

Oil supply shocks and fuel tax policy in Australia: insights from a dynamic CGE framework

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Overview

Background

- Recent surges in global oil prices
 - July 2021→March 2022, more than 50% increase
 - Higher intermediate input costs for businesses, higher price of transport, and an overall increase in the cost of living for households
- Policy response: fuel excise cut by 50% (44c/L→22c/L) for six months

This paper explores

- The impact of the **oil supply shock** on the **Australian economy**
 - Different responses to oil supply shocks across countries (Peersman and Robays, 2012)
 - Australia: net oil-importing, non-oil energy exporting
- The role of **oil-gas price linkage** in Australian LNG export
 - Oil-indexed LNG pricing mechanism in the Asia-Pacific gas market
 - Higher oil import prices & higher LNG export prices
- Economic implications of a temporary **fuel excise cut**
 - Budget-neutral VS Deficit-financed
- Alternative policy option: **UK-style energy profits levy** on LNG producers

Empirical framework

- Single-country dynamic Computable General Equilibrium (CGE) model
→ Victoria University Regional model with Taxation detail (VURMTAX) (Nassios et al. 2019)

Counter-factual analysis: a hypothetical persistent oil price shock based upon observed market responses

- 52.6% increase in global oil prices in 2022
- Duration: 3 years
- Unwind from 2026 onwards, back to the baseline

Main findings

- 1 Such an oil supply shock leads to a fall in real GDP by 0.24% on impact, mainly driven by a weakened labour market. The damage is damped by a rise in net exports, particularly energy-intensive commodities
- 2 The oil-gas price linkage has a limited capacity to mitigate the economic damage caused by higher oil prices
 - LNG sector: low labour intensity, high foreign ownership
 - Higher gas prices hurt domestic gas users
- 3 A 50% reduction in fuel excise can help damp the short-run fall in real GDP and employment, but at the expense of larger budget deficits and debt overhang
- 4 A UK-style LNG profits levy could promote household consumption without costing the budget

Brief overview of the VURMTAX model

- A 91-industry, eight-region CGE model of Australia
- Based on the Victoria University Regional Model (VURM) developed by Adams et al. (2015)
- Rich tax-specific features which facilitate modelling of the Australian tax system
→ See Nassios et al. (2019) for a full account
- Data from a variety of sources to parameterise VURMTAX
→ ABS, Agricultural Census data, state accounts data, international trade, etc...
- Base year 2017/18

Key assumptions

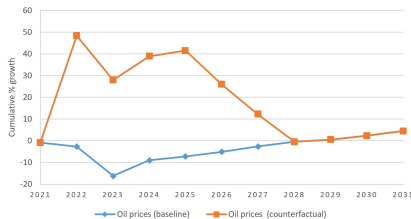
- Sticky real wage in the short run
- Regional migration driven by real wage disparity
- Public consumption moves with private consumption
- Fixed investment response for mining industries

Oil price shock

A simulation in VURMTAX involves two parallel model runs:

- Baseline forecast:

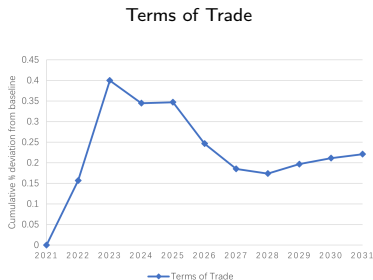
- The "would-be" of global oil prices if the recent oil price shock had not happened
- Oil price growth aligned to the reference oil price projection (European Brent spot price) from US Energy Information Administration (EIA)



- Counterfactual scenario 1:

- **Hypothetical world oil prices** rise by 52.6% in 2022 relative to the EIA baseline forecast, remaining elevated for three years, easing back afterwards
- **Global price inflation of commodities:** infer from domestic cost-structure (exc. key resource exports) and align with literature (Choi et al., 2018)
- **Lower foreign demand:** an increase in world oil price by 50% from the baseline would cause about 1% loss of global GDP (Timilsina, G.R., 2015)
- **LNG export price rise:** 50% of the oil price rise (Zhang et al, 2018)

Scenario 1: macro results - Terms of trade



Intuitively:

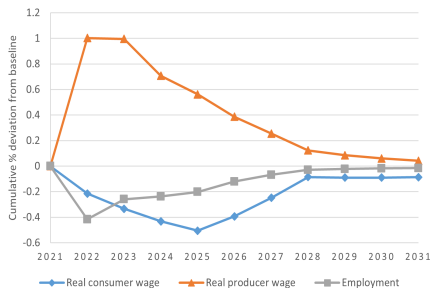
- Oil-importing: higher world oil prices drives up Australian import prices and decrease terms of trade

Mild appreciation in the terms of trade, why?

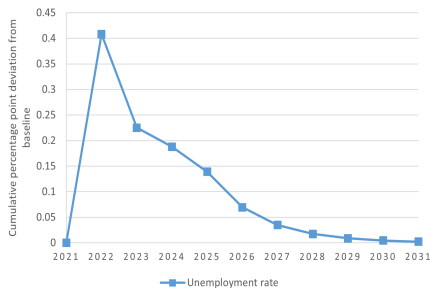
- Non-oil energy exporting
- Consequence of the oil-indexed LNG export prices → oil-gas price linkage in Australia
 - Little impact to labour market
 - More on this later...

Scenario 1: macro results - Labour market

Wage and employment



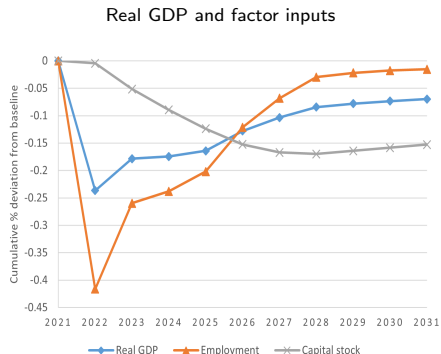
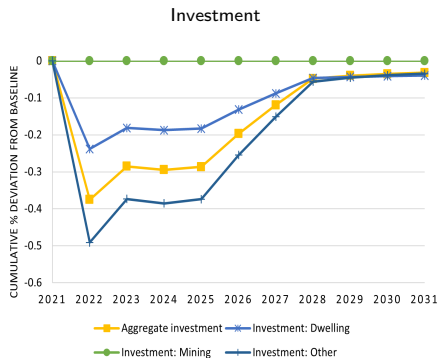
Unemployment rate



Labour market:

- Real sticky wage in the short run
- Labour costs influenced by CPI, rise relative to output prices
- Lower employment in the short run.
- Unemployment rate rises by 0.41pp

Scenario 1 - oil price rise: macro impact



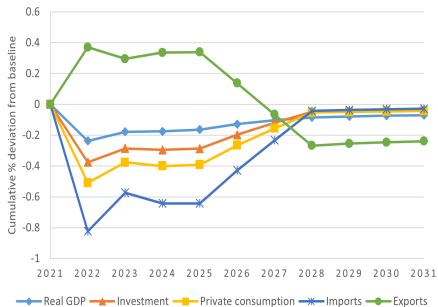
Capital market

- Lower rate of return of capital → lower investment

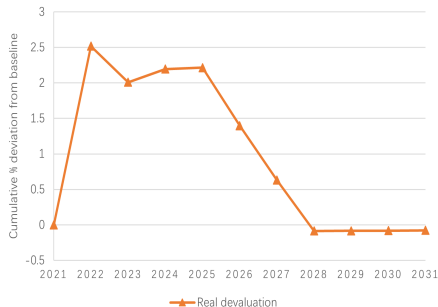
Real GDP falls by 0.24% on impact

Scenario 1 - oil price rise: macro impact

Real GDP expenditure



Real devaluation

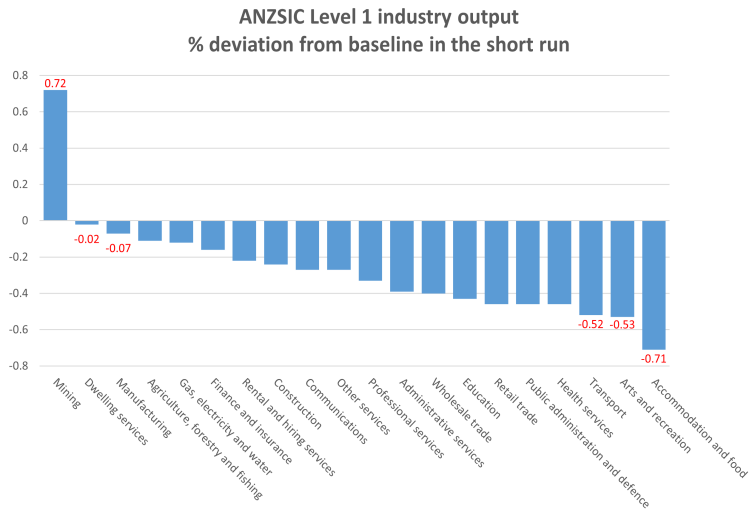


Fallen private consumption

- Weak labour market
- High energy prices

Increased international competitiveness

Oil price shock: industry impact



Scenario 2: Evaluating the offsetting effect of the oil-gas price linkage to oil price shocks

Australia:

- Australia is one of the largest **LNG exporters** in the world
- About 80% of Australia's LNG is sold under long-term contracts in the Asian market that carry terms linking LNG prices to oil prices with a lag of around three to six months, depending on specific contractual arrangements.
- **Oil-gas price linkage:** co-movement in oil import and LNG export prices
- **Offsetting effect:** favourably influence the terms of trade and the purchasing power of domestic income

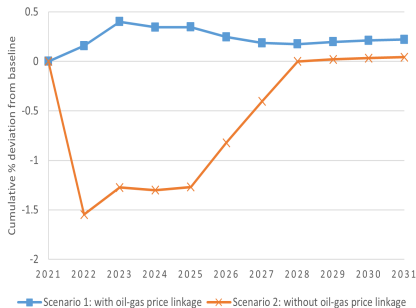
→ **But to what extent?**

Scenario 2

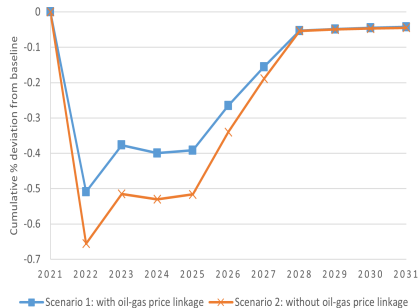
- Deactivate the oil-gas price linkage in Scenario 1 to examine its impact during oil supply shocks

Scenario 2: with and without oil-gas price linkage

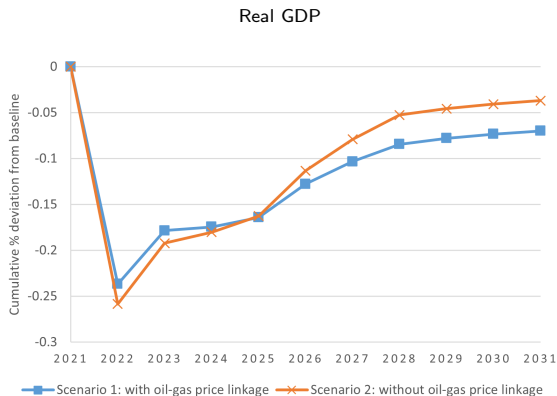
Terms of trade



Private consumption



Scenario 2: with and without oil-gas price linkage



The impact of oil-gas price linkage

Results:

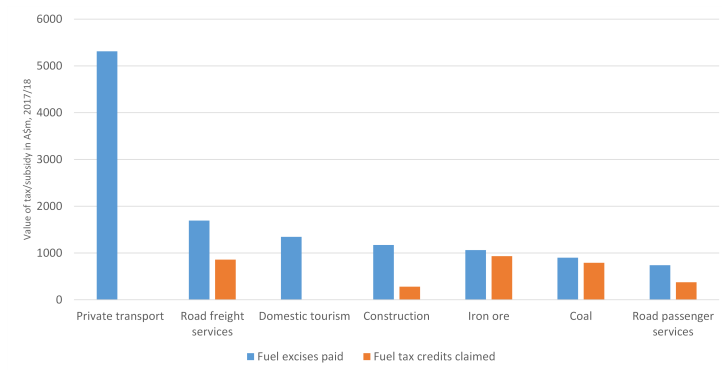
- Help counter the negative effect of increased oil prices
 - Moderate the fall in the terms of trade and private consumption
- Limited offsetting capability to counter the harm

Why?

- High capital intensity of the Australian LNG industry
 - limited impact to the labour market and household income
- Substantial foreign ownership
 - dilute the contribution of the boosted industry output to the national income
 - only a small portion of profits stay in Australia (Cassidy and Kosev, 2015)
- Higher domestic gas prices
 - Less affordable gas for domestic users
 - Reduce household purchasing power

Scenario 3 & 4 : Fuel Excise Cut

Fuel excise and fuel tax credits claimed across a selection of VURMTAX industries, 2017/18

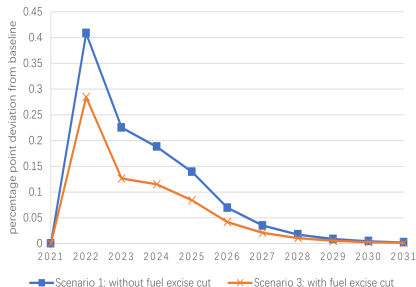


Policy Simulation Setup:

- A temporary 50% reduction in the fuel excise rate, that remains in place for three years and unwinds as the oil price rise unwinds
- Scenario 3: Budget-neutral → funded via direct tax to households
- Scenario 4: Deficit-financed

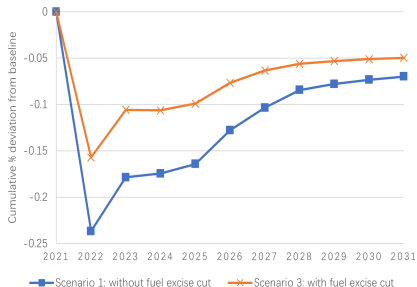
Scenario 3: budget-neutral fuel excise cut

Unemployment rate



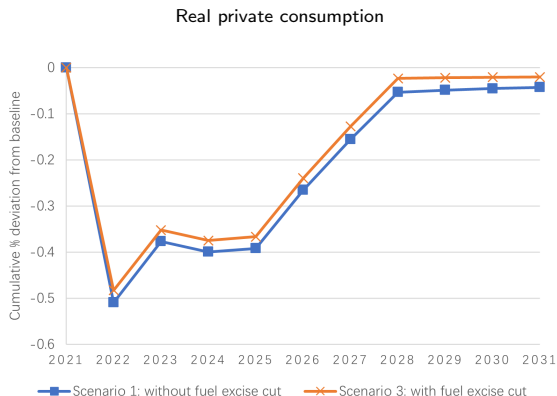
Reduced by 0.13 percentage points

Real GDP



Improved by 0.08 percentage points

Scenario 3: budget-neutral fuel excise cut

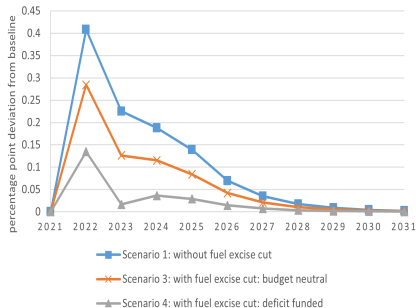


Budget-neutral fuel tax policy: funded via direct tax on households

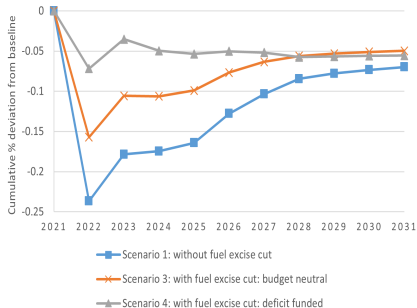
- Mute the peak fall in real GDP by around 33%
- Small improvement in private consumption
- Households pay for the short-run fiscal costs

Scenario 4: 50% fuel excise cut - Deficit-financed

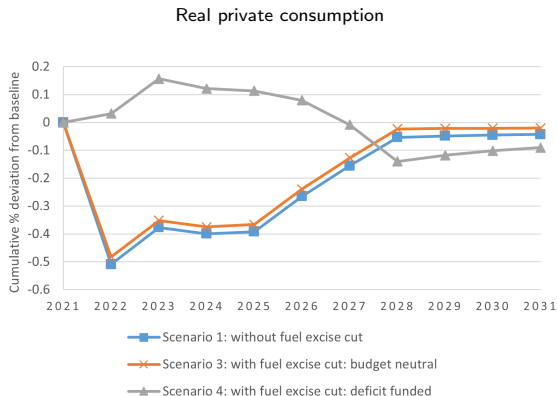
Unemployment rate



Real GDP



Scenario 4: 50% fuel excise cut - Deficit-financed



Deficit-funded fuel tax policy:

- First-year impact largely neutralised, strong short-run real private consumption,
- Smooth the negative consequences of high oil prices in the short run
- **Debt overhang:** high interest payments, dampens the post-shock recovery path

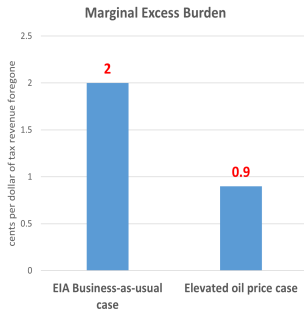
Excess burden evaluation

Assess the allocative efficiency gain from a temporary 50% fuel tax cut by the year 2025

- Estimation of marginal excess burden follows Nassios et al. (2019)

Implication:

- Small allocative efficiency gain when cut in a business-as-usual case
- Even lower allocative efficiency gain when oil prices are 52.6% higher
- Fuel excise is a specific tax: levied as a fixed rate per litre of fuel
- Higher oil prices compromise the merit of the fuel excise tax cut and mitigate its capability to reduce tax distortion



Scenario 5: UK-Style energy levy on LNG producers

Alternative policy option: motivation

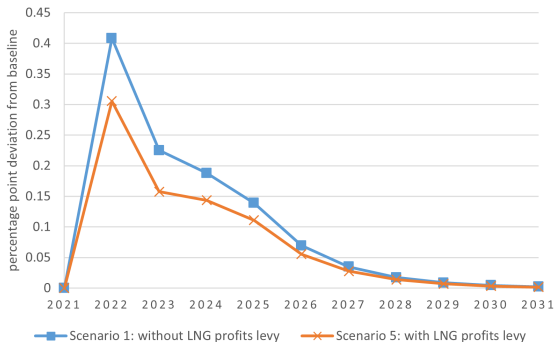
- Energy producers can accrue significant windfall gains when energy prices rise
- Households suffer from higher costs of living
- Large terms of trade gain may not translate to large national income and consumption stimulus
- UK: 25% **Energy Profits Levy** introduced in May 2022 on oil and gas industry profits

Investigate the impact of such a **UK-style energy profits levy** on Australian LNG producers in response to high energy prices

- Additional 25% tax on top of the existing 30% corporate tax for LNG producers
- Temporary: 2022-2025 high oil price periods, following UK's levy
- Budget-neutral: redistribute tax revenue to households
 - keeping with the spirit of the UK policy: revenues used to fund welfare payments

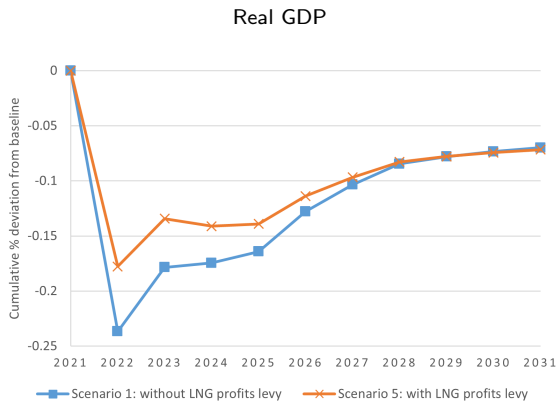
Scenario 5: UK-Style energy levy

Unemployment rate



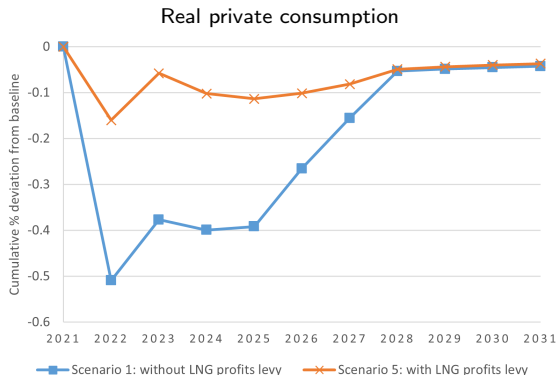
Reduced by 0.1 percentage point

Scenario 5: UK-Style energy levy



Improved by 0.06 percentage points

Scenario 5: UK-Style energy levy



Improved by 0.35 percentage points

25% UK-Style Energy Profits Levy on LNG producers

- Reorient part of the windfall gains due to high energy prices from largely foreign-owned LNG producers to domestic households
- Improves private consumption outcomes without costing the budget

Overview: scenario summary

	Scenario				
	1	2	3	4	5
Shocks describing an elevated oil price environment					
Elevated oil prices	*	*	*	*	*
Export demand shifts	*	*	*	*	*
Elevation of energy-intensive import prices	*	*	*	*	*
Shocks describing policy responses					
Fuel excise cut			*	*	
LNG profits levy					*
Closure assumptions					
Linkage of LNG export prices to world oil prices	*		*	*	*
Fiscal neutrality via direct tax adjustment	*	*	*		*
Deficit financing				*	

Conclusion

This paper

- ① Investigate the effects of a persistent **global oil supply shock** on the Australian economy
 - Size of the shock (52.6%) based upon observed market response
 - On impact:
 - Increased the unemployment rate by 0.41%
 - Decreased household consumption by 0.5%
 - Damage the real GDP by 0.24%
- ② Investigate the capacity of the **oil-linked LNG export prices** to cushion the harm
 - Modest offsetting effect
 - LNG sector: low labour intensity and high foreign ownership
 - Higher domestic gas prices
- ③ Policy response: 50% temporary **fuel excise cut**
 - Budget-neutral policy: limited effect to mitigate the damage
 - Deficit-financed policy: short-run effect at the cost of debt overhang and sluggish economic recovery
 - Allocative efficiency perspective: small gain
- ④ Alternative policy option: 25% **UK-Style LNG Profits Levy**
 - Promote household consumption without compromising the budget
 - Valuable addition to the taxation toolbox for policymakers