A top-down approach to SAM Estimation

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Outline

- Introduction
  - A problem statement
- Objectives
  - Complete and Consistent
    - 'A balanced SAM'
  - Control totals & Information
- Mathematical methods
  - Bi-proportional and loss minimisation
- Pitfalls
  - Incomplete and Consistent
    - 'A balanced SAM'
  - 'Poor' prior estimates
  - Control totals & Information
    - Inadequate
    - Misapplied
  - Abnormal year

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Introduction

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Problem Statement

- Top-down vv Bottom-up
  - National statistical offices vv Other compilers
- Incomplete and Inconsistent data
  - Inconsistent classification of agents
  - Inappropriate classification of agents
  - Statistical errors
  - Withheld data
  - Suppressed data
  - Economic rents
- Inadequate funding
  - Data are low status
- Acceptability of the SAM
  - Perspective of 'clients'
- What matters for the models?

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Problem Statement

- Constraints
  - Incomplete and inconsistent data
  - Inadequate funding
  - 'Clients'

"Theorizing requires inspiration and technical know-how, while data gathering - particularly for practical implementation of large models - needs much sweat and tears, and always a large amount of time and money. No wonder we face over-production of models and underinvestment - both intellectual and financial - into compilation of the data bases needed to implement them." *(Leontief, 1989, p 287).*

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Objectives

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Complete & Consistent

- Complete
  - All transactions are recorded
- Consistent
  - All incomes to an agent are identical to expenditures by other agents
  - All expenditures by an agent are identical to incomes of other agents

IF ALL transactions are complete and reconciled across accounts/agents a SAM is consistent

'A balanced SAM' is ONLY consistent

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Control Totals & Information

- Roles of control totals
  - Completeness
  - Enhance estimation process
  - Acceptability
- Information
  - Imperfect
    - Control totals
    - Different sources
      - Surveys
      - (Aggregate) national accounts
  - Nature of errors
    - Normal, uniform, etc. distributions

Estimation process is probabilistic

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Mathematical methods

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Mathematical methods

- Loss minimisation
  - Bi-proportional
  - Other loss minimisation methods

Aim: find a set of TVs that are **closest**, according to some metric, to the prior TVs

$$\sum_{j=1}^{n} x_{ij}^{*} . \log \frac{x_{ij}^{*}}{x_{ij}} \qquad \textbf{RAS}$$

where x_{ij} is the prior estimate, and x_{ij}^{*} is the solution estimate

$$\left| x_{ij}^{*} - x_{ij} \right|^{p/v_{ij}} \qquad \textbf{Other loss minimisation}$$

where x_{ij} is the prior estimate, and x_{ij}^{*} is the solution estimate, p is a power (0.5, 1, 2), v_{ij} is the variance

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Pitfalls

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Incomplete and Consistent

Mathematical methods cannot solve the problems with an incomplete prior

$$\sum_{j=1}^{n} x_{ij}^*.\log \frac{x_{ij}^*}{x_{ij}} \qquad \textbf{RAS}$$

where x_{ij} is the prior estimate, and x_{ij}^* is the solution estimate

$$\left| x_{ij}^* - x_{ij} \right|^{p/v_{ij}} \qquad \textbf{Other loss minimisation}$$

where x_{ij} is the prior estimate, and x_{ij}^* is the solution estimate, p is a power (0.5, 1, 2), v_{ij} is the variance

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'Poor' prior estimates

Is a zero prior better than a
'poor' prior estimate?

NO

Zeros stay zeros

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Control totals & Information

- Control totals & Information
  - Is information complete?
    - Are prior estimates point estimates?
    - Estimation with error
  - Are all data sources for the same year?
  - If transaction data are measured with error, are the aggregates measured with error?
  - Are controls applied appropriately
    - Simple averages of row and column control totals!!!

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Abnormal year

What is a normal year?

e.g.,   SUT are often periodic with preset dates

Data from different years

INFORMATION IS IMPERFECT

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The End

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