

Elasticities for the calibration of the MAMS model

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Presentation for the Inception & Training Workshop of the
UNDP/UN-DESA/World Bank/LAS Project “Assessing
Development Strategies to Achieve the MDGs in the Arab Region”,
League of Arab States, Cairo, 2-5 April, 2007

MAMS elasticities: where can they be found?

- Ideal case scenario
 - Data permit to estimate country-specific elasticities
 - Preferably sector-specific when required and not just national estimates
 - Ideally own estimates can be compared with elasticities available in other studies for the country
- Borrow elasticities that have been estimated (and not merely used) in other studies
 - Option that is far from ideal and essentially induced by data limitations.
 - Avoid borrowing elasticities from another country's model
- Worse case scenario
 - Elasticities guessed or computed using some basic operations provided that the required data were available.
- Educated guesses
 - Careful thinking about the nature of the elasticity and the reality of the country whose economy is being modeled.
 - That is, should one expect a high or low responsiveness to changes in demand, income or relative prices?

Elasticities in the MAMS model

- MAMS specific ones (i.e. MDG elasticities)
 - Determinants for MDG achievement
- Standard-CGE-model specific elasticities
 - Substitution
 - Transformation
 - Expenditure (consumption)
- Other elasticities
 - Elasticity of savings rate with respect to per-capita income
 - Elasticity of minimum wage for labor with respect to determinants
 - Elasticity of TFP for activity a with respect to GDP trade share

Standard-CGE-model specific elasticities

- Since MAMS fundamentally draws from a standard CGE model, its functioning and solution feasibility will heavily depend upon standard-CGE-model specific elasticities.
- Play a crucial role in the functioning of the model and consequently affect the solution and the results of policy simulations.
- *Armington* - elasticity of substitution between imports & domestic output in domestic demand
 - The consumer faces the cost minimization problem of finding the optimal consumption mix between domestically produced goods and imported goods.

- CES production technology
 - Elasticity of substitution between aggregate factor & aggregate intermediate
 - Producer minimizes costs by finding the optimal quantity mix between value-added and intermediate consumption
 - Elasticity of substitution between factors
 - Producer minimizes costs by finding the optimal quantity mix factors
- Constant elasticity of transformation (CET)
 - Elasticity of transformation for domestic marketed output between exports and domestic supplies
 - Producer maximizes profits by finding the optimal combined use of domestic output for domestic market sales and exports
- Linear Expenditure System
 - Expenditure elasticity of market demand by commodity and household in linear expenditure system

- Relative prices affect the optimal ratio for the mix of all the quantities involved in the producer and the consumer problem, given the functions constraints.
- The degree of response of quantity ratios to relative price shifts depends on the elasticity values

Estimating standard-CGE-model specific elasticities using time series

- CES: derive a demand equation system as a first order approximation of a CES function
 - $\log q = a + b \log p + c t$ (+ dummies)
 - q : quantity ratio of the CES function
 - p : relative price index that measures the ratio of the implicit price deflators of quantities in q
 - t : time trend term that takes into account changes in tastes over time
 - dummies for structural or important policy changes
 - $\text{elas} = b + 1$
 - a = captures combined effect of elas , the function shift parameter, the function share parameter and relative prices

- CET: export quantity shares of output level respond to relative price shifts in the model.
- This relationship can be imposed *a priori* using a restricted form of a complete export supply function.
 - $\log(q_e/q_x) = a \log \lambda_0 - b \log(p_d/p_e) + c t + \text{dummies}$
 - q_e : quantity of exports
 - q_d : quantity of output for domestic market
 - q_x : quantity of total output
 - p_e : price of q_e
 - p_d : price of q_d
 - t : time trend term captures the exogenous change in time
 - dummies for structural or important policy changes
 - b is the elasticity of transformation.
 - a captures the effect of the function share parameter over time

- LES: income elasticities of demand
- Logarithmic commodity-wise expenditure demand function using OLS
 - $\log C_{ch} = b_0 + b_1 \log Y_h + e$
 - C_{ch} : total consumption of commodity c by household h
 - Y_h : total income of household type h
 - b_1 : Engel elasticity
 - input to calculate the marginal budget shares of consumption spending in the LES

Data requirements

■ Armington

■ Relative price variable builds from:

- Import price index
- Producer price index

■ Quantity ratio variable builds from:

- Import value (including tariff revenue) in current and constant prices
- Total demand (supply) or gross output value (value added + intermediate consumption) in current and constant prices

- CES –production function
 - Employment data (number of occupied workers)
 - GDP at factor cost (current and constant prices) as a proxy of value added
 - Gross output value (value added + intermediate consumption)
 - Implicit price in GDP at factor cost
 - Labor income
- CET
 - Export price index
 - Wholesale price index
 - Export value (constant and current)
 - Total demand (supply) or gross output value (value added + intermediate consumption) in current and constant prices
- LES: household survey data

What if having to guess or borrow?

- Guessing is the last resort option! Make sure these are educated guesses!
- Use of elasticity values from other models should also be subject to serious scrutiny: are these realistic in order of magnitude for my country?
 - Imagine whether corresponding sectors and economic agents of your country would be at a similar development stage, income level and/or facing similar market conditions and constraints.
- The more guesstimates or borrowed parameters have been used, the more important it will become to perform some sensitivity analysis with the key elasticities
- That is, changing elasticity values - one by one if necessary - to check whether:
 - (a) there is still a feasible model solution after altering the elasticity
 - (b) whether there is a major change in the overall outcome.
- Such sensitivity analysis can be a tedious and lengthy process but is it absolutely necessary.