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A Social Accounting Matrix For Egypt

by

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1. Introduction:

This paper relied heavily on the ruslts of a larger research work on Multisector General Equilibrium Models for Egypt, which has been a phase of the project on Improved Methods of Macro economic and Sectoral Planning. The project was started in 1977 as part of the Cairo University /MIT technological Planning program. The auther of the present monograph is a member of the project team. The results of the research undertaken have not been published elsewhere. Only a draft has been made available for purposes of comments and discussion. The leaders of the project are Professor R.S.Eckaus of MIT, and Professor Amr Mohie Eldin of Cairo University. Neither of them nor any of the project team members bears any responsibility for the form of the present paper.

The present paper is devoted to sketching how a social accounting matrix (SAM) can provide a useful vehicle for organizing the data. This helps in designing an analytical scheme that can fit the available data, and give policy-relevant information. Thus, a general equilibrium model (GEM) has been built around the SAM. The requisites lead us to set up the data for the SAM around the Leontief type of an input-output table. Section 2 outlines the operations that were carried out to update an I/O table for 1976 SAM. Section 3 then describes the structure of the SAM for Egypt, and section 4 introduces the logic of constructing GEM using the SAM.

Yet, the GEM models and the data which they embody, represent a major potential advance for economic policymaking for Egypt. Some of the data have never before been estimated for Egypt and all of it has never before been organized in a consistent Social Accounting Matrix. Nor has an explicit model structure of this type ever been constructed for Egypt and solutions computed. However, further improvement and expansion of this work is quite persistent and fruitful.

2. Updating The Input-Output Table for 1976:

The 12x12 Input-Output table for 1976 was based on the 1970/71 27x27 Input-Output table. It represents an aggregation of the latter table and then was transformed to fit 1976 final demand vector. The 1970/71 Input-Output table was constructed according to the rows method and not by columns. This methodology was adopted because estimatation of the I/O table depends on the data available from estimates of commodity balances of physical production.

In order to make the 27x27 1970/71 Input-Output consistent with the 12 sector social accounting matrix and the model used, three operations were carried out.

1. The restructuring of the 1970/71 Input-Output table to transform it into a 12x12 table.

This needed disaggregation of certain sectors and the aggregation of others to fit the new sectoral classification. It was also necessary to take into account types of production activities which had been created after 1970/71, such as the new steel complex, the aluminum complex and the reopening of the Suez Canal.

2. The transformation of values of the flows in 1970/71 table to 1976 prices by using index numbers of production.

The rows were multiplied by index number of prices and the columns by index number of quantities and the consistency of the results were checked.

3. Adjustment of the new 12x12 table at 1976 prices to be consistent with 1976 final demand vector as obtained from actual national income accounts. This was carried out through the R.A.S. method.

3. Structure of the Social Accounting Matrix

The structure of the matrix that we used is set out schematically at the end of this note. It is composed of 40 rows and 40 columns. In the north western block of the matrix (Block No. I) is the interindustry matrix, composed of twelve sectors which represent an aggregation of the original 27X27 input-output table. These twelve sectors are:

1. Staple food
2. Non-staple food
3. Cotton
4. Other agriculture
5. Food processing industries
6. Textile industries
7. Other industries
8. Construction
9. Crude oil & products
10. Transport & Communication
11. Housing services
12. Other services

The final private consumption demands in block two (columns 15-20 and 21) are assumed to come from six socioeconomic classes. There are three income classes distinguished for urban and rural consumers separately with income recipients divided among the lowest 60%, the middle 30%, and the top 10%, of the household distribution in each case. However it should be noted that "rural" in this distinction of income classes means just the agricultural population and agricultural incomes. The final demands of the government sector were subdivided into three categories (columns 22 to 24): the public sector, conventional government, and the government trading sector. These categories made it possible to distinguish quite different types of activities. The special emphasis on government trading sector is justified because through that sector the activities of the general supply authority are carried out by means of which basic consumer necessities are provided to the house-hold sector in the ration shops (consumer cooperative and where sub-sidies are incurred..

The final demands also include exports (column 25,26, & 27), which cover the government trade exports, a price differential realiz-ed on government trade exports and other exports. The next component of final demand is capital formation or final investment demands(columns 24 to 38) which is divided into private investment, the investment corresponding to the three sectors of the government and foreign in-vestment. However, in the present matrix, due to the unavailability of the necessary data, all investments are aggregated into a single category of total investment (column 40).

The last final demand vector is inventory investment or the change in stocks (DTS) in column 30.

Columns from 28 to 33 represent import tariffs, indirect taxes, direct taxes, and transfers. There are four rows that correspond to these columns. The final column, 40, is gross production of the sectors concerned.

After the rows for each of the first twelve producing sectors, row 13 of Block I, the inter-industry flow matrix, represents the total inputs into the 12 sectors.

Row 14 represents gross value added of the twelve sectors concerned. It is disaggregated in rows 21 and 22. Row 21, though "household value added", actually represents the gross income of the household sector. Thus, this row includes both value added in the private sector and wages generated in the government and the public sectors. Row 22 then represents just the surplus of public sector enterprise. Part of it is retained by the public sector, the other is transferred to the government. However, we treat it as one unit in row 22 which corresponds to column 22 of the SAM.

Corresponding to the columns 15 to 20 which represent household consumption of the six socioeconomic classes, rows 15 to 21 represent, the gross income of the households from each sector distributed among the six socioeconomic groups. Added to that in row 22 under column 26 there are remittances of Egyptians abroad which are treated here as a household export. This is also distributed among the five income classes and added to the gross income which appears in column 41 corresponding to rows 15 to 2 .

Rows 23 and 24 represent the two rows corresponding to columns 23 and 24. Row 23 is conventional government revenue derived from import tariffs, indirect taxes, direct taxes and other revenues. The government trade row, 24, represents revenue from sales of intermediate goods by the government to producing sectors and sales directly to the household sector, box 24, 21, which is again distributed among the six socioeconomic classes. Row 24 also includes government direct sales abroad, i.e., government exports.

Row 23 and column 23 must balance and the balancing item is government deficit which appears in the box in row 36 column 23. An analogous balancing must occur with government trade purchases in column 24 and government trade sales in row 24: the balancing item in this case is government trade deficit, in the box in column 37 and row 24.

Row 27, represents total imports which are subdivided into rows 25 and 26. Row 25 represents government trade imports which are imports directly by the government. Imports in this row corresponding to columns 1 to,12 represent intermediate imports for the twelve sectors. They are treated here as non-competitive imports, i.e., as if none of them are producible domestically and so are not competitive with domestic production. There is also government trade imports directly to the household sector in row 24, column 21 which is again divided among the six income classes.

The second type of imports in row 26 are "other imports". These include: first, both public sector and household imports - imports in the row corresponding to columns 1 to 12 represent intermediate goods; second, direct imports to the household sector in the box in row 26, column 21, which is again divided among the six income classes as part of their expenditure. Rows 28 to 32 represent types of government revenues. Thus, row 28 shows import tariffs paid by each of the twelve production sectors and tariffs paid by the household sector on its own imports. Row 29 contains indirect taxes considered as part of government revenues. These are also divided among the 12 production sectors. Column 21 in row 29 shows indirect taxes paid by the household sector on its own expenditure. This also has been divided among the six income classes.

Row 30 contains government subsidies. These go either to the production sectors which appear in the row corresponding to columns 1 to 12[x], or are paid directly to household sector. These affect the prices of the commodities sold directly to the household. The effect appears in row 30, column 21. This last item is again divided among the six socioeconomic classes in row 30, columns 15 to 20.

Row 31 represents government transfers considered from the revenue side and not the expenditure side. This includes the net contribution by households to the social security and pension funds in row 31, column 21. This item is again divided among the six income classes in row 31, columns 15 to 20. Row 32 represents direct taxes as revenue to the government. These include: Direct taxes paid by the production sectors 1 to 12, as, for example, the corporate tax; and direct taxes paid directly by the household sector, like wage tax, land tax etc.

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x For example, subsidies for the first four sectors are subsidies on fertilizers and pesticides, in sector five subsidies are on wheat flour and other items, etc.

The latter appears in line 32 column 21. The last item is again divided among the six income classes, corresponding to columns from 15 to 29 in row 32.

Row 34 shows private savings which appear as figure corresponding to that row under column 21. This is divided among the six income classes. It appears as a balancing item between household income and household expenditure. Thus, the totals of rows 15 to 20 which represent the income accruing to the six income classes must balance with the totals of columns 15 to 20 which represent their expenditure. The balancing item is private savings whether positive or negative.

Row 35 represents government & public sector savings which is the surplus realized in government and public sector enterprises. Row 36 shows the deficit of conventional government which is the balancing item between conventional government revenue, and conventional government revenue, and conventional government. Row 37 shows government trade deficit which is again the balancing item between sales and purchases. Row 38 shows foreign savings which represent the balancing item between total exports in column 27, and total imports, row 27.

Line 39 shows total savings which balances with the sum of column 40 of total investment. Total savings equals private savings plus government and public sector savings minus government conventional deficit minus government trade deficit plus foreign finance.

Row 41 shows gross production which corresponds to column 41 for the 12 sectors. Data in row 41, from columns 1-12, could be arrived at in this way. Gross production equals total inputs plus value added plus imports plus import tariffs plus indirect taxes minus subsidies.

4. Structure of the Planning Model and Policy Options:

Given the data layout in the SAM, it is straight-forward to construct a general equilibrium model around them. Table 1 gives the equations, with variables and parameter names explained in tables 2-3.

The model in its various versions is a simplified multisector, static, general equilibrium model (GEM). In the different versions it achieves macroeconomic consistency, identifies descrepancies in resource demands and availabilities as well, and also adjusts resource prices and uses to resource availabilities. The GEM is useful for simple macroeconomic effective demand analysis and for the study of the macroeconomic and some limited microeconomic effects of expenditure, export and import and tax and subsidy policies affecting prices and factor returns and distributional issues.

The GEMS are not well suited, however, for the exploration of the growth implications of alternative resource allocations and investment policies, for which additional models will be developed.

The devising of the alternative policies to be tested and the comparison and analysis of the resulting solutions is as essential a part of the use of the models as the calculations which are called for by the formal structure of the model. The Egyptian economy is widely regarded as characterized by a variety of goods and factor price distortions created by market imperfections and government interventions

SOCIAL ACCOUNTING MATRIX FOR EGYPT

Receiving Sectors / Conveying Sectors	1. Staple Food	2. Non-Staple Food	3. Cotton	4. Other Agriculture	5. Food Processing Industry	6. Textile Industry	7. Other Industries	8. Construction	9. Crude oil & Products	10. Transport & Communication	11. Housing	12. Other Services	13. Total Intermediate (Σ1–12)	14. Total Final Demand	15. Urb Lowest 60%	16. Urb Middle 30%	17. Urb Top 10%	18. Rur Lowest 60%	19. Rur Middle 30%
1. Staple Food	466727	—	—	—	1796283	—	—	—	—	1.3611	—	10 18230	238	217	22.0	13.5	5.3	22.6	7.1
2. Non-Staple Food	167613	37 25629	0 47093	5 91269	3507248	1.05422	238918	—	—	1061618	—	17.61671	416	852	177.6	156.6	110.7	114.0	65.6
3. Cotton	—	—	2.40303	—	1 53937	73 09589	200489	—	—	—	—	—	75	160	1.6	0.3	0.4	1.6	0.6
4. Other Agriculture	5458146	282 05030	9.92237	2 13755	5.95715	37 46799	186421	—	—	0.61798	—	0.27845	392	72	143	16.4	11.8	7.2	4.3
5. Food Processing Ind.	—	39 82283	—	—	144.30160	3.77228	960896	—	—	2.17375	0.00846	93.21643	290	1232	324.5	275.1	140.4	234.6	100.6
6. Textile Industry	1.85542	0 05167	3.29823	0 02107	1 41447	310 59292	1.3079	1.11537	0.22504	0 26195	0.01569	53 05059	373	512	77.9	97.2	55.1	38.2	30.9
7. Other Industries	9 35869	0 16335	2.91491	0 21883	1.54634	13.57468	144 0098	11.28930	9 00784	8.51700	0.16177	70 89040	292	1100	95.6	99.1	60.3	45.1	23.3
8. Construction	—	1.17015	0.13579	—	0.57014	1.77530	0.9940	0.57402	2 42426	9.84410	5 66571	144582	37	599	—	—	—	—	—
9. Crude oil & Products	12 77104	3.559498	3.91501	2.00618	3.41795	12 06315	1105788	306 6330	132.0536	35 30494	—	80 81433	355	254	21.9	18.4	9.4	11.5	4.7
10. Transport & Comm.	0 20957	0 40542	0 21384	0 02907	0 54438	2 08350	8 68208	2.16599	0.81176	2.10867	0 00697	31 54770	40	537	30.0	45.4	170.5	7.8	6.3
11. Housing	0 03204	0 01099	0.01148	0.00192	1.00936	0 65231	0 40390	0.73597	0 41705	0.35143	—	6 31525	10	152	16.7	37.4	55.3	4.4	3.9
12. Other Services	3.90146	16 47459	7.71460	0 63209	31.94575	35 86751	41 25930	355.3957	12.75550	26.38286	2.14139	48 38543	968	2150	205.3	223.2	152.7	78.1	63.4
13. Total Inputs Σ1–12	130	408	29	11	719	487	201	382	157	87	8	867	3486	7817	974.4	1014.6	772.2	565.4	311.9
14. Value Added	317	806	202	438	166	330	509	256	324	456	134	2049	6041						
15. Urb. Lowest 60%	0.0	0.0	0.0	0.0	70.566	91.563	66 785	36.260	0.923	52.356	34.076	631.421							
16. Urb. Middle 30%	0.0	0.0	0.0	0.0	45.177	87 570	87 166	35 473	23.425	61.263	76.122	646.961							
17. Urb. Top 10%	0.0	0.0	0.0	0.0	64.255	72 627	79.166	95 261	45.618	79.331	20.501	653.67							
18. Rur. Lowest 60%	135.110	[illegible]	90.312	183.311	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
19. Rur. Middle 30%	37.227	242.565	58.504	127.271	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
20. Rur. Top 10%	71.556	225.641	53 177	127.415	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
21. Households	302	755	202	438	150	277	276	170	75	193	125	1962	4923						
22. Gov & Pub. enterprises	15	51	-	-	16	53	195	84	249	261	9	87	1113						
23. Gov. Conventional					25								25		20.2	15.2	7.6	19.9	11.7
24. Gov. Trade	12	37	10	8	398							96	552		50.7	45.2	31.7	47.1	29.[illegible]
25. Gov. Trade Imports	7	22	4	15	9	47	435		66	51			656		15.5	30.4	57.3	11.6	17.[illegible]
26. Other Imports																			
27. Total Imports	19	59	16	23	425	47	435		66	51		96	1208						
28. Imp. Tariffs	1	5			166	12	100		42				326						
29. Ind. Taxes					205	65	35		15			20	340		37.9	37.2	31.1	17.3	15.[illegible]
30. Subsidies (-)	-12	-10	-10	-8	-182	-86	-3		-8	-15		-12	-346		-63.9	-45.4	-23.6	-12.9	-7.8
31. Gov. Transfers															78.7	94.3	123.0	—	—
32. Dir. Taxes					25	30	55		13			100	223		6.2	33.7	70.7	3.7	15.1
33. Σ28–30															-96.8	-78.2	202.5	67.9	173.[illegible]
34. Priv. Savings																			
35. Gov & Pub. Savings																			
36. Gov. Conv. Deficit																			