CHAPTER V

MOSES Macro Accounting System —Updating Procedures

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Contents

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 affect the macro development through demand for raw material and investment goods, labor etc. They also set guidelines for wages and prices for the whole economy. Developments outside industry, however, provide restrictions on the micro solutions 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. on 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 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 accounts are not directly consistent with the firm level data of the micro part of MOSES. The firms in each sector only make up 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 the 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. Efforts have been made to "model" even the residuals in MOSES. It is obvious, however, that too large residuals weaken the micro foundation of the macro results.

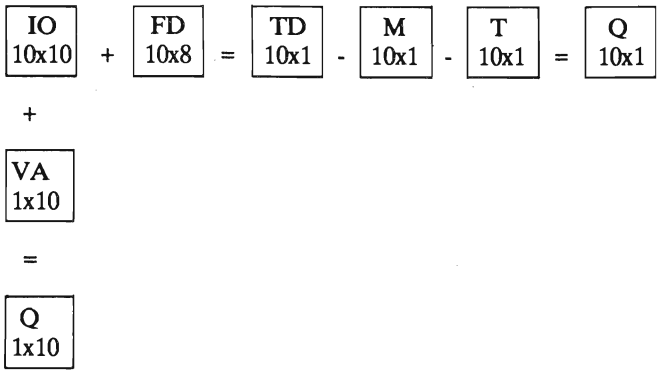
This paper deals with the specification and updating procedures of the macro accounting system of MOSES. A manual showing the use of data sources and programs for updating is given in Section 4. Before going into details, however, Section 2 will give some basic principles for the IO-system in the model, 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 built 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 MOSES) and no commodity is produced in more than one sector.

Following the format given in *MOSES Handbook*, Part 2, "The Initialization Process" (IUI Research Report No. 35, 1989) the layout of the commodity balances is 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 is given by the 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, are subtracted from total demand, we are left with domestic production of each commodity in producers' prices, Q. Q, however, is also the sum of the value in purchasers' prices of input into each sector, plus value added since each sector produces

Figure 1 Macro accounting system layout



one and only one commodity. This can be seen from the lower part of the figure, where the vertical sum of IO for each sector plus value added, VA, equal 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:

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

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

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

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

where *GDP* is given in purchasers' prices.

3. Data Sources

Commodity balances are regularly produced by the Central Bureau of Statistics in Sweden. Detailed primary data are, however, collected only every fifth year. 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 compiled 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 be used as an accounting framework for MOSES. It should be observed that even the larger IO-system will have to be extrapolated to fit the National Accounts for the base year of the model simulations.

Also, although commodities and sectors in MOSES are defined in a somewhat 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 for applications 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 are 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 customs 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 the 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 under way.) 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 have 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 balance available from the Central Bureau of Statistics in Sweden is written in FORTRAN. It is called I082.FOR and is stored 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 column sums of this system are printed on KON82.DAT to check correct punching of SCB82.DAT as well as consistency with the National Accounts (cf. below). The 45x10 aggregation matrix (cf. Appendix 3) is stored on AMD.DAT and the resulting l0x10 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 imports 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 made 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 the sum of final demand per commodity, while FD(I,8) is the 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 have been placed 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 entered by computing total supply and demand for each commodity etc. Also computation of column sums, e.g., total gross investments, allows checks against the National Accounts. Note that value added is computed as a residual. Differences in this sum compared to the National Accounts' estimates are easy indicators 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 price 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 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 IO82.FOR. 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 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 inputs 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 as tax base. This is again a short-cut which is acceptable

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 the National Accounts and aggregated to MOSES' sectors (this is done outside the program). Note that DVALP, a residual in the National Accounts, is distributed 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), the distribution of which is given by the FD-matrix. Preliminary deflators for exports and imports can be constructed from the National Accounts. Since it is not possible to identify exactly the MOSES sectors in the 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 sectors 1-4 since these sectors are more difficult to identify in the National Accounts than the other sectors (line 9600-9700). It should be emphasized that the program requires data inputs 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 brief 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, stockbuilding)
E_i = exports.

Note that trade margins are included in Y and IO.

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

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

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 and all variables in (1) are known. Among prices in (2) only PY and PH are unknown since PM and PE are computed directly from the 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 exogenous.

The equations (2) and (3) will determine PY and PH. However, to get a set of prices consistent with the National Accounts, we must also compute the deflator for FDA, i.e., in purchasers' prices. This deflator obviously differs from PB 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., $PFDA_i \cdot FDA_i = PH_i \cdot FDA_i \cdot (1\text{-}TRB_i) + TR_i \cdot PFDA_i \cdot FDA_i$. 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 taxcharged 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

$$P_i = PFDA_i/(1\text{-}TRB_i)$$

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

$$P_i = PH_i/(1\text{-}TR_i)$$

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

The relations (2)–(4) allow us 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 compatible 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 are in accordance with the National Accounts. Since changes in tax rates, in fact, differ 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, where more precise data from other sources are used. 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 rapidly—after 5–10 iterations. Line 10600 –11400 sets preliminary values for the 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, has been 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 those of the National Accounts. The PPs adjust prices PH to exact accordance with the 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 are 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 do 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.

Line 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 have changed differently from the others could be used to improve the accuracy 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.

Table 1 is the supply matrix called TILL in the programs. With i as commodity index the matrix also shows the 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 enterprises are recorded in the first columm 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

Year 1982	Fixed prices		Purchase values							
Intermediate use code IO	1	2	3	4		5	6	7	8	SUM
101[a)]	20186	53	4689	108	25036	4421	372	-4536	1667	26960
102	9585	365	712		10662	1229			90	11981
103	626		91		717	128		-16	73	902
104	1627		3		1630	48				1678
105	1173		981		2154	168				2322
106	1179	54	14359		15592	299			52	15943
107	26630	40	1305	228	28203	6150		-728	5017	38642
108	13333	32	4544	239	18148	5047	491	-183	2812	26315
109	3594		954	17	4565	3142	9225	-10	3046	19968
110	7941	52	10622	344	18959	10361			4577	33897
111	11480	28	318		11826	1461			42	13329
112	12802	28	1596	16	14442	3252			1040	18734
113	7384		256		7640	410				8050
114	13981		392		14373	975			60	15408
115	6237		872	4	7113	744	6		204	8067
116	16672	53	938		17663	1534	215		1072	20484
117	2194		1880	29	4103	764			259	5126
118	11723		9761	46	21530	1949			63	23542
119	9057	204	4825	12	14098	3660	182	-2520	1022	16442
120	3122		1349	12	4483	787	9		311	5590
121	16549		16190		32739	4621	8457		123	45940
122	7918		1910	18	9846	2035	34		211	12126
123	16263		4542	16	20821	2865			6	23692

124	7702		3862	4	11568	1416			2	12986
125	21686	115	7430	32	29263	2479	37		690	32469
126	32536		16238	166	48940	4343			516	53799
127	31463		11862	103	43428	5293	658		2414	51793
128	2998	65	3579	50	6692	1259			486	8437
129	19241		10582	187	30010	3904			1589	35503
130	7007		1099	2	8108	193			178	8479
131	1744	22	1566	21	3353	1843			699	5895
132	20279		989		21268		2404			23672
133	330				330					330
134	1564				1564					1564
135	74250				74250				5716	79966
136			2356		2356	1538				3894
137	9041	886			9927				1008	10935
138	45596	467	5904		51967		152		224	52343
139	14856		534		15390					15390
140	26061		34		26095					26095
141	52933				52933					52933
142	10966	363			11329					11329
143	29898	1270	2716		33884				964	34848
144	9933		34		9967				1435	11402
145	29103	1994	227		31324	610	1218		367	33519
Sum	670443	6091	152101	1654	830289	78928	23460	-7993	38035	962719

a) For sector codes 100-145 see p. 307.

Note: 1 = Gross production in producer prices (excl. residual); 2 = sales of market products from the public sector; 3 = imports cif; 4 = customs duties and import levels; 5 = trade margins; 6 = commodity taxes; 7 = subsidies; 8 = value added taxes.

Table 2 Final demand matrix

Year 1982	Fixed prices	Purchase values						
Intermediate use code IO	Inputs	1	2	3	4	5	6	SUM
101[a)]	16339	405	8844	322	82	1251	-283	26960
102	11138		498	653	427	150	-885	11981
103	306	9	397			334	-144	902
104	659				46	1014	-41	1678
105	2256				-3	694	-625	2322
106	16084	206	107		222	356	-1032	15943
107	8457	1860	26450		69	1544	262	38642
108	8013	523	15343		5	1272	1159	26315
109	1627	24	17253		35	139	890	19968
110	5424	935	25305	256	98	3738	-1859	33897
111	6612	88	39		-489	7002	77	13329
112	11055	395	5302	844	-287	3193	-1768	18734
113	3055				15	4955	25	8050
114	5555	242	82		-4	10277	-744	15408
115	5003	368	748		-131	2391	-312	8067
116	12145	1991	5227		6	654	461	20484
117	2948	127	1353		-50	873	-125	5126
118	15379	82	360		333	5539	1849	23542
119	6275	2370	5100		16	3824	-1143	16442
120	3024	449	1291		-5	914	-83	5590
121	23556	2408	15340		-808	6313	-869	45940
122	10100	317	940		-202	1564	-593	12126
123	16772	82	45		-724	8504	-987	23692

124	9078	85	19		-28	3618	214	12986
125	17001	857	2267	3249	-505	7037	2563	32469
126	15339	1394	984	15508	-1225	22571	-772	53799
127	13812	1893	11931	6090	-689	19689	-933	51793
128	1268	709	1579	2168	-65	2362	416	8437
129	11857	1486	5958	5008	-960	10849	1305	35503
130	1540	487	991	1828	-279	3907	5	8479
131	631	418	3510	69	-81	944	404	5895
132	11630	2076	9574			384	8	23672
133	57	4	120				149	330
134	1226	307					31	1564
135	19379	3771		56816				79966
136	1534					1538	822	3894
137	2407	821	7410				297	10935
138	29295	3273	7401			12880	-506	52343
139	6509	1658	4530			497	2196	15390
140	21924	243	2425			14	1489	26095
141			52933					52933
142	7518	2893	749				169	11329
143	18977	5157	477	6422		6301	-2486	34848
144	4817	277	6366			82	-140	11402
145	12184	3070	18879			492	-1106	33519
SUM	399765	43760	268127	99233	-5181	159660	-2645	962719

[a] For sector codes 100-145 see page 307.

Note: 1 = use of intermediate goods in the public sector; 2 = private consumption; 3 = gross investments
4 = stock building; 5 = exports; 6 = residual between supply and demand.

Table 3 Goods-sector matrix, inputs

Year 1982	Fixed prices		Purcharse values											
Intermediate use code IO	101	102	103	104	105	106	107	108	109	110	111	112	113	114
101[a)]	639						11143	3516	320	80		3		
102	19	398			2			27		7	5257	561	2270	2322
103	33						2	198						
104				164										
105					12									
106	142			5	2	67				4			10	190
107	81						4810	1008	83	148				
108	3370		9				496	3035	92	2		4	6	63
109								2	519					
110	67	73	39	9	35		54			2551		278	48	239
111			1			3	6			4	881	1457	961	788
112	42	46	24		27			23	8	14	40	1976	20	222
113										3			14	2886
114	43	6	4				158	77	51	55		19	2	568
115	8			1		4	245	314	74	53	1	162	8	129
116	25	13		3	4	6	33	43	41	39	44	63	13	58
117	53	33		1			5		5	10		3		
118	1500	25		14	42	8	146	276	22	419	57	588	557	696
119	61		9	19	16	35	7	44	24	27	58	209	5	89
120	2	4		1	2	8	169	164	54	62		37		4
121	673	202	87	81	35	25	374	184	57	195	140	155	242	728
122	69			33	24	11	11	97	125	12		379	24	46
123				7							22	27	25	52

124							8	106	10			4		
125	54	54	2	24	43	14	39	217	340	68	209	592	106	129
126	619	327		39	38	75	33	22	12	120	79	27	113	157
127				4	6									
128														
129			2	3	4		5	8	2	6	35	33	36	145
130			41											
131										35				2
132	482	40		131	106	79	227	106	33	102	212	170	444	1243
133							3							
134				1		4	16	10	2	11	22	9	5	14
135	843	108		57	45	6	118	54	23	38	45	50	53	103
136							13	12	1	31	73	29	96	123
137				4	3		19	12	6	21	8	18	7	16
138	216	761	6	410	70	69	448	246	80	99	283	272	27	82
139	15	3		4	6	2	46	46	8	41	19	45	10	33
140	322	21	8	30	29	3	149	100	39	57	57	97	72	227
141														
142				5	3	2	77	42	9	22	23	19	16	28
143	207	25		16	20	3	357	216	104	227	121	258	78	215
144	210	39		14	15	4	100	20	14	17	89	43	22	18
145	95	3		9	3	1	135	44	10	66	64	88	34	91
SUM	9890	2181	232	1089	592	429	19452	10269	2168	4646	7839	7675	5324	11706

[a] For sector codes 100-145 see p. 307.

Table 3 Goods–sector matrix, inputs (cont.)

Year 1982	Fixed prices		Purchase values											
Intermediate use code IO	115	116	117	118	119	120	121	122	123	124	125	126	127	128
101			75	2	21									
102	42			3	39			2	3		7			1
103														
104									495					
105								25	385	1423	409	2		
106			4	285	20		13723	604	74	23	4	4	10	
107				1	139			7						
108			4	104	88									
109				28	28	1								
110		4	193	13	4	7		9	54		20	167	345	17
111	76		2	2	22			9			45	18	182	3
112	8	4	11	2				47	64	8	216	207	699	4
113	16			123		4								
114	1512	2209	1	34	32	30	18	43	2	6	7	12	40	
115	597	880	1	72	262	64		45	2		71	109	59	10
116	12	3915	10	46	188	35	59	82	41	2	130	229	133	22
117		18	240	13				6	1		5	351	919	19
118	334	21	301	4164	1318	1277	178	251	169	161	169	132	147	
119	87	291	24	151	1160	1	84	10	25	3	561	132	263	14
120	21	18		76	164	50	21	58	2		90	442	360	6
121	78	101	56	1373	292	40	985	510	1621	107	337	349	424	18
122	4	3	2	23	68	11	51	1075	243	19	108	162	299	15
123	7	3		3		16	4	168	5940	13	4032	2617	2362	39

124	9	1		55	154	2		15	468	3756	991	293	457	53
125	9	64	57	49	164	5	157	103	336	465	2247	2027	1116	35
126	9	27	16	226	36	56	206	41	376	49	356	6311	1646	42
127											4	201	8290	
128		4		3	4						39	173	266	508
129	7	4	4	38	6	10	47	30	157	5	246	703	1366	127
130													18	
131		4	2		6					60	3	8	3	
132	97	95	45	602	96	101	68	250	819	262	318	285	261	15
133		3							29		4	2		
134		6	2	12	5	2	44	7	8	1	17	21	18	2
135	25	80	15	44	62	25	18	67	108	37	127	206	169	12
136	47	6	8	68	40	8	55	18	89	30	85	244	239	26
137	7	37	7	23	29	6		20	23	6	39	76	51	8
138	80	181	33	110	152	67	9	257	303	89	341	452	421	27
139	23	247	12	33	47	12	20	39	48	18	88	168	112	19
140	104	91	24	64	83	27	100	83	181	59	145	240	163	26
141														
142	13	17	5	22	17	4	23	20	35	13	37	50	56	4
143	127	1090	74	194	292	74	77	226	279	92	382	619	762	102
144	6	30	5	16	17	7	5	52	31	9	50	57	115	5
145	15	307	28	37	50	29	21	55	98	15	177	275	212	30
SUM	3372	9761	1261	8114	5105	1971	15973	4234	12509	6731	11907	17344	21983	1209

Table 3 Goods—sector matrix, inputs (cont.)

Year 1982	Fixed prices		Purchase values											
Intermediate use code IO	129	130	131	132	133	134	135	136	137	138	139	140	141	142
101							77		241			2	62	10
102			15				128						35	
103									73					
104														
105														
106	10		52	5		8	775						52	11
107			14						1379	582				
108									653					
109									947	60				
110	16	68	64				360	150	55	175	72	31		
111	4	151	140	5			1313			140			194	10
112	62	105	26				6398	326	13	235	37			
113				9										
114	52	1	62	3			112	77	3	119	9	33	3	2
115	119	2	25	3			402	690	41	21	12	45	5	5
116	191	46	38	19		4	327	1673	42	272	486	280		144
117	135	18	35	5			187	227		602				
118	596	296	131	6		22	988	23						
119	87	176	142			6	1373	51	37	246	49	12	186	20
120	287	6	36	3			216	309	102	39	14	53	5	2
121	141	85	44	3040	106	25	1409	1368	318	5188	114	250	416	773
122	197	106	17			3	6515	71	176				84	
123	283	514	93				545							

124	1005	29	508				1073	49						
125	221	881	114	67	2	14	5727	279	20	422	52	11	238	24
126	335	808	10	1098			1488	151		131	35	11		
127		157					3	139		1310				
128	25	43					17	22		3		12	2	
129	5298	168	20	183		17	1888	434	21	111	190		112	9
130		732								749				
131	4		140				26	75	15	15	7	22	3	1
132	191	64	30	637	2	64	184	989	109	528	219	124	618	559
133				16										
134	14	6	5			30							616	264
135	241	33	7	2126	24	299		494		1016	954		10628	838
136	151	35	7											
137	65	10	6	17		2	111	738	14	202	63	200	34	22
138	285	38	18	25		2	2677	10242	34	8446	1061	288	6	2
139	154	17	8	34		3	228	1118	31	496	609	1481	99	33
140	192	33	10	35	2	3	349	592	45	584	104	15883	654	332
141														
142	37	8	3				137	2234	336	183	351	996		
143	799	112	52	47		6	722	1859	76	850	492	1964	268	100
144	18	13	3	80	2	17	555	794	55	1835	47	29	51	22
145	205	44	17	131		1	511	1220	150	518	256	301	3699	463
SUM	11420	4805	1892	7594	138	526	36821	26394	4986	25078	5233	22028	18070	3646

Table 3 Goods—sector matrix, inputs (cont.)

Year 1982	Fixed prices		Purchase values	
Intermediate use code IO	143	144	145	SUM
101	2		146	16339
102				11138
103				306
104				659
105				2256
106				16084
107			205	8457
108			87	8013
109	15		27	1627
110	32	72	103	5424
111	38		157	6612
112			141	11055
113				3055
114	99	8	43	5555
115	38	8	416	5003
116	1601	132	1601	12145
117	2	9	46	2948
118	36	44	265	15379
119	92	114	275	6275
120	67	9	61	3024
121	434	84	292	23556
122		17		10100
123				16772

124			32	9078
125	7	57	140	17001
126	1	210	3	15339
127		3698		13812
128	111		36	1268
129	65	171	141	11857
130				1540
131	167	7	26	631
132	136	152	335	11630
133				57
134			52	1226
135		43	138	19379
136				1534
137	151	36	290	2407
138	299	58	223	29295
139	308	96	630	6509
140	227	70	208	21924
141				
142	1743	36	892	7518
143	4092	132	1169	18977
144	40	94	152	4817
145	294	128	2254	12184
SUM	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 *MOSES Handbook*, IUI Research Report No. 35, Stockholm 1989). The distribution of commodities between MOSES sectors shown in the table below can be further improved.

Classification of economic activities – intermediate use "45-level"

Intermediate use code IO	SNR group	Title of category
101	1100	Agriculture, hunting
102	1200	Forestry and logging
103	1300	Fishing
104	2100	Iron ore mining
105	2200	Non-ferrous ore mining
106	2300	Coal mining, crude petroleum production, other mining and quarrying
107	3111	Protected food manufacturing
108	3112	Import-competing food manufacturing
109	3120	Manufacture of beverages and tobacco
110	3200	Textile, wearing apparel and leather industries
111	3411	Saw mills, planing mills, wood preserving plants
112	3412	Prefabrication of wooden building materials, manufacture of wooden packaging products, furniture and other manufacture of wooden products
113	3421	Wood pulp industries
114	3422	Manufacture of paper and paperboard
115	3423	Manufacture of fibreboards, containers and boxes of paper and paperboards; others
116	3430	Printing, publishing and allied industries
117	3510	Manufacture of rubber products
118	3521	Manufacture of industrial chemicals, fertilizers and plastic materials
119	3522	Manufacture of other chemical products
120	3523	Manufacture of plastic products
121	3530	Petroleum refining and manufacture of products of petroleum and coal
122	3600	Manufacture of non-metallic mineral products, except products of petroleum and coal
123	3710	Iron and steel basic industries
124	3720	Non-ferrous metal basic industries
125	3811	Manufacture of fabricated metal products except machinery and equipment
126	3812	Manufacture of machinery and equipment except electrical
127	3813	Manufacture of transport equipment except ship building
128	3814	Manufacture of professional and scientific measuring and controlling equipment and of photographic and optical goods, watches and clocks
129	3830	Manufacture of electrical machinery, apparatus, appliances and supplies
130	3843	Ship building and repairing
131	3900	Other manufacturing industries incl. public semi-industrial activities
132	4100	Electric light and power, steam and hot water supply
133	4200	Gas manufacture and distribution
134	4410	Water works and supply
135	5000	Construction
136	6100	Wholesale and retail trade
137	6300	Restaurants and hotels
138	7100	Transport and storage
139	7200	Communication
140	81+82	Financial institutions and nominal industry for unallocated banking services. Insurance
141	8300	Letting of dwellings and use of owner-occupied dwellings
142	8400	Letting of other premises
143	8500	Business services
144	9510	Repair services not elsewhere classified
145	9other	Other personal services

SNR group	MOSES Macro Sectors									
	1	2	3	4	5	6	7	8	9	10
1100					1.0					
1200					1.0					
1300					1.0					
2100						1.0				
2200						1.0				
2300							1.0			
3111				1.0						
3112				1.0						
3120				1.0						
3200		0.2	0.2	0.6						
3411	1.0									
3412		0.5	0.25	0.25						
3421	1.0									
3422		1.0								
3423		0.8		0.2						
3430				1.0						
3510		0.8		0.2						
3521		1.0								

3522		0.5		0.5						
3523		0.5		0.5						
3530							1.0			
3600		0.9		0.1						
3710	0.5	0.5								
	Raw material	Inter-mediate goods	Investment goods, consumer durables	Consumption goods (excl. durables)	Agriculture, forestry, fishing	Mining and quarrying	Oil	Construc-tion	Electricity	Other services

	MOSES Macro Sectors									
SNR group	1	2	3	4	5	6	7	8	9	10
3720	0.5	0.5								
3811		0.8	0.1	0.1						
3812			1.0							
3813			1.0							
3814			1.0							
3830			1.0							
3843			1.0							
3900				1.0						
4100									1.0	
4200									1.0	
4410									1.0	
5000								1.0		
6100										1.0
6300										1.0
7100										1.0
7200										1.0
81+82										1.0

8300										1.0
8400										1.0
8500										1.0
9510										1.0
9other										1.0
	Raw material	Inter-mediate goods	Investment goods, consumer durables	Consumption goods (excl. durables)	Agriculture, forestry, fishing	Mining and quarrying	Oil	Construc-tion	Electricity	Other services

APPENDIX 4 Aggregation Program Code (IO82.FOR), Variables, and Print Out

Beside the basic variables defined in Appendix 2 the following main variables have been used:

VA(i) = value added in producers' prices
Y(i) = gross production in producers' prices (incl. residual)
GG(i,j) = aggregation matrix (cf. Appendix 3).

22FD, NR, TINR are aggregate values (column sums) of respective component of final demand and supply taken from the National Accounts.

```
00100    C        PROGRAM IO82.FOR.
00200    C        KONTROLL OCH BEARBETNING AV SCB:S 45*45 MATRIS 1982
00300    C        INDATA P] SCB82.DAT, KONTROLLDATA P] KON82.DAT
00400    C        AGGREGERINGSMATRIS P] AMO.DAT (AX.DAT)
00500    C        RESULTAT P] MO82.DAT (X82.DAT)
00600    C        TILL[GG G\RS F\R TURISTTJ[NSTER (EJ MED I SCB-MATRISEN)
00700    C        SEPARAT KOLUMN BILDAS F\R HANDELSMARGINALER, MED NOLLOR I
00800    C        ALLA CELLER UTOM F\R VARUHANDELN SOM GES V[RDET MINUS
00900    C        SUMMA MARGINALER. D[RMED KAN SUMMA HANDELSMARGINALER DIREKT
01000    C        S[TTAS IN I CELLEN F\R 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        G\RS I TJ[NSTESEKTORN.
01600    C        NR-V[RDEN F\R FINAL DEMAND=FDNR(1-6),
01700    C        DITO F\R TILLF\RSEL (EXKL BRUTTOPROD)=TINR(2-9),
01800    C        V[RDEN L[SES 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        L[S SCB-MATRISEN, TURISTTJ[NSTER OCH NR-DATA
02900    C        FIL-NUMMER F\R 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
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        TILLFÄLLSELMATRISEN
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        SLS=SLS+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+I0(46,46)
08500    C       KOLUMNSUMMOR I FD- OCH TILL-MATRISERNA KORRIGERAS TILL
08600    C       AKTUELLA NR-VIRDEN. [VEN 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
09500            FD(46,7)=FD(46,7)+S1
09600            FD(45,8)=FD(45,8)+S1
09700            FD(46,8)=FD(46,8)+S1
09800            DO 27 I=2,9
09900            SS2=TINR(I)-TILL(46,I)
10000            S2=S2+SS2
10100            TILL(45,I)=TILL(45,I)+SS2
10200    27      TILL(46,I)=TILL(46,I)+SS2
10300    C       BRUTTOPRODUKTIONEN I TJINSTESEKTORN KORRIGERAS S] ATT
10400    C       KORR ANV=KORR TILLF
10500            TILL(45,1)=TILL(45,1)+S1-S2
10600            TILL(46,1)=TILL(46,1)+S1-S2
10700            TILL(45,10)=TILL(45,10)+S1
10800            TILL(46,10)=TILL(46,10)+S1
10900    C       BER[KNING AV BRUTTOPRODUKTION (MINUS RES) OCH F\R[DLINGSVIRDE
11000            DO 22 I=1,46
11100            Y(I)=TILL(I,1)-FD(I,6)
11200    22      VA(I)=Y(I)-I0(46,I)
11300    C       ================================================================
11400    C       UTSKRIFT AV SUMMOR I SCB-MATRISEN F\R KONTROLL
11500    C       ================================================================
11600            WRITE(21,'(/,A)') TILLG]NG PER VARA:'
11700            DO 8 K=1,5
11800    8       WRITE(21,'(9F8.0)')(TILL(I,10),I=(K-1)*9+1,K*9)
11900            WRITE(21,'(/,A,F8.0)') SUMMA TILLG]NG=',TILL(46,10)
12000            WRITE(21,'(/,A)') TILLG]NG PER KOMPONENT:'
12100            WRITE(21,'(9F8.0)')(TILL(46,J),J=1,9)
12200            WRITE(21,'(/,A,F8.0)') SUMMA TILLG]NG=',SL5
```

```
12300           WRITE(21,'(/,A)') ' INSATS PER VARA:'
12400           DO 11 K=1,5
12500    11     WRITE(21,'(9F8.0)')(IO(I,46),I=(K-1)*9+1,K*9)
12600           WRITE(21,'(/,A,F8.0)') ' SUMMA INSATS=',IO(46,46)
12700           WRITE(21,'(/,A)') ' INSATS PER BRANSCH:'
12800           DO 13 K=1,5
12900    13     WRITE(21,'(9F8.0')(IO(46,J),J=(K-1)*9+1,K*9)
13000           DO 14 J=1,45
13100    14     SL2=SL2+IO(46,J)
13200           WRITE(21,'(/,A,F8.0)') ' SUMMA INSATS=',SL2
13300           WRITE(21,'(/,A)') ' FINAL DEMAND PER VARA:'
13400           DO 17 K=1,5
13500    17     WRITE(21,'(9F8.0)')(FD(I,7),I=(K-1)*9+1,K*9)
13600           WRITE(21,'(/,A)') ' ANVÄNDNING PER VARA:'
13700           DO 19 K=1,5
13800    19     WRITE(21,'(9F8.0)')(FD(I,8),I=(K-1)*9+1,K*9)
13900           WRITE(21,'(/,A,F8.0)') ' SUMMA ANVÄNDNING=',FD(46,8)
14000           WRITE(21,'(/,A)') ' ANVÄNDNING PER KOMPONENT:'
14200           WRITE(21,'(/,A,F8.0,A,F8.0)') ' SUMMA ANVÄNDNING=',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)') ' FÖRÄDLINGSVÄRDE:'
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 FÖRÄDLINGSVÄRDE=',VA(46)
15200    C      ================================================================
15300    C      LÄS AGGREGERINGSMATRIS AGG OCH IO-SYSTEMETS DIMENSION IDIM
15400    C      SAMT NUMMER PÅ 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)
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 have been 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]V[L 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       BERÄKNA 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       BERÄKNA 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 PJ 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\R[DLINGSV[RDE:'
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
```