

UNESCWA Quantitative Tools

Economic and Social Commission for Western Asia



UNITED NATIONS

الاسكوا
ESCWA

Economic Development and Integration Division



UNESCWA quantitative tools

- UNESCWA is developing a package of quantitative tools to help member countries assessing the impacts of various macroeconomic and fiscal shocks.
- Tools are fine-tuned to respond to specific or multiple questions
- Each question has its own tool.
 - Global/regional trade Agreements: Global CGE
 - Fiscal: single country CGE model
 - Pension: OLG model
 - Forecasting: econometric model.
- User-friendly interface (accessibility, easily, non-technical)



Single country CGE model 3 steps process

1. A Social Accounting Matrix (SAM) based on the most recent input-output (I/O) table.
2. Static and dynamic versions of a Computable General Equilibrium (CGE) model for Bahrain.
3. A user-friendly Interface Application to the CGE model.

Page 3

© Copyright 2014 ESCWA. All rights reserved. No part of this presentation in all its property may be used or reproduced in any form without a written permission



Introduction: The use of economic models should help improve policymaking

They provide a theoretically consistent framework for analyzing various economic policy questions and options.

Models can provide a handle on complicated questions

Models can help give greater intellectual support for a chosen trade policy

The use of models can provide a common "language" for policy discourse or debate

They help answer "What if" types of questions

But models should complement rather than substitute for policy making

Page 4

© Copyright 2014 ESCWA. All rights reserved. No part of this presentation in all its property may be used or reproduced in any form without a written permission



Introduction: What is a CGE model?

Computable → solvable numerically

General → economy-wide (all production, consumption, investment, and trade that is covered by the national accounts)

Equilibrium → optimizing agents have found their best solutions subject to their budget constraints



What is a CGE model

Walrasian general equilibrium prevails when supply and demand are equalized across all of the interconnected markets in the economy.

CGE models are simulations that combine the abstract general equilibrium structure of Arrow and Debreu with realistic economic data to solve numerically.

CGE models are a standard tool of empirical analysis, and are widely used to analyze the aggregate welfare and distributional impacts of policies whose effects may be transmitted through multiple markets, or contain menus of different tax, subsidy, quota or transfer instruments.



CGE Standard Model Elements

- Input Output Economics & SAMs
- Behavioural Relationships/ Agents
 - Supply
 - Demand
 - Trade
- Government
- Pricing and Imperfect substitutes
- Policy – tax equivalents
- Closure
 - Accounting identities
 - Endogenous/exogenous variables
 - Macroeconomic assumptions
 - Exchange rate determination
- Solution
 - Equilibrium
 - Linearization
 - Percent change variables



CGE Standard Model Elements

- Calibration/Benchmarking
- Aggregation
 - Agents
 - Goods/Sectors
- Experiments
 - Welfare Measures
 - Projections
 - What if
- Extensions
 - Imperfect Competition, IRS
 - Product Differentiation
 - Dynamics
- Results Comparisons



Input-Output economics & SAMs

- Production= Intermediates + Value Added
- Production= Intermediate demand + Final Demand
- Macroeconomic accounting identities to capture income flows, tax incidence, trade and payments, and savings-investment balances
- => SAMs capture `circular flow' of income and expenditure



Input-Output economics & SAMs

- Whether neoclassical, structuralism, neo-Keynesian, or Monetarist, a CGE modeler must respect accounting identities and equilibrium conditions. Hence, most applied work is based on a social accounting matrix to benchmark (calibrate) a model and to represent relevant accounting identities.
- SAMs capture equilibrium conditions
- Walras' law applies



Decision Making and Institutions

- Linkages in SAMs are accounted for by modelling the decision-making process of the firm, the consumer, as well as other economic agents and institutions: production and demand structure
- Trade results from that decision-making processes and their interaction with institutions:
 - Production- Exports + Imports=Consumption



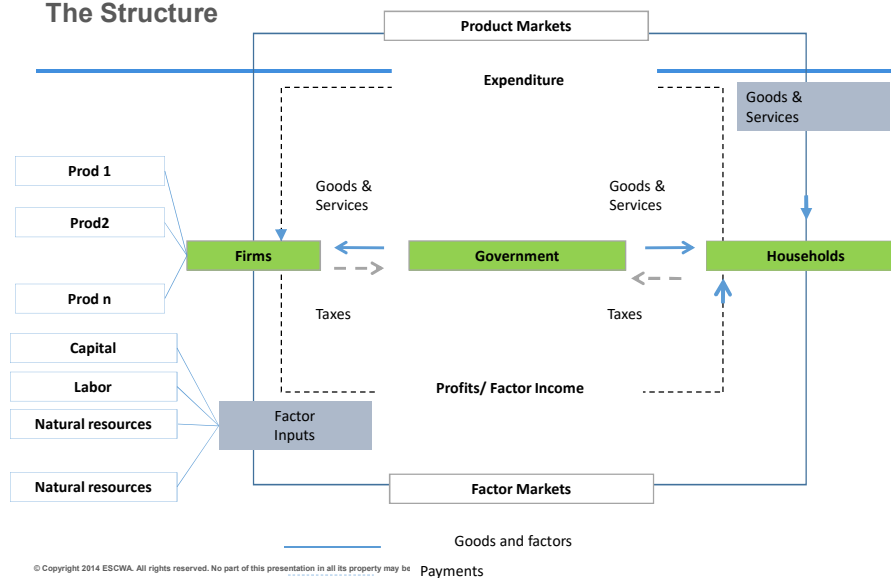
Closing the Model

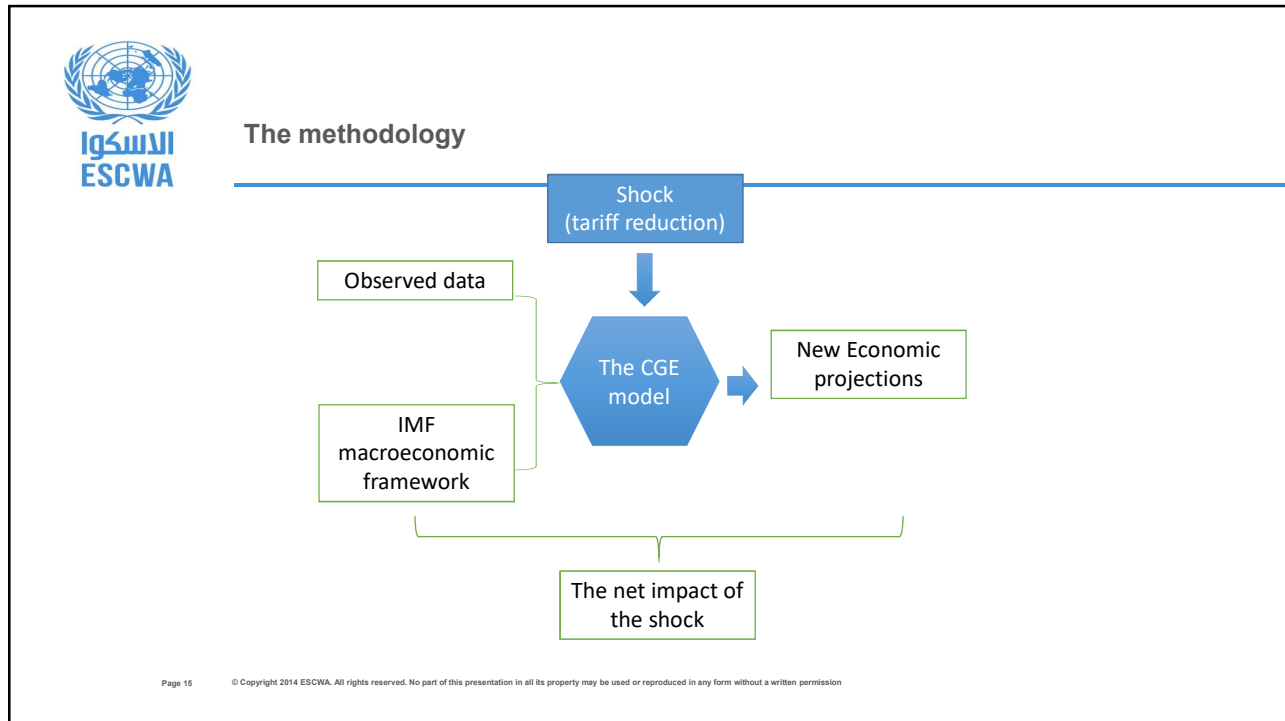
- Need to define a numéraire (walras law allows to “drop” one market)
- Assumption about the adjustment mechanism in factor and commodity markets
- Macro closure
 - Macro accounting balance (gvt expenditure and deficit; aggregate saving and investment; balance of trade and -real- exchange rate)
 - Macro adjustment mechanism (exogenously determined)

Closing the Model

- Johansen closure: investment is exogenous and consumption is the adjustment variable
- Keynesian closure: nominal wage is fixed and employment is the adjustment variable (unemployment)
- Kaldorian closure: wages could be less or equal to the marginal product of labor (exploitation of labor model)
- Classical closure: prices and wages are the adjustment variables (constant employment) and investment becomes endogenous and adjusts to total savings available
- Foreign borrowing (Robinson): trade balance is endogenous, current account and hence net capital inflows are the adjustment variable

The Structure





The Interface 1

Working Path Gams Path Help (F1) About Closure Rule (Foreign Financing)

SDG Simulator SUSTAINABLE DEVELOPMENT GOALS

Add Shock Clear Save Load Run Macro - Economic SDGs Sectoral Open Log

Parameters to Shock

Policy: Factors Productivity


From: 2016 To: 2030

Percent: 0.00 Offset: 0.00

Argument 1: All

Del	Policy	From Date	To Date	Argument 1	Preced	Offset

Page 16















The Interface 2

Working Path Gams Path Help (F1) About Closure Rule (Foreign Financing)

ADD SHOCK CLEAR SAVE LOAD **RUN** Macro-Economic Sectoral Open Log


PROTOTYPE CGE MODEL

Policy	Factors Productivity	
From	2016	To 2030
Percent	0.00	Offset 0.00
Argument 1	All	

 Real GDP	 Unemployment Rate	 CPI	 Exchange Rate
 Total Investment	 Total Exports	 Total Imports	 Total Government Expenditure
 Total Revenue	 Financing Need	 Domestic Debt	 Foreign Debt

Del	Policy	From Date	To Date	Argument 1	Preced	Offset

Page 17



Thank You

Page 18 © Copyright 2014 ESCWA. All rights reserved. No part of this presentation in all its property may be used or reproduced in any form without a written permission