



THE ECONOMIC IMPACT OF AUSTRALIA'S ROADS

SEPTEMBER 2019

BIS Oxford Economics

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EXECUTIVE SUMMARY

\$133.0 bn

Total economic *welfare* value of road availability

Derived using a community welfare approach, based on willingness to pay for roads

Australian roads ensure the smooth-running of our daily lives while making a valuable contribution to our economy. The roads network is also an integral part of Australia’s multi-modal transport network, although the extent of this is not commonly understood. Indeed, the road network’s economic and social value is comprised of a wide range of benefits, with examples including:

- Flexibility in facilitating additional (marginal) journeys that would not have otherwise been taken for business or pleasure
- Enabling improved health outcomes and other essential services
- Connecting rail, sea, air and inland port facilities to markets

Other benefits include enabling light rail services and active transport. Light rail services are only able to offer low emission connectivity, place-making and agglomeration benefits due to the road network on which they operate. Similarly, the proliferation of bike networks and the health and environmental benefits they provide are also facilitated by the road network.

Roads also have a so-called “option value”, since they provide people with the option to reside away from a major population hub with a rail network and to travel when the rail network is not operating. This option value offers up both gains in productivity, and social welfare (“consumer surplus”).

“Roads make a valuable contribution to Australia’s economic growth, jobs and social welfare. This ultimately enhances the well-being and livelihoods of all Australians.”

In 2017/18 it is estimated there were 529,000 persons directly employed on a full-time equivalent¹ (FTE) basis in the roads industry, of which 313,000 were in the for-hire industry and 215,000 were in-house. This includes both workers involved in the physical transportation of people or goods and workers that directly support these operations.

The roads industry is also a major contributor to economic activity. In 2017/18, the roads industry was directly responsible for around 4 per cent of Australian gross value-added, of which 2.5 per cent was accounted for by the in-house roads industry.

The total economic value added associated with the roads industry was estimated at \$206.8 bn in 2017/18 prices, while total employment is estimated at 1,295,000 FTEs.

The roads industry share of gross value-added is comparable to that of the wholesale trade industry. The broader logistics industry which comprises the activity of the transport, postal and warehousing industry, as well as all in-house transport modes, makes up around 8 per cent of gross value-added.

\$206.8 bn

Added economic value (GDP) due to roads

Based on economic impact approach using input-output analysis and satellite data



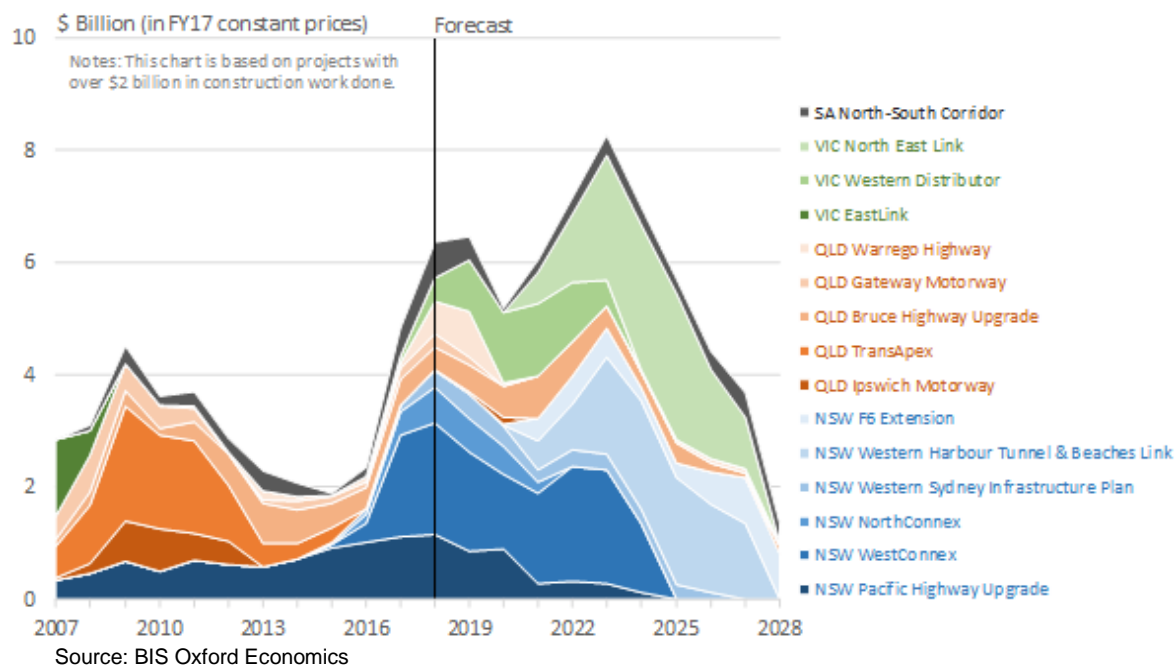
¹ A part-time worker is assumed as 50% of a full-time worker

The total road network coverage in Australia is estimated at 877,651km² of which 73 per cent is classified as local roads controlled by local governments.

Looking ahead, there is a strong pipeline of roads activity underway, with total roads, highways and subdivisions activity expected to average \$22.7bn over the five years to 2022/23 and \$25.4bn over the five years to 2027/28 (in 2016/17 prices).

In the short term, this activity will provide a significant fillip to employment and activity at a time when business investment and consumer spending are sluggish. In the longer run, the increase in the road network will help accommodate a growing population, increased urban density and support the modal-shift required to make our cities more productive.

Major Road Projects above A\$2bn



In terms of the road network's contribution to economic activity, the for-hire industry is counted as part of the transport, postal and warehousing industry division (Division I) in the National Accounts. However, in-house activities by industries (for all transport modes) are not currently separately identified.

Two well-established and robust approaches were used to undertake analysis into the economic value of the road network:

1. **Economic impact (input-output) analysis**, which involves estimating the road network's contribution to *economic activity (growth)* and *employment*. This approach uses the Transport Satellite Account data³ published by ABS as a basis for determining GDP contributions. Indirect effects are also included, relating to employment and activity levels required by suppliers to

² The Bureau of Infrastructure, Transport and Regional Economics (BITRE) Statistical Yearbook 2018

³ Australian Bureau of Statistics (2018), Cat. No. 5270.0

support the current level of roads activity. Meanwhile, induced effects relate to demand from higher household income due to this related employment.

2. **Economic welfare analysis**, which is focussed on “consumer surplus”: the benefit that the community receives due to proposed road developments. Technically speaking, consumer surplus measures the (net) willingness to pay for goods and services, after allowing for commodity cost. A welfare approach can also allow for the estimation of “externalities” (or third-party effects) which arise even when no goods or services are directly traded.

The results from these distinctive approaches are summarised in Figure 1.

Fig. 1. Value of roads, 2017/18

Economic impact approach	Value
<i>Economic value</i>	<i>\$billion</i>
For-hire roads industry	79.9
In-house roads industry	126.9
Total economic value	206.8
<i>Employment</i>	<i>000 persons</i>
For-hire roads industry	737
In-house roads industry	558
Total employment	1,295
Economic welfare approach	Value
<i>Consumer surplus</i>	<i>\$billion</i>
Passenger car and motorcycle	86.5
Road freight	41.4
Bus	3.2
<i>Sub-total consumer surplus</i>	<i>131.1</i>
Option value (bus only)	1.9
Total economic welfare value	133.0

Source: BIS Oxford Economics

Using alternative approaches gives a fuller picture of value, though it is important to note the distinctions between approaches. The input-output approach, for instance, considers employment and economic activity attributable to the roads industry (for-hire and in-house). It does not therefore cover roads trips made by households for either work or pleasure. The welfare approach on the other hand considers consumer surplus from across all road trip purposes. Thus, it does not consider the cost of journey time and other data limitations suggest that the welfare figure is likely to be conservative.

Crucially, the economic impact results obtained from each approach cannot be added to give a larger impact figure. This arises for several reasons: the bases of each analysis are not directly comparable; the approaches have different methodologies and assumptions; there is an indirect overlap in economic values; and this would result in an inflated figure subject to “double counting”. We therefore report each impact measure individually.

1. INTRODUCTION

1.1 BACKGROUND TO STUDY

BIS Oxford Economics has been engaged by Roads Australia to undertake analysis into the economic value of the road network.

The strategic importance of the road network in facilitating a multi-modal network are not well understood. The economic and social value of the road network includes its:

- 'Last mile' role in connecting rail, sea, air and inland port facilities to markets
- Flexibility in facilitating marginal journeys that would not have otherwise been taken for business
- Flexibility in facilitating marginal journeys that would not have otherwise been taken for pleasure
- Important enabling role for health and other essential services
- Agglomeration benefits and other wider economic benefits from overcoming imperfections in secondary markets
- Enabling of light rail, coach and bus services which are intrinsic to public transport provision
- Enabling of active transport including walking and cycling
- Providing connectivity to areas where rail is not feasible, including regional and remote communities

A road does not produce economic output by itself but is an input to economic activity. The marginal contribution of the road network to economic production varies by industry but is on the whole a comparatively small component.

1.2 AUSTRALIA'S ROAD NETWORK

The total road network coverage in Australia is estimated at 877,651km⁴ of which 73 per cent is classified as local roads controlled by local governments.

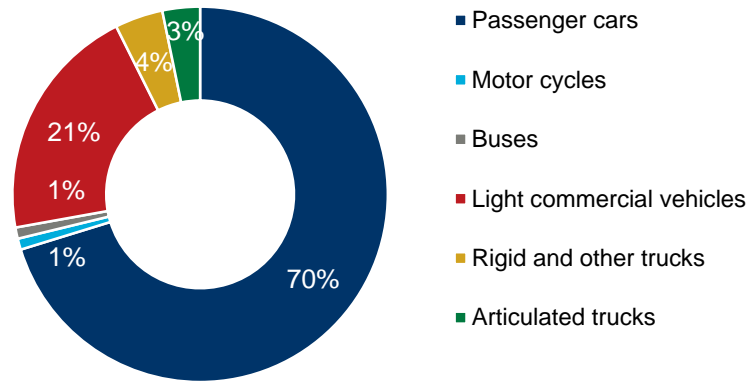
The Australian Bureau of Statistics annual Survey of Motor Vehicle Use, Australia (cat. no. 9208.0) reported 19 million motor vehicles in use for the 12 months ending 2017/18 with an average distance travelled of 13.4 thousand kilometres.

Passenger vehicles accounted for 70.5 per cent of total kilometres travelled and were mostly driven for personal and other use (54 per cent) followed by travel to and from work (25 per cent) and travel for business purposes (21 per cent).

⁴ The Bureau of Infrastructure, Transport and Regional Economics (BTIRE) Statistical Yearbook 2018

On average passenger vehicles were reported to have travelled 12.6 thousand kilometres. In comparison, articulated trucks were reported to have travelled 79.4 thousand kilometres on average.

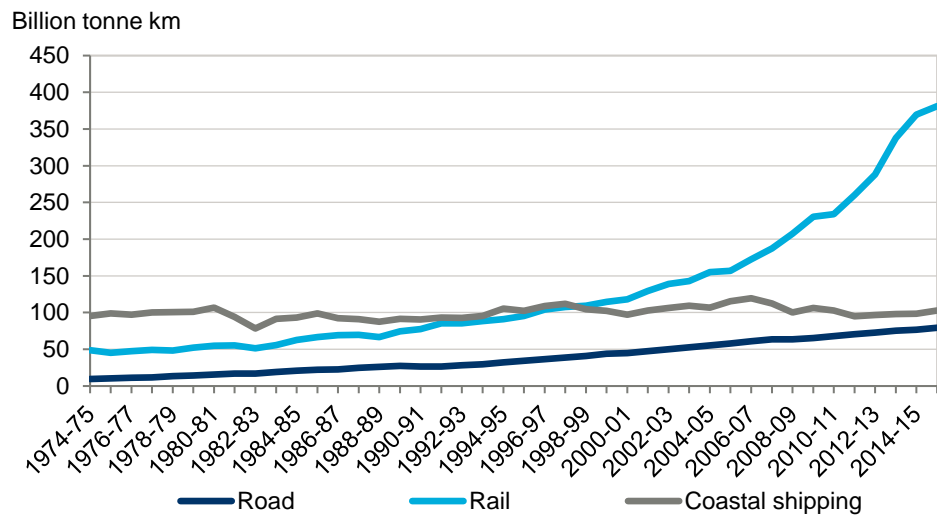
Fig. 2. Mode share of road kilometres, 2017/18



Source: BITRE Statistical Yearbook 2018

The rail network is responsible for moving the bulk of the domestic freight task, with its role have increased significantly over the past two decades. However, the road network plays a crucial role in facilitating this task by providing the ‘last mile’ role in connecting the freight to its markets.

Fig. 3. Australian domestic freight task, by mode of transport



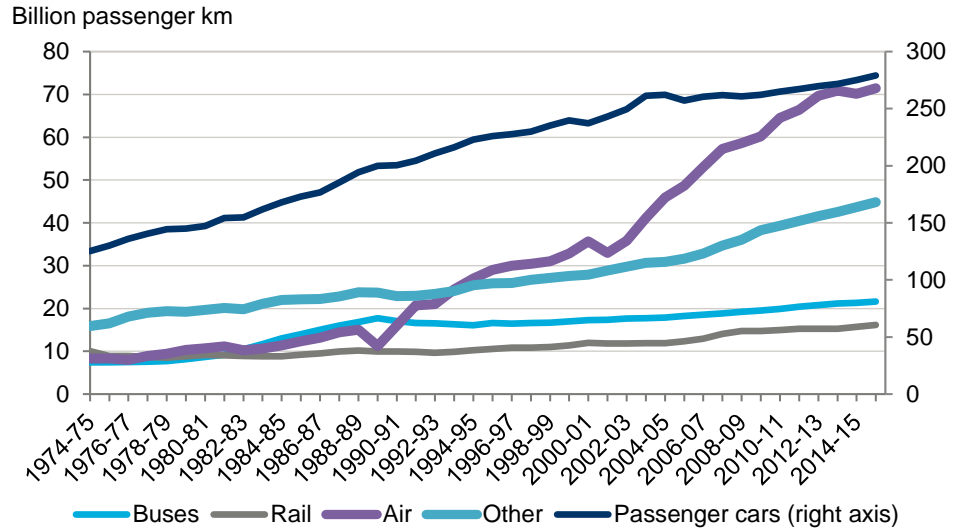
Source: BITRE

In contrast, the road network accounts for the bulk of the domestic passenger task (Fig 3). This includes passenger cars, buses and other non-business use of light commercial vehicles, motorcycles etc.

It should be noted that the transport task figures exclude the increasing use of active transport (e.g. bikes and walking) both for commuting and personal purposes, which are facilitated by the road network. Also, the increasing presence of light rail in major cities and its contribution to the passenger task

are counted under rail, although parts of the route – particularly through the cities – is facilitated by the road network.

Fig. 4. Australian domestic passenger task, by mode of transport

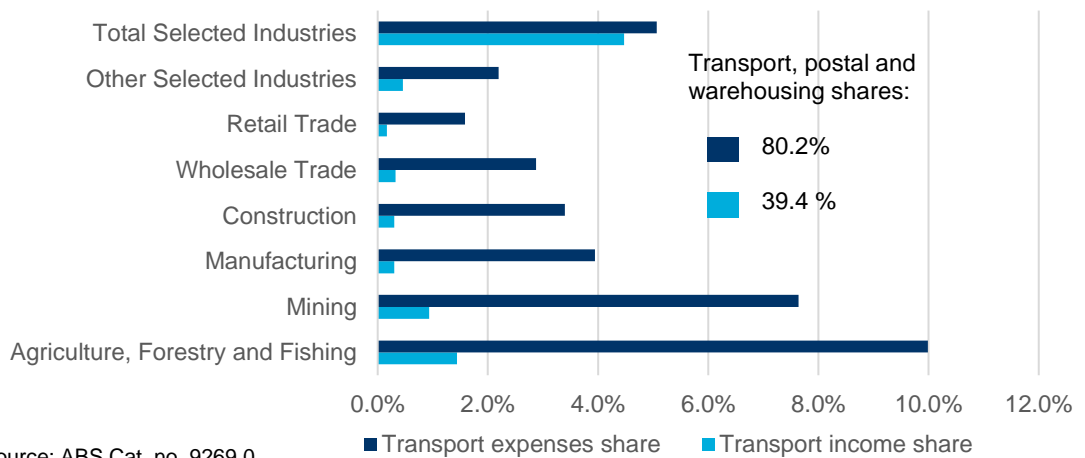


Source: BITRE

In terms of the road network’s contribution to economic activity, the for-hire industry is counted as part of the transport, postal and warehousing industry division (Division I) in the National Accounts. However, in-house activities by industries (for all transport modes) are not currently separately identified.

The ABS collected economic and financial data for transport activity undertaken by business during 2010-11⁵, which showed that for some non-transport industries transport expenses were a significant part of total expenses. Some non-transport industries also earned a small part of their income from transport activities.

Fig. 5. Business transport shares of activity, 2010-11



Source: ABS Cat. no. 9269.0

⁵ ABS, Business Transport Activity, Australia, 2010-11 (Cat. no. 9269.0). The data excludes entities classified as SISCA Sector 3 General Government except for Division D and entities classified to Division K

1.3 REPORT COVERAGE

While the focus of this report is on the contribution of the roads sector to economic activity and employment, one of the key benefits of roads is their 'option value'. For instance, they provide people with the option to reside away from a major population hub with a rail network and they provide the option for people to travel when the rail network is not operating, i.e. at night and off-peak when there are fewer services. This option value offers up both productivity gains and increases in consumer surplus.

Other benefits which can be quantified include the benefits from enabling light rail services and active transport. Whether it is Sydney Light Rail or Brisbane Metro, these projects are only able to offer the low emission connectivity, place-making and agglomeration benefits they do as a result of the road network on which they operate. Similarly, the proliferation of bike networks and the health and environmental benefits they provide are also facilitated by the road network.

Additional research will be required to identify the extent to which the role that roads plays in facilitating the delivery of essential services and potential other social benefits.

We have adopted two approaches to estimating the economic impact of Australia's road network. In Section 2 we consider an input-output based approach to estimating the road network's contribution to economic activity and employment using as a basis the Transport Satellite Account published by the Australian Bureau of Statistics (cat. no. 5270.0). In Section 3 we consider an alternative way of measuring the value of the roads using a welfare economics approach.

2. AN INPUT-OUTPUT APPROACH

2.1 THE ABS EXPERIMENTAL TRANSPORT SATELITTE ACCOUNT

In October 2018, the Australian Bureau of Statistics released An Experimental Transport Satellite Account, 2010-11 to 2015-16 (cat. no. 5270.0). The Transport Satellite Account extends the focus of the core National Accounts to provide a more detailed analysis of transport activity. It includes both transport activities conducted on a for-hire basis (primarily undertaken by businesses classified under the transport, postal and warehousing industry division in the National Accounts) as well as activity conducted by businesses for their own use.

The ABS created four new 'in-house' transport industries, one each for road, rail, air and sea transportation. Using data relating to transport activity undertaken in non-transport industries from Business Transport Activity, Australia, 2010-11 (cat. no. 9269.0) and detailed employment information from the Labour Account, the ABS was able to build up a profile for the inputs and use of the four new in-house industries and adjust the supply-use tables incorporated in the National Accounts to explicitly capture the supply and use relating to in-house transport activity. Each of the new industries was assumed to only produce a single output, being in-house transport relating to the specific mode (road, rail, air, sea).

The Transport Satellite Account assumes that the in-house transport industries exhibit the same input structure and production functions as the equivalent for-hire industries. There are three components identified as inputs in the production of in-house road transport: transport related (e.g. fuel, repairs, parts and rental, registration and insurance costs); non-transport related (e.g. other intermediate inputs such as accounting and support services) and value-added components (e.g. taxes, gross operating surplus and compensation of employees).

In-house transport activity is assumed to either be for own use (ancillary production) or for supplying to another institutional unit (secondary production). It is assumed that all activity within the transport, postal and warehousing industry division is for-hire and no products from this industry have been used as input to the in-house industries.

We have used the Transport Satellite Account data as the base for estimating the current size of the roads industry (for-hire and in-house) and establishing an input-output approach to assessing the industry's broader impacts on economic activity and employment. See Appendix A for more details on approach used.

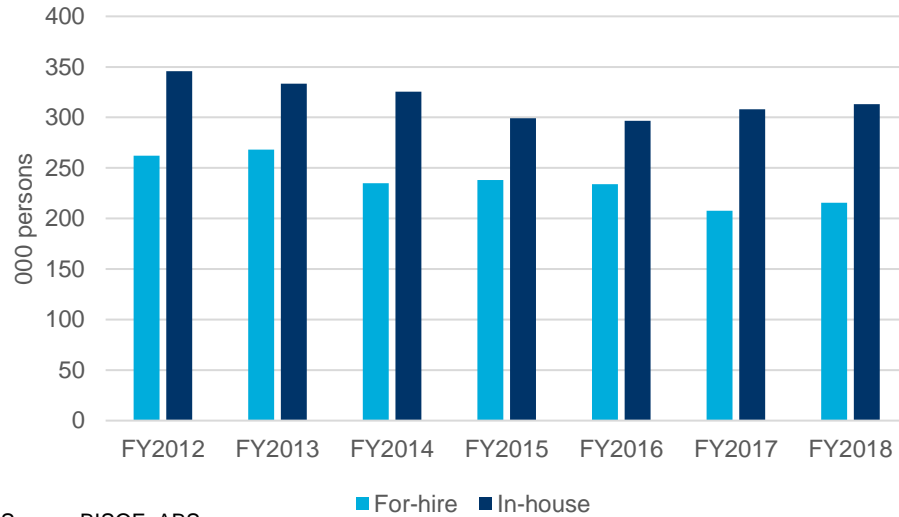
2.2 CURRENT SIZE OF THE ROADS INDUSTRY

In 2017/18 it is estimated there were 529,000 persons directly employed on a full-time equivalent⁶ (FTE) basis in the roads industry, of which 313,000 were in the for-hire industry and 215,000 were in-house. This includes both workers

⁶ A part-time worker is assumed as 50% of a full-time worker

involved in the physical transportation of people or goods and workers that directly support these operations.

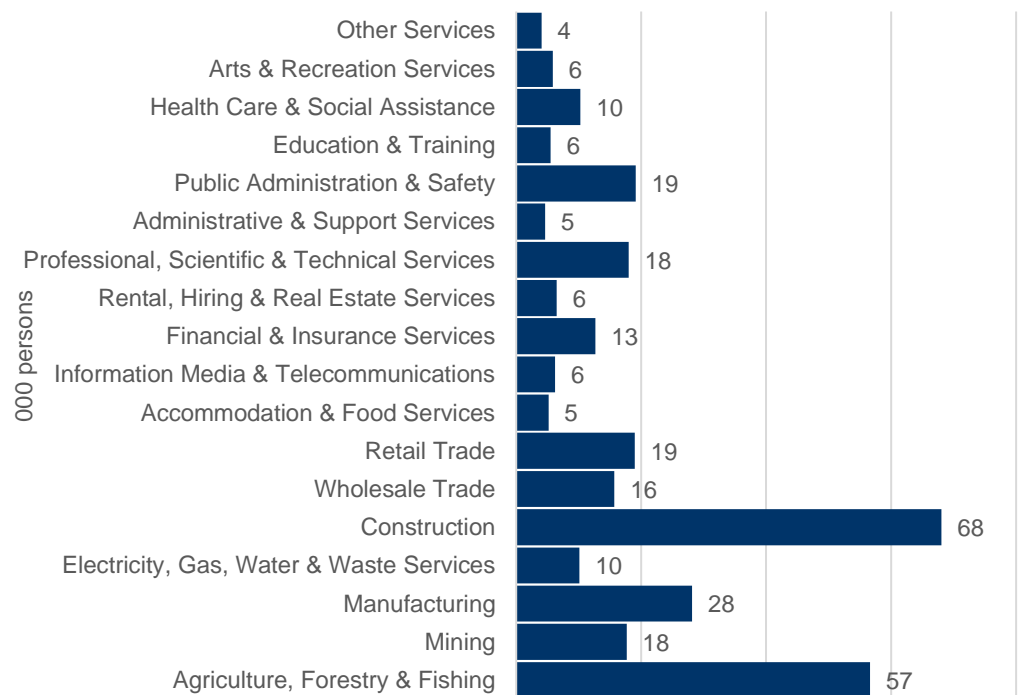
Fig. 6. Roads industry employment by sector (FTEs), 2017/18



Source: BISOE, ABS

For in-house road transportation, the largest employing industry is estimated to be construction with 68,000 full-time equivalent workers in 2017/18, followed by agriculture, forestry and fishing with 57,000 full-time equivalent workers. In total, the road transport industry (for-hire and in-house combined) was estimated to account for 5 per cent of all full-time equivalent employees in 2017/18.

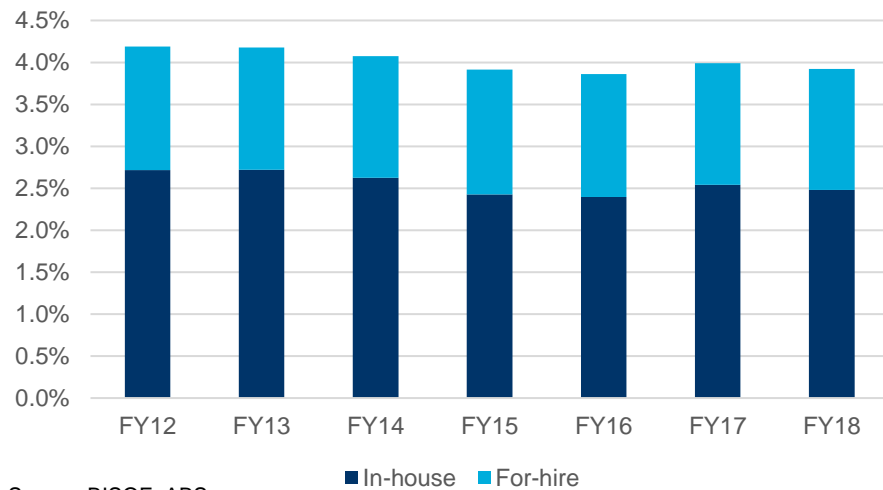
Fig. 7. In-house road industry employment by industry (FTEs), 2017/18



Source: BISOE, ABS

The roads industry is also a major contributor to economic activity. Fig. 7 shows that the roads industry is currently directly responsible for around 4 per cent of Australian gross value-added, of which 2.5 per cent is accounted for by the in-house roads industry. This figure highlights the extent to which the value of the roads industry to gross value-added is underestimated by only considering the for-hire industry.

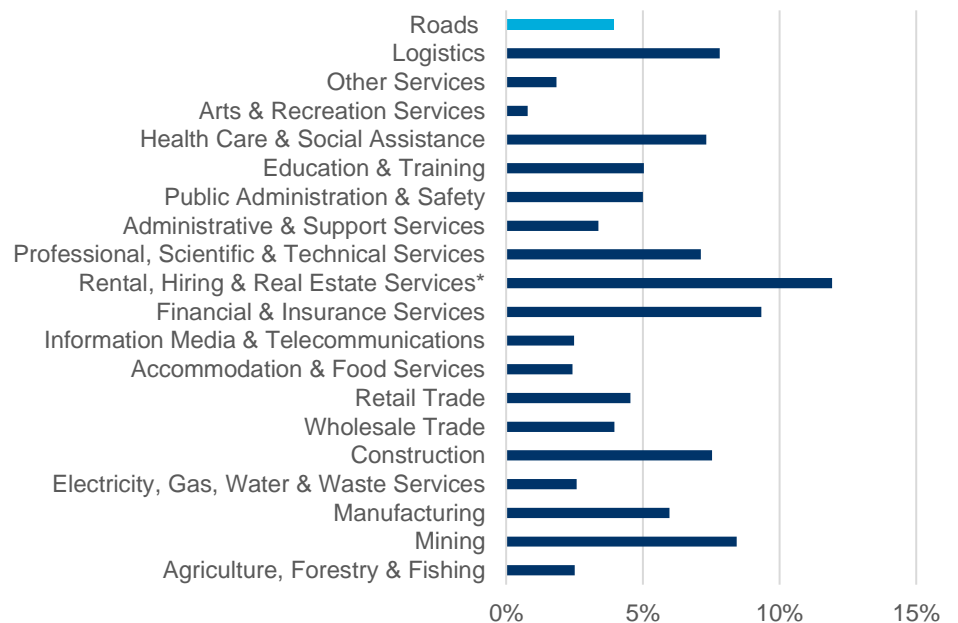
Fig. 8. Roads industry share of total gross value-added



Source: BISOE, ABS

Fig. 8 shows that the roads industry share of gross value-added is comparable to that of the wholesale trade industry. The broader logistics industry which comprises the activity of the transport, postal and warehousing industry, as well as all in-house transport modes, makes up around 8 per cent of gross value added or contributes around the same to value added as both the mining and construction sectors.

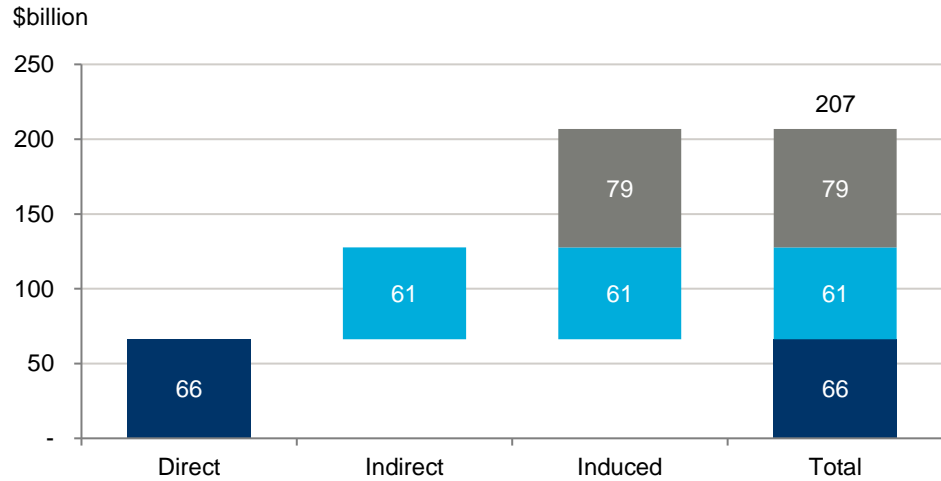
Fig. 9. Roads industry share (%) of total gross value-added, 2017/18



Source: BISOE, ABS (* includes ownership of dwellings)

In addition to the direct employment and value-added contribution of the roads industry, there are broader benefits to the economy, namely the indirect and induced effects. Indirect effects relate to the employment and activity levels required by suppliers to facilitate the current level of roads activity and induced effects relate to demand from increased household income associated with employment (direct and indirect), a proportion of which will be re-spent on goods and services.

Fig. 10. Total Economic Effects of Roads Industry, 2017/2018

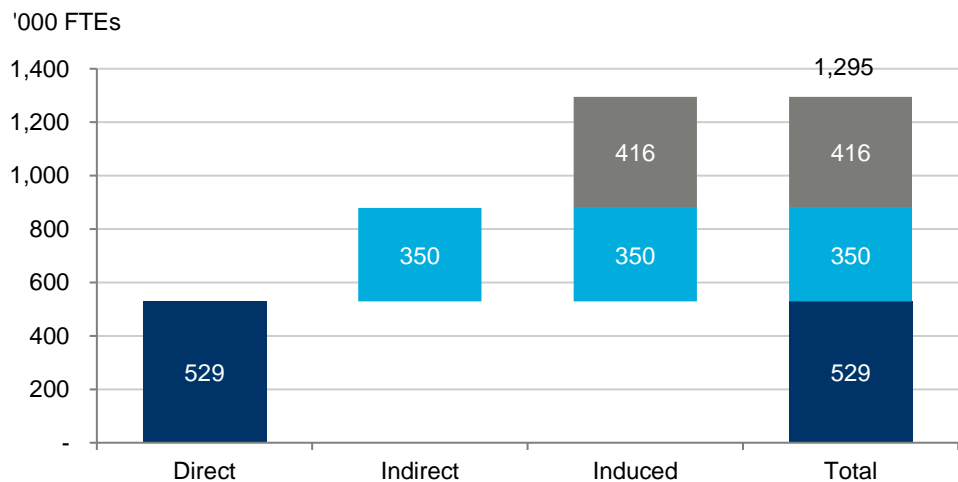


Source: BISOE, ABS

The total economic value of the roads industry in 2017/18 was valued at \$207 billion, comprising \$66billion in direct effects, \$61billion in indirect effects and \$79billion in induced effects.

The broader employment effects are illustrated in Fig. 7. In total it is estimated that the roads industry supports around 1.3 million jobs nationally.

Fig. 11. Total Employment Effects of Roads Industry, 2017/2018



Source: BISOE, ABS

The figures above relate to employment and economic activity attributable to the roads industry (for-hire and in-house). The Transport Satellite Account is linked to the supply-use tables incorporated in the National Accounts. It does not therefore cover roads trips made by households for either work or pleasure. The consumer surplus associated with private car trips is measured in the next section.

3. ECONOMIC WELFARE APPROACH

3.1 BACKGROUND

An alternative to the economic impact (or GDP focused) approach to the valuation of roads is the use of an economic welfare approach. Unlike a GDP focussed approach, an economic welfare approach is focussed on “consumer surplus”, as measured by the (net) willingness to pay for goods and services, after allowing for the cost of those commodities. In addition, a welfare approach can also allow for the estimation of “externalities” (or third-party effects) which arise even when no goods or services are directly traded. We discuss a key externality (option value) in a later section of this chapter.

3.2 CONSUMER SURPLUS

Consumer surplus is a key measure in assessing the value of commodities to society in an economic welfare sense. Consumer surplus refers to the difference between what users pay for a good or service and what they are willing to pay (WTP) for it. For example, a private road user may be WTP \$30 for a trip which only costs her \$10. Her consumer surplus is \$20. Consumer surplus therefore effectively represents a consumer’s “profit” – how much they gain from using a commodity in net terms. The sum of all of the consumer surpluses for individual users adds up to the total consumer surplus for society as a whole for road usage. This allows analysts to measure the net benefit to society from usage.

Consumer surplus (CS) can be estimated using a demand curve relating prices and quantities consumed and data on “price elasticities”⁷. Price elasticities measure the responsiveness of a good or service to a change in price. For example, a price elasticity of 1.0 for road usage means that a 1% increase in the road usage price is associated with a 1% decrease in demand for usage. An elasticity of 0.5 means a 1% increase in price is associated with a 0.5% decrease in demand (known as inelastic demand) while an elasticity of 1.5 means a 1% increase in price is associated with an 1.5% increase in usage.

In essence, a simplified formula for assessing the value of consumer surplus using a linear (straight line) demand curve is:

$$CS = (\text{Total cost} \times 0.5) / (\text{Elasticity})$$

While this is likely to form a lower bound value for consumer surplus, it is nonetheless useful in getting a first order approximation of the consumer surplus associated with a given good or service.⁸

⁷ For a technical discussion of this see Chapter 4 of Boardman, A., Greenberg, D., Vining, A. and Weimer, D., Cost Benefit Analysis: Concepts and Practice, Fifth Edition, 2018

⁸ Technically speaking, models specified in logs (e.g. double log models) can often yield closer approximations to industry demand curves and higher values for CS. However, analysis can “linearise the demand curve” in order to develop a lower bound estimate for consumer surplus values. This is effectively what has been done here.

In the case of valuing Australians' usage of the road network, this approach therefore requires assessing:

1. Total costs of usage
2. The elasticity of demand
3. The values of 1. and 2. for passenger cars and motorcycles, bus and road freight transport.

Note that in assessing item 1, we have limited our valuations to the estimated operating costs of road transport (e.g. fuel, operating costs, fares, fees etc.)⁹.

Estimations of the CS value of Australia road transport are described for private vehicles, bus transport and freight below.

Values have been expressed in 2018 dollars.

3.2.1 Passenger cars and motorcycles

Estimates of the cost of passenger car and motorcycle transport in Australia can be derived from multiplying:

1. the number of kilometers traveled per year; and
2. the average cost per kilometer

Item 1. is readily available from the ABS' *Survey of Motor Vehicle Use, Australia*.¹⁰ This indicates passenger car km travelled (179.8m km) and motorcycle km travelled (2.1m km) in the year up to 30 June 2018. This publication also disaggregates km travelled into urban and rural environments which is of use for the calculation below.

Estimates for the car costs per km were based on medium car operating costs provided in the *NSW Principles and Guidelines for Economic Appraisal 2018*, with an assumed average speed of 40 kph in urban areas and 90 kph in rural ones.¹¹ Separate operating costs for motorcycles were not available, however small car costs for these speeds were used as a proxy. While this may overestimate motorcycle operating costs to some extent, given the relatively small motorcycle km travelled this is unlikely to be material.

This process suggested operating cost of 46.9c/km for urban areas and 29.9c/km for rural ones. The equivalent motorcycle costs were 0.34c/km for urban areas and 23.3c/km for rural ones. These estimates produced an average cost of 42.8c/km for passenger vehicles and motorcycles. Given a combined total of some 182million km travelled in the year to 30 June 2018, this implies total expenditure of \$77.9 billion.¹²

⁹ While it might be possible to extend the analysis to include the cost of journey time, this poses additional complications given the lack of data on typical journey times and comprehensive value of time elasticities. This also means that our assessments are likely to be relatively conservative.

¹⁰ [ABS \(2019\) Survey of Motor Vehicle Use, Australia, 12 months ended 30 June 2018, Cat No. 9208.0](#)

¹¹ Transport for NSW, (2018) *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives*, June 2018. These are resource costs including fuel, oil, vehicle capital costs, repair and maintenance.

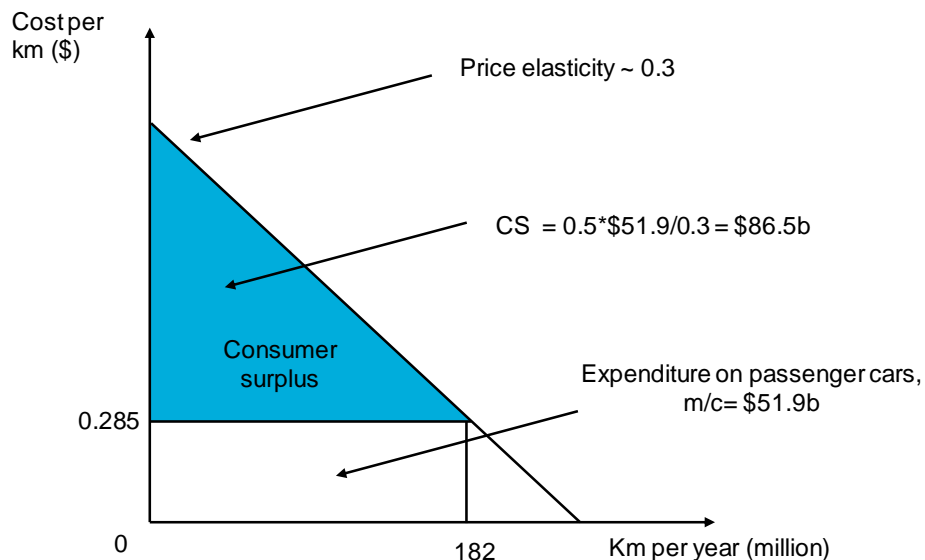
¹² This value is very similar to the figure of \$ 82.7 billion for 2015-16 for Australian household expenditure on owning and operating vehicles estimated in Bureau of Infrastructure, Transport and regional Economics (BITRE)

However, this figure includes vehicle capital costs, whereas our interest is in actual road usage activity. Accordingly, the percentage of vehicle purchase costs within total spending on passenger vehicles and motorcycles was estimated based on BITRE data.¹³ This was then excluded from the calculations.

This produced a revised operating cost figure (excluding capital costs) of \$51.9 billion. A vehicle operating cost elasticity of 0.3 was estimated, based on the extensive international work of Wallis and Schmidt.¹⁴

This produced an estimated consumer surplus of \$86.5 billion for passenger cars and motorcycles, based on the formula given above. The figure below provides a diagrammatic illustration of this figure.

Fig. 12. Passenger car and motorcycle consumer surplus



3.2.2 Road freight

Estimation of a consumer surplus figure for road freight proceeded along broadly similar lines to the estimation for passenger cars and motorcycles above. However, in this case the cost of road freight services can be estimated

(2017) Spending by Australian households on owning and operating vehicles in 2015-16. This alternative estimate provides a cross check to the calculations. Though the figures have some differences (e.g. reference years are slightly different, some passenger cars and motorcycles would be commercially owned) the closeness of the figures is notable.

¹³ BITRE (2017) *ibid*, Table 2

¹⁴ Wallis, I and Schmidt, N.(2003), *Australasian travel demand elasticities: An update of the evidence.*, 6th Australasian Transport Research Forum, Wellington, New Zealand. This figure is also consistent with fuel price elasticities which are more commonly estimated across the literature – see Litman, T 2019 Transit Price Elasticities and Cross Elasticities and de Jong, G. and Gunn, H.F. (2001) “Recent evidence on car cost and time elasticities of travel demand in Europe”. *Journal of Transport Economics and Policy*, 35 (2).

from ABS (2012) *Business Transport Activity, Australia, 2010-11* which disaggregates road freight transport services income.¹⁵ The income from road transport effectively constitutes the road freight costs to the broader community for these services and therefore can be used as a total expenditure estimate. This document was a one-off publication, with subsequent published ABS information omitting a precise road freight transport income estimate. However, the estimated costs can be indexed to the broader growth in road transport Sales and Service Income since 2010-11 using the ABS's *Australian Industry 2017-18* publication.¹⁶

This produces a figure of \$35.7 billion in 2017-18 (up from \$30.1 billion in 2010-11).

A price elasticity of 0.43 was used for road freight based on extensive past modelling work by the Productivity Commission.¹⁷

This yielded a road freight consumer surplus of \$41.4 billion (i.e. $\$35.7 \times 0.5 / 0.43$)

3.2.3 Bus transport

As is the case for road freight, a one-off supplement to an ABS publication, (ABS 2011, *Australian Industry, 2009-10*) provides income for both urban and interurban/rural bus transport income from passenger fares. This income effectively constitutes the user cost of bus transport.

As this data:

1. Included tram fares; and
2. Related to income in 2009-10

it was necessary to make adjustments to derive a "pure" bus fares updated figure.

In order to address the first issue above, tram fare income was excluded based on estimates for 2009-10 for the Melbourne tram network.¹⁸ The second issue was addressed by indexing the 2009-10 figures to RBA estimates of the growth in CPI to 2018.¹⁹ This produced an estimated \$3.1 billion in bus transport costs in 2017-18 (of which \$2.1 billion relates to urban bus transport and \$1 billion to interurban and rural transport).

¹⁵ ABS (2012) *Business Transport Activity, Australia, 2010-11*, Cat. No. 9269.0.

¹⁶ ABS (2019), *Australian Industry 2017-18*, Cat. No. 8155.0

¹⁷ Productivity Commission (2006) *Road and Rail Freight Infrastructure Pricing*

¹⁸ Stone, J. (2015), *Melbourne's public transport: performance and prospects after 15 years of 'privatisation'* Australian Cities Conference 2015. While trams obviously also run on roads, they have been excluded due to the mixed mode nature of light rail (e.g. some routes also run along a dedicated right of way). Only Melbourne tram revenue has been deducted, however this would constitute the great majority of Australian farebox revenue

¹⁹ Reserve Bank of Australia (RBA) "Inflation calculator" <https://www.rba.gov.au/calculator/> accessed 16 August 2019

An elasticity of 0.4 was used for urban bus transport – this figure is consistent with estimates from a variety of sources.²⁰ As there is little Australian evidence for non-urban bus transport, a non-urban bus transport elasticity of 0.9 was based on Dargay and Hanly's major UK study of non-urban buses.²¹

These figures were then used to derive a consumer surplus estimate of \$3.2 billion for buses.

3.3 OPTION VALUE

As indicated above, the externalities associated with road transport may also be considered. One such externality is option value. This is essentially the value associated with the option of having access to a good or service without necessarily using it. In a sense it is akin to a kind of insurance value. Accordingly, having the option of using the road network (or aspects of it) may be of importance to Australians whether or not they make extensive use of large parts of that network and/or network services.

While often discussed, there is little quantification of option value in the Australian or international literature. While there appears to be no generic estimation of the value of accessing the road network *per se*, option values are sometimes estimated for forms of road-using public transport such as bus transport. Even here there appear to be a lack of Australian evidence, though publications such as the ATAP Guidelines recognize the importance of option value in this context.²²

A way forward may be found in the bus transport option value estimates developed by the UK Department for Transport (DfT). These draw on extensive UK research and suggest a bus transport figure of £73 per household, expressed in 2010 terms.²³

Adjusting these figures to 2018 Australian dollars (allowing for both inflation and purchasing power parity (PPP) exchange rates) yields a figure of \$188 per household.²⁴ Allowing for some 9.9 million Australian households, this suggests a total option value figure for bus services of \$1.9 billion in 2017-18.²⁵

²⁰ Transport for NSW op. cit; Wallis and Schmidt, op. cit ; Australian Transport Assessment and Planning (ATAP) Guidelines (2018) M1 Public Transport

²¹ As cited in Litman, op. cit.

²² ATAP op. cit.

²³ UK Department for Transport (2019), TAG Data Book, May 2019. Table A4.1.8 at <https://www.gov.uk/government/publications/tag-data-book> accessed 16 August 2019

²⁴ Allowing for UK inflation calculated using Bank of England, Inflation Calculator <https://www.bankofengland.co.uk/monetary-policy/inflation/inflation-calculator> accessed 16 August 2019 and OECD Purchasing Power Parities at <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm> accessed 16 August 2019

²⁵ Australian Bureau of Statistics 2016 Census Quickstats https://quickstats.censusdata.abs.gov.au/census_services/getproduct/census/2016/quickstat/036 accessed 16 August 2019

3.4 TOTAL VALUE

The consumer surplus and option value figures estimated above can be combined to derive a total economic welfare estimate for the value of road transport services. This figure represents an alternative to a GDP based approach to the estimation of the value of roads to the Australian community. Using a welfare-based approach the economic value of roads to Australians was estimated as \$133 billion in 2017-18.

As indicated above, data limitations suggest that this figure is likely to be conservative.

Fig. 13. Value of roads: economic welfare basis

	\$ billion
Consumer surplus	
Passenger car and motorcycle	86.5
Road freight	41.4
Bus	3.2
<i>Sub-total consumer surplus</i>	<i>131.1</i>
Option value (bus only)	1.9
Total economic welfare value	133.0

Source: BIS Oxford Economics analysis

4. APPENDIX A – METHODOLOGY

Transport Satellite Accounts

- The tables from the Transport Satellite Account were used to expand the supply-use tables associated with the 2015-16 National Accounts to include the in-house transport industries for road, rail, sea and air. Employment and gross value-added for the in-house industries in 2016-17 and 2017-18 were estimated by projecting forward the productivity trends for in-house industries from the Transport Satellite Account using industry employment and value-added movements from the annual National Accounts and Labour Force releases.
- Input-output analysis is conducted using symmetric tables (industry by industry) which are constructed from the supply-use tables (industry by product group). However, converting the supply-use tables to consistent symmetric input-output tables is a nontrivial process and it would not be possible to replicate the approach used by the ABS. A simplifying assumption that outside of the in-house transport industries there is no secondary production was used, so that the supply-use table was considered to represent industry by industry flows.
- An adjustment was made to the 2015-16 supply-use table (with the added in-house industries) to switch the treatment of imports from an indirect to a direct allocation as the area of interest is domestic employment and production.
- The multipliers were then estimated using the expanded 2015-16 supply-use tables and applied to the 2017-18 estimates of employment and gross value-added for the for-hire and in-house roads industries. While the 2016-17 supply-use tables are available, technologies are unlikely to have changed significantly in this time and therefore the 2015-16 multipliers are considered appropriate for use.
- In using an input-output approach no counterfactual is assumed. Obviously, there is some scope with both for-hire and in-house transport movements to be switched to rail, air or sea and therefore alternative uses to be found for resources currently dedicated to roads activity. However, the focus of this analysis is on the currently usage of transport, particularly the road network, and the analytical approach used reflects that.



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