

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

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Extended Abstract

While much of 2020 and 2021 were punctuated by the impact of COVID-19 on our health and economic wellbeing, 2022 has been defined by geopolitical tensions and the Russia-Ukraine war. The sanctions that have accompanied this conflict have increased intermediate input costs for businesses, and the price of transport for households across the globe. Compared to price levels in July 2021, crude oil prices in March 2022 have increased by more than 50%. On 29th March 2022, the Australian federal government announced that in response to this rapid inflation in the cost of fuel, it would cut the federally-imposed fuel excise by 50% for six months.

The aim of this paper is to explore the impact of the oil supply shock on the Australian economy, and the economic implications of the federal government's fuel excise policy response in particular. The analysis is undertaken within a single-country dynamic computable general equilibrium (CGE) modelling framework, namely the Victoria University Regional model with Taxation detail (VURMTAX) model.

Studies of energy price shocks from the demand and supply side have a long history. The negative impact of oil price increases on economic activities has been found by a large body of literature ever since the influential work by Hamilton (1983). Many recent studies have highlighted the importance of understanding the underlying causes of oil price shocks when assessing their effects on the global economy [for example, Kilian (2009); Peersman and Robays (2012); and Aastveit et al. (2014)]. We rely on the cross-country study by Peersman and Robays (2012), who compare the dynamic effects of several types of oil shocks across a diverse set of industrialized countries. They find substantial asymmetries in the effects of exogenous oil supply shocks across countries. They highlight the necessity of understanding the underlying sources of oil price shifts and the importance of the role of oil and energy when studying the effects of exogenous oil supply shocks.

In recent years, Australia gradually reduced its domestic oil production capacity, becoming more reliant on foreign imports of both crude oil and refined petroleum. This is juxtaposed against its position as one of the largest non-oil energy exporters in the world. As summarised by Peersman and Robays (2012), given this economic structure oil supply shocks will drive very different economic consequences for Australia, compared to other developed economies. A key contribution of this work is to consider how the impact of such shocks can be attenuated by changes to fuel taxes, such as Australia's fuel excise. While lower fuel excises damp the impacts of the price rise on consumer prices, fuel excises are specific taxes, levied at a fixed cost per litre of fuel. As the basic price of fuel rises, the capacity of such policy to offset the impact of the price shock on purchasers' prices of fuel would be reduced.

The version of the VURMTAX model used in our analysis contains two regions, Victoria and the rest-of-Australia. It is a bottom-up, dynamic, multi-regional CGE model of Australia's states and territories that identifies 91 distinct industries, who produce a mix of 98 distinct commodities. As is standard in CGE models, VURMTAX determines the supply and demand for each regionally produced commodity as the outcome of optimising behaviour of economic agents. Regional industries are assumed to choose labour, capital and land to minimise primary factor costs while operating in a competitive market. In each region a representative household purchases a particular bundle of goods in accordance with the household's preferences, relative prices and its disposable income. Regions are linked via interregional trade, interregional migration and capital movements and governments operate within a fiscal federal framework.

VURMTAX differs from its predecessor VURM by Adams et al. (2015) in that it also contains a government finance module, which provides a comprehensive treatment of revenues, expenditures and budget balances at two levels of government: federal and state/territory. The model contains a number of innovations relating to the treatment of many taxes [see Nassios et al. (2019) for a full account]. Herein, enhancements of relevance are our modelling of the fuel excise, which is treated as a specific tax on the use of refined petroleum products (except aviation fuel), and the fuel tax credits scheme, which is separated from a broad set of federal government subsidies to industry using tax claims by industries for 2017/18 from the Australian Taxation Office.

This study is broken into two sections, each comprising their own simulation outputs. In the first section, we begin by outlining and simulating our oil supply shock scenario to investigate the economic consequences of a persistent oil supply shock on the Australian economy, at both the aggregated macro level and the disaggregated sectoral level. We find that at its peak, such a shock translates to a 0.67 percentage point rise in the Australian unemployment rate. Coupled with the shock to the terms of trade, this causes a fall in national welfare valued at A\$1439 per capita by 2024. The large deterioration in the terms of trade stimulates output of export-oriented and import competing domestic industries, such as the agriculture, mining and manufacturing industries.

In the second section, we consider the degree to which a cut in the rate of Australian fuel excise can damp this economic impact. The magnitude of the cut in the fuel excise rate we study (a temporary 50 percent reduction), is informed by the policy response put forward by the Australian federal government in its 2022-23 Budget. We implement the excise tax cut in a budget-neutral way, funding it via a lump-sum tax. We find that the size of the welfare and employment gain is relatively modest. Compared to the scenario that has no such policy response to the oil price shock, the fuel excise cut reduces the peak in the unemployment rate deviation from our baseline forecast (in which there is no fuel excise reduction and no oil supply shock) from 0.67% to 0.59% and improves national welfare by approximately A\$30 per capita.

The contribution of our study to the literature is three-fold. First, cross-country studies on the effects of oil shocks typically focus on a small subset of macroeconomic outcomes. As demonstrated by Peersman and Robays (2012), the effects of exogenous oil supply shocks can be very different across countries, and this is largely due to industry structure. Australia is a unique net oil-importing and non-oil energy exporting small open economy. The economic consequences of surges in global oil prices due to supply disruption will be very different compared to countries with different levels of foreign energy production dependence and energy import-export structure. Adopting a carefully crafted CGE model that carries within its database this kind of structure, we quantify the economic impact of an oil supply shock not only at the aggregated macro level but also in the disaggregated sectoral level in a consistent analytical framework.

Second, we consider a real-world policy response to an oil supply shock: Australia's recently-announced reduction in fuel excise duty. This necessitated two model developments:

1. Fuel excise in Australia is levied at a fixed rate per litre of fuel, i.e., it is a specific tax. We introduce new theory to model fuel excises as specific taxes; and,
2. Many Australian industries receive credits for fuel excises paid via the Fuel Tax Credits Scheme. We use ATO Taxation Statistics to disaggregate Australian Fuel Tax Credits across VURMTAX industries. This ensures that reductions in fuel excises correctly pass through into industry costs on a net of tax credit load basis.

Third, we evaluate the marginal excess burden of the fuel excise under both business-as-usual and fuel price-spike environments. This allows us to (a) contribute to the tax efficiency literature by evaluating the marginal excess burden of the fuel excise; and (b) comment on the merits of the fuel excise tax cut, not only from the perspective of its macroeconomic effects, but also from the perspective of allocative efficiency.

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Key Words

Oil prices; Taxation policy; CGE modelling; Dynamics

Biography of the proposed presenter

Xianglong (Locky) Liu is a Research Fellow at the Centre of Policy Studies. He holds a PhD in Economics from the University of Melbourne. His areas of interest include applied macro-finance, applied economic modelling and policy analysis.