

# CGE modelling and policy analysis

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## Government Economics Network

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# Overview

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- ▶ Demystify CGE modelling
- ▶ Debunk a couple of myths
- ▶ Where is CGE is prominent and why?

# Just another analytical technique

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- ▶ A CGE model is just another model
  - Approximation of reality
  - Adds discipline
  
- ▶ Standard building blocks
  - Relationships/Frameworks
  - Data
  - Computing power

# Relationships

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- ▶ Macro identities
  - GDP  $Y = C + I + G + X - M$
  - Savings and investment  $S = I + \Delta NFL$
- ▶ Sector relationships
  - Production function (use of intermediates, K, L, Land)
  - Capital accumulation  $K_t = K_{t-1} + I - \text{Dep}$
  - Armington assumption on imports (imperfect substitutes)
- ▶ General (Walrasian) equilibrium
  - All markets clear

# Data

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- ▶ Statistics New Zealand input-output tables
  - How goods and services flow through the economy
- ▶ Macroeconomic data
  - GDP, foreign liabilities etc.
- ▶ Other sector specifics as available
  - Employment, exports etc.
- ▶ Elasticities
  - Econometric analysis/assumption

# Myth #1: CGE analysis can't report welfare

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- ▶ User not model error!
- ▶ CGE analysis can report:
  - **GDP**: value of production in economy
  - **GNDI**: total income NZ residents receive (domestic income + net inflows)
  - **Consumption**: how much we can buy
  - **Equivalent and compensating variation**: consumer welfare metrics

## Myth #2: CGE labour market is prescriptive

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- ▶ It can be, but doesn't have to be!
- ▶ A CGE labour market model can assume:
  - Excess capacity (**unemployment**) to no excess capacity (**full employment**)
  - **Dynamic labour market** e.g. wages are initially sticky but respond to disequilibrium in labour supply and demand over time

# Labour market example

- ▶ RWC increases demand for hospitality sector by \$10 million in a one-off 2011 shock
- ▶ Results:

	Excess capacity	No excess capacity	Temporary sticky-wages
Consumption	\$26.2	\$7.4	\$10.7
GDP	\$23.4	\$2.4	\$6.9

- ▶ Huge differences!
- ▶ Model can handle any assumptions – up to us as policy developers to select most plausible



# Where is CGE analysis prominent?

## ► Trade

- GTAP trade analyses from 1993 (Uruguay) to today (Doha)
- Research question: impact of trade liberalisation on sectors, countries and global welfare



## ► Environmental policy

- Most common tool for climate change policies
- Research question: impact of GHG policies on sectors, countries and global welfare (incl. the environment)



# Why is CGE analysis prominent?

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- ▶ Consider all **markets/sectors** within an economy
  - Energy use central to all sectors
- ▶ Consider **prices** within markets
  - Taxation, permits applied at detailed level
- ▶ Consider **industry structure**
  - Industry-specific investment, tech improvement
- ▶ Provides **magnitudes: winners and losers**
  - Empirically supported, theoretically grounded
- ▶ Can be **tailored** to research question
  - Link GHGs to sectors/commodities

# Indirect impacts: an example

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- ▶ **Upstream and downstream impacts**
  - Increased dairy production; use of concrete
- ▶ **Resource competition** for labour, land, capital
  - Demand for engineers and construction workers
- ▶ **Price changes** for goods & services, resources
  - Milk solids, concrete, wages
- ▶ **Taxation, government spending and debt**
  - More government spending? Increase in debt?
- ▶ **Macroeconomic impacts**
  - Exchange rate, terms of trade
- ▶ **Environmental impacts?**

# Where else is CGE analysis used?



# Take home points for policy analysts

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- ▶ CGE is just another analytical tool
  - Approximates reality; adds discipline to our thinking
- ▶ CGE is widely used for policy analyses where:
  - many markets, prices, indirect impacts and/or industry structure matter
- ▶ No restrictions on what you can model...
  - ...but you need to tailor your analysis!
- ▶ Can help to quantify trade-offs in your policy decisions