

Social Accounting Matrix Exercises: Module M2

cgemod

These exercises are largely preparatory. They are concerned with the basic collection of national accounts data, including Supply and Use tables, developing an appreciation of the relationship between a macro-SAM and T-accounts, and beginning the process of deriving a National Accounts Matrix (NAM)/macro-SAM from National accounts data.

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1. Introduction

The course design is based on the principle of learning-by-doing. Accordingly, during the course the participants will develop a SAM for their chosen country. Ideally, the country for which the SAM will be developed will be the participant's own country or a country where the participant is studying. But participants will need access to summary national accounts data for the chosen country.

The exercises for Module M2 are concerned with the development of highly aggregated National Accounts Matrix (NAM) and/or macro-SAM that contain the same data. The aggregated data in these matrices will be important as information to inform the development of a detailed SAM for your chosen country, so the accuracy of these aggregate matrices is important as is the keeping of detailed records about the sources and reliability of the data point.

The choice to first compile a NAM or macro-SAM should be determined by the format of the available summary national accounts. If the national accounts are reported using the System of National Accounts (SNA) after 2008 then the NAM route may be optimal, otherwise adopt the macro-SAM route. It makes little difference to the information content, which is chosen, although it may be relevant in terms of the ease with which the data can be reconciled. If you can compile a NAM, you should do so since the information content is likely to be greater.

However, given the focus of this course towards CGE models, subsequent modules in this course will use a macro-SAM as a basis for developing a full SAM. The exercises provide a simple method for deriving a macro-SAM from a NAM.

If your chosen country's data is better organised for a NAM you should use Exercise M2.1, if not Exercise M2.2. If you compile a NAM, the use Exercise M2.3 to convert the NAM to a macro-SAM.

2. The Course Library

This course does not use a GAMS model library to organise the correct files for each exercise. The computer/code/data files will be downloaded from the Moodle site as they are required: however, it is recommended that course directory is formed, e.g.,
C:\cgemod\samest_lib, to store the downloaded materials.

**RESIST THE TEMPTATION TO EXPLORE THE CONTENTS OF THE
SUBSEQUENT EXERCISE FILES PRIOR TO COMPLETING THE
PREVIOUS EXERCISE; THIS WAY LIES CONFUSION. YOU GET TO
SEE AND USE ALL THE FILES.**

All the computer/code/data files used in this course are in Excel and/or GAMS.

**FOR THIS COURSE YOU NEED A GAMS LICENCE THAT
INCLUDES THE CONOPT 3, CONOPT 4 AND PATH/PATHNLP
SOLVERS.**

A GAMS license can be obtained from GAMS (www.gams.com/try_gams/).

The computer/code/data files for this module are in 'SAM Estimation Code
M2.zip' that is on the website for Module M2.

3 Ex M2.1 Deriving an Aggregate NAM

The previous exercise used data that were presented as neatly organised T-accounts. But real-world national accounts data are often not presented as simple and easy to read T-accounts even when the underlying data can be so presented. In addition to degree of detail is often far greater. This exercise begins the process of compiling a micro-SAM by starting from a NAM. This is part of the process of developing a systematic way of working to compile SAMs.

This exercise involves compiling a National Accounts Matrix from published national accounts data. The data used are determined by the course participant not the tutor; hence the content of this exercise will be participant specific, and no data can be provided by the tutor. You should have collected the required data as part of Module M1 and exercise M1.5. The course does however provide templates for the macro-SAMs and guidance on how to find the data points.

The templates for this exercise are available on Moodle as a resource in the workbook 'NAM Template M2.xlsx'. The workbook has two worksheets: 'Agg NAM template' and 'Full NAM template'. The first exercise uses the worksheet 'Agg NAM template' and the second uses the worksheet 'Full NAM template'.

It is recommended that you make working copies of the templates 'Agg NAM template' and 'Full NAM template' in the workbook (right click on the worksheet tab and choose 'Move or Copy' and then choose copy.

Since these exercises are case specific it is not possible to provide detailed instructions. Instead, a detailed 'guide', Guidance for Compiling a NAM.pdf, is provided. You will need to use the guide and your understanding of national accounts when developing the NAMs.

Ex M2.1.1 An Aggregate NAM

This exercise uses the template 'Agg NAM template'. The suggested accounts may need changing, but for this exercise the accounts should not be changed unless it is necessary because of the way the country's national accounts are presented. The reason for not changing the accounts is that it makes the process more deterministic and thereby allows the participant to concentrate on finding pre-defined datapoints. Note that if you do change the accounts then

the formulae in cells D43 to Y43 will need to be deleted and then revised for the new dimensions of the vector of calculated row totals. In the template, cells that are expected to be zero have been filled in light green; it is unlikely that there should be datapoints for any of these cells so you should be cautious before entering non-zero values in these cells. The cells for which non-zero values are expected are unfilled and do not have a zero (0) entry: not all these cells will have non-zero entries.

The guidance for this exercise is found in part three (3) of the document ‘Guidance for Compiling a NAM.pdf’.

Ex M2.1.2 Deriving an Aggregate NAM

This exercise uses the ‘Full NAM template’. The suggested accounts may need to be changed, and for this exercise careful consideration should be given to selection of tax accounts and institutions. Note that if you do change the accounts then the formulae in cells E66 to AW66 will need to be deleted and then revised for the new dimensions of the vector of calculated row totals. The reason for changing the accounts is to customise the Full NAM template to the specific characteristics of the country. In the template, cells that are expected to be zero have been filled in light green; it is unlikely that there should be datapoints for any of these cells so you should be cautious before entering non-zero values in these cells. The cells for which non-zero values are expected are unfilled and do not have a zero (0) entry: not all these cells will have non-zero entries.

The guidance for this exercise is found in part four (4) of the document ‘Guidelines for Compiling a NAM.pdf’.

4 Ex M2.2 Deriving a Macro SAM

The previous exercise used data that were presented in a format that is consistent with more recent versions of the System of National Accounts. But most economic models use SAM that are slightly different although containing basically the same information; The choice is a matter of preference. This exercise begins the process of compiling a micro-SAM by starting from a macro-SAM.

This exercise involves compiling a National Accounts Matrix from published national accounts data. The data used are determined by the course participant not the tutor; hence the content of this exercise will be participant specific, and no data can be provided by the tutor. You should have collected the required data as part of Module M1 and exercise M1.5. The course does however provide templates for the macro-SAMs and guidance on how to find the data points.

The templates for this exercise are available on Moodle as a resource in the workbook 'Macro SAM Template M2.xlsx'. The workbook has two worksheets: 'Agg Macro SAM template' and 'Full Macro SAM template'. The first exercise uses the worksheet 'Agg Macro SAM template' and the second uses the worksheet 'Full Macro SAM template'.

It is recommended that you make working copies of the templates 'Agg NAM template' and 'Full NAM template' in the workbook (right click on the worksheet tab and choose 'Move or Copy' and then choose copy.

Since these exercises are case specific it is not possible to provide detailed instructions. Instead, a detailed 'guide', [Guidelines for Compiling a macro-SAM.pdf](#), is provided. You will need to use the guide and your understanding of national accounts when developing the macro-SAMs.

Ex M2.2.1 An Aggregate NAM

This exercise uses the template 'Agg Macro SAM template'. The suggested accounts may need changing, but for this exercise the accounts should not be changed unless it is necessary because of the way the country's national accounts are presented. The reason for not changing the accounts is that it makes the process more deterministic and thereby allows

the participant to concentrate on finding pre-defined datapoints. Note that if you do change the accounts then the formulae in cells D25 to O27 will need to be deleted and then revised for the new dimensions of the vector of calculated row totals. In the template, cells that are expected to be zero have been filled in light green; it is unlikely that there should be datapoints for any of these cells so you should be cautious before entering non-zero values in these cells. The cells for which non-zero values are expected are unfilled and do not have a zero (0) entry: not all these cells will have non-zero entries.

The guidance for this exercise is found in part three (3) of the document ‘Guidelines for Compiling a macro-SAM.pdf’.

Ex M2.2.2 Deriving an Aggregate NAM

This exercise uses the ‘Full NAM template’. The suggested accounts may need to be changed, and for this exercise careful consideration should be given to selection of tax accounts and institutions. Note that if you do change the accounts then the formulae in cells D49 to AL54 will need to be deleted and then revised for the new dimensions of the vector of calculated row totals. The reason for changing the accounts is to customise the Full NAM template to the specific characteristics of the country. In the template, cells that are expected to be zero have been filled in light green; it is unlikely that there should be datapoints for any of these cells so you should be cautious before entering non-zero values in these cells. The cells for which non-zero values are expected are unfilled and do not have a zero (0) entry: not all these cells will have non-zero entries.

The guidance for this exercise is found in part four (4) of the document ‘Guidelines for Compiling a macro-SAM.pdf’.

5. Ex M2.3 From A NAM to a macro-SAM

A review of the accounts of data in a NAM and macro-SAM shows that the ‘Allocation of Primary Income’, Secondary Distribution’ and ‘Use of Disposable Income’ groups of accounts all include the following individual accounts

1. Institutions
 - a. Households
 - b. NPISH
 - c. Non Financial Corporations
 - d. Financial Corporations
 - e. Government
2. Direct Taxes
3. Social Contributions
4. Current Transfers

that map directly onto accounts with the same names in the ‘Full Macro SAM template’. In addition, the ‘Generation of Income Accounts’ map directly to accounts with the same names in the ‘Full Macro SAM template’. These accounts present no challenges because they contain no additional information.

The one account that does not map directly to a macro-SAM is the ‘financial’ account. The process of transforming a NAM to a macro-SAM therefore simply reduces to folding the information in the ‘financial’ account into the NAM or the macro-SAM, without loss of information. This is the problem Pyatt addressed by the method of ‘Apportionment’.

When to Apply Apportionment

The apportionment method can be applied at most stages in the process and can be used to fold the information into the NAM while retaining all the other accounts or as part of the process of moving from a NAM to a macro-SAM.

One, arguably preferable, option is

1. complete the ‘Full NAM Template’,
2. fold the ‘financial’ account into the NAM using the Apportionment method,

- map the TVs in the ‘Allocation of Primary Income’, Secondary Distribution’ and ‘Use of Disposable Income’ onto the individual accounts in the macro-SAM.

If you wish to continue with the NAM account structure, then stop after step 2.

Assume the initial SAM, \mathbf{T} , is of dimension $n \times n$ and the objective is to eliminate the n^{th} account. The matrix \mathbf{T} can then be partitioned such that the first $n-1$ rows and columns form the matrix \mathbf{X} and the n^{th} row and column are made up of an $n-1 \times 1$ vector, \mathbf{s} , a $1 \times n-1$ vector, \mathbf{r} , and a scalar, q . Pyatt (1989) demonstrated that a new SAM, \mathbf{X}^* , can be derived as

$$\begin{aligned} \mathbf{X}^* &= \mathbf{X} + \left(\frac{1}{v-q} \right) \mathbf{sr}' \\ &= \mathbf{X} + \left(\frac{1}{\mathbf{i}'\mathbf{s}} \right) \mathbf{sr}' = \mathbf{X} + \left(\frac{1}{\mathbf{r}'\mathbf{i}} \right) \mathbf{sr}' \end{aligned}$$

where v is the account total for the n^{th} account.

Table 1 **Partitioned SAM**

	Expenditure Accounts		Totals
Income Accounts	\mathbf{X}	\mathbf{s}	\mathbf{u}
	\mathbf{r}'	q	\mathbf{v}
Totals	\mathbf{u}'	\mathbf{v}	

A convenient feature of the Apportionment method is that it can be implemented in Excel, using the standard matrix functions, `()` or in GAMS `()`. The files with example data are included in ‘SAM Estimation Code M2.zip’