                                                                       GEM00750
C                                                                       GEM00760
      DO  122  I=1,12                                                   GEM00770
      RENT(I)=1.                                                        GEM00780
 122  CONTINUE                                                          GEM00790
C                                                                       GEM00800
C    SETTING THE INITIAL VALUES FOR THE  X'S                            GEM00810
C                                                                       GEM00820
C WHEN PUSHING THE MODEL AWAY FROM A STATIONARY                         GEM00830
C POINT WE PUT A COMMENT C ON THE INITIALIZING                          GEM00840
C STATEMENTS AND RESET THE X VALUES JUST BELOW                          GEM00850
C                                                                       GEM00860
C     X(11)=RENT(1)                                                     GEM00870
C     X(11)=RENT(2)                                                     GEM00880
C     X(11)=RENT(3)                                                     GEM00890
C     X(11)=RENT(4)                                                     GEM00900
      X(11)=1.62                                                        GEM00910
C     X(1)=WAGES(3,1)                                                   GEM00920
      X(1)=10.05                                                        GEM00930
C     X(2)=WAGES(3,2)                                                   GEM00940
      X(2)=6.28                                                         GEM00950
C      X(3)=WAGES(7,2)                                                  GEM00960
      X(3)=13.12                                                        GEM00970
C      X(4)=WAGES(7,3)                                                  GEM00980
      X(4)=7.36                                                         GEM00990
C     X(5)=WAGES(8,1)                                                   GEM01000
      X(5)=17.09                                                        GEM01010
C     X(6)=WAGES(8,2)                                                   GEM01020
      X(6)=9.76                                                         GEM01030
C     X(7)=WAGES(12,2)                                                  GEM01040
      X(7)=5.43                                                         GEM01050
      X(8)=2.90                                                         GEM01060
C     X(9)=RATG(7)                                                      GEM01070
      X(9)=.09170                                                       GEM01080
C     X(10)=RATG(12)                                                    GEM01090
C     X(8)=WAGES(3,3)                                                   GEM01100
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```
      X(10)=.1090                                                        GEM01110
C LAND AVAILABILITY                                                      GEM01120
C                                                                        GEM01130
      DO  33   I=1,4                                                     GEM01140
   33 TLAND(I)=COEFTP(I)*((HPU(I))**(ELSCP(I)))*HM(I)                    GEM01150
      TL=TLAND(1)+TLAND(2)+TLAND(3)+TLAND(4)                             GEM01160
      DO  3001  I=1,12                                                   GEM01170
      HMR(I)=HM(I)                                                       GEM01180
      GMR(I)=GM(I)                                                       GEM01190
 3001 CONTINUE                                                           GEM01200
      DO  131   I=15,20                                                  GEM01210
      Z(I,26)=CI(I-14)                                                   GEM01220
      DO  131  J=1,12                                                    GEM01230
      Z(I,J)=C(I-14,J)                                                   GEM01240
  131 CONTINUE                                                           GEM01250
      ICNT=0                                                             GEM01260
C                                                                        GEM01270
C                                                                        GEM01280
C REENTRY HERE FROM PREVIOUS ITERATION                                   GEM01290
C                                                                        GEM01300
C                                                                        GEM01310
      WRITE(1,*)ICNT                                                     GEM01320
   57 ICNT=ICNT+1                                                        GEM01330
      DO 152 I=1,40                                                      GEM01340
      B(I)=1.0                                                           GEM01350
      BE(I)=1.0                                                          GEM01360
      BI(I)=1.0                                                          GEM01370
  152 CONTINUE                                                           GEM01380
      BB=1.0                                                             GEM01390
      BE(1)=2.0                                                          GEM01400
      BE(2)=3.0                                                          GEM01410
      BE(3)=1.55                                                         GEM01420
      BE(9)=3.041                                                        GEM01430
      DO  111  I=1,12                                                    GEM01440
      Q(I)=ZT(I)                                                         GEM01450
      HM(I)=HMR(I)                                                       GEM01460
      GM(I)=GMR(I)                                                       GEM01470
      CH(I)=HM(I)/Q(I)                                                   GEM01480
      CG(I)=GM(I)/Q(I)                                                   GEM01490
  111 CONTINUE                                                           GEM01500
      IF(ICNT.GT.1)GO  TO  289                                           GEM01510
   10 CONTINUE                                                           GEM01520
      N=NUMC                                                             GEM01530
      CALL  NSOIA(N,X,F,AJINV,STEP,DMAX,ACC,MAXFUN,IPRINT,W)             GEM01540
      WRITE(1,9000)                                                      GEM01550
 9000 FORMAT(10X,'BACK FROM NSOIA INTO MAIN')                            GEM01560
      CALL RITE                                                          GEM01570
      GO  TO  57                                                         GEM01580
  289 STOP                                                               GEM01590
      END                                                                GEM01600
C                                                                        GEM01610
C                                                                        GEM01620
C                                                                        GEM01630
      SUBROUTINE  RITE                                                   GEM01640
      REAL LAB                                                           GEM01650
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      REAL KAP,KAPG                                                      GEM01660
      REAL KAPIT,KAPITP,KAPITG                                           GEM01670
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13) GEM01680
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),    GEM01690
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                    GEM01700
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13),  GEM01710
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)               GEM01720
     6,YO(14),SECT(14,13),SME(13,6)                                      GEM01730
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),      GEM01740
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),   GEM01750
     3XE(12),XINV(12),XDST(12),                                          GEM01760
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CLB(12),WAGE(12),RENT(12)     GEM01770
     7,KAP(12)                                                           GEM01780
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),       SHAT(6)GEM01790
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                GEM01800
      COMMON   TK(12), TLAND(4),TL,LAB(12),TLAB1,WBASE(12,3),RBASE(12)   GEM01810
     1,FLOUZ(12,3),BSSHR(3),ZALL                                         GEM01820
      DIMENSION  SMET(6)                                                 GEM01830
C                                                                        GEM01840
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)          GEM01850
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),      GEM01860
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)    GEM01870
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),           GEM01880
     4PAROLG(12,3),COELLG(12,3),PINC(12,6)                               GEM01890
C                                                                        GEM01900
C                                                                        GEM01910
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),               GEM01920
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),       GEM01930
     3VACAPG(12),CAPDT(12),KAPIT(12),KAPITP(12),KAPITG(12),              GEM01940
     4TVACAP(12),RATP(12),RATG(12)                                       GEM01950
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                   GEM01960
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)               GEM01970
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                 GEM01980
     9SHSKI(12,3),SHSKIG(12,3)                                           GEM01990
C                                                                        GEM02000
      DIMENSION DIFF(13,6),PERCD(12),ZTOT(6),CDCO(13,6),RWAGE(12,3),     GEM02010
     1XINDEX(6),RRENT(12),RRATP(12),PERKD(12,3),IY(3),SHLAB(12,3)        GEM02020
     2,SHKAP(12),SHLAND(12),XIMPER(12),SHLAF(12,3),SHKAT(12),SHLANK(12)  GEM02030
     3,TSHLAB(3)                                                         GEM02040
      DATA IY/3,2,1/                                                     GEM02050
C                                                                        GEM02060
C                                                                        GEM02070
C                                                                        GEM02080
C THIS PROGRAM WRITES OUT THE RESULTS OF THE MODEL                       GEM02090
C                                                                        GEM02100
C                                                                        GEM02110
C INITIALIZING                                                           GEM02120
      CALL GRAPH                                                         GEM02130
      CALL NUPAGE                                                        GEM02140
      CALL SKIF(3)                                                       GEM02150
      WRITE(6,10)                                                        GEM02160
10    FORMAT(40X,'COMMODITY PRICES AND OUTPUT ')                         GEM02170
      CALL SKIF(2)                                                       GEM02180
      CALL LINE(1,130)                                                   GEM02190
      CALL SKIF(1)                                                       GEM02200
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      WRITE(6,20)                                                       GEM02210
20    FORMAT(47X,'FINAL OUTPUT',3X,'INITIAL OUTPUT',1X,'CHANGE'         GEM02220
     1,9X,'PRICES')                                                     GEM02230
      CALL SKIP(2)                                                      GEM02240
      CALL LINE(1,130)                                                  GEM02250
      DO 30 I=1,12                                                      GEM02260
      WRITE(6,40)(SECN(I,J),J=1,13),Q(I),QI(I),D(I),B(I)                GEM02270
40    FORMAT(1X,13A2,17X,4(2X,F12.6))                                   GEM02280
30    CONTINUE                                                          GEM02290
      CALL LINE(1,132)                                                  GEM02300
C                                                                       GEM02310
C                                                                       GEM02320
C                                                                       GEM02330
C FACTOR PRICES                                                         GEM02340
C..............LABOR                                                   GEM02350
C                                                                       GEM02360
      CALL NUPAGE                                                       GEM02370
      CALL SKIP(2)                                                      GEM02380
      WRITE(6,50)                                                       GEM02390
      CALL SKIP(2)                                                      GEM02400
50    FORMAT(40X,'WHITE COLLAR WAGES IN THE PRIVATE SECTOR'             GEM02410
     1,1X,'(000,000)')                                                  GEM02420
      CALL SKIP(2)                                                      GEM02430
      CALL LINE(1,132)                                                  GEM02440
      WRITE(6,60)                                                       GEM02450
60    FORMAT(45X,'INITIAL',8X,'FINAL',4X,'% CHANGE')                    GEM02460
      CALL SKIP(1)                                                      GEM02470
      CALL LINE(1,132)                                                  GEM02480
      DO 70 I=1,12                                                      GEM02490
      PERCD(I)=((WAGES(I,1)-WBASE(I,1))/WBASE(I,1))*100                 GEM02500
      WRITE(6,80)(SECN(I,J),J=1,13),WBASE(I,1),WAGES(I,1),PERCD(I)      GEM02510
80    FORMAT(1X,13A2,17X,3(2X,F12.6)/)                                  GEM02520
70    CONTINUE                                                          GEM02530
      CALL LINE(1,132)                                                  GEM02540
      CALL NUPAGE                                                       GEM02550
      CALL SKIP(3)                                                      GEM02560
      WRITE(6,1001)                                                     GEM02570
1001  FORMAT(40X,'BLUE COLLAR WAGES IN THE PRIVATE SECTOR')             GEM02580
      CALL SKIP(1)                                                      GEM02590
      CALL LINE(1,132)                                                  GEM02600
      WRITE(6,60)                                                       GEM02610
      CALL SKIP(1)                                                      GEM02620
      CALL LINE(1,132)                                                  GEM02630
      DO 1000 I=1,12                                                    GEM02640
      PERCD(I)=((WAGES(I,2)-WBASE(I,2))/WBASE(I,2))*100                 GEM02650
      WRITE(6,80)(SECN(I,J),J=1,13),WBASE(I,2),WAGES(I,2),PERCD(I)      GEM02660
1000  CONTINUE                                                          GEM02670
      CALL SKIP(1)                                                      GEM02680
      CALL LINE(1,132)                                                  GEM02690
      CALL NUPAGE                                                       GEM02700
      CALL SKIP(2)                                                      GEM02710
      WRITE(6,1003)                                                     GEM02720
1003  FORMAT(40X,'UNSKILLED LABOR WAGES IN THE PRIVATE SECTOR')         GEM02730
      CALL SKIP(2)                                                      GEM02740
      CALL LINE(1,132)                                                  GEM02750
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      CALL SKIF(1)                                                      GEM02760
      WRITE(6,60)                                                       GEM02770
      CALL LINE(1,132)                                                  GEM02780
      DO 1004 I=1,12                                                    GEM02790
      PERCD(I)=((WAGES(I,3)-WBASE(I,3))/WBASE(I,3))*100                 GEM02800
      WRITE(6,80)(SECN(I,J),J=1,13),WBASE(I,3),WAGES(I,3),PERCD(I)      GEM02810
1004  CONTINUE                                                          GEM02820
      CALL SKIF(1)                                                      GEM02830
      CALL LINE(1,132)                                                  GEM02840
C                                                                       GEM02850
C                                                                       GEM02860
C.............KAPITAL AND LAND                                         GEM02870
C                                                                       GEM02880
      CALL NUPAGE                                                       GEM02890
      CALL SKIF(3)                                                      GEM02900
      WRITE(6,90)                                                       GEM02910
90    FORMAT(40X,'CAPITAL AND LAND RETURNS',//,20X,'PVT SECTOR')        GEM02920
      CALL SKIF(2)                                                      GEM02930
      CALL LINE(1,100)                                                  GEM02940
      WRITE(6,100)                                                      GEM02950
      CALL SKIF(1)                                                      GEM02960
      CALL LINE(1,100)                                                  GEM02970
100   FORMAT(41X,'CAPITAL RETURNS',3X,'LAND RETURNS')                   GEM02980
      DO 101 I=1,12                                                     GEM02990
      WRITE(6,102)(SECN(I,J),J=1,13),RATP(I),RENT(I)                    GEM03000
102   FORMAT(1X,13A2,17X,2(2X,F12.6))                                   GEM03010
101   CONTINUE                                                          GEM03020
      CALL LINE(1,100)                                                  GEM03030
      CALL NUPAGE                                                       GEM03040
      CALL SKIF(3)                                                      GEM03050
      WRITE(6,103)                                                      GEM03060
103   FORMAT(30X,'CAPITAL RETURNS IN THE GOV SECTOR ')                  GEM03070
      CALL LINE(1,132)                                                  GEM03080
      CALL SKIF(1)                                                      GEM03090
      WRITE(6,60)                                                       GEM03100
      CALL LINE(1,132)                                                  GEM03110
      DO 104 I=1,12                                                     GEM03120
      PERCD(I)=((RATP(I)-RBASE(I))/RBASE(I))*100                        GEM03130
      WRITE(6,80)(SECN(I,J),J=1,13),RBASE(I),RATG(I),PERCD(I)           GEM03140
105   FORMAT(1X,13A2,2X,F12.6)                                          GEM03150
104   CONTINUE                                                          GEM03160
      CALL LINE(1,132)                                                  GEM03170
C FACTOR DEMANDS                                                        GEM03180
C                                                                       GEM03190
C                                                                       GEM03200
C                                                                       GEM03210
      CALLNUPAGE                                                        GEM03220
      CALL SKIF(3)                                                      GEM03230
      WRITE(6,106)                                                      GEM03240
106   FORMAT(30X,'DEMAND FOR WHITE COLLAR LABOR IN THE PVT SECTOR'      GEM03250
     1,1X,'(0,000)')                                                    GEM03260
      CALL SKIF(2)                                                      GEM03270
      WRITE(6,60)                                                       GEM03280
      CALL SKIF(1)                                                      GEM03290
      CALL LINE(1,132)                                                  GEM03300
```

```
      DO 107 I=1,12                                                    GEM03310
      PERCD(I)=(-(SKIP(I,1)-CLP(I,1))/SKIP(I,1))*100                   GEM03320
      WRITE(6,80)(SECN(I,J),J=1,13),SKIP(I,1),CLP(I,1),PERCD(I)        GEM03330
107   CONTINUE                                                         GEM03340
      CALL LINE(1,132)                                                 GEM03350
      CALL NUPAGE                                                      GEM03360
      CALL SKIP(2)                                                     GEM03370
      WRITE(6,1050)                                                    GEM03380
1050  FORMAT(45X,'DEMAND FOR BLUE COLLAR LABOR IN THE PVT SECTOR ')    GEM03390
      CALL SKIP(1)                                                     GEM03400
      CALL LINE(1,132)                                                 GEM03410
      CALL SKIP(1)                                                     GEM03420
      WRITE(6,60)                                                      GEM03430
      CALL SKIP(1)                                                     GEM03440
      CALL LINE(1,132)                                                 GEM03450
      DO 1020 I=1,12                                                   GEM03460
      PERCD(I)=(-(SKIP(I,2)-CLP(I,2))/SKIP(I,2))*100                   GEM03470
      WRITE(6,80)(SECN(I,J),J=1,13),SKIP(I,2),CLP(I,2),PERCD(I)        GEM03480
1020  CONTINUE                                                         GEM03490
      CALL SKIP(1)                                                     GEM03500
      CALL LINE(1,132)                                                 GEM03510
      CALL NUPAGE                                                      GEM03520
      CALL SKIP(2)                                                     GEM03530
      WRITE(6,1021)                                                    GEM03540
1021  FORMAT(45X,'DEMAND FOR UNSKILLED LABOR IN THE PRIVATE SECTOR')   GEM03550
      CALL SKIP(1)                                                     GEM03560
      CALL LINE(1,132)                                                 GEM03570
      WRITE(6,60)                                                      GEM03580
      CALL LINE(1,132)                                                 GEM03590
      CALL SKIP(1)                                                     GEM03600
      DO 1022 I=1,12                                                   GEM03610
      PERCD(I)=(-(SKIP(I,3)-CLP(I,3))/SKIP(I,3))*100                   GEM03620
      WRITE(6,80)(SECN(I,J),J=1,13),SKIP(I,3),CLP(I,3),PERCD(I)        GEM03630
1022  CONTINUE                                                         GEM03640
      CALL SKIP(1)                                                     GEM03650
      CALL LINE(1,132)                                                 GEM03660
C                                                                      GEM03670
C GOVERNMENT SECTOR                                                    GEM03680
      CALL NUPAGE                                                      GEM03690
      CALL SKIP(3)                                                     GEM03700
      WRITE(6,108)                                                     GEM03710
108   FORMAT(30X,'DEMAND FOR WHITE COLLAR LABOR  IN THE GOV. SECTOR')  GEM03720
      CALL SKIP(2)                                                     GEM03730
      CALL LINE(1,132)                                                 GEM03740
      WRITE(6,60)                                                      GEM03750
      CALL SKIP(1)                                                     GEM03760
      CALL LINE(1,132)                                                 GEM03770
      SKIG(3,1)=1.                                                     GEM03780
      SKIG(4,1)=1.                                                     GEM03790
      DO 109 I=1,12                                                    GEM03800
      PERCD(I)=((CLG(I,1)-SKIG(I,1))/SKIG(I,1))*100                    GEM03810
      WRITE(6,80)(SECN(I,J),J=1,13),SKIG(I,1),CLG(I,1),PERCD(I)        GEM03820
109   CONTINUE                                                         GEM03830
      CALL SKIP(1)                                                     GEM03840
      CALL LINE(1,130)                                                 GEM03850
```

```
      CALL NUPAGE                                                       GEM03860
      CALL SKIF(2)                                                      GEM03870
      WRITE(6,1030)                                                     GEM03880
1030  FORMAT(45X,'DEMAND FOR BLUE COLLAR LABOR IN THE GOV SECTOR ')     GEM03890
      CALL SKIF(1)                                                      GEM03900
      CALL LINE(1,132)                                                  GEM03910
      WRITE(6,60)                                                       GEM03920
      CALL LINE(1,132)                                                  GEM03930
      CALL SKIF(1)                                                      GEM03940
      SKIG(3,2)=1.                                                      GEM03950
      SKIG(4,2)=1.                                                      GEM03960
      DO 1031 I=1,12                                                    GEM03970
      PERCD(I)=((CLG(I,2)-SKIG(I,2))/SKIG(I,2))*100                     GEM03980
      WRITE(6,80)(SECN(I,J),J=1,13),SKIG(I,2),CLG(I,2),PERCD(I)         GEM03990
1031  CONTINUE                                                          GEM04000
      CALL SKIF(1)                                                      GEM04010
      CALL LINE(1,132)                                                  GEM04020
      CALL NUPAGE                                                       GEM04030
      CALL SKIF(2)                                                      GEM04040
      WRITE(6,1040)                                                     GEM04050
1040  FORMAT(45X,'DEMAND FOR UNSKILLED LABOR IN THE GOVERNMENT SECT')   GEM04060
      CALL SKIF(1)                                                      GEM04070
      CALL LINE(1,132)                                                  GEM04080
      WRITE(6,60)                                                       GEM04090
      CALL LINE(1,132)                                                  GEM04100
      CALL SKIF(1)                                                      GEM04110
      SKIG(3,3)=1.                                                      GEM04120
      SKIG(4,3)=1.                                                      GEM04130
      DO 1041 I=1,12                                                    GEM04140
      PERCD(I)=((CLG(I,3)-SKIG(I,3))/SKIG(I,3))*100                     GEM04150
      WRITE(6,80)(SECN(I,J),J=1,13),SKIG(I,3),CLG(I,3),PERCD(I)         GEM04160
1041  CONTINUE                                                          GEM04170
      CALL SKIF(1)                                                      GEM04180
      CALL LINE(1,132)                                                  GEM04190
C                                                                       GEM04200
C                                                                       GEM04210
C OTHER FACTORS                                                         GEM04220
C                                                                       GEM04230
C                                                                       GEM04240
      CALL NUPAGE                                                       GEM04250
      CALL SKIF(3)                                                      GEM04260
      WRITE(6,110)                                                      GEM04270
110   FORMAT(30X,'PVT CAP.. DEMAND , LAND DEMAND ,GOV. CAPITAL DEMAND') GEM04280
      DO 111 I=1,12                                                     GEM04290
      WRITE(6,112)(SECN(I,J),J=1,13),CLK(I),CLT(I),CLB(I)               GEM04300
112   FORMAT(1X,13A2,17X,3(2X,F12.6))                                   GEM04310
111   CONTINUE                                                          GEM04320
C                                                                       GEM04330
C                                                                       GEM04340
      CALL LINE(1,130)                                                  GEM04350
C-----THIRD PAGE OF RESULTS                                             GEM04360
      CALL NUPAGE                                                       GEM04370
      CALL SKIF(2)                                                      GEM04380
      CALL LINE(1,120)                                                  GEM04390
      WRITE(6,300)                                                      GEM04400
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300   FORMAT(24X,'YH',13X,'YD',13X,'YET',12X,'YE',28X,'SHAT')          GEM04410
      CALL LINE(1,120)                                                 GEM04420
      CALL SKIF(1)                                                     GEM04430
      DO 310 I=1,6                                                     GEM04440
310    WRITE(6,320)I,YH(I),YD(I),YET(I),YE(I),SHAT(I)                  GEM04450
320    FORMAT(10X,I5,5X,4(F10.5,5X),18X,F10.5,/)                       GEM04460
      CALL SKIF(1)                                                     GEM04470
      CALL LINE(1,120)                                                 GEM04480
      CALL SKIF(2)                                                     GEM04490
C-----CALCULATE PERCENTAGE DIFFERENCE BETWEEN QH(FINAL)-QH(INITIAL)    GEM04500
      DO 335 J=1,6                                                     GEM04510
      K=J+14                                                           GEM04520
      DO 335 I=1,12                                                    GEM04530
      IF(Z(I,K).EQ.0)Z(I,K)=.1                                         GEM04540
335   DIFF(I,J)=(QH(I,J)-Z(I,K))*(100/Z(I,K))                          GEM04550
      DO 336 J=1,6                                                     GEM04560
      K=J+14                                                           GEM04570
336   DIFF(13,J)=(QH(13,J)-Z(26,K))*(100/Z(26,K))                      GEM04580
C-----END CALCULATION                                                  GEM04590
      WRITE(6,330)                                                     GEM04600
330   FORMAT(50X,'HOUSEHOLD CONSUMPTION BY CLASSES')                   GEM04610
      CALL SKIF(2)                                                     GEM04620
      CALL LINE(1,130)                                                 GEM04630
      DO 340 J=1,13                                                    GEM04640
340   WRITE(6,350)J,QH(J,1),DIFF(J,1),QH(J,2),DIFF(J,2),QH(J,3),       GEM04650
     1 DIFF(J,3),QH(J,4),DIFF(J,4),QH(J,5),DIFF(J,5),QH(J,6),DIFF(J,6) GEM04660
350   FORMAT(2X,I5,3X,12(F10.3),/)                                     GEM04670
      CALL LINE(1,130)                                                 GEM04680
C-----FOURTH PAGE OF RESULTS                                           GEM04690
      CALL NUPAGE                                                      GEM04700
      CALL SKIF(2)                                                     GEM04710
      WRITE(6,400)                                                     GEM04720
400   FORMAT(50X,'OTHER IMPORTANT VARIABLES')                          GEM04730
      CALL SKIF(1)                                                     GEM04740
      CALL LINE(1,130)                                                 GEM04750
      CALL SKIF(1)                                                     GEM04760
      WRITE(6,410)                                                     GEM04770
410   FORMAT(55X,'FINAL',5X,'INITIAL',3X,'CHANGE',/)                   GEM04780
      CALL LINE(1,130)                                                 GEM04790
      CALL SKIF(1)                                                     GEM04800
      DO 420 I=5,14                                                    GEM04810
420   WRITE(6,430)(SECT(I,J),J=1,9),Y(I),YO(I),CY(I)                   GEM04820
430   FORMAT(24X,9A2,8X,3(F11.4),/)                                    GEM04830
      CALL LINE(1,130)                                                 GEM04840
      CALL SKIF(2)                                                     GEM04850
      WRITE(6,440)                                                     GEM04860
440   FORMAT(50X,'GOVERNMENT SECTOR')                                  GEM04870
      CALL SKIF(1)                                                     GEM04880
      CALL LINE(1,130)                                                 GEM04890
      CALL SKIF(1)                                                     GEM04900
      WRITE(6,450)                                                     GEM04910
450   FORMAT(50X,'EXPENDITURE',5X,'REVENUE',6X,'NET',/)                GEM04920
      CALL SKIF(1)                                                     GEM04930
      CALL LINE(1,130)                                                 GEM04940
      CALL SKIF(1)                                                     GEM04950
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      DO 460 I=1,4                                                        GEM04960
460   WRITE(6,470)(GNAME(I,J),J=1,10),TE(I),GR(I),TNET(I)                 GEM04970
470   FORMAT(24X,10A2,4X,3(F11.4),/)                                      GEM04980
      CALL LINE(1,130)                                                    GEM04990
C                                                                         GEM05000
C                                                                         GEM05010
C PRICE INDEX CALCULATIONS                                                GEM05020
C                                                                         GEM05030
      DO 2000 K=1,6                                                       GEM05040
      ZTOT(K)=0.0                                                         GEM05050
      DO 2001 I=1,12                                                      GEM05060
      M=K+14                                                              GEM05070
      ZTOT(K)=Z(I,M)+ZTOT(K)                                              GEM05080
2001  CONTINUE                                                            GEM05090
      ZTOT(K)=ZTOT(K)+Z(26,M)                                             GEM05100
2000  CONTINUE                                                            GEM05110
C                                                                         GEM05120
C SHARES OF BASE YEAR CONSUMPTION                                         GEM05130
C                                                                         GEM05140
      DO 2004 K=1,6                                                       GEM05150
      DO 2003 I=1,12                                                      GEM05160
      M=K+14                                                              GEM05170
      CDCO(I,K)=Z(I,M)/ZTOT(K)                                            GEM05180
2003  CONTINUE                                                            GEM05190
      CDCO(13,K)=Z(26,K)/ZTOT(K)                                          GEM05200
2004  CONTINUE                                                            GEM05210
C                                                                         GEM05220
C PRICE INDEX                                                             GEM05230
      DO 2005 K=1,6                                                       GEM05240
      XINDEX(K)=1.                                                        GEM05250
      DO 2006 I=1,12                                                      GEM05260
      XINDEX(K)=XINDEX(K)*B(I)**CDCO(I,K)                                 GEM05270
2006  CONTINUE                                                            GEM05280
      XINDEX(K)=XINDEX(K)*BI(26)**CDCO(13,K)                              GEM05290
2005  CONTINUE                                                            GEM05300
C                                                                         GEM05310
C                                                                         GEM05320
C REAL WAGES                                                              GEM05330
C                                                                         GEM05340
      DO 2007 I=1,4                                                       GEM05350
      DO 2008 J=1,3                                                       GEM05360
      M=IY(J)+3                                                           GEM05370
      RWAGE(I,J)=WAGES(I,J)/XINDEX(M)                                     GEM05380
2008  CONTINUE                                                            GEM05390
      RRATP(I)=RATP(I)/XINDEX(6)                                          GEM05400
      PERCD(I)=((RRATP(I)-RATP(I))/RATP(I))*100                           GEM05410
      RRENT(I)=RENT(I)/XINDEX(6)                                          GEM05420
2007  CONTINUE                                                            GEM05430
C                                                                         GEM05440
      DO 2010 I=5,12                                                      GEM05450
      DO 2011 J=1,3                                                       GEM05460
      RWAGE(I,J)=WAGES(I,J)/XINDEX(IY(J))                                 GEM05470
2011  CONTINUE                                                            GEM05480
      RRATP(I)=RATP(I)/XINDEX(3)                                          GEM05490
      PERCD(I)=((RRATP(I)-RBASE(I))/RBASE(I))*100.                        GEM05500
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2010  CONTINUE                                                          GEM05510
C                                                                       GEM05520
C PRINTING THE RESULTS                                                  GEM05530
C                                                                       GEM05540
C % CHANGE IN REAL WAGES                                                GEM05550
C                                                                       GEM05560
      DO 3000 I=1,12                                                    GEM05570
      DO 3001 J=1,3                                                     GEM05580
      PERKD(I,J)=((RWAGE(I,J)-WBASE(I,J))/WBASE(I,J))*100.              GEM05590
3001  CONTINUE                                                          GEM05600
3000  CONTINUE                                                          GEM05610
C                                                                       GEM05620
C                                                                       GEM05630
      CALL NUPAGE                                                       GEM05640
      CALL SKIF(2)                                                      GEM05650
      WRITE(6,3002)                                                     GEM05660
3002  FORMAT(40X,'REAL WAGE CHANGES ')                                  GEM05670
      CALL SKIF(2)                                                      GEM05680
      CALL LINE(1,132)                                                  GEM05690
      WRITE(6,3003)                                                     GEM05700
3003  FORMAT(50X,'INITIAL FOR 3 SKILLS',10X,'FINAL FOR 3 SKILLS')       GEM05710
      CALL LINE(1,132)                                                  GEM05720
      DO 3004 I=1,12                                                    GEM05730
3004  WRITE(6,3005)(SECN(I,J),J=1,13),(WBASE(I,J),J=1,3),(RWAGE(I,J)    GEM05740
     1,J=1,3)                                                           GEM05750
3005  FORMAT(1X,13A2,3X,6(2X,F12.6),/)                                  GEM05760
      CALL SKIF(1)                                                      GEM05770
      CALL LINE(1,132)                                                  GEM05780
      CALL SKIF(3)                                                      GEM05790
      WRITE(6,4000)(XINDEX(I),I=1,6)                                    GEM05800
4000  FORMAT(25X,'THE PRICE INDEX ',//,6(5X,F10.7))                     GEM05810
C                                                                       GEM05820
      CALL NUPAGE                                                       GEM05830
      CALL SKIF(3)                                                      GEM05840
      WRITE(6,3006)                                                     GEM05850
3006  FORMAT(40X,'%CHANGE IN REAL WAGES ,REAL RET. ON CAP AND RE.RENT') GEM05860
      CALL SKIF(1)                                                      GEM05870
      CALL LINE(1,132)                                                  GEM05880
      WRITE(6,3030)                                                     GEM05890
3030  FORMAT(50X,'%CHANGE',30X,'REALRET ON CAP',5X,'% CHNG',5X,'RRENT') GEM05900
      CALL LINE(1,132)                                                  GEM05910
      CALL SKIF(1)                                                      GEM05920
      DO 3007 I=1,12                                                    GEM05930
3007  WRITE(6,3005)(SECN(I,J),J=1,13),(PERKD(I,J),J=1,3),RRATP(I)       GEM05940
     1,PERCD(I),RRENT(I)                                                GEM05950
      CALL LINE(1,132)                                                  GEM05960
      CALL SKIF(1)                                                      GEM05970
C                                                                       GEM05980
C                                                                       GEM05990
C FACTOR SHARES IN VALUE ADDED                                          GEM06000
C                                                                       GEM06010
      CALL NUPAGE                                                       GEM06020
      CALL SKIF(3)                                                      GEM06030
      WRITE(6,5000)                                                     GEM06040
5000  FORMAT(40X,'FACTOR SHARES IN BASE PERIOD')                        GEM06050
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      CALL SKIP(2)                                                        GEM06060
      CALL LINE(1,132)                                                    GEM06070
      WRITE(6,5001)                                                       GEM06080
5001  FORMAT(26X,'WHITE COLLAR',3X,'BLUE COLLAR',3X,'UNSKILLED',          GEM06090
     13X,'CAPITAL',3X,'LAND')                                             GEM06100
      TIMPER=0                                                            GEM06110
      DO 5002 I=1,12                                                      GEM06120
      XIMPER(I)=RBASE(I)*(KAPIT(I)/(HM(I)+GM(I)))                         GEM06130
      TIMPER=RBASE(I)*(KAPIT(I))+TIMPER                                   GEM06140
      WRITE(6,5003)(SECN(I,J),J=1,13),(FLOUZ(I,J),J=1,3),XIMPER(I)        GEM06150
     1,SPR(I)                                                             GEM06160
5003  FORMAT(1X,13A2,5X,5(2X,F12.8),/)                                    GEM06170
5002  CONTINUE                                                            GEM06180
      TIMPER=TIMPER/ZALL                                                  GEM06190
      WRITE(6,6006)(BSSHR(I),I=1,3),TIMPER,ZALL                           GEM06200
      CALL SKIP(1)                                                        GEM06210
      CALL LINE(1,132)                                                    GEM06220
      CALL NUPAGE                                                         GEM06230
      CALL SKIP(3)                                                        GEM06240
      WRITE(6,5004)                                                       GEM06250
5004  FORMAT(40X,'FACTOR SHARES IN THE FINAL PERIOD ')                    GEM06260
      CALL SKIP(2)                                                        GEM06270
      CALL LINE(1,132)                                                    GEM06280
      WRITE(6,5001)                                                       GEM06290
      CALL LINE(1,132)                                                    GEM06300
      TSHKAP=0                                                            GEM06310
      TSHLND=0                                                            GEM06320
      DO 5005 I=1,12                                                      GEM06330
      DO 5006 J=1,3                                                       GEM06340
      SHLAB(I,J)=WAGES(I,J)*((CLP(I,J)+CLG(I,J))/(HM(I)+GM(I)))           GEM06350
      SHLAF(I,J)=WAGES(I,J)*((CLP(I,J)+CLG(I,J)))                         GEM06360
5006  CONTINUE                                                            GEM06370
      SHKAP(I)=RATP(I)*((CLK(I)+CLB(I))/(HM(I)+GM(I)))                    GEM06380
      SHKAT(I)=RATP(I)*((CLK(I)+CLB(I)))                                  GEM06390
      TSHKAP=TSHKAP+SHKAT(I)                                              GEM06400
      SHLAND(I)=RENT(I)*(CLT(I)/(HM(I)+GM(I)))                            GEM06410
      SHLANK(I)=RENT(I)*(CLT(I))                                          GEM06420
      SHLND=SHLND+SHLANK(I)                                               GEM06430
      WRITE(6,5003)(SECN(I,J),J=1,13),(SHLAB(I,J),J=1,3),SHKAP(I)         GEM06440
     1,SHLAND(I)                                                          GEM06450
5005  CONTINUE                                                            GEM06460
      DO 6000 J=1,3                                                       GEM06470
      TSHLAB(J)=0.0                                                       GEM06480
      HUM=0                                                               GEM06490
      DO 6001 I=1,12                                                      GEM06500
      TSHLAB(J)=TSHLAB(J)+SHLAF(I,J)                                      GEM06510
      HUM=HM(I)+GM(I)+HUM                                                 GEM06520
6001  CONTINUE                                                            GEM06530
      TSHLAB(J)=TSHLAB(J)/HUM                                             GEM06540
6000  CONTINUE                                                            GEM06550
      TSHKAP=TSHKAP/HUM                                                   GEM06560
      SHLND=SHLND/HUM                                                     GEM06570
      WRITE(6,6006)(TSHLAB(I),I=1,3),TSHKAP,SHLND                         GEM06580
6006  FORMAT(1X,'TOTALS FOR ALL SECTORS',10X,5(2X,F12.8))                 GEM06590
      CALL SKIP(1)                                                        GEM06600
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      CALL LINE(1,132)                                                  GEM06610
      RETURN                                                            GEM06620
      END                                                               GEM06630
      SUBROUTINE MINV(A,N,D,L,M,N1)                                     GEM06640
C  MINV FINDS THE INVERSE OF A MATRIX                                   GEM06650
C     N1 IS THE ORDER OF ORIGINAL MATRIX IN MAIN                        GEM06660
      DIMENSION A(900),L(30),M(30)                                      GEM06670
      D = 1.0                                                           GEM06680
      NK = -N1                                                          GEM06690
      DO 80 K=1,N                                                       GEM06700
      NK = NK + N1                                                      GEM06710
      L(K) = K                                                          GEM06720
      M(K) = K                                                          GEM06730
      KK   = NK + K                                                     GEM06740
      BIGA = A(KK)                                                      GEM06750
      DO 20 J=K,N                                                       GEM06760
      IZ = N1 * (J-1)                                                   GEM06770
      DO 20 I=K,N                                                       GEM06780
      IJ = IZ + I                                                       GEM06790
      IF(ABS(BIGA).GE.ABS(A(IJ))) GO TO 20                              GEM06800
      BIGA = A(IJ)                                                      GEM06810
      L(K) = I                                                          GEM06820
      M(K) = J                                                          GEM06830
   20 CONTINUE                                                          GEM06840
      J = L(K)                                                          GEM06850
      IF(J.LE.K) GO TO 35                                               GEM06860
      KI = K - N1                                                       GEM06870
      DO 30 I = 1,N                                                     GEM06880
      KI = KI + N1                                                      GEM06890
      HOLD = -A(KI)                                                     GEM06900
      JI = KI - K + J                                                   GEM06910
      A(KI) = A(JI)                                                     GEM06920
   30 A(JI) = HOLD                                                      GEM06930
C                                                                       GEM06940
   35 I = M(K)                                                          GEM06950
      IF(I.LE.K) GO TO 45                                               GEM06960
      JP = N1 *(I-1)                                                    GEM06970
      DO 40 J=1,N                                                       GEM06980
      JK = NK + J                                                       GEM06990
      JI = JP + J                                                       GEM07000
      HOLD = -A(JK)                                                     GEM07010
      A(JK) = A(JI)                                                     GEM07020
   40 A(JI) = HOLD                                                      GEM07030
   45 IF(ABS(BIGA).GE.1.0E-10) GO TO 48                                 GEM07040
      D = 0.0                                                           GEM07050
      RETURN                                                            GEM07060
   48 DO 55 I=1,N                                                       GEM07070
      IF(I.EQ.K) GO TO 55                                               GEM07080
      IK = NK + I                                                       GEM07090
      A(IK) =-A(IK)/BIGA                                                GEM07100
   55 CONTINUE                                                          GEM07110
C                                                                       GEM07120
      DO 65 I=1,N                                                       GEM07130
      IK = NK + I                                                       GEM07140
      HOLD = A(IK)                                                      GEM07150
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      IJ = I - N1                                                    GEM07160
      DO 65 J=1,N                                                    GEM07170
      IJ = IJ + N1                                                   GEM07180
      IF(I.EQ.K.OR.J.EQ.K) GO TO 65                                  GEM07190
      KJ = IJ - I + K                                                GEM07200
      A(IJ) = HOLD * A(KJ) + A(IJ)                                   GEM07210
   65 CONTINUE                                                       GEM07220
      KJ = K - N1                                                    GEM07230
      DO 75 J=1,N                                                    GEM07240
      KJ = KJ + N1                                                   GEM07250
      IF(J.EQ.K) GO TO 75                                            GEM07260
      A(KJ) = A(KJ) / BIGA                                           GEM07270
   75 CONTINUE                                                       GEM07280
      D = D * BIGA                                                   GEM07290
      A(KK) = 1.0 / BIGA                                             GEM07300
   80 CONTINUE                                                       GEM07310
C                                                                    GEM07320
      K = N                                                          GEM07330
  100 K = K - 1                                                      GEM07340
      IF(K.LE.0) GO TO 150                                           GEM07350
      I = L(K)                                                       GEM07360
      IF(I.LE.K) GO TO 120                                           GEM07370
      JQ = N1 * (K - 1)                                              GEM07380
      JR = N1 * (I - 1)                                              GEM07390
      DO 110 J=1,N                                                   GEM07400
      JK = JQ + J                                                    GEM07410
      HOLD = A(JK)                                                   GEM07420
      JI = JR + J                                                    GEM07430
      A(JK) = -A(JI)                                                 GEM07440
  110 A(JI) = HOLD                                                   GEM07450
  120 J=M(K)                                                         GEM07460
      IF(J.LE.K) GO TO 100                                           GEM07470
      KI = K - N1                                                    GEM07480
      DO 130 I=1,N                                                   GEM07490
      KI = KI + N1                                                   GEM07500
      HOLD = A(KI)                                                   GEM07510
      JI = KI - K + J                                                GEM07520
      A(KI) = -A(JI)                                                 GEM07530
  130 A(JI) = HOLD                                                   GEM07540
      GO TO 100                                                      GEM07550
  150 RETURN                                                         GEM07560
      END                                                            GEM07570
      SUBROUTINE SORT(YP,NUM,INDEX)                                  GEM07580
C  SORTS IN ASCENDING ORDER VECTOR YP, WHICH IS OF LENGTH NUM.       GEM07590
C  RETURNS IN INDEX THE INDEX OF YP IN THE NEW ORDER.                GEM07600
      DIMENSION YP(NUM),INDEX(NUM)                                   GEM07610
      INDEX(1) = 1                                                   GEM07620
      NUM1 = NUM-1                                                   GEM07630
      DO 100 J=1,NUM1                                                GEM07640
      NEW = NUM                                                      GEM07650
100   INDEX(J+1) = INDEX(J) + 1                                      GEM07660
      DO 101 J=1,NUM1                                                GEM07670
      NEW = NEW - 1                                                  GEM07680
      DO 101 I=1,NEW                                                 GEM07690
      IF(YP(I+1).LT.YP(I)) GO TO 110                                 GEM07700
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      GO TO 111                                                          GEM07710
110   DUM = YP(I+1)                                                      GEM07720
      DUI = INDEX(I+1)                                                   GEM07730
      YP(I+1) = YP(I)                                                    GEM07740
      INDEX(I+1) = INDEX(I)                                              GEM07750
      YP(I) = DUM                                                        GEM07760
      INDEX(I) = DUI                                                     GEM07770
111   CONTINUE                                                           GEM07780
101   CONTINUE                                                           GEM07790
      RETURN                                                             GEM07800
      END                                                                GEM07810
      SUBROUTINE  REED                                                   GEM07820
      REAL KAP,KAPG                                                      GEM07830
      REAL LAB                                                           GEM07840
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),       ZT(40),Q(13)   GEM07850
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),    GEM07860
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                    GEM07870
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13),  GEM07880
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)               GEM07890
     6,YD(14),SECT(14,13),SME(13,6)                                      GEM07900
      COMMON      YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),     GEM07910
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),   GEM07920
     3XE(12),XINV(12),XDST(12),                                          GEM07930
     4 CLP(12),CLK(12),CLT(12),CLG(12),CLB(12),WAGE(12),RENT(12),KAP(12)GEM07940
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),       SHAT(6)GEM07950
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                GEM07960
      COMMON   TK(12),     TLAND(4),TL,LA8(12),TLA81                      GEM07970
      DIMENSION  SMET(6)                                                 GEM07980
      READ(5,104)(Z21(I),I=1,12)                                         GEM07990
C*     WRITE(6,101)(Z21(I),I=1,12)                                       GEM08000
      READ(5,104)(Z22(I),I=1,12)                                         GEM08010
C*     WRITE(6,101)(Z22(I),I=1,12)                                       GEM08020
      READ(5,103)(SPL(I),I=1,13)                                         GEM08030
C*     WRITE(6,101)(SPL(I),I=1,13)                                       GEM08040
      READ(5,103)(SPK(I),I=1,13)                                         GEM08050
C*     WRITE(6,101)(SPK(I),I=1,13)                                       GEM08060
      READ(5,103)(SPR(I),I=1,13)                                         GEM08070
C*     WRITE(6,101)(SPR(I),I=1,13)                                       GEM08080
      READ(5,103)(SBL(I),I=1,13)                                         GEM08090
C*     WRITE(6,101)(SBL(I),I=1,13)                                       GEM08100
      READ(5,103)(SBK(I),I=1,13)                                         GEM08110
C*     WRITE(6,101)(SBK(I),I=1,13)                                       GEM08120
      BE21=1                                                             GEM08130
      Z26=310                                                            GEM08140
      DO  10  I=1,6                                                      GEM08150
      READ(5,103)(SSPL(I,J),J=1,13)                                      GEM08160
C*     WRITE(6,101)(SSPL(I,J),J=1,13)                                    GEM08170
   10 CONTINUE                                                           GEM08180
      DO  20  I=1,6                                                      GEM08190
      READ(5,103)(SSPK(I,J),J=1,13)                                      GEM08200
C*     WRITE(6,101)(SSPK(I,J),J=1,13)                                    GEM08210
   20 CONTINUE                                                           GEM08220
      DO  30  I=1,6                                                      GEM08230
      READ(5,103)(SSPR(I,J),J=1,13)                                      GEM08240
C*     WRITE(6,101)(SSPR(I,J),J=1,13)                                    GEM08250
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   30 CONTINUE                                                          GEM08260
      DO  40  I=1,6                                                     GEM08270
      READ(5,103)(SS8L(I,J),J=1,13)                                     GEM08280
C*     WRITE(6,101)(SS8L(I,J),J=1,13)                                   GEM08290
   40 CONTINUE                                                          GEM08300
      DO  50  I=1,12                                                    GEM08310
      GM(I)=Z22(I)/S8K(I)                                               GEM08320
      HM(I)=Z21(I)+Z22(I)-GM(I)                                         GEM08330
   50 CONTINUE                                                          GEM08340
C*     WRITE(6,101)(GM(I),I=1,12)                                       GEM08350
C*     WRITE(6,101)(HM(I),I=1,12)                                       GEM08360
      DO  70  J=1,6                                                     GEM08370
      TOT=0                                                             GEM08380
      DO  60  I=1,12                                                    GEM08390
      TE1=SPL(I)*SSPL(J,I)                                              GEM08400
      TE2=SPK(I)*SSPK(J,I)                                              GEM08410
      TE3=SPR(I)*SSPR(J,I)                                              GEM08420
      TE4=S8L(I)*SSBL(J,I)                                              GEM08430
      TOT=TOT+HM(I)*(TE1+TE2+TE3)+GM(I)*TE4                             GEM08440
   60 CONTINUE                                                          GEM08450
      YC(J)=TOT+8E21*Z26*SSPL(J,13)                                     GEM08460
   70 CONTINUE                                                          GEM08470
C*     WRITE(6,102)(YC(J),J=1,6)                                        GEM08480
      DO  80  I=1,6                                                     GEM08490
      CI(I)=310.*SSPL(I,13)                                             GEM08500
      DO  80  J=1,12                                                    GEM08510
      T1=SSPL(I,J)*HM(J)*SPL(J)                                         GEM08520
      T2=SSPK(I,J)*HM(J)*SPK(J)                                         GEM08530
      T3=SSPR(I,J)*HM(J)*SPR(J)                                         GEM08540
      T4=SS8L(I,J)*GM(J)*S8L(J)                                         GEM08550
      C(I,J)=T1+T2+T3+T4                                                GEM08560
   80 CONTINUE                                                          GEM08570
      DO  90  I=1,6                                                     GEM08580
   90  S2(I)=0.                                                         GEM08590
      DO  95  J=1,12                                                    GEM08600
   95 S1(J)=0.                                                          GEM08610
      DO  100  I=1,6                                                    GEM08620
      S2(I)=S2(I)+CI(I)                                                 GEM08630
      DO  100  J=1,12                                                   GEM08640
      S2(I)=S2(I)+C(I,J)                                                GEM08650
      S1(J)=S1(J)+C(I,J)                                                GEM08660
  100 CONTINUE                                                          GEM08670
      S3=0.                                                             GEM08680
      DO  108  I=1,6                                                    GEM08690
  108 S3=S3+CI(I)                                                       GEM08700
C*     DO  110  I=1,6                                                   GEM08710
C*110  WRITE(6,105)(C(I,J),J=1,12),CI(I),S2(I)                         GEM08720
C*     WRITE(6,106)(S1(I),I=1,12),S3                                    GEM08730
      DO  79    J=1,6                                                   GEM08740
   79 READ(5,303)(SME(I,J),I=1,13)                                      GEM08750
      DO  751   J=1,6                                                   GEM08760
      SMET(J)=0.                                                        GEM08770
      DO  752   I=1,13                                                  GEM08780
      SMET(J)=SMET(J)+SME(I,J)                                          GEM08790
  752 CONTINUE                                                          GEM08800
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  751 CONTINUE                                                          GEM08810
      DO  753  J=1,6                                                    GEM08820
      DO  754  I=1,13                                                   GEM08830
      ALP(I,J)=SME(I,J)/SMET(J)                                         GEM08840
  754 CONTINUE                                                          GEM08850
  753 CONTINUE                                                          GEM08860
      READ(5,509)(QI(I),I=1,13)                                         GEM08870
      READ(5,555)(YO(I),I=1,14)                                         GEM08880
      DO   9    I=1,13                                                  GEM08890
    9 READ(5,4)(SECN(I,J),J=1,13)                                       GEM08900
      DO  33   I=1,14                                                   GEM08910
   33 READ(5,4)(SECT(I,J),J=1,13)                                       GEM08920
      DO  97   I=1,4                                                    GEM08930
   97 READ(5,4)(GNAME(I,J),J=1,13)                                      GEM08940
      DO 1 I=1,40                                                       GEM08950
    1 READ(5,555)(Z(I,J),J=1,40)                                        GEM08960
C-----SUBROUTINE ZDATA INCORPORATES THE NEW VARIABLES FOR                GEM08970
C-----THE Z MATRIX                                                      GEM08980
C**     CALL ZDATA(Z)                                                   GEM08990
      READ(5,555)(ZT(I),I=1,40)                                         GEM09000
C*     WRITE(6 ,520)                                                    GEM09010
C*     DO 151 I=1,40                                                    GEM09020
C* 151 WRITE(6 ,504)(Z(I,J),J=1,40)                                     GEM09030
C*    WRITE(6 ,521)                                                     GEM09040
C*    WRITE(1 ,504)(ZT(I),I=1,40)                                       GEM09050
      DO 150 I=1,40                                                     GEM09060
      IF(ZT(I).EQ.0.)ZT(I)=0.1                                          GEM09070
  150 CONTINUE                                                          GEM09080
      DO 63 I=1,40                                                      GEM09090
      DO 63 J=1,40                                                      GEM09100
      A(I,J)=Z(I,J)/ZT(J)                                               GEM09110
   63 CONTINUE                                                          GEM09120
C*     WRITE(6 ,503)                                                    GEM09130
C*     DO 305 I=1,40                                                    GEM09140
C*305 WRITE(6 ,504)(A(I,J),J=1,40)                                      GEM09150
      M=12                                                              GEM09160
      N1=12                                                             GEM09170
      DO 260 I=1,M                                                      GEM09180
      DO 260 J=1,N1                                                     GEM09190
      IF(I.EQ.J)GO TO 255                                               GEM09200
      AW(I,J)=-A(I,J)                                                   GEM09210
      GO TO 260                                                         GEM09220
  255 AW(I,J)=1-A(I,J)                                                  GEM09230
  260 CONTINUE                                                          GEM09240
C*     WRITE(6,335)                                                     GEM09250
C*     DO  26  I=1,12                                                   GEM09260
C* 26  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=1,6)                   GEM09270
C*     DO   52  I=1,12                                                  GEM09280
C*52  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=7,12)                   GEM09290
      CALL  MATINV(AW,M)                                                GEM09300
C*     WRITE(6,337)                                                     GEM09310
C*     DO  42  I=1,12                                                   GEM09320
C*42  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=1,6)                   GEM09330
C*     DO  43   I=1,12                                                  GEM09340
C* 43  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=7,12)                  GEM09350
```

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 335  FORMAT(20X,'(1-A(I,J)) MATRIX',///)                              GEM09360
 336  FORMAT(2X,13A2,6(F8.6,3X)//)                                     GEM09370
 337  FORMAT(20X,'INVERSE  MATRIX',///)                                GEM09380
      DO  21  J=1,6                                                    GEM09390
      K=J+14                                                           GEM09400
      TEXR(J)=Z(13,K)+Z(26,K)                                          GEM09410
      DSHAT(J)=TEXR(J)*0.5                                             GEM09420
  21  CONTINUE                                                         GEM09430
      DO  22  J=1,6                                                    GEM09440
      K=J+14                                                           GEM09450
      DO  23  I=1,12                                                   GEM09460
      QH(I,J)=Z(I,K)                                                   GEM09470
      QH(13,J)=Z(26,K)                                                 GEM09480
  23  CONTINUE                                                         GEM09490
  22  CONTINUE                                                         GEM09500
      DO  24  J=1,6                                                    GEM09510
      DO  45  I=1,13                                                   GEM09520
      THE(I,J)=QH(I,J)-ALP(I,J)*DSHAT(J)                               GEM09530
  45  CONTINUE                                                         GEM09540
  24  CONTINUE                                                         GEM09550
C*     DO  49  J=1,6                                                   GEM09560
C*     WRITE(6,602)J                                                   GEM09570
C*     WRITE(6,603)( ALP(I,J),I=1,13)                                  GEM09580
C*     WRITE(6,603)( THE(I,J),I=1,13)                                  GEM09590
C*     WRITE(6,603)(QH(I,J),I=1,13)                                    GEM09600
C* 49  CONTINUE                                                        GEM09610
  602 FORMAT(///,10X,'CLASS',I5)                                       GEM09620
 603  FORMAT(/,5X,13(F8.4,1X))                                         GEM09630
  504 FORMAT(///,4(5X,10(F11.5,1X),/))                                 GEM09640
  503 FORMAT(20X,'MATRIX A(40,40)',/)                                  GEM09650
  520 FORMAT(///,20X,'SOCIAL ACCOUNTING MATREX',//)                    GEM09660
  555 FORMAT(7F11.5)                                                   GEM09670
  303 FORMAT(2X,13(F6.4))                                              GEM09680
 509  FORMAT(7F11.5)                                                   GEM09690
  4   FORMAT(13A2)                                                     GEM09700
  101 FORMAT(/,5X,13(F8.3,1X))                                         GEM09710
  102 FORMAT(//,10X,6(E12.5,4X))                                       GEM09720
 103  FORMAT(13F6.3)                                                   GEM09730
 104  FORMAT(12F6.1)                                                   GEM09740
  105 FORMAT(/,2X,14(F8.3,1X))                                         GEM09750
  106 FORMAT(//,2X,13(F8.3,1X))                                        GEM09760
 521  FORMAT(///,20X,'TOTAL  GROSS PRODUCTION',//)                     GEM09770
      RETURN                                                           GEM09780
      END                                                              GEM09790
      SUBROUTINE AMULB(A,B,C,I,J,K)                                    GEM09800
      DIMENSION A(I,J),B(J,K),C(I,K)                                   GEM09810
      DO 3 L=1,I                                                       GEM09820
      DO 3 M=1,K                                                       GEM09830
      C(L,M)=0.0                                                       GEM09840
      DO 3 N=1,J                                                       GEM09850
    3 C(L,M)=C(L,M)+A(L,N)*B(N,M)                                      GEM09860
      RETURN                                                           GEM09870
      END                                                              GEM09880
C     MATRIX INVERSE ROUTINE                                           GEM09890
      SUBROUTINE MATINV(A,N)                                           GEM09900
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      DIMENSION A(N,N)                                          GEM09910
      DO 1 I=1,N                                                GEM09920
      X=A(I,I)                                                  GEM09930
      A(I,I)=1.0                                                GEM09940
      DO 2 J=1,N                                                GEM09950
    2 A(I,J)=A(I,J)/X                                           GEM09960
      DO 1  K=1,N                                               GEM09970
      IF(K-I)3,1,3                                              GEM09980
    3 X=A(K,I)                                                  GEM09990
      A(K,I)=0.0                                                GEM10000
      DO 4 J=1,N                                                GEM10010
    4 A(K,J)=A(K,J)-X*A(I,J)                                    GEM10020
    1 CONTINUE                                                  GEM10030
      RETURN                                                    GEM10040
      END                                                       GEM10050
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      SUBROUTINE  CALFUN(N,X,F)                                          NSO00010
      REAL KAPIT,KAPITP,KAPITG                                           NSO00020
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13)  NSO00030
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),    NSO00040
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                    NSO00050
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13),  NSO00060
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)               NSO00070
     6,YO(14),SECT(14,13),SME(13,6)                                      NSO00080
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),      NSO00090
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),   NSO00100
     3XE(12),XINV(12),XDST(12),                                          NSO00110
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CLB(12),WAGE(12),RENT(12),    NSO00120
     7KAP(12)                                                            NSO00130
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),SHAT(6)        NSO00140
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                NSO00150
      COMMON   TK(12),     TLAND(4),TL,LAB(12),TLAB1                     NSO00160
      DIMENSION     X(11),F(11)                                          NSO00170
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)          NSO00180
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),      NSO00190
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)    NSO00200
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),           NSO00210
     4PAROLG(12,3),COELLG(12,3),PINC(12,6),DIFUNS(12)                    NSO00220
C                                                                        NSO00230
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),               NSO00240
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),       NSO00250
     3VACAPG(12),CAPOT(12),KAPIT(12),KAPITP(12),KAPITG(12),              NSO00260
     4TVACAP(12),RATP(12),RATG(12)                                       NSO00270
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                   NSO00280
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)               NSO00290
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                 NSO00300
     9SHSKI(12,3),SHSKIG(12,3),DIFW(12,3),DIFR(12),SKILLM(12,3)          NSO00310
C-------------------------------------------------------------------     NSO00320
C                                                                        NSO00330
C                                                                        NSO00340
C SET GROWTH RATE COEFFICIENTS AS FOLLOWS :                              NSO00350
C        AI:INVESTMENT , AG: GOVERNMENT, AE:EXPORTS , AS:STOCKS          NSO00360
C         AR;REMITTANCES , A1:SKILLED LABOR , A2:SEMISKILLED LABOR       NSO00370
C         A3:UNSKILLED LABOR , IT:TIME  PERIOD                           NSO00380
      AI=.089                                                            NSO00390
      AG=.040                                                            NSO00400
      AE=.059                                                            NSO00410
      AS=.03                                                             NSO00420
      A1=.0313                                                           NSO00430
      A2=.0322                                                           NSO00440
      A3=.0098                                                           NSO00450
      AR=.112                                                            NSO00460
      IT=10                                                              NSO00470
C                                                                        NSO00480
C NOTE THAT THE TIME PERIOD MUST ALSO BE SET                             NSO00490
C IN THE PARAMS SUBROUTINE  TO ACCOUNT FOR                               NSO00500
C LABOR PRODUCTIVITY INCREASES.                                          NSO00510
C THE RATE OF GROWTH OF PRODUCTIVITY MUST ALSO                           NSO00520
C BE SET IN PARAMS .                                                     NSO00530
C                                                                        NSO00540
C                                                                        NSO00550
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      L=13                                                          NSO00560
      M=12                                                          NSO00570
      N1=12                                                         NSO00580
      NNN=0                                                         NSO00590
C                                                                   NSO00600
C RESETTING THE FACTOR RETURNS WITH THE UPDATED X'S                 NSO00610
C FROM NSOIA                                                        NSO00620
C                                                                   NSO00630
      RENT(1)=X(11)                                                 NSO00640
      RENT(2)=X(11)                                                 NSO00650
      RENT(3)=X(11)                                                 NSO00660
      RENT(4)=X(11)                                                 NSO00670
      WAGES(3,1)=X(1)                                               NSO00680
      WAGES(3,2)=X(2)                                               NSO00690
      DO 3322 I=1,5                                                 NSO00700
      WAGES(I,1)=DIFW(I,1)*X(1)                                     NSO00710
      WAGES(I,2)=DIFW(I,2)*X(2)                                     NSO00720
3322  CONTINUE                                                      NSO00730
      WAGES(7,2)=X(3)                                               NSO00740
      WAGES(7,3)=X(4)                                               NSO00750
      WAGES(9,2)=DIFW(9,2)*X(3)                                     NSO00760
      WAGES(9,3)=DIFW(9,3)*X(4)                                     NSO00770
      WAGES(6,2)=DIFW(6,2)*X(3)                                     NSO00780
      WAGES(6,3)=DIFW(6,3)*X(4)                                     NSO00790
      WAGES(8,1)=X(5)                                               NSO00800
      WAGES(8,2)=X(6)                                               NSO00810
      WAGES(11,1)=DIFW(11,1)*X(5)                                   NSO00820
      WAGES(11,2)=DIFW(11,2)*X(6)                                   NSO00830
      WAGES(12,2)=X(7)                                              NSO00840
      WAGES(10,2)=DIFW(10,2)*X(7)                                   NSO00850
      WAGES(1,3)=DIFW(1,3)*X(8)                                     NSO00860
      WAGES(2,3)=DIFW(2,3)*X(8)                                     NSO00870
      WAGES(4,3)=DIFW(4,3)*X(8)                                     NSO00880
      WAGES(5,3)=DIFW(5,3)*X(8)                                     NSO00890
      WAGES(3,3)=X(8)                                               NSO00900
      WAGES(8,3)=DIFUNS(8)*X(8)                                     NSO00910
      WAGES(10,3)=DIFUNS(10)*X(8)                                   NSO00920
      WAGES(11,3)=DIFUNS(11)*X(8)                                   NSO00930
      WAGES(12,3)=DIFUNS(12)*X(8)                                   NSO00940
C     DO 3323 I=1,4                                                 NSO00950
C     RATP(I)=DIFR(I)*X(8)                                          NSO00960
C     RATG(I)=DIFR(I)*X(8)                                          NSO00970
C3323  CONTINUE                                                     NSO00980
      DO 3324 I=5,7                                                 NSO00990
      RATG(I)=DIFR(I)*X(9)                                          NSO01000
      RATP(I)=DIFR(I)*X(9)                                          NSO01010
3324  CONTINUE                                                      NSO01020
      DO 3325 I=8,12                                                NSO01030
      RATP(I)=DIFR(I)*X(10)                                         NSO01040
      RATG(I)=DIFR(I)*X(10)                                         NSO01050
3325  CONTINUE                                                      NSO01060
C                                                                   NSO01070
C                                                                   NSO01080
   10 NNN=NNN+1                                                     NSO01090
      DO 103 I=1,12                                                 NSO01100
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      QG1(I)=Z(I,22)*((1+AG)**IT)                                        NSO01110
      QG2(I)=Z(I,23)*((1+AG)**IT)                                        NSO01120
      QG3(I)=Z(I,24)*((1+AG)**IT)                                        NSO01130
      XPD(I)=Z(I,25)*((1+AE)**IT)                                        NSO01140
      XE(I)=Z(I,26)*((1+AE)**IT)                                         NSO01150
      XINV(I)=Z(I,36)*((1+AI)**IT)                                       NSO01160
      XDST(I)=Z(I,39)*((1+AS)**IT)                                       NSO01170
  103 CONTINUE                                                           NSO01180
C                                                                        NSO01190
C                                                                        NSO01200
C                                                                        NSO01210
C HERE WE COMPUTE THE COST OF THE LABOR AGGREGATE                        NSO01220
C OF VALUE ADDED , FACTOR DEMANDS , AND INCOMES                          NSO01230
C BY FACTOR AND INCOME GROUP . ALL IN SUBROUTINE COSTS                   NSO01240
C                                                                        NSO01250
      CALL COSTS                                                         NSO01260
C                                                                        NSO01270
C                                                                        NSO01280
C SOLVE FOR PRICES                                                       NSO01290
C                                                                        NSO01300
C                                                                        NSO01310
      DO 200 I=1,M                                                       NSO01320
      F1(I)=HP(I)+HG(I)                                                  NSO01330
     1+(A(25,I)+A(26,I)+A(28,I))*BI(I)                                   NSO01340
  200 CONTINUE                                                           NSO01350
      DO  210  I=1,M                                                     NSO01360
      TERM=A(24,I)+A(29,I)+A(30,I)+A(32,I)                               NSO01370
      DO 210 J=1,N1                                                      NSO01380
      IF(I.EQ.J)GO TO 205                                                NSO01390
      AW(I,J)=-A(J,I)                                                    NSO01400
      GO TO 210                                                          NSO01410
  205 AW(I,J)=1-TERM-A(J,I)                                              NSO01420
  210 CONTINUE                                                           NSO01430
      CALL MATINV(AW,M)                                                  NSO01440
      CALL AMULB(AW,F1,B,M,N1,1)                                         NSO01450
C                                                                        NSO01460
C     DO 7690 I=1,12                                                     NSO01470
C     WRITE(6,7693)B(I)                                                  NSO01480
C7693  FORMAT(5X,'PRICES',/,2X,12(F10.6,5X))                             NSO01490
C7690  CONTINUE                                                          NSO01500
C                                                                        NSO01510
C                                                                        NSO01520
C ADD REMITTANCES (CI) TO GROSS INCOMES (YH)                             NSO01530
C AND COMPUTE NET EXPENDITURES .                                         NSO01540
C                                                                        NSO01550
C     WRITE(6,9534)                                                      NSO01560
9534  FORMAT(15X,'GROSS INCOME BY CLASS ')                               NSO01570
      DO  16  I=1,6                                                      NSO01580
      K=I+14                                                             NSO01590
9010  FORMAT(10X,F12.5,/)                                                NSO01600
      YH(I)=YH(I)+CI(I)*((1+AR)**IT)                                     NSO01610
C     WRITE(6,9010)YH(I)                                                 NSO01620
      YD(I)=(1-A(32,K)-A(31,K)-A(30,K))*YH(I)                            NSO01630
      AM34(I)=A(34,K)*YH(I)/YD(I)                                        NSO01640
      YET(I)=(1-AM34(I))*YD(I)                                           NSO01650
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      YINR=YH(I)/YET(I)                                                    NSO01660
      AM29(I)=A(29,K)*YINR                                                 NSO01670
      AM25(I)=A(25,K)*YINR                                                 NSO01680
      AM24(I)=A(24,K)*YINR                                                 NSO01690
      YE(I)=(1-AM29(I)-AM25(I)-AM24(I))*YET(I)                             NSO01700
   16 CONTINUE                                                             NSO01710
C                                                                          NSO01720
C     WRITE(6,7697)                                                        NSO01730
7697  FORMAT(15X,//,/,'THE VARIABLES YD,YET,YE ',/)                        NSO01740
C     DO 7698 I=1,6                                                        NSO01750
C7698  WRITE(6,7699)YD(I),YET(I),YE(I)                                     NSO01760
7699  FORMAT(15X,3(5X,F15.6))                                              NSO01770
C                                                                          NSO01780
C                                                                          NSO01790
C COMPUTE CONSUMPTION                                                      NSO01800
C                                                                          NSO01810
      DO  70  I=1,6                                                        NSO01820
      SHAT(I)=0.                                                           NSO01830
      DO  72  J=1,13                                                       NSO01840
      SHAT(I)=SHAT(I)+THE(J,I)*B(J)                                        NSO01850
 72   CONTINUE                                                             NSO01860
      DO  73  J=1,13                                                       NSO01870
      QH(J,I)=THE(J,I)+(YE(I)-SHAT(I))*ALP(J,I)/B(J)                       NSO01880
  73  CONTINUE                                                             NSO01890
  70  CONTINUE                                                             NSO01900
C                                                                          NSO01910
C     WRITE(6,7694)                                                        NSO01920
7694  FORMAT(15X,'CONSUMPTION BY SECTOR AND INC. GRP. ')                   NSO01930
C     DO 7695 J=1,13                                                       NSO01940
C7695  WRITE(6,7696)(QH(J,I),I=1,6)                                        NSO01950
7696  FORMAT(2X,6(5X,F15.6),/)                                             NSO01960
C                                                                          NSO01970
C                                                                          NSO01980
C THE FINAL DEMAND VECTOR                                                  NSO01990
C                                                                          NSO02000
      DO  250  I=1,M                                                       NSO02010
      SQ=0.                                                                NSO02020
      DO  999  J=1,6                                                       NSO02030
 999  SQ=SQ+QH(I,J)                                                        NSO02040
      F2(I)=SQ+QG1(I)+QG2(I)+QG3(I)+XPO(I)+XE(I)+XINV(I)+XDST(I)           NSO02050
  250 CONTINUE                                                             NSO02060
      DO 260 I=1,M                                                         NSO02070
      DO 260 J=1,N1                                                        NSO02080
      IF(I.EQ.J)GO TO 255                                                  NSO02090
      AW(I,J)=-A(I,J)                                                      NSO02100
      GO TO 260                                                            NSO02110
  255 AW(I,J)=1-A(I,J)                                                     NSO02120
  260 CONTINUE                                                             NSO02130
C                                                                          NSO02140
C                                                                          NSO02150
C                                                                          NSO02160
C                                                                          NSO02170
C THE EXCESS DEMAND FUNCTIONS THAT WILL ENTER THE                          NSO02180
C NON LINEAR ALGORITHM .                                                   NSO02190
C                                                                          NSO02200
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      CL1=0.0                                                          NSO02210
      CL2=0.0                                                          NSO02220
      CL3=0.0                                                          NSO02230
      DO 8001 I=1,5                                                    NSO02240
      CL1=CLP(I,1)+CLG(I,1)-((1+A1)**IT)*((SKILLM(I,1))/1E4)+CL1       NSO02250
      CL2=CLP(I,2)+CLG(I,2)-((1+A2)**IT)*((SKILLM(I,2))/1E4)+CL2       NSO02260
      CL3=CL3+CLP(I,3)+CLG(I,3)-((1+A3)**IT)*((SKILLM(I,3))/1E4)       NSO02270
8001  CONTINUE                                                         NSO02280
C                                                                      NSO02290
C                                                                      NSO02300
      F(1)=CL1                                                         NSO02310
      F(2)=CL2                                                         NSO02320
      F(3)=CLP(6,2)+CLG(6,2)+CLP(7,2)+CLG(7,2)+CLP(9,2)+CLG(9,2)       NSO02330
     1-((1+A2)**IT)*(SKILLM(6,2)+SKILLM(7,2)+SKILLM(9,2))/1E4          NSO02340
      F(4)=CLP(6,3)+CLG(6,3)+CLP(7,3)+CLG(7,3)+CLP(9,3)+CLG(9,3)       NSO02350
     1-((1+A3)**IT)*(SKILLM(6,3)+SKILLM(7,3)+SKILLM(9,3))/1E4          NSO02360
      F(5)=CLP(8,1)+CLG(8,1)+CLP(11,1)+CLG(11,1)                       NSO02370
     1-((1+A1)**IT)*(SKILLM(8,1)+SKILLM(11,1))/1E4                     NSO02380
      F(6)=CLP(8,2)+CLG(8,2)+CLP(11,2)+CLG(11,2)                       NSO02390
     2-((1+A2)**IT)*(SKILLM(8,2)+SKILLM(11,2))/1E4                     NSO02400
      F(7)=CLP(12,2)+CLG(12,2)+CLP(10,2)+CLG(10,2)                     NSO02410
     1-((1+A2)**IT)*(SKILLM(12,2)+SKILLM(10,2))/1E4                    NSO02420
C     F(8)=CLB(1)+CLB(2)+CLB(3)+CLB(4)+CLK(1)+CLK(2)                   NSO02430
C    1+CLK(3)+CLK(4)-(KAPIT(1)+KAPIT(2)+KAPIT(3)+KAPIT(4))             NSO02440
C    2*((1+.060)**IT-1)                                                NSO02450
      F(9)=CLB(5)+CLB(6)+CLB(7)-(KAPITG(6)+KAPITG(5)+KAPITG(7))        NSO02460
     1*((1+.1050)**IT-1)                                               NSO02470
      F(10)=CLB(8)+CLB(9)+CLB(10)+CLB(11)                              NSO02480
     1-(KAPITG(8)+KAPITG(9)+KAPITG(10)+KAPITG(11))                     NSO02490
     2*((1+.125)**IT-1)                                                NSO02500
      F(11)=CLT(1)+CLT(2)+CLT(3)+CLT(4)-445.55547*((1.015)**IT)        NSO02510
      F(8)=CL3+CLP(8,3)+CLG(8,3)+CLP(10,3)+CLG(10,3)+CLG(11,3)         NSO02520
     1+CLP(11,3)+CLP(12,3)+CLG(12,3)                                   NSO02530
     2-((1+A3)**IT)*(SKILLM(8,3)+SKILLM(10,3)+SKILLM(11,3)             NSO02540
     3+SKILLM(12,3))/1E4                                               NSO02550
C                                                                      NSO02560
C                                                                      NSO02570
C                                                                      NSO02580
C     THIS PART COMPUTES GOVERNMENT REVENUES AND EXPENDITURES .        NSO02590
C          WHERE : G1=GOVERNMENT AND PUBLIC SECTOR                     NSO02600
C                  G2=CONVENTIONAL                                     NSO02610
C                  G3=TRADE                                            NSO02620
C          USING : "E" FOR EXPENDITURE                                 NSO02630
C                  "R" FOR REVENUE                                     NSO02640
      GMSB=0.                                                          NSO02650
      A30BX=0.                                                         NSO02660
      A28BI=0.                                                         NSO02670
      A29BX=0.                                                         NSO02680
      A32BX=0.                                                         NSO02690
      Z24B=0.                                                          NSO02700
      A25BI=0.                                                         NSO02710
      A26BI=0.                                                         NSO02720
      TE(1)=0.                                                         NSO02730
      Z23B=0.                                                          NSO02740
      Z36B=0.                                                          NSO02750
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      DST=0.                                                                NSO02760
      DO  20  I=1,12                                                        NSO02770
      GMSB=GMSB+PROFG(I)                                                    NSO02780
      Z23B=Z23B+QG2(I)*B(I)                                                 NSO02790
      Z36B=Z36B+XINV(I)*B(I)                                                NSO02800
      DST=DST+XDST(I)*B(I)                                                  NSO02810
      TE(1)=TE(1)+QG1(I)*B(I)                                               NSO02820
      A30BX=A30BX+A(30,I)*B(I)*Q(I)                                         NSO02830
      A28BI=A28BI+A(28,I)*BI(I)*Q(I)                                        NSO02840
      A29BX=A29BX+A(29,I)*B(I)*Q(I)                                         NSO02850
      A32BX=A32BX+A(32,I)*B(I)*Q(I)                                         NSO02860
      Z24B=Z24B+QG3(I)*B(I)                                                 NSO02870
      A25BI=A25BI+A(25,I)*BI(I)*Q(I)                                        NSO02880
      A26BI=A26BI+A(26,I)*BI(I)*Q(I)                                        NSO02890
   20 CONTINUE                                                              NSO02900
      A31Y=0.                                                               NSO02910
      A30Y=0.                                                               NSO02920
      Q13B=0.                                                               NSO02930
      AY29=0.                                                               NSO02940
      A32Y=0.                                                               NSO02950
      AY25=0.                                                               NSO02960
      AY24=0.                                                               NSO02970
      SP=0.                                                                 NSO02980
      DO  30  J=1,6                                                         NSO02990
      K=J+14                                                                NSO03000
      A31Y=A31Y+A(31,K)*YH(J)                                               NSO03010
      A30Y=A30Y+A(30,K)*YH(J)                                               NSO03020
      Q13B=Q13B+QH(13,J)*BI(21)                                             NSO03030
      AY29=AY29+AM29(J)*YET(J)                                              NSO03040
      A32Y=A32Y+A(32,K)*YH(J)                                               NSO03050
      AY25=AY25+AM25(J)*YET(J)                                              NSO03060
      AY24=AY24+AM24(J)*YET(J)                                              NSO03070
      SP=SP+AM34(J)*YD(J)                                                   NSO03080
   30 CONTINUE                                                              NSO03090
C                                                                           NSO03100
C                                                                           NSO03110
C                                                                           NSO03120
C     THIS PART COMPUTES THE PRICE DIFFERENTIA IN THE EXPORT SECTOR         NSO03130
C                                                                           NSO03140
C                                                                           NSO03150
      PD=(17*(BE(1)-B(1))+2*(BE(2)-B(2))+100*(BE(3)-B(3))                   NSO03160
     1+49*(BE(9)-B(9)))*((1+AE)**IT)                                        NSO03170
      GR(1)=GMSB+A31Y                                                       NSO03180
      SSUB=A30BX+A30Y                                                       NSO03190
      TIND=A29BX+AY29                                                       NSO03200
      TE(2)=Z23B-0.284*SSUB                                                 NSO03210
      GR(2)=A28BI+                                                          NSO03220
     *  0.324*Q13B+0.2327*((1+AI)**IT)*Z(26,40)+TIND*0.957+A32BX+A32Y       NSO03230
      GEX=(17.*B(1)+2.*B(2)+100.*B(3)+49.*B(9))*((1+AE)**IT)                NSO03240
      TE(3)=Z24B+A25BI+AY25-0.716*SSUB+AY24-79.+GEX                         NSO03250
      GR(3)=   AY25+A(24,5)*BI(5)*Q(5)+GEX+0.043*TIND+AY24+A25BI+PD         NSO03260
      TE(4)=TE(1)+TE(2)+TE(3)                                               NSO03270
      GR(4)=GR(1)+GR(2)+GR(3)                                               NSO03280
      ZBET=0                                                                NSO03290
      DO 40 I=1,M                                                           NSO03300
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      ZBET=ZBET+XE(I)*B(I)                                                    NSO03310
   40 CONTINUE                                                                NSO03320
      PEXP=ZBET+((1+AR)**IT)*Z(21,26)*BE(21)+PD                               NSO03330
      PIMP=A25BI+AY25+A26BI+0.676*Q138+((1+AI)**IT)*Z(26,40)*BI(40)           NSO03340
C     THIS PART CALCULATE SVING-INVESTMENT                                    NSO03350
      TNET(1)=GR(1)-TE(1)                                                     NSO03360
      TNET(2)=GR(2)-TE(2)                                                     NSO03370
      TNET(3)=GR(3)-TE(3)                                                     NSO03380
      TNET(4)=GR(4)-TE(4)                                                     NSO03390
      SF=PIMP-PEXP                                                            NSO03400
      SSS=SP+SF+TNET(4)                                                       NSO03410
      PINV=    ((1+AI)**IT)*Z(26,36)*BI(36)*1.2327 +Z36B                      NSO03420
      PINVT=PINV+DST                                                          NSO03430
      BAL=(SSS-PINVT)/PINVT                                                   NSO03440
C     WRITE(1,*)BAL                                                           NSO03450
      Y(5)=PEXP                                                               NSO03460
      Y(6)=PIMP                                                               NSO03470
      Y(7)=SF                                                                 NSO03480
      Y(8)=PINV                                                               NSO03490
      Y(9)=DST                                                                NSO03500
      Y(10)=PINVT                                                             NSO03510
      Y(11)=SP                                                                NSO03520
      Y(12)=PD                                                                NSO03530
      Y(13)=TNET(4)                                                           NSO03540
      Y(14)=Y(13)+Y(11)                                                       NSO03550
      DO  88  I=5,14                                                          NSO03560
   88 CY(I)=(Y(I)-YO(I))*100/YO(I)                                            NSO03570
      IF(NNN.GT.8) GO TO 3                                                    NSO03580
      CALL MATINV(AW,M)                                                       NSO03590
      CALL AMULB(AW,F2,Q,M,N1,1)                                              NSO03600
      Q(13)=0.                                                                NSO03610
C     WRITE(6,9015)NNN                                                        NSO03620
C9015  FORMAT(5X ,'AT ITERATION',I4,'NEW OUTPUT IS ',/)                       NSO03630
      DO  77  I=1,12                                                          NSO03640
C     WRITE(6,9999)Q(I)                                                       NSO03650
9999  FORMAT(5X,F15.6,/)                                                      NSO03660
      Q(13)=Q(13)+Q(I)                                                        NSO03670
   77 CONTINUE                                                                NSO03680
      DO  44  I=1,13                                                          NSO03690
   44 D(I)=100*(Q(I)-QI(I))/QI(I)                                             NSO03700
      IF(BAL.LT.-0.1E-03.OR.BAL.GT.0.1E-03) GO TO 10                          NSO03710
C 3   CALL RITE                                                              NSO03720
C     WRITE(6,1212)                                                           NSO03730
1212  FORMAT(////,20X,'THE UNADJUSTED  EXCESS DEMAND VECTOR ')                NSO03740
C     WRITE(6,1111)(F(I),I=1,11)                                              NSO03750
1111  FORMAT(5X,E15.8)                                                        NSO03760
    3 RETURN                                                                  NSO03770
C     STOP                                                                    NSO03780
      END                                                                     NSO03790
      SUBROUTINE NSOIA(N,X,F,AJINV,DSTEP,DMAX,ACC,MAXFUN,IPRINT,W)            NSO03800
      REAL KAPIT,KAPITP,KAPITG                                                NSO03810
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13)       NSO03820
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),         NSO03830
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                         NSO03840
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13),       NSO03850
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     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)                NSO03860
     6,YO(14),SECT(14,13),SME(13,6)                                       NSO03870
      COMMON      YH(6),YO(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),      NSO03880
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),    NSO03890
     3XE(12),XINV(12),XDST(12),                                           NSO03900
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CLB(12),WAGE(12),RENT(12),     NSO03910
     7KAP(12)                                                             NSO03920
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),SHAT(6)         NSO03930
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                 NSO03940
      COMMON    TK(12),      TLAND(4),TL,LAB(12),TLAB1                    NSO03950
      DIMENSION      X(11),F(11),AUINV(11,11),W(300),L(30),M(30)         NSO03960
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)           NSO03970
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),       NSO03980
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)     NSO03990
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),            NSO04000
     4PAROLG(12,3),COELLG(12,3),PINC(12,6)                                NSO04010
C                                                                         NSO04020
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),                NSO04030
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),        NSO04040
     3VACAPG(12),CAPOT(12),KAPIT(12),KAPITP(12),KAPITG(12),               NSO04050
     4TVACAP(12),RATP(12),RATG(12)                                        NSO04060
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                    NSO04070
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)                NSO04080
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                  NSO04090
     9SHSKI(12,3),SHSKIG(12,3)                                            NSO04100
C                                                                         NSO04110
C     SET VARIOUS PARAMETERS                                              NSO04120
      MAXC=0                                                              NSO04130
      BLNEW=0                                                             NSO04140
C     'MAXC' COUNTS THE NUMBER OF CALLS OF CALFUN                         NSO04150
      NDIM =N                                                             NSO04160
C     'NDIM' DIMENSION OF AUINV IN DIMENSION STATEMENT.                   NSO04170
C            IT MUST BE GREATER THAN OR EQUAT TO N.                       NSO04180
      NT=N+4                                                              NSO04190
      NTEST=NT                                                            NSO04200
C     'NT' AND 'NTEST' CAUSE AND ERROR RETURN IF F(X) DOES                NSO04210
C     NOT DECREASE                                                        NSO04220
      DTEST=FLOAT(N+N)-0.5                                                NSO04230
C     'DTEST' IS USED TO MAINTAIN LINEAR INDEPENDENCE                     NSO04240
      NX=N*N                                                              NSO04250
      NF=NX+N                                                             NSO04260
      NW=NF+N                                                             NSO04270
      MW=NW+N                                                             NSO04280
      NDC=MW+N                                                            NSO04290
      ND=NDC+N                                                            NSO04300
C     THESE PARAMETERS SEPARATE THE WORKING SPACE                         NSO04310
C     ARRAY W                                                             NSO04320
      FMIN=0.                                                             NSO04330
C     USUALLY 'FMIN' IS THE LEAST CALCULATED VALUE OF F(X),               NSO04340
C     AND THE BEST X IS IN W(NX+1) TO W(NX+N)                             NSO04350
      DD=0.                                                               NSO04360
C     USUALLY DD IS THE SQUARE OF THE CURRENT STEP LENGTH                 NSO04370
      DSS=DSTEP*DSTEP                                                     NSO04380
      DM=DMAX*DMAX                                                        NSO04390
      DMM=4.*DM                                                           NSO04400
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```
      IS=5                                                              NSO04410
C     'IS' CONTROLS A 'GO TO' STATEMENT FOLLOWING A CALL OF             NSO04420
C     CALFUN                                                            NSO04430
      TINC=1.                                                           NSO04440
C     'TINC' IS USED IN THE CRITERION TO INCREASE THE STEP              NSO04450
C     LENGTH                                                            NSO04460
C     START A NEW PAGE FOR PRINTING                                     NSO04470
      IF(IPRINT)1,1,85                                                  NSO04480
   85 PRINT 86                                                          NSO04490
C     CALL THE SU8ROUTINE CALFUN                                        NSO04500
    1 MAXC=MAXC+1                                                       NSO04510
   86 FORMAT(1H1)                                                       NSO04520
      CALL       CALFUN(N,X,F)                                         NSO04530
C     TEST FOR CONVERGENCE                                              NSO04540
      FSQ=0.                                                            NSO04550
      DO 2 I=1,N                                                        NSO04560
      FSQ=FSQ+F(I)*F(I)                                                 NSO04570
    2 CONTINUE                                                          NSO04580
C     WRITE(1,1111)                                                     NSO04590
1111  FORMAT(5X,'IN NSOIA FSQ = ')                                      NSO04600
C     WRITE(1,*)FSQ                                                     NSO04610
      IF(FSQ-ACC)3,3,4                                                  NSO04620
C     PROVIDE PRINTING OF FINAL SOLUTION IF REQUESTED                   NSO04630
    3 IF(IPRINT+1)5,5,6                                                 NSO04640
    6 PRINT 7,MAXC                                                      NSO04650
    7 FORMAT(///5X,38HTHE FINAL SOLUTION CALCULATED BY NS01A            NSO04660
     19H REQUIRED,I5,24H CALLS OF CALFUN, AND IS)                       NSO04670
      PRINT 8,(I,X(I),F(I),I=1,N)                                       NSO04680
    8 FORMAT(//4X,1HI,7X,4HX(I),12X,4HF(I)//(I5,2E17.8))               NSO04690
      PRINT 9,FSQ                                                       NSO04700
    9 FORMAT (/5X,21HTHE SUM OF SQUARES IS,E17.8)                       NSO04710
      CALL CALFUN(N,X,F)                                                NSO04720
    5 RETURN                                                            NSO04730
C     TEST FOR ERROR RETURN BECAUSE F(X) DOES NOT DECREASE              NSO04740
    4 GO TO (10,11,11,10,11),IS                                         NSO04750
   10 IF(FSQ-FMIN)15,20,20                                              NSO04760
   20 IF(DD-DSS)12,12,11                                                NSO04770
   12 NTEST=NTEST-1                                                     NSO04780
      IF(NTEST)13,14,11                                                 NSO04790
   14 PRINT 16,NT                                                       NSO04800
   16 FORMAT (///5X,31HERROR RETURN FROM NSO1A BECAUSE,I5,              NSO04810
     1  48H CALLS OF CALFUN FAILED TO IMPROVE THE RESIDUALS)            NSO04820
   17 DO 18 I=1,N                                                       NSO04830
      X(I)=W(NX+I)                                                      NSO04840
      F(I)=W(NF+I)                                                      NSO04850
   18 CONTINUE                                                          NSO04860
      FSQ=FMIN                                                          NSO04870
      GO TO 3                                                           NSO04880
C     ERROR RETURN BECAUSE A NEW JACOBIAN IS UNSUCCESSFUL               NSO04890
   13 PRINT 19                                                          NSO04900
   19 FORMAT (///5X,36HERROR RETURN FROM NSO1A BECAUSE F(X),            NSO04910
     1  39HFAILED TO DECREASE USING A NEW JACOBIAN)                     NSO04920
      GO TO 17                                                          NSO04930
   15 NTEST=NT                                                          NSO04940
C     TEST WHETHER THERE HAVE BEEN MAXFUN CALLS OF                      NSO04950
```

```
C     CALFUN                                                          NSO04960
   11 IF(MAXFUN-MAXC)21,21,22                                         NSO04970
   21 PRINT 23,MAXC                                                   NSO04980
23    FORMAT(///5X,48H ERROR RETURN FROM NS01A BECAUSE THERE HAVE BEEN. NSO04990
     2  I5, 16H CALLS OF CALFUN      )                               NSO05000
      IF(FSQ-FMIN)3,17,17                                             NSO05010
C     PROVIDE PRINTING IF REQUESTED                                   NSO05020
   22 IF(IPRINT)24,24,25                                              NSO05030
   25 PRINT 26,MAXC                                                   NSO05040
   26 FORMAT (///5X,6HAT THE,I5,26H TH CALL OF CALFUN WE HAVE)        NSO05050
      PRINT 8,(I,X(I),F(I),I=1,N)                                     NSO05060
      PRINT 9,FSQ                                                     NSO05070
   24 GO TO (27,28,29,87,30),IS                                       NSO05080
C     STORE THE RESULT OF THE INITIAL CALL OF CALFUN                  NSO05090
   30 FMIN=FSQ                                                        NSO05100
      WRITE(1,1112)                                                   NSO05110
1112  FORMAT(5X,'AT FSMIN=FSQ ')                                      NSO05120
      DO 31 I=1,N                                                     NSO05130
      W(NX+I)=X(I)                                                    NSO05140
      W(NF+I)=F(I)                                                    NSO05150
   31 CONTINUE                                                        NSO05160
C     CALCULATE A NEW JACOBIAN APPROXIMATION                          NSO05170
   32 IC=0                                                            NSO05180
      IS=3                                                            NSO05190
   33 IC=IC+1                                                         NSO05200
      X(IC)=X(IC)+DSTEP                                               NSO05210
      GO TO 1                                                         NSO05220
   29 K=IC                                                            NSO05230
      DO 34 I=1,N                                                     NSO05240
      W(K)=(F(I)-W(NF+I))/DSTEP                                       NSO05250
      K=K+N                                                           NSO05260
   34 CONTINUE                                                        NSO05270
      X(IC)=W(NX+IC)                                                  NSO05280
      IF(IC-N)33,35,35                                                NSO05290
C     CALCULATE THE INVERSE OF THE JACOBIAN AND SET THE               NSO05300
C     DIRECTION MATRIX                                                NSO05310
   35 K=0                                                             NSO05320
      DO 36 I=1,N                                                     NSO05330
      DO 37 J=1,N                                                     NSO05340
      K=K+1                                                           NSO05350
      AJINV(I,J)=W(K)                                                 NSO05360
      W(ND+K)=0.                                                      NSO05370
   37 CONTINUE                                                        NSO05380
      W(NOC+K+I)=1.                                                   NSO05390
      W(NOC+I)=1.+FLOAT(N-I)                                          NSO05400
   36 CONTINUE                                                        NSO05410
      WRITE(6,900)                                                    NSO05420
      DO 800 I=1,N                                                    NSO05430
      WRITE(6,901) (AJINV(I,J),J=1,N)                                 NSO05440
800   CONTINUE                                                        NSO05450
      CALL MINV(AJINV,N,D,L,M,NDIM)                                   NSO05460
      WRITE(6,902)                                                    NSO05470
      DO 801 I=1,N                                                    NSO05480
      WRITE(6,901) (AJINV(I,J),J=1,N)                                 NSO05490
801   CONTINUE                                                        NSO05500
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900   FORMAT(1H0,8HJACOBIAN)                                          NS005510
901   FORMAT(1H ,10G12.4)                                             NS005520
902   FORMAT(1H0,16HJACOBIAN INVERSE )                                NS005530
      IF(IPRINT+1.EQ.1) PRINT 1000,D                                  NS005540
1000  FORMAT(1H0,27H  DETERMINANT OF AJINV IS      , E15.5)           NS005550
C     START ITERATION BY PREDICTING THE DESCENT AND                   NS005560
C     NEWTON MINIMA                                                   NS005570
   38 DS=0.                                                           NS005580
      DN=0.                                                           NS005590
      SP=0.                                                           NS005600
      DO 39 I=1,N                                                     NS005610
      X(I)=0.                                                         NS005620
      F(I)=0.                                                         NS005630
      K=I                                                             NS005640
      DO 40 J=1,N                                                     NS005650
      X(I)=X(I)-W(K)*W(NF+J)                                          NS005660
      F(I)=F(I)-AJINV(I,J)*W(NF+J)                                    NS005670
      K=K+N                                                           NS005680
   40 CONTINUE                                                        NS005690
      DS=DS+X(I)*X(I)                                                 NS005700
      DN=DN+F(I)*F(I)                                                 NS005710
      SP=SP+X(I)*F(I)                                                 NS005720
   39 CONTINUE                                                        NS005730
C     TEST WHETHER A NEARBY STATIONARY POINT IS                       NS005740
C     PREDICTED                                                       NS005750
      IF(FMIN*FMIN-DMM*DS)41,41,42                                    NS005760
C     IF SO THEN RETURN OR REVISE JACOBIAN                            NS005770
   42 GO TO (43,43,44),IS                                             NS005780
   44 PRINT 45                                                        NS005790
   45 FORMAT (///5X,33HERROR RETURN FROM NS01A BECAUSE A,             NS005800
     1   44HNEARBY STATIONARY POINT OF F(X) IS PREDICTED)             NS005810
      GO TO 17                                                        NS005820
   43 NTEST=0                                                         NS005830
      DO 46 I=1,N                                                     NS005840
      X(I)=W(NX+I)                                                    NS005850
   46 CONTINUE                                                        NS005860
      GO TO 32                                                        NS005870
C     TEST WHETHER TO APPLY THE FULL NEWTON CORRECTION                NS005880
   41 IS=2                                                            NS005890
      BLNEW=BLNEW+1                                                   NS005900
      IF(DN-DD)47,47,48                                               NS005910
   47 DD=AMAX1(DN,DSS)                                                NS005920
      DS=0.25*DN                                                      NS005930
      TINC=1.                                                         NS005940
      IF(DN-DSS    )49,58,58                                          NS005950
   49 IS=4                                                            NS005960
      GO TO 80                                                        NS005970
C     CALCULATE THE LENGTH OF THE STEEPEST DESCENT STEP               NS005980
   48 K=0                                                             NS005990
      DMULT=0.                                                        NS006000
      DO 51 I=1,N                                                     NS006010
      DW=0.                                                           NS006020
      DO 52 J=1,N                                                     NS006030
      K=K+1                                                           NS006040
      DW=DW+W(K)*X(J)                                                 NS006050
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   52 CONTINUE                                                          NSO06060
      DMULT=DMULT+DW*DW                                                 NSO06070
   51 CONTINUE                                                          NSO06080
C     WRITE(1,1114)DMULT                                                NSO06090
1114  FORMAT(5X,'DMULT = ',F20.10)                                      NSO06100
      DMULT=DS/DMULT                                                    NSO06110
      DS=DS*DMULT*DMULT                                                 NSO06120
C     TEST WHETHER TO USE THE STEEPEST DESCENT DIRECTION                NSO06130
      IF(DS-DD)53,54,54                                                 NSO06140
C     TEST WHETHER THE INITIAL VALUE OF DD HAS BEEN SET                 NSO06150
   54 IF(DD)55,55,56                                                    NSO06160
   55 DD=AMAX1(DSS,AMIN1(DM,DS))                                        NSO06170
      DS=DS/(DMULT*DMULT)                                               NSO06180
      GO TO 41                                                          NSO06190
C     SET THE MULTIPLIER OF THE STEEPEST DESCENT DIRECTION              NSO06200
   56 ANMULT=0.                                                         NSO06210
      DMULT=DMULT*SQRT(DD/DS)                                           NSO06220
      GO TO 98                                                          NSO06230
C     INTERPOLATE BETWEEN THE STEEPEST DESCENT AND THE                  NSO06240
C     NEWTON DIRECTIONS                                                 NSO06250
   53 SP=SP*DMULT                                                       NSO06260
      ANMULT=(DD-DS)/((SP-DS)+SQRT((SP-DD)**2+(DN-DD)                   NSO06270
     1*(DD-DS)))                                                        NSO06280
      DMULT=DMULT*(1.-ANMULT)                                           NSO06290
C     CALCULATE THE CHANGE IN X AND ITS ANGLE WITH THE                  NSO06300
C     FIRST DIRECTION                                                   NSO06310
   98 DN=0.                                                             NSO06320
      SP=0.                                                             NSO06330
      DO 57 I=1,N                                                       NSO06340
      F(I)=DMULT*X(I)+ANMULT*F(I)                                       NSO06350
      DN=DN+F(I)*F(I)                                                   NSO06360
      SP=SP+F(I)*W(ND+I)                                                NSO06370
   57 CONTINUE                                                          NSO06380
      DS=0.25*DN                                                        NSO06390
C     TEST WHETHER AN EXTRA STEP IS NEEDED FOR                          NSO06400
C     INDEPENDENCE                                                      NSO06410
      IF(W(NDC+1)-DTEST)58,58,59                                        NSO06420
   59 IF(SP*SP-DS)60,58,58                                              NSO06430
C     TAKE THE EXTRA STEP AND UPDATE THE DIRECTION MATRIX               NSO06440
   50 IS=2                                                              NSO06450
   60 DO 61 I=1,N                                                       NSO06460
      X(I)=W(NX+I)+DSTEP*W(ND+I)                                        NSO06470
      W(NDC+I)=W(NDC+I+1)+1.                                            NSO06480
   61 CONTINUE                                                          NSO06490
      W(ND)=1.                                                          NSO06500
      DO 62 I=1,N                                                       NSO06510
      K=ND+I                                                            NSO06520
      SP=W(K)                                                           NSO06530
      DO 63 J=2,N                                                       NSO06540
      W(K)=W(K+N)                                                       NSO06550
      K=K+N                                                             NSO06560
   63 CONTINUE                                                          NSO06570
      W(K)=SP                                                           NSO06580
   62 CONTINUE                                                          NSO06590
      GO TO 1                                                           NSO06600
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C     EXPRESS THE NEW DIRECTION IN TERMS OF THOSE OF THE                NSO06610
C     DIRECTION MATRIX, AND UPDATE THE COUNTS IN W(NDC+1)               NSO06620
C     ETC.                                                              NSO06630
   58 SP=0.                                                             NSO06640
      K=ND                                                              NSO06650
      DO 64 I=1,N                                                       NSO06660
      X(I)=DW                                                           NSO06670
      DW=0.                                                             NSO06680
      DO 65 J=1,N                                                       NSO06690
      K=K+1                                                             NSO06700
      DW=DW+F(J)*W(K)                                                   NSO06710
   65 CONTINUE                                                          NSO06720
      GO TO (68,66),IS                                                  NSO06730
   66 W(NDC+I)=W(NDC+I)+1.                                              NSO06740
      SP=SP+DW*DW                                                       NSO06750
      IF(SP-DS)64,64,67                                                 NSO06760
   67 IS=1                                                              NSO06770
      KK=I                                                              NSO06780
      X(1)=DW                                                           NSO06790
      GO TO 69                                                          NSO06800
   68 X(I)=DW                                                           NSO06810
   69 W(NDC+I)=W(NDC+I+1)+1.                                            NSO06820
   64 CONTINUE                                                          NSO06830
      W(ND)=1.                                                          NSO06840
C     REORDER THE DIRECTIONS SO THAT KK IS FIRST                        NSO06850
      IF(KK-1)70,70,71                                                  NSO06860
   71 KS=NDC+KK*N                                                       NSO06870
      DO 72 I=1,N                                                       NSO06880
      K=KS+I                                                            NSO06890
      SP=W(K)                                                           NSO06900
      DO 73 J=2,KK                                                      NSO06910
      W(K)=W(K-N)                                                       NSO06920
      K=K-N                                                             NSO06930
   73 CONTINUE                                                          NSO06940
      W(K)=SP                                                           NSO06950
   72 CONTINUE                                                          NSO06960
C     GENERATE THE NEW ORTHOGONAL DIRECTION MATRIX                      NSO06970
   70 CONTINUE                                                          NSO06980
      DO 74 I=1,N                                                       NSO06990
      W(NW+I)=0.                                                        NSO07000
   74 CONTINUE                                                          NSO07010
      SP=X(1)*X(1)                                                      NSO07020
      K=ND                                                              NSO07030
      DO 75 I=2,N                                                       NSO07040
      DS=SQRT(SP*(SP+X(I)*X(I)))                                        NSO07050
      DW=SP/DS                                                          NSO07060
      DS=X(I)/DS                                                        NSO07070
      SP=SP+X(I)*X(I)                                                   NSO07080
      DO 76 J=1,N                                                       NSO07090
      K=K+1                                                             NSO07100
      W(NW+J)=W(NW+J)+X(I-1)*W(K)                                       NSO07110
      W(K)=DW*W(K+N)-DS*W(NW+J)                                         NSO07120
   76 CONTINUE                                                          NSO07130
   75 CONTINUE                                                          NSO07140
      SP=1./SQRT(DN)                                                    NSO07150
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      DO 77 I=1,N                                                    NSO07160
      K=K+1                                                          NSO07170
      W(K)=SP*F(I)                                                   NSO07180
   77 CONTINUE                                                       NSO07190
C     CALCULATE THE NEXT VECTOR X, AND PREDICT THE RIGHT             NSO07200
C     HAND SIDES                                                     NSO07210
   80 FNP=0.                                                         NSO07220
      K=0                                                            NSO07230
      DO 78 I=1,N                                                    NSO07240
      X(I)=W(NX+I)+F(I)                                              NSO07250
      W(NW+I)=W(NF+I)                                                NSO07260
      DO 79 J=1,N                                                    NSO07270
      K=K+1                                                          NSO07280
      W(NW+I)=W(NW+I)+W(K)*F(J)                                      NSO07290
   79 CONTINUE                                                       NSO07300
      FNP=FNP+W(NW+I)**2                                             NSO07310
   78 CONTINUE                                                       NSO07320
C     CALL CALFUN USING THE NEW VECTOR OF VARIABLES                  NSO07330
      GO TO 1                                                        NSO07340
C     UPDATE THE STEP SIZE                                           NSO07350
   27 DMULT=0.9*FMIN+0.1*FNP-FSQ                                     NSO07360
      IF(DMULT)82,81,81                                              NSO07370
   82 DD=AMAX1(DSS,0.25*DD)                                          NSO07380
      TINC=1.                                                        NSO07390
      IF(FSQ-FMIN)83,28,28                                           NSO07400
C     TRY THE TEST TO DECIDE WHETHER TO INCREASE THE STEP            NSO07410
C     LENGTH                                                         NSO07420
   81 SP=0.                                                          NSO07430
      SS=0.                                                          NSO07440
      DO 84 I=1,N                                                    NSO07450
      SP=SP+ABS(F(I)*(F(I)-W(NW+I)))                                 NSO07460
      SS=SS+(F(I)-W(NW+I))**2                                        NSO07470
   84 CONTINUE                                                       NSO07480
      PJ=1.+DMULT/(SP+SQRT(SP*SP+DMULT*SS))                          NSO07490
      SP=AMIN1(4.,TINC,PJ)                                           NSO07500
      TINC=PJ/SP                                                     NSO07510
      DD=AMIN1(DM,SP*DD)                                             NSO07520
      GO TO 83                                                       NSO07530
C     IF F(X) IMPROVES STORE THE NEW VALUE OF X                      NSO07540
   87 IF(FSQ-FMIN)83,50,50                                           NSO07550
   83 FMIN=FSQ                                                       NSO07560
      DO 88 I=1,N                                                    NSO07570
      SP=X(I)                                                        NSO07580
      X(I)=W(NX+I)                                                   NSO07590
      W(NX+I)=SP                                                     NSO07600
      SP=F(I)                                                        NSO07610
      F(I)=W(NF+I)                                                   NSO07620
      W(NF+I)=SP                                                     NSO07630
      W(NW+I)=-W(NW+I)                                               NSO07640
   88 CONTINUE                                                       NSO07650
      IF(IS-1)28,28,50                                               NSO07660
C     CALCULATE THE CHANGES IN F AND IN X                            NSO07670
   28 DO 89 I=1,N                                                    NSO07680
      X(I)=X(I)-W(NX+I)                                              NSO07690
      F(I)=F(I)-W(NF+I)                                              NSO07700
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   89 CONTINUE                                                          NSO07710
C     UPDATE THE APPROXIMATIONS TO J AND TO AJINV                       NSO07720
      K=0                                                               NSO07730
      DO 90 I=1,N                                                       NSO07740
      W(MW+I)=X(I)                                                      NSO07750
      W(NW+I)=F(I)                                                      NSO07760
      DO 91 J=1,N                                                       NSO07770
      W(MW+I)=W(MW+I)-AJINV(I,J)*F(J)                                   NSO07780
      K=K+1                                                             NSO07790
      W(NW+I)=W(NW+I)-W(K)*X(J)                                         NSO07800
   91 CONTINUE                                                          NSO07810
   90 CONTINUE                                                          NSO07820
      SP=0.                                                             NSO07830
      SS=0.                                                             NSO07840
      DO 92 I=1,N                                                       NSO07850
      DS=0.                                                             NSO07860
      DO 93 J=1,N                                                       NSO07870
      DS=DS+AJINV(J,I)*X(J)                                             NSO07880
   93 CONTINUE                                                          NSO07890
      SP=SP+DS*F(I)                                                     NSO07900
      SS=SS+X(I)*X(I)                                                   NSO07910
      F(I)=DS                                                           NSO07920
   92 CONTINUE                                                          NSO07930
      DMULT=1.                                                          NSO07940
      IF(ABS(SP)-0.1*SS)94,95,95                                        NSO07950
   94 DMULT=0.8                                                         NSO07960
   95 PJ=DMULT/SS                                                       NSO07970
      PA=DMULT/(DMULT*SP+(1.-DMULT)*SS)                                 NSO07980
      K=0                                                               NSO07990
      DO 96 I=1,N                                                       NSO08000
      SP=PJ*W(NW+I)                                                     NSO08010
      SS=PA*W(MW+I)                                                     NSO08020
      DO 97 J=1,N                                                       NSO08030
      K=K+1                                                             NSO08040
      W(K)=W(K)+SP*X(J)                                                 NSO08050
      AJINV(I,J)=AJINV(I,J)+SS*F(J)                                     NSO08060
   97 CONTINUE                                                          NSO08070
   96 CONTINUE                                                          NSO08080
      GO TO 38                                                          NSO08090
      END                                                               NSO08100
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      SUBROUTINE  RITE                                                      REE00010
      REAL LAB                                                              REE00020
      REAL KAP,KAPG                                                         REE00030
      IMPLICIT REAL*8 (A-H)                                                 REE00040
      IMPLICIT REAL*8 (P-Z)                                                 REE00050
      REAL KAPIT,KAPITP,KAPITG                                              REE00060
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13)     REE00070
     2,THE(13,8),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),       REE00080
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                       REE00090
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SS8L(6,13),SBK(13),     REE00100
     5SSPL(6,13),SSPK(6.13),QI(13),SECN(13,13),GNAME(4,13)                  REE00110
     6,YD(14),SECT(14,13),SME(13,6)                                         REE00120
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),         REE00130
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),      REE00140
     3XE(12),XINV(12),XDST(12),                                             REE00150
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CLB(12),WAGE(12),RENT(12)        REE00160
     7,KAP(12)                                                              REE00170
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),       SHAT(6)    REE00180
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                   REE00190
      COMMON   TK(12),     TLAND(4),TL,LAB(12),TLAB1                        REE00200
      DIMENSION  SMET(6)                                                    REE00210
C                                                                           REE00220
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)             REE00230
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),         REE00240
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)       REE00250
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),              REE00260
     4PAROLG(12,3),COELLG(12,3),PINC(12,6)                                  REE00270
C                                                                           REE00280
C                                                                           REE00290
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),                  REE00300
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),          REE00310
     3VACAPG(12),CAPOT(12),KAPIT(12),KAPITP(12),KAPITG(12),                 REE00320
     4TVACAP(12),RATP(12),RATG(12)                                          REE00330
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                      REE00340
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)                  REE00350
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                    REE00360
     9SHSKI(12,3),SHSKIG(12,3)                                              REE00370
C                                                                           REE00380
      DIMENSION DIFF(13,6)                                                  REE00390
C-----CALL MINI-PLOT SUBS WITH INITIALIZING                                 REE00400
C-----ROUTINE 'INIT'                                                        REE00410
      CALL GRAPH                                                            REE00420
C-----FIRST PAGE OF RESULTS                                                 REE00430
      CALL NUPAGE                                                           REE00440
      CALL SKIP(2)                                                          REE00450
      CALLLINEA                                                             REE00460
      CALL LINE(100)                                                        REE00470
      WRITE(6,10)                                                           REE00480
10    FORMAT(50X,'THE NEW COMMODITY PRICES ARE:')                           REE00490
      CALL SKIP(2)                                                          REE00500
      CALL LINE(100)                                                        REE00510
      DO 40 I=1,12                                                          REE00520
40    WRITE(6,50)(SECN(I,J),J=1,13),B(I)                                    REE00530
50    FORMAT(1X,13A2,2X,F12.6)                                              REE00540
      CALL LINE(100)                                                        REE00550
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C-----SECOND PAGE OF RESULTS                                            REE00560
      CALL NUPAGE                                                       REE00570
      CALL SKIP(3)                                                      REE00580
      WRITE(6,200)                                                      REE00590
200   FORMAT(50X,'LABOUR DEMAND BY SECTOR AND SKILL')                   REE00600
      CALL SKIP(2)                                                      REE00610
      CALL LINE(130)                                                    REE00620
      WRITE(6,210)                                                      REE00630
210   FORMAT(35X,'PRIVATE SECTOR',46X,'GOVERNMENT SECTOR')              REE00640
      CALL SKIP(1)                                                      REE00650
      CALL LINE(130)                                                    REE00660
      WRITE(6,220)                                                      REE00670
220   FORMAT(15X,'SKILLED',12X,'SEMISKILLED',13X,'UNSKILLED'            REE00680
     1,9X,SKILLED',4X,'SEMISKILLED',10X,'UNSKILLED')                    REE00690
      CALL LINE(130)                                                    REE00700
      CALL SKIP(2)                                                      REE00710
      DO 240 I=1,12                                                     REE00720
240   WRITE(6,250)(SECN(I,J),J=1,13),(CLP(I,J),J=1,3),(CLG(I,J),J=1,3)  REE00730
250   FORMAT(1X,13A2,6(F15.5,5X),//)                                    REE00740
      CALL LINE(130)                                                    REE00750
C-----THIRD PAGE OF RESULTS                                             REE00760
      CALL NUPAGE                                                       REE00770
      CALL SKIP(2)                                                      REE00780
      CALL LINE(120)                                                    REE00790
      WRITE(6,300)                                                      REE00800
300   FORMAT(24X,'YH',13X,'YD',13X,'YET',12X,'YE',28X,'SHAT')           REE00810
      CALL LINE(120)                                                    REE00820
      CALL SKIP(1)                                                      REE00830
      DO 310 I=1,6                                                      REE00840
310    WRITE(6,320)I,YH(I),YD(I),YET(I),YE(I),SHAT(I)                   REE00850
320    FORMAT(10X,I5,5X,4(F10.5,5X),18X,F10.5,/)                        REE00860
      CALL SKIP(1)                                                      REE00870
      CALL LINE(120)                                                    REE00880
      CALL SKIP(2)                                                      REE00890
C-----CALCULATE PERCENTAGE DIFFERENCE BETWEEN QH(FINAL)-QH(INITIAL)     REE00900
      DO 335 J=1,6                                                      REE00910
      K=J+14                                                            REE00920
      DO 335 I=1,12                                                     REE00930
      IF(Z(I,K).EQ.0)Z(I,K)=.1                                          REE00940
335   DIFF(I,J)=(QH(I,J)-Z(I,K))*(100/Z(I,K))                           REE00950
      DO 336 J=1,6                                                      REE00960
      K=J+14                                                            REE00970
336   DIFF(13,J)=(QH(13,J)-Z(26,K))*(100/Z(26,K))                       REE00980
C-----END CALCULATION                                                   REE00990
      WRITE(6,330)                                                      REE01000
330   FORMAT(50X,'HOUSEHOLD CONSUMPTION BY CLASSES')                    REE01010
      CALL SKIP(2)                                                      REE01020
      CALL LINE(130)                                                    REE01030
      DO 340 J=1,13                                                     REE01040
340   WRITE(6,350)J,QH(J,1),DIFF(J,1),QH(J,2),DIFF(J,2),QH(J,3),        REE01050
     1 DIFF(J,3),QH(J,4),DIFF(J,4),QH(J,5),DIFF(J,5),QH(J,6),DIFF(J,6)  REE01060
350   FORMAT(2X,I5,3X,12(F10.3),/)                                      REE01070
      CALL LINE(130)                                                    REE01080
C-----FOURTH PAGE OF RESULTS                                            REE01090
      CALL NUPAGE                                                       REE01100
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      CALL SKIP(2)                                                      REE01110
      WRITE(6,400)                                                      REE01120
400   FORMAT(50X,'OTHER IMPORTANT VARIABLES')                           REE01130
      CALL SKIP(1)                                                      REE01140
      CALL LINE(130)                                                    REE01150
      CALL SKIP(1)                                                      REE01160
      WRITE(6,410)                                                      REE01170
410   FORMAT(55X,'FINAL',5X,'INITIAL',3X,'CHANGE',/)                    REE01180
      CALL LINE(130)                                                    REE01190
      CALL SKIP(1)                                                      REE01200
      DO 420 I=5,14                                                     REE01210
420   WRITE(6,430)(SECT(I,J),J=1,9),Y(I),YO(I),CY(I)                    REE01220
430   FORMAT(24X,9A2,8X,3(F11.4),/)                                     REE01230
      CALL LINE(130)                                                    REE01240
      CALL SKIP(2)                                                      REE01250
      WRITE(6,440)                                                      REE01260
440   FORMAT(50X,'GOVERNMENT SECTOR')                                   REE01270
      CALL SKIP(1)                                                      REE01280
      CALL LINE(130)                                                    REE01290
      CALL SKIP(1)                                                      REE01300
      WRITE(6,450)                                                      REE01310
450   FORMAT(50X,'EXPENDITURE',5X,'REVENUE',6X,'NET',/)                 REE01320
      CALL SKIP(1)                                                      REE01330
      CALL LINE(130)                                                    REE01340
      CALL SKIP(1)                                                      REE01350
      DO 460 I=1,4                                                      REE01360
460   WRITE(6,470)(GNAME(I,J),J=1,10),TE(I),GR(I),TNET(I)               REE01370
470   FORMAT(24X,10A2,4X,3(F11.4),/)                                    REE01380
      CALL LINE(130)                                                    REE01390
      RETURN                                                            REE01400
      END                                                               REE01410
      SUBROUTINE MINV(A,N,D,L,M,N1)                                     REE01420
C  MINV FINDS THE INVERSE OF A MATRIX                                   REE01430
C     N1 IS THE ORDER OF ORIGINAL MATRIX IN MAIN                        REE01440
      DIMENSION A(900),L(30),M(30)                                      REE01450
      D = 1.0                                                           REE01460
      NK = -N1                                                          REE01470
      DO 80 K=1,N                                                       REE01480
      NK = NK + N1                                                      REE01490
      L(K) = K                                                          REE01500
      M(K) = K                                                          REE01510
      KK   = NK + K                                                     REE01520
      BIGA = A(KK)                                                      REE01530
      DO 20 J=K,N                                                       REE01540
      IZ = N1 * (J-1)                                                   REE01550
      DO 20 I=K,N                                                       REE01560
      IJ = IZ + I                                                       REE01570
      IF(ABS(BIGA).GE.ABS(A(IJ))) GO TO 20                              REE01580
      BIGA = A(IJ)                                                      REE01590
      L(K) = I                                                          REE01600
      M(K) = J                                                          REE01610
   20 CONTINUE                                                          REE01620
      J = L(K)                                                          REE01630
      IF(J.LE.K) GO TO 35                                               REE01640
      KI = K - N1                                                       REE01650
```

```
      DO 30 I = 1,N                                                    REE01660
      KI = KI + N1                                                     REE01670
      HOLD = -A(KI)                                                    REE01680
      JI = KI - K + J                                                  REE01690
      A(KI) = A(JI)                                                    REE01700
   30 A(JI) = HOLD                                                     REE01710
C                                                                      REE01720
   35 I = M(K)                                                         REE01730
      IF(I.LE.K) GO TO 45                                              REE01740
      JP = N1 *(I-1)                                                   REE01750
      DO 40 J=1,N                                                      REE01760
      JK = NK + J                                                      REE01770
      JI = JP + J                                                      REE01780
      HOLD = -A(JK)                                                    REE01790
      A(JK) = A(JI)                                                    REE01800
   40 A(JI) = HOLD                                                     REE01810
   45 IF(ABS(BIGA).GE.1.0E-10) GO TO 48                                REE01820
      D = 0.0                                                          REE01830
      RETURN                                                           REE01840
   48 DO 55 I=1,N                                                      REE01850
      IF(I.EQ.K) GO TO 55                                              REE01860
      IK = NK + I                                                      REE01870
      A(IK) =-A(IK)/BIGA                                               REE01880
   55 CONTINUE                                                         REE01890
C                                                                      REE01900
      DO 65 I=1,N                                                      REE01910
      IK = NK + I                                                      REE01920
      HOLD = A(IK)                                                     REE01930
      IJ = I - N1                                                      REE01940
      DO 65 J=1,N                                                      REE01950
      IJ = IJ + N1                                                     REE01960
      IF(I.EQ.K.OR.J.EQ.K) GO TO 65                                    REE01970
      KJ = IJ - I + K                                                  REE01980
      A(IJ) = HOLD * A(KJ) + A(IJ)                                     REE01990
   65 CONTINUE                                                         REE02000
      KJ = K - N1                                                      REE02010
      DO 75 J=1,N                                                      REE02020
      KJ = KJ + N1                                                     REE02030
      IF(J.EQ.K) GO TO 75                                              REE02040
      A(KJ) = A(KJ) / BIGA                                             REE02050
   75 CONTINUE                                                         REE02060
      D = D * BIGA                                                     REE02070
      A(KK) = 1.0 / BIGA                                               REE02080
   80 CONTINUE                                                         REE02090
C                                                                      REE02100
      K = N                                                            REE02110
  100 K = K - 1                                                        REE02120
      IF(K.LE.0) GO TO 150                                             REE02130
      I = L(K)                                                         REE02140
      IF(I.LE.K) GO TO 120                                             REE02150
      JQ = N1 * (K - 1)                                                REE02160
      JR = N1 * (I - 1)                                                REE02170
      DO 110 J=1,N                                                     REE02180
      JK = JQ + J                                                      REE02190
      HOLD = A(JK)                                                     REE02200
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      JI = JR + J                                                       REE02210
      A(JK) = -A(JI)                                                    REE02220
  110 A(JI) = HOLD                                                      REE02230
  120 J=M(K)                                                            REE02240
      IF(J.LE.K) GO TO 100                                              REE02250
      KI = K - N1                                                       REE02260
      DO 130 I=1,N                                                      REE02270
      KI = KI + N1                                                      REE02280
      HOLD = A(KI)                                                      REE02290
      JI = KI - K + J                                                   REE02300
      A(KI) = -A(JI)                                                    REE02310
  130 A(JI) = HOLD                                                      REE02320
      GO TO 100                                                         REE02330
  150 RETURN                                                            REE02340
      END                                                               REE02350
      SUBROUTINE SORT(YP,NUM,INDEX)                                     REE02360
C  SORTS IN ASCENDING ORDER VECTOR YP, WHICH IS OF LENGTH NUM.          REE02370
C  RETURNS IN INDEX THE INDEX OF YP IN THE NEW ORDER.                   REE02380
      DIMENSION YP(NUM),INDEX(NUM)                                      REE02390
      INDEX(1) = 1                                                      REE02400
      NUM1 = NUM-1                                                      REE02410
      DO 100 J=1,NUM1                                                   REE02420
      NEW = NUM                                                         REE02430
100   INDEX(J+1) = INDEX(J) + 1                                         REE02440
      DO 101 J=1,NUM1                                                   REE02450
      NEW = NEW - 1                                                     REE02460
      DO 101 I=1,NEW                                                    REE02470
      IF(YP(I+1).LT.YP(I)) GO TO 110                                    REE02480
      GO TO 111                                                         REE02490
110   DUM = YP(I+1)                                                     REE02500
      DUI = INDEX(I+1)                                                  REE02510
      YP(I+1) = YP(I)                                                   REE02520
      INDEX(I+1) = INDEX(I)                                             REE02530
      YP(I) = DUM                                                       REE02540
      INDEX(I) = DUI                                                    REE02550
111   CONTINUE                                                          REE02560
101   CONTINUE                                                          REE02570
      RETURN                                                            REE02580
      END                                                               REE02590
      SUBROUTINE  REED                                                  REE02600
      REAL KAP,KAPG                                                     REE02610
      REAL LAB                                                          REE02620
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13) REE02630
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),   REE02640
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                   REE02650
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13), REE02660
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)              REE02670
     6,YO(14),SECT(14,13),SME(13,6)                                     REE02680
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),     REE02690
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),  REE02700
     3XE(12),XINV(12),XDST(12),                                         REE02710
     4 CLP(12),CLK(12),CLT(12),CLG(12),CLB(12),WAGE(12),RENT(12),KAP(12)REE02720
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),       SHAT(6)REE02730
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)               REE02740
      COMMON   TK(12),     TLAND(4),TL,LAB(12),TLAB1                    REE02750
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      DIMENSION  SMET(6)                                                REE02760
      READ(5,104)(Z21(I),I=1,12)                                        REE02770
C*     WRITE(6,101)(Z21(I),I=1,12)                                      REE02780
      READ(5,104)(Z22(I),I=1,12)                                        REE02790
C*     WRITE(6,101)(Z22(I),I=1,12)                                      REE02800
      READ(5,103)(SPL(I),I=1,13)                                        REE02810
C*     WRITE(6,101)(SPL(I),I=1,13)                                      REE02820
      READ(5,103)(SPK(I),I=1,13)                                        REE02830
C*     WRITE(6,101)(SPK(I),I=1,13)                                      REE02840
      READ(5,103)(SPR(I),I=1,13)                                        REE02850
C*     WRITE(6,101)(SPR(I),I=1,13)                                      REE02860
      READ(5,103)(SBL(I),I=1,13)                                        REE02870
C*     WRITE(6,101)(SBL(I),I=1,13)                                      REE02880
      READ(5,103)(SBK(I),I=1,13)                                        REE02890
C*     WRITE(6,101)(SBK(I),I=1,13)                                      REE02900
      BE21=1                                                            REE02910
      Z26=310                                                           REE02920
      DO  10  I=1,6                                                     REE02930
      READ(5,103)(SSPL(I,J),J=1,13)                                     REE02940
C*     WRITE(6,101)(SSPL(I,J),J=1,13)                                   REE02950
   10 CONTINUE                                                          REE02960
      DO  20  I=1,6                                                     REE02970
      READ(5,103)(SSPK(I,J),J=1,13)                                     REE02980
C*     WRITE(6,101)(SSPK(I,J),J=1,13)                                   REE02990
   20 CONTINUE                                                          REE03000
      DO  30  I=1,6                                                     REE03010
      READ(5,103)(SSPR(I,J),J=1,13)                                     REE03020
C*     WRITE(6,101)(SSPR(I,J),J=1,13)                                   REE03030
   30 CONTINUE                                                          REE03040
      DO  40  I=1,6                                                     REE03050
      READ(5,103)(SSBL(I,J),J=1,13)                                     REE03060
C*     WRITE(6,101)(SSBL(I,J),J=1,13)                                   REE03070
   40 CONTINUE                                                          REE03080
      DO  50  I=1,12                                                    REE03090
      GM(I)=Z22(I)/SBK(I)                                               REE03100
      HM(I)=Z21(I)+Z22(I)-GM(I)                                         REE03110
   50 CONTINUE                                                          REE03120
C*     WRITE(6,101)(GM(I),I=1,12)                                       REE03130
C*     WRITE(6,101)(HM(I),I=1,12)                                       REE03140
      DO  70  J=1,6                                                     REE03150
      TOT=0                                                             REE03160
      DO  60  I=1,12                                                    REE03170
      TE1=SPL(I)*SSPL(J,I)                                              REE03180
      TE2=SPK(I)*SSPK(J,I)                                              REE03190
      TE3=SPR(I)*SSPR(J,I)                                              REE03200
      TE4=SBL(I)*SSBL(J,I)                                              REE03210
      TOT=TOT+HM(I)*(TE1+TE2+TE3)+GM(I)*TE4                             REE03220
   60 CONTINUE                                                          REE03230
      YC(J)=TOT+BE21*Z26*SSPL(J,13)                                     REE03240
   70 CONTINUE                                                          REE03250
C*     WRITE(6,102)(YC(J),J=1,6)                                        REE03260
      DO  80  I=1,6                                                     REE03270
      CI(I)=310.*SSPL(I,13)                                             REE03280
      DO  80  J=1,12                                                    REE03290
      T1=SSPL(I,J)*HM(J)*SPL(J)                                         REE03300
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      T2=SSPK(I,J)*HM(J)*SPK(J)                                        REE03310
      T3=SSPR(I,J)*HM(J)*SPR(J)                                        REE03320
      T4=SSBL(I,J)*GM(J)*SBL(J)                                        REE03330
      C(I,J)=T1+T2+T3+T4                                               REE03340
   80 CONTINUE                                                         REE03350
      DO  90  I=1,6                                                    REE03360
   90  S2(I)=0.                                                        REE03370
      DO  95  J=1,12                                                   REE03380
   95 S1(J)=0.                                                         REE03390
      DO  100  I=1,6                                                   REE03400
      S2(I)=S2(I)+CI(I)                                                REE03410
      DO  100  J=1,12                                                  REE03420
      S2(I)=S2(I)+C(I,J)                                               REE03430
      S1(J)=S1(J)+C(I,J)                                               REE03440
  100 CONTINUE                                                         REE03450
      S3=0.                                                            REE03460
      DO  108  I=1,6                                                   REE03470
  106 S3=S3+CI(I)                                                      REE03480
C*     DO  110  I=1,6                                                  REE03490
C*110  WRITE(6,105)(C(I,J),J=1,12),CI(I),S2(I)                         REE03500
C*     WRITE(6,106)(S1(I),I=1,12),S3                                   REE03510
      DO  79    J=1,6                                                  REE03520
   79 READ(5,303)(SME(I,J),I=1,13)                                     REE03530
      DO  751   J=1,6                                                  REE03540
      SMET(J)=0.                                                       REE03550
      DO  752   I=1,13                                                 REE03560
      SMET(J)=SMET(J)+SME(I,J)                                         REE03570
  752 CONTINUE                                                         REE03580
  751 CONTINUE                                                         REE03590
      DO  753  J=1,6                                                   REE03600
      DO  754  I=1,13                                                  REE03610
      ALP(I,J)=SME(I,J)/SMET(J)                                        REE03620
  754 CONTINUE                                                         REE03630
  753 CONTINUE                                                         REE03640
      READ(5,509)(QI(I),I=1,13)                                        REE03650
      READ(5,555)(YO(I),I=1,14)                                        REE03660
      DO   9   I=1,13                                                  REE03670
   9  READ(5,4)(SECN(I,J),J=1,13)                                      REE03680
      DO  33  I=1,14                                                   REE03690
   33 READ(5,4)(SECT(I,J),J=1,13)                                      REE03700
      DO  97  I=1,4                                                    REE03710
   97 READ(5,4)(GNAME(I,J),J=1,13)                                     REE03720
      DO 1 I=1,40                                                      REE03730
    1 READ(5,555)(Z(I,J),J=1,40)                                       REE03740
C-----SUBROUTINE ZDATA INCORPORATES THE NEW VARIABLES FOR               REE03750
C-----THE Z MATRIX                                                     REE03760
C**    CALL ZDATA(Z)                                                   REE03770
      READ(5,555)(ZT(I),I=1,40)                                        REE03780
C*     WRITE(6 ,520)                                                   REE03790
C*     DO 151 I=1,40                                                   REE03800
C* 151 WRITE(6 ,504)(Z(I,J),J=1,40)                                    REE03810
C*    WRITE(6 ,521)                                                    REE03820
C*    WRITE(6 ,504)(ZT(I),I=1,40)                                      REE03830
      DO 150 I=1,40                                                    REE03840
      IF(ZT(I).EQ.0.)ZT(I)=0.1                                         REE03850
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  150 CONTINUE                                                          REE03860
      DO 63 I=1,40                                                      REE03870
      DO 63 J=1,40                                                      REE03880
      A(I,J)=Z(I,J)/ZT(J)                                               REE03890
   63 CONTINUE                                                          REE03900
C*     WRITE(6 ,503)                                                   REE03910
C*     DO 305 I=1,40                                                   REE03920
C*305 WRITE(6 ,504)(A(I,J),J=1,40)                                     REE03930
      M=12                                                              REE03940
      N1=12                                                             REE03950
      DO 260 I=1,M                                                      REE03960
      DO 260 J=1,N1                                                     REE03970
      IF(I.EQ.J)GO TO 255                                               REE03980
      AW(I,J)=-A(I,J)                                                   REE03990
      GO TO 260                                                         REE04000
  255 AW(I,J)=1-A(I,J)                                                  REE04010
  260 CONTINUE                                                          REE04020
C*     WRITE(6,335)                                                    REE04030
C*     DO  26  I=1,12                                                  REE04040
C* 26  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=1,6)                  REE04050
C*     DO   52  I=1,12                                                 REE04060
C*52  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=7,12)                  REE04070
      CALL  MATINV(AW,M)                                                REE04080
C*     WRITE(6,337)                                                    REE04090
C*     DO  42  I=1,12                                                  REE04100
C*42  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=1,6)                  REE04110
C*     DO  43   I=1,12                                                 REE04120
C* 43  WRITE(6,336)(SECN(I,K),K=1,13),(AW(I,J),J=7,12)                  REE04130
  335 FORMAT(20X,'(1-A(I,J)) MATRIX',///)                               REE04140
  336 FORMAT(2X,13A2,6(F8.6,3X)//)                                      REE04150
  337 FORMAT(20X,'INVERSE  MATRIX',///)                                 REE04160
      DO  21  J=1,6                                                     REE04170
      K=J+14                                                            REE04180
      TEXR(J)=Z(13,K)+Z(26,K)                                           REE04190
      DSHAT(J)=TEXR(J)*0.5                                              REE04200
   21 CONTINUE                                                          REE04210
      DO  22  J=1,6                                                     REE04220
      K=J+14                                                            REE04230
      DO  23  I=1,12                                                    REE04240
      QH(I,J)=Z(I,K)                                                    REE04250
      QH(13,J)=Z(26,K)                                                  REE04260
   23 CONTINUE                                                          REE04270
   22 CONTINUE                                                          REE04280
      DO  24  J=1,6                                                     REE04290
      DO  45  I=1,13                                                    REE04300
      THE(I,J)=QH(I,J)-ALP(I,J)*DSHAT(J)                                REE04310
   45 CONTINUE                                                          REE04320
   24 CONTINUE                                                          REE04330
C*     DO  49  J=1,6                                                   REE04340
C*     WRITE(6,602)J                                                   REE04350
C*     WRITE(6,603)( ALP(I,J),I=1,13)                                  REE04360
C*     WRITE(6,603)( THE(I,J),I=1,13)                                  REE04370
C*     WRITE(6,603)(QH(I,J),I=1,13)                                    REE04380
C* 49  CONTINUE                                                        REE04390
  602 FORMAT(///,10X,'CLASS',I5)                                        REE04400
```

```
 603  FORMAT(/,5X,13(F8.4,1X))                                    REE04410
  504 FORMAT(///,4(5X,10(F11.5,1X),/))                            REE04420
  503 FORMAT(20X,'MATRIX A(40,40)',/)                             REE04430
  520 FORMAT(///,20X,'SOCIAL ACCOUNTING MATREX',//)               REE04440
  555 FORMAT(7F11.5)                                              REE04450
  303 FORMAT(2X,13(F6.4))                                         REE04460
 509  FORMAT(7F11.5)                                              REE04470
   4   FORMAT(13A2)                                              REE04480
  101 FORMAT(/,5X,13(F8.3,1X))                                    REE04490
  102 FORMAT(//,10X,6(E12.5,4X))                                  REE04500
 103  FORMAT(13F6.3)                                              REE04510
 104  FORMAT(12F6.1)                                              REE04520
  105 FORMAT(/,2X,14(F8.3,1X))                                    REE04530
  106 FORMAT(//,2X,13(F8.3,1X))                                   REE04540
 521  FORMAT(///,20X,'TOTAL  GROSS PRODUCTION',//)                REE04550
      RETURN                                                      REE04560
      END                                                         REE04570
      SUBROUTINE AMULB(A,B,C,I,J,K)                               REE04580
      DIMENSION A(I,J),B(J,K),C(I,K)                              REE04590
      DO 3 L=1,I                                                  REE04600
      DO 3 M=1,K                                                  REE04610
      C(L,M)=0.0                                                  REE04620
      DO 3 N=1,J                                                  REE04630
    3 C(L,M)=C(L,M)+A(L,N)*B(N,M)                                 REE04640
      RETURN                                                      REE04650
      END                                                         REE04660
C     MATRIX INVERSE ROUTINE                                      REE04670
      SUBROUTINE MATINV(A,N)                                      REE04680
      DIMENSION A(N,N)                                            REE04690
      DO 1 I=1,N                                                  REE04700
      X=A(I,I)                                                    REE04710
      A(I,I)=1.0                                                  REE04720
      DO 2 J=1,N                                                  REE04730
    2 A(I,J)=A(I,J)/X                                             REE04740
      DO 1  K=1,N                                                 REE04750
      IF(K-I)3,1,3                                                REE04760
    3 X=A(K,I)                                                    REE04770
      A(K,I)=0.0                                                  REE04780
      DO 4 J=1,N                                                  REE04790
    4 A(K,J)=A(K,J)-X*A(I,J)                                      REE04800
    1 CONTINUE                                                    REE04810
      RETURN                                                      REE04820
      END                                                         REE04830
```

```
      SUBROUTINE COSTS                                                      COS00010
      REAL KAPIT,KAPITP,KAPITG                                              COS00020
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13)     COS00030
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),       COS00040
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                       COS00050
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13),     COS00060
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)                  COS00070
     6,YO(14),SECT(14,13),SME(13,6)                                         COS00080
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),         COS00090
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),      COS00100
     3XE(12),XINV(12),XDST(12),                                             COS00110
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CLB(12),WAGE(12),RENT(12)        COS00120
     7,KAP(12)                                                              COS00130
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),       SHAT(6)    COS00140
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)                   COS00150
      COMMON   TK(12),     TLAND(4),TL,LAB(12),TLAB1                        COS00160
      DIMENSION  SMET(6)                                                    COS00170
C                                                                           COS00180
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)             COS00190
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),         COS00200
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)       COS00210
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),              COS00220
     4PAROLG(12,3),COELLG(12,3),PINC(12,6)                                  COS00230
C                                                                           COS00240
C                                                                           COS00250
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),                  COS00260
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),          COS00270
     3VACAPG(12),CAPOT(12),KAPIT(12),KAPITP(12),KAPITG(12),                 COS00280
     4TVACAP(12),RATP(12),RATG(12)                                          COS00290
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                      COS00300
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)                  COS00310
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                    COS00320
     9SHSKI(12,3),SHSKIG(12,3)                                              COS00330
C                                                                           COS00340
C                                                                           COS00350
      COMMON/PROP/PROPP(3,3,12),PROPG(3,3,12)                               COS00360
      DIMENSION TEMP(12,6)                                                  COS00370
      DIMENSION DEDE(3,3,12)                                                COS00380
C-------------------------------------------------------------------------COS00390
C                                                                           COS00400
C                                                                           COS00410
C UNIT COST OF LABOR AGGREGATE .                                            COS00420
C                                                                           COS00430
      DO 20 I=1,12                                                          COS00440
      WAALP(I)=(COELLP(I,1)*(WAGES(I,1)**(1-SIGMAP(I)))+COELLP(I,2)         COS00450
     1*(WAGES(I,2)**(1-SIGMAP(I)))+COELLP(I,3)*(WAGES(I,3)**                COS00460
     2(1-SIGMAP(I))))**(1/(1-SIGMAP(I)))                                    COS00470
      WAALG(I)=(COELLG(I,1)*(WAGES(I,1)**(1-SIGMAG(I)))+COELLG(I,2)         COS00480
     1*(WAGES(I,2)**(1-SIGMAG(I)))+COELLG(I,3)*(WAGES(I,3)**                COS00490
     2(1-SIGMAG(I))))**(1/(1-SIGMAP(I)))                                    COS00500
20    CONTINUE                                                              COS00510
C                                                                           COS00520
C                                                                           COS00530
C                                                                           COS00540
C UNIT 'COST' OF VALUE ADDED : HPU, HPG                                     COS00550
```

```
C                                                                       COS00560
C     WRITE(6,8111)NNN                                                  COS00570
8111  FORMAT(15X,////,'AT ITER',2X,I3,2X,'UNIT LABOR COST IS ',/)       COS00580
      DO 172 I=1,12                                                     COS00590
      IF(I.GT.4)GOTO 8001                                               COS00600
      HPU(I)=(COEFLP(I)*(WAALP(I)**(1-ELSCP(I)))+COEFKP(I)*(RATP(I)     COS00610
     1**(1-ELSCP(I)))+COEFTP(I)*(RENT(I)**(1-ELSCP(I))))**(1/(1-ELSCP(I)COS00620
     2))                                                                COS00630
      GOTO 8002                                                         COS00640
8001  HPU(I)=(COEFLP(I)*(WAALP(I)**(1-ELSCP(I)))+COEFKP(I)*(RATP(I)     COS00650
     1**(1-ELSCP(I))))**(1/(1-ELSCP(I)))                                COS00660
8002  CONTINUE                                                          COS00670
      HGU(I)=(COEFLG(I)*(WAALG(I)**(1-ELSCG(I)))+COEFKG(I)*(RATG(I)     COS00680
     1**(1-ELSCG(I))))**(1/(1-ELSCG(I)))                                COS00690
C                                                                       COS00700
C                                                                       COS00710
C                                                                       COS00720
C VALUE ADDED COST PER UNIT OF OUTPUT                                   COS00730
C                                                                       COS00740
      HP(I)=CH(I)*HPU(I)                                                COS00750
      HG(I)=CG(I)*HGU(I)                                                COS00760
      HM(I)=HP(I)*Q(I)                                                  COS00770
      GM(I)=HG(I)*Q(I)                                                  COS00780
172   CONTINUE                                                          COS00790
C                                                                       COS00800
C                                                                       COS00810
C                                                                       COS00820
C FACTOR DEMANDS AND PAYMENTS                                           COS00830
C                                                                       COS00840
C.....DEMAND FOR THE LABOR AGGREGATE  BY SECTOR  (GOV AND PRIVA)        COS00850
C                                                                       COS00860
      DO 13 I=1,12                                                      COS00870
      AGLABP(I)=COEFLP(I)*((HPU(I)/WAALP(I))**(ELSCP(I)))*CH(I)*Q(I)    COS00880
      AGLABG(I)=COEFLG(I)*((HGU(I)/WAALG(I))**(ELSCG(I)))*CG(I)*Q(I)    COS00890
13    CONTINUE                                                          COS00900
C                                                                       COS00910
C                                                                       COS00920
C .....LABOR DEMAND BY SKILL , SECTOR AND GOV/PVT CLASS                 COS00930
C                                                                       COS00940
      DO 14 I=1,12                                                      COS00950
      DO 15 J=1,3                                                       COS00960
      CLP(I,J)=COELLP(I,J)*((WAALP(I)/WAGES(I,J))**SIGMAP(I))*AGLABP(I) COS00970
      CLG(I,J)=COELLG(I,J)*((WAALG(I)/WAGES(I,J))**SIGMAG(I))*AGLABG(I) COS00980
15    CONTINUE                                                          COS00990
C.....CAPITAL AND LAND DEMAND                                           COS01000
      CLK(I)=COEFKP(I)*((HPU(I)/RATP(I))**(ELSCP(I)))*CH(I)*Q(I)        COS01010
      CLB(I)=COEFKG(I)*((HGU(I)/RATG(I))**(ELSCG(I)))*CG(I)*Q(I)        COS01020
      CLT(I)=COEFTP(I)*((HPU(I)/RENT(I))**(ELSCP(I)))*CH(I)*Q(I)        COS01030
14    CONTINUE                                                          COS01040
C     WRITE(5,8112)NNN                                                  COS01050
8112  FORMAT(5X,'DEMAND FOR FACTORS LAB , KAP, LAND ','ITER',I3,/)      COS01060
C     DO 8114 I=1,12                                                    COS01070
C     WRITE(6,8113)(CLP(I,J),J=1,3),(CLG(I,J),J=1,3)                    COS01080
8113  FORMAT(5X,6(5X,F15.6))                                            COS01090
C8114  CONTINUE                                                         COS01100
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C     DO 8117 I=1,12                                                    COS01110
C     WRITE(6,8009)CLK(I),CLB(I),CLT(I)                                 COS01120
8009  FORMAT(/////,5X,3(5X,F15.6))                                      COS01130
C8117  CONTINUE                                                         COS01140
C                                                                       COS01150
C                                                                       COS01160
C                                                                       COS01170
C CAPITAL AND LAND INCOMES                                              COS01180
C                                                                       COS01190
      DO 16 I=1,12                                                      COS01200
      PROFP(I)=CLK(I)*RATP(I)                                           COS01210
      PROFG(I)=CLB(I)*RATG(I)                                           COS01220
      LNDRNT(I)=CLT(I)*RENT(I)                                          COS01230
16    CONTINUE                                                          COS01240
C                                                                       COS01250
C                                                                       COS01260
C                                                                       COS01270
C EARNINGS BY SKILL AND SECTOR                                          COS01280
C                                                                       COS01290
      DO 1 I=1,12                                                       COS01300
      DO 2 J=1,3                                                        COS01310
      PAROLP(I,J)=WAGES(I,J)*CLP(I,J)                                   COS01320
      PAROLG(I,J)=WAGES(I,J)*CLG(I,J)                                   COS01330
2     CONTINUE                                                          COS01340
1     CONTINUE                                                          COS01350
C                                                                       COS01360
C                                                                       COS01370
C GENERATING THE MAPPING FROM SKILL EARNINGS                            COS01380
C TO INCME GROUP EARNINGS .                                             COS01390
C                                                                       COS01400
C                                                                       COS01410
C     DO 4490 I=1,12                                                    COS01420
C     WRITE(14,4491)I                                                   COS01430
4491  FORMAT(15X,'DATA FOR SECTOR : ',I3,2X,'PAROLP,PARALG,PROPP')      COS01440
C     WRITE(14,4494)(PAROLP(I,K),K=1,3)                                 COS01450
C     WRITE(14,4494)(PAROLG(I,K),K=1,3)                                 COS01460
4494  FORMAT(5X,3(F15.6,5X),///)                                        COS01470
C     DO 4492 N=1,3                                                     COS01480
C4492C WRITE(14,4493)(PROPP(N,M,I),M=1,3)                               COS01490
4493  FORMAT(5X,3(F15.6,5X))                                            COS01500
C4490  CONTINUE                                                         COS01510
C                                                                       COS01520
C                                                                       COS01530
C                                                                       COS01540
C.....DISTRIBUTE EARNINGS BY SKILL AMONG INCOME GROUPS                  COS01550
C                                                                       COS01560
C.........................THE RURAL SECTOR                              COS01570
C                                                                       COS01580
      DO 3 I=1,4                                                        COS01590
      DO 4 J=4,6                                                        COS01600
      TEMP(I,J)=0.0                                                     COS01610
      M=J-3                                                             COS01620
      DO 5 K =1,3                                                       COS01630
      TEMP(I,J)=PAROLP(I,K)*PROPP(K,M,I)+PAROLG(I,K)*PROPG(K,M,I)       COS01640
     1+TEMP(I,J)                                                        COS01650
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```
5     CONTINUE                                                          COS01660
      PINC(I,J)=TEMP(I,J)                                               COS01670
4     CONTINUE                                                          COS01680
C     WRITE(6,4990)I                                                    COS01690
C4990  FORMAT(15X,'ERNINGS  MAPPED INTO INCOME GROUPS SECTOR :',I3,/)   COS01700
C     WRITE(6,4991)(PINC(I,J),J=4,6)                                    COS01710
4991  FORMAT(15X,3(5X,F15.6),/)                                         COS01720
3     CONTINUE                                                          COS01730
C                                                                       COS01740
C.....................THE URBAN SECTOR                                  COS01750
C                                                                       COS01760
      DO 6 I=5,12                                                       COS01770
      DO 7 J=1,3                                                        COS01780
      TEMP(I,J)=0                                                       COS01790
      DO 8 K=1,3                                                        COS01800
      TEMP(I,J)=PAROLP(I,K)*PROPP(K,J,I)+PAROLG(I,K)*PROPG(K,J,I)       COS01810
     1+TEMP(I,J)                                                        COS01820
8     CONTINUE                                                          COS01830
      PINC(I,J)=TEMP(I,J)                                               COS01840
7     CONTINUE                                                          COS01850
6     CONTINUE                                                          COS01860
C                                                                       COS01870
C                                                                       COS01880
C                                                                       COS01890
C TOTAL INCOME ( FROM CAPITAL , LABOR AND LAND ) BY INCOME GROUP        COS01900
C AND SECTOR .                                                          COS01910
C                                                                       COS01920
      DO 9 I=1,12                                                       COS01930
      DO 10 J=1,6                                                       COS01940
      XINC(I,J)=PINC(I,J)+PROFP(I)*SSPK(J,I)+LNDRNT(I)*SSPR(J,I)        COS01950
10    CONTINUE                                                          COS01960
9     CONTINUE                                                          COS01970
C                                                                       COS01980
C                                                                       COS01990
C INCOMES BY INCOME GROUPS                                              COS02000
      DO 11 J=1,6                                                       COS02010
      YH(J)=0.0                                                         COS02020
      DO 12 I=1,12                                                      COS02030
      YH(J)=XINC(I,J)+YH(J)                                             COS02040
12    CONTINUE                                                          COS02050
11    CONTINUE                                                          COS02060
      RETURN                                                            COS02070
      END                                                               COS02080
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      SUBROUTINE PARAMS                                                 PAR00010
C-----------------------------------------------------------------------PAR00020
C---PROGRAM NAME:DIST(RIBUTION) FORTRAN   14/6/79   T.B-G               PAR00030
C---THIS PROGRAM CALCULATES THE SHARES OF EACH INCOME GROUP             PAR00040
C---IN EARNINGS BY SKILL.                                               PAR00050
C--- IT READS DATA FROM THE FOLLOWING UNITS:                            PAR00060
C---                                                                    PAR00070
C---         UNIT 5:SAMEG DATA                                          PAR00080
C---         UNIT 7:SKILL DATA                                          PAR00090
C---THE REED SUBROUTINE IS TAKEN FROM THE GEM2 FORTRAN PROGRAM          PAR00100
C-----------------------------------------------------------------------PAR00110
      REAL KAPIT,KAPITP,KAPITG                                          PAR00120
      COMMON Z(40,40),A(40,40),B(40),BI(40),BE(40),        ZT(40),Q(13) PAR00130
     2,THE(13,6),DSHAT(6),TEXR(6),QH(13,6),ALP(13,6),Z21(12),Z22(12),   PAR00140
     3C(6,12),CI(6),S1(12),S2(6),GM(12),HM(12),YC(6),                   PAR00150
     4SBL(13),   SPL(13),SPK(13),SPR(13),SSPR(6,13),SSBL(6,13),SBK(13). PAR00160
     5SSPL(6,13),SSPK(6,13),QI(13),SECN(13,13),GNAME(4,13)              PAR00170
     6,YO(14),SECT(14,13),SME(13,6)                                     PAR00180
      COMMON     YH(6),YD(6),YET(6),YE(6), AM34(6),AM29(6),AM25(6),     PAR00190
     2AM24(6),AW(12,12),F1(12),F2(12),QG1(12),QG2(12),QG3(12),XPD(12),  PAR00200
     3XE(12),XINV(12),XDST(12),                                         PAR00210
     4 CLP(12,3),CLK(12),CLT(12),CLG(12,3),CLB(12),WAGE(12),RENT(12)    PAR00220
     7,KAP(12)                                                          PAR00230
     5,KAPG(12),WAGG(12),CY(14),TE(4),GR(4),TNET(4),Y(14),      SHAT(6)PAR00240
     6,CH(12),CG(12),HP(12),HG(12), D(13),HMR(12),GMR(12)               PAR00250
      COMMON   TK(12), TLAND(4),TL,LAB(12),TLAB1,WBASE(12,3),RBASE(12)  PAR00260
     1,FLOUZ(12,3),BSSHR(3),ZALL                                        PAR00270
      DIMENSION  SMET(6)                                                PAR00280
C                                                                       PAR00290
      COMMON /COST/ WAALP(12),COELLP(12,3),SIGMAP(12),WAALG(12)         PAR00300
     1,SIGMAG(12),HPU(12),HGU(12),COEFLP(12),COEFLG(12),COEFKP(12),     PAR00310
     2COEFKG(12),COEFTP(12),ELSCP(12),ELSCG(12),AGLABP(12),AGLABG(12)   PAR00320
     3,PROFP(12),PROFG(12),LNDRNT(12),XINC(12,6),PAROLP(12,3),          PAR00330
     4PAROLG(12,3),COELLG(12,3),PINC(12,6),DIFUNS(12)                   PAR00340
C                                                                       PAR00350
C                                                                       PAR00360
      COMMON/COEF/ ZVAL(12),ZVAP(12),ZVAG(12),ZVAPG(12,6),              PAR00370
     1ZVAGG(12,6), ZVALT(12,6),SK1(12),SK2(12),SK3(12),VACAPP(12),      PAR00380
     3VACAPG(12),CAPOT(12),KAPIT(12),KAPITP(12),KAPITG(12),             PAR00390
     4TVACAP(12),RATP(12),RATG(12)                                      PAR00400
     6,SKIP(12,3),SKILLP(12,3),SKILLG(12,3),SKIG(12,3)                  PAR00410
     7,WAGES(12,3),EARNP(12),EARNG(12),ZVAPT(12),ZVAGT(12)              PAR00420
     8,DISCR1(12),DISCR2(12),DISCR3(12),                                PAR00430
     9SHSKI(12,3),SHSKIG(12,3),DIFW(12,3),DIFR(12),SKILLM(12,3)         PAR00440
C                                                                       PAR00450
C                                                                       PAR00460
      DIMENSION SKILL1(7),SKILL2(7),SKILL3(7),EMPL(12,3),FLOUZO(12)     PAR00470
      DIMENSION  TLAVA(12),TLAVAT(4),PROPOP(12),FLOUZY(3),FRIC(12,3)    PAR00480
     1,GAP(12),XNEED(12)                                                PAR00490
C                                                                       PAR00500
C                                                                       PAR00510
C                                                                       PAR00520
C                                                                       PAR00530
C SET THE TIME PERIOD (IT) AND THE                                      PAR00540
C PRODUCTIVITY GROWTH RATE ( PRODUC) .                                  PAR00550
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      IT=10                                                          PAR00560
      PRODUC=0.020                                                   PAR00570
C                                                                    PAR00580
C                                                                    PAR00590
C----READING THE DATA IN THE PROGRAM                                 PAR00600
C DATA IS ENTERED AS J=1:SKILLED, 2=SEMISKILLED , 3=UNSKILLED        PAR00610
C WAGES ARE ENTERED AS ABOVE , SAME FOR GOV LABOR                    PAR00620
C                                                                    PAR00630
C WE ARE ALSO REDING IN THE DATA FOR THE ELASTICITIES                PAR00640
C OF SUBSTITUTION FOR BOTH CES FUNCTIONS                             PAR00650
C       THE PRODUCTION C.E.S HAS ELSCP AND ELSCG                     PAR00660
C       THE LABOR C.E.S HAS SIGMAP AND SIGMAG                        PAR00670
      DO 2994 J=1,3                                                  PAR00680
      READ(12,2995)(SKILLM(I,J),I=1,12)                              PAR00690
2995  FORMAT(F12.4)                                                  PAR00700
2994  CONTINUE                                                       PAR00710
      DO 2000 J=1,3                                                  PAR00720
2000  READ(12,1)(WAGES(I,J),I=1,12)                                  PAR00730
1     FORMAT(F12.4)                                                  PAR00740
      WRITE(6,2993)                                                  PAR00750
2993  FORMAT(10X,'THE BASE PERIOD EMPLOYMENT MATRIX ')               PAR00760
      DO 1010 I=1,12                                                 PAR00770
      DO 1011 J=1,3                                                  PAR00780
      WAGES(I,J)=WAGES(I,J)/100.                                     PAR00790
      WBASE(I,J)=WAGES(I,J)                                          PAR00800
1011  CONTINUE                                                       PAR00810
1010  CONTINUE                                                       PAR00820
C     DO 2997 I=1,12                                                 PAR00830
C2997  WRITE(6,2998)(SKILLM(I,J),J=1,3)                              PAR00640
2998  FORMAT(3(5X,F12.4))                                            PAR00850
      ZALL=0.0                                                       PAR00860
      DO 3001 I=1,12                                                 PAR00870
      TLAVA(I)=HM(I)*SPL(I)+GM(I)*SBL(I)                             PAR00880
      PROPOP(I)=HM(I)*SPL(I)/TLAVA(I)                                PAR00890
      ZALL=HM(I)+GM(I)+ZALL                                          PAR00900
C     WRITE(6,3002)TLAVA(I),PROPOP(I)                                PAR00910
3002  FORMAT(5X,'**',2(5X,F15.5),/)                                  PAR00920
3001  CONTINUE                                                       PAR00930
C                                                                    PAR00940
C                                                                    PAR00950
C                                                                    PAR00960
C THE MATRIX OF THE WAGE DIFFERENTIALS                               PAR00970
C                                                                    PAR00980
      DO 2493 I=1,12                                                 PAR00990
2493  DIFONS(I)=WAGES(I,3)/WAGES(3,3)                                PAR01000
C                                                                    PAR01010
C                                                                    PAR01020
      DO 3113 I=1,5                                                  PAR01030
      DO 3114 J=1,3                                                  PAR01040
      DIFA(I,J)=WAGES(I,J)/WAGES(3,J)                                PAR01050
3114  CONTINUE                                                       PAR01060
3113  CONTINUE                                                       PAR01070
C                                                                    PAR01080
      DO 3115 J=1,3                                                  PAR01090
      DIFW(6,J)=WAGES(6,J)/WAGES(7,J)                                PAR01100
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      DIFW(7,J)=1.                                                      PAR01110
      DIFW(9,J)=WAGES(9,J)/WAGES(7,J)                                   PAR01120
      DIFW(8,J)=1.                                                      PAR01130
      DIFW(11,J)=WAGES(11,J)/WAGES(8,J)                                 PAR01140
      DIFW(12,J)=1.                                                     PAR01150
      DIFW(10,J)=WAGES(10,J)/WAGES(12,J)                                PAR01160
3115  CONTINUE                                                          PAR01170
C                                                                       PAR01180
C                                                                       PAR01190
C SKILL MATRICES FOR GOV AND PVT                                        PAR01200
C                                                                       PAR01210
      DO 3992 I=1,12                                                    PAR01220
      FLOUZO(I)=0                                                       PAR01230
      DO 3993 J=1,3                                                     PAR01240
      SKIP(I,J)=(SKILLM(I,J)*PROPOP(I))/1E4                             PAR01250
      SKIG(I,J)=(SKILLM(I,J)*(1-PROPOP(I)))/1E4                         PAR01260
      FLOUZ(I,J)=(SKILLM(I,J)/1E4)*(WAGES(I,J)/(HM(I)+GM(I)))           PAR01270
      FRIC(I,J)=(SKILLM(I,J)/1E4)*(WAGES(I,J))                          PAR01280
      FLOUZO(I)=FLOUZO(I)+FLOUZ(I,J)                                    PAR01290
3993  CONTINUE                                                          PAR01300
3992  CONTINUE                                                          PAR01310
      DO 3997 J=1,3                                                     PAR01320
      FLOUZY(J)=0                                                       PAR01330
      DO 3998 I=1,12                                                    PAR01340
      FLOUZY(J)=FLOUZY(J)+FRIC(I,J)                                     PAR01350
3998  CONTINUE                                                          PAR01360
      SSSHR(J)=FLOUZY(J)/ZALL                                           PAR01370
3997  CONTINUE                                                          PAR01380
C     WRITE(6,3998)                                                     PAR01390
      DO 3996 I=1,12                                                    PAR01400
      GAP(I)=FLOUZO(I)-TLAVA(I)                                         PAR01410
      XNEED(I)=GAP(I)/(SKILLM(I,1))                                     PAR01420
C     WRITE(6,3997)GAP(I),XNEED(I),FLOUZO(I)                            PAR01430
3996  CONTINUE                                                          PAR01440
      WRITE(6,3)                                                        PAR01450
      DO 4000 I=1,12                                                    PAR01460
4000    WRITE(6,2)(SKIP(I,J),J=1,3),(SKIG(I,J),J=1,3)                   PAR01470
2     FORMAT(/,6(5X,F15.6))                                             PAR01480
3     FORMAT(////,25X,'EMPLOYMENT BY SKILL IN THE PRIVATE SECTOR ',/,   PAR01490
     125X,'AND GOV SECTOR','IN 0,000 UNITS',//)                         PAR01500
      WRITE(6,4)                                                        PAR01510
4     FORMAT(1H1,///,25X,'WAGES BY SKILL ,(000,000)',/,5X,'SKILLED',12X,PAR01520
     1'SEMISKILLED',12X,'UNSKILLED',//)                                 PAR01530
      DO 5000 I=1,12                                                    PAR01540
5000    WRITE(6,2)(WAGES(I,J),J=1,3)                                    PAR01550
      DO 156 I=1,12                                                     PAR01560
      READ(12,155)ELSCP(I),ELSCG(I),SIGMAP(I),SIGMAG(I)                 PAR01570
155     FORMAT(4F7.5)                                                   PAR01580
C     WRITE(6,155)ELSCP(I),ELSCG(I),SIGMAP(I),SIGMAG(I)                 PAR01590
156     CONTINUE                                                        PAR01600
      READ(12,157)(CAPOT(I),I=1,12)                                     PAR01610
157   FORMAT(F8.5)                                                      PAR01620
C                                                                       PAR01630
C                                                                       PAR01640
C                                                                       PAR01650
```

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C----LABOR COEFFICIENTS IN THE COST FUNCTION PRIVATE AND GOV SECTORS    PAR01660
C                                                                       PAR01670
      DO 200 I=1,12                                                     PAR01680
      COEFLP(I)=SPL(I)*EXP(PRODUC*(ELSCP(I)-1.)*IT)                     PAR01690
      COEFLG(I)=SBL(I)*EXP(PRODUC*(ELSCG(I)-1.)*IT)                     PAR01700
200   CONTINUE                                                          PAR01710
C     WRITE(6,113)                                                      PAR01720
113   FORMAT(1H1,///,20X,'LABOR COEFFICIENTS IN COST FUNCT.',///.25X,   PAR01730
     1'PRIVATE SECTOR ',25X,'GOV. SECTOR')                              PAR01740
C     DO 201 I=1,12                                                     PAR01750
C201   WRITE(6,114)COEFLP(I),COEFLG(I)                                 PAR01760
114   FORMAT(/,27X,2(F10.6,25X))                                        PAR01770
C----CAPITAL VALUE ADDED IN PVT AND GOV SECTORS                         PAR01780
      DO 202 I=1,12                                                     PAR01790
      VACAPP(I)=HM(I)*SPK(I)                                            PAR01800
      VACAPG(I)=GM(I)*SBK(I)                                            PAR01810
      KAPIT(I)=ZT(I)*CAPOT(I)                                           PAR01820
      TVACAP(I)=VACAPP(I)+VACAPG(I)                                     PAR01830
202   CONTINUE                                                          PAR01840
C                                                                       PAR01850
C                                                                       PAR01860
C                                                                       PAR01870
C----SPLIT CAPITAL BETWEEN PRIVATE AND GOV SECTORS                      PAR01880
C    ACCORDING TO THE SHARE OF EACH IN TOTAL CAPITAL VALUE ADDED        PAR01890
C                                                                       PAR01900
      DO 203 I=1,12                                                     PAR01910
      KAPITP(I)=KAPIT(I)*(VACAPP(I)/TVACAP(I))                          PAR01920
      KAPITG(I)=KAPIT(I)*(1-VACAPP(I)/TVACAP(I))                        PAR01930
203   CONTINUE                                                          PAR01940
C                                                                       PAR01950
C----WRITING OUT RESULTS                                                PAR01960
C     WRITE(6,115)                                                      PAR01970
115   FORMAT(1H1,///,10X,'CAPITAL VALUE ADDED IN PVT & GOV SECTORS',    PAR01980
     1/ .20X,'PRIVATE SECTOR',20X,'GOVERNMENT SECTOR '/)                PAR01990
C     DO 204 I=1,12                                                     PAR02000
C204   WRITE(6,120)VACAPP(I),VACAPG(I)                                 PAR02010
      WRITE(6,117)                                                      PAR02020
117   FORMAT(1H1,///,25X,'TOTAL CAPITAL IN THE TWELVE SECTORS',//)      PAR02030
      DO 205 I=1,12                                                     PAR02040
205   WRITE(6,118)KAPIT(I)                                              PAR02050
118   FORMAT(/,25X,F12.5)                                               PAR02060
      WRITE(6,119)                                                      PAR02070
119   FORMAT(1H1,///,25X,'CAPITAL IN THE PVT. & THE PUBLIC SECTORS',///)PAR02080
      DO 206 I=1,12                                                     PAR02090
206   WRITE(6,120)KAPITP(I),KAPITG(I)                                   PAR02100
120   FORMAT(/,20X,2(F12.5,13X),/)                                      PAR02110
C----COMPUTE THE RETURNS TO CAPITAL IN THE 12 SECTORS ( PVT & GOV       PAR02120
C                                                                       PAR02130
C                                                                       PAR02140
      DO 207 I=1,12                                                     PAR02150
      RATP(I)=VACAPP(I)/KAPITP(I)                                       PAR02160
      RBASE(I)=RATP(I)                                                  PAR02170
      IF(KAPITG(I).EQ.0.0)GO TO 207                                     PAR02180
      RATG(I)=VACAPG(I)/KAPITG(I)                                       PAR02190
207   CONTINUE                                                          PAR02200
```

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C                                                                       PAR02210
C GETTING RIG OF THE ZERO VALUES IN RATG(3),AND RATG(4)                 PAR02220
C FOR EASE OF COMPUTATIONS LATER .                                      PAR02230
      RATG(3)=1.                                                        PAR02240
      RATG(4)=1.                                                        PAR02250
C                                                                       PAR02260
C                                                                       PAR02270
      WRITE(6,121)                                                      PAR02280
121   FORMAT(1H1,///,10X,'RETURNS TO CAPITAL',//,25X,'PVT CAPITAL',25X, PAR02290
     1'GOV. CAPITAL',/)                                                 PAR02300
      DO 208 I=1,12                                                     PAR02310
208   WRITE(6,122)RATP(I),RATG(I)                                       PAR02320
122   FORMAT(25X,2(F12.5,13X),/)                                        PAR02330
C                                                                       PAR02340
C RATES OF RETURN DIFFERENTIALS                                         PAR02350
C                                                                       PAR02360
      DO 3211 I=1,4                                                     PAR02370
      DIFR(I)=RATP(I)/RATP(3)                                           PAR02380
3211  CONTINUE                                                          PAR02390
      DO 3116 I=5,7                                                     PAR02400
      DIFR(I)=RATP(I)/RATP(7)                                           PAR02410
3116  CONTINUE                                                          PAR02420
      DO 3117 I=8,12                                                    PAR02430
3117  DIFR(I)=RATP(I)/RATP(12)                                          PAR02440
C                                                                       PAR02450
C                                                                       PAR02460
C----COST FUNCTION COEFFICIENTS FOR CAPITAL AND LAND ( GOV & PVT SECT ) PAR02470
C                                                                       PAR02480
      DO 209 I=1,12                                                     PAR02490
      COEFKP(I)=(SPK(I))*(RATP(I)**((ELSCP(I)-1)))                      PAR02500
      COEFKG(I)=(S8K(I))*(RATG(I)**((ELSCG(I)-1)))                      PAR02510
      COEFTP(I)=SPR(I)                                                  PAR02520
209   CONTINUE                                                          PAR02530
C------WRITING OUT RESULTS                                             PAR02540
C                                                                       PAR02550
C     WRITE(6,123)                                                      PAR02560
123   FORMAT(1H1,//,20X,'COST FUNCTION COEFFICIENTS FOR CAP AND LAND',  PAR02570
     1///,25X,'CAP COEF PVT SECT.',2X,'CAP COEF GOV SECT',2X,'LAND CO   PAR02580
     2EFF PVT SECT ',/)                                                 PAR02590
C     DO 210 I=1,12                                                     PAR02600
C210   WRITE(6,124)COEFKP(I),COEFKG(I),COEFTP(I)                       PAR02610
124   FORMAT(25X,3(F12.6,13X),/)                                        PAR02620
C                                                                       PAR02630
C                                                                       PAR02640
C---TOTAL VALUE ADDED                                                   PAR02650
C                                                                       PAR02660
      DO 10 I=1,12                                                      PAR02670
10    ZVAL(I)=HM(I)+GM(I)                                               PAR02680
C     WRITE(6,19)                                                       PAR02690
19    FORMAT(1H1,///,10X,'TOTAL VALUE ADDED IN THE 12 SECTORS ',///)    PAR02700
C     WRITE(6,20)(ZVAL(I),I=1,12)                                       PAR02710
20    FORMAT(10X,F20.8,/)                                               PAR02720
C                                                                       PAR02730
C---TOTAL LABOUR VALUE ADDED BY SECTOR                                  PAR02740
C---     PRIVATE SECTOR:   ZVAP                                         PAR02750
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C---     GOVERM. SECTOR:    ZVAG                                          PAR02760
      DO 30 I=1,12                                                        PAR02770
      ZVAP(I)=HM(I)*SPL(I)                                                PAR02780
30    ZVAG(I)=GM(I)*SBL(I)                                                PAR02790
C     WRITE(6,100)                                                        PAR02800
100   FORMAT(1H1,//,20X,'LABOR VALUE ADDED IN THE PRIVATE SECTOR ',////)  PAR02810
C     WRITE(6,105)(ZVAP(I),I=1,12)                                        PAR02820
105   FORMAT(25X,F12.5,/)                                                 PAR02830
C     WRITE(6,106)(ZVAG(I),I=1,12)                                        PAR02840
106   FORMAT(1H1,25X,'LABOR VALUE ADDED IN GOV SECTOR ',//,25X,           PAR02850
     112(F12.5,3X,//))                                                    PAR02860
C----LABOR VALUE ADDED BY SECTOR AND INCOME GROUP                         PAR02870
C----INCOME GROUPS RUN FROM THE LOWEST URBAN 60%TO THE TOP 10%IN THE RURPAR02880
C----RAL SECTOR . .                                                       PAR02890
C----IHAVE ALSO DIFFERENTIATED BETWEEN THE PRIVATE AND THE GOVERNMENT SEPAR02900
C----CTORS                                                                PAR02910
C                                                                         PAR02920
C                                                                         PAR02930
      DO 50 I=1,12                                                        PAR02940
      DO 60 J=1,6                                                         PAR02950
      ZVAPG(I,J)=ZVAP(I)*SSPL(J,I)                                        PAR02960
      ZVAGG(I,J)=ZVAG(I)*SSBL(J,I)                                        PAR02970
60    CONTINUE                                                            PAR02980
50    CONTINUE                                                            PAR02990
C     WRITE(6,110)                                                        PAR03000
110   FORMAT(1H1,20X,'PVT SECTOR LABOR VALUE ADDED BY CLASS',////)        PAR03010
C     DO 70 I=1,12                                                        PAR03020
C     WRITE(6,111)(ZVAPG(I,J),J=1,6)                                      PAR03030
111   FORMAT(//,6(5X,F12.5))                                              PAR03040
70    CONTINUE                                                            PAR03050
C     WRITE(6,112)                                                        PAR03060
112   FORMAT(1H1,//,20X,'GOV. SECTOR LABOR VALUE ADDED BY CLASS ',//)     PAR03070
C     DO 80 I=1,12                                                        PAR03080
C80    WRITE(6,111)(ZVAGG(I,J),J=1,6)                                     PAR03090
C                                                                         PAR03100
C                                                                         PAR03110
C                                                                         PAR03120
C---- CALCULATING EARNINGS BY SKILL FOR BOTH THE PRIVATE AND              PAR03130
C---- THE GOVENMENT SECTORS .                                             PAR03140
C     SYMBOLS ARE AS FOLLOWS :                                            PAR03150
C               SKILLP(I,J)ARE EARNINGS BY SKILL                          PAR03160
C               CLASSIFICATION FOR THE 12 SECTORS, J=1 ARE                PAR03170
C               SKILLED                                                   PAR03180
C               SKILLG(I,J) IS FOR GOVENMENT                              PAR03190
C                                                                         PAR03200
C                                                                         PAR03210
C                                                                         PAR03220
      DO 6000 I=1,12                                                      PAR03230
      DO 7000 J=1,3                                                       PAR03240
      SKILLP(I,J)=WAGES(I,J)*SKIP(I,J)                                    PAR03250
      SKILLG(I,J)=WAGES(I,J)*SKIG(I,J)                                    PAR03260
7000    CONTINUE                                                          PAR03270
6000    CONTINUE                                                          PAR03280
      DO 8000 I=1,12                                                      PAR03290
      IF(I.GT.4)GO TO 8990                                                PAR03300
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        WRITE(14,5)(SKILLP(I,J),J=1,3),ZVAPG(I,6),ZVAPG(I,5),ZVAPG(I,4)  PAR03310
5       FORMAT(6(F8.4,4X))                                               PAR03320
        GO TO 8000                                                       PAR03330
8990      WRITE(14,5)(SKILLP(I,J),J=1,3),ZVAPG(I,3),ZVAPG(I,2),ZVAPG(I,1) PAR03340
8000    CONTINUE                                                         PAR03350
        DO 211 I=1,12                                                    PAR03360
        IF(I.GT.4)GO TO 8991                                             PAR03370
        WRITE(14,5)(SKILLG(I,J),J=1,3),ZVAGG(I,6),ZVAGG(I,5),ZVAGG(I,4)  PAR03380
        GO TO 211                                                        PAR03390
8991    WRITE(14,5)(SKILLG(I,J),J=1,3),ZVAGG(I,3),ZVAGG(I,2),ZVAGG(I,1)  PAR03400
211     CONTINUE                                                         PAR03410
C                                                                        PAR03420
C                                                                        PAR03430
C----CHECKING FOR CONSISTENCY BETWEE EARNINGS DATA AND                   PAR03440
C----INCOME DATA                                                         PAR03450
C                                                                        PAR03460
        DO 212 I=1,12                                                    PAR03470
        EARNP(I)=0                                                       PAR03480
        EARNG(I)=0                                                       PAR03490
        DO 213 J=1,3                                                     PAR03500
        EARNP(I)=EARNP(I)+SKILLP(I,J)                                    PAR03510
        EARNG(I)=SKILLG(I,J)+EARNG(I)                                    PAR03520
213     CONTINUE                                                         PAR03530
212     CONTINUE                                                         PAR03540
C                                                                        PAR03550
C----SUMMING INCOMES ACCROSS GROUPS                                      PAR03560
C                                                                        PAR03570
        DO 214 I=1,12                                                    PAR03580
        ZVAPT(I)=0                                                       PAR03590
        ZVAGT(I)=0                                                       PAR03600
        DO 215 J=1,6                                                     PAR03610
        ZVAPT(I)=ZVAPT(I)+ZVAPG(I,J)                                     PAR03620
        ZVAGT(I)=ZVAGT(I)+ZVAGG(I,J)                                     PAR03630
215     CONTINUE                                                         PAR03640
214     CONTINUE                                                         PAR03650
C                                                                        PAR03660
C                                                                        PAR03670
C----DISCREPANCY BETWEEN EARNINGS AND TOTAL INCOMES                      PAR03680
C     FOR PRIVATE AND GOVERNMENT SECTORS SEPARATELY THEN OVERALL         PAR03690
C                                                                        PAR03700
        DO 216 I=1,12                                                    PAR03710
        DISCR1(I)=EARNP(I)+EARNG(I)-ZVAPT(I)-ZVAGT(I)                    PAR03720
        DISCR2(I)=EARNP(I)-ZVAPT(I)                                      PAR03730
        DISCR3(I)=EARNG(I)-ZVAGT(I)                                      PAR03740
216     CONTINUE                                                         PAR03750
C                                                                        PAR03760
C                                                                        PAR03770
C----WRITE OUT RESULTS                                                   PAR03780
C                                                                        PAR03790
C       WRITE(6,125)                                                     PAR03800
125     FORMAT(1H1,///,25X,'DISCREPANCIES BETWEEN EARNINGS BY SKILL      PAR03810
     1AND INCOMES BY GROUPS',/,'WE ARE USING SUM(SKILL)OF EARNINGS       PAR03820
     2MINUS SUM(INC.GROUPS)OF INCOMES',///,25X,'IN THE PRIVATE           PAR03830
     3SECTOR',3X,'IN THE GOVERNMENT SECT',2X,'OVERALL')                  PAR03840
C       DO 217 I=1,12                                                    PAR03850
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C217   WRITE(6,126)DISCR2(I),DISCR3(I),DISCR1(I)                    PAR03860
126    FORMAT(//,25X,3(F15.13,14X),/)                                PAR03870
C                                                                    PAR03880
C                                                                    PAR03890
C                                                                    PAR03900
C CALCULATION OF THE COEFFICIENTS OF THE                             PAR03910
C C.E.S FUNCTION FOR THE LABOR AGGREGATE                             PAR03920
C                                                                    PAR03930
C....SHARES OF PAYMENTS TO EACH SKILL                                PAR03940
C                                                                    PAR03950
      DO 1003 I=1,12                                                 PAR03960
      DO 1004 J=1,3                                                  PAR03970
      SHSKI(I,J)=SKILLP(I,J)/EARNP(I)                                PAR03980
      IF(EARNG(I).EQ.0.0)GO TO 9001                                  PAR03990
      SHSKIG(I,J)=SKILLG(I,J)/EARNG(I)                               PAR04000
      GO TO 1004                                                     PAR04010
9001  SHSKIG(I,J)=0.0                                                PAR04020
1004  CONTINUE                                                       PAR04030
1003  CONTINUE                                                       PAR04040
C                                                                    PAR04050
C COMPUTING THE COEFFICIENTS .                                       PAR04060
C                                                                    PAR04070
      DO 1005 I=1,12                                                 PAR04080
      DO 1006 J=1,3                                                  PAR04090
      COELLP(I,J)=(SHSKI(I,J))*((WAGES(I,J))                         PAR04100
     1**((SIGMAP(I)-1)))                                             PAR04110
      COELLG(I,J)=(SHSKIG(I,J))*((WAGES(I,J))                        PAR04120
     1**((SIGMAG(I)-1)))                                             PAR04130
      IF(COELLG(I,J).EQ.0.)COELLG(I,J)=1.                            PAR04140
1006  CONTINUE                                                       PAR04150
1005  CONTINUE                                                       PAR04160
C                                                                    PAR04170
C WRIING OUT RESULTS                                                 PAR04180
C                                                                    PAR04190
C     WRITE(6,130)                                                   PAR04200
130   FORMAT(1H1,///,25X,'COEFFICIENTS OF THE C.E.S FOR LABOR'       PAR04210
     1,30X,//,'PVT SECT',//,25X,'SKILD',24X,'SEMSKLD'                PAR04220
     2,24X,'UNSKLD',/,30X,3(F15.8,15X))                              PAR04230
C     DO 1007 I=1,12                                                 PAR04240
C     WRITE(6,131)(COELLP(I,J),J=1,3)                                PAR04250
131   FORMAT(30X,3(F15.8,15X),//)                                    PAR04260
1007  CONTINUE                                                       PAR04270
C     WRITE(6,132)                                                   PAR04280
C     DO 1008 I=1,12                                                 PAR04290
C     WRITE(6,131)(COELLG(I,J),J=1,3)                                PAR04300
132   FORMAT(1H1,30X,//,'GOV SECT',//,25X,'SKLD',24X,'SEMSKLD'       PAR04310
     1,24X,'UNSKLD',/)                                               PAR04320
1008  CONTINUE                                                       PAR04330
      RETURN                                                         PAR04340
      END                                                            PAR04350
```