

cgemod

STAGE

Designing & Analysing Policy Experiments and Simulations

Single Country CGE, 2024

© cgemod


1

1

cgemod

Outline

- Simulations and Experiments
 - ‘Backstory’ and policy scenarios
- Shocks
 - ‘The’ policy and options
 - Ranges of shocks
- Market Clearing and Closures
 - Reality vv Relevance
- Comparative Statics & Designing Experiments
 - Changing the future
- Analysing the Results
 - Theory vv data
 - Stages of analyses

Single Country CGE, 2024

© cgemod


2

2



What is the job of an analyst?

- Advice or Legitimation?
- Advice
 - Analyse options
 - Identify implications
 - Provide information
- Legitimation
 - ‘*post hoc ergo propter hoc*’ (after this, therefore because of this)
 - Argument by analogy (It worked in ****)
 - Appeal to authority (The **** says this is best)

Single Country CGE, 2024

© cgemod



3

3



Backstory

- What is the policy issue being examined?
 - Is CGE the right method?
 - What is the time horizon?
- What is the ‘economic’ environment?
 - Socio-politico-economic issues
- How do the economies operate?
 - Exchange rate regimes
 - Tax system options
 - etc.

Single Country CGE, 2024

© cgemod



4

4



Simulations and Experiments

- Simulate or experiment?
 - Simulate – evaluate a specific option
 - Experiment – analyse a range of options
- Time horizon
 - ‘Short-run vv long-run’
- Responsiveness
 - Simulate – specific elasticities
 - Experiment – a range of elasticities

Aim: Understand how a system may operate and respond to policy changes

Objective: Provide information useful to policy makers

Single Country CGE, 2024

© cgemod



5

5



The Model

Do model and/or data need changing?

Behavioural issues: change the model

Data issues: change the database

It is (arguably) bad practice to change the data to fit the model

Single Country CGE, 2024

© cgemod



6

6



Shocks

Single Country CGE, 2024

© cgemod


7

7



Policy

- Policy Objectives
 - Reduce the government’s budget deficit
 - Improve the efficiency of the tax system
- Policy proposal
 - the government plans to replace indirect commodity taxes with a single rate VAT system

Tinbergen ‘principle’!!

Single Country CGE, 2024

© cgemod


8

8



Shocks: Simulation

- Shocks
 - Set all indirect commodity tax rates to ZERO
 - Identify **the** VAT rate that the government should impose
- Report
 - Identify the **aggregate** welfare gains associated with a '**more efficient**' tax instrument

Single Country CGE, 2024

© cgemod



9

9



Shocks: Experiment

- Shocks
 - Remove each indirect commodity tax in turn
 - Assists with identifying less efficient tax instruments
 - Analyse the implications of differential VAT rates
 - Recognises differential patterns of expenditure by RHGs
 - Analyse a range of alternative fiscal policy options, e.g., direct taxes, reductions in government expenditure, etc.,
 - Checks the relative efficiency of VAT and other taxes
- Report
 - Identify the **household** welfare effects associated with different combinations of tax instruments
 - Identify implications for **other dimensions** of the economy, e.g., competitiveness of activities

Single Country CGE, 2024

© cgemod



10

10



Market Clearing and Macroeconomic Closure

Single Country CGE, 2024

© cgemod


11

11



Principles

- Different applications and uses/users require different closure settings
 - Reflect reality, e.g.,
 - Exchange rate regime
 - Unemployment/surplus labour
 - Analyse causal forces
 - Efficiency of different tax instruments
 - Identification of endowment effects
- Avoid distorting the results
 - Consistency with the research method

Single Country CGE, 2024

© cgemod


12

12



cgemod

Tax Replacement Instruments

- Tax replacement
 - Replacement of tax revenue lost by reducing the rates of one tax instrument by increasing the rates of one or more alternative tax instruments
 - Fix government’s internal balance
- Tax efficiency
 - Different instruments have differential impacts upon ‘efficiency’
 - Some taxes enter FOCs (explicit and implicit) and therefore directly influence prices
 - GST – all activities and institutions
 - VAT – only RHG
 - Some taxes are more like ‘lumpsum’ taxes – income taxes, VAT

Single Country CGE, 2024

© cgemod



13

13

cgemod

Comparative Statics

Single Country CGE, 2024

© cgemod



14

14



Comparative Static Models

- Comparative statics and ‘*manna from heaven*’
 - Avoid
 - Free goods from the future – unrequited debts
 - Changing the future
- Comparative Statics and Deficits
 - Reduce tax rates with flexible internal balance
 - Welfare enhancing because government deficit does not enter the welfare/absorption metrics
 - **debt passed to future generations**
- Comparative Statics and the Future
 - Reduce savings rates
 - Welfare enhancing because households can consume more **NOW** at the expense of reductions in consumption later
 - **capital stock in the future declines**

Single Country CGE, 2024

© cgemod



15

15



‘Standard’ Settings: Comparative Static

- Real Internal balance – fixed
- Real External balance – fixed
- Investment volumes – fixed
- Tax rates – fixed or flexible
- Factor supplies – fixed or flexible

1. All adjustments realised in household consumption expenditures/welfare
2. Alternative – all adjustments realised in domestic absorption

Single Country CGE, 2024

© cgemod



16

16



Changes to the Future

- Changes in internal and/or external balances
 - change debts owed to the future or RoW
- **BUT** future and RoW are **exogenous**
- Need to distinguish between impact of other shocks and changes to the future
 - closure swaps – other shocks with/without changes to the future

Increases in the deficits on internal and/or external balances will by definition increase current welfare

Single Country CGE, 2024

© cgemod



17

17



Changes in Technology

- Improving technology means *ceteris paribus* that welfare will increase – ‘*manna from heaven*’
 - **No** behavioural relationship to explain changes in technology
- Improvements in technology are costly, e.g., R&D, education, training, capital investment, etc.
 - Proxy: **Add** behavioural relationships that link technology parameters to current expenditures, e.g., on R&D

Single Country CGE, 2024

© cgemod



18

18



Analysing Results

Single Country CGE, 2024

© cgemod


19

19



ANALYSES ≠ TABLES OF SUMMARY RESULTS

Single Country CGE, 2024

© cgemod


20

20



cgemod

Analyses

- Results derive from
 - Model – behaviours
 - Data – shares, elasticities, etc.
 - Shocks
- Know your
 - Model
 - Data
 - Shocks

Follow the behaviours and prices in the model

Single Country CGE, 2024

© cgemod

21

cgemod

Prices & Quantities

Single Country CGE, 2024

© cgemod

22



Stages

1. Check the shock
2. Check the macroeconomic closure conditions
3. Check the market clearing conditions
4. Check first round changes match expectations
 1. Are prices change as expected?
 2. Do quantity changes ‘match’ price changes?
5. Review summary statistics
6. Explore the impacts expected to follow from the policy changes

Single Country CGE, 2024

© cgemod

23

23





Designing & Analysing Policy Experiments and Simulations

The End

Single Country CGE, 2024

© cgemod

24

24