A list of Working Papers on the last pages

No. 196, 1988

MOSES MACRO ACCOUNTING SYSTEM

- UPDATING PROCEDURES

by

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This is a preliminary paper.
Comments are welcome.

Aug., 1988

MOSES Macro Accounting System - Updating Procedures

1. Introduction

The macro accounting system has basically two functions in MOSES. Firstly, it integrates the outcome of industrial firm-level processes of the micro part of the model into the framework of the total national economy. The links between the micro and macro parts of the model are of course two-sided. The micro solutions affects the macro development through demand for raw material and investment goods, labour etc. It also sets guide lines for wages and prices for the whole economy. However, developments outside industry provide restrictions on the microsolutions in terms of available labor, and prices of goods needed in the production process.

Secondly, the macro accounting system assures consistency of solutions in a book-keeping sense. This is not the least important when aggregate prices, e.g., for private consumption, are constructed. Consistent macro-deflators are also needed to properly allocate net lending of the total economy (i.e. the current account) between domestic sectors.

The distinguishing feature of MOSES is its specification of the industrial sector in terms of individual firms. This is also where the main modeling effort lies. Specifying and updating the micro part is a heavy task. For this reason the macro accounting system must be constructed as simple and transparent as possible. This puts restrictions on the number of sectors outside industry, the treatment of indirect taxes and subsidies etc.

The difference of data sources for the micro and macro parts of the production system involves serious problems.

The basis for the macro accounting system is the Swedish System of National Accounts. These are not directly consistent with the firm level data of the micro part of MOSES for many reasons. The firms in each sector are only a sample, firms may produce goods properly belonging to another sector (the macro accounting system allows for no mixed output), definitions of production, sales and employment may differ etc. As in the System of National Accounts ample use of residuals is unavoidable in the model. The sources of these residuals may well be easily identified, e.g., small business production and employment, undeclared taxable income. Some efforts are made to "model" even the residuals in MOSES. It is obvious, however, that too large residuals weakens the micro foundation of the macro results.

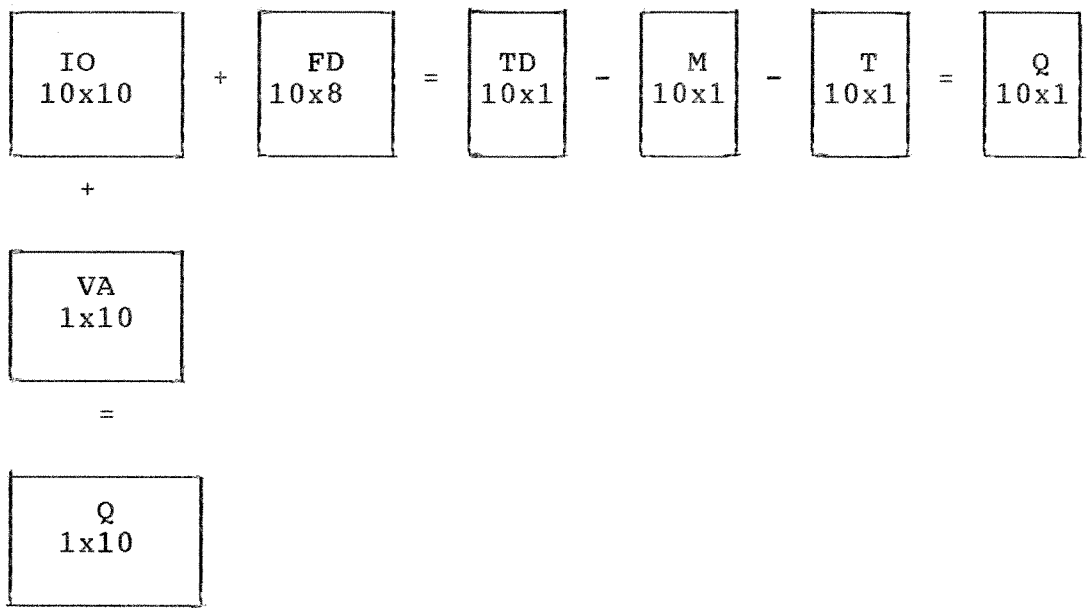
This paper deals with the specification and updating procedures of the macro accounting system of MOSES. A manual showing the use of data sources and programs for updating is given in Section 4. Before going into details, however, Section 2 will give some basic principles for the IO-system in the model, and Section 3 some general remarks on data sources. The relations between the micro and macro parts in MOSES will not be discussed further.

2. Some Basic Input-Output Relations

The macro accounting system is build up by a number of identities showing supply and demand for each commodity in fixed and current prices. The number of commodity balances is equal to the number of production sectors (which is ten in in MOSES) and no commodity is produced in more than one sector.

Following the format given in "The MOSES Manual, Part 2, The Initialization Process" (IUI, Working Paper No. 118, 1983) the layout of the commodity balances are given by Figure 1. The matrix diagram reads as follows. IO is a 10x10 input-output matrix, where e.g. the first row tells the value (in fixed or current prices) of commodity 1 that is used as input in the ten production sectors. The latter are given by column index. Final demand is divided into eight components (cf. Appendix 1). The matrix FD gives these components in terms of commodity composition. Summing each row of IO and FD over column-indices results in the vector TD, which is total demand in purchasers' prices. If imports (cif), M, and indirect taxes net, T, is subtracted from total demand, we are obviously left with domestic production of each commodity in producers' prices, Q. However, Q is also the sum of the value of input into each sector plus value added in purchasers' prices since each sector produces one and only one commodity. This is seen from the lower part of the figure, where the vertical sum of IO for each sector plus value added, VA, is equal to output Q. Thus output of each commodity can be computed in two ways - from the supply side or from the demand side. These should always give identical results:

Figure 1 Macro Accounting System Layout



$$Q_i^S = \sum_j IO_{ji} + VA_i = Q_i^D = \sum_j IO_{ij} + \sum_j FD_{ij} - M_i - T_i$$

Summing over commodity index i results in the GDP identity for the market sector:

$$\sum\sum_{ij} IO_{ji} + \sum_i VA_i = \sum\sum_{ij} IO_{ij} + \sum\sum_{ij} FD_{ij} - \sum_i M_i - \sum T_i$$

or

$$GDP = VA + T = FD - M$$

where GDP is given in purchasers' prices.

3. Data Sources

Commodity balances are regularly produced by Statistics Sweden. Only every fifth year, however, is detailed primary data collected. In between extrapolations are made on the basis of data from other statistical branches. Extrapolated matrices are available with 45 commodities (cf. Appendix 2), while the results of the more thoroughly worked through IO-accounts distinguish between twice as many commodities.

Although the quality of the extrapolated matrices doubtless is lower than in the full scale IO inquiries, they may still be good enough to use as an accounting framework for MOSES. It should be observed that even the larger IO-system will have to be extrapolated to fit National Accounts for the base year of the models simulations. The lags in publication of the full IO-accounts is disturbing.

Still in spring 1986 the latest vintage available is 1975 while the extrapolated system is published with a lag of two years. Also, although commodities and sectors in MOSES are defined in a bit unconventional way requiring strongly disaggregated data, the gain in having 90 instead of 45 commodities may not even compensate the cost of more complicated aggregation and data handling procedures. Neither is the more comprehensive coverage of the full IO-accounts in terms of e.g. matrices for imports and indirect taxes of immediate interest of application in MOSES.

Appendix 2 gives the complete 45x45 system of commodity balances for 1982 which is used to update the macro accounting system in MOSES. All figures are in fixed prices with 1980 as index base. This matrix system must accordingly not only be transformed to the ten MOSES-commodities (-sectors) but also be reflated to current prices. As can be seen from the final demand matrix only total gross investments is given compared to the four components required in MOSES. The investment vector will be split up after aggregation and reflation. Also three kinds of indirect taxes are distinguished besides custom duties. They will simply be added to one net tax already in the aggregation program.

Finally, before getting into details, one general remark should be made about the treatment of deflators (price-indices) in MOSES. All values in fixed prices are assumed to be given in producers' values. To compute private consumption in current purchasers' prices from its value in fixed purchasers' prices the price index must include not only the change in commodity tax rate but also the base

year rate itself. If the base year tax rate is 20 % the price index in purchasers' prices is said to be 1.20 for the base year. This is a bit at odds with the common use of the concept of an index number, but will be adopted in the subsequent presentation.

4. Program Manual

As stated in the previous section updating of the macro accounting system involves two elements. One is to adapt the available IO-statistics to MOSES format. The other is to reflate the system to current prices. The second part is necessary only because commodity-balances are still only published in fixed prices by Statistics Sweden. (Regularly published tables in current prices are underway.) These two steps are taken in the order given above in the updating procedure, i.e. first aggregation and then reflation. There is no compelling reason for this. Given the assumptions that has to be made in the reflation computations (cf. below) the results would, however, not necessarily be identical if the steps were taken in reversed order.

4.1 Aggregation Program

The program that transforms the 45 commodity-balanced available from Statistics Sweden is written in FORTRAN. It is called IO82.FOR and is stored as a SOS-file on the DEC-10 machine at Stockholms Datorcentral. The complete code is given in Appendix 4 and will be described step by step with reference to line numbers.

Line 100 - 1800: Comment statements.

Line 1900 - 2100: Declaration of variables.

Line 2200 - 2700: OPEN statements.

The 45 sector system is stored on file SCB82.DAT. After some completions and rearrangements row - and columnsums of this system is printed on KON82.DAT to check correct punching of SCB82.DAT as well as consistency with National Accounts (cf. below). The 45x10 aggregation matrix (cf. Appendix 3) is stored on AMD.DAT and the resulting 10x10 MOSES system is stored on MO82.DAT. AX.DAT and X82.DAT are dummy-names (cf. below).

Line 3200: Read parameters.

The first line in SCB82.DAT sets some "parameters". The first, KFIL, identifies the aggregation matrix to be used. In the program shown the matrix is stored on AMD.DAT connected to unit 30 by the OPEN statement on line 2400. Thus the first number of the first line of SCB82.DAT should be 30. The second number, IFIL, gives the unit number of the output file. In this case the aggregated system is stored on MO82.DAT, so IFIL should be 40 (cf. OPEN-statements). IDIM is the dimension of the aggregated system. By setting these parameters properly the program can easily be used for alternate aggregation matrices and dimensions without interfering with the standard application. The filenames AX.DAT and X82.DAT are used for such exercises requiring the aggregation matrix to be stored in AX.DAT, KFIL to be 31, IFIL to be 41 and IDIM whatever dimension is desired. The result is stored on X82.DAT.

Line 330 - 4100: Read 45x45 system.

TILL = supply
FD = final demand
IO = intermediate goods
Cf. Appendix 4.

Line 4200 - 4600: Add tourist services.

The commodity balances must be corrected for tourist services to make private consumption equal not to consumption in Sweden as given by IO-data but to Swedish residents' consumption. This is accomplished by adding export of tourist services, TUEX, to exports of services and expenditures of Swedish tourists abroad, TUIM, to import of services. Net tourist expenditures are added to private service consumption. Note that this does not affect the value of GDP. Figures for TUEX and TUIM are found in the National Accounts.

Line 4700 - 5000: Trade margins.

The commodity balances account for trade margins on each commodity. To avoid double counting the figure for production of trade services must exclude aggregated trade margins which of course makes the recorded figure close to zero for book-keeping reasons. The program lines just add total margins to production, TILL(36,1), and again subtract them in the new supply column TILL(I,9) which is zero for all I except 36 (the trade sector) where it is put equal to minus aggregated margins.

In this way we can properly solve for value added in the trade sector. The balance of resources in

purchasers' prices for the whole economy will then read: value added in producers' prices + indirect taxes + imports = final demand. For each commodity, however, trade margins must be added to the supply side.

Line 5100 - 8400: Sum over rows and columns.

Note that FD(I,7) stands for sum of final demand per commodity, while FD(I,8) is sum of total demand, i.e. including demand for intermediate goods.

Line 8500 - 11200: Calibrate to National Accounts.

For different reasons total figures for the components of supply and demand in the 45x45 system may not exactly equal the National Accounts. Differences are put in sector 45 (other services). Note that differences in gross production are treated as residuals to assure that supply equals demand. This implies that total market sector GDP in producers' prices must be equal to the National Accounts figure since all other components of the balance of resources are equal.

Line 11300 - 15100: Control print out.

This part checks that the system, i.e. SCB82.DAT, was correctly punched by computing total supply and demand for each commodity etc. Also computation of columnsums, e.g. total gross investments, allows for checks against National Accounts. Note that value added is computed as a residual. Differences in this sum compared to National Accounts is an easy indicator of errors in the system (cf. Appendix 4).

Line 15200 - 15700: Read aggregation matrix.

Unit number KFIL is given in SCB82.DAT.

Line 15800 - 18100: Aggregation.

Dimension of aggregated matrix, IDIM, is given in SCB82.DAT.

Line 18200-19300: Result print out.

Unit number IFIL is given in SCB82.DAT.

4.2 Reflation Program

The program MO82.FOR computes commodity balances in current prices given fixed prices balances and National Accounts. The complete code is given in Appendix 5. The system matrices are the same as in the aggregation program IO82.FOR (cf. also Appendix 2). For each matrix in fixed prices, however, a matrix in current prices is defined by adding the letter "L" to the name. Also for the supply and final demand matrices deflator matrices are defined by putting the letter "P" before the name. So TILL(I,J) is the supply matrix in fixed prices, TILLL(I,J) in current prices and PTILL(I,J) the name of the corresponding deflators.

Line 100 - 900: Comment statements.

Line 1000 - 1500: Declaration of variables.

Line 1600 - 1800: OPENT statements.

The matrices IO, FD and TILL are stored on MO82.DAT, which is an output-file of IO82FOR. PRIS82.DAT contains National Account data. On MOIO82.DAT, finally, the results are written. These include some rearrangements of the fixed price matrices (cf. below).

Line 1900 - 7600:Read and rearrange fixed price matrices.

After reading the commodity balances from MO82.DAT the rearrangements take place on line 3900. First, trade margins are added to row number 10 in the IO matrix, i.e., they are treated as input of services in each sector. The implication is that trade margins are related to domestic output rather than to absorption - a simplification that is justified if the components of supply and demand grow at a fairly equal rate. Note that trade margins must also be added to gross output to keep value added unaffected. The second rearrangement is to subtract the residual between total supply and demand from gross output (line 4400). Finally indirect taxes and subsidies are added and an aggregated "tax rate" is defined with public sector purchases and private consumption a tax base. This is again a short cut which seems defesenible in a model focusing on firm behavior like MOSES.

Line 7700 - 10200: Read National Accounts in current prices.

VALP is value added in current prices as given by National Accounts and aggregated to MOSES' sectors (this is done outside the program). Note that DVALP, a residual in National Accounts, is distrib-

uted proportionally between the ten sectors (cf. line 9500). This is a bit at odds with the treatment of the residual in fixed prices, FD(I,6), whose distribution is given by the FD-matrix. Preliminary deflators for exports and imports can be constructed from National Accounts. Since it is not possible to identify exactly the MOSES-sectors in published National Accounts, multiplying these deflators with values in fixed prices will not add up to total recorded values in current prices. The adjustments are laid on sector 1-4 since these are the sectors that are more difficult to identify in National Accounts than the other sectors (line 9600-9700). It should be emphasized that the program requires data input in this section to be consistent. The solution algorithm will not converge if aggregated value added plus commodity taxes plus imports differ from final demand. This is certainly no problem if all figures are taken from the same source. If, however, a revised figure for e.g. investments is taken from another source it is necessary to change some other component of the aggregated balance of resources.

Line 10300 - 16700: Computation of prices.

In order to explain the solution of prices (deflators) and the simplifying assumptions which are used it is necessary to make a short digression.

In fixed prices each commodity balance i is given by (with index i running from 1 to 10)

$$Y_i + M_i + T_i = \sum_j IO_{ij} + FDA_i + FDB_i + E_i \qquad (1)$$

where Y_i = gross output excl. indirect taxes
M_i = imports cif
T_i = indirect taxes
IO_{ij} = use of commodity i in sector j
FDA_i = domestic final demand charged with indirect taxes (intermediate goods in public sector plus private consumption)
FDB_i = domestic final demand not charged with indirect taxes (fixed investments, stock-building, exports)
E_i = exports.

Note that trade margins are included in Y and IO.

The strategic assumption in the computation of prices is that the price of a commodity excluding taxes is independent of its use. With this assumption commodity balances in current prices are given by

$$PY_i \cdot Y_i + PM_i \cdot M_i = PH_i(\sum_j IO_{ij} + FDA_i(1-TRB_i) + FDB_i) + PE_i \cdot E_i \quad (2)$$

where PY_i = deflator for gross output
PM_i = deflator for imports
PH_i = deflator for domestic demand excl. taxes
PE_i = deflator for exports
TRB_i = tax rate in fixed prices, i.e. the tax rate in the base years.

Note that the base FDA of indirect taxes T includes taxes. The tax rate TRB is given by T/FDA.

As can be seen from (1) and (2) commodity balances in current prices are formally constructed simply by multiplying each component in the fixed price balance by an appropriate price index.

At this stage of the updating procedure commodity-balances in fixed prices are already solved so all variables in (1) are known. Among prices in (2) only PY and PH are unknown since PM and PE are computed directly from National Accounts (cf. 7700 - 10200). This leaves us with 20 variables to determine and so far 10 equations. The 10 missing equations are derived from the supply (cost) side:

$$PY_i \cdot Y_i = VALP_i + \sum_j PH_j \cdot IO_{ji} \qquad (3)$$

where $VALP_i$ = value added in producers' prices.

(3) simply states that the value of output equals total costs plus excess profits. Technically, when updating the system VALP, which consists of labor and capital cost as well as excess profits, is exogeneous.

The equations (2) and (3) will determine PY and PH. However, to get a set of prices consistent with National Accounts we must also compute the deflator for FDA, i.e. in purchasers' prices. This deflator obviously differs from PH to the extent that indirect tax rates have changed from the base year of the price indices to the year for which we solve the system.

The relation between PH and PFDA can be derived in the following way. Let TR be the current tax rate. Then, if TL are indirect taxes in current prices, we get for each commodity:

$$TL_i = TR_i \cdot PFDA_i \cdot FDA_i$$

The current value of tax-charged demand in purchasers' prices equals tax-charged demand excluding taxes plus taxes, i.e. $PFDA_i \cdot FDA_i = PH_i \cdot FOA_i \cdot (1-TRB_i) + TR_i \cdot PFDA_i \cdot FDA_i$. Solving for $PFDA_i$ yields:

$$PFDA_i = PH_i \cdot (1-TRB_i)/(1-TR_i) \qquad (4)$$

This relation between the deflator PFDA for tax-charged demand in fixed purchasers' prices and the deflator PH for demand in fixed producers' prices is, like all relations used in the updating procedures, an identity that assures consistency in a book-keeping sense.

Although all deflators by definition take the value unity in the base year the MOSES program treats all variables in fixed prices as given in producers' prices. The pseudo price-index that transforms the fixed price value excluding taxes to current price value including taxes will not be unity for the base year. To see this, let's call the pseudo price-index P, defined as:

$$P_i \cdot FDA_i \cdot (1-TRB_i) = PFDA_i \cdot FDA_i$$

This gives P_i in terms of the proper price index $PFDA_i$ as

$$P_i = PFDA_i/(1-TRB_i)$$

Also P_i can be expressed in terms of PH using (3) above:

$$P_i = PH_i/(1-TR_i)$$

The use of such a pseudo index is of course perfectly alright as long as the relations to PFDA and PH given above are fullfilled.

The relations (2)-(4) allow as to compute the balance of resources in purchasers' prices for the whole market sector of the economy. Adjustments will be necessary to make these aggregated results fit with the National Accounts. Among these adjustments the treatment of indirect taxes deserves special attention. For the current year we only know the total amount of commodity based indirect taxes in current prices from the National Accounts. The computation of current tax rates will be based on tax rates in fixed prices, i.e. tax rates for the base year of price indices. Adjustments are made proportionally until computed total current taxes is in accord with National Accounts. Since changes in tax rates in fact differs between commodities this procedure is a short cut that can be defended only on the grounds that MOSES is not a model for detailed analysis of indirect taxes. However, this kind of crudeness in the macro part of the system may give rise to troublesome residuals in other parts of the system using more precise data from other sources. So far no comprehensive investigation has been made in MOSES to identify and estimate the effects of such residuals.

The basic equations (2)-(4) are solved by a Gauss-Seidel algorithm. Usually the system converges fairly rapid - after 5-10 iterations. Line 10600 - 11400 set preliminary values for endogenous

variables PY and TR (cf. definitions above). Export prices are used as initial prices for domestic demand, PH. The variable PP, which will be explained below, is set to unity.

The first task is to compute PH, the price of domestic demand in producers' prices. Disregarding PP for a moment, HP in line 11900 is exactly the component in (2) multiplied by PH. Then PH is given by the right hand side of (2) decreased by exports in current prices divided by HP (line 12100).

The variable PP is an "adjustment" constant. When the system is solved on the assumption of equal prices PH throughout all components of domestic demand for each commodity, the aggregated value of each final demand component in current prices will, not surprisingly, differ from National Accounts. The PPs adjust prices PH to exact accordance with National Accounts. For each component, e.g. private consumption, one constant PP is applied to each commodity price PH. By implication the solution will in fact yield prices on domestic demand that do differ between components for a certain commodity. The price of commodity 1 in private consumption will be PP(2) * PH(1), while the price of the same commodity used for investments will be PP(3) * PH(1). A similar approach is taken on the supply side of the system where the basic hypothesis, that market sales from the public sector have the same price as gross output from industry, is modified by PP(5) to achieve accordance with National Accounts.

So far all computations have been based on the preliminary PY. Given PH, however, new values of PY can be computed from the cost side given value added (VALP). These new PY is compared to the PYs from the previous iteration (or, in the first

iteration, with the preliminary values). The iteration loop is halted if all differences between actual and previous solutions of PY does not affect the fourth decimal of the price-index. (In fact the condition is even a bit tougher than that.) If this condition is not fulfilled for some PY the calculations are repeated with the actual PY used to compute PH. The value is stored in PY1 to permit comparison with PY as computed in the new iteration.

If the break condition is fulfilled the loop is left and PH is recomputed with the last PY.

Linde 16800 - END: Print out.

All variables are computed in current prices and the three basic matrices, the input matrix, the final demand matrix and the supply matrix, are printed on MOIO82.DAT. Adjustment constants PP, some of the deflators and tax rates are also printed. Note that the deviation of the PPs from unity can be seen as a check on the hypothesis that (producers') prices are equal between domestic demand components. Large deviations should be analyzed. Also the difference between tax rates in fixed and current prices should be considered. Information that tax or subsidy rates for some commodity has changed distinctively different from the others could be used to improve the accurateness of the price-indices.

APPENDIX 1 MOSES MACRO-SECTORS

1 Raw material

2 Intermediate goods

3 Investment goods and consumer durables

4 Consumption goods (excl. durables)

5 Agriculture, forestry, fishing

6 Mining and quarrying

7 Oil

8 Construction

9 Electricity

10 Other services

APPENDIX 2 THE 45x45 COMMODITY BALANCES

The system of commodity balances is given as three matrices in the tables below. Since the same format is used in the aggregation and reflation programs the variables in the tables will be described more closely.

Tabel 1 is the supply matrix called TILL in the programs. With i as commodity index the matrix shows with appropriate column index added in the table:

TILL(i,1) = gross production in producers' prices (excl. residual)
TILL(i,2) = sales of market products from the public sector (note that public enterprices is recorded in the first column of TILL)
TILL(i,3) = imports cif
TILL(i,4) = customs duties and import levels
TILL(i,5) = trade margins
TILL(i,6) = commodity taxes
TILL(i,7) = subsidies
TILL(i,8) = value added taxes

Table 2 shows final demand, FD:

FD(i,1) = use of intermediate goods in the public sector
FD(i,2) = private consumption
FD(i,3) = gross investments
FD(i,4) = stock building
FD(i,5) = exports
FD(i,6) = residual between supply and demand

Table 3, finally, is called IO and shows the intermediate use of each commodity (row index) in each production sector (column index).

Table 1 Supply Matrix

IOR TILLGÅNGSSIDEMATRIS

AR 1982 FASTA PRISER	1	MOTTAGARPRIS 2	3	4		5	6	7	8	
VARUSNI	IPRO	OF FÖR	IMPOR	TUL	UP	HMAR	SVS	SUB	MOM	SUMMA
01 JORDBR	20186	53	4689	108	25036	4421	372	-4536	1667	26960
02 SKOGSBR	9585	365	712		10662	1229			90	11981
03 FISKE	626		91		717	128		-16	73	902
04 JÄRNGR	1627		3		1630	48				1678
05 I JÄRNG	1173		981		2154	168				2322
06 RÅOLJA MM	1179	54	14359		15592	299			52	15943
07 SK LIVS	26630	40	1305	228	28203	6150		-728	5017	38642
08 KONK LIVS	13333	32	4544	239	18148	5047	491	-183	2812	26315
09 DR TOBAK	3594		954	17	4565	3142	9225	-10	3046	19968
10 TEXTIL	7941	52	10622	344	18959	10361			4577	33897
11 SÅGVERK	11480	28	318		11826	1461			42	13329
12 TRÄVARU	12802	28	1596	16	14442	3252			1040	18734
13 MASSA	7384		256		7640	410				8050
14 PAPPER	13981		392		14373	975			60	15408
15 PAPPV	6237		872	4	7113	744	6		204	8067
16 GRAFISK	16672	53	938		17663	1534	215		1072	20484
17 GUMMI	2194		1880	29	4103	764			259	5126
18 KEMIK BASPL	11723		9761	46	21530	1949			63	23542
19 AN KEMISK	9057	204	4825	12	14098	3660	182	-2520	1022	16442
20 PLASTVAROR	3122		1349	12	4483	787	9		311	5590
21 PETROLEUM	16549		16190		32739	4621	8457		123	45940
22 JORD O STEN	7918		1910	18	9846	2035	34		211	12126
23 JÄRN O STÅL	16263		4542	16	20821	2865			6	23692
24 I JÄRNMET	7702		3862	4	11568	1416			2	12986
25 METALLVAROR	21686	115	7430	32	29263	2479	37		690	32469
26 MASKINER	32536		16238	166	48940	4343			516	53799
27 TRANSPORTM	31463		11862	103	43428	5293	658		2414	51793
28 INSTRUMENT	2998	65	3579	50	6692	1259			486	8437
29 ELEKTRO	19241		10582	187	30010	3904			1589	35503
30 VARV	7007		1099	2	8108	193			178	8479
31 AN TILLV	1744	22	1566	21	3353	1843			699	5895
32 EL O VÄRME	20279		989		21268		2404			23672
33 GAS	330				330					330
34 VATTEN	1564				1564					1564
35 BYGGNAD	74250				74250				5716	79966
36 VARUHANDEL			2356		2356	1538				3894
37 HOTELL REST	9041	886			9927				1008	10935
38 SAMFÄRDSEL	45596	467	5904		51967		152		224	52343
39 POST O TELE	14856		534		15390					15390
40 BANK O FÖRS	26061		34		26095					26095
41 BOSTÄDER	52933				52933					52933
42 FASTIGHETER	10966	363			11329					11329
43 UPPDRAG	29898	1270	2716		33884				964	34848
44 REPARATIONER	9933		34		9967				1435	11402
45 ÖVR PR TJ	29103	1994	227		31324	610	1218		367	33519
SUMMA	670443	6091	152101	1654	830289	78928	23460	-7993	38035	962719

Table 2 Final Demand Matrix

FINAL-DEMAND MATRIS

AR 1982 FASTA PRISER MOTTAGARPRIS

VARUSNI	INSATS	OFF 1	PR.KONS 2	INV 3	LAGER 4	EXPORT 5	ÖVRIGT	RES 6	SUMMA
01 JORDBR	16339	405	8844	322	82	1251		-283	26960
02 SKOGSBR	11138		498	653	427	150		-885	11981
03 FISKE	306	9	397			334		-144	902
04 JÄRNGR	659				46	1014		-41	1678
05 I JÄRNG	2256				-3	694		-625	2322
06 RÅOLJA MM	16084	206	107		222	356		-1032	15943
07 SK LIVS	8457	1860	26450		69	1544		262	38642
08 KONK LIVS	8013	523	15343		5	1272		1159	26315
09 DR TOBAK	1627	24	17253		35	139		890	19968
10 TEXTIL	5424	935	25305	256	98	3738		-1859	33897
11 SÅGVERK	6612	88	39		-489	7002		77	13329
12 TRÄVARU	11055	395	5302	844	-287	3193		-1768	18734
13 MASSA	3055				15	4955		25	8050
14 PAPPER	5555	242	82		-4	10277		-744	15408
15 PAPPV	5003	368	748		-131	2391		-312	8067
16 GRAFISK	12145	1991	5227		6	654		461	20484
17 GUMMI	2948	127	1353		-50	873		-125	5126
18 KEMIK BASPL	15379	82	360		333	5539		1849	23542
19 AN KEMISK	6275	2370	5100		16	3824		-1143	16442
20 PLASTVAROR	3024	449	1291		-5	914		-83	5590
21 PETROLEUM	23556	2408	15340		-808	6313		-869	45940
22 JORD O STEN	10100	317	940		-202	1564		-593	12126
23 JÄRN O STÅL	16772	82	45		-724	8504		-987	23692
24 I JÄRNMET	9078	85	19		-28	3618		214	12986
25 METALLVAROR	17001	857	2267	3249	-505	7037		2563	32469
26 MASKINER	15339	1394	984	15508	-1225	22571		-772	53799
27 TRANSPORTM	13812	1893	11931	6090	-689	19689		-933	51793
28 INSTRUMENT	1268	709	1579	2168	-65	2362		416	8437
29 ELEKTRO	11857	1486	5958	5008	-960	10849		1305	35503
30 VARV	1540	487	991	1828	-279	3907		5	8479
31 AN TILLV	631	418	3510	69	-81	944		404	5895
32 EL O VÄRME	11630	2076	9574			384		8	23672
33 GAS	57	4	120					149	330
34 VATTEN	1226	307						31	1564
35 BYGGNAD	19379	3771		56816					79966
36 VARUHANDEL	1534					1538		822	3894
37 HOTELL REST	2407	821	7410					297	10935
38 SAMFÄRDSEL	29295	3273	7401			12880		-506	52343
39 POST O TELE	6509	1658	4530			497		2196	15390
40 BANK O FÖRS	21924	243	2425			14		1489	26095
41 BOSTÄDER			52933						52933
42 FASTIGHETER	7518	2893	749					169	11329
43 UPPDRAG	18977	5157	477	6422		6301		-2486	34848
44 REPARATIONER	4817	277	6366			82		-140	11402
45 ÖVR PR TJ	12184	3070	18879			492		-1106	33519
SUMMA	399765	43760	268127	99233	-5181	159660		-2645	962719

Table 3 Input Matrix

IOR VARA-BRANSCHMATRIS, INSATSDELEN 86-01-08

AR 1982 FASTA PRISER MOTTAGARPRIS

VARUSNI	101	102	103	104	105	106	107	108	109	110	111	112	113	114
01 JORDBR	639						11143	3516	320	80		3		
02 SKOGSBR	19	398			2			27		7	5257	561	2270	2322
03 FISKE	33						2	198						
04 JÄRNGR				164										
05 I JÄRNG					12									
06 RAOLJA MM	142			5	2	67				4			10	190
07 SK LIVS	81						4810	1008	83	148				
08 KONK LIVS	3370		9				496	3035	92	2		4	6	63
09 DR TOBAK								2	519					
10 TEXTIL	67	73	39	9	35		54			2551		278	48	239
11 SÅGVERK			1			3	6			4	881	1457	961	788
12 TRÄVARU	42	46	24		27			23	8	14	40	1976	20	222
13 MASSA										3			14	2886
14 PAPPER	43	6	4				158	77	51	55		19	2	568
15 PAPPV	8			1		4	245	314	74	53	1	162	8	129
16 GRAFISK	25	13		3	4	6	33	43	41	39	44	63	13	58
17 GUMMI	53	33		1			5		5	10		3		
18 KEMIK BASPL	1500	25		14	42	8	146	276	22	419	57	588	557	696
19 AN KEMISK	61		9	19	16	35	7	44	24	27	58	209	5	89
20 PLASTVAROR	2	4		1	2	8	169	164	54	62		37		4
21 PETROLEUM	673	202	87	81	35	25	374	184	57	195	140	155	242	728
22 JORD O STEN	69			33	24	11	11	97	125	12		379	24	46
23 JÄRN O STÅL				7							22	27	25	52
24 I JÄRNMET							8	106	10			4		
25 METALLVAROR	54	54	2	24	43	14	39	217	340	68	209	592	106	129
26 MASKINER	619	327		39	38	75	33	22	12	120	79	27	113	157
27 TRANSPORTM				4	6									
28 INSTRUMENT														
29 ELEKTRO			2	3	4		5	8	2	6	35	33	36	145
30 VARV			41											
31 ÄN TILLV										35				2
32 EL O VÄRME	482	40		131	106	79	227	106	33	102	212	170	444	1243
33 GAS							3							
34 VATTEN				1		4	16	10	2	11	22	9	5	14
35 BYGGNAD	843	108		57	45	6	118	54	23	38	45	50	53	103
36 VARUHANDEL							13	12	1	31	73	29	96	123
37 HOTELL REST				4	3		19	12	6	21	8	18	7	16
38 SAMFÄRDSEL	216	761	6	410	70	69	448	246	80	99	283	272	27	82
39 POST O TELE	15	3		4	6	2	46	46	8	41	19	45	10	33
40 BANK O FÖRS	322	21	8	30	29	3	149	100	39	57	57	97	72	227
41 BOSTÄDER														
42 FASTIGHETER				5	3	2	77	42	9	22	23	19	16	28
43 UPPDRAG	207	25		16	20	3	357	216	104	227	121	258	78	215
44 REPARATIONER	210	39		14	15	4	100	20	14	17	89	43	22	18
45 ÖVR PR TJ	95	3		9	3	1	135	44	10	66	64	88	34	91
SUMMA	9890	2181	232	1089	592	429	19452	10269	2168	4646	7839	7675	5324	11706

IOR VARA-BRANSCHMATRIS, INSATSDELEN 86-01-08

AR 1982 FASTA PRISER MOTTAGARPRIS

VARUSNI	115	116	117	118	119	120	121	122	123	124	125	126	127	128
01 JORDBR			75	2	21									
02 SKOGSBR	42			3	39			2	3		7			1
03 FISKE														
04 JÄRNGR									495					
05 I JÄRNG								25	385	1423	409	2		
06 RAOLJA MM			4	285	20		13723	604	74	23	4	4	10	
07 SK LIVS				1	139			7						
08 KONK LIVS			4	104	88									
09 DR TOBAK				28	28	1								
10 TEXTIL		4	193	13	4	7		9	54		20	167	345	17
11 SAGVERK	76		2	2	22			9			45	18	182	3
12 TRÄVARU	8	4	11	2				47	64	8	216	207	699	4
13 MASSA	16			123		4								
14 PAPPER	1512	2209	1	34	32	30	18	43	2	6	7	12	40	
15 PAPPV	597	880	1	72	262	64		45	2		71	109	59	10
16 GRAFISK	12	3915	10	46	188	35	59	82	41	2	130	229	133	22
17 GUMMI		18	240	13				6	1		5	351	919	19
18 KEMIK BASPL	334	21	301	4164	1318	1277	178	251	169	161	169	132	147	
19 AN KEMISK	87	291	24	151	1160	1	84	10	25	3	561	132	263	14
20 PLASTVAROR	21	18		76	164	50	21	58	2		90	442	360	6
21 PETROLEUM	78	101	56	1373	292	40	985	510	1621	107	337	349	424	18
22 JORD O STEN	4	3	2	23	68	11	51	1075	243	19	108	162	299	15
23 JÄRN O STÅL	7	3		3		16	4	168	5940	13	4032	2617	2362	39
24 I JÄRNMET	9	1		55	154	2		15	468	3756	991	293	457	53
25 METALLVAROR	9	64	57	49	164	5	157	103	336	465	2247	2027	1116	35
26 MASKINER	9	27	16	226	36	56	206	41	376	49	356	6311	1646	42
27 TRANSPORTM											4	201	8290	
28 INSTRUMENT		4		3	4						39	173	266	508
29 ELEKTRO	7	4	4	38	6	10	47	30	157	5	246	703	1366	127
30 VARV													18	
31 AN TILLV		4	2		6					60	3	8	3	
32 EL O VÄRME	97	95	45	602	96	101	68	250	819	262	318	285	261	15
33 GAS		3							29		4	2		
34 VATTEN		6	2	12	5	2	44	7	8	1	17	21	18	2
35 BYGGNAD	25	80	15	44	62	25	18	67	108	37	127	206	169	12
36 VARUHANDEL	47	6	8	68	40	8	55	18	89	30	85	244	239	26
37 HOTELL REST	7	37	7	23	29	6		20	23	6	39	76	51	8
38 SAMFÄRDSEL	80	181	33	110	152	67	9	257	303	89	341	452	421	27
39 POST O TELE	23	247	12	33	47	12	20	39	48	18	88	168	112	19
40 BANK O FÖRS	104	91	24	64	83	27	100	83	181	59	145	240	163	26
41 BOSTÄDER														
42 FASTIGHETER	13	17	5	22	17	4	23	20	35	13	37	50	56	4
43 UPPDRAG	127	1090	74	194	292	74	77	226	279	92	382	619	762	102
44 REPARATIONER	6	30	5	16	17	7	5	52	31	9	50	57	115	5
45 ÖVR PR TJ	15	307	28	37	50	29	21	55	98	15	177	275	212	30
SUMMA	3372	9761	1261	8114	5105	1971	15973	4234	12509	6731	11907	17344	21983	1209

Table 3 (cont.)

IOR VARA-BRANSCHMATRIS, INSATSDELEN 86-01-08

AR 1982 FASTA PRISER MOTTAGARPRIS

VARUSNI	129	130	131	132	133	134	135	136	137	138	139	140	141	142
01 JORDBR							77		241			2	62	10
02 SKOGSBR			15				128						35	
03 FISKE									73					
04 JÄRNGR														
05 I JÄRNG														
06 RÅOLJA MM	10		52	5		8	775						52	11
07 SK LIVS			14						1379	582				
08 KONK LIVS									653					
09 DR TOBAK									947	60				
10 TEXTIL	16	68	64				360	150	55	175	72	31		
11 SÅGVERK	4	151	140	5			1313			140			194	10
12 TRÄVARU	62	105	26				6398	326	13	235	37			
13 MASSA				9										
14 PAPPER	52	1	62	3			112	77	3	119	9	33	3	2
15 PAPPV	119	2	25	3			402	690	41	21	12	45	5	5
16 GRAFISK	191	46	38	19		4	327	1673	42	272	486	280		144
17 GUMMI	135	18	35	5			187	227		602				
18 KEMIK BASPL	596	296	131	6		22	988	23						
19 AN KEMISK	87	176	142			6	1373	51	37	246	49	12	186	20
20 PLASTVAROR	287	6	36	3			216	309	102	39	14	53	5	2
21 PETROLEUM	141	85	44	3040	106	25	1409	1368	318	5188	114	250	416	773
22 JORD O STEN	197	106	17			3	6515	71	176				84	
23 JÄRN O STÅL	283	514	93				545							
24 I JÄRNMET	1005	29	508				1073	49						
25 METALLVAROR	221	881	114	67	2	14	5727	279	20	422	52	11	238	24
26 MASKINER	335	808	10	1098			1488	151		131	35	11		
27 TRANSPORTM		157					3	139		1310				
28 INSTRUMENT	25	43					17	22		3		12	2	
29 ELEKTRO	5298	168	20	183		17	1888	434	21	111	190		112	9
30 VARV		732								749				
31 AN TILLV	4		140				26	75	15	15	7	22	3	1
32 EL O VÄRME	191	64	30	637	2	64	184	989	109	528	219	124	618	559
33 GAS				16										
34 VATTEN	14	6	5			30							616	264
35 BYGGNAD	241	33	7	2126	24	299		494		1016	954		10628	838
36 VARUHANDEL	151	35	7											
37 HOTELL REST	65	10	6	17		2	111	738	14	202	63	200	34	22
38 SAMFÄRDSEL	285	38	18	25		2	2677	10242	34	8446	1061	288	6	2
39 POST O TELE	154	17	8	34		3	228	1118	31	496	609	1481	99	33
40 BANK O FÖRS	192	33	10	35	2	3	349	592	45	584	104	15883	654	332
41 BOSTÄDER														
42 FASTIGHETER	37	8	3				137	2234	336	183	351	996		
43 UPPDRAG	799	112	52	47		6	722	1859	76	850	492	1964	268	100
44 REPARATIONER	18	13	3	80	2	17	555	794	55	1835	47	29	51	22
45 ÖVR PR TJ	205	44	17	131		1	511	1220	150	518	256	301	3699	463
SUMMA	11420	4805	1892	7594	138	526	36821	26394	4986	25078	5233	22028	18070	3646

Table 3 (cont.)

Table 3 (cont.)

IOR VARA-BRANSCHMATRIS, INSATSDELEN

AR 1982 FASTA PRISER MOTTAGARPRIS

VARUSNI	143	144	145	SUMMA
01 JORDBR	2		146	16339
02 SKOGSBR				11138
03 FISKE				306
04 JÄRNGR				659
05 I JÄRNG				2256
06 RÅOLJA MM				16084
07 SK LIVS			205	8457
08 KONK LIVS			87	8013
09 DR TOBAK	15		27	1627
10 TEXTIL	32	72	103	5424
11 SÅGVERK	38		157	6612
12 TRÄVARU			141	11055
13 MASSA				3055
14 PAPPER	99	8	43	5555
15 PAPPV	38	8	416	5003
16 GRAFISK	1601	132	1601	12145
17 GUMMI	2	9	46	2948
18 KEMIK BASPL	36	44	265	15379
19 AN KEMISK	92	114	275	6275
20 PLASTVAROR	67	9	61	3024
21 PETROLEUM	434	84	292	23556
22 JORD O STEN		17		10100
23 JÄRN O STÅL				16772
24 I JÄRNMET			32	9078
25 METALLVAROR	7	57	140	17001
26 MASKINER	1	210	3	15339
27 TRANSPORTM		3698		13812
28 INSTRUMENT	111		36	1268
29 ELEKTRO	65	171	141	11857
30 VARV				1540
31 AN TILLV	167	7	26	631
32 EL O VÄRME	136	152	335	11630
33 GAS				57
34 VATTEN			52	1226
35 BYGGNAD		43	138	19379
36 VARUHANDEL				1534
37 HOTELL REST	151	36	290	2407
38 SAMFÄRDSEL	299	58	223	29295
39 POST O TELE	308	96	630	6509
40 BANK O FÖRS	227	70	208	21924
41 BOSTÄDER				
42 FASTIGHETER	1743	36	892	7518
43 UPPDRAG	4092	132	1169	18977
44 REPARATIONER	40	94	152	4817
45 ÖVR PR TJ	294	128	2254	12184
SUMMA	10097	5485	10586	399765

APPENDIX 3 AGGREGATION MATRIX

The 45 sector system does not allow for an exact specification (aggregation) of the sectors in MOSES (cf. Appendix 2 and IUI Working Paper No. 118, 1983, Appendix E). The distribution of commodities between MOSES sectors shown in the table below is no more than a quick quesstimate and can easily be improved.

BRANSCHINDELNING INSATS "45-NIVÅN"

Insats-kod IO	SNR	Benämning
101	1100	Jordbruk
102	1200	Skogsbruk
103	1300	Fiske
104	2100	Järnmalmsgruvor
105	2200	Icke järnmalmsgruvor
106	2300	Andra gruvor, mineralbrott
107	3111	Skyddad livsmedelsindustri
108	3112	Konkurrerande livsm.ind.
109	3120	Dryck- och tobaksindustri
110	3200	Textilindustri
111	3411	Sågverk
112	3412	Övrig trävaruindustri
113	3421	Massaindustri
114	3422	Pappers- och pappindustri
115	3423	Pappvaruindustri
116	3430	Grafisk industri
117	3510	Gummivaruindustri
118	3521	Kemikalie- och plastindustri
119	3522	Annan kemisk industri
120	3523	Plastvaruindustri
121	3530	Petroleumraff. Smörjmedel
122	3600	Jord- och stenvaruindustri
123	3710	Järn-, stål- o. ferroleg.verk
124	3720	Ickejärnmetallverk
125	3811	Metallvaruindustri
126	3812	Maskinindustri
127	3813	Transportm.ind. exkl. varv
128	3814	Instrumentindustri
129	3830	Elektroindustri
130	3843	Skeppsvarv
131	3900	Annan tillverkningsindustri
132	4100	El- och värmeverk
133	4200	Gasverk
134	4410	Vattenverk
135	5000	Byggnadsindustri
136	6100	Varuhandel
137	6300	Restaurang och hotell
138	7100	Samfärdsel
139	7200	Post- och televerk
140	81+82	Banker och försäkringsinst.
141	8300	Bostadsförvaltning
142	8400	Annan fastighetsförvaltning
143	8500	Uppdragsverksamhet
144	9510	Rep. av hushållsvaror o. fordon
145	9 övr.	Övriga privata tjänster

1986-01-16
T.N.

Aggregeringsmatris AMO (45,10)

IO45	MOSES-sektorer, Andelar av IO45 sektorer												SNR
	1	2	3	4	5	6	7	8	9	10			
Jord					1.0								1100
Skog					1.0								1200
Fiske					1.0								1300
Järnmalm						1.0							2100
Icke järnmalm						1.0							2200
Råolja, kol mm							1.0						2300
Slaktdad livsm.				1.0									3111
Konk. utsatt livsm.				1.0									3112
Dryck & tobak				1.0									3120
Textil		0.2	0.2	0.6									3200
Sågverk	1.0												3411
Övrig trä *)		0.50	0.25	0.25									3412
Massa	1.0												3421
Papper		1.0											3422
Pappvaror *		0.8		0.2									3423
Grafisk				1.0									3430
Gummi		0.8		0.2									3510
Plast & kemi		1.0											3521
Övr. kemi (läkem)		0.5		0.5									3522
Plastvaror		0.5		0.5									3523
Petroleum							1.0						3530
Jord & sten *)		0.9		0.1									3600
Järn & stål	0.5	0.5											3710
Icke järnverk	0.5	0.5											3720
	Råvaror	Insatsvaror	Investeringsvaror	Konsumtionsvaror	Jord, skog	Gruv	Olja	Byggnads	El	Privata tjänster			

IO45	1	2	3	4	5	6	7	8	9	10			SNR
	MOSES - sektorer; Andelar av IO45 sektorer												
25 Metallvaror *)		0.8	0.1	0.1									3811
26 Maskiner			1.0										3812
27 Transp.m.			1.0										3813
28 Instrument			1.0										3814
29 Elektro			1.0										3830
30 Varv			1.0										3843
31 Övr. tillv.				1.0									3900
32 El o värme									1.0				4100
33 Gas									1.0				4200
34 Vatten									1.0				4410
35 Byggnad								1.0					5000
36 Varuhandel										1.0			6100
37 Rest, hotell										1.0			6300
38 Samf.										1.0			7100
39 Post, tele										1.0			7200
40 Banker m.m										1.0			81+82
41 Bost. förv.										1.0			8300
42 Annan fast förv.										1.0			8400
43 Uppdragsverks.										1.0			8500
44 Reparationer										1.0			9510
45 Övr.										1.0			9 övr
	Råvaror	Insatsv.	Inv.varor	Kons.varor	Jord, skog	Gruv	Olja	Byggnads	El	Privstj.			

APPENDIX 4 AGGREGATION PROGRAM CODE (IO82.FOR), VARIABLES AND PRINT OUT

Besides the basic variables defined in Appendix 2 the following main variables are used:

VA(i) = value added in producers' prices

Y(i) = gross production in producers' prices (incl. residual)

AGG(i,j) = aggregation matrix (cf. Appendix 3).

FD NR,TINR are aggregate values (columnsums) of respective component of final demand and supply taken from National Accounts.

```
00100    C         PROGRAM IO82.FOR.
00200    C         KONTROLL OCH BEARBETNING AV SCB:S 45*45 MATRIS 1982
00300    C         INDATA FJ SCB82.DAT, KONTROLLDATA FJ KON82.DAT
00400    C         AGGREGERINGSMATRIS FJ AMO.DAT (AX.DAT)
00500    C         RESULTAT FJ MO82.DAT (X82.DAT)
00600    C         TILLÄGG GÅRS FÖR TURISTTJÄNSTER (EJ MED I SCB-MATRISEN)
00700    C         SEPARAT KOLUMN BILDAS FÖR HANDELSMARGINALER, MED NOLLOR I
00800    C         ALLA CELLER UTOM FÖR VARUHANDELN SOM GES VÄRDET MINUS
00900    C         SUMMA MARGINALER. DÄRMED KAN SUMMA HANDELSMARGINALER DIREKT
01000    C         SÄTTAS IN I CELLEN FÖR PRODUKTION I VARUHANDELN (36)
01100    C         TILL:1=PROD 2=OFS  3=IMP  4=TULL 5=HMAR 6=SVS
01200    C              7=SUB  8=MOM  9=HMAR
01300    C         FD:  1=LF   2=PK   3=INV  4=LAG  5=EXP  6=RES
01400    C         KORRIGERING TILL SENASTE AGGREGERADE NR-DATA
01500    C         GÅRS I TJÄNSTESEKTORN.
01600    C         NR-VÄRDEN FÖR FINAL DEMAND=FDNR(1-6),
01700    C         DITTO FÖR TILLFÖRSEL (EXKL BRUTTOPROD)=TINR(2-9),
01800    C         VÄRDEN LÄSES IN SIST I SCB82.DAT
01900             REAL FD(46,8),TILL(46,10),IO(46,46),VA(46),Y(46)
02000             REAL FD1(11,11),TILL1(11,10),IO1(11,11),VA1(11),IOX(11,46)
02100             REAL FDNR(6),TINR(9),AGG(45,10)
02200             OPEN(20,FILE='SCB82.DAT')
02300             OPEN(21,FILE='KON82.DAT')
02400             OPEN(30,FILE='AMO.DAT')
02500             OPEN(31,FILE='AX.DAT')
02600             OPEN(40,FILE='MO82.DAT')
02700             OPEN(41,FILE='X82.DAT')
02800    C        LÄS SCB-MATRISEN, TURISTTJÄNSTER OCH NR-DATA
02900    C        FIL-NUMMER FÖR AGGREGERINGSFIL (KFIL) ,FOR RESULTATFIL
03000    C        (IFIL) SAMT FOR DIMENSION  FOR AGRREGERAD MATRIS(IDIM)
03100    C        LIGGER FORST I SCB82.DAT.
03200             READ(20,'(3I)')KFIL,IFIL,IDIM
03300             DO 1 I=1,45
03400    1        READ(20,'(8F)')(TILL(I,J),J=1,8)
03500             DO 2 I=1,45
03600    2        READ(20,'(6F)')(FD(I,J),J=1,6)
03700             DO 3 I=1,45
03800             READ(20,'(11F)')(IO(I,J),J=1,11)
03900             READ(20,'(11F)')(IO(I,J),J=12,22)
04000             READ(20,'(11F)')(IO(I,J),J=23,33)
04100    3        READ(20,'(12F)')(IO(I,J),J=34,45)
04200    C        LÄS TURISTTJÄNSTER OCH KORRIGERA PRIV KONS, EXPORT OCH IMPORT
04300             READ(20,'(2F)')TUEX,TUIM
04400             FD(45,2)=FD(45,2)+TUIM-TUEX
04500             FD(45,5)=FD(45,5)+TUEX
04600             TILL(45,3)=TILL(45,3)+TUIM
```

```
04700    C        BILDA HANDELSMARGINALER FOR PRODUKTION I VARUHANDELN
04800             DO 24 I=1,45
04900    24       TILL(36,9)=TILL(36,9)-TILL(I,5)
05000             TILL(36,1)=TILL(36,1)-TILL(36,9)
05100    C        ********************************************************************
05200    C        BERÄKNING AV SUMMOR I SCB-MATRISEN
05300    C        ********************************************************************
05400    C        TILLFÖRSELMATRISEN
05500             DO 4 I=1,45
05600             DO 5 J=1,9
05700    5        TILL(I,10)=TILL(I,10)+TILL(I,J)
05800    4        TILL(46,10)=TILL(46,10)+TILL(I,10)
05900             DO 6 J=1,9
06000             DO 7 I=1,45
06100    7        TILL(46,J)=TILL(46,J)+TILL(I,J)
06200    6        SL5=SL5+TILL(46,J)
06300    C        IO-MATRISEN
06400             DO 9 I=1,45
06500             DO 9 J=1,45
06600    9        IO(I,46)=IO(I,46)+IO(I,J)
06700             DO 10 J=1,45
06800             DO 10 I=1,45
06900    10       IO(46,J)=IO(46,J)+IO(I,J)
07000             DO 12 I=1,45
07100    12       IO(46,46)=IO(46,46)+IO(I,46)
07200    C        FINAL DEMAND MATRISEN
07300             DO 15 I=1,45
07400             DO 16 J=1,6
07500    16       FD(I,7)=FD(I,7)+FD(I,J)
07600    15       FD(I,8)=IO(I,46)+FD(I,7)
07700             DO 18 I=1,45
07800             FD(46,7)=FD(46,7)+FD(I,7)
07900    18       FD(46,8)=FD(46,8)+FD(I,8)
08000             DO 20 J=1,6
08100             DO 21 I=1,45
08200    21       FD(46,J)=FD(46,J)+FD(I,J)
08300    20       SL3=SL3+FD(46,J)
08400             SL4=SL3+IO(46,46)
08500    C        KOLUMNSUMMOR I FD- OCH TILL-MATRISERNA KORRIGERAS TILL
08600    C        AKTUELLA NR-VÄRDEN. ÄVEN BRUTTOPRODUTKIONEN KORRIGERAS.
08700             READ(20,'(6F)')FDNR
08800             READ(20,'(8F)')(TINR(I),I=2,9)
08900             DO 26 I=1,6
09000             SS1=FDNR(I)-FD(46,I)
09100             S1=S1+SS1
09200             FD(45,I)=FD(45,I)+SS1
09300    26       FD(46,I)=FD(46,I)+SS1
```

```
      FD(45,7)=FD(45,7)+S1
      FD(46,7)=FD(46,7)+S1
      FD(45,8)=FD(45,8)+S1
      FD(46,8)=FD(46,8)+S1
      DO 27 I=2,9
      SS2=TINR(I)-TILL(46,I)
      S2=S2+SS2
      TILL(45,I)=TILL(45,I)+SS2
27    TILL(46,I)=TILL(46,I)+SS2
C     BRUTTOPRODUKTIONEN I TJ]NSTESEKTORN KORRIGERAS S] ATT
C     KORR ANV=KORR TILLF
      TILL(45,1)=TILL(45,1)+S1-S2
      TILL(46,1)=TILL(46,1)+S1-S2
      TILL(45,10)=TILL(45,10)+S1
      TILL(46,10)=TILL(46,10)+S1
C     BER[KNING AV BRUTTOPRODUKTION (MINUS RES) OCH F\R[DLINGSV[RDE
      DO 22 I=1,46
      Y(I)=TILL(I,1)-FD(I,6)
22    VA(I)=Y(I)-IO(46,I)
C     ====================================================================
C     UTSKRIFT AV SUMMOR I SCB-MATRISEN F\R KONTROLL
C     ====================================================================
      WRITE(21,'(/,A)')' TILLG]NG PER VARA:'
      DO 8 K=1,5
8     WRITE(21,'(9F8.0)')(TILL(I,10),I=(K-1)*9+1,K*9)
      WRITE(21,'(/,A,F8.0)')' SUMMA TILLG]NG=',TILL(46,10)
      WRITE(21,'(/,A)')' TILLG]NG PER KOMPONENT:'
      WRITE(21,'(9F8.0)')(TILL(46,J),J=1,9)
      WRITE(21,'(/,A,F8.0)')' SUMMA TILLG]NG=',SL5
      WRITE(21,'(/,A)')' INSATS PER VARA:'
      DO 11 K=1,5
11    WRITE(21,'(9F8.0)')(IO(I,46),I=(K-1)*9+1,K*9)
      WRITE(21,'(/,A,F8.0)')' SUMMA INSATS=',IO(46,46)
      WRITE(21,'(/,A)')' INSATS PER BRANSCH:'
      DO 13 K=1,5
13    WRITE(21,'(9F8.0')(IO(46,J),J=(K-1)*9+1,K*9)
      DO 14 J=1,45
14    SL2=SL2+IO(46,J)
      WRITE(21,'(/,A,F8.0)')' SUMMA INSATS=',SL2
      WRITE(21,'(/,A)')' FINAL DEMAND PER VARA:'
      DO 17 K=1,5
17    WRITE(21,'(9F8.0)')(FD(I,7),I=(K-1)*9+1,K*9)
      WRITE(21,'(/,A)')' ANV[NDNING PER VARA:'
      DO 19 K=1,5
19    WRITE(21,'(9F8.0)')(FD(I,8),I=(K-1)*9+1,K*9)
      WRITE(21,'(/,A,F8.0)')' SUMMA ANV[NDNING=',FD(46,8)
      WRITE(21,'(/,A)')' ANV[NDNING PER KOMPONENT:'
```

```
14100            WRITE(21,'(7F8.0)')IO(46,46),(FD(46,J),J=1,6)
14200            WRITE(21,'(/,A,F8.0,A,F8.0)')' SUMMA ANVINDNING=',SL4,
14300           1'      SUMMA FINAL DEMAND=',SL3
14400            WRITE(21,'(/,A)')'BRUTTOPRODUKTION (MINUS RES):'
14500            DO 25 K=1,5
14600    25      WRITE(21,'(9F8.0)')(Y(I),I=(K-1)*9+1,K*9)
14700            WRITE(21,'(/,A,F8.0)')' SUMMA BRUTTOPRODUKTION=',Y(46)
14800            WRITE(21,'(/,A)')' F\R[DLINGSV[RDE:'
14900            DO 23 K=1,5
15000    23      WRITE(21,'(9F8.0)')(VA(I),I=(K-1)*9+1,K*9)
15100            WRITE(21,'(/,A,F8.0)')' SUMMA F\R[DLINGSV[RDE=',VA(46)
15200    C       ...
15300    C       LIS AGGREGERINGSMATRIS AGG OCH IO-SYSTEMETS DIMENSION IDIM
15400    C       SAMT NUMMER P] UTSKRIFTSFILER.
15500    C       ...
15600            DO 55 K=1,45
15700    55      READ(KFIL,*)(AGG(K,I),I=1,IDIM)
15800    C       FINAL DEMAND-MATRISEN
15900            DO 80 J=1,8
16000            DO 80 I=1,IDIM
16100            DO 81 K=1,45
16200    81      FD1(I,J)=FD1(I,J)+AGG(K,I)*FD(K,J)
16300    80      FD1(IDIM+1,J)=FD1(IDIM+1,J)+FD1(I,J)
16400    C       TILLF\RSEL-MATRISELN
16500            DO 82 J=1,10
16600            DO 82 I=1,IDIM
16700            DO 83 K=1,45
16800    83      TILL1(I,J)=TILL1(I,J)+AGG(K,I)*TILL(K,J)
16900    82      TILL1(IDIM+1,J)=TILL1(IDIM+1,J)+TILL1(I,J)
17000    C       IO-MATRISEN RADVIS
17100            DO 84 J=1,46
17200            DO 84 I=1,IDIM
17300            DO 85 K=1,45
17400    85      IOX(I,J)=IOX(I,J)+AGG(K,I)*IO(K,J)
17500    84      IOX(IDIM+1,J)=IOX(IDIM+1,J)+IOX(I,J)
17600    C       IO-MATRISEN KOLUMNVIS
17700            DO 86 I=1,IDIM+1
17800            DO 86 J=1,IDIM
17900            DO 87 K=1,45
18000    87      IO1(I,J)=IO1(I,J)+AGG(K,J)*IOX(I,K)
18100    86      IO1(I,IDIM+1)=IO1(I,IDIM+1)+IO1(I,J)
18200    C       ...
18300    C       UTSKRIFT AV RESULTAT
18400    C       ...
18500            WRITE(IFIL,'(/,A)')' INSATS-MATRIS:'
18600            DO 100 I=1,IDIM+1
18700    100     WRITE(IFIL,'(11F7.0)')(IO1(I,J),J=1,IDIM+1)
```

```
18800             WRITE(IFIL,'(/,A)') ' ANVENDNINGS-MATRIS:'
18900             DO 101 I=1,IDIM+1
19000     101     WRITE(IFIL,'(I2,8F8.0)')I,(FD1(I,J),J=1,8)
19100             WRITE(IFIL,'(/,A)') ' TILLF\RSEL-MATRIS:'
19200             DO 102 I=1,IDIM+1
19300     102     WRITE(IFIL,'(I2,F8.0,8F7.0,F8.0)')I,(TILL1(I,J),J=1,10)
19400             END
```

APPENDIX 5 REFLATION PROGRAM CODE (MO82.FOR), VARIABLES AND PRINT OUT

Beside variables defined in Appendices 2 and 4 the following main variables are used:

TRB(i) = base year tax rate
TR(i) = current tax rate
VALP(i) = value added in current producers' prices
PVA(i) = ditto deflator
PH(i) = price of domestic demand excl. taxes.
PP(i) = adjustment factor for PH.

For IO, FD, TILL and Y the following rule applies. The letter "P" before the name denotes the corresponding price index. The letter "L" added at the end of the name denotes the corresponding value in current prices.

```
00100    C          PROGRAM MO82.FOR
00200    C          MATRIS AGGREGERADE TILL MOSES-NIV].
00300    C          HANDELSMARGINALER L[GGS IN I IO-MATRISEN (RAD 10)
00400    C          OCH ADDERAS TILL BRUTTOPRODUKTIONEN.
00500    C          D[RMED  INNEH]LLER S]VL TILLF\RSEL SOM ANV[NDNING
00600    C          DUBBELR[KANDE HANDELSMARGINALER. F\R[DLINGSV[RDE TILL
00700    C          PRODUCENTPRIS F]R R[TT V[RDE.
00800    C          SAMTLIGA INDIREKA SKATTER (INKL TULLAR) BELASTAR
00900    C          PRIVAT KONSUKTION OCH OFFENTLIG INSATSANV[NDNING.
01000              REAL FD(11,8),TILL(11,10),IO(11,11),VA(11),Y(11)
01100              REAL FDK(11,8),TILLK(11,10),IOK(11,11),SHARE(11)
01200              REAL T(11),TRB(11),TR(11),TL(11)
01300              REAL VALP(11),FDL(11,8),TILLL(11,10),IOL(11,11),YL(11)
01400              REAL PP(5),PH(11),PY1(11),PY(11),PFD(11,8),PTILL(11,10)
01500              REAL PVA(11),PT(11),HP(11),SL(11)
01600              OPEN(30,FILE='MO82.DAT')
01700              OPEN(31,FILE='PRIS82.DAT')
01800              OPEN(32,FILE='MOIO82.DAT')
01900    C         ================================================================
02000    C         BER[KNA OCH SKRIV UT F\RS\RJNINGSBALANSER I FASTA
02100    C         PRISER P] MOSES-FORMAT
02200    C         ================================================================
02300
02400    C         L[S IO-MATRISEN P] SCBFORMAT MED MOSESAGGREGAT
02500    C         OBS!!!! HANDELSMARGINALERNA I TJ[NSTESEKTORNS PRODUKTION!!
02600    C         (AGGREGERINGSPROGRAM IO82.FOR, UTSKRIFT P] MO82.DAT)
02700    C         INSATS-MATRIS
02800              READ(30,'(/)')
02900              DO 1 I=1,11
03000    1         READ(30,'(11F7.0)')(IO(I,J),J=1,11)
03100    C         ANV[NDNINGSMATRIS
03200              READ(30,'(/)')
03300              DO 2 I=1,11
03400    2         READ(30,'(I2,8F8.0)')K,(FD(I,J),J=1,8)
03500    C         TILLF\RSEL-MATRIS
03600              READ(30,'(/)')
03700              DO 3 I=1,11
03800    3         READ(30,'(I2,F8.0,8F7.0,F8.0)')K,(TILL(I,J),J=1,10)
03900    C         L[GG IN HANDELMARGINALER I IO-MATRISEN OCH BER[KNA
04000    C         BRUTTOPRODUTKION INKL RESIDUAL
```

```
04100           DO 4 I=1,11
04200           IO(10,I)=IO(10,I)+TILL(I,5)
04300           IO(11,I)=IO(11,I)+TILL(I,5)
04400    4      Y(I)=TILL(I,1)+TILL(I,5)-FD(I,6)
04500    C      SUMMERA INDIREKTA SKATTER
04600           DO 5 I=1,11
04700    5      T(I)=TILL(I,4)+TILL(I,6)+TILL(I,7)+TILL(I,8)
04800    C      BER[KNA F\R[DLINGSV[RDE OCH SKATTEKVOT
04900           DO 6 I=1,11
05000           IF(I.NE.6)TRB(I)=T(I)/(FD(I,1)+FD(I,2))
05100    6      VA(I)=Y(I)-IO(11,I)
05200    C      BER[KNA IO-KOEFFICIENTER MM
05300           DO 7 I=1,11
05400           DO 7 J=1,11
05500           IOK(I,J)=IO(I,J)/Y(J)
05600    7      IF(J.LE.5)FDK(I,J)=FD(I,J)/FD(11,J)
05700    C      BER[KNA N[RINGSLIVETS BNP
05800    C      TILLF\RSEL (INKL OFF F[RS[LJNING OCH SKATTER)
05900           DO 8 I=1,10
06000           BNPT=BNPT+VA(I)+TILL(I,2)+T(I)
06100    C      ANV[NDNING
06200    8      BNPA=BNPA+FD(I,1)+FD(I,2)+FD(I,3)+FD(I,4)+FD(I,5)-TILL(I,3)
06300           WRITE(32,'(/,A,2F10.0)') BNPT, BNPA:',BNPT,BNPA
06400           WRITE(32,'(/,A)') INSATS-MATRIS:'
06500           DO 9 I=1,11
06600    9      WRITE(32,'(11F7.0)')(IO(I,J),J=1,11)
06700           WRITE(32,'(/,A)') ANV[NDNINGS-MATRIS:'
06800           DO 10 I=1,11
06900           SL(I)=0
07000           DO 42 J=1,5
07100    42     SL(I)=SL(I)+FD(I,J)
07200    10     WRITE(32,'(I2,6F8.0)')I,(FD(I,J),J=1,6)
07300           WRITE(32,'(/,A)') TILLF\RSEL-MATRIS:'
07400           DO 11 I=1,11
07500    11     WRITE(32,'(I2,5F8.0,F8.4)')I,Y(I),TILL(I,2),TILL(I,3),T(I),
07600           1VA(I),TRB(I)
07700    C      ================================================================
07800    C      L[S NR-DATA MM F\R AVST[MNING
07900    C      ================================================================
08000           READ(31,'(5F)')(VALP(I),I=1,5)
```

```
08100           READ(31,'(6F)')(VALP(I),I=6,10),DVALP
08200           READ(31,'(5F)')(PFD(I,5),I=1,5)
08300           READ(31,'(5F)')(PFD(I,5),I=6,10)
08400           READ(31,'(5F)')(PTILL(I,3),I=1,5)
08500           READ(31,'(5F)')(PTILL(I,3),I=6,10)
08600           READ(31,'(8F)')(FDL(11,I),I=1,5),TILLL(11,3),TL(11),TILLL(11,2)
08700   C       KORRIGERINGAR
08800           DO 20 I=1,10
08900           VALP(11)=VALP(11)+VALP(I)
09000           SL1=SL1+PFD(I,5)*FD(I,5)
09100           IF(I.LE.4)SL2=SL2+PFD(I,5)*FD(I,5)
09200           SL3=SL3+PTILL(I,3)*TILL(I,3)
09300   20      IF(I.LE.4)SL4=SL4+PTILL(I,3)*TILL(I,3)
09400           DO 21 I=1,10
09500           VALP(I)=(1+DVALP/VALP(11))*VALP(I)
09600           IF(I.LE.4)PFD(I,5)=(1+(FDL(11,5)-SL1)/SL2)*PFD(I,5)
09700           IF(I.LE.4)PTILL(I,3)=(1+(TILLL(11,3)-SL3)/SL4)*PTILL(I,3)
09800           FDL(I,5)=PFD(I,5)*FD(I,5)
09900   21      TILLL(I,3)=PTILL(I,3)*TILL(I,3)
10000           VALP(11)=0
10100           DO 40 I=1,10
10200   40      VALP(11)=VALP(11)+VALP(I)
10300   C       ================================================
10400   C       BERÄKNING AV PRISER
10500   C       ================================================
10600   C       PRELIMINÄRA VÄRDEN
10700           DO 22 J=1,10
10800           SL1=0
10900           IF(J.LE.5)PP(J)=1
11000           DO 23 I=1,10
11100   23      SL1=SL1+IOK(I,J)*PFD(I,5)
11200           TR(J)=TRB(J)
11300           PY1(J)=VALP(J)/Y(J)+SL1
11400   22      PY(J)=VALP(J)/Y(J)+SL1
11500   C       ITERATIV LÖSNINGSALGORITM
11600           IX=0
11700   100     IX=IX+1
11800           DO 25 I=1,10
11900           HP(I)=IO(I,11)+(PP(1)*FD(I,1)+PP(2)*FD(I,2))*(1-TRB(I))+
12000          1PP(3)*FD(I,3)+PP(4)*FD(I,4)
```

```
12100    25      PH(I)=(PY(I)*(Y(I)+PP(5)*TILL(I,2))-FDL(I,5)+TILLL(I,3))/HP(I)
12200    C       BERIKNA SKATTEKVOT
12300            SL1=0
12400            SL3=0
12500            DO 26 I=1,10
12600            SL2=(PP(1)*FD(I,1)+PP(2)*FD(I,2))*(1-TRB(I))
12700            SL3=SL3+PH(I)*SL2/(1-TR(I))*TR(I)
12800            SL1=SL1+PH(I)*SL2/(1-TR(I))
12900    26      CONTINUE
13000            DO 27 I=1,10
13100            IF(I.NE.6)TR(I)=(TL(11)-SL3)/SL1+TR(I)
13200    27      CONTINUE
13300    C       BERIKNA PRISKORRIGERINGAR
13400            DO 28 I=1,5
13500    28      SL(I)=0
13600            DO 29 I=1,10
13700            DO 30 J=1,2
13800    30      SL(J)=SL(J)+PH(I)*PP(J)*(1-TRB(I))/(1-TR(I))*FD(I,J)
13900            SL(3)=SL(3)+PH(I)*PP(3)*FD(I,3)
14000            SL(4)=SL(4)+PH(I)*PP(4)*FD(I,4)
14100    29      SL(5)=SL(5)+PY(I)*PP(5)*TILL(I,2)
14200            DO 31 J=1,4
14300    31      PP(J)=FDL(11,J)/SL(J)*PP(J)
14400            PP(5)=TILLL(11,2)/SL(5)*PP(5)
14500            DO 34 J=1,10
14600            SL1=0
14700            DO 32 I=1,10
14800    32      SL1=SL1+IOK(I,J)*PH(I)
14900    34      PY(J)=VALP(J)/Y(J)+SL1
15000            IFOR=0
15100            DIFFS=0
15200            DO 33 I=1,10
15300            DIFF=((PY(I)-PY1(I))*10000)**2
15400            DIFFS=DIFFS+DIFF
15500    33      IF(DIFF.GE..1)IFOR=1
15600            IF(IX.GE.2)TYPE '(I3,F10.2)',IX,DIFFS
15700            IF(IFOR.EQ.0)GOTO 1000
15800            DO 35 I=1,10
15900            SL1=PY(I)
16000    35      PY1(I)=SL1
```

```
16100               GOTO 100
16200    1000       CONTINUE
16300               DO 36 I=1,10
16400               PVA(I)=VALP(I)/VA(I)
16500               HP(I)=IO(I,11)+(PP(1)*FD(I,1)+PP(2)*FD(I,2))*(1-TRB(I))+
16600               1PP(3)*FD(I,3)+PP(4)*FD(I,4)
16700    36         PH(I)=(PY(I)*(Y(I)+PP(5)*TILL(I,2))-FDL(I,5)+TILLL(I,3))/HP(I)
16800    C          ...
16900    C          UTSKRIFTER PÅ MOI082.DAT
17000    C          ...
17100               WRITE(32,'(//,A)') ' L\PANDE PRISER 1982:'
17200               DO 47 I=1,10
17300               YL(I)=PY(I)*Y(I)
17400               TILLL(I,2)=PP(5)*PY(I)*TILL(I,2)
17500               SL1=PP(1)*FD(I,1)+PP(2)*FD(I,2)
17600               SL2=(1-TRB(I))/(1-TR(I))
17700               TL(I)=TR(I)*PH(I)*SL2*SL1
17800               PFD(I,1)=PH(I)*PP(1)*SL2
17900               PFD(I,2)=PH(I)*PP(2)*SL2
18000               PFD(I,3)=PH(I)*PP(3)
18100               PFD(I,4)=PH(I)*PP(4)
18200               DO 52 J=1,4
18300    52         FDL(I,J)=PFD(I,J)*FD(I,J)
18400               DO 47 J=1,10
18500               IOL(I,J)=PH(I)*IO(I,J)
18600    47         IOL(I,11)=IOL(I,11)+IOL(I,J)
18700               DO 49 J=1,10
18800               DO 48 I=1,10
18900    48         IOL(11,J)=IOL(11,J)+IOL(I,J)
19000               YL(11)=YL(11)+YL(J)
19100    49         IOL(11,11)=IOL(11,11)+IOL(11,J)
19200               WRITE(32,'(/,A)') ' INSATS-MATRIS:'
19300               DO 50 I=1,11
19400    50         WRITE(32,'(11F7.0)')(IOL(I,J),J=1,11)
19500               WRITE(32,'(/,A)') ' F\RDLINGSVERDE:'
19600               WRITE(32,'(11F7.0)')VALP
19700               WRITE(32,'(/,A)')'BRUTTOPRODUKTION:'
19800               WRITE(32,'(11F7.0)')YL
19900               WRITE(32,'(/,A)') ' FINAL DEMAND-MATRIS:'
20000               WRITE(32,'(/,6(A9))')'OFFLF','PRIVK','INV','LAGER','EXPORT',
```

```
20100           1'SUM'
20200           DO 44 I=1,11
20300           DO 45 J=1,5
20400    45     FDL(I,6)=FDL(I,6)+FDL(I,J)
20500    44     WRITE(32,'(6F9.0)')(FDL(I,J),J=1,6)
20600           WRITE(32,'(/,A)')' TILLF\RSEL'
20700           WRITE(32,'(/,5(A9))')'PROD','OFS','IMP','IND SK','SUM'
20800           DO 41 I=1,11
20900           TILLL(I,5)=YL(I)+TILLL(I,2)+TILLL(I,3)+TL(I)
21000    41     WRITE(32,'(5F9.0)')YL(I),TILLL(I,2),TILLL(I,3),TL(I),TILLL(I,5)
21100           WRITE(32,'(A,5F6.3)')' PP',(PP(I),I=1,5)
21200           WRITE(32,'(A,10F6.3)')' PE ',(PFD(I,5),I=1,10)
21300           WRITE(32,'(A,10F6.3)')' PM ',(PTILL(I,3),I=1,10)
21400           WRITE(32,'(A,10F6.3)')' PY ',(PY(I),I=1,10)
21500           WRITE(32,'(A,10F6.3)')' PH ',(PH(I),I=1,10)
21600           WRITE(32,'(A,10F6.3)')' TRB',(TRB(I),I=1,10)
21700           WRITE(32,'(A,10F6.3)')' TR ',(TR(I),I=1,10)
21800           END
```