

National CGE Workshop 2026

Abstract and Timetable Booklet

Friday 23 October 2026
2 Lonsdale Street
Melbourne, Australia

The Centre of Policy Studies (CoPS), incorporating the IMPACT project, is a research centre at Victoria University devoted to quantitative analysis of issues relevant to economic policy.

Conference web page: <https://www.vu.edu.au/about-vu/news-events/events/national-cge-modelling-workshop-2026>

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Organising Committee Welcome

Welcome to the 2026 National CGE Modelling Workshop.

Australia has played a distinctive role in the development and application of computable general equilibrium (CGE) modelling. For more than four decades, Australian researchers have been at the forefront of advancing CGE methods and applying them to practical policy questions, spanning taxation, trade, energy, climate policy, labour markets, transport, education, regional development and public finance. Through this work, CGE modelling has become an important part of the evidence base supporting economic policy formulation in Australia and across our region.

The Centre of Policy Studies (CoPS) has been privileged to contribute to this tradition. Since its establishment, CoPS and its researchers have played a leading role in the development of models, databases and software that are now used by universities, government agencies, international organisations and consulting firms around the world. Equally important has been the Centre's commitment to training successive generations of modellers, many of whom continue to contribute to policy analysis and research throughout Australia and internationally. The continuing strength of the CGE community is a testament to those foundations and to the many researchers and practitioners who have built upon them.

The National CGE Modelling Workshop has become an important part of that tradition. The workshop provides a forum for researchers, policy analysts and practitioners to exchange ideas, showcase new modelling developments, discuss emerging policy challenges and strengthen professional networks. A defining feature of the Australian CGE community has always been its willingness to share knowledge across institutional boundaries, and the workshop continues that collaborative spirit.

This year's program highlights both the breadth and vitality of contemporary CGE research. Presentations span taxation and fiscal sustainability, international trade, energy and environmental policy, transport, demographic change, higher education, Indigenous economic development, and advances in modelling frameworks and databases. Together, they demonstrate the continuing evolution of CGE modelling and its relevance to some of the most significant policy issues facing Australia and the world.

On behalf of the Centre of Policy Studies and Victoria University, we would like to thank all presenters, chairs and attendees for contributing to the workshop. We are particularly pleased to welcome participants from universities, government agencies and industry across Australia and abroad. We hope that the discussions throughout the day prove informative, stimulating and productive, and that they foster new collaborations and ideas for future research.

We wish you an enjoyable and rewarding workshop.

*Janine Dixon, Michael Jerie, Locky Xianglong Liu, and Jason Nassios
Organising Committee, 2026 National CGE Workshop.*

Timetable

Time	Lonsdale Room	
9:00	Welcome Prof. Janine Dixon (CoPS)	
	Session 1: Keynote address (Lonsdale Room) Chair: Prof. Glyn Wittwer (CoPS)	
9:15	Prof. Tom Kompas (University of Melbourne) <i>Economic Damages from Climate Change and the Challenge of Meeting Emissions Reduction Targets in a Global Energy and Trade Model</i>	
10:15	Morning tea (20 mins)	
	PARALLEL SESSIONS - BLOCK A (10:35AM – 12:15PM)	
	Session 2A (Lonsdale Room) Chair: Diego Machillanda (PC)	Session 2B (Elizabeth Room) Chair: Sam Marginson (CoPS)
	Tax, fiscal sustainability and domestic policy	Global trade, growth and the world economy
10:35	Phang (NSW Treasury) - Tax efficiency in Australia	Giesecke (CoPS) - Extreme trade disruption
11:00	Gunaratna Nugawela & Churchill (Tas DTF) - Fiscal repair	Gretton (ANU) - Brexit revisited, ex-post
11:25	Riggs (WA DTF) - AI and the WA economy	Powell (Deloitte) - Circular economy and waste
11:50	Liu (CoPS) - Road user charges	Zhou (ANU) - China's current account surplus
12:15	Lunch (1 hour)	
	PARALLEL SESSIONS - BLOCK B (1:15PM – 2:55PM)	
	Session 3A (Lonsdale Room) Chair: Lynn Riggs (WA DTF)	Session 3B (Elizabeth Room) Chair: Paul Gretton (ANU)
	Energy, emissions, resources and the environment	Models, databases and new applications
13:15	Bui (ANU) - Viet Nam's Revised PDP8	Tran (CoPS) - University Accord, VUEF
13:40	Marginson (CoPS) - EU gas emissions-intensity targets	Cantele (Unimelb) - Teems / teemsphere platform
14:05	Jakeman (DeltaPearl) - PNG extractives in PapuaCGE	Lennox (CoPS) - Nominal rigidity, frictional labour
14:30	Yusuf (CoPS) - Indonesia's nickel export ban	Jeffery (Deloitte) - Indigenous business
14:55	Afternoon tea (20 mins)	
	Session 4: Advances in CGE modelling and Policy Analysis (Lonsdale Room) Chair: Prof. Janine Dixon (CoPS)	
15:15	Wittwer (CoPS) - GlobeTERM sub-national detail	
15:40	Murphy (ANU) - CGETAX, efficiency and equity	
16:05	Peng (CoPS) - China's demographic headwinds	
16:30	Dixon (CoPS) - GTAP-Money	
16:55	Closing A/Prof. Jason Nassios (CoPS)	
17:00	Workshop ends	
17:45	Workshop Dinner The Imperial Hotel, 1st floor (elevator access available) 2-8 Bourke St, Melbourne VIC 3000	

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Session 1: Keynote Address

About the Speaker

We are pleased to welcome Professor Tom Kompas as the keynote speaker for the 2026 National CGE Workshop. Professor Kompas is one of Australia's leading environmental and resource economists and has made internationally recognised contributions to the development and application of computable general equilibrium (CGE) models to major policy challenges. His work has advanced understanding of the economic impacts of climate change, environmental policy, trade, biosecurity, food security, and natural resource management, helping to inform public policy in Australia and around the world.

Professor Kompas has developed innovative high-dimensional dynamic CGE models that capture the long-run effects of economic, environmental, and policy change across countries and industries. A Fellow of the Academy of the Social Sciences in Australia, former Director of the Crawford School of Public Policy at The Australian National University, and recipient of the Australian Museum Eureka Prize, he is widely recognised for bringing cutting-edge economic modelling to complex public policy questions.

Economic Damages from Climate Change and the Challenge of Meeting Emissions Reduction Targets in a Global Energy and Trade Model

Tom Kompas

University of Melbourne

Abstract

Along with estimating the heat stress and sea level rise damages from global warming, we construct a large-dimensional Global Trade Analysis Project (GTAP) economic model for energy and international trade to calculate the needed changes in the energy mix and carbon emissions to meet a minimum Paris Agreement target and path (PTP) of less than 2°C warming. From 2026 to 2050, model results show carbon emissions must decrease by at least 6.0% globally, per year, on average, and coal consumption must fall continuously, complemented by significant increases in renewable energy. Overall, we also find that annual global carbon emissions must decline by almost 53% in 2035 and 80% in 2050 to meet the PTP path by 2100. Coal consumption must fall between 85–99% by 2050 among the key emitters (China, the USA, and India), complemented by a continuous transition to renewables. For Net-Zero Emissions Targets (NZET), carbon sequestration from reforestation and land-use change is also essential. Model results indicate that a global NZET outcome, even with assumed carbon sequestration, no accelerated global warming relative to current trends, and highly unlikely assumptions on reductions in future carbon emissions, does not occur before 2058, at the earliest. The potential benefit of achieving NZET, given only very limited heat-stress damage functions, is at least 10 times greater than the estimated damages from global warming.

Session 2A: Tax, Fiscal Sustainability and Domestic Policy

NSW Treasury Tax Efficiency Technical Paper

Florence Stoker, John Dundas, **Angela Phang**, Guilherme Bandeira, Adam Sinclair, Nicholas Young and Jane Cheung

NSW Treasury

Abstract

In this paper, NSW Treasury examines the principle of tax efficiency within the state tax system and the role of an efficient tax system in supporting long term fiscal sustainability.

Using computable general equilibrium (CGE) modelling from the Centre of Policy Studies (CoPS), the paper examines three interrelated research questions. First, what are the marginal economic costs of NSW taxes? Second, what is the aggregate efficiency of the current NSW tax system, and how does this change as governments seek to raise higher levels of revenue? Finally, what insights do these results provide for future tax reform aimed at improving efficiency while meeting long term revenue needs?

Using a baseline which incorporates NSW emission targets and long-term macro and revenue forecasts, the paper estimates the current marginal excess burden (MEB) of the NSW tax system at 22.5 cents per dollar of tax revenue raised. This provides policymakers with an evidence base and a practical benchmark for weighing the economic costs of revenue-raising against the net benefits of new spending.

The paper estimates that the MEB of the NSW tax system increases non-linearly at higher tax rates. If NSW tax revenue increased by around 3 percentage points of gross state product (consistent with the long-run revenue and expenditure gap estimated in the 2021 NSW Intergenerational Report), the MEB of the NSW tax system would more than double to 47.9 cents per dollar raised.

The paper also quantifies the economic benefits of replacing the NSW Emergency Services Levy with a broad-based land tax, a reform currently being considered in NSW.

Balancing Fiscal Sustainability and Economic Performance: A CGE Analysis of Fiscal Repair Scenarios for Tasmania

Tharindi Gunaratna Nugawela, Finn Churchill

Department of Treasury and Finance Tasmania

Abstract

In February 2026, the Tasmanian Department of Treasury and Finance released the Fiscal Sustainability Report 2026. As part of this Report, the VURMTAX CGE model was used to

examine alternative fiscal repair pathways for Tasmania, exploring the tradeoffs between fiscal sustainability and economic performance under different budget repair strategies. Nine fiscal repair scenarios were developed and the VURMTAX model was used to trace the economy wide effects of each pathway. By comparing the fiscal repair scenarios within a consistent modelling framework, the study provided a well structured assessment of the macroeconomic implications of alternative fiscal adjustment strategies. A presentation will be given that outlines the process that was undertaken and the input into the final Report.

AI and the Western Australian Economy

Sineth Kannangara, Peter Martin, **Lynn Riggs**, Andrew Robins, Qiang Ye

Department of Treasury and Finance WA

Abstract

The artificial intelligence (AI) literature is extensive, and the scope of it is broad. Much of the literature – regardless of the topic – talks about AI as the next General Purpose Technology (GPT) and, as such, AI is largely expected to boost aggregate productivity (Filippucci et al., 2025). However, there are a broad range of estimates in terms of how big this boost will be, how long the effects will last, or how different economies will be affected. Hence, our research examines the potential effects on the Western Australian economy.

To do so, our research uses estimates of industry-level productivity gains from the literature in the VURMTAX-G model to examine how AI may affect various aspects of the Western Australian economy. Given the uncertainty around the type of productivity shock and the rate of AI adoption, we examine the results of different scenarios varying the type of productivity (i.e., primary-factor-saving, labour-saving, and capital-saving) and varying the rate of AI adoption (low, medium, and high). Anecdotal evidence in the media also suggests the potential for a cost-neutral shift by producers towards more capital and less labour; hence, we include scenarios to examine the potential effects of this type of preference shift on our economic outcome variables.

Reforming Road Pricing: A General Equilibrium Approach to Modelling Road User Charges

Locky Xianglong Liu, Jason Nassios

Centre of Policy Studies, Victoria University

Abstract

Fuel excise has long provided an indirect means of charging conventional vehicles for road use while generating substantial government revenue. However, the growing uptake of

electric vehicles is weakening the relationship between road use and fuel-tax revenue, raising concerns about the sustainability of funding for road investment and maintenance. In response, alternative forms of road pricing have been widely discussed, with distance-based road user charges (RUC) emerging as a potential policy option. This paper develops a computable general equilibrium (CGE) framework for modelling road user charges and assessing their economy-wide impacts in the Australian context.

The analysis extends VURMTAX, a dynamic multi-regional CGE model with detailed taxation widely used for policy analysis in Australia. The framework explicitly represents demand for road access as a derived demand associated with vehicle use and distinguishes road users by user type, vehicle class and propulsion technology. This enables transport electrification and road pricing to be analysed consistently within a unified economy-wide framework.

The modelling framework has three key components. First, private vehicle use is disaggregated into internal combustion engine (ICE) and electric vehicle (EV) services within the household transport demand system. Substitution between ICE and EV transport is represented through a CES subnest, with cost-neutral taste shifters capturing non-price drivers of household EV adoption.

Second, dedicated commercial vehicle-use sectors are constructed to supply vehicle services to industries at cost. Commercial vehicle use is differentiated by vehicle class, including light commercial vehicles and heavy trucks and buses, with each class further divided into ICE and EV technologies.

Third, a government-owned road sector supplies road access services to private and commercial vehicle-use activities. In the baseline, the imputed charge for road access is fully offset through an implicit subsidy, so that no additional explicit road-access charge is imposed. Counterfactual RUC policies are introduced by reducing or removing this subsidy.

This framework provides a flexible platform for analysing road pricing in an increasingly electrified transport system. By linking road charges directly to vehicle use rather than fuel consumption, it can accommodate heterogeneous road users, evolving vehicle technologies, and alternative charging regimes. In doing so, the framework can trace the macroeconomic, sectoral, vehicle-class, vehicle-technology, and fiscal consequences of transitioning from existing fuel-based taxation arrangements towards alternative forms of road user charging.

Session 2B: Global Trade, Growth and the World Economy

Modelling extreme trade disruption in a global CGE framework

James Giesecke

Centre of Policy Studies, Victoria University

Abstract

CGE models are typically built and calibrated to investigate shocks at the scale of government policy interventions. Applying them to extreme, abrupt trade disruption, such as the interdiction of a substantial share of one economy's trade, can move the model beyond the range of shock values its structure was built for and towards its solution limits. This paper reports methods developed to investigate extreme trade disruption in GTAP-FIN, a recursive-dynamic global model with a financial block.

Four extensions are described. (1) Quarterly periodicity is introduced in a manner that allows the model to be run in either quarterly or annual mode under the same closure and shock assumptions. (2) Capital utilisation is endogenised, allowing industry to idle capital, or work it somewhat harder, depending on the return it earns. (3) Short-run wages are sticky, but an endogenous emergency labour assignment mechanism makes wage adjustment respond to the rate of employment decline. (4) The Armington import sourcing nest is generalised from CES to CRESH, allowing substitutability to differ by source and so distinguishing suppliers whose output is not readily substitutable.

The model is applied in both annual and quarterly mode to three interdiction scenarios of escalating severity: sustained grey-zone pressure, a quarantine, and a blockade sitting at the threshold of war. We find that the economic impact of the escalation ladder is strongly convex: a roughly four-fold escalation of instruments between the two lower rungs produces a twelve-fold increase in GDP loss. At blockade intensity, the model reveals points where substitution margins are exhausted, thus identifying economic bottlenecks. In this regard, energy imports emerge as the most binding constraint.

Revisiting projections of the effects of Brexit: An Early and an Ex-Post Analysis

Paul Gretton

Crawford School of Public Policy, ANU

Abstract

The United Kingdom entered into the Brexit process at a time when the global economy was gradually recovering from the effects of the global financial crisis. Gretton and Vines (2018) looked into the prospective economic implications of Brexit under alternative trade regimes that could emerge after the UK's exit from the EU. This analysis was undertaken within a

comparative static GTAP modelling framework with a long-run closure. This study provides an illustrative translation of the high-impact scenario applied in the comparative static modelling to the dynamic GDyn-FS modelling framework and traces out a possible dynamic adjustment path. It is found that the dynamic projections by year intersect comparative static projections after about 25 years. Sensitivity testing also suggest that the projected longer-run impact is not particularly sensitive to baseline assumptions. A cross-study comparison suggests similarity in longer-term overall impacts, but differing perspectives on the underlying policy scenario and possible adjustment paths. These matters afford an area for further research. The analysis supports the view that policy formulation that favours greater trade openness and economic reform particularly in the area of capital-finance markets would help improve growth prospects and diminish the possible negative effects of Brexit.

There and Back Again – A Circular Tale in a CGE Framework

Rhiain Powell

Deloitte Access Economics

Abstract

Global material use is projected to double by 2060, highlighting the unsustainability of linear resource consumption. Consequently, circular economy strategies are vital for meeting future resource consumption while minimising environmental externalities. As the circular economy becomes a more significant component of the global economy, robust modelling of its potential impacts is crucial. Australia is currently preparing for a circular economy transition, with the government releasing a circular economy framework in 2024, but comprehensive economic analyses of this shift are limited. Achieving circularity will require substantial behavioural and industry changes, especially as Australia currently exports 5% of its waste for recycling, with scrap metal accounting for 64% of its exports.

A hurdle to modelling circularity is found in traditional input-output databases, as they fail to disentangle recycling activities from broader sectors. To address this gap, the authors have developed a waste-satellite database and a set of equations for integrating circular economy principles into a Computable General Equilibrium (CGE) model, with an initial focus on steel manufacturing. The model will simulate various circularity-promotion measures, such as subsidies, levies, productivity improvements and behavioural policies. They will also consider scenarios involving major trading partners like China, to understand the impacts of global circularity on Australia's exports. This will provide an evidence-base for understanding the economic, trade, and environmental implications of a circular transition to inform policymakers and industry.

Balancing China's current account surplus: policy choices and impacts

Yixiao Zhou

Crawford School of Public Policy, ANU

Abstract

The gap between the high saving and relatively low investment in China has translated into a persistent current account surplus. Overall, China has two broad policy pathways to maintain its current account balance within international norms: lowering the saving rate by boosting domestic consumption, or absorbing saving through higher domestic investment by improving the attractiveness of investing in China—both requiring sustained policy actions. We examine the long-term economic implications of these policy options for the Chinese economy, using a six-region global macro model. We also examine the impacts of a rise in desirability of investing in China while allowing saving rates to converge towards international norms. We find that in such circumstances, sustaining relatively high investment rates requires the drawing on foreign savings to make up the shortfall of domestic saving over domestic investment demands. Our findings are more supportive of policies that bolster the structural resilience of the Chinese economy in the longer run over policies directed at temporary short term activity stimulus measures such as subsidies to current consumption or investment.

Session 3A: Energy, Emissions, Resources and the Environment

The Cost of Resilience: A Computable General Equilibrium Analysis of Viet Nam's Dual-Track Energy Strategy under the Revised Power Development Plan VIII

Manh-Tien Bui

Crawford School of Public Policy, ANU

Abstract

Viet Nam's 2025 revision of its Eighth National Power Development Plan (PDP8) is best understood not as a simple acceleration or retreat from decarbonisation, but as a resilience-oriented diversification strategy. The Revised PDP8 expands renewable ambition while retaining substantial dispatchable thermal generation and increasing regional electricity imports. Using GTAP-E-Power with a recalibrated 2024 electricity benchmark and a common 2030 business-as-usual reference, this paper compares the Original and Revised PDP8 across macroeconomic, sectoral, trade and direct territorial and import-attributed emissions outcomes. The results show that the Revised PDP8 carries a measurable resilience premium. Relative to the Original PDP8, it imposes larger economy-wide adjustment costs, increases capital-market pressure, weakens the external balance and shifts activity away from export-oriented manufacturing, especially electronics, textiles and chemicals. Territorial CO₂ falls more under the revised pathway, but direct domestic electricity-sector emissions fall less. Once imports from Lao PDR and China are incorporated, the Revised PDP8 is associated with substantially greater external emissions exposure. Making this resilience premium transparent across economic, industrial and emissions-accounting dimensions, is a necessary step toward aligning Viet Nam's electricity planning with its high-growth development strategy and longer-term decarbonization commitments.

The economic impacts of emissions intensity targets for natural gas producers

Sam Marginson

Centre of Policy Studies, Victoria University

Abstract

The EU will soon begin requiring natural gas importers to demonstrate that fugitive emissions from the production of the gas are limited to a certain level. To estimate the economic impacts of the policy, we incorporate an element of heterogeneity into firms' production functions in GTAP-E. This presentation will give an overview of the modifications made and summarise our findings regarding the economic impacts of this policy.

Economy-wide Impacts of Major Extractives Projects in Papua New Guinea : Insights from PapuaCGE

Guy Jakeman

DeltaPearl Partners

Abstract

This presentation estimates the economy-wide impacts of major extractives projects in Papua New Guinea using the PapuaCGE computable general equilibrium model. The analysis examines how large-scale mining, petroleum and gas developments affect national output, incomes, employment, government revenue, and sectoral activity. By capturing linkages across industries, households, government and external markets, PapuaCGE provides a structured framework for assessing both direct and indirect effects of project investment, production and export activity. The results highlight the scale of potential economic gains, the distribution of benefits across sectors and households, and the sensitivity of outcomes to assumptions about project timing, local content, fiscal arrangements and global commodity prices. The presentation also discusses implications for policy design, revenue management and broader development planning in Papua New Guinea. Time permitting, the results are compared with the projected impacts using the Macroeconomic Assessment of Public Investment Options (MAPIO) macroeconomic model developed by the World Bank.

Economy-Wide Impacts of Indonesia's Nickel Export Ban: A CGE Approach

Arief Yusuf

Centre of Policy Studies, Victoria University

Abstract

Using the multi-country GTAP 2017 database, this study conducts an ex-post evaluation of Indonesia's 2020 nickel export ban. The methodology addresses key CGE modelling challenges by constructing a credible no-ban baseline for 2020 that reflects the rapid expansion and structural transformation of Indonesia's nickel sector based on historical data, and by representing the near-total halt in nickel exports following the policy's implementation. The results indicate that the export ban reduced Indonesia's GDP by 0.27%. The findings also identify the drivers of the domestic economic contraction and its spillover effects on other economies.

Session 3B: Models, Databases and New Applications

Economic and Employment Effects of the Australian University Accord

Achievement: A national dynamic CGE analysis

Trang Tran

Centre of Policy Studies, Victoria University

Abstract

Australia has one of the highest tertiary education attainment rates among OECD countries for individuals aged 25-65 years. Despite this achievement, the qualifications of the current labour force do not fully meet the nation's current needs and Australia faces a shortage of skilled workforce in several critical industries, including healthcare, digital technology, education and renewable energy. Australia's population is projected to reach 36.09 million by 2050; an additional 6.3 million jobs requiring tertiary education will be added to the labour force to reach 15.9 million tertiary-educated jobs in 2050. Furthermore, around nine out of ten new jobs created over the next three decades are expected to require a tertiary qualification. The Australian University Accord was established to strengthen Australia's human capital and address the growing demand for highly skilled workers. The Accord sets an ambitious target, including increasing tertiary education attainment to 80% of the working-age population and 55% of Australians aged 25-34 holding a bachelor's degree or higher by 2050.

This study evaluates the economic and employment impacts of achieving the Accord's targets by 2050 using the Victoria University Employment Forecast (VUEF) model. The VUEF model is a national dynamic Computable General Equilibrium model that incorporates employment by occupation and qualification. It is particularly well suited to this analysis as the model disaggregates labour by qualification level and field of study associated with population changes in the cohort model. In addition, the model represents changes in occupation- and industry-specific labour demand and in skills associated with occupation, allowing measurement of the effect of changes in tertiary education attainment by 2050 on the whole economy.

This study has found that achieving the Australian Universities Accord targets would increase GDP by 0.12% relative to the baseline by 2050. Skill-intensive industries are estimated to increase in both output and employment, with the tertiary education industry recording the strongest gains, increasing by 4.0% in output and 4.4% in employment compared to the baseline by 2050. In contrast, output and employment growth in industries with a higher concentration of low-skilled workers are projected to decline relative to the baseline. Similarly, occupations with a greater reliance on highly skilled labour are expected to expand, while occupations with a higher share of low-skilled workers are estimated to contract by 2050.

Introducing teems and the teemsphere: an open-source platform for reproducible computable general equilibrium modeling

Matthew Cantele, Ha Van Pham and Tom Kompas

School of Agriculture, Food and Ecosystem Sciences, University of Melbourne

Abstract

The Trade and Environment Equilibrium Modeling System (TEEMS) R package (available on CRAN) represents a significant advancement in computable general equilibrium (CGE) modeling.

TEEMS sits alongside a range of other repositories, and further packages in development, under the teemsphere umbrella; together these form an integrated suite of open-source tools designed to enable reproducible, modular workflows for equilibrium model analyses. teemsphere comprises the teems R package for composing model runs; the Docker image teems-solver (a C-based solver for large systems of nonlinear equations); teems-models (containing internally available and immediately compatible models); teems-mappings (with internally available set mappings); and teems-scripts (showcasing model configurations and options). A separate R package, teems.models, is now being developed to provide easy access to a variety of bespoke CGE models through custom functions that will integrate seamlessly with the core teems package.

The teems package serves as the central application for model specification and execution. Through this package, users can adjust multiple model components, including data format conversions, set aggregations, parameter weighting specifications, closure configurations (including swaps), and a range of shock specifications. The package also exposes a considerable number of advanced options for finer-grained customization of model runs. It has been designed to accommodate intertemporal models such as the GTAP Rational Expectations Model (GTAP-RE), and has been vetted on a range of prominent models, including the standard and classic GTAP models. The solution engine underlying the package is teems-solver, implemented in C and drawing on HSL Fortran routines for performance-critical numerical computation. This solver handles the large systems of nonlinear equations that characterize equilibrium models, employing matrix solution methods with configurable step and subinterval designations. It also performs constrained optimization and structures all outputs into organized data formats compatible with R's analytical ecosystem.

Beyond these immediate technical capabilities, we seek to address a broader scientific goal: advancing interdisciplinary research by lowering the barriers to equilibrium model applications. We hope that the software will flatten the steep learning curve traditionally associated with running equilibrium models, thereby enabling scientists from various disciplines to improve model representations within their respective fields. This democratization of CGE modeling capabilities could accelerate methodological innovation by bringing diverse domain expertise to bear on model development and application.

Finally, the scripting-based approach aligns with broader trends in scientific computing toward transparency, reproducibility, and community-driven development.

Inflation, Unemployment and Sectoral Adjustment to an Energy Price Shock in Australia

James Lennox

Centre of Policy Studies, Victoria University

Abstract

This paper develops a 20-sector model of the Australian economy that combines a conventional CGE production structure with nominal rigidity and frictional labour reallocation. Computable general equilibrium (CGE) models trace the consequences of shocks through the structure of production to outcomes at both the industry and aggregate level, but in dynamic versions adjustment over time comes largely from investment and the accumulation of sector-specific capital. Labour market adjustment is typically absent or governed by reduced-form rules. Prices are purely relative: wage and price setting and monetary policy conventionally sit outside the framework and are left to macroeconomic models with little or no sectoral detail. The model bridges these traditions. Because agents respond to expected future conditions as if certain, the model presented here can be written and solved in the widely used CGE package GEMPACK.

Prices and wages are subject to sector-specific quadratic adjustment costs, and wages are set by bargaining between firms and workers. Because price, wage and investment decisions are all made intertemporally, the speed of sectoral adjustment is derived rather than imposed. It responds to the nature and timing of the shock, and to the monetary policy regime, here an inflation-targeting rule. Hiring is subject to search and matching frictions that vary across sectors, with vacancies costly to post and to fill. Unemployment through the transition follows from these frictions and from how sectoral demand shifts. Solving the model requires the determination of equilibrium jointly across all periods, rather than recursively as is most common in CGE modelling.

We illustrate the model with a stylised shock to world oil, gas and coal prices. Australia imports crude and refined product but exports gas and coal, so the shock raises costs for energy users while affecting export returns and the terms of trade. Transition paths differ according to whether the shock is permanent or temporary, and whether it is foreseen or not — including the case where expectations of future prices shift before any current price has moved. The purpose is to demonstrate what the framework makes visible rather than to offer a policy assessment.

Estimating the impact of Indigenous-owned businesses using a novel CGE framework

Louisa Jeffery

Deloitte Access Economics

Abstract

Indigenous businesses are widely recognised for generating economic, social and community benefits. Despite this, their economy-wide impact remains difficult to quantify using conventional modelling approaches. Standard computable general equilibrium (CGE) databases do not distinguish the differing activities of Indigenous businesses and Indigenous households or the unique economic relationships that exist within the Indigenous economy from the rest of the economy. Consequently, the broader economic impacts of Indigenous business activity are often underestimated since they are derived from measures of non-Indigenous economic activity.

This paper presents a novel extension of a regional CGE model developed for the Northern Territory Indigenous Business Network (NTIBN) to estimate the economic impact of Indigenous businesses in the Northern Territory. The modelling framework adapts Deloitte Access Economics' regional CGE model (DAE-RGEM) by introducing Indigenous and non-Indigenous business and household accounts within a Northern Territory regional disaggregation. To support this extension, primary data were collected through a survey of Indigenous businesses and consultations with stakeholders to identify characteristics that differentiate Indigenous-owned businesses from their non-Indigenous counterparts, including employment of Indigenous workers, procurement relationships between Indigenous business and household income flows.

The paper outlines the methodology used to construct the model database, including sectoral disaggregation of priority Indigenous industries (especially those that have no non-Indigenous counterpart, such as Aboriginal Tourism), calibration of Indigenous business behavioural parameters, and representation of Indigenous households within the CGE model. It also presents a series of counterfactual scenarios designed to estimate: (1) the contribution of Indigenous businesses to the Northern Territory economy, (2) the incremental impacts attributable to Indigenous ownership and business practices, and (3) the potential economic gains associated with the future growth of the Indigenous economy.

Beyond the empirical findings, the paper contributes to the CGE literature by demonstrating an approach for incorporating specific business types and household groups into an economy-wide modelling framework where conventional data sources are limited. The methodology offers a pathway for evaluating Indigenous economic development policies and provides a foundation for future modelling of Indigenous economies in Australia and internationally.

Session 4: Advances in CGE Modelling and Policy Analysis

GlobeTERM including sub-national detail in a multi-country model: Trans-Tasman example

Glyn Wittwer

Centre of Policy Studies, Victoria University

Abstract

The GlobeTERM approach combines national Global Trade Analyses Project (GTAP) regions with sub-national detail. The approach extends the sub-national TERM methodology to create a master database includes 74 sectors, based on GTAP with electricity split into 9 generation sectors plus a distribution sector. The other 64 sectors are those in GTAP Data Base version 11c. In most examples, one country within GTAP is split into sub-national regions, while retaining the other 159 GTAP regions in the master database. Examples include China, Germany, UK and USA. Another version represents Europe's regions at the NUTS-2 level. An illustrative simulation examines the impacts of surging energy prices on the dairy sectors in Australia and New Zealand.

A New Dynamic Model of the Effects of Tax Policies on Efficiency and Equity

Chris Murphy

Crawford School of Public Policy, ANU

Abstract

The Australian Government has regularly used Computable General Equilibrium (CGE) modelling to assess the economy-wide effects of tax policy options. For example, the author led a team at KPMG Econtech (2010) that used the MM900 model to estimate the marginal excess burdens (MEBs) of different taxes for the Henry Tax Review (2009). Those MEB estimates remain influential; they were recently used by the Parliamentary Budget Office (2024) in a report on Australia's tax mix.

The MM900 modelling had two important features. For usefulness, it distinguished the behavioural effects of many different taxes. For rigour, it used the compensating variation from welfare economics to estimate the effects of tax policy changes on consumer welfare.

The new CGETAX model adds three more important features. Like Nassios et al. (2019), it introduces dynamics by allowing for sluggish adjustment of capital stocks. Like Tran and Wende (2020), it introduces equity by distinguishing three types of consumers, and it follows Harding (1990) in focussing on their differences in lifetime incomes. Finally, it adds realism by relaxing the assumption that all businesses are national companies that operate under perfect competition. Specifically, it allows for oligopoly power in some industries

(Roson, 2006), international profit shifting by multinational corporations (de Mooij and Devereux, 2009) and unincorporated businesses operating in competition with incorporated businesses (Gravelle and Kotlikoff, 1993), all of which is important for tax policy.

What distinguishes the new CGETAX is that it incorporates all five features, the two original features and the three new features, in the one model. This allows it to show how MEBs vary between consumers with different lifetime incomes and between the short run and the long run. Further, allowing for the different types of businesses adds robustness to the MEB estimates.

Can Productivity Growth Offset China's Demographic Headwinds? A Dynamic CGE Analysis

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Abstract

China is undergoing a profound demographic transition characterised by persistently low fertility, rapid population ageing and a shrinking working-age population. These demographic changes raise important questions about the sustainability of China's long-run economic growth. Using the dynamic CHINAGEM model, this paper examines the extent to which productivity gains associated with improvements in education and human capital can sustain China's economic growth in the context of a declining and ageing population. The analysis uses a medium population projection for China over the period 2020–2100. The education-driven component of labour productivity growth is estimated using a productivity-weighted labour force (PWLF), which accounts for changes in the age and educational composition of the labour force and differences in productivity across education groups.

Our simulation results show that the contraction of the working-age population places significant downward pressure on China's long-run economic growth. Productivity improvements partially offset this effect, helping to sustain real GDP growth for much of the projection period, but are insufficient to prevent a continuing slowdown in economic growth. In contrast, real GDP per capita grows considerably faster than aggregate real GDP, reflecting continued productivity gains alongside a declining population.

Creating GTAP-Money: A GTAP model with financial assets and liabilities, monetary policy, excess capacity, and nominal exchange rates

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Abstract

Standard GTAP provides a medium-term view of the effects of tariffs and other policies. To enhance GTAP for short-run analysis, we create GTAP-Money by adding to standard GTAP: (1) accumulation of financial assets and liabilities; (2) monetary policy; (3) unemployment, excess capacity and inflation; and (4) nominal exchange rates.

Our theoretical specification introduces a financial agent for each country r that solves an optimization problem, taking account of expected rates of return, to determine the allocation of its budget between financing physical capital and buying bonds in all countries. Introduction of financial agents handles features (1) and (2). It provides a framework for keeping track of each country's wealth, saving, current account, and its accumulation of foreign assets and liabilities. Through its optimization problem, financial agent r responds to monetary tightening (e.g. an increase in interest rates on bonds issued by r 's central bank) by reallocating part of its budget away from acquiring foreign assets and financing r 's physical assets and towards buying government bonds. This is consistent with the aim of monetary policy, namely, to have a short-run modifying influence on domestic demand mainly through affecting physical investment.

For embracing feature (3), we specify asymmetric responses of factor prices to changes in demand. We assume that nominal wages do not move down significantly in the short run in response to unemployment but move up sharply if unemployment goes below the normal rate of frictional unemployment. We assume similar asymmetric responses for capital rental rates.

We work through the GTAP equations adding a nominal exchange rate for each country r . Endogenous movements in nominal exchange rates [feature (4)] provide the extra degrees of freedom required to determine real exchange rates when domestic price levels are tied down by sticky nominal factor prices.

The paper contains illustrative simulations.