Estimating a Social Accounting Matrix: Online Course

Course Description

This course is an advanced/specialist course in the estimation of Social Accounting Matrices (SAMs). The course is orientated to the estimation of SAMs designed to support computable General Equilibrium (CGE) models, but SAMs so estimated can be used by other whole economy models. The course is designed for individuals who have a well-developed background in economics and single-country or global CGE modelling, and who have extensive experience using the General Algebraic Modelling System (GAMS) software. The GAMS programmes used in this course are substantially more complex than those used for CGE models. The course uses GAMS intensively. During the course participants will typically need to expand their knowledge and understanding of GAMS.

The course emphasises the development of an understanding of the properties and structure of SAMs, with a strong emphasis on understanding the price system embedded in a SAM and its role in whole economy models. The course follows the principles of national accounting developed by Richard Stone, and associates, during the 1950s and 1960s, that are now cornerstones of the System of National Accounts.[1] The estimation of SAMs that are appropriate to support meaningful policy analyses depend critically upon the effort devoted to compiling a high quality *PRIOR* (initial) SAM from national accounts data, including various surveys. The mathematical techniques, explored in this course, for converting the prior SAM into a final SAM cannot be a substitute for the efforts devoted to compiling the prior SAM.

The main GAMS programme used in this course, to derive/estimate the final SAM, uses a maximum entropy metric (developed by Sherman Robinson and associates) that is based on information theory. During the course the RAS method, developed by Stone and associates, is also used: it is demonstrated that the RAS method is good, given the computing constraints when it was developed, for its intended purposes. But RAS is deficient as a tool

[1] "The fact that others have not had to reinvent the architecture of the national accounts in particular is perhaps the most telling measure of the importance of Richard Stone's contributions and their enduring significance." (Pyatt, 2005).

for SAM estimation; this is demonstrated by replication a study by Lynch to estimate a Input-Output Table (IOT) for 1968 using the 1963 IOT as a prior. A modified RAS method isused to demonstrate how adding information can greatly improve the performance of the RAS method. The modified RAS method provides a basis upon which users can appreciate how adding information can greatly improve the performance of any mathematical SAM estimation technique. The entropy programme used in this course is designed to allow those estimating a SAM to add additional layers of information over and above the *prior* SAM. The entropy method has another major advantage: the estimation results provide information about the potential benefits of improved prior estimates of transaction values.

Participants on this course are required to demonstrate that they are experienced users of GAMS. Evidence of adequate GAMS experience include completion of advanced courses offered by CGEMOD, i.e., Single Country CGE Modelling course' (see www.cgemod.org.uk/single_cge.html) or the 'Global CGE Modelling course' (see www.cgemod.org.uk/global_cge.html).

The course assumes that the participants have an in-depth knowledge of graduate level economics and a reasonable understanding of mathematics and statistics for economics. The methods used in this course require an understanding of Social Accounting Matrices (SAMs), and an understanding of the relationships between SAMs and CGE models will be helpful.

The materials are organised in 5 modules offered over 5 weeks, with support offered in a sixth week to allow for 'slippage'. The first three modules have a total of 21 components. The seven components of the first module will require an average of 2 to 3 hours each, each of seven components in the second and third modules will require an average of 4 or more hours each. The project should take some 25 hours to complete since the data collection and basic organisation has been done. Participants should plan a SAM estimation project of their own that will be undertaken immediately following completion of this course: experience indicates that embedding the skills explored in this course is important. Each module requires the participants to submit a deliverable; this allows the tutor to monitor progress and understanding.

The course is delivered via an electronic learning environment – Moodle. Moodle provides an environment that allows the delivery of learning materials in a structured and

organised manner, and an asynchronous forum in which participants can engage with other participants and with the course tutor. The course tutor is available, by email and/or the Moodle message system, to answer specific questions and provide help with problems: questions and requests for advice submitted between 0800 and 1600 UTC will be responded to by the end of the next working (Monday to Friday) day, i.e., by 1600 UTC. Each module requires the participants to submit an assignment; this allows the tutor to monitor progress and understanding, and to intervene if participants are not understanding concepts and techniques or having difficulties. Feedback is provided for each assignment.

This course does NOT use a GUI (Graphical User Interface) to access GAMS. The GAMS programmes used in this course require that the participants work in 'native' GAMS using data that are accessed from Excel and GDX. Subsequently, when estimating a SAM using national surveys users may need to master other computer programmes, e.g., SPSS, SQL, etc., to extract the data; the requisite programmes will depend on the format in which the data have been stored. These programmes are not used in this course.

A time limited licence for GAMS is available courtesy of GAMS Corporation. Access to the CONOPT and PATH solvers is required.

Course Aims and Objectives

Course Aims

To develop the SAM estimation skills of participants (using GAMS) so they

i) understand the structure and content of complete and consistent SAMs;
ii) understand the price system in a SAM;
iii) can organise the data required for *prior* SAMs and satellite accounts;
iv) understand the strengths and weaknesses of SAM estimation techniques; and
v) can critically evaluate the information content of a SAM.

Course Objectives

On completion of the course the participants will be able to:

i) evaluate critically the information content of a SAM;
ii) identify and understand the data requirements to create a *prior* SAM;
iii) use SAMEST, & RAS, programmes to estimate complete & consistent SAMs;
iv) interpret the results from the SAMEST programme to identify those cells of a prior SAM that would benefit from improved prior estimates; and
v) identify appropriate satellite accounts consistent with the estimated SAM.

Linked Models

The structure of a SAM developed during this course is linked to the STAGE family of CGE models. The STAGE_1 and STAGE_2 models are open source (www.cgemod.org.uk/stage.html). The STAGE_t model, a development of the STAGE_2 model, is a state-of-the-art CGE model designed for the analyses of a wide range of real-world policy issues and an advanced base for the further (academic) model development. The STAGE_t model is used in the 'Single Country CGE Modelling Course' (www.cgemod.org.uk/single_int.html) and the 'Recursive Dynamic CGE Modelling Course' (www.cgemod.org.uk/rdyn_che.html).

There are no plans (as of early 2020) to make STAGE_3 open source; the plan is to restrict the distribution of STAGE_3 to participants of the single country CGE courses offered by CGEMOD.

Timetable

Online courses are run in four cycles – Oct/Nov, Nov/Dec, Jan/Feb and March/April – with recruitment for each course limited to c12 participants. This course is offered in cycles 3 and 4.

The timetables for courses are available at www.cgemod.org.uk/ttable.html

Course Fees

The course fees and conditions are detailed at www.cgemod.org.uk/fees.html

Discounts are offered for participants from developing countries ('Low-income economies' and 'Lower-middle-income economies' as classified by the World Bank) and students. Additional discounts are offered for participants who take multiple courses offered by CGEMOD.

A limited number of scholarships are available to students from developing countries. Applications for a scholarship must be made at the time of registration; applications must be accompanied by a case for being awarded the scholarship that is not longer than one-side of A4/US letter. Applicants must be registered at a degree awarding institution, correspond from an academic email address and provide confirmation of their status from an academic advisor.

Registration

Registration is online at www.cgemod.org.uk/regist.html

Further Information and registration

For further information please contact Professor Karen Thierfelder

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Estimating a Social Accounting Matrix (Online) Course

Outline

Programme Module O27: Theory of Social Accounting

	Topic	Tasks	Exercises
O27:1	Introduction	SAMs as accounting systems	Interpreting transaction values (TV)
O27:2	What is a SAM?	Understanding the single-entry accounting method	Deriving a very simple SAM from macro T-accounts
O27:3	Properties of a SAM	The price system in a SAM and the Law of One Price (LOOP)	Deriving implicit prices from TVs
O27:4	SAMs and the SNA	Roles of Supply and Use Tables (SUT) and SAMs in the System of National Accounts (SAN)	Interpreting the data in satellite accounts
O27:5	SNA Production boundary	The SNA and 'general' production boundaries	Interpreting aggregate measures of economic activity, e.g., GDP, & welfare
O27:6	SUT vv IOT	The relationship between SUT and Input-output tables	No exercise
O27:7	Interpreting Information in a SAM	Using coefficients to interpret the information in a SAM>	A SAM interpretation exercise (Deliverable 27:1)

Programme Module O28: Deriving Prior Macro and Micro SAMs

	Topic	Tasks	Exercises
O28:1	Introduction	Top down vv Bottom up	Collecting aggregate national accounts data
O28:2	Macro SAM	Role of a macro SAM	Deriving a macro SAM from aggregate national accounts data
O28:3	Data Requirements for a SAM	Overview of data requirements	Reconciling income and expenditure data
O28:4	Organisation of data and code to generate priors	Organising data for a *prior* SAM	Use of Excel, GDX and GAMS
O28:5	Micro SAM	Relationship between micro and macro SAMs	Using supplied data to derive a prior micro SAM
O28:6	Factor satellite accounts	Relationship between TVs and satellite account data	Using supplied data to derive a prior factor satellite account
O28:7	Prior SAM exercise	Develop a small prior SAM	**Deliverable 28:1**

Programme Module O29: Mathematical Methods for Estimating a Complete and Consistent SAM

	Topic	Tasks	Exercises
O29:1	Introduction	Mathematical estimation tools; estimation vv balancing	No exercise
O29:2	RAS	The simple mechanics of RAS	RAS in Excel and GAMS; estimating a 1968 UK IOT from a 1963 IOT as the prior.
O29:3	Modified RAS	Modified RAS: estimation with additional information	Evaluating the benefits of additional information in RAS
O29:4	Entropy estimation metric	Estimation principles. Overview of the code; structure and controls	Using entropy estimation with a simple prior
O29:5	Macro SAM estimation	Using the SAMEST programme	Estimating a macro SAM
O29:6	Micro SAM estimation	Using the SAMEST programme	Estimating a micro SAM
O29:7	Estimating a small SAM	SAM estimation exercise	Using SAMEST with a prior SAM (from O28:7)

Programme Module O30: Estimating a SAM Project

The objectives of the project are to develop your ability to (i) organise data used to develop a *prior* SAM; (ii) develop a *prior* macro and micro SAMs; and (iii) estimate a complete and consistent SAM.

This part of the course uses the data organisation methods and SAMEST code developed during the course. It also requires you to use your understanding of the theoretical properties of a SAM to guide your progress. There is NO unambiguously right answer to this project. The emphasis during the project is on encouraging systematic working practices and awareness of the assumptions it will be necessary for you to make.

The project will use one of the two databases provided: one is for the USA and the other for the UK. Both databases are provided in the course library, hence after the course is finished you can experiment with the other database.

The project task is: you are an economic accounts consultant who has been hired to develop a SAM for the either USA or UK using published national accounts data. The national accounts division has collated the data you can use as part of the assignment. The final report will be a maximum of 15 pages plus the computer codes used.

	Topic	**Tasks**	**Exercises**
O30:1	Introduction	Overview of the supplied database	No exercise
O30:2a	USA SAM	Collate the data for a prior USA SAM	Estimate a final SAM for the USA
O30:2b	UK SAM	Collate the data for a prior USA SAM	Estimate a final SAM for the USA