The SAM: What is it? How is it Adapted for MAMS?

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Inception workshop on "**Strengthening Macroeconomic and Social Policy Coherence through Integrated Macro-Micro Modelling**", Amman, 28-29 March, 2012.

Outline

- Introduction
- A Standard SAM
- A SAM for MAMS
- Steps in Building a SAM for MAMS

What is a SAM?

- A SAM is a consistent and complete data system that captures the interdependence that exists within a socio-economic system
  - it includes both the input-output and national and external accounts in a consistent framework
- Originated from the pioneering work on national accounts by Meade and Stone (1940)
  - first SAM developed by Nobel Laureate Richard Stone for the UK in 1962; work on developing countries started in the 1970s

Features of a SAM

- A SAM is a square matrix with identical row and column accounts
  - each cell shows payment from its column account to its row account
- Accounting consistency means that
  - column totals = row totals; (budget constraint; supply=demand)
- A SAM says nothing about the behavioral and technical relationships that generated its values.

Uses of a SAM

- A SAM describes the economic structure.
- The SAM construction process puts together data from disparate sources
  - usually, need for reconciliation
  - in fact, SAM building helps to check data consistency
- A SAM can be key data source for economy-wide models
  - SAM multiplier models and CGE models
  - in MAMS, the SAM provides the bulk of the data used to define base-year parameter values

Main Account Types in a SAM

- Activities: each activity produces one or more commodities using factor services and intermediates.
- Commodities: supplied by activities and/or via imports; demanded for exports and domestic final and intermediate use.
- Factors: services produced by stocks
  - labor, capital, land, other natural resources
- Institutions: entities that own factors, consume and invest, receive or pay taxes and transfers
  - households, enterprises, government, rest of world
- Others: taxes, interest, saving, capital, and investment.

A Standard MacroSAM

	act	com	fac	hhd	gov	row	tax-dom	tax-imp	sav-inv	total
act		prod								
com	io			cons	cons	exp			inv	
fac	va					incf				
hhd			va-h		trns	trns				
gov			va-g	trns		trns	itax+dtax	mtax		
row		imp	incf	trns	trns					
tax-dom	atax	ctax		dtax						
tax-imp		mtax								
sav-inv				sav	sav	sav				
total										

A Standard MacroSAM -- accounts

account	explanation
act	production activities
com	commodities
fac	factors
hhd	households (domestic non-government)
gov	government
row	rest of world
tax-dom	domestic taxes
tax-imp	import taxes
sav-inv	savings-investment (consolidated)

A Standard MacroSAM -- Cells

item	explanation
prod	production (output)
cons	consumption
exp	exports
imp	imports
io	intermediate consumption
va	value added (=GDP at factor cost)
va-g	value added paid to government
va-h	value added paid to households
inv	investment
sav	savings
dtax	direct taxes
itax	domestic indirect taxes
mtax	import taxes (tariffs)
trns	transfers
incf	factor income

A Standard MacroSAM: Numerical Example

	act	com	fac	hhd	gov	row	tax	s-i	total
act		975							975
com	499			332	43	163		121	1,157
fac	458					3			460
hhd			398		15	32			445
gov			39			2	61		101
row		156	23	1	0				181
tax	19	25		17					61
s-i				95	43	-18			121
total	975	1,157	460	445	101	181	61	121	

SAM-Based CGE Model Calibration

- A typical CGE model is calibrated using a SAM.

- SAM-based calibration

    - on the basis of a dataset for a base period given by the SAM, the parameters of the model are estimated in a manner that enables the model solution to precisely replicate the SAM

        - (in the absence of shocks)

Calibration Example; Cobb-Douglas

- According to the SAM – specific activity,
  - production value = 100
  - labor payment = 40
  - capital payment = 60
  - intermediate consumption = 0

$$Q = \gamma K^{\alpha_K} L^{\alpha_L} \qquad p = w = r = 1 \qquad Q = 100 \qquad K = 60$$

$$\alpha_K + \alpha_L = 1 \qquad\qquad\qquad\qquad\qquad\qquad L = 40$$

Calibration Example – cont.

- The cost minimization problem consist in finding the input combination that minimizes a firm's production cost, given quantity of output. From the First Order Conditions,

$$\alpha_K = \frac{rK}{pQ} = 0.60 \qquad\qquad \alpha_L = \frac{wL}{pQ} = 0.40$$

$$\alpha_K = \frac{1x60}{1x100} = 0.60 \qquad\qquad \alpha_L = \frac{1x40}{1x100} = 0.40$$

SAM-Based Model Calibration

- Main disadvantage
  - high dependence on data for one year; results may be misleading, especially if the year is exceptional or there are data errors
    - make sure the SAM is good!
- Main advantage
  - makes it possible to develop a model that can address relatively detailed policy-relevant issues without asking for non-existent data and/or carrying out complicated estimations
- Implications
  - careful judgment has to be applied; draw on model for insights, not for exact numbers.

A SAM for MAMS

- Minimum account disaggregation
  - activities/commodities: government, private
  - factors: labor, private capital
  - institutions: household, government, rest of world
- Accounts of each institution
  - current (= named after the institution)
  - capital
- Other institution-related accounts
  - taxes but also interest payments
- One investment account per capital stock

A SAM for MAMS

	a-prv	a-gov	c-prv	c-gov	f-lab	f-capprv	hhd	gov	row	tax-dom	tax-imp	int-dom	int-row	cap-hhd	cap-gov	cap-row	inv-prv	inv-gov	dstk	total
a-prv			prod																	
a-gov				prod																
c-prv	io	io					con		exp								inv	inv	dstk	
c-gov								con												
f-lab	va	va																		
f-capprv	va																			
hhd					va-h	va-h		trns	trns			intd								
gov						va-g	trns		trns	itax+dtax	mtax									
row		imp					trns	trns					intr							
tax-dom	atax		ctax			incf	itax													
tax-imp			mtax																	
int-dom								intd												
int-row							intr-h	intr-g												
cap-hhd							sav									borr				
cap-gov								sav						borr		borr				
cap-row									sav											
inv-prv														inv-p		inv-p				
inv-gov															inv-g					
dstk														dstk-h	dstk-g					
total																				

Cells in SAM for MAMS

item	explanation
prod	production of gov/priv commodity
cons	gov/hhd consumption of gov/priv commodity
exp	exports of private commodity
imp	imports of private commodity
io	intermediate use of private commodity by gov/priv activity
va	value added from gov/priv activity
va-g/va-h	value added to gov/hhd from capital/labor and capital
incf	factor income to capital/RoW from RoW/capital
sav	gov/hhd/RoW savings
borr	borrowing
inv	investment use of private commodity for gov/priv capital
inv-g	investment in gov capital financed by gov
inv-p	investment in priv capital financed by hhd or RoW
dstk	stock change for priv commodity
dstk-g/dstk-h	stock change financed by gov/hhd
dtax/itax	direct/indirect domestic taxes
mtax	import taxes (tariffs)
trns	transfers to gov/hhd/RoW from gov/hhd/RoW
intd	domestic interest to hhd from gov
intr	RoW interest (total)
intr-g/intr-h	RoW interest from gov/hhd

SAM for MAMS: New Accounts

- The MDG version of MAMS focuses on human development. Then, need to disaggregate government accounts (activity, commodity, investment) into
  - education (primary, secondary, tertiary)
  - health
  - water and sanitation
- In addition, other government sectors are usually singled out
  - public infrastructure (roads, bridges, airports, and so on) -- provide productivity-raising services
  - other government (public administration and other services)

SAM for MAMS: New Accounts – cont.

- The labor factor is disaggregated by educational achievement into
  - less than completed secondary
  - completed secondary but not tertiary
  - completed tertiary
- Typically, payments to capital from government activities do not appear in IO tables -- may only reflect depreciation.

SAM for MAMS: New Accounts – cont.

- Private activity and commodity into
  - agriculture -- can be split further
  - industry -- can be split further
  - services
    - split further to single out MDG-related services provided by the private sector
- Private capital into
  - private capital (defined more narrowly)
  - agricultural land
  - natural resources
- Household and related capital account into rural/urban or by income characteristics if needed.

Steps in the SAM Building Process

1. Construction of a MacroSAM
   - national accounts, government budget, and the balance of payments
2. Disaggregation of the MacroSAM into a matrix with a large sectoral breakdown (MicroSAM) suitable for the calibration of MAMS
   - use data in MacroSAM as control totals
   - disaggregate accounts for activities, commodities, factors, institutions
3. Adaptation of the MicroSAM to make it suitable for the calibration of MAMS.