Updating the Input Output based Macmod functions

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WP 2002: 1

CMI Working Papers

Indexing terms

Input Output tables
Statistical analysis
Tanzania

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1. Introduction

The present paper reports on a statistical analysis undertaken as part of the Macmod project (phase III). The aim of this effort, as summed up in a background document, 'is to construct production and consumption functions, with special emphasise on the structure of:
- commodity inputs/ requirements,
- import-dimension of such inputs.' [1]

The present paper consequently puts the focus on the nature of production and consumption inputs, endeavouring to identified them in terms of:
- product type, i.e. in respect of the different products involved,
- origin, i.e. the source (foreign or local) of the above products,
- magnitude, i.e. in respect of the shilling-value of the above products.

It may seem that information of this nature may already be available from the recently published Input Output table of Tanzania for 1992[2]. On closer inspection, however, it becomes clear that the IO92[3] estimates do not meet our current needs, given that Macmod is as a planning and forecasting instrument focusing on the medium term future.

Thus, the present effort is instigated by earlier attempts to incorporate IO92 based production and consumption functions into the Macmod model. These attempts failed to produce reasonable results. It was felt that this was due to the underlying IO92 data being out of tune with current economic realities. The present effort attempts to address this problem by updating the IO-relationships.

Summing up, the purpose of the present exercise is to enable the construction of production and consumption functions for the Macmod model, functions that are:
- up-to-date, in the sense that they represent the situation today, and hopefully in the reasonably near future.
- input specific, in the sense that they identify by type and origin the various products used in production and consumption activities.

2. Some central issues

Before proceeding to the tasks described in the above we shall look closer at some central issues providing tangible justification for taking on the extensive labour involved. The issues in question concern the limitations of the published IO92 table, the impact of economic changes after 1992, and the need for a revised and updated version of the IO-table.

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[1] From: Background project document, prepared by Ms H. K. Nordås.
[2] Input Output table of Tanzania for 1992; Research Papers and Reports: No. 1; President's Office – Planning Commission – National Bureau of Statistics; Dar es Salaam; December 1999.
[3] The abbreviation IO92 refers to the original IO-table, *and* to the version of it aggregated to Macmod sector level.

2.1 The IO92 table

The IO92 table referred to in the above represents a major statistical effort on Tanzania's part, and a unique source of information about the structure of the Tanzanian economy. Such structural information is badly needed for the Macmod effort. Attempts to incorporate relevant IO structures into the model were consequently made at the time of release for the IO92. As noted in the above, however, these efforts failed to yield reasonable results. Data flaws were identified as the likely reason for this failure. The IO92 data in general, and the import data in particular, were deemed to be out of tune with current economic realities.

This reflects the fact that the IO92 table depicts the situation in 1992, almost a decade ago. In the subsequent years the economy has developed appreciably. We may therefore suspect the IO92 estimates of being out of data by now[4]. Hence, even if the IO92 table depicts the 1992 situation correctly, it may not do so in respect of the present situation. Moreover, we can not take it for granted that the IO92 table depicts the 1992 situation correctly, given that central IO92 estimates of production and consumption are incompatible with the corresponding National Accounts data.

There is evidently a need for fundamental revisions in one, or both, of these data sets. Most likely, the IO92 table contains the better data. If so, the present National Accounts data for 1992 are in definite need of revision. Such a revision of central 1992 National Accounts data is sure to entail revisions for other variables, and for other years. They will consequently bring revisions also in the National Accounts time series estimates. These estimates are urgently needed for the present exercise; without them the present exercise may make limited sense.

The production of these estimates, however, is outside the scope of the present project. The task must be left to the National Accounts Statisticians of Tanzania[5]. The present effort relates to another issue, closely associated with Macmod's raison d'être. Macmod was built as a means to analyse the medium term future, not the distant past. It is therefore a prime concern of the Macmod effort to identify data inputs that may mirror present and future economic conditions, rather than those mirroring the distant past.

It is when seen in this specific light that the IO92 table is found lacking. The IO92 represents a crucial source of information on the Tanzanian economy. Even so, it

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[4] It should be emphasised that this is *not* to belittle the IO92 effort. The construction of an IO table, especially a pioneer table like the IO92, does necessarily entail a production lag of several years. IO tables built from scratch will never be entirely up-to-date, and the problem is exacerbated if fundamental economic structures are experiencing rapid changes. A quick and easy way of updating existing IO tables is therefore needed. The present paper addresses this need.

[5] In executing this project we have, as a matter of principle, endeavoured to use data drawn from Tanzania's official statistics. This policy reflects the argument that these data are probably the best ones available, but also the principle that government institutions should employ a common official source of data rather than several private ones. Adherence to this principle, however, may cause costs. In the present case the cost is that we have to face data problems so severe that they may possibly invalidate the results produced and conclusions drawn. Thus, the data problem, and the urgent need for substantial revisions in the National Accounts series, has been discussed elsewhere in this paper.

does not lend itself *directly* to the present purpose. In order to assist us study today's realities the IO92 must be updated to a recent year, taking on board the major changes in the Tanzanian economy since 1992.

The treatment of imports represents another key issue. The standard IO92 table specifies imports in a highly aggregated form: specified by recipient, but not by type of product.[6] This import format does not meet Macmod's needs. As further explained in chapter 2.3, these needs require imports to be detailed in the same way as domestic products.

Summing up, the present assignment involves the following main tasks:
- Rebuilding the IO92 table, by splitting all imports up by sector of origin, in order to make imports and domestic products directly 'comparable' in all relevant markets.[7]
- Revising the sections of the rebuilt table that depict production and household consumption functions, in order to make them mirror current economic realities.

The last-mentioned task is seen to be limited to the updating of the sections of the IO table detailing production and household consumption functions only. These functions, however, account for the lion's share of the IO table. This table represents a complex picture of the economy, a picture in which supply and demand elements are balanced against each other. This is in fact the very rational of the IO table. Individual, major IO sections ought therefor not to be revised 'in isolation', but in conjunction with the rest of the table.

Moreover, Macmod's need for IO data is not limited to the coefficients depicting the immediate and direct production inputs only. Macmod also needs coefficients depicting the *total* production inputs, including the effect of relevant secondary effects. The complete IO matrix is required for the calculation of these coefficients. The tasks before us therefore necessitate the updating of the *whole* IO table. In the following we consequently refer to the updating of the complete IO table, rather than selected parts of it.

2.2   Recent economic developments

In the above we have argued that economic developments since 1992 have been such as to render the IO92-structures out of date. In this chapter we shall look a little closer at this issue.

Table 2.2.1 illustrates the growth of domestic production (GDP at factor cost) over the period 1992-98. GDP at current prices is seen to have grown rapidly, from approx. 1.3 trillion shilling in 1992 to approx. 5.1 trillion in 1998, i.e. by more than 300%. This gives an annual average growth rate of more than 26 % pa. These results, however, grossly overstates the real amount of growth in the

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[6] This description refers to the format of the IO92 table commonly encountered. More detailed estimates of imports are however given in the basic IO92 publication, as explained in chapter 3.1.

[7] The revised IO92 table, as aggregated to Macmod sector level, is detailed in the Statistical Annex I. See tables IO92Tot, IO92Dom and IO92Imp.

economy. They are measured in current prices, and represent a period during which rapid inflation occurred. In real terms GDP is reported to have grown by no more than 18% over the 6 years period, averaging a relatively modest 2.8 % pa.

Table 2.2.1 Growth of total GDP (factor cost) at current prices

Year	Current price estimates		Constant 1992 price estimates	
	Value TZShs'mill.	%pa growthrate	Value TZShs'mill.	%pa growthrate
1992	1,275,915	--	1,275,915	--
1993	1,607,764	26 %	1,281,007	0 %
1994	2,125,324	32 %	1,298,945	1 %
1995	2,796,642	32 %	1,345,246	4 %
1996	3,452,559	23 %	1,401,711	4 %
1997	4,286,768	24 %	1,448,213	3 %
1998	5,125,311	20 %	1,505,827	4 %
1992-98	Avg. growthrate: 26.1 % pa		Avg. growthrate: 2.8 % pa	

Source: Bank of Tanzania, Economic Bulletin for the quarter ended 31st March, 2001

The period 1992-98 has consequently seen large increases in prices, and only modest real term economic growth. This may seem an important conclusion in the current context. It could imply that we *might*, after all, base our analysis on the IO92 table 'as is' (i.e. without updating to a later year). This reflects the argument that there may be no real problem in employing the IO92 table for our present Macmod tasks *if* the Tanzanian economy has changed in size but *not* in structure.

Such a situation may for instance be envisaged if prices and volumes grow by common factors. All variables would then change, but to the same degree, ensuring that the relative weight of various economic variables would remain unaltered. In practise, however, economic growth tends to be unevenly distributed. The result is changes in economic structures, and a need for updating the IO92 table.

Table 2.2.2 lends support to this argument. It illustrates developments in the Macro Budget Identity variables, i.e. in the various elements of resource supply and demand. The table shows major changes in the demand side variables. The share of total national resources devoted to private household consumption has increased from 54% in 1992 to 68% in 1998. This is a dramatic shift, implying that other end-use purposes must have decreased drastically. This is easily seen to be the case with Public Consumption (down from 13% in 1992 to 6% in 1998), and Gross Fixed Capital Formation (down from 23% in 1992 to 15% in 1998). The share of exports, on the other hand, has grown slightly (from 9% to 10%) mirroring the implementation of a renewed emphasis on exports.

The supply side also features significant changes. Local production, as measured by GDP at factor price, has grown more than imports. In 1992 it accounted for 69% of total resource supply, and for 72% in 1998. Also local taxation has grown in strength, it accounted for 5% of total resource supply (measured at market prices) in 1992, and 6% in 1998. GDP at market price in consequence increased its share of total resource supply from 74% in 1992 to 78% in 1998. In consequence imports decreased its share of total resource supply from 26% in 1992 to 22 % in 1998.

Table: 2.2.2 Macro Budget Identity, 1992 & 1998, current price

	1992		1998	
Supply side:	TZShs'bill.	% distr.	TZShs'bill.	% distr.
GDP at factor cost	1,530	68.8 %	5,125	71.8 %
Indirect taxes (inc. import duty)	108	4.9 %	446	6.3 %
GDP at market price	1,638	73.7 %	5,572	78.1 %
Imports (exc. duty)	585	26.3 %	1,565	21.9 %
Total Supply at market price	2,223	100.0 %	7,137	100.0 %
Demand side (at market prices):				
Private Consumption	1,196	53.8 %	4,879	68.4 %
Public Consumption	294	13.2 %	434	6.1 %
Exports	197	8.8 %	724	10.1 %
Gross Fixed Capital Formation	510	22.9 %	1,091	15.3 %
Increase in Stocks	27	1.2 %	10	0.1 %
Total Final Uses	2,223	100.0 %	7,137	100.0 %

Source: IO92 and IO98 (see Statistical Annex I & II).

Summing up, table 2.2.2 depicts a situation of considerable changes in economic structure. The period 1992-98 has seen substantial import substitution, with local supply out-growing imported supply, and a major change in the demand situation, with resources being shifted from investments and public consumption towards private consumption and exports.

Changes in overall supply and demand variables of this nature hardly endorse the argument that the underlying structures have remained unaffected by economic developments. These changes instead demonstrate the need for an update of the IO92 table.

2.3   Amended IO format

In the above chapter we have discussed the need for updating the IO92 table to a recent year. In this chapter we shall address the question of why it is necessary also to rebuild it into a different format.

The answer to this question has already been suggested earlier. Thus, it is recalled that the standard IO92 table presents imports as a single-row aggregate, as if it consisted of a single product inherently different from the local ones. This format does not lend itself to the analysis of substitution between imports and domestic products, a central concern in the current context. The IO92 table therefore does not meet Macmod's needs. These needs require imports to be detailed in the same way as domestic products, allowing the two to be 'matched' against each other in all relevant markets.

The concern for the substitution issue reflects the fact that the Tanzanian economy is increasingly opening up towards the world. Tanzanian producers have to compete against foreign suppliers, not only in foreign markets but also in their own local market. They can no longer take the local market for granted, but have to earn their share of it by offering their customers competitive prices and qualities.

In analysing economic developments in the years ahead one will have to take this trait into account. Macmod is constructed for the purpose of assisting in this task, and the absence of a suitable format for addressing the import issue has been felt as

a 'flaw' in the existing model structure. Thus, a central Macmod project document states that:

> It appears that the I-O coefficients derived from the 1992 table overestimate demand for imported intermediates and underestimate local supply of intermediate inputs for the more recent years. The next step in the sector block is therefore to introduce the possibility of substitution between imported and local inputs in the I-O model.[8]

The present effort is in direct response to this concern. It focuses on the substitution issue through the construction of a multi-dimensional IO table in which all IO elements (except GDP etc) are specified in terms of their total values as well as the corresponding domestic and import subtotals. Hence, the revised IO table contains the following three dimensions[9]:

- Total, referring to goods and services irrespective of origin,
- Domestic, referring to locally produced goods and services,
- Import, referring to imported goods and services.

3. Constructing the new IO-table

3.1 Rebuilding the IO92 table

The rebuilding of the IO92 table from a single- to a multi-dimensional format is fairly easily accomplished. Both domestic and import dimensional estimates are available from the IO92, in one way or another. Hence:

- The estimates of the domestic dimension are directly available from the IO92 table itself.
- The estimates of the import dimension are also available from IO92 sources, although not from the IO92 table itself (in its standard format).

The last point warrants some explanation. The import data of the standard IO92 table are highly aggregated. These aggregates, however, are derived from more disaggregated import data, classified both by sector of origin and recipient. The latter data are specified in a separate table given in the recently published Input Output publication referred to in the Introduction. These estimates are the basis for the rebuilding of the IO92 table.

Some other revisions in the original IO92 table were also made at this stage. These essentially concern the reclassification of import duty. In the original IO92 table most import duty was 'billed' to the trade sector, conceivably on the argument that they are collected by that sector. Following standard IO logic, however, the implication of this allocation is that the import duties are treated as indirect taxes paid in respect of the trade services themselves (i.e. as indirect taxes paid in respect of the services provided by the importer/trades, as distinct from duties paid on products imported). In the revised table we have followed the standard IO

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[8] From: Macroeconomic and budgetary modelling for medium term planning (Phase III), by Ms H. K. Nordàs.

[9] Note that the only two dimensions are independent, the third is given by these two (for instance: Total = Domestic + Import).

prescription of 'billing' all indirect taxes to the products in question, and not to the merchants that happen to sell it. The duties in question are consequently reclassified (tentatively) in the revised table.

3.2   Updating the IO92 table

In updating the IO92 table we combine the following two main components:
- The first component is the IO92 table itself, or rather: the internal input/output structure of the rebuilt IO92 table.
- The second component is the set of (exogenous) data referring to the new reference year. These data typically refer to the elements of the overall supply and disposition of resources in the new reference year. These data represent the 'outer framework' of the new IO table.

The two components are amalgamated through the use of a mathematical formula. The formula fits the old internal structure to the new framework through a iterative series of column- and row-wise adjustments and recalculations. A spreadsheet programme of this type has been developed for the present updating exercise.

As repeatedly argued in this paper there seems a definite need to replicate the present exercise in the years ahead. The said programme has therefore been developed towards a more formalised 'updating tool'. The 'tool' in question is briefly portrayed in chapter 3.3, while the updated IO table is detailed in Statistical Annex II[10]. In this chapter we shall discuss the exogenous data required as inputs in the updating exercise. These data depict the fundamental supply and demand variables of the economy, and are mainly drawn from the following sources:
- National Accounts Statistics (for: GDP, supply and disposition of resources).
- Foreign Trade Statistics (for: imports and exports of goods and services).

Reference year

The updating of the IO92 table is undertaken with reference to a given reference year. The reference year is the year portrayed by the updated IO-table, and to which the above-mentioned base-data must all refer. The need for reliable data 'covering' the reference year implies that the updated IO table can never be entirely up-to-date. Hence, although one ideally wants a very recent reference year for the updated IO table, the choice is in practise severely limited by the problem of data availability. Reliable data depicting central economic variables are only available some time 'after the fact'. The need for actuality must consequently be balanced against the need for proper data inputs.

Considerations of this nature resulted in the choice of 1998 as the reference period for the present exercise. This year is reasonably recent, and it provides a minimum of data coverage. Even so, there are significant data problems to be faced also for this year. The same is true for alternative reference years. In the next sections we shall describe some main data sources and problems.

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[10] See tables IO98Tot, IO98Dom and IO98Imp.

National Accounts data

Data on central National Accounts variables (GDP, supply and disposition of resources) represent a key area of exogenous data requirements for the IO updating exercise. The National Accounts estimates in question are in principle available from official sources, and in a format that requires relatively little 'transformation' to fit the Macmod format. In practice, however, the present situation is one of significant problems both in terms of data coverage and data reliability.

The central National Accounts estimates are in principle easily available. Estimates of GDP are published regularly, for instance in the Economic Bulletin issued by the Bank of Tanzania. Even so there are problems; the published GDP estimates are in some cases too aggregated for our present purpose. Thus, the official data combines the growing of agricultural crops into a single production sector, whereas Macmod specifies two sectors (export crops and food crops). Likewise, official statistics only allow for one manufacturing sector, whereas Macmod has four (manufacturing of beverages, of tobacco, of petroleum, and of other products).

The missing data should in principle be available from National Accounts files containing the background data used for the construction of the published National Accounts series. This source has been tapped for the present exercise, with the assistance of the Tanzania partners. Even so, some data requirements were not met, and instead had to be represented by less reliable guestimates.[11]

Table 3.2.1 Alternative GDP estimates, by Macmod production sector

1992 GDP (factor cost) Macmod sector:	A : National Accounts Statistics*)	B : Input-Output Table	C : Percentage difference C=(B-A)/A
Agriculture, crops	450,601	399,948	-11 %
Agriculture, other	161,802	182,848	13 %
Mining	13,503	21,429	59 %
Manufacturing	104,589	218,358	109 %
Electricity & water	19,766	23,130	17 %
Construction	68,860	74,741	9 %
Trade etc.	202,207	285,260	41 %
Transport etc.	66,191	110,735	67 %
Finance etc.	70,978	61,735	-13 %
Public admin. etc	117,419	127,332	8 %
Other services	14,464	24,418	69 %
Total GDP	1,275,915	1,529,934	20 %

   *) Recently published National Accounts statistics (by Bank of Tanzania, in Economic Bulletin
   for the quarter ended 31st March 2001)

The chief data problem, however, concerns data quality rather than data availability. The nature and extent of the quality problem is demonstrated in table 3.2.1. The table compares two sets of GDP estimates for the year 1992, one drawn from the official National Accounts statistics and the other from the IO92 table. A considerable degree of discrepancy is seen to exist in the two sets of estimates. The

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[11] For this reason the results presented in this paper do to a certain extent build on guestimates made by the present author. The quality of the estimates calculated from these data inputs is in consequence far from perfect.

GDP estimates of the Input Output table are on the whole significantly higher than the corresponding National Accounts estimates, in one case by as much as 109%. Obviously, one (or both) of these data sets needs to be significantly revised.

The nature of these revisions is not yet known but the IO estimates are presumably the more reliable of the two data sets. This presumption reflects the stipulation that the IO estimates are based on an in-debt analysis of the economy as a whole in which all relevant supply and demand elements are assessed against one another. Presumably, therefore, the IO table reflects a more painstaking assessment of the economy than does the National Accounts estimates.

Two concrete examples may be informative in demonstrating this argument. The first example concerns the estimation of GDP in crop agriculture. The National Accounts estimates of this GDP are calculated as follows:
- First the actual or implied sales value of the crops grown (i.e. the Gross Output) is estimated.
- Next the GDP is estimated on the assumption that the cost of production is equal to 4% of the Gross Output.

This is in itself a reasonable way of calculating GDP in crop agriculture. GDP is by its very nature imputed, not observed. In most cases the imputation is based on the corresponding Gross Output (GO) variable, because this is the variable most readily observed. To 'translate' GO to GDP, however, one needs reliable information about the cost of production. A 4% cost of production seems quite low, suggesting a largely 'non-monetary' production sector. This may have been a correct description of the sector in the past, but it seems unlikely to be valid today. Thus, the IO92 table indicates costs of production of quite another magnitude. Rather than 4% production costs it indicates 24%[12], a figure presumably arrived at after taking into consideration the supply of misc. products typically used as inputs into agriculture (fertilisers, pesticides etc).

The second example concerns the manufacturing sector. Table 3.2.1 shows that the IO92 estimate for manufacturing GDP is more than twice the size of the corresponding National Accounts estimate. The cause of this huge difference is not known (by the present author) but presumably it does i.a. reflect the IO table's broader use of information on supply and demand throughout the economy. Thus, it is recalled that the raison d'être of the IO table is the balancing of supply and demand elements. Supply may therefore to some extent be measured by demand, and vice versa.

This may be a decisive factor in the present case. The amount of supply (local and foreign) of products typically used as inputs in manufacturing industry identified by the IO table is suggestive of a significantly larger sector than what is indicated by the National Account estimate of GDP, provided that the sector is presumed to have a reasonable input structure.

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[12] Note that 24% is the average for all crops. The corresponding ratio for export crops is 49%, and 21% for food crops.

The nature of the above argument is demonstrated in table 3.2.2, which gives two alternative sets of 1992 estimates in respect of the manufacturing sector's input structure. The first set (column A) is copied directly from the IO92 table. The second set (column B) is based on the same data, but differs from it in the following respects:

- The IO92 GDP-estimate for manufacturing is substituted by the corresponding National Account estimate.
- The implied reduction in GDP is presumed to result in a corresponding reduction in Gross Output, i.e. in the supply of locally produced manufactures.
- The supply reduction is carried forward to the various uses of these products, and evenly distributed among them. This also applies to the intermediary use of such products by the manufacturing sector itself.

The use of other intermediate inputs in the manufacturing sector is assumed to remain as in the IO92 table (in line with above argument about the need to find a use for these production inputs).

It is seen from table 3.2.2 that these assumptions imply that the GO/GDP-ratio decreases from a little above 30% to a little below 18%. In the absence of firm and in-depth information about the manufacturing industries in question we cannot really determine the validity of these estimates. Even so, we may assert that evidence from other developing nations suggest that a 30% GDP/GO-ratio in manufacturing looks fairly reasonable, while an 18% ratio does not.[13]

Table 3.2.2 Manufacturing sector's input structure. Alternative 1992 estimates

	A: Estimates from IO92-table	B: Tentative Nat.Acc.est.[14]	Memo: B/A-ratio
Locally manufactured intermediate inputs	77,107	63,451	0.823
All other intermediate inputs	424,025	424,025	1.000
Total intermediate inputs	501,132	487,476	0.973
Total Value Added (exc. indirect taxes)	218,358	104,589	0.479
Gross Output (exc. indirect taxes)	719,490	592,065	0.823
Memo: Value Added in % of Gross Output	30.3%	17.7%	

In conclusion it seems highly likely that the present National Accounts estimates for the year 1992 need to be revised quite significantly, in view of the IO evidence. If this is indeed the case, similar revisions will need to be made also in the corresponding estimates for other years. The quality of the data inputs used in the present updating exercise is therefore questionable, and will remain so no matter what reference year we adopt. This should be kept in mind when interpreting the

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[13] Note, however, that this is not to argue that an 18% GDP/GO-ratio is impossible, only that it seems implausible. Ratios of this magnitudes may often be encountered in the case of simple processing operations, such as for instance: cotton ginning, tobacco curing, completion of already largely assembled structures etc. Such operations presumably account for a fairly large part of Tanzania's manufacturing, but it seems hard to accept that all of it is of this nature.

[14] It is emphasised that the estimates of column B are highly speculative. They are offered not as proper estimates but as illustrations of likely magnitude.

results derived from the present exercise. They should not be seen as 'final answers', but rather as illustrations of possible magnitude.[15]

Foreign trade data

In this section we focus on the foreign trade data required as exogenous inputs into the IO updating exercise. The situation of the trade estimates is very different from that of the GDP data discussed above. Unlike the latter the trade estimates require significant measures of 'transformation' in order to fit the Macmod format. This is discussed in the below sections.

Trade Statistics is the natural source of information about a country's foreign trade. These statistics normally cover the country's imports and exports in considerable detail, but only in respect of goods. Service exports and imports are also vital components of foreign trade, but estimates of such trade tend to be less detailed and reliable than for goods. This reflects the well-known fact that goods are subject to customs clearance, while services are not. Services therefore tend to be covered by more tentative imputations, produced by the Central Bank for Balance of Payments purposes.

Such as they are, however, all estimates are in principle analysed and classified in the same way. Hence: imports and exports must be classified by sector of origin; i.e. according to the local sector producing the type of commodities in question. In addition, imports must be classified by end-use, i.e. according to the 'receiving purpose'.[16]

Service imports and exports

Services account for a considerable part of today's total foreign trade. Table 3.2.3 shows the situation for Tanzania. Service exports are seen to account for as much as 49% of all exports in 1998, up from 40% in 1992. The corresponding figures for service imports are lower: 31% in 1998 and 10% in 1992. Even so, these figures readily demonstrate the rapidly growing importance of service imports.

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[15] Presumably, the revisions discussed in the above will materialise in due course. It might seem reasonable to await the amended data before proceeding with the present exercise. Project deadlines, however, rules this out. As a compromise between conflicting needs (to proceed without delay, and to await new data before proceeding) the current effort has been given a dual focus. Hence, an analysis based on the flawed input data presently available has been made (and the results presented as 'illustrations of possible magnitude'). Rather than going into a detailed discussion of the nature and employment of these results, however, the focus has next been shifted towards the method used to produce them. The expressed purpose of doing so is to demonstrate how the whole analysis may be repeated at minimal costs once revised National Accounts data are available.

[16] The term is further explained in below sections.

Table 3.2.3 Main components of foreign trade, 1992 & 1998

	1992		1998	
Exports	TZShs'mill.	%	TZShs'mill.	%
Goods	*117,964*	60 %	*366,523*	51 %
Services	78,701	40 %	357,169	49 %
Total	196,665	100 %	723,691	100 %
Imports				
Goods	546,446	90 %	1,140,659	69 %
Services	61,709	10 %	520,731	31 %
Total	608,155	100 %	1,661,390	100 %

Source: IO92 and IO98 (see Statistical Annex I & II).

The implication for the present updating effort is clear. Ideally we would like to analyse the services traded in the same depth and detail as the traded goods. This, however, is not possible due to problems of data availability. The in-depth analysis would require extensive information about all types of services traded. Information of this nature typically exists only as unpublished background data for the Balance of Payments statistics, if at all.

If statistical details are not available we must instead rely on the more combined service aggregates regularly published as part of Balance of Payments summaries or similar. These totals, however, tend to be much too aggregated; they consequently have to be broken down into relevant Macmod entities. In order to do so we need some kind of allocation-formula.

A formula based on the IO92 table may be a feasible alternative *if* no better instrument presents itself. The disadvantage of employing the IO92 formula, of course, is estimates of a somewhat questionable validity. Even so, data inputs of this nature may often be unavoidable; without them we would not be able to 'bridge' data-gaps that would otherwise stop us from proceeding altogether. This has been the case also in the present case.

Goods exports

As noted earlier, information on exports is required as inputs into the IO updating. The export estimates in question should ideally be based on detailed Trade Statistics data. In practise, we may have to settle for other sources giving much less detail. This is also true in the present case. This have caused certain estimation problems, some of which are briefly noted in the below.

The Tanzanian authorities regularly publish export statistics of the type illustrated in table 3.2.4. The table is seen to itemise the six traditional export crops. It also lists the export value of petroleum products and minerals, while exports of all other goods are presented in terms of two broader commodity groups: "Manufactured products" and "Others".

The first eight commodity groups, representing 65% of all goods exported in 1998, seem easily and exclusively associated with the Macmod sectors of export crop agriculture, petroleum refining, and mining. The last two groups, in contrast,

representing the remaining 35% of all goods exported, refer to various Macmod sectors.

The present exercise consequently necessitated the breaking up of a full 35% of goods exports (corresponding to approx. 1/6 of all goods and services exported in 1998) into proper Macmod sectors. The break-up was made using a distribution key based on the parallel IO92 magnitudes. Once again we must therefore warn that the estimates produced are far from perfect.

Table 3.2.4 Exports by Major Commodity Groups, 1998

Exported product	TZS'mill	% dist.
Cotton	31,647	8 %
Coffee	72,280	18 %
Sisal	4,508	1 %
Tea	20,091	5 %
Tobacco	36,672	9 %
Cashewnuts	71,806	18 %
Petroleum Products	66	0 %
Minerals	17,509	4 %
Manufactured Products	23,782	6 %
Others	113,444	29 %
Total	391,804	100 %

Source: Economic Bulletin, Bank of Tanzania

Returning to the six major export crops it is recalled that these are directly associated with Macmod's Export Crop sector. At first impression it appears that the table 3.2.4 offers considerably more crop detail than required, i.e. that they only need to aggregate for our present purpose. Closer inspection, however, reveals a significant specification problem also in respect of these exports.

Table 3.2.5 illustrates the problem. It compares export and production statistics for the six agricultural crops in question. It is seen that the export value in most cases exceeds the corresponding production value. It may look as if the two data sets are made without reference to one another. This, however, is unlikely to be the case. The apparent anomaly is probably caused by the export data covering the raw agricultural crops they are directly associated with, plus the semi-processed products made from them.[17]

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[17] Ginned cotton and cured tobacco are two examples of such semi-processed products.

Table 3.2.5 A closer look at major export crops

	Cotton	Coffee	Sisal	Tea	Tobacco	Cashew
Export value	Millions of TZS					
1992	28,367	17,301	391	7,165	8,187	6,487
1993	31,697	39,428	1,441	15,176	7,097	9,133
1994	53,425	58,765	2,643	20,154	10,495	26,507
1995	69,238	81,168	3,535	13,216	15,372	36,077
1996	79,571	85,604	3,054	15,005	28,009	47,447
1997	79,623	72,744	5,591	19,498	33,060	55,513
1998	31,647	72,280	4,508	20,091	36,672	71,806
IO92est.	0	9,288	2,670	3,150	4,104	6,075
Production (Gross Output)	Millions of TZS					
1992	21,264	9,280	4,423	3,600	5,825	5,519
1993	8,768	11,823	2,705	3,878	7,702	5,259
1994	9,888	7,168	6,314	4,608	7,165	12,075
1995	26,520	31,533	7,196	5,891	15,872	21,705
1996	52,106	36,215	6,306	5,355	18,787	28,605
1997	24,121	26,466	9,100	5,001	31,503	19,845
1998	24,120	27,205	5,476	6,630	25,079	29,760
IO92est.	18,927	13,190	4,462	5,545	14,226	9,243
Implied export ratio (Export in % of Production)						
1992	133 %	186 %	9 %	199 %	141 %	118 %
1993	362 %	333 %	53 %	391 %	92 %	174 %
1994	540 %	820 %	42 %	437 %	146 %	220 %
1995	261 %	257 %	49 %	224 %	97 %	166 %
1996	153 %	236 %	48 %	280 %	149 %	166 %
1997	330 %	275 %	61 %	390 %	105 %	280 %
1998	131 %	266 %	82 %	303 %	146 %	241 %
IO92est.	0 %	70 %	60 %	57 %	29 %	66 %

Source: IO92 table and misc. National Accounts Statistics

Table 3.2.6 lends support to this argument. It details the IO92 distribution of the six export crops between various uses. It is seen that much of the crops grown are exported 'as is', but much is also delivered to local producers for further processing.

Table 3.2.6 Distribution coefficients for major export crops, 1992

Production sector:	Export	Priv. cons.	Intermd.use	Total GO
Growing of cotton	0 %	0 %	100 %	100 %
Growing of coffee	70 %	14 %	15 %	100 %
Growing of sisal fibre	60 %	0 %	40 %	100 %
Growing of tea	57 %	3 %	40 %	100 %
Growing of tobacco	29 %	8 %	63 %	100 %
Growing of cashewnuts	66 %	26 %	8 %	100 %

Source: IO92 table

Yet again we are consequently faced with a need for more detailed export information, allowing us to split the official export data into relevant Macmod entities, i.e. into agricultural versus manufactured products. If the necessary statistical details are not made available to us we once again have to settle for some kind of allocation formula, for instance based on the IO92 data given in table 3.2.6. This is the case for the estimates employed in the present exercise.

Goods imports

The case of goods imports is in principle similar to that of goods exports, but the degree of information is more extensive and the analysis wider. Thus, imported goods, being subject to import taxes, are examined and recorded in great detail by the customs authorities. These data permit an in-depth analysis, giving far better estimates than for exports and services.

Moreover, imports are not only analysed with respect to sector of origin but also in terms of their intended use. The latter kind of analysis is commonly referred to as an end-use analysis. Such an analysis is essential to the production of the IO98 table. It has consequently been undertaken as part of the present project. The result of this effort is summarised in table 3.2.7.

Table 3.2.7 Imported goods (cif) 1998, classifiedby sector of origin and end use

Sector of origin	Intermed. uses	Private Consumpt.	Capital Formation	Total
Agriculture: Export crops	0	0	0	0
Agriculture: Food crops	15,980	32,047	0	48,027
Agriculture: Other products	471	344	0	815
Mining	55,780	408	0	56,189
Manufacturing: Beverages	661	11,856	0	12,517
Manufacturing: Tobacco	1,105	279	0	1,384
Manufacturing: Petroleum	36,680	4,580	0	41,260
Manufacturing: Other products	307,790	218,263	358,348	884,402
Total (goods only)	418,468	267,778	358,348	1,044,594

Source: Working Paper WP2002:2, Chr. Michelsen Institute, Norway

The specifics of the import analysis are given in a separate paper, to which the interested student is referred.[18] A short summary of the two major classification principles employed may nevertheless be in order before leaving the topic:
- Imported goods, recorded at a fairly detailed commodity level, are classified according to their most likely sector of origin, i.e. according to the domestic sector most likely to produce the type of products in question, given the Macmod sector specification.
- They are also classified according to their most likely end-use, i.e. according to the activity most likely to take delivery of them[19]. The relevant end-use categories are:
  - intermediate consumption,[20]

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[18] Working Paper WP2002:2, Chr. Michelsen Institute, Norway

[19] Note that the end-use category refers to the *direct* recipient of the product in question, not the ultimate. Thus, goods that need further processing are classified as intermediates, even though they will eventually be used for another purpose. The implication is for instance that public consumption is ruled out as a relevant end-use category for imports, although government may be a major importer. These imports, however, are delivered to government activities, i.e. to government production activities. Imports consumed by government are consequently classified as intermediate inputs.

[20] Note that this group comprises intermediate production inputs in general. The receiving sectors in question are not individually identified at this stage. The detailed nature of the primary data may nevertheless allow a few important intermediates to be associated directly with a specific sector. Crude oil is for instance easily associated with petrol refining. Such direct allocation of major

- private consumption,
- gross fixed capital formation.

3.3 The updating programme

It is recalled that there may soon be a need for fresh IO updates, in response to major revisions in the GDP series or rapid structural transformations in the Tanzanian economy. Although not envisaged in the original project documents, the present effort has addressed this issue.

A computer programme allowing for fresh updates of the Tanzanian Input Output table has been constructed. The programme draws on the RAS-model developed by R. Stone at the University of Cambridge in the early 1960s. Stone's RAS-model was part of a larger project seeking *i.a.* to *predict* input/output-tables. Our adoption of the method, however, does not imply such an ambitious aim. The task at hand is not to predict the IO table, but produce a table at least partly based on actual data in a quick and inexpensive way.

This reduction is achieved by computerizing the production of the internal IO matrix. It should be emphasised that the updating model deals with the elements of the internal IO matrix only. All row- and column totals of the IO table, as well as the GDP-elements.

The basic assumptions on which the RAS-model relies may be summarised as follows: All variations that have affected the elements of the matrix of intermediate uses between 1992 and 1998 are the results of uniformly operating price- and volume effects. The latter may be envisaged as simple volume- and price indices.

The price-effect-index: R_i represents the price change in products originating from sector i. The price effects are assumed to vary *between* sectors of origin, but to operate uniformly *within* each sector. All products supplied by a given sector to other sectors are consequently subject to one and the same price effect.

The volume-effect-index S_j represents the volume change in sector j's production activity (or the change in end-use category j's overall consumption volume). The volume effects are assumed to vary *between* sectors, but to operate uniformly *within* each sector. All intermediate inputs used by a given sector are consequently subject to one and the same volume effect.

The above postulates suggest the following equation between known and unknown IO variable: $X_{ij} = R_i * A_{ij} * S_j$ where:
- A_{ij} denotes the base-table IO-coefficient in respect of intermediate deliveries from sector i to sector j (or the IO-coefficient in respect of end-use category j);
- X_{ij} denotes the corresponding IO-coefficient in the updated IO table.
This is the basic type of equations employed by the RAS-programme.

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import categories constitutes important information about the 'hubs' of the economy, and are of great importance for the updating exercise.

It may be noted that the actual magnitudes of the R_i and S_j indices are not a priori known. This is of no consequence to the successful operation of the programme, which only needs to be instructed about the properties of the indices (i.e. about the individual but uniform effects). Based on this information the RAS programme is able to make calculate the X_j estimates through an iterative process.

It is recalled that the Macmod IO table is three-dimensional: each total dimensional X_{ij} element is split into imported and domestic sub-components. The RAS formula described above refers to the total dimensional only. Estimates for the sub-dimensions have to be calculated differently. This reflects the fact that the exogenous row and column totals required by the above RAS formula are not available for these dimensions.

The end-use-analysis of imports represents the most detailed source of information about these variables. We consequently use these to calculate the import estimates, leaving the domestic elements to be calculated as residuals. The end-use-analysis classifies imports by sector of origin and end-use category. This satisfies the data need in respect of the final use categories. It also provides sector-of-origin estimates of intermediate imports. These estimates, however, represent total intermediate supplies; they are not distributed by receiving sector.

Data pertaining to the latter distribution is a prerequisite of the standard RAS iteration routine. The import-elements are therefore estimated by another formula, based on total dimensional estimate and IO92 import fractions. The two data sets are combined to calculate preliminary import estimates, which are next adjusted until they balance the exogenously given row totals. The adjustments differ between sectors of origin, but are uniform within each sector. They may be interpreted as representing import substitution (or rather: substitution between imports and local products).

The programme is in the form of a fairly extensive spreadsheet, which does not lend itself to documentation on paper. The source programme is instead supplied to the Macmod team under separate cover. The operating instructions etc required to run the updating programme are given in the programme itself; they will not be detailed in this paper. A short review of the main operational characteristics may nevertheless be in order:
- The programme is constructed as an Excel spreadsheet file.
- The programme is tailor-made to fit the present Macmod sector specification (but can be revised to fit other sector specifications).
- The programme calls for a minimum of exogenous data inputs in respect of the new reference year. The data in question are mainly the central estimates of standard National Accounts and Foreign Trade Statistics (as discussed above).
- In other respects the programme is flexible in terms of data inputs. The programme does not require any data over and above the minimum requirement, but it allows additional data to be utilised in the updating exercise if such data are available.
- Such an additional input may for instance be the value of crude oil imports, destined for the local petroleum refinery. This entry represents an important

element of the new IO table. The more such elements we are able to pre-specify, the better the updated table will be.

- The programme accepts all pre-specified data inputs, and balances the rest of the table 'around' these data. The final result is in most cases a new and fully balanced IO table with all pre-specified elements intact.
- All pre-specified data inputs should be checked for internal and external consistency. The introduction of internally imbalanced or incompatible[21] data will typically result in the programme proving unable to fully balance the new table.

4.   Findings & suggestions

4.1   Broad IO findings

The IO98 table, formatted and produced as described above, is given in Statistical Annex II. It will not be replicated here. A brief look at some broad findings is nevertheless in order. In this chapter we shall look at some major characteristics of a highly aggregated table constructed for this purpose. The 3-sector IO98 table in question is given below. The corresponding 3-sector version of the IO92 table is also given in order to demonstrate the structural changes occurred in the interim period.

The production sectors of the 3-sector IO tables are named and defined (in terms of corresponding Macmod sectors) as follows:

Primary sector : Agriculture, Mining
Secondary sector : Manufacturing, Electricity & Water, Construction
Tertiary sector : Trade, Transport, Finance, Public admin., Other services

The 3-sector tables are given in table 4.1.1 and 4.1.2. Both tables refer to the Total dimension (i.e. the same dimension as suggested for the introduction of IO functions into the Macmod model, as explained in below chapters). Estimates referring to the two sub-dimensions are only given in the form of import fractions. The import fractions in question are detailed in table 4.1.4 and 4.1.5. Two additional tables are also given: 4.1.3 and 4.1.6. These tables reveal the changes that have occurred in Total and Import variables from 1992 to 1998.

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[21] This is for instance the case if individual internal IO element exceeds the corresponding IO totals, or if the Macro Budget Identity is not satisfied.

Table 4.1.1 Table IO98Tot aggregated to 3-sector level   TZS'billion

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Primary sector	358	636	70	1,065	1,990	0	2	180	3,237
Secondary sector	199	577	247	1,023	1,117	0	893	186	3,220
Tertiary sector	131	165	2,105	2,401	1,772	434	206	357	5,170
Total Intermediate Inputs	689	1,378	2,422	4,489	4,879	434	1,101	724	11,626
Total GDP (market price)	2,434	815	2,227	5,476					
Total GO (market price)	3,123	2,193	4,649	9,965					
Total Supply of Resources (at market price)									
Domestic Resources	3,123	2,193	4,649	9,965					
Imported (inc.duty) *)	114	1,027	521	1,661					
Total Supply (inc.duty)	3,237	3,220	5,170	11,626					

*) Imports classified by sector of origin
Source: Table IO98Tot of Statistical Annex II

Table 4.1.2 Table IO92Tot aggregated to 3-sector level   TZS'billion

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Primary sector	60	283	30	373	386	0	5	50	813
Secondary sector	79	293	152	525	518	0	409	68	1,519
Tertiary sector	37	68	375	481	292	294	123	79	1,269
Total Intermediate Inputs	176	644	558	1,378	1,196	294	537	197	3,601
Total GDP (market price)	617	348	649	1,615					
Total GO (market price)	793	992	1,207	2,993					
Total Supply of Resources (at market price)									
Domestic Resources	793	992	1,207	2,993					
Imported (inc.duty) *)	20	527	62	608					
Total Supply (inc.duty)	813	1,519	1,269	3,601					

*) Imports classified by sector of origin
Source: Table IO92Tot of Statistical Annex I

Comparing table 4.1.1 and 4.1.2 the pattern previously described when analysing the Macro Budget Identity (see table 2.2.2) is called to mind. Hence, dramatic changes have occurred in demand side variables. Private Consumption, and to a lesser extent Exports, have outgrown Public Consumption and Gross Fixed Capital Formation. The supply side also features significant changes, with local production (measured by GDP at factor price) and taxation outgrowing imports.

Table 4.1.3 Changes in individual resource-shares, 1998-92, 3-sector level

Receiving sectors Delivering sectors	Primary sector	Second. Sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Primary sector	1.4 %	-2.4 %	-0.2 %	-1.2 %	6.4 %	0.0 %	-0.1 %	0.2 %	5.3 %
Secondary sector	-0.5 %	-3.2 %	-2.1 %	-5.8 %	-4.8 %	0.0 %	-3.7 %	-0.3 %	-14.5 %
Tertiary sector	0.1 %	-0.5 %	7.7 %	7.3 %	7.1 %	-4.4 %	-1.7 %	0.9 %	9.2 %
Total Intermediate Inputs	1.0 %	-6.0 %	5.4 %	0.4 %	8.8 %	-4.4 %	-5.4 %	0.8 %	0.0 %
Total GDP (market price)	3.8 %	-2.7 %	1.1 %	2.2 %					
Total GO (market price)	4.8 %	-8.7 %	6.5 %	2.6 %					
Total Supply of Resources (at market price)									
Domestic Resources	4.8 %	-8.7 %	6.5 %	2.6 %					
Imported (inc.duty) *)	0.4 %	-5.8 %	2.8 %	-2.6 %					
Total Supply (inc.duty)	5.3 %	-14.5 %	9.2 %	0.0 %					

The magnitude of these changes is demonstrated in table 4.1.3. The table measures the direct difference between 1998 and 1992 resource-shares. The resource-shares in question depict the relative distribution of the IO elements with respect to the total resource endowment. They are calculated by dividing the elements of table 4.1.2 and 4.1.1 by their respective resource total (i.e. by TZS' billion 3,601 for 1992 and 11,626 for 1998).

The table shows that the period 1992-98 witnessed a 2.6% shift in overall resource supply, with local products outgrowing imports. It also shows the dramatic shift in

resource disposition in favour of private consumption, at the expense of capital formation and public consumption. Thus, private consumption increased its share of total resources by 8.8% over the period, while capital formation lost 5.4% and public consumption 4.4%.

The table also demonstrates the changes in the sector distribution of local production. It is seen that the main locomotive of economic growth over the period appears to have been the primary sector (agriculture and mining), followed by the tertiary sector (i.e. services)[22]. Together these activities have outgrown the secondary sector (manufacturing, utilities and construction) to a considerable extent. It is noteworthy that the same pattern applies also for the imported supplies: imports typically originating in the tertiary and primary sector are outgrowing imports typically produced by the secondary sector.

Table 4.1.4 and 4.1.5 portrays the import fractions, i.e. the percentages of the above totals that are credited to imports (inc. duty). It is emphasised that the import fractions do not represent a standard import distribution as such. They describe individual import intensities, as calculated separately for each IO cell.

Table 4.1.4 IO98 import fractions*) 3-sector level

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Primary sector	0.1 %	11.8 %	3.2 %	7.3 %	1.8 %	0.0 %	0.0 %	0.0 %	3.5 %
Secondary sector	45.4 %	36.4 %	30.9 %	36.9 %	24.4 %	0.0 %	42.2 %	0.0 %	31.9 %
Tertiary sector	0.0 %	1.1 %	19.3 %	17.0 %	6.4 %	0.0 %	0.0 %	0.0 %	10.1 %
Total Intermediate Inputs	13.2 %	20.8 %	20.0 %	19.2 %	8.6 %	0.0 %	34.2 %	0.0 %	14.3 %
Total Supply	3.5 %	31.9 %	10.1 %	14.3 %					

*) Import value (inc. duty) in % of Total value, in the individual IO cell concerned
Source: Table IO98Tot of Statistical Annex II

Table 4.1.5 IO92 import fractions*) 3-sector level

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Primary sector	0.4 %	6.5 %	2.1 %	5.2 %	0.0 %	0.0 %	0.0 %	0.0 %	2.4 %
Secondary sector	41.7 %	46.8 %	51.1 %	47.3 %	17.9 %	0.0 %	45.5 %	0.0 %	34.7 %
Tertiary sector	0.0 %	0.5 %	12.9 %	10.1 %	4.5 %	0.0 %	0.0 %	0.0 %	4.9 %
Total Intermediate Inputs	18.8 %	24.2 %	22.7 %	22.9 %	8.9 %	0.0 %	34.7 %	0.0 %	16.9 %
Total Supply	2.4 %	34.7 %	4.9 %	16.9 %					

*) Import value (inc. duty) in % of Total value, in the individual IO cell concerned
Source: Table IO92Tot of Statistical Annex I

The secondary sector products are seen to have a much higher import intensity than the other production sectors in both 1992 and 1998. This is true for both resource supply and resource demand. Thus, imports account for more than 30% of the total supply of secondary sector products, versus less than 10% in other sectors. Similarly for the various types of resource demand: the import intensity for inputs used in production, consumption and capital formation is significantly higher for secondary sector products than for other products.

The higher import fraction of secondary products is reasonable. Manufactured goods make up the larger share of these products, and manufactures traditionally make up the bulk of foreign trade. Developments are however moving towards a

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[22] This refers to growth in GDP. The picture is a little different for Gross Output, with the tertiary sector outgrowing the primary sector.

more balanced situation. Thus, the secondary sector import fraction has decreased during the period 1992-98 while the primary and tertiary sector import fractions have increased.

Table 4.1.6 Changes in Import fractions, 1998-92, 3-sector level

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Primary sector	-0.3 %	5.2 %	1.2 %	2.1 %	1.8 %	0.0 %	0.0 %	0.0 %	1.1 %
Secondary sector	3.7 %	-10.3 %	-20.2 %	-10.4 %	6.5 %	0.0 %	-3.4 %	0.0 %	-2.8 %
Tertiary sector	0.0 %	0.6 %	6.4 %	6.9 %	1.9 %	0.0 %	0.0 %	0.0 %	5.2 %
Total Intermediate Inputs	-5.6 %	-3.4 %	-2.7 %	-3.7 %	-0.2 %	0.0 %	-0.4 %	0.0 %	-2.6 %
Total Supply	1.1 %	-2.8 %	5.2 %	-2.6 %					

Source: Tables IMP92 and IMP98

Developments in import fractions are highlighted in table 4.1.6. The entries of the table are calculated by deducting the 1992 fractions from the parallel 1998 fractions. The table confirms the 2.6% decrease in overall import intensity already found in table 4.1.3. It also demonstrates quite clearly that the decrease is far from evenly distributed across sectors and activities. Thus, some have experienced quite significant reductions in their import fractions, while others have experienced quite significant increases.

4.2   IO formats and assumptions

The IO-tables presented in the Statistical Annexes embrace three separate table-entities each, pertaining to the Total, Domestic and Import dimensions respectively. The Total Dimensional tables are complete in all respects while the Domestic and Import dimensional tables are partial, restricted to the sections of the IO table relevant for the dimension concerned.

The Domestic and Import dimensional tables are consequently not complete, all-inclusive IO tables in their own right. Rather, they are building blocks allowing us to construct an IO table with a different format than the Total Dimensional. The IO table in question is constructed by substituting the elements of the upper part of the Total Dimensional table by the corresponding Domestic and Import Dimensional elements.

Table 4.2.1 Total-Dimensional table, IO98, 3-sector level   TZS'billion

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Tot: Primary sector	358	636	70	1,065	1,990	0	2	180	3,237
Tot: Secondary sector	199	577	247	1,023	1,117	0	893	186	3,220
Tot: Tertiary sector	131	165	2,105	2,401	1,772	434	206	357	5,170
Tot: Total Int. Inputs	689	1,378	2,422	4,489	4,879	434	1,101	724	11,626
Total GDP (market price)	2,434	815	2,227	5,476					
Total GO (market price)	3,123	2,193	4,649	9,965					
Total Supply of Resources (at market price)									
Domestic Resources	3,123	2,193	4,649	9,965					
Imported (inc.duty) *)	114	1,027	521	1,661					
Total Supply (inc.duty)	3,237	3,220	5,170	11,626					

*) Imports classified by sector of origin
Source: Table IO98Tot of Statistical Annex II

Table 4.2.1 and 4.2.2 demonstrate the format of the two tables. Table 4.2.1 (which is identical to table 4.1.1) presents the Total-Dimensional version of the IO98. All

entries above the GDP-row are seen to represent Total-Dimensional flows; the distinction between foreign and local products is ignored.

Table 4.2.2 DomImp-Dimensional table, IO98, 3-sector level   TZS'billion

Receiving sectors Delivering sectors	Primary sector	Second. sector	Tertiary sector	Total interm.	Private consum.	Govrnm. consum.	Capital format.	Export	Total demand
Dom: Primary sector	358	561	68	987	1.954	0	2	180	3.123
Dom: Secondary sector	109	367	171	646	844	0	516	186	2.193
Dom: Tertiary sector	131	163	1.699	1.993	1.659	434	206	357	4.649
Dom: Total Int. Inputs	598	1.091	1.938	3.626	4.457	434	724	724	9.965
Imp: Primary sector	0	75	2	77	36	0	0	0	114
Imp: Secondary sector	91	210	76	377	273	0	377	0	1.027
Imp: Tertiary sector	0	2	406	408	113	0	0	0	521
Imp: Total Int. Inputs	91	287	485	863	422	0	377	0	1.661
Total Intermed. Inputs	689	1.378	2.422	4.489	4.879	434	1.101	724	11.626
Total GDP (market price)	2,434	815	2,227	5,476					
Total GO (market price)	3,123	2,193	4,649	9,965					
Total Supply of Resources (at market price)									
Domestic Resources	3,123	2,193	4,649	9,965					
Imported (inc.duty) *)	114	1,027	521	1,661					
Total Supply (inc.duty)	3,237	3,220	5,170	11,626					

*) Imports classified by sector of origin
Source: Table IO98Tot, IO98Dom and IO98Imp of Statistical Annex I

Table 4.2.2 presents the DomImp-Dimensional version of the table, i.e. the table in which the Total Dimensional elements above the GDP-row (of table 4.2.1) have been substituted by Domestic and Import Dimensional elements. The result is a larger table, containing a full set of additional delivering-sector rows, and a full specification of domestic products and imports.

These tables are in itself no more than statistical descriptions of the economy. Even so, their use in economic analysis is generally associated with certain hypotheses about the ways in which the economy works. The inclusion of such 'analytical tools' in the Macmod model consequently has certain theoretical implications. It may be useful to look briefly at these.

Standard IO assumptions entail that producers demand a certain mix of products as inputs for their production activity. Likewise, consumers demand a certain mix of products to satisfy their consumption needs. The commodity mixes in question are given by the corresponding IO structures. These structures are strictly adhered to in standard IO analysis. The constant-structure assumption simplifies the analysis, but it also makes it more 'powerful'. Thus, it allows us to solve the IO equation system, and calculates the full input coefficients (incorporating both direct and indirect demand impacts).

Analytical simplicity and strength, however, are sometimes achieved at the cost of realism. The above presumption rules out the possibility of product substitution. This implies that producers have inflexible production techniques, and that consumers have rigidly set preferences. This is hardly realistic in the longer term. It may nevertheless be a feasible approximation to reality in the shorter-term perspective. Macmod is developed with the latter perspective in mind. The standard IO assumption consequently recommends itself to Macmod.

The analytical implications of table 4.2.1 and 4.2.2 are very different. The IO assumption only refers to the data actually specified in the IO table. Both tables

therefore imply non-substitution between sector-products, but they differ with respect to import substitution. The DomImp-dimensional table specifies data in respect of both foreign and local products. The implication is that foreign and local products are inherently different. The standard IO assumption does not allow substitution between such products. The DomImp-dimensional table does consequently not allow substitution between foreign and local products, simply because both are specified in their own right.

The Total Dimensional table, in contrast, specifies product-totals irrespective of origin. It consequently implies no assumption with respect to these origins. It allows us to estimate the foreign/local breakdown of the input-totals in whatever way desired. Thus, we may for instance assume that producers and consumers have no preference for imports, or local products, as such, but feel free to accept the 'best buy' offered them. The associated estimation routines, however, are not part of the IO analysis proper, but must be entered 'outside' it.

Summing up, the Total-Dimensional table is most relevant to our present aim. It is seen to invite the following assumptions in respect of purchaser/consumer preferences and actions:
- In the eyes of the producers/consumers there are inherent differences between alternative types of products, but not between foreign or local alternatives of these products.
- Producers selecting inputs for their production activities, and households purchasing consumer products, consequently have set preferences for given product categories, but not for imports or domestic products as such.
- When faced with a choice between imports and domestic products they consequently feel free to look for the 'best value for money' or similar.

The operative implications of these statements are fairly evident. The above assumptions in respect of producer/consumer behaviour logically suggest the following simple analytical approach for the Macmod model:
- Firstly: estimate the total demand for each product, employing the standard IO assumption described above, and functions from the IO98Tot table.
- Secondly: estimate the breakdown of each of these product-totals into imports and domestic products, using for instance the relative price between the two as argument.

Finally, having reached the above conclusion one may be excused for asking why it was necessary to rebuild the original IO92 table into a *multi*-dimensional format when a *single*-dimension table meets our requirements? The answer to this question is that the original IO92 table is not Total-Dimensional but Domestic-Dimensional in format[23]. Estimates pertaining to the Import Dimension are crucial to the rebuilding of latter to the former format.

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[23] In describing the original IO92 table as Domestic Dimensional we are not denying that it embraces both local and foreign products. The crucial feature, however, is that it does not detail imports in the internal IO matrix. Such product-specific IO information is only given for domestic products. Imports, in contrast, are added as a single-row aggregate, i.e. as if it consists of a single product, inherently different from the local products.

The import data are also crucial to the updating effort, because imports represent as major source of resource supply. The import data also represent vital information in respect of base-year import intensities etc. Such base-year data represent useful points of departure for the Macmod projections of these variables. The import dimensional data are therefore essential to our task, even though they do not figure as such in the adopted version of the IO98 table.

4.3   Macmod inputs

The current effort is undertaken in response to Macmod's need for detailed and up-to-date coefficients pertaining to its consumption and production functions. These functions, introduced into the Macmod model at the time of IO92 publication, are of the standard IO kind. They were drawn directly from the original IO92 table (as aggregated to Macmod format), and the associated tables of full input coefficients.

The IO format appears, in principle, to be fully acceptable to the Macmod team, despite the problems encountered in their employment. These problems related to data validity and under-specification of imports, not to functional format. It is recalled that the IO98 table is constructed for the precise purpose of addressing these data problems.

It is consequently suggested that the estimates of the IO98 table recommend themselves for the task here at hand. More precisely: the estimates of the Total Dimensional IO98 table recommend themselves (as explained in chapter 4.2). The estimates in question are detailed in table IO98Tot of Statistical Annex II.

The estimates of table IO98Tot are measured in terms of their Shilling-value. The parallel Direct-Input coefficients are not specified, but they are easily calculated by dividing each IO-elements by its respective Gross Output value. The corresponding Full-Input coefficients are not so easily calculated. They are consequently calculated and detailed in tables FIC1 and FIC2 of Statistical Annex III.

Before ending this chapter we take note of the fact that the IO98 data may alternative be used in other ways than discussed above. The so-called KLEM production function represents one such alternative. This type of function has earlier been suggested for Macmod. Thus, a central Macmod project document states that:

> We also plan to incorporate sectoral production functions. Again the I-O table has provided data that can be used for estimating production functions. So-called KLEM production functions will be estimated on the basis of the I-O table. The KLEM production function is common in macroeconomic models; K represents capital, L labor, E energy and M represents intermediate goods and services. The introduction of production functions will allow us to take constraints on the supply side into account in a rigorous way.[24]

In the below we have rearranged the IO98 data into the KLEM format. The IO estimates employed are picked directly from the IO98 tables of Statistical Annex II.

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[24] From: Macroeconomic and budgetary modelling for medium term planning (Phase III), by Ms H. K. Nordàs.

Table 4.3.1 defines the conversion of IO-elements into KLEM-elements. It also details their respective Dimensional Status. The latter specifies whether the KLEM element in question is single-dimensional (T) or multi-dimensional (T/D/I). In the latter case the total-dimensional magnitude (T) of the elements in question is split into the sub-components: Domestic (D) and Import (I).

Table 4.3.1 Definition of KLEM elements

KLEM element	Corresponding IO-element	Dimensional Status
K: Capital	Consumption of fixed capital Operating surplus	T
L: Labour	Compensation of employees	T
E: Energy	Petroleum Electricity & water[25]	T/D/I
M: Other intermed. inputs	All other intermediates	T/D/I
Total intermed. inputs	E + M	T/D/I
Total GDP (fc)	K + L	T
Gross Output (fc)	K + L + E + M	T

Table 4.3.2 depicts the KLEM production function for each of the Macmod sectors. The estimates specified above the memo section all refer to the Total (T) dimension. The choice of this format reflects the need for flexibility with respect to substitution between foreign and local products. In constructing the KLEM functions of table 4.3.2 we have consequently adhered to the formula introduced above: that input structures are fixed with respect to product type, but flexible with respect to product origin.

The KLEM functions consequently invite the same estimation sequence as the IO functions: first estimate the total demand for each product, next estimate the breakdown-by-origin of each total. The relevant base-period data in respect of this breakdown is given in the memo section of table 4.3.2. The data specified are the Import (I) dimensional estimates, specified in terms of import fractions. The corresponding Domestic (D) dimensional estimates are left (but they are easily calculated as the difference between Total and Import dimensional estimates).

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[25] Note that the KLEM element representing energy includes water, because Electricity and Water constitutes one production sector in Macmod. This may serve as a warning that the Macmod sectors structure is not too well suited for the KLEM structure.

Table 4.3.2 Sector estimates in KLEM format, 1998   TZShs'billion

KLEM element	Agriculture			Min-ing	Manufacturing			
	Export crops	Food crops	Other		Bevera ges	Tobac co	Petroleu m	Other
K: Capital	113.4	1,655.7	525.1	74.3	50.4	3.9	9.0	313.6
L: Labour	0.1	0.7	0.4	0.1	0.3	0.3	0.2	5.2
E: Energy	14.7	11.2	10.1	4.7	7.0	0.3	1.7	67.1
M: Other intermediates	100.5	425.2	112.7	9.4	54.4	23.8	48.0	685.1
Total intermediates	115.2	436.4	122.9	14.1	61.4	24.1	49.7	752.2
Total GDP (fc)	113.5	1,656.4	525.5	74.4	50.7	4.2	9.2	318.8
Gross Output (fc)	228.7	2,092.8	648.3	88.5	112.1	28.3	58.9	1,071.0
Memo: Import fractions (% of Total Dim. magnitude)								
E: Energy	16,4 %	41,4 %	32,9 %	1,2 %	9,5 %	0,0 %	28,4 %	4,8 %
M: Other intermed.	16,2 %	13,0 %	7,4 %	7,7 %	2,8 %	6,2 %	96,4 %	12,4 %

cont.

KLEM element	Elect. & water	Cons-truction	Trade etc.	Transp. etc.	Finance etc.	Public admin.	Other services
K: Capital	80.1	236.1	633.1	248.9	586.3	137.2	48.2
L: Labour	1.7	19.2	2.2	1.2	4.1	373.3	1.1
E: Energy	27.7	11.1	20.9	12.0	8.1	5.7	9.9
M: Other intermediates	37.0	414.8	296.4	132.1	1,013.3	892.8	31.2
Total intermediates	64.7	426.0	317.3	144.1	1,021.4	898.5	41.1
Total GDP (fc)	81.8	255.3	635.3	250.1	590.3	510.5	49.3
Gross Output (fc)	146.4	681.3	952.6	394.2	1,611.8	1,409.0	90.4
Memo: Import fractions (% of Total Dim. magnitude)							
E: Energy	27,7 %	34,8 %	13,2 %	36,5 %	8,8 %	10,6 %	37,3 %
M: Other intermed.	4,8 %	32,5 %	12,2 %	22,2 %	17,2 %	25,1 %	27,2 %

Source: IO98 (see Statistical Annex II)

Statistical Annex I

Tanzanian 1992 I/O Tables, as rearranged for Macmod purposes

Table of Contents:[26]
Table IO92Tot : Tanzanian 1992 I/O Table, Total Dim. (Complete)
Table IO921Dom : Tanzanian 1992 I/O Table, Domestic Dim. ('Truncated')
Table IO921Imp : Tanzanian 1992 I/O Table, Import Dim. ('Truncated')

Table IO92Tot   1992 I/O Table, Total Dim. (Complete)

TZShs'mill.		Receiving sector:							
Delivering sector:		1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
1,1	Agriculture: Export crops	3,676	0	0	0	0	7,703	0	23,230
1,2	Agriculture: Food crops	0	37,241	5,307	23	2,585	0	0	156,935
1,3	Agriculture: Other products	1,024	200	11,908	49	0	24	0	66,819
2	Mining	0	0	248	365	1	0	2,651	7,626
3,1	Manufacturing: Beverages	0	0	0	0	1,891	0	0	551
3,2	Manufacturing: Tobacco	0	0	0	0	0	169	0	0
3,3	Manufacturing: Petroleum	1,476	2,363	2,535	152	463	37	625	6,328
3,4	Manufacturing: Other products	16,108	37,293	13,610	1,287	5,216	1,164	818	138,069
4	Electricity & Water	1,375	252	632	900	801	157	155	23,910
5	Construction	156	203	154	102	428	114	47	7,650
6	Trade, hotels & restaurants	5,556	13,449	4,582	354	1,603	626	365	27,140
7	Transport & communication	2,635	5,713	2,812	349	1,241	199	403	6,675
8	Finance, insurance, etc.	140	263	925	486	481	86	111	3,822
9,1	Public administration	0	0	36	0	0	0	0	0
9,2	Other services	0	44	0	0	289	27	62	1,835
Total intermediate and final use		32,146	97,021	42,749	4,067	14,999	10,306	5,237	470,590
Indirect taxes (exc. import duty)		1,759	5,609	5,293	341	961	330	462	22,697
Subsidies		0	0	0	0	0	0	0	-662
Consumption of fixed capital		71	772	425	236	842	351	1,047	11,460
Compensation of employees		611	3,612	2,653	359	1,364	1,005	1,268	50,920
Operating surplus		31,006	363,876	179,770	20,834	10,191	516	2,326	137,068
Value added at factor cost		31,688	368,260	182,848	21,429	12,397	1,872	4,641	199,448
Value added at market prices		33,447	373,869	188,141	21,770	13,358	2,202	5,103	221,483
Total input (= gross output)		65,593	470,890	230,890	25,837	28,357	12,508	10,340	692,073
TOTAL SUPPLY OF RESOURCES (at market price) 1)									
Domestic Resources		65,593	470,890	230,890	25,837	28,357	12,508	10,340	692,073
Imported Resources (inc.imp.duty)		24	6,839	553	12,139	1,178	474	38,859	486,356
of which: Imports (exc.imp.duty)		24	6,839	553	12,139	1,178	474	38,859	462,905
Import duty		0	0	0	0	0	0	0	23,451
Total Supply of Resources (inc.imp.duty)		65,617	477,729	231,443	37,976	29,535	12,982	49,199	1,178,429

1) Imports are classified by sector of origin

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[26] The Total Dimensional table is complete, i.e. it embraces all IO sections. The tables representing the Domestic and Import dimensions are 'truncated', excluding IO sections detailing GDP, GO etc.

Table IO92Tot (cont,1)   1992 I/O Table, Total Dim. (Complete)

TZShs'mill.	Receiving sector:							Total
Delivering sector:	4	5	6	7	8	9,1	9,2	intermed.
1,1 Agriculture: Export crops	0	0	158	0	0	0	0	34,767
1,2 Agriculture: Food crops	0	0	4,873	0	0	2,263	0	209,227
1,3 Agriculture: Other products	0	4,064	18,618	0	0	1,614	16	104,336
2 Mining	0	11,080	3	0	2,300	6	0	24,280
3,1 Manufacturing: Beverages	0	0	1,121	0	0	149	145	3,857
3,2 Manufacturing: Tobacco	0	0	779	0	0	50	0	998
3,3 Manufacturing: Petroleum	6,275	2,601	3,554	6,451	549	1,750	5,206	40,365
3,4 Manufacturing: Other prod.	2,349	83,497	41,832	15,035	4,404	51,077	3,472	415,231
4 Electricity & Water	2,372	575	3,857	1,126	869	2,565	921	40,467
5 Construction	674	6,549	1,216	874	3,052	2,161	210	23,590
6 Trade, hotels & restaurants	2,809	7,791	14,756	16,673	7,819	49,177	3,878	156,578
7 Transport & communication	2,075	5,862	32,878	10,971	3,829	25,633	2,460	103,735
8 Finance, insurance, etc.	1,256	2,130	10,717	8,757	80,489	5,082	2,726	117,471
9,1 Public administration	81	510	1,962	2,219	1,244	79,656	310	86,018
9,2 Other services	405	30	6,144	1,694	2,261	2,934	1,014	16,739
Total intermediate and final use	18,296	124,689	142,468	63,800	106,816	224,117	20,358	1,377,659
Indirect taxes (exc. import duty)	945	7,350	13,133	8,682	4,317	12,007	1,789	85,675
Subsidies	0	0	0	0	0	0	0	-662
Consumption of fixed capital	10,807	2,969	6,302	2,842	8,702	11,593	909	59,328
Compensation of employees	4,336	46,321	19,568	10,310	7,185	115,191	7,798	272,501
Operating surplus	7,987	25,451	259,390	97,583	45,848	548	15,711	1,198,105
Value added at factor cost	23,130	74,741	285,260	110,735	61,735	127,332	24,418	1,529,934
Value added at market prices	24,075	82,091	298,393	119,417	66,052	139,339	26,207	1,614,947
Total input (= gross output)	42,371	206,780	440,861	183,217	172,868	363,456	46,565	2,992,606
TOTAL SUPPLY OF RESOURCES (at market price) 1)								
Domestic Resources	42,371	206,780	440,861	183,217	172,868	363,456	46,565	2,992,606
Imported Resources (inc.imp.duty)	24	0	3,242	1,384	33,266	23,778	39	608,155
of which: Imports (exc.imp.duty)	24	0	3,242	1,384	33,266	23,778	39	584,704
Import duty	0	0	0	0	0	0	0	23,451
Total Supply of Resources (inc.duty)	42,395	206,780	444,103	184,601	206,134	387,234	46,604	3,600,761

Table IO92Tot (cont,2)   1992 I/O Table, Total Dim. (Complete)

TZShs'mill.	Private	Govern.	Gr.Fix. Capital	Changes in	Exports	Total Final	Total
Delivering sector:	Consumpt.	Consum.	Format.	Inventory		Demand	Demand
1,1 Agriculture: Export crops	5,563	0	0	0	25,287	30,850	65,617
1,2 Agriculture: Food crops	261,594	0	0	37	6,871	268,502	477,729
1,3 Agriculture: Other products	118,687	0	0	4,465	3,955	127,107	231,443
2 Mining	120	0	0	115	13,461	13,696	37,976
3,1 Manufacturing: Beverages	24,986	0	0	666	26	25,678	29,535
3,2 Manufacturing: Tobacco	10,404	0	0	1,114	466	11,984	12,982
3,3 Manufacturing: Petroleum	8,462	0	0	0	372	8,834	49,199
3,4 Manufacturing: Other prod.	472,024	0	230,561	-6,561	67,174	763,198	1,178,429
4 Electricity & Water	1,609	0	0	-33	352	1,928	42,395
5 Construction	166	0	182,901	123	0	183,190	206,780
6 Trade, hotels & restaurants	140,281	0	77,001	24,510	45,733	287,525	444,103
7 Transport & communication	46,381	0	19,312	2,633	12,540	80,866	184,601
8 Finance, insurance, etc.	88,688	0	0	-89	64	88,663	206,134
9,1 Public administration	6,993	294,080	0	0	143	301,216	387,234
9,2 Other services	9,644	0	0	0	20,221	29,865	46,604
Total final use	1,195,602	294,080	509,775	26,980	196,665	2,223,102	3,600,761

Table IO92Dom   1992 I/O Table, Domestic Dim. ('Truncated')

TZShs'mill.		Receiving sector:							
Delivering sector:		1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
1,1	Agriculture: Export crops	3,676	0	0	0	0	7,703	0	23,230
1,2	Agriculture: Food crops	0	37,234	5,307	23	2,577	0	0	150,861
1,3	Agriculture: Other products	1,024	200	11,664	49	0	24	0	66,512
2	Mining	0	0	248	365	0	0	0	4,842
3,1	Manufacturing: Beverages	0	0	0	0	1,891	0	0	551
3,2	Manufacturing: Tobacco	0	0	0	0	0	169	0	0
3,3	Manufacturing: Petroleum	86	132	135	102	63	37	115	958
3,4	Manufacturing: Other products	10,159	20,579	9,968	889	4,659	688	180	67,796
4	Electricity & Water	1,375	252	632	900	801	157	155	23,910
5	Construction	156	203	154	102	428	114	47	7,650
6	Trade, hotels & restaurants	5,556	13,449	4,582	354	1,603	626	365	27,140
7	Transport & communication	2,635	5,713	2,812	349	1,241	199	222	6,494
8	Finance, insurance, etc.	140	263	925	486	481	86	111	3,822
9,1	Public administration	0	0	36	0	0	0	0	0
9,2	Other services	0	44	0	0	289	27	62	1,835
Total intermediate and final use		24,807	78,069	36,463	3,619	14,033	9,830	1,257	385,601

Table IO92Dom (cont,1)   1992 I/O Table, Domestic Dim. ('Truncated')

TZShs'mill.		Receiving sector:							Total intermed.
Delivering sector:		4	5	6	7	8	9,1	9,2	
1,1	Agriculture: Export crops	0	0	139	0	0	0	0	34,748
1,2	Agriculture: Food crops	0	0	4,281	0	0	2,263	0	202,546
1,3	Agriculture: Other products	0	4,063	18,617	0	0	1,614	16	103,783
2	Mining	0	4,394	0	0	2,300	0	0	12,149
3,1	Manufacturing: Beverages	0	0	532	0	0	31	145	3,150
3,2	Manufacturing: Tobacco	0	0	732	0	0	50	0	951
3,3	Manufacturing: Petroleum	329	101	554	403	139	261	206	3,621
3,4	Manufacturing: Other prod.	1,484	33,742	25,185	5,905	2,172	20,083	1,229	204,718
4	Electricity & Water	2,362	575	3,852	1,126	869	2,557	921	40,444
5	Construction	674	6,549	1,216	874	3,052	2,161	210	23,590
6	Trade, hotels & restaurants	2,809	7,791	14,756	16,673	7,819	48,691	3,716	155,930
7	Transport & communication	2,075	5,862	32,878	10,071	3,829	25,633	2,460	102,473
8	Finance, insurance, etc.	1,256	2,130	8,985	5,757	63,213	5,082	1,860	94,597
9,1	Public administration	81	510	1,962	2,219	1,244	55,878	310	62,240
9,2	Other services	405	30	6,144	1,694	2,261	2,934	985	16,710
Total intermediate and final use		11,475	65,747	119,833	44,722	86,898	167,238	12,058	1,061,650

Table IO92Dom (cont,2)   1992 I/O Table, Domestic Dim. ('Truncated')

TZShs'mill.		Private Consumpt.	Govern. Consum.	Gr.Fix. Capital Format.	Changes in Inventory	Exports	Total Final Demand	Total Demand
Delivering sector:								
1,1	Agriculture: Export crops	5,558	0	0	0	25,287	30,845	65,593
1,2	Agriculture: Food crops	261,436	0	0	37	6,871	268,344	470,890
1,3	Agriculture: Other products	118,687	0	0	4,465	3,955	127,107	230,890
2	Mining	112	0	0	115	13,461	13,688	25,837
3,1	Manufacturing: Beverages	24,515	0	0	666	26	25,207	28,357
3,2	Manufacturing: Tobacco	9,977	0	0	1,114	466	11,557	12,508
3,3	Manufacturing: Petroleum	6,347	0	0	0	372	6,719	10,340
3,4	Manufacturing: Other prod.	382,340	0	44,402	-6,561	67,174	487,355	692,073
4	Electricity & Water	1,608	0	0	-33	352	1,927	42,371
5	Construction	166	0	182,901	123	0	183,190	206,780
6	Trade, hotels & restaurants	141,966	0	88,137	24,510	45,733	300,346	456,276
7	Transport & communication	46,259	0	19,312	2,633	12,540	80,744	183,217
8	Finance, insurance, etc.	78,296	0	0	-89	64	78,271	172,868
9,1	Public administration	6,993	294,080	0	0	143	301,216	363,456
9,2	Other services	9,634	0	0	0	20,221	29,855	46,565
Total final use		1,093,894	294,080	334,752	26,980	196,665	1,946,371	3,008,021

Table IO92Imp   1992 I/O Table, Import Dim. ('Truncated')

TZShs'mill.		Receiving sector:							
Delivering sector:		1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
1,1	Agriculture: Export crops	0	0	0	0	0	0	0	0
1,2	Agriculture: Food crops	0	7	0	0	8	0	0	6,074
1,3	Agriculture: Other products	0	0	244	0	0	0	0	307
2	Mining	0	0	0	0	1	0	2,651	2,784
3,1	Manufacturing: Beverages	0	0	0	0	0	0	0	0
3,2	Manufacturing: Tobacco	0	0	0	0	0	0	0	0
3,3	Manufacturing: Petroleum	1,390	2,231	2,400	50	400	0	510	5,370
3,4	Manufacturing: Other products	5,949	16,714	3,642	398	557	476	638	70,273
4	Electricity & Water	0	0	0	0	0	0	0	0
5	Construction	0	0	0	0	0	0	0	0
6	Trade, hotels & restaurants	0	0	0	0	0	0	0	0
7	Transport & communication	0	0	0	0	0	0	181	181
8	Finance, insurance, etc.	0	0	0	0	0	0	0	0
9,1	Public administration	0	0	0	0	0	0	0	0
9,2	Other services	0	0	0	0	0	0	0	0
Total intermediate and final use		7,339	18,952	6,286	448	966	476	3,980	84,989

Table IO92Imp (cont,1)   1992 I/O Table, Import Dim. ('Truncated')

TZShs'mill.		Receiving sector:							Total intermed.
Delivering sector:		4	5	6	7	8	9,1	9,2	
1,1	Agriculture: Export crops	0	0	19	0	0	0	0	19
1,2	Agriculture: Food crops	0	0	592	0	0	0	0	6,681
1,3	Agriculture: Other products	0	1	1	0	0	0	0	553
2	Mining	0	6,686	3	0	0	6	0	12,131
3,1	Manufacturing: Beverages	0	0	589	0	0	118	0	707
3,2	Manufacturing: Tobacco	0	0	47	0	0	0	0	47
3,3	Manufacturing: Petroleum	5,946	2,500	3,000	6,048	410	1,489	5,000	36,744
3,4	Manufacturing: Other prod.	865	49,755	16,647	9,130	2,232	30,994	2,243	210,513
4	Electricity & Water	10	0	5	0	0	8	0	23
5	Construction	0	0	0	0	0	0	0	0
6	Trade, hotels & restaurants	0	0	0	0	0	486	162	648
7	Transport & communication	0	0	0	900	0	0	0	1,262
8	Finance, insurance, etc.	0	0	1,732	3,000	17,276	0	866	22,874
9,1	Public administration	0	0	0	0	0	23,778	0	23,778
9,2	Other services	0	0	0	0	0	0	29	29
Total intermediate and final use		6,821	58,942	22,635	19,078	19,918	56,879	8,300	316,009

Table IO92Imp (cont,2)   1992 I/O Table, Import Dim. ('Truncated')

TZShs'mill.		Private Consumpt.	Govern. Consum.	Gr.Fix. Capital Format.	Changes in Inventory	Exports	Total Final Demand	Total Demand
Delivering sector:								
1,1	Agriculture: Export crops	5	0	0	0	0	5	24
1,2	Agriculture: Food crops	158	0	0	0	0	158	6,839
1,3	Agriculture: Other products	0	0	0	0	0	0	553
2	Mining	8	0	0	0	0	8	12,139
3,1	Manufacturing: Beverages	471	0	0	0	0	471	1,178
3,2	Manufacturing: Tobacco	427	0	0	0	0	427	474
3,3	Manufacturing: Petroleum	2,115	0	0	0	0	2,115	38,859
3,4	Manufacturing: Other prod.	89,684	0	186,159	0	0	275,843	486,356
4	Electricity & Water	1	0	0	0	0	1	24
5	Construction	0	0	0	0	0	0	0
6	Trade, hotels & restaurants	2,594	0	0	0	0	2,594	3,242
7	Transport & communication	122	0	0	0	0	122	1,384
8	Finance, insurance, etc.	10,392	0	0	0	0	10,392	33,266
9,1	Public administration	0	0	0	0	0	0	23,778
9,2	Other services	10	0	0	0	0	10	39
Total final use		105,987	0	186,159	0	0	292,146	608,155

Statistical Annex II

Tanzanian 1998 I/O Tables, as updated and rearranged for Macmod purposes

Table of Contents:[27]
Table IO98Tot : Tanzanian 1998 I/O Table, Total Dim. (Complete)
Table IO98Dom : Tanzanian 1998 I/O Table, Domestic Dim. ('Truncated')
Table IO98Imp : Tanzanian 1998 I/O Table, Import Dim. ('Truncated')

Table IO98Tot   1998 I/O Table, Total Dim. (Complete)

TZShs'mill.		Receiving sector:							
Delivering sector:		1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
1,1	Agriculture: Export crops	34,763	0	0	0	0	20,213	0	75,886
1,2	Agriculture: Food crops	0	255,684	24,221	87	14,156	0	0	308,905
1,3	Agriculture: Other products	3,864	909	35,989	123	0	25	0	87,097
2	Mining	0	0	1,126	1,374	5	0	44,603	14,938
3,1	Manufacturing: Beverages	0	0	0	0	8,658	0	0	907
3,2	Manufacturing: Tobacco	0	0	0	0	0	1,322	0	0
3,3	Manufacturing: Petroleum	4,664	8,996	6,416	319	1,406	32	1,094	6,907
3,4	Manufacturing: Other products	32,510	90,689	22,001	1,725	10,117	652	914	96,260
4	Electricity & Water	10,015	2,211	3,687	4,352	5,607	317	625	60,157
5	Construction	3,096	4,854	2,448	1,344	8,163	628	516	52,443
6	Trade, hotels & restaurants	16,165	47,149	10,678	684	4,482	505	588	27,278
7	Transport & communication	8,652	22,602	7,395	761	3,916	181	733	7,571
8	Finance, insurance, etc.	1,453	3,289	7,689	3,349	4,797	248	638	13,701
9,1	Public administration	0	0	1,200	0	0	0	0	0
9,2	Other services	0	11	0	0	56	2	7	127
Total intermediate and final use		115,181	436,395	122,850	14,118	61,364	24,126	49,717	752,177
Indirect taxes (exc. import duty)		8,486	33,971	20,481	1,594	5,294	1,000	1,230	48,849
Subsidies		0	0	0	0	0	0	0	0
Consumption of fixed capital		31	416	147	100	489	290	454	3,075
Compensation of employees		101	745	352	58	303	318	211	5,233
Operating surplus		113,408	1,655,250	524,962	74,228	49,927	3,602	8,515	310,483
Value added at factor cost		113,540	1,656,412	525,461	74,386	50,719	4,211	9,179	318,792
Value added at market prices		122,027	1,690,383	545,942	75,980	56,013	5,211	10,410	367,641
Total input (= gross output)		237,208	2,126,778	668,793	90,098	117,377	29,336	60,127	1,119,818
TOTAL SUPPLY OF RESOURCES (at market price) 1)									
Domestic Resources		237,208	2,126,778	668,793	90,098	117,377	29,336	60,127	1,119,818
Imported Resources (inc.imp.duty)		0	53,024	907	59,789	14,726	1,400	43,231	967,582
of which: Imports (exc.imp.duty)		0	48,027	815	56,189	12,517	1,384	41,260	884,402
Import duty		0	4,998	91	3,600	2,209	16	1,972	83,180
Total Supply of Resources (inc.imp.duty)		237,208	2,179,802	669,700	149,887	132,103	30,736	103,358	2,087,399

1) Imports are classified by sector of origin

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[27] The Total Dimensional table is complete, i.e. it embraces all IO sections. The tables representing the Domestic and Import dimensions are 'truncated', excluding IO sections detailing GDP, GO etc.

Table IO98Tot (cont,1)   1998 I/O Table, Total Dim. (Complete)

TZShs'mill.	Receiving sector:							Total
Delivering sector:	4	5	6	7	8	9,1	9,2	intermed.
1,1 Agriculture: Export crops	0	0	793	0	0	0	0	131,654
1,2 Agriculture: Food crops	0	0	14,731	0	0	3,061	0	620,846
1,3 Agriculture: Other products	0	13,772	37,271	0	0	1,445	26	180,521
2 Mining	0	56,426	9	0	13,146	8	0	131,635
3,1 Manufacturing: Beverages	0	0	2,833	0	0	168	295	12,862
3,2 Manufacturing: Tobacco	0	0	170	0	0	5	0	1,498
3,3 Manufacturing: Petroleum	14,790	7,381	5,958	8,528	1,748	1,312	7,028	76,580
3,4 Manufacturing: Other prod.	3,536	151,342	44,792	12,696	8,959	24,467	2,994	503,655
4 Electricity & Water	12,887	3,761	14,904	3,431	6,379	4,434	2,866	135,634
5 Construction	9,977	116,718	12,802	7,257	61,047	10,179	1,781	293,252
6 Trade, hotels & restaurants	6,096	20,358	22,777	20,297	22,930	33,960	4,821	238,770
7 Transport & communication	5,082	17,286	57,273	15,072	12,672	19,977	3,451	182,625
8 Finance, insurance, etc.	9,723	19,851	59,004	38,022	841,916	12,518	12,087	1,028,285
9,1 Public administration	2,515	19,062	43,320	38,639	52,184	786,841	5,513	949,274
9,2 Other services	61	5	653	142	457	140	245	1,905
Total intermediate and final use	64,666	425,962	317,292	144,084	1,021,440	898,515	41,107	4,488,994
Indirect taxes (exc. import duty)	4,497	33,809	39,383	26,401	55,586	64,818	4,864	350,265
Subsidies	0	0	0	0	0	0	0	0
Consumption of fixed capital	11,059	3,218	1,817	856	12,892	98,085	328	133,258
Compensation of employees	1,699	19,231	2,161	1,189	4,077	373,268	1,079	410,025
Operating surplus	68,993	232,881	631,327	248,036	573,379	39,138	47,898	4,582,028
Value added at factor cost	81,751	255,330	635,305	250,081	590,348	510,491	49,305	5,125,311
Value added at market prices	86,248	289,139	674,688	276,482	645,934	575,309	54,169	5,475,576
Total input (= gross output)	150,914	715,102	991,980	420,566	1,667,374	1,473,823	95,276	9,964,570
TOTAL SUPPLY OF RESOURCES (at market price) 1)								
Domestic Resources	150,914	715,102	991,980	420,566	1,667,374	1,473,823	95,276	9,964,570
Imported Resources (inc.imp.duty)	0	0	27,358	11,679	280,715	200,650	329	1,661,390
of which: Imports (exc.imp.duty)	0	0	27,358	11,679	280,715	200,650	329	1,565,325
Import duty	0	0	0	0	0	0	0	96,065
Total Supply of Resources (inc.duty)	150,914	715,102	1,019,338	432,245	1,948,089	1,674,474	95,605	11,625,960

Table IO98Tot (cont,2)   1998 I/O Table, Total Dim. (Complete)

TZShs'mill.	Private	Govern.	Gr.Fix. Capital	Changes in	Exports	Total Final	Total
Delivering sector:	Consumpt.	Consum.	Format.	Inventory		Demand	Demand
1,1 Agriculture: Export crops	52,558	0	0	0	52,995	105,554	237,208
1,2 Agriculture: Food crops	1,489,204	0	0	20	69,733	1,558,956	2,179,802
1,3 Agriculture: Other products	447,430	0	0	1,610	40,139	489,178	669,700
2 Mining	680	0	0	62	17,509	18,251	149,887
3,1 Manufacturing: Beverages	118,929	0	0	303	9	119,241	132,103
3,2 Manufacturing: Tobacco	4,285	0	0	44	24,910	29,238	30,736
3,3 Manufacturing: Petroleum	26,713	0	0	0	66	26,778	103,358
3,4 Manufacturing: Other prod.	951,778	0	474,376	0	157,590	1,583,744	2,087,399
4 Electricity & Water	11,708	0	0	0	3,572	15,280	150,914
5 Construction	3,291	0	418,325	233	0	421,850	715,102
6 Trade, hotels & restaurants	407,775	0	158,428	6,815	207,550	780,568	1,019,338
7 Transport & communication	152,150	0	39,734	826	56,910	249,620	432,245
8 Finance, insurance, etc.	919,514	0	0	0	290	919,805	1,948,089
9,1 Public administration	290,765	433,786	0	0	649	725,200	1,674,474
9,2 Other services	1,932	0	0	0	91,769	93,701	95,605
Total final use	4,878,711	433,786	1,090,864	9,914	723,691	7,136,966	11,625,960

Table IO98Dom   1998 I/O Table, Domestic Dim. ('Truncated')

TZShs'mill. Delivering sector:		Receiving sector: 1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
1,1	Agriculture: Export crops	34,763	0	0	0	0	20,213	0	75,886
1,2	Agriculture: Food crops	0	255,623	24,221	87	14,100	0	0	293,695
1,3	Agriculture: Other products	3,864	909	35,663	123	0	25	0	86,919
2	Mining	0	0	1,126	1,374	3	0	0	12,907
3,1	Manufacturing: Beverages	0	0	0	0	8,658	0	0	907
3,2	Manufacturing: Tobacco	0	0	0	0	0	220	0	0
3,3	Manufacturing: Petroleum	2,264	4,355	3,096	262	742	32	606	3,704
3,4	Manufacturing: Other products	16,223	35,554	14,015	1,001	8,652	290	0	29,800
4	Electricity & Water	10,015	2,211	3,687	4,352	5,607	317	625	60,157
5	Construction	3,096	4,854	2,448	1,344	8,163	628	516	52,443
6	Trade, hotels & restaurants	16,165	47,149	10,678	684	4,482	505	588	27,278
7	Transport & communication	8,652	22,602	7,395	761	3,916	181	0	6,444
8	Finance, insurance, etc.	1,453	3,289	7,689	3,349	4,797	248	638	13,701
9,1	Public administration	0	0	1,200	0	0	0	0	0
9,2	Other services	0	11	0	0	56	2	7	127
Total intermediate and final use		96,494	376,557	111,218	13,337	59,177	22,662	2,980	663,967

Table IO98Dom (cont,1)   1998 I/O Table, Domestic Dim. ('Truncated')

TZShs'mill. Delivering sector:		Receiving sector: 4	5	6	7	8	9,1	9,2	Total intermed.
1,1	Agriculture: Export crops	0	0	793	0	0	0	0	131,654
1,2	Agriculture: Food crops	0	0	12,454	0	0	3,061	0	603,241
1,3	Agriculture: Other products	0	13,770	37,270	0	0	1,445	26	180,015
2	Mining	0	43,743	6	0	13,146	5	0	72,310
3,1	Manufacturing: Beverages	0	0	2,143	0	0	107	295	12,110
3,2	Manufacturing: Tobacco	0	0	155	0	0	5	0	381
3,3	Manufacturing: Petroleum	7,131	3,504	3,210	4,159	1,035	702	3,340	38,142
3,4	Manufacturing: Other prod.	1,770	29,008	20,612	2,238	2,800	4,327	370	166,659
4	Electricity & Water	12,887	3,761	14,904	3,431	6,379	4,434	2,866	135,634
5	Construction	9,977	116,718	12,802	7,257	61,047	10,179	1,781	293,252
6	Trade, hotels & restaurants	6,096	20,358	22,777	20,297	22,930	30,543	2,770	233,302
7	Transport & communication	5,082	17,286	57,273	8,283	12,672	19,977	3,451	173,976
8	Finance, insurance, etc.	9,723	19,851	50,117	25,882	673,500	12,518	8,509	835,263
9,1	Public administration	2,515	19,062	43,320	38,639	52,184	586,191	5,513	748,623
9,2	Other services	61	5	653	142	457	140	0	1,660
Total intermediate and final use		55,241	287,066	278,491	110,328	846,151	673,632	28,920	3,626,221

Table IO98Dom (cont,2)   1998 I/O Table, Domestic Dim. ('Truncated')

TZShs'mill. Delivering sector:		Private Consumpt.	Govern. Consum.	Gr.Fix. Capital Format.	Changes in Inventory	Exports	Total Final Demand	Total Demand
1,1	Agriculture: Export crops	52,558	0	0	0	52,995	105,554	237,208
1,2	Agriculture: Food crops	1,453,783	0	0	20	69,733	1,523,536	2,126,778
1,3	Agriculture: Other products	447,029	0	0	1,610	40,139	488,778	668,793
2	Mining	216	0	0	62	17,509	17,788	90,098
3,1	Manufacturing: Beverages	104,954	0	0	303	9	105,267	117,377
3,2	Manufacturing: Tobacco	4,002	0	0	44	24,910	28,955	29,336
3,3	Manufacturing: Petroleum	21,919	0	0	0	66	21,985	60,127
3,4	Manufacturing: Other prod.	698,039	0	97,529	0	157,590	953,158	1,119,818
4	Electricity & Water	11,708	0	0	0	3,572	15,280	150,914
5	Construction	3,291	0	418,325	233	0	421,850	715,102
6	Trade, hotels & restaurants	385,885	0	158,428	6,815	207,550	758,678	991,980
7	Transport & communication	149,120	0	39,734	826	56,910	246,591	420,566
8	Finance, insurance, etc.	831,821	0	0	0	290	832,112	1,667,374
9,1	Public administration	290,765	433,786	0	0	649	725,200	1,473,823
9,2	Other services	1,847	0	0	0	91,769	93,616	95,276
Total final use		4,456,941	433,786	714,017	9,914	723,691	6,338,349	9,964,570

Table IO98Imp   1998 I/O Table, Import Dim. ('Truncated')

TZShs'mill.		Receiving sector:							
Delivering sector:		1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
1,1	Agriculture: Export crops	0	0	0	0	0	0	0	0
1,2	Agriculture: Food crops	0	61	0	0	56	0	0	15,211
1,3	Agriculture: Other products	0	0	327	0	0	0	0	177
2	Mining	0	0	0	0	2	0	44,603	2,031
3,1	Manufacturing: Beverages	0	0	0	0	0	0	0	0
3,2	Manufacturing: Tobacco	0	0	0	0	0	1,102	0	0
3,3	Manufacturing: Petroleum	2,400	4,642	3,319	57	664	0	488	3,203
3,4	Manufacturing: Other products	16,287	55,136	7,986	724	1,466	362	914	66,460
4	Electricity & Water	0	0	0	0	0	0	0	0
5	Construction	0	0	0	0	0	0	0	0
6	Trade, hotels & restaurants	0	0	0	0	0	0	0	0
7	Transport & communication	0	0	0	0	0	0	733	1,127
8	Finance, insurance, etc.	0	0	0	0	0	0	0	0
9,1	Public administration	0	0	0	0	0	0	0	0
9,2	Other services	0	0	0	0	0	0	0	0
Total intermediate and final use		18,687	59,838	11,632	781	2,187	1,464	46,737	88,210

Table IO98Imp (cont,1)   1998 I/O Table, Import Dim. ('Truncated')

TZShs'mill.		Receiving sector:							Total intermed.
Delivering sector:		4	5	6	7	8	9,1	9,2	
1,1	Agriculture: Export crops	0	0	0	0	0	0	0	0
1,2	Agriculture: Food crops	0	0	2,277	0	0	0	0	17,604
1,3	Agriculture: Other products	0	2	1	0	0	0	0	507
2	Mining	0	12,683	3	0	0	3	0	59,325
3,1	Manufacturing: Beverages	0	0	690	0	0	62	0	752
3,2	Manufacturing: Tobacco	0	0	15	0	0	0	0	1,117
3,3	Manufacturing: Petroleum	7,658	3,877	2,748	4,369	714	610	3,689	38,437
3,4	Manufacturing: Other prod.	1,766	122,335	24,179	10,458	6,159	20,140	2,624	336,996
4	Electricity & Water	0	0	0	0	0	0	0	0
5	Construction	0	0	0	0	0	0	0	0
6	Trade, hotels & restaurants	0	0	0	0	0	3,417	2,051	5,468
7	Transport & communication	0	0	0	6,789	0	0	0	8,649
8	Finance, insurance, etc.	0	0	8,887	12,140	168,416	0	3,579	193,022
9,1	Public administration	0	0	0	0	0	200,650	0	200,650
9,2	Other services	0	0	0	0	0	0	245	245
Total intermediate and final use		9,425	138,896	38,801	33,757	175,289	224,883	12,187	862,773

Table IO98Imp (cont,2)   1998 I/O Table, Import Dim. ('Truncated')

TZShs'mill.		Private Consumpt.	Govern. Consum.	Gr.Fix. Capital Format.	Changes in Inventory	Exports	Total Final Demand	Total Demand
Delivering sector:								
1,1	Agriculture: Export crops	0	0	0	0	0	0	0
1,2	Agriculture: Food crops	35,420	0	0	0	0	35,420	53,024
1,3	Agriculture: Other products	400	0	0	0	0	400	907
2	Mining	464	0	0	0	0	464	59,789
3,1	Manufacturing: Beverages	13,974	0	0	0	0	13,974	14,726
3,2	Manufacturing: Tobacco	283	0	0	0	0	283	1,400
3,3	Manufacturing: Petroleum	4,794	0	0	0	0	4,794	43,231
3,4	Manufacturing: Other prod.	253,739	0	376,847	0	0	630,586	967,582
4	Electricity & Water	0	0	0	0	0	0	0
5	Construction	0	0	0	0	0	0	0
6	Trade, hotels & restaurants	21,889	0	0	0	0	21,889	27,358
7	Transport & communication	3,029	0	0	0	0	3,029	11,679
8	Finance, insurance, etc.	87,693	0	0	0	0	87,693	280,715
9,1	Public administration	0	0	0	0	0	0	200,650
9,2	Other services	84	0	0	0	0	84	329
Total final use		421,770	0	376,847	0	0	798,617	1,661,390

Statistical Annex III

Full input coefficients in respect of the IO98Tot table

Table FIC1   Full input coefficients in respect of intermediate inputs

	Receiving sector:	1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
Delivering sector:									
1,1	Agriculture: Export crops	1,188	0,005	0,004	0,003	0,012	0,860	0,004	0,092
1,2	Agriculture: Food crops	0,067	1,156	0,059	0,012	0,197	0,061	0,017	0,367
1,3	Agriculture: Other products	0,042	0,007	1,062	0,005	0,017	0,036	0,007	0,100
2	Mining	0,033	0,007	0,013	1,027	0,031	0,030	0,779	0,039
3,1	Manufacturing: Beverages	0,000	0,000	0,000	0,000	1,080	0,000	0,000	0,001
3,2	Manufacturing: Tobacco	0,000	0,000	0,000	0,000	0,000	1,047	0,000	0,000
3,3	Manufacturing: Petroleum	0,035	0,007	0,013	0,011	0,025	0,030	1,029	0,021
3,4	Manufacturing: Other products	0,204	0,060	0,047	0,033	0,149	0,183	0,048	1,154
4	Electricity & Water	0,072	0,006	0,011	0,057	0,071	0,068	0,057	0,077
5	Construction	0,043	0,009	0,011	0,030	0,113	0,063	0,037	0,079
6	Trade, hotels & restaurants	0,099	0,030	0,023	0,015	0,063	0,095	0,025	0,054
7	Transport & communication	0,059	0,016	0,016	0,014	0,052	0,053	0,026	0,026
8	Finance, insurance, etc.	0,059	0,014	0,035	0,092	0,130	0,071	0,100	0,063
9,1	Public administration	0,030	0,008	0,013	0,014	0,034	0,030	0,018	0,022
9,2	Other services	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000
	Total intermediate use	1,933	1,324	1,307	1,314	1,977	2,627	2,148	2,096

cont.

	Receiving sector:	4	5	6	7	8	9,1	9,2
Delivering sector:								
1,1	Agriculture: Export crops	0,005	0,024	0,007	0,004	0,003	0,004	0,005
1,2	Agriculture: Food crops	0,022	0,099	0,042	0,019	0,015	0,023	0,022
1,3	Agriculture: Other products	0,010	0,053	0,048	0,008	0,007	0,009	0,010
2	Mining	0,097	0,120	0,014	0,025	0,029	0,007	0,070
3,1	Manufacturing: Beverages	0,000	0,000	0,003	0,000	0,000	0,000	0,004
3,2	Manufacturing: Tobacco	0,000	0,000	0,000	0,000	0,000	0,000	0,000
3,3	Manufacturing: Petroleum	0,114	0,022	0,012	0,025	0,006	0,005	0,083
3,4	Manufacturing: Other prod.	0,066	0,304	0,070	0,056	0,042	0,052	0,062
4	Electricity & Water	1,107	0,035	0,025	0,017	0,015	0,013	0,045
5	Construction	0,105	1,225	0,032	0,039	0,096	0,026	0,048
6	Trade, hotels & restaurants	0,060	0,057	1,038	0,065	0,039	0,057	0,070
7	Transport & communication	0,051	0,044	0,069	1,049	0,025	0,036	0,052
8	Finance, insurance, etc.	0,180	0,109	0,149	0,212	2,043	0,056	0,296
9,1	Public administration	0,073	0,093	0,124	0,230	0,152	2,164	0,166
9,2	Other services	0,001	0,000	0,001	0,000	0,001	0,000	1,003
	Total intermediate use	1,892	2,184	1,635	1,751	2,473	2,455	1,935

Table FIC2   Full input coefficients in respect of primary inputs

	Receiving sector:							
Delivering sector:	1,1	1,2	1,3	2	3,1	3,2	3,3	3,4
Indirect taxes (exc. Import duty)	0,070	0,025	0,041	0,029	0,080	0,093	0,048	0,077
Subsidies	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Consumption of fixed capital	0,009	0,002	0,003	0,007	0,014	0,019	0,015	0,012
Compensation of employees	0,012	0,003	0,005	0,006	0,017	0,023	0,011	0,015
Operating surplus	0,909	0,970	0,952	0,958	0,889	0,864	0,926	0,897
Total Value Added at market prices	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000

cont.

Delivering sector:	Receiving sector:						
	4	5	6	7	8	9,1	9,2
Indirect taxes (exc. Import duty)	0,061	0,092	0,064	0,092	0,086	0,107	0,085
Subsidies	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Consumption of fixed capital	0,089	0,016	0,014	0,021	0,028	0,146	0,021
Compensation of employees	0,035	0,059	0,036	0,064	0,047	0,549	0,057
Operating surplus	0,815	0,833	0,886	0,823	0,840	0,198	0,837
Total Value Added at market prices	1,000	1,000	1,000	1,000	1,000	1,000	1,000

Note on the calculation and interpretation of Full Input Coefficients

The basic structure of the Total Dimensional IO table may be illustrated as follows:

where: $X(T)_{ij}$ = sector: j's intermediate use of sector-i-products

$S(T)_i$ = final use of category-i-products

$X(T)_i$ = total use of sector-i-products

V_{rj} = sector: j's use of primary input factor: r

$X(D)_j$ = total supply of domestically produced sector-j-products

The basic IO-*equations* used to calculate the Full Input Coefficients are:

i) $\Sigma_j X(T)_{ij} + S(T)_I = X(T)_i$

ii) $\Sigma_j V_{rj} = V_{r\Sigma}$

where: $V_{r\Sigma}$ = the total use of primary input-factor r

The basic IO-*assumptions* used to calculate the Full Input Coefficients are:

iii) $X(T)_{ij} = a_{ij} * X(D)_j$

iv) $V_{rj} = b_{rj} * X(D)_j$

where: a_{ij} and b_{rj} are the direct input coefficients

Inserting the assumption into the equations we get:

$$\text{i')} \quad \Sigma_j \, a_{ij} * X(D)_j + S(T)_i = X(T)_i$$

$$\text{ii')} \quad \Sigma_j \, b_{rj} * X(D)_j = V_{r\Sigma}$$

Expressing these equations in matrix algebra we get:

$$\text{i')} \quad A \, X^D + S^T = X^T$$

$$\text{ii')} \quad B \, X^D = V$$

where: A = matrix of a_{ij} elements
B = matrix of b_{rj} elements
X^T = vector of $X(T)_i$ elements
X^D = vector of $X(D)_j$ elements
S^T = vector of $S(T)_i$ elements
V = vector of $V_{r\Sigma}$ elements

X^T is by definition: $X^T = X^D + X^I$, where: X^I = vector of $X(I)_i$ elements

Inserting this expression into equation i') we get:

$$A \, X^D + S^T = X^D + X^I$$

which gives: $S^T - X^I = X^D - A \, X^D$

which gives: $(1 - A) \, X^D = S^T - X^I$

which gives: $X^D = (1 - A)^{-1} (S^T - X^I) = \alpha \, G$

which gives, when inserted into equation ii'):

$$V = B \, \alpha \, G = \beta \, G$$

where: α = matrix of Full Input Coefficients in respect of local production
β = matrix of Full Input Coefficients in respect of primary inputs
$G = (S^T - X^I)$ = vector of total import-deducted end-use

Interpretation of above results

*The **a**-matrix* consists of elements of the following type:
$$\alpha_{ij} = \delta X(D)_i \, / \, \delta G_j$$
where G_j is the full import-deducted final use of sector-j-products.

The G-variable warrents further explanation. It is recalled that the distinction between local and imported products is disregarded in the Total Dimensional IO table. The basic assumption upon which the above estimates is based may therefore be expressed as follows: Products of a given sector of origin, whether they be imported or domestically produced, are identic as regards their local use. Imports and domestic products may therefore be freely substituted for one another.

Local production will therefore react both to changes in final demand and to changes in the foreign/local composition of demand. This feature is expressed by the variable G, which is given by the equation: $G = (S^T - X^I)$. G consequently represents the total final demand (irrespective of origin), minus the total demand for imports (irrespective of use). The α_{ij}-coefficient therefore measures the impact on domestic production sector: i from a unite increase in final demand for sector-j-products; or from a unite decrease in the use of sector-j-imports[28].

*The **b**- matrix* consists of elements of the following type:

$$\beta_{rj} = \delta\, V_{r\Sigma}\, /\, \delta G_j$$

The interpretation of this coefficient is similar to the one given above; i.e. β_{rj} measures the impact on the use of primary input-factor r from a unite increase in final demand for sector-j-products, or from a unite decrease in the use of sector-j-imports.

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[28] I.e. a decrease under constant-final-demand conditions, i.e. in the form of import substitution.

Summary

The present paper reports on a statistical effort undertaken for the Macmod project. It reports on the revision and updating of the Tanzanian Input-Output table for 1992. These IO activities are undertaken in order to furnish the Macmod model with production and consumption functions that are up-to-date, commodity specific with respect to inputs, and explicit in respect of the input origin.

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