Plenary Session II: Defining MAMS Scenarios – Available Closure Rules

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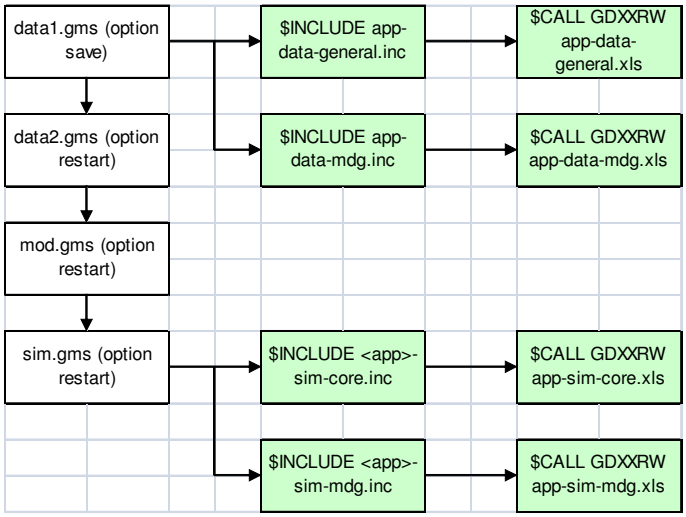
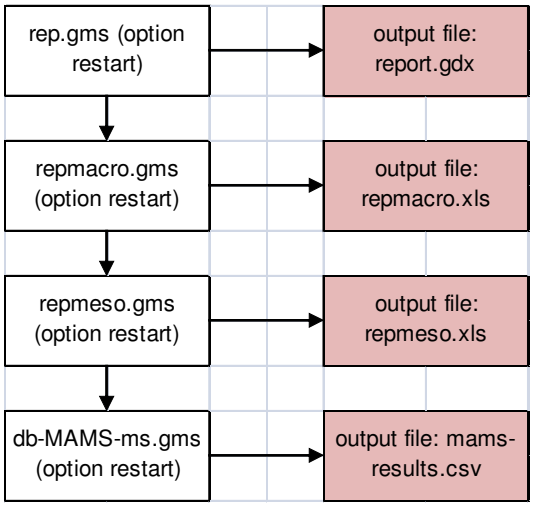
Outline

- Organization of MAMS files
- Different Types of Closure (i.e., ways of balancing supply and demand)
  - macroeconomic
  - factor markets
  - commodity markets
- Closure Rules for the "Achieving MDGs" Scenarios
- Defining Simulations in MAMS Using Excel

Organization of MAMS files – baseline + simulations



Organization of MAMS files -- reports



Macro Closure Rules

- Clearing mechanisms that ensure equality between receipts and outlays for
  - balance of payments' current account
  - savings-investment
  - government budget
- By default, the selections for the baseline (in app-data-general.xls) are applied to the other simulations (in app-sim-mdg.xls).

Balance of Payments (rowclos0)

- Non-trade-related payments (transfers, foreign investment) are non-clearing, determined by their own rules
  - exogenous growth rates in foreign currency
  - exogenous shares of GDP
  - exogenous shares of absorption
- The real exchange rate equilibrates inflows and outflows of FCU, by influencing export and import quantities.

Balance of Payments – cont.

- A BoP deficit (e.g., due to a decline in foreign aid) generates a depreciation of the real exchange rate
  - for producers: increased price for exports relative to price of domestic sales, increase in QE/QD
  - for consumers: increased price for imports relative to price of domestic purchases, decrease in QM/QD
- The exchange rate will change as much as needed to bring about the changes in export and imports needed to eliminate the imbalance.

Savings-Investment (siclos0)

- Government investment
  - typically, determined by needs for capital stocks in government service production – follows current consumption
  - government closure rule (discussed below) assures that it is financed
- Foreign Direct Investment changes according to a “rule” (see below).
- The relationship between private savings and investment depends on siclos0.

Savings-Investment – cont.

Table 8. Rules for clearing saving-investment balance

Rule No.	household investment	household saving
1	clearing variable (endogenous real growth, GDP and absorption shares)	rule-determined savings rate for households
2	exogenous absorption share	clearing variable: uniform savings rate point change for selected households
3	exogenous absorption share	clearing variable: uniform savings rate scaling for selected households
4	exogenous GDP share	clearing variable: uniform savings rate point change for selected households
5	exogenous GDP share	clearing variable: uniform savings rate scaling for selected households

Government Budget (govclos0)

- Select the variable that clears the government budget
  - essential for designing counterfactual scenarios
- The other components of the government budget follow some rule
  - for example, keep constant the ratio between government consumption and GDP

Government Budget – cont.

Table 4. Rules for clearing the government budget

Rule No.	Variable clearing the budget
1	all domestic tax rates (direct and indirect): uniform scaling
2	direct tax rates: uniform point change for selected households
3	direct tax rates: uniform scaling for selected households
4	transfers to government from the rest of the world (grant aid)
5	foreign borrowing;
6	domestic government borrowing (interest paid on debt)
7	government borrowing via monetary sector
8	separate treatment of current and capital budgets:* a. current budget: direct tax rates: uniform scaling for selected households (same as 3) b. capital budget: domestic government borrowing (same as 6) exogenous government savings*
9	government spending on one or more commodities (specified by government spending rule)

*To separate the two, government saving (current receipts - current spending) is exogenous; for all other rules, it is endogenous.

Rules for Government Expenditures and Incomes – not selected in govclos0

- Should be specified for government expenditures and incomes that are not used to balance the government budget
  - expenditures in govspndrule0
  - incomes in govrecrule0
  - NOTE: in the “achieving MDGs” scenarios government consumption is endogenous

Rules for Government Spending (govspndrule0)

Table 5. Rules for government spending

Rule No.	Rule (disaggregated by spending item)	Controlling parameter*	Default (if controlling parameter is empty)
1	Fixed growth rate**	govspndgrw0	gdpgrw0
2	Fixed GDP share	govspndgdp0	base-year share
3	Fixed absorption share	govspndabs0	base-year share
4	Fixed educational quality for cycle of commodity***	eduqualgrw	NA****
5	Items under 1-4 are all flexible*****	NA	NA

*The controlling parameter defines the evolution over time for the item in question.

**For consumption and capital stocks, growth rates are real; for other items, they are nominal in LCU (implicitly indexed to the numeraire) or FCU. For interest payments, 1 signifies a exogenous rates, controlled by *gintrat0* and *fintrat0* and defaulting to the base-year rate (derived from debt stocks and interest payments in the SAM).

***Only for education services in the MDG version; quality = [service level]/[enrollment]; parameter is found in app-mdg-data.xls

****Data for the controlling parameter (*eduqualgrw*) is required.

*****If other rule controls spending. Required for at least one commodity or capital stock if the government closure is 9.

Rules for Government Spending – cont.

- The identified government spending items are
  - **c** = commodities = current consumption
  - **'trngovgov'** = transfers from gov to non-gov institutions
  - **'trrowgov'** = transfers from gov to row
  - **intdomrow** = domestic and foreign interest payments
- To impose growth rates, use govspndgrw0
- To impose GDP share, use govspndgdp0
- To impose absorption share, use govspndabs0

Rules for Government Receipts (govrecrule0)

Table 6. Rules for government receipts

Rule No.	Rule (disaggregated by spending item)	Controlling parameter*	Default (if controlling parameter is empty)
1	Fixed rate (for taxes) / growth rate (other items)	taxrate0 / govrecgrw0	base-year rate / gdpgrw0***
2	Fixed GDP share	govrecgdp0	base-year share
3	Fixed absorption share	govrecabs0	base-year share

*The controlling parameter defines the evolution over time for the item in question.
**Growth rates are nominal, in LCU (implicitly indexed to the numeraire) or FCU.
***For government domestic and foreign borrowing, the default for (1) is that borrowing is set so that the debt stocks grow at the same rate as gdpgrw0 (i.e., not that the flows of borrowing grow at the same rate as GDP). For foreign borrowing, this calculation assumes that there are no changes in the exchange rate.

Rules for Government Receipts – cont.

- The identified government receipts are
  - **tax** = tax accounts in SAM
  - **'trgovrow'** = transfers from row to gov
  - **'trgovngov'** = transfers from domestic non-gov institutions to gov
  - **'gborz'** = '**gbormsz** '= domestic gov borrowing
  - **'fborgov'** = foreign government borrowing
- To impose growth rates, use govrecgrw0
  - debtgrw if govrecrule0=1 and govrecgrw=blank
- To impose GDP share, use govrecgdp0
- To impose absorption share, use govrecabs0

An Example: Government Receipts

- The imposition or not of the values in govrecgrw0, govrecgdp0 and govrecabs0 depends on the values selected for govrecrule0
  - if govrecrule0=1 for trgovrow, govrecgrw0 can be used to impose a growth rate to the transfers from the row to the government
  - if govrecrule0=2 for tax-dir (i.e., exogenous direct tax collection/GDP ratio), govrecgdp0 can be used to impose a trajectory to the direct tax collection/GDP ratio

An Example: Government Receipts – cont.

govclos0(t1)	
2002	
5	

govrecrule0(ac,t1)	
	2002
tax-dir	2
tax-imp	1
tax-exp	1
tax-oind	1
trgovrow	1
trgovngov	1
gborz	1
gbormsz	2
fborgov	1

An Example: Government Receipts – cont.

govrecgrw0(ac,t1)	growth in government receipts of ac							
	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
trgovrow	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05

govrecgdp0(ac,t1)	GDP share for government receipts of ac								
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
tax-dir	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2

Rules for Non-Government Payments – (ngovpayrule0)

Table 7. Rules for non-government payments

Rule No.	Rule (disaggregated by spending item)	Controlling parameter*	Default (if controlling parameter is empty)
1	Fixed growth rate	ngovpaygrw0	gdpgrw0***
2	Fixed GDP share	ngovpaygdp0	base-year share
3	Fixed absorption share	ngovpayabs0	base-year share

*The controlling parameter defines the evolution over time for the item in question.
**Growth rates are nominal, in LCU (implicitly indexed to the numeraire) or in FCU.
***For foreign borrowing, the default for (1) is that borrowing is set so that the debt debt stock(s) grow at the same rate as gdpgrw0 (i.e., not that the borrowing flow grows at the same rate as GDP); this calculation is based on the assumption that there are no changes in the exchange rate.

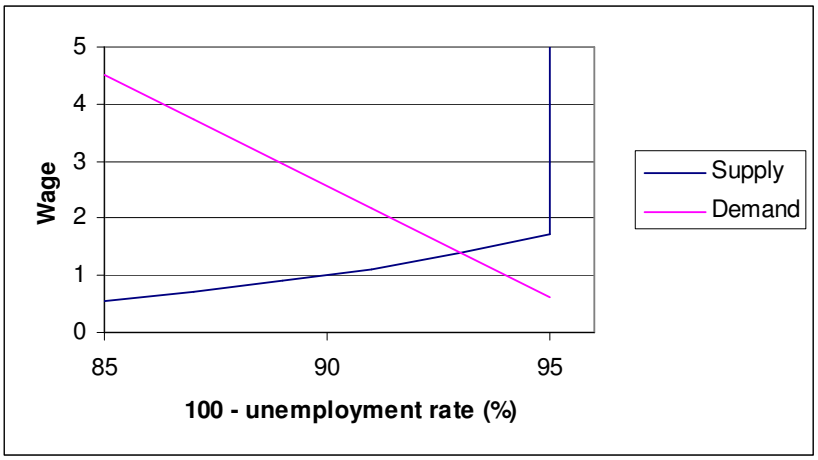
Rules for Non-Government Payments – cont.

- The identified non-government payments are
  - **'trngovrow'** = transfers from row to non-gov institutions
  - **'trfacrow'** = transfers from row to factors
  - **'fborngov'** = non-gov institutions foreign borrowing
  - **'fdiz'** = foreign direct investment
  - **'dkngov'** = non-government fixed investment
- To impose growth rates, use ngovpaygrw0
  - debtgrw if govrecrule0=1 and govrecgrw=blank
- To impose GDP share, use ngovpaygdp0
- To impose absorption share, use ngovpayabs0

Market Clearing for Factors

- Two alternatives
  - exogenous unemployment – typically zero – with wage as the clearing variable
  - endogenous unemployment; two possible regimes:
    - unemployment > minimum unemployment – clears trough unemployment rate
    - unemployment = minimum unemployment (i.e., full employment) – clears trough wages
    - the reservation wage is a function of: employment rate (i.e., wage curve), pc consumption, etc.

Factor Market with Endogenous Unemployment



Market Clearing for Commodities

- Three categories
  - domestic output sold at the home market: clears trough prices
  - exports:
    - clears trough quantities demanded by the row (i.e., small country assumption)
    - clears trough export demand function with constant elasticity
  - imports: clears trough quantities supplied by the row

Closure Rules for Project Scenarios – in app-data-general.xls

- In the baseline scenario, each country should select the relevant variable to balance the government budget.
- In addition, other indicators should follow reasonable paths – as explained above
  - private investment
  - government consumption
  - government borrowing, domestic and foreign
  - others

Closure Rules for Project Scenarios – in app-sim-mdg.xls

- In the "achieving MDGs" scenarios, the government consumption of one or more services is endogenously adjusted; requires financing source trough govclossim.
- To achieve an MDG, government consumption of the relevant service should be made endogenous
  - for MDG 4/5, govspndrulesim ('c-health',t1) = 5
  - govspndrulesim = 5; no restrictions in
    - growth and share GDP or absorption
    - evolution of quality of education (c-edu/enrollment)

Closure Rules for Project Scenarios – in app-sim-mdg.xls – cont.

- The following alternatives should be considered to balance the government budget:
  - 1 or 2 (direct and indirect taxes or only direct taxes) – be careful with the subsidies!
  - 4 (foreign grants) (?) – transfers from row to government
  - 5 (domestic debt – causes interest payments)
  - 6 (foreign debt – causes interest payments)

Closure Rules for Project Scenarios – in app-sim-mdg.xls – cont.

- IMPORTANT; it is possible to combine different sources of financing to achieve the MDGs
  - one variable to clear the government budget
  - other(s) variable(s) with exogenous evolution but different from the BaU
  - for example, govclossim=1 + govrecgdpsim to increase the ratio fborgov/GDP – requires govrecrulesim ('fborgov') = 2 (see below)

Simulations File

- definition of simulation names
  - sim + other-sim-sets
- definition of closure rules; for each simulation (same names as base0 + sim)
  - govclossim + govspndrulesim + govrecrulesim + siclossim + rowclossim
  - by default, same values as BaU are used
  - (!) use siclossim=1 in MDG simulations
- definition of MDGs achieving scenarios
  - mdgtargetdata – introduce sim + mdg + trgyr

Simulations File – cont.

- MAMS can be used to run other (non-MDG) simulations
  - pwesim + pwmsim
  - govspnd(grw/gdp/abs)sim
    - simulate an increase in government spending in infrastructure
  - govrec(grw/gdp/abs)sim
  - ngovpay(grw/gdp/abs)sim
  - alphavagsim

An Example: Defining an MDG Simulation

- In **govclossim** select the financing mechanism – overwrite selection for BaU.
- In **govspndrulesim** select 5 for the relevant government service – c-wtsn for MDG 7ab
  - government consumption selected service becomes endogenous
- In **siclossim** select 1 for all MDG simulations – allows to capture crowding out of private investment.
- In **mdgtargetdata** introduce simulation and relevant MDG element.

Example Combining Sources of Financing

- show scenario **mdg2-fb-tax** in pret-sim-mdg.xls – folder MAMS-in-GAMS-demo-2010-05-08b
  - use govrecgdpsim in Excel simulations file