

Compilation of a Transport Revenue & Expenditure Model (TREM) for Australia

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Abstract

Estimating transport sector revenues and expenditures by mode and volume is essential for policy analysis by transport agencies as well as state and Commonwealth treasuries. This paper outlines the methodology used to compile a transport revenue and expenditure model (TREM) for Australia, focussing on a disaggregated road transport component. The paper first reviews current approaches to transport sector revenue and expenditure estimation within Australia. It then examines data sources used, namely the Survey of Motor Vehicle Use and its vehicle classifications by kilometres travelled and volumes used, i.e. litres of fuel. As a 'bottom-up' approach, the TREM estimates overall volumes and expenditures across each of the states within Australia for 2015/16 by vehicle type on fuel, oil, tyres, repairs and maintenance and new vehicles, and what portion of this is allocated to fuel excise, vehicle registration charges and GST. This is compared with available estimates of these revenues published by the ABS, BITRE and NTC. This provides transport agencies and treasuries with a basis for estimating the impacts of reduced fuel use on user charges and taxation revenues arising out of changes in engine technologies or mode switching, for example. Finally, directions for the future development of the model are provided.

1 Introduction

This paper outlines the methodology used to compile a transport revenue and expenditure model (TREM) for Australia, focussing on a road transport component disaggregated by vehicle type and across states. The TREM is a 'bottom-up' approach focussing on a range of vehicle types, their expenditures on input costs and their contribution to revenues from road user charges and taxes, i.e. registration fees, fuel excise and GST. It therefore complements 'top-down' approaches to analysing the transport sector emanating from the economic National Accounts, as well as models aimed at specific issues such as heavy vehicle charging.

2 Literature review

Various representations of the transport sector exist, at a national level (i.e. not state-level) with some modal disaggregation. These include 'top-down' approaches the foremost of which is the System of National Accounts (SNA) as reflected in the national input-output (Supply & Use) tables published by the Australian Bureau of Statistics

(ABS, 2018b). “Road Transport” is included as a sector but is not disaggregated to passenger and freight transport. It must also be noted that these relate to ‘for hire’ (‘for reward’) activities and not in-house (‘own’) transport. To address the latter, the ABS undertook an estimation of in-house transport as an Experimental Transport Satellite Account (ABS, 2018c) incorporating a 4-sector classification (road, rail, air & water). Both these sources provide estimates of the provision of transport services to other sectors of the national economy, as well as inputs required in the form of fuel, registration & insurance and repairs & maintenance.

National Transport Commission (NTC) work on the National Land Transport Productivity Framework (NLTPF) has identified a number of input-output type metrics for the transport sector including capital and operating cost items per mode (i.e. inputs) e.g. fuel, registration costs, new vehicle costs, number of employees, as well as data on the output side, e.g. passengers & freight transported (Houston Kemp & Associates, 2017). The NTC also sponsored work undertaken by CSIRO (Graham & Reedman, 2015) aimed at projecting future tax revenues from the transport sector in Australia and their sustainability as a source of revenue.

3 Data & methodology

The primary source of data on vehicle registrations and use (vehicle-km & litres of fuel) across states and by vehicle type was the Survey of Motor Vehicle Use (SMVU) 2016 (ABS, 2017a). The vehicle classifications used in the SMVU are: passenger vehicles, motorcycles, light commercial vehicles (LCVs), rigid trucks, articulated trucks, non-freight carrying trucks and buses. This is disaggregated further to 35 vehicle types in the NTC PAYGO Heavy Vehicle Charges model (NTC, 2018). New vehicle sales were obtained from ABS (2018a) and weighted according to vehicle registrations by type across states. Data on unit prices¹ across vehicle operating cost (VOC) components, levels of vehicle registration charges and fuel excise were obtained from the most recent parameter values published in the Australian Transport Assessment and Planning (ATAP) Guidelines (Transport & Infrastructure Council, 2016), as well as from state road transport agencies and peak bodies² where appropriate, and applied to the volume data. GST estimates were based on the total value of purchases made by vehicle type and cost component, e.g. estimates of total input costs of fuel, oil, tyres, new vehicles and repairs & maintenance³. The base year for the model was 2015/16 to ensure consistency and comparison across available data sources and models, e.g. SMVU, Transport Satellite Accounts and Australian Input-Output tables.⁴

4 Results

Estimates were undertaken by vehicle type and by state in terms of:

- Total input costs – i.e. total purchases by the road transport sector of that input / sales revenue in the respective product market to the road transport sector;

¹ Updated as required.

² Such as the Federal Chamber of Automotive Industries (FCAI) & Bus Industry Confederation.

³ Using appropriate VOC models in Austroads and other reports identified in Transport & Infrastructure Council (2016), e.g. for oil & tyre consumption, with assumptions for road condition and travel speed.

⁴ The most recent version of the SMVU was released for 2018 (ABS, 2019) and estimates in TREM can be updated to reflect the latest data.

- Taxation component – registration charges, fuel excise and GST.

Estimates from the TREM are presented in Table 1 for the contribution by vehicle type to vehicle registration charges, fuel excise and GST, as well as total input costs (vehicle registration, fuel, oil, tyres, new vehicles, repairs & maintenance) by vehicle type for the Australian road transport sector in 2015/16. These estimates can be broken down across state and vehicle type, as well as by detailed input cost component.

Table 1: Australian road transport sector taxation contribution and input expenditures (TREM), 2016

Vehicle type	Registration (\$m)	Fuel excise (\$m)	GST (\$m)	Total tax / user charges (\$m)	Total inputs (\$m)
Passenger vehicles	6,582.1	6,815.1	7,007.4	20,404.7	77,081.59
Motorcycles	305.1	48.3	214.0	567.4	2,354.22
Light commercial vehicles	1,431.9	1,784.8	1,019.9	4,236.5	11,218.90
Rigid trucks	433.2	750.6	705.8	1,889.6	7,764.04
Articulated trucks	1,077.6	1,114.2	1,070.2	3,262.0	11,772.02
Non-freight carrying trucks	198.5	19.2	12.5	230.3	138.04
Buses	26.4	169.9	143.8	340.1	1,581.8
Total (\$m)	10,054.9	10,702.1	10,173.7	30,930.6	111,910.6

Source: TREM (2019)

Estimates obtained from the bottom-up estimation presented in Table 1 were compared to available sources, namely Bureau of Infrastructure, Transport and Regional Economics (BITRE, 2017) and the PAYGO model (NTC, 2018).⁵ In terms of fuel excise, the TREM estimate of \$10,702.1m compares to \$10,976.2m in BITRE (Ibid) for net road-related petroleum products excise for 2015/16, i.e. net of fuel tax credits⁶. The fuel excise revenue estimate of \$2,035.9m in TREM for heavy vehicles (rigid trucks, articulated trucks, non-freight trucks & buses) was compared to the fuel revenue estimate for heavy vehicles in PAYGO (NTC, Ibid) of \$1,887.4m. Likewise, estimates of vehicle registration fees of \$10,054.9m in the TREM were compared to the BITRE (Ibid) estimate of \$9,680.5m and the ABS (2017b) estimate of \$9,903m for vehicle registration fees (plus stamp duty) accruing to states in 2015/16.

⁵ BITRE (2017) data on road-related taxes and charges includes actual Australian Taxation Office (ATO) revenues from fuel excise, while the NTC's PAYGO Heavy Vehicle Charges model contains estimates of fuel excise and vehicle registration charges for a range of heavy vehicle types and is used in policy analysis for major heavy vehicle charging initiatives, e.g. NLTPF and Forward Looking Cost Base project.

⁶ Fullarton (2018) estimates total annual fuel excise revenue for 2016 as \$17,468m, i.e. before tax credit offsets.

5 Conclusions and future development

The TREM provides the following by state and vehicle type for the year 2015/16:

- Estimates for total road transport sector input costs for the main elements of vehicle operating cost;
- Contributions by state and vehicle type to vehicle registration charges, fuel excise and GST; and
- Basis for estimating the impacts of reduced fuel use on user charges and taxation revenues arising out of efficiencies secured through changes in engine technologies or mode switching.

The following directions for the future development of the TREM have been identified:

- More detailed analysis of variations in estimates across data sources;
- Inclusion of a more detailed heavy vehicle classification;
- Updated to 2018 SMVU and other data, including prices and tax contribution;
- Extension to other transport modes, e.g. rail, air; and
- Integration with available road expenditure data by level of government.

6 References

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