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Jamal Kerwat, John Dewhurst and Hassan Molana

Department of Economic Studies, University of Dundee, Dundee. DD1 4HN

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CONSTRUCTING A SOCIAL ACCOUNTING MATRIX FOR LIBYA

Jamal Kerwat, John Dewhurst* and Hassan Molana

University of Dundee

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Abstract
In this paper a Social Accounting Matrix is constructed for Libya for the year 2000. The procedure was divided into three steps. First, a macro SAM was constructed to consistently capture and represent the macroeconomic framework of the Libyan economy in 2000. Second, that macro SAM was disaggregated into a micro SAM incorporating the accounts for individual activities, primary factors and the main economic institutions. But the SAM obtained in this way was not balanced. So in the final step we balanced the SAM using a cross-entropy procedure in General Algebraic Modelling System (GAMS). This SAM integrates national income, input-output, flow-of-funds, and foreign trade statistics into a comprehensive and consistent dataset.

The lack of coherent time series data for Libya is a serious obstacle for applied research that uses econometric analysis. Our main intension in constructing this SAM has been one of providing benchmark data for economy-wide analysis using CGE modelling for Libya.

Keywords: input-output table, social accounting matrix, national accounts, cross-entropy

JEL Classification: Y1, O5

* Contact author: John Dewhurst, Economic Studies, University of Dundee, 3 Perth Road, Dundee DD1 4HN, UK. Tel: (00)44(0)1382 384376; E-mail: j.h.l.dewhurst@dundee.ac.uk

1. Introduction

Libya has recently been going through considerable changes as the country has been opening its doors to international trade and implementing 'market based' or 'economic liberalization' reforms. This invites applied research on the Libyan economy with a view both to examine the impacts of these changes and to compare alternative policies. The lack of coherent time series data for Libya, however, is a serious obstacle for applied research that uses econometric analysis. It would nevertheless be possible to conduct applied comparative analysis using the computable general equilibrium approach if a reasonably reliable social accounting matrix (SAM) for the country were made available. In this paper we use the available data sources to construct a SAM for the country for the year 2000.

A SAM is a square table detailing the transactions and transfers that take place, during a specified period of time (usually one specific calendar year), between different production activities, factors of production and institutions within an economy and with respect to the rest of the world. A SAM is constructed with an internally-consistent accounting framework that provides a snapshot of an economy at a certain time. Each row of the SAM gives receipts to an account. Also, for each row there is a corresponding column that gives expenditures by that account. Thus each cell of the matrix represents expenditure by the column account and an income to the row account. The principle objective of constructing a SAM for an economy is to arrange its economic data in an efficient manner in order to provide a consistent representation of the economy. The framework for a SAM was first developed in the 1950s as an extension of the core national accounts in order to integrate the economic and social aspects of development – see Pyatt and Round (1985) for details. In the 1970s, when it had become clear that economic development measured by GDP growth could not ensure poverty reduction, and that a tool which enabled the monitoring of income distribution was necessary, various studies started to use SAMs to examine economic policy choices – see Thorbecke (1985) for a survey. The SAM is now included as part of the 1993 revision of the System of National Accounts, the framework used by virtually all countries for compiling national accounts (UN, 1993, Chapter XX). SAMs may not only be used to analyse directly national economic problems (see, for examples, Keuning and Thorbecke, 1992; and Powell and Round, 2000), but also they provide a reference point for calibrating computable general equilibrium (CGE) models (see, for example, Johansen, 1960; Shoven and Whalley, 1972; and Adelman and Robinson, 1978).

The construction of SAMs in developing countries is often made difficult by insufficient and fragmented data sources as well as by problems of data reliability (Thomas et. al., 1999). As a result, for some developing countries there are still no official SAMs available. While Libya belongs to this set of countries, there are a number of relevant data represented in a set of unpublished 1986-2000 Libyan National Accounts which could be utilised to construct a SAM for that country. The Libyan SAM (LIBSAM2000) documented in this paper was constructed in this way, our main intention being one of providing benchmark data for economy-wide analysis using CGE modelling. LIBSAM2000 integrates national income, input-output, flow-of-funds, and foreign trade statistics into a comprehensive and consistent dataset for the year 2000.

We divided the construction of LIBSAM2000 into three steps. First, we built a highly aggregated SAM. This is the so-called macro SAM which consistently captures and represents the macroeconomic framework of the Libyan economy in

2000. Second, we disaggregated the macro SAM into a micro SAM by incorporating the accounts for individual activities, primary factors and the main economic institutions including the foreign sector. However the SAM obtained in this way was not balanced. So in the final step we balanced the SAM using a cross-entropy procedure in General Algebraic Modelling System (GAMS) – see Robinson and El-Said (2000) for a detailed example of this application. We outline these three steps respectively in Sections 2 to 4 below and give our concluding remarks in Section 5.

2. Constructing a Macro SAM

United Nations (1993) suggests a standardized and general structure for a SAM. But in practice SAM structures differ depending on the goals of constructors, the requirements of users, the objectives of policymakers and the availability of data. In this section we focus on constructing a macro SAM of the form shown in Table 1 which is mainly determined by data availability.

The schematic structure of the macro SAM presented in Table 1 has six major accounts: activities, commodities, factors (of production), institutions, taxes and saving-investment which are respectively explained below.

Activities:

The activity account shows production by domestic industry. Activities produce commodities or products the sum total of which corresponds to gross output. This is shown in the 1st row of Table 1. In the 1st column of the table the entries signify expenditures incurred in the production activity. Thus the activity uses intermediate inputs (which may be either domestically produced or imported) and provides rewards for factors of production (Gross Value Added) either as wages and salaries earned by employees or as operating surpluses. In addition, if there were any, the column would contain entries in an additional Tax row reflecting any payment of subsidies or taxes on production.

Commodities:

Reading across the 2nd row shows how the commodities are used in the economy: (i) as inputs to domestic production activities; (ii) as consumption by households and government; (iii) as exports to the Rest of the World (ROW); and (iv) as investment goods. The column of the commodity account (2nd column) shows the total value (at purchasers' prices) of commodities supplied to the economy either from domestic production or from imported goods and services. To ensure that the column sum equates to the row sum it is necessary to include two additional entries: (i) sales tax less subsidies on products; and (ii) import tariffs on products less import subsidies.

Factors:

This typically includes primary factors, i.e., labour and capital. The rest of the factors are termed intermediate inputs which appear in the commodities account (whether imported or domestically produced). As is shown in the 3rd row, total rewards to factors from productive activities comprise gross value-added at factor cost and consists of wages and salaries plus profits (or return to capital) plus the consumption of fixed capital (or depreciation). The 3rd column shows how this factor income is

accrued to institutions (i.e. to households, to the government – if it retains the profits of productive organizations that it operates – and as transfers to ROW. It is worth noting that 'consumption of fixed capital' in the third column across the savings-investment account row is added to net value added to obtain gross value added and to balance the factor account column and row.

Institutions:

The three institutions identified in Table 1 are households, government and ROW.[1] Households earn their income (4th row) by supplying labour and capital as factors of production, and may also receive transfers from other institutions. This income is then used by households (4th column) to: (i) purchase goods and services for consumption; (ii) make transfers to the government in the form of income tax; (iii) make remittances abroad; and (iv) set aside as savings. The 5th row and column detail the government's account. Receipts of the government consist of income from the factors (on the capital it provides), various kinds of taxes (income tax, sales tax and import tariffs, etc.), and any direct receipts from the rest of the world. The 5th column shows how the government uses this income: either paying for its final consumption of goods and services, or making transfer payments to other institutions. The balance – i.e., the budget deficit or surplus – appears as government saving in the Saving/Investment row. The country's economic interactions with other countries are reflected in the ROW account. This captures the ingredients of the foreign sector's balance of payments. Total foreign exchange inflows (6th column) come from exports plus wages and salaries, transfers and property income that other institutions, notably Libyan households, receive from abroad. Reading across the 6th row gives the payments made to the ROW, i.e., payments for imported goods and services plus wages and salaries, transfers and property income that other institutions remit abroad. In what follows we enter net figures for transfers and property income. The difference between the foreign exchange receipts and payments constitutes the balance of payments which, within this framework, may appear either as net lending by the country to the ROW or as the country's foreign saving.

Taxes:

Three tax accounts are separately identified: Income tax, Sales tax and Imports tax (duties, tariffs, etc.). The first is paid directly by households to the government and the other two are flows from the commodities' account to the government (as they are reflected in the market value of the commodities). These are shown in columns and rows 7 to 9.

Savings-investment:

Also known as 'accumulation', this is the final account which acts as a balancing account in that it represents the aggregate *'capital account'* of all the institutions in the economy. In the 10th column we find the level of investment demand in the economy (i.e. gross fixed capital formation inclusive of changes in stocks). The 10th row indicates the sources of savings in the economy, including the consumption of fixed capital; gross domestic savings consist of net domestic savings (i.e. household

[1] Most SAMs also include a fourth institution, referred to as 'enterprise' which reflects the accounts of firms but the available data for Libya do not allow one to identify this account.

and government savings) and the consumption of fixed capital (depreciation). The foreign saving – or the current account balance – must match the difference between total investment and gross domestic savings.[2]

The recently revised set of Libyan National Accounts 2000 is used as the principal data source to fill in the values in the macro SAM described above and depicted in Table 1. A few entries are based on data from Central Bank of Libya. The relevant data are reproduced as Tables 2, 3 and 4. Of the twenty-two cells identified in Table 1, a number can be entered directly. Private Consumption, Government Consumption, Imports, Exports, GFCF, Transfers to and from and Net Lending to the ROW are taken from the National Accounts in Table 2. Gross Output, Intermediate Consumption, Gross Value Added and Consumption of Fixed Capital are taken from the GDP data in Table 4. Data relating to taxation are taken from the Annual Reports of the Central Bank of Libya for 2001 and 2002, as reproduced in Table 3. It should be noted that the items for both Sales Tax and Import Tariff are entered as net figures (i.e. as taxes less subsidies) which explains the negative entries for Sales Tax.

This leaves four items in Table 1 – factor incomes accrued to households and to the government and their respective saving – for which values must be found. From Table 2 it can be observed that the sum of factor incomes to households and government must be equal to the sum of Compensation to Employees and Gross Operating Surplus (16,213.5 Million Libyan Dinar – MLD). Table 2 also shows Gross Domestic Savings (4505.8 MLD). The main problem therefore is to split the Gross Operating Surplus and Gross Domestic Savings between households and the government. However it is important to recognize that, because each account in the SAM must balance, these cannot be split independently; any allocation of Gross Operating Surplus between households and the government also determines an allocation of savings between these and vice versa. In the absence of any relevant Libyan data which could aid estimating the ratio for either of the accounts, we decided to approximate this ratio using data from another country with a "similar" economy (on the assumption that the division of the Gross Operating Surplus between households and the government would be approximately the same in the two economies). Clearly, while there might be several countries whose economies could be considered to be, in some ways, similar to the Libyan economy, none of these could be expected to exhibit precisely the same division of Gross Operating Surplus as applied in Libya. For this exercise we chose to use data from another oil-dominated economy and approximated the division of Gross Operating Surplus in Libya by that derived from the Saudi Arabia SAM for 2000.[3] The division of savings is then made in a manner so as to bring the households and government accounts into balance. Table 5 presents the actual numerical entries for the 2000 Libyan macro SAM. All values are in 2000 MLD.

[2] Note that in the case Libya the current account surplus in 2000 is invested in the foreign market and it appears in column 10 as net lending to the ROW.

[3] See Chemingui and Lofgren (2004) for the 2000 SAM for Saudi Arabia. In the rest of this exercise we shall make use of the Saudi Arabian data to fill in the gaps that exist in the Libyan data. This approximation may only be partially justified by the fact that the figures are for the same year (2000), that they relate to an economy which is heavily dependent on oil and that this is an intermediate step in the SAM construction and hence the initial estimates may not be too crucial in the determination of the final values, the derivation of which is detailed in the following section. Clearly such assumptions are not entirely satisfactory and any work using this data – e.g. simulations based on computable general equilibrium analysis – ought to examine the sensitivity of any results to the implied approximations.

3. Disaggregation to a Micro SAM

The second step in our construction of a SAM for Libya is the disaggregation of the macro SAM outlined above. The main aim here is to reveal the ingredients of the accounts pertaining to activities, commodities and factors as well as dividing the sales tax into taxes and subsidies.

Given the data in Table 4, it is possible to disaggregate the total factor income into 'Compensation of Employees' and 'Operating Surplus' which respectively constitute the factor income due to labour and capital – i.e., the main primary factors. These figures from Table 4 may be entered directly in the disaggregated SAM in the position corresponding to Cell [3,1] in the macro SAM. We then need to break each of the households-factors and government-factor cells in the macro SAM into two cells in line with dividing factors into labour and capital.

Table 4 also gives the industrially disaggregated data which provides a thirteen-way division of products. It is therefore possible, in principle, to disaggregate the activities and commodities accounts in a similar way. The disaggregation of the commodities-activities cell in the macro SAM into a 13x13 matrix (corresponding to the categories that appear in the rows of Table 4) requires the equivalent of an input-output table for the Libyan economy for 2000. Unfortunately, there is no such table for Libya that can be used; neither is it the case that one can be constructed using Libyan data sources (Table 6 displays the extent of Libyan data available). We therefore re-employed the assumption made above regarding the 'similarity' between the Saudi and Libyan structures and in all those cases where it was necessary to impose a division upon a Libyan aggregate figure in order to affect the necessary disaggregation the equivalent ratios derived from the Saudi 2000 SAM were used. It is worth noting that the Saudi SAM is constructed for a 24 activity-commodity breakdown of the economy whereas the Libyan SAM can only accommodate a 13-sector disaggregation. We therefore used a suitably aggregated version the Saudi SAM in this exercise.

In order to fill in the gaps in the SAM table it is necessary to perform the following nine operations:

(I) Total subsidies can be identified separately from total sales taxes. We can therefore treat them explicitly in the SAM. As figures for 2000 were not available, subsidies were disaggregated across three sectors – namely Oil, Manufacturing and Construction – by assuming that the division applying in 2001 (a year for which there are figures) also applied in 2000 (see Table 7). Alone of the estimates reported on in this section these figures were not subject to revision when the table was balanced. The disaggregation of the sales tax figure is addressed later.

(II) The total intermediate inputs for each activity must be disaggregated across different commodities. This is done by assuming that the technologies used by industries in Libya and in Saudi Arabia in year 2000 were the same.

(III) Households' aggregate consumption has to be disaggregated across commodities. In the absence of any information regarding disaggregated Libyan household expenditures we used relevant average propensity to consume figures for Saudi Arabia.

(IV) Government expenditure too has to be disaggregated across commodities. Again because of the lack of data directly pertaining to Libya it was assumed that the proportion of total government expenditure spent on each commodity was identical to that proportion for Saudi Arabia.

(V) Total exports ought to be disaggregated across the exportable commodities. Here there is one piece of information that we can make use of. The 2001 annual report of the Central Bank of Libya gives exports by oil and non-oil sectors. Thus the value of oil exports can be entered directly in the micro SAM. The value of non-oil exports has been allocated across the remaining sectors by applying the share coefficients of the 2000 Saudi SAM to total non-oil exports of Libya. It should be noted that this assumes that the four commodities – Electricity, gas and water, Public services, Education and Health – are not exported.

(VI) Investment has to be disaggregated. To estimate these flows the expenditure of different productive activities on investment given in Table 4 can be utilized. In order to convert investment expenditure by industry into investment expenditures on commodities use was made of an aggregated version of the conversion matrix that applied in 2000 for the UK.[4]

(VII) Total imports ought to be disaggregated across the importable commodities. There is no official information regarding the level of imports at a commodity level. However, it would be feasible to assume that there are no imports in Oil, Electricity gas and water, Public services, Education and Health.[5] Total imports were therefore allocated across remaining commodities in proportion to the domestic output of the commodities. We acknowledge that this assumption may not be firmly supported by real data and take it into consideration in the balancing exercise that follows.

(VIII) Import taxes were disaggregated across the set of imported commodities by assuming a common import tax rate.

(IX) Finally, sales taxes were disaggregated across commodities by assuming that there were no sales taxes on either Oil or Public services and that there was a constant sales tax rate applied to other commodities that applied equally to domestic production sold on the domestic market (i.e. domestic production less exports) and to imported products after any import tax had been imposed.

Whilst the micro SAM constructed as described above is useful, in that it conveys a good deal of information regarding the ingredients of aggregate accounts, it is not a balanced matrix and can therefore not be used in conjunction with a model that is based on equilibrium.[6]

[4] http://www.statistics.gov.uk/about/methodology_by_theme/inputoutput/archive_data.asp
[5] Given the assumptions made regarding the disaggregation of exports, Electricity gas and water, Public services, Education and Health constitute the non-traded commodities.
[6] This SAM can be viewed at http://www.dundee.ac.uk/econman/discussion/UnbalancedSAM.xls

4. Balancing the Micro SAM

The micro SAM detailed above does not balance in that the row sum for each commodity account does not necessarily match the column sum for that account. It is therefore necessary to adjust some of the cell values so as to achieve that required balance. These adjustments, however, cannot be carried out arbitrarily and should be implemented on the basis of clear objectives and criteria. However, we note at the outset that because many of the cell values are estimates based on strong assumptions, these adjustments may be interpreted as 'fine tuning' our initial estimates.

To balance the SAM we adapt the procedure proposed by Robinson and El-Said (2000) and apply the cross-entropy method that attempts to find a new SAM which is consistent with the original matrix but whose corresponding rows and columns have the same totals. This balancing method minimizes the entropy distance of the new SAM from the initial SAM subject to the constraint that row and column totals are equal and will penalise larger deviations between two corresponding cells more heavily than smaller deviations.

The cells to be adjusted in the unbalanced matrix are all in either the commodity account rows or the commodity account columns. The commodity account row consists of intermediate inputs purchased by activities and four final demand components (Household consumption, Government consumption, Exports and GFCF).[7] For each column j, let T_{ij}^0 and B_j^0 respectively denote the cells in the block of the unbalanced matrix (which are to be adjusted to achieve a balanced SAM) and the corresponding column total. Thus,

$$B_j^0 = \sum_i T_{ij}^0 + F_j^0,$$

holds where F_j^0 refers to other known elements in the column.

The i[th] commodity account column of the unbalanced SAM consists of the domestic output of commodity i, Q_i^0, the imports of commodity i, M_i^0, and subsidies, import and sales taxes pertaining to this commodity. The domestic output figures are from published sources and thus can be considered fixed. We also take subsidies as fixed and assume that (a) import taxes are applied at the same known rate, μ, on all imported goods and (b) sales taxes are applied at the same known rate, λ, on all domestic sales excluding those of Oil and Public services, which attract a zero rate. Therefore the column total for the i[th] commodity account may be written as

$$C_i^0 = Q_i^0 + (1+\mu) M_i^0 + \lambda\left(Q_i^0 + (1+\mu) M_i^0 - T_{i,Exps}\right) - \text{Subsidies}_i$$

where $T_{i,Exps}$ are the exports of commodity i.

The balancing problem becomes one of choosing new values for T_{ij} and M_i so that the new commodity account row totals become equal to the new commodity

[7] Note that each of the activity and final demand accounts are in balance.

account column totals. Using the cross entropy technique to do the balancing then amounts to choosing T_{ij} and M_i to minimise[8]

$$\sum_i \sum_j \left(T_{ij}/B_j^0\right).\ln\left(\frac{T_{ij}/B_j^0}{T_{ij}^0/B_j^0}\right) + \sum_i \left(M_i/M^0\right).\ln\left(\frac{M_i/M^0}{M_i^0/M^0}\right)$$

subject to

$$\sum_i T_{ij} = B_j^0 - F_j^0,$$
$$\sum_i M_i = M^0,$$
$$\sum_i T_{ij} = Q_i^0 + (1+\mu) M_i + \lambda\left(Q_i^0 + (1+\mu) M_i - T_{i,Exps}\right) - \text{Subsidies}_i,$$
$$T_{ij}, M_i \geq 0.$$

However, in order to take account of the fact that the reliability of the estimates used in constructing the micro SAM in Section 3 is of variable quality, we shall assign different weights to different sets of elements that appear in the objective function. In particular,

(i) The assumption that Libyan uses the same technology as the Saudi's seems the most reliable assumption. Accordingly, the elements of the SAM relating to commodity use by activities are given a weight of 5 in the cross entropy procedure thus penalizing relatively heavily movements away from the common technology assumption.

(ii) The assumptions that (i) Libyan households have the same average propensities to consume as Saudi households, and (ii) Libyan investment for each sector is allocated across commodities in the same proportion as in the UK, although plausible, seem less attractive than the technology assumption. Accordingly, shifts in the elements corresponding to the division of households' consumption and of investment are given a weight of 3.

(iii) Finally, the assumptions concerning the allocation of government expenditure, exports and imports are somewhat arbitrary. Therefore, changes in the elements of the SAM relating to these items are given a weight of 1.

The resulting SAM is reported in LIBSAM2000 which may be viewed at http://www.dundee.ac.uk/econman/discussion/BalancedSAM.xls. This is a complete social accounting matrix for Libya which is fully balanced and can be used to conduct computable general equilibrium analysis for Libya on the assumption that the year

[8] This function is based on Kullback-Leibler (1951) measure of the "cross-entropy" distance between one probability distribution, $p_i\ (i=1...n)$, from another, $\pi_i\ (i=1...n)$, i.e $\sum_{i=1}^{n} p_i \ln\left(p_i/\pi_i\right)$. Note that In order to achieve correspondence between this and the balancing of a SAM it is necessary to normalise the relevant elements of the SAM so that they lie between 0 and 1. We have done so by dividing T_{ij} and M_i by the column sums and the known total imports, respectively.

2000 accounts represent a reasonably good approximation to the equilibrium situation.

5. Concluding Remarks

It is recognized that the construction of LIBSAM2000 has involved a large number of assumptions and thus the feasibility of using it could be questioned on various grounds. However, in the absence of superior data there is no way of judging competing views. We therefore recommend that in work that uses LIBSAM2000 it will be important to remember that it is based on a set of assumptions and that the analysis being undertaken should be examined to see how robust the results are to variations in the matrix occasioned by altering the assumptions used to construct the table outlined in this paper.

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Table 1: Schematic Structure of the Libyan Macro SAM

	1 ACTIVITIES	2 COMMODITIES	3 FACTORS	4 HOUSEHOLD	5 GOVERNMENT	6 ROW	7 YTAX	8 STAX	9 IMPTAX	10 S-I	TOTAL
1 ACT		Gross output									Gross Output
2 COM	Intermediate Inputs			Private Consumption[9]	Government consumption[10]	Exports				GFCF[11]	Demand of Composite good
3 FAC	Gross Value-added										Factor Income
4 HH			Factor Income to HH			Transfers from ROW[12]					Household. Income
5 GOV			Factor Income to GOV				Income Tax	Sales Tax	Imports Tariff		Government Income
6 ROW		Imports		Transfers to ROW [13]						Net Lending to ROW	Payments of The Foreign Exchanges
7 YTAX				Income Tax							Income Tax Revenue
8 STAX		Sales Tax									Sales Tax Revenue
9 IMPTAX		Imports Tariff									Tariff Revenue
10 S-I			Consumption of fixed capital	Household Saving	Government Saving						Savings
TOTAL	Total cost of Production	Total Supply of Composite good	Factors Expenditure	Household Expenditure	Government Expenditure	Receipts of Foreign Exchanges	Income Tax	Sales Tax	Imports Tariff	Total Investment	

9 Private final consumption expenditure.
10 Government final consumption expenditure.
11 Gross Fixed Capital Formation plus Change in Stock
12 Net of transfers and property income from and to the ROW.
13 Compensation of employee to ROW.

Table 2: Libyan National Income Statistics Balance Sheets: 2000 In (MLD) [14]

GDP	Income	GDP	Expenditure
Compensation of employees	5778.8	Government final consumption	3615.9
Gross operating surplus	10434.7	Private final consumption	7962.3
		Gross fixed capital formation	2281.2
Net indirect taxes*	-225.5	Change in stocks	40.0
		Exports of goods and services	6185.6
		Less: Imports of goods and services	2690.3
Total (GDP at current market price)	17394.7	Total (GDP at current market price)	17394.7
National disposal income	**Income**	**National disposal income**	**Expenditure**
Compensation of employees	5778.8	Government final consumption	3615.9
Gross operating surplus	10434.7	Private final consumption	7962.3
Net indirect taxes	-225.5	Savings	4505.8
Compensation of employees from ROW (net)	-100.7		
Property and entrepreneurial income from ROW (net)	219.0		
Current transfer from ROW (net)	-22.3		
Total	16084.0	Total	16084.0
Gross savings	4505.8	GFCF (investments)	2281.2
Consumption of fixed capital	1406.7	Change in stocks	40.0
Capital transfers from the ROW	0.0	Purchases of intangible assets from the ROW (net)	0.0
		Net lending to the ROW	3591.3
Total	5912.5	Total	5912.5
External Transactions		**External Transactions**	
Exports of goods and services	6185.6	Imports of goods and services.	2690.3
Compensation of employees from the ROW	0.0	Compensation of employees to the ROW.	100.7
Property and entrepreneurial income from the ROW	413.6	Property and entrepreneurial income to the ROW.	194.6
		Other current transfers to the ROW.	25.3
Other current transfers from the ROW	3.0	Surplus of the nation from current transactions	3591.3
Current receipts	6602.2		6602.2

14 MLD is Million Libyan Dinar. Taken from data provided in Ministry of Planning – Plans and Programs Dep. Libyan National Accounts 1986 to 2000.

Table 3: Net Indirect Taxes (MLD) [15]

Import tax	440.0	Imports subsidies	78.5
Sales tax	104.3	Other subsidies	691.3
Total indirect taxes	544.3	Total subsidies	769.8
Net Indirect Taxes = 544.3 - 769.8 = -225.5			
Net sales tax = 104.3 - 691.3 = -587.0			
Net Imports tax = 440.0 - 78.5 = 361.5			

15 Taken from data in Central Bank of Libya – Annual Report, 2001 and 2002.

Table 4: Gross domestic product by income in 2000 at factor cost (MLD)

Sectors	Gross output	Intermediate consumption	Gross value-added	Consum-ption of fixed capital	Net value-added	Compen-sation of employees	Operating surplus	GDFCF
Agriculture, fishing & forestry	2,334.1	894.4	1,439.7	160.7	1,279.0	380.1	898.9	508.7
Oil & Natural Gas	7,553.8	892.8	6,661.0	183.0	6,478.0	196.2	6,281.8	200.0
Mining	392.6	79.1	313.5	55.0	258.5	157.0	101.5	5.5
Manufacturing	4012.7	3039.8	972.9	242.7	730.2	380.6	349.6	40.3
Electricity, Gas & Water	470.8	179.0	291.8	132.4	159.4	159.4	0.0	142.5
Construction	1,870.1	783.0	1,087.1	56.2	1,030.9	748.2	282.7	9.0
Trade, Restaurant & Hotels	2,150.8	450.5	1,700.3	107.8	1,592.5	322.5	1,270.0	12.0
Transportation & Communication	1,795.4	543.4	1,252.0	198.5	1,053.5	583.0	470.5	256.9
Finance	449.7	99.4	350.3	63.0	287.3	92.8	194.5	14.0
Public services	1,837.7	600.0	1,237.7	91.2	1,146.5	1,152.8	-6.3	464.6
Education services	1,118.3	196.4	921.9	53.3	868.6	868.6	0.0	308.3
Health services	780.4	274.2	506.2	41.0	465.2	448.7	16.5	107.4
Other services	955.6	69.8	885.8	21.9	863.9	288.9	575.0	212.0
Total	25,722.0	8,101.8	17620.2	1,406.7	16,213.5	5,778.8	10,434.7	2281.2

Source: Ministry of Planning – Plans and Programs Dep. Libyan National Accounts 1986 to 2000, Table 2 & Table 4.

Table 5: Libyan Macro SAM 2000

	1 ACTIVITIES	2 PRODUCTS	3 FACTORS	4 H'HOLD	5 GOVERNMENT	6 ROW	7 YTAX	8 STAX	9 IMPTAX	10 S-I	TOTAL
1 ACT		25,722.0									25,722.0
2 PRO	8,101.8			7,962.3	3,615.9	6,185.6				2,321.2	28,186.8
3 FAC	17,620.2										17,620.2
4 HH			10,996.2			196.7					11,192.9
5 GOV			5,217.4				337.0	-587.0	361.5		5,328.9
6 ROW		2,690.3		100.7						3,591.3	6,382.3
7 YTAX				337.0							337.0
8 STAX		-587.0									-587.0
9 IMTAX		361.5									361.5
10 S-I			1,406.7	2,792.9	1,713.0						5,912.5
TOTAL	25,722.0	28,186.8	17,620.2	11,192.9	5,328.9	6,382.3	337.0	-587.0	361..5	5,912.5	

Table 6: An Input-Output Table for Libya for 2000; the available data

		EXPENDITURE (USE)																	
		1	2	3	4	5	6	7	8	9	10	1	12	13	**IC**	H	G	GDFCF	E	**TS**
INCOME (SUPPLY)	1AGR																			
	2 OIL																		5955.1	
	3 MINI																			
	4 MAN																			
	5 ELECT																			
	6 CONST																			
	7 TRADE																			
	8 TRANS																			
	9 FINAN																			
	10 PUBSER																			
	11-EDUC																			
	12-HEAL																			
	13-OTHER																			
	IC	894.4	892.8	79.1	3039.8	179.0	783.0	450.5	543.4	99.4	600.0	196.4	274.2	69.8						8101.8
	+STAX																			104.3
	- Subsidies																			691.3
	+ IMPTAX																			440.0
	- Subsidies																			78.5
	= CP																			7876.3
	VA	1439.7	6661.0	313.5	972.9	291.8	1087.1	1700.3	1252.0	350.3	1237.7	921.9	506.2	885.8						17620.2
	LAB	380.1	196.2	157.0	380.6	159.4	748.2	322.5	583.0	92.8	1152.8	868.6	448.7	288.9						5778.8
	CAP	1059.6	6464.8	156.5	592.3	132.4	338.9	1377.8	669.0	257.5	84.9	53.3	57.5	596.9						11841.4
	M																			2690.3
	TU=CP+VA+M														8101.8	7962.3	3615.9	2321.2	6185.6	

Source of data: Ministry of Planning – Plans and Programs Dep. Libyan National Accounts 1986 to 2000, various tables.

Table 7: Subsidies on Products and Imports (LD th.)

	2001	%	2000 (est)
Oil products (sold in dometic market)	620,829.7	0.452	348.021
Natural Gas (sold in dometic market)	133,990.3	0.098	75.111
Man-Made River	478,415.2	0.348	268.187
Food	140,000.0	0.102	78.480
total	1,373,235.2	1.000	769.800

Source: Libyan National Accounts, 2001 Ministry of Planning.