MAMS Dataset: An Overview

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Outline

- Introduction
  - MAMS as a Standard Model
- General and MDG Datasets for Building a Baseline
  - highlighting key data

MAMS as a Standard Model

- MAMS is written as a “standard” (flexible structural) model.
- Separation between model code and database
  - a generic set of model files in GAMS
  - application-specific files in Excel for data and simulations
  - anything that is not specific to a database should appear in the model code
    - if you want to correct an error, you only need to do it once

MAMS as a Standard Model – cont.

- Model code is written to capture what is found in each database
  - flexible (dis)aggregation
  - alternatives specified for selected assumptions
    - macro closures
    - presence/absence of unemployment
    - presence/absence of regulated sectors
    - other features

MAMS File Structure

- MAMS data files
  - general data (SAM, standard CGE elasticities, base-year unemployment, other)
  - MDG data
  - simulations data – see ISIM-MAMS presentation
- MAMS GAMS files
  - calibration and base run
  - simulations
  - reports

Two Key Excel Files for Base Run

- For core version
  - **app-general-data.xls**
  - allows to solve MAMS without the MDG module
- For MDG version
  - **app-mdg-data.xls**
  - enables computation of MDG indicators and targets

SAM, Growth, and Rules/Policies

- SAM -- provides the bulk of the data used to define base-year parameter values
  - e.g., base year effective tax rates
- Miscellaneous data essentially easy to compile based on observed trends – national accounts and government accounts
  - economy-wide growth rate
  - government spending and receipts
  - non-government payments
  - growth for world prices – exports and imports
  - growth in debt

Example: Government Spending Projection (GDPshr) (baseyr=2007)

ITEM	2007	2008	2009	2010	2011	2012	2013	2014	2015
c-edup	1.386	1.439	1.288	1.288	1.288	1.288	1.288	1.288	1.288
c-edus	0.548	0.530	0.509	0.509	0.509	0.509	0.509	0.509	0.509
c-edut	0.383	0.424	0.364	0.364	0.364	0.364	0.364	0.364	0.364
c-hltg	1.099	1.232	1.154	1.154	1.154	1.154	1.154	1.154	1.154
c-wtsn	0.022	0.064	0.071	0.071	0.071	0.071	0.071	0.071	0.071

Population

- Population data – also generally easy to compile; from UN population statistics
  - total population
  - population for each hhd in SAM (base year only)
  - population in age cohort that enters grade 1 of primary school
  - population in the age cohort that is in the first year of labor-force age, often 15 years
  - population in labor force age (often 15-64)

Population -- Only for MDG Version

- In the primary school age cohorts
- In the secondary school age cohorts
- In the tertiary school age cohorts
- In the age group that is in the last year of primary school
- In the age group that is in the last year of secondary school
- In the age group that is in the last year of tertiary school

Productive Factors

- Factor data – also generally easy to compile, especially if hhd survey data is available
  - base-year employment by labor category and activity
  - labor force participation rate
  - unemployment rate by labor category
  - labor market related elasticities -- more difficult to compile
    - elasticity of reservation wage by labor category w.r.t. unemployment rate (i.e., wage curve)

Private Capital Stocks

- In a dynamic model, private and public capital stocks need to be estimated.
- For private, computed based on net profit rate, depreciation rate, and capital income.

$$qfbase_{fcap,'total'} = \frac{\sum_{a} SAM_{fcap,a}}{netprfrat_{fcap} + depr00_{fcap}}$$

Government Capital Stocks – cont.

- MAMS computes government capital stocks that usually are not in SAM
  - capital is needed for public provision of MDG commodities – in fact, government invest in MDG commodities (edu, health, wtsn)
- Typically, the government does not receive capital income from the provision of public (free) primary education.
- On the other hand, the government can receive capital income from the provision of private goods; for example, oil.

Government Capital Stocks

- For government, initial capital stocks are computed based on the relationship between expansion of government consumption (service provision) and past investments
  - historical government investment
  - capital depreciation rates
  - government consumption
  - (in all cases, by government activity)

Elasticities

- The “usual” CGE elasticities are
  - CES substitution between primary factors of production, by activities
  - CES substitution between imports and domestic goods, by commodity
  - CET transformation between exports and domestic sales, by commodity
  - expenditure elasticity of market demand by commodity and household – LES

Example: Trade-Related Elasticities

COMMODITY	sigmaq	sigmat
c-agr	0.900	2.250
c-ind	1.200	2.250
c-ser	0.900	2.250
c-trnsp	0.900	2.250
c-ogov	0.900	2.250

MDG and Education Indicators

- Level of key MDG indicators in 1990, base-year and policy goal for 2015
  - MDG 4, 5, 7w, and 7s
- In education, each educational level requires rates for promotion, repetition, dropout, and entry (among graduates from the previous cycle, or, in the case of primary education, out of the relevant age cohort).
- For education, base-year enrollment by cycle and grade and additional population data (identifying age groups relevant to education) are also required.

Example: Rates for Student Behavior (Outcome) by Cycle and Year

OUTCOME	CYCLE	BASE-YR
neting1	c-edup	0.723
prom	c-edup	0.802
prom	c-edus	0.794
prom	c-edut	0.794
grdcont	c-edus	0.523
grdcont	c-edut	0.596
grdexit	c-edus	0.477
grdexit	c-edut	0.404
rep	c-edup	0.089
rep	c-edus	0.062
rep	c-edut	0.165
dropout	c-edup	0.109
dropout	c-edus	0.144
dropout	c-edut	0.041

MDG "Production" and Education – cont.

- To model how these outcomes change over time, two additional pieces of information are needed
  - base-year elasticities with respect to a set of explanatory variables
    - linking outcomes to determinants
  - vector showing a non-base point – a combination of values for the outcome and the explanatory variables; this point shows
    - business-as-usual projection, or
    - projection derived from a strategy for achieving an MDG or education target
- This information is used to calibrate the functions so that they replicate base-year outcomes and elasticities, reach each MDG under specified conditions, and have the upper or lower limits that are specified exogenously.

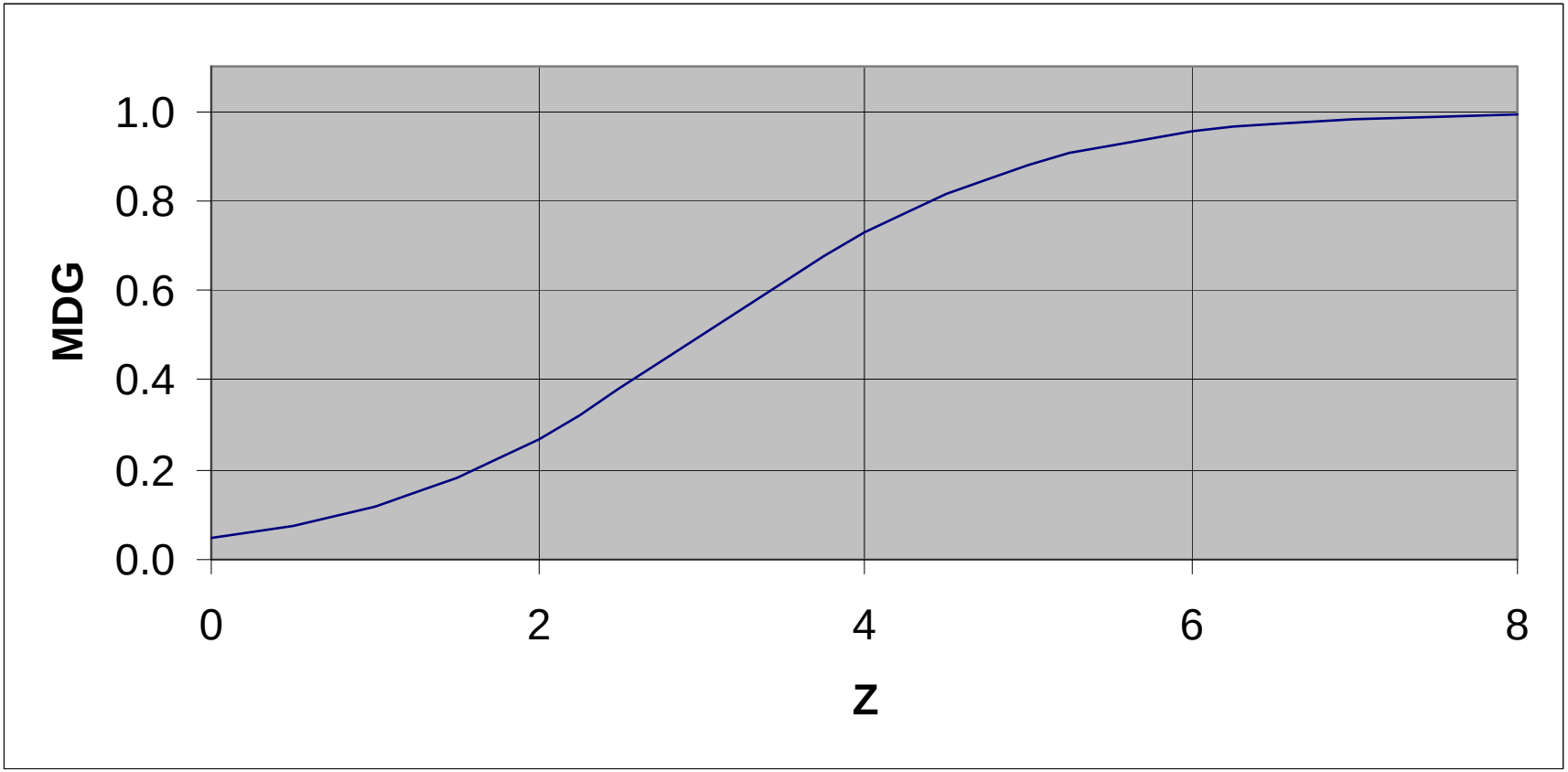
MDG Module Elasticities and Determinants

MDG		Service Delivery	Per-Capita HHD Cons	Wage Incentives	Public Infra	Other MDGs
1	Poverty		X			
2	Primary Education	X	X	X	X	4
4	Under-5 Mortality	X	X		X	7w, 7s
5	Maternal Mortality	X	X		X	7w, 7s
7w	Access to Safe Water	X	X		X	
7s	Access to Basic Sanitation	X	X		X	

MDG "Production" and Education

- The analysis uses a logistic function that permits:
  - imposition of limits (maximum or minimum) given by logic or country experiences
  - replication of base-year values and elasticities
  - calibration of a reference time path for achieving MDGs
  - diminishing marginal returns to the inputs
- Two-level function:
  - constant-elasticity function at the bottom: $Z = f(X)$
  - logistic function at the top: $MDG = g(Z)$

Logistic Function



Example: Calibration Points for Logistic Functions

		c-hltg	c-wtsn	edu-qual	f-caproads	qhpc	mdg4	mdg7w	mdg7s	wage-prem	goal
mdg4	dummy	2.919			1.744	1.257		1.286	1.744		53.333
mdg5	dummy	7.298			1.744	1.257		1.286	1.744		131.000
mdg7w	dummy		2.242		1.744	1.347					72.000
mdg7s	dummy		2.242		1.744	1.347					71.500
neting1	c-edup			1.500	1.435		0.768			1.000	0.995
prom	c-edup			2.129	1.435		0.768			1.000	0.995
prom	c-edus			2.000	1.744		0.381			1.000	0.897
prom	c-edut			2.000	1.744		0.381			1.000	0.897
grdcont	c-edus			2.000	1.744		0.381			1.000	0.643
grdcont	c-edut			2.000	1.744		0.381			1.000	0.697

Example: MDG Elasticities

		c-hltg	c-wtsn	edu-qual	f-caproads	qhpc	mdg4	mdg7w	mdg7s	wage-prem
mdg4	dummy	-0.563			-0.011	-0.110		-0.086	-0.010	
mdg5	dummy	-0.563			-0.011	-0.134		-0.086	-0.010	
mdg7w	dummy		0.273		0.008	0.030		0.000		
mdg7s	dummy		0.273		0.008	0.027				
neting1	c-edup			0.159	0.013		-0.031			0.001
prom	c-edup			0.112	0.004		-0.016			0.001
prom	c-edus			0.490	0.020		-0.016			0.084
prom	c-edut			0.394	0.072		-0.647			0.090
grdcont	c-edus			0.394	0.008		-0.016			0.084
grdcont	c-edut			0.394	0.072		-0.647			0.090