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Long distance commuters in Australia: A socio-economic and demographic profile

Hema de Silva[1], Leanne Johnson[1] and Karen Wade[1]

[1]Cities Research

Bureau of Infrastructure, Transport and Regional Economics

Email for correspondence: hema.desilva@infrastructure.gov.au

Abstract

There are various types of long distance commutes in Australia, such as the widely known fly-in-fly-out commutes that occur in sparsely populated mining areas or daily commutes from peri urban areas to a nearby city. This paper provides a review of the published literature on different types of long-distance commutes. It analyses long distance commutes of over 100 kilometres and elicits the underlying drivers while adopting measures to overcome data issues inherent in researching important trends in long distance commuting. The paper presents new empirical evidence on types of long distance commuting that occurred in Australia in 2006 and outlines some implications for planning and formulation of policies.

1. Introduction

As noted by Mitchell (2008, p. 6), 'orthodox theory posits that labour mobility is the "fluid" that allows the labour market (to) operate efficiently'. The two common forms of mobility are: commuting—which is temporary and migration—which is permanent (Shaw and Williams 2002). This paper focuses on mobility through commuting. In particular it deals with long distance commuting. Unlike the migrants, the long distance commuters travel from their usual place of residence and remain at the destination for a period of time, which could be as short as eight hours, or a longer period of one day or even several weeks as observed amongst those who work at resource project sites.

The unevenness in the distribution of employment opportunities between different regions and the differentials in the rewards and risks between a 'destination region' and an 'origin region', are generally cited by researchers and practitioners as the main drives that influence all forms of mobility (see Gordon 2003, Mitchell 2008). Based on a literature survey, the next section of this paper identifies variations of these two main drivers of mobility that motivate long distance commuting in Australia. Various data issues that affected this study and previous studies on long distance commuting are outlined in section 3. Based on a preliminary analysis of ABS Census data, section 4 outlines the extent and the spread of various types of long distance commutes as enumerated on the Census day of 2006. In recognition of the most common destinations of long distance commuting and the distances commuted from origin region to those destinations, section 5 presents the principal types of long distance commuting occurring in Australia.

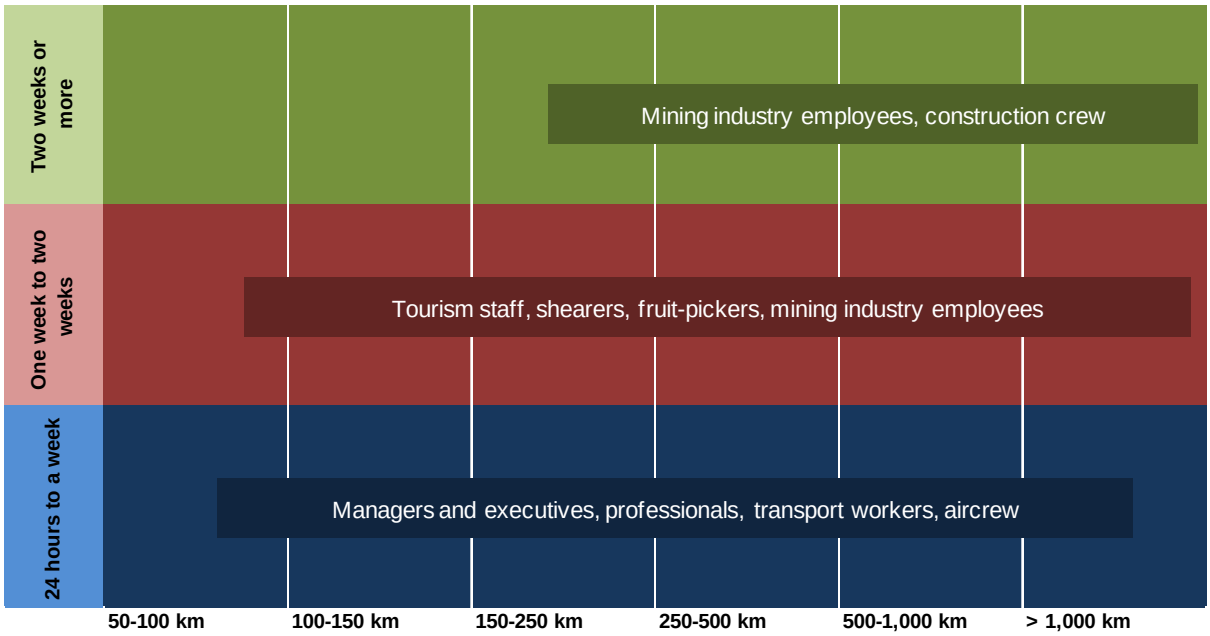
As in other similar studies, the primary source of data for empirical analysis in this paper is the customised ABS Census data. Section 6 presents the results of empirical analysis based on five case studies. In particular section 6 outlines various socio-economic and demographic aspects that characterise individuals undertaking different types of long distance commutes. Some policy implications of long distance commuting from a transport and a regional development point of view are in the last section.

2. Long distance commuting: a review of literature

The significance of non-permanent movements or long distance commuting has long been recognised in theoretical work—largely due to the past and ongoing mining booms and the consequent demand for skilled workers—which the employers find difficult to meet by drawing from regions where the mines are located. A recent report by the Department of Sustainability, Environment, Water, Population and Communities noted that around 50 per cent of all mining employees in Western Australia are long distance commuters and this proportion was expected to continue to grow (DSEWPAC 2011). The demand for non-resident workers is not unique to mining and resource regions only. Major cities and regional cities also have many non-resident workers coming from areas that are beyond the reach of daily commuting distances and times (DSEWPAC 2011).

As noted by Bell (2000) long distance commuters may undertake a regular and more frequent cycle of moves between home and work on a daily basis (e.g. from peri urban areas), or commute on a weekly basis (e.g. involving spending Monday to Friday at the workplace followed by weekend return to home) or undertake commuting involving several weeks of stay away from home, as is characteristic of offshore oil and gas fields and the remote mining industry (Bell 2000; Chamber of Minerals and Energy 2005). Bell (2000) includes seasonal workers such as shearers, fruit-pickers and travelling showmen also in the category of long distance commuters. For workers commuting long distances on a daily basis, such as those from peri urban areas, long distance commuting is a strategic mobility choice. Figure 1 shows the mobility of less frequent long distance commuters in space and time.

Figure 1: Typical long distance commuters and indicative duration of work rosters and distances commuted



Source: Based on Figure 1 of Bell (2000)

From a long distance commuter's point of view, living in the origin region has many advantages. These include commuters' family preferences regarding work-life balance, the preference to live with the family in a region where there may be relatively better access to amenities and social infrastructure such as schools and proximity to established friendship, family and social networks. From an employers' point of view, long distance commuting of their workers is favoured because it enables them to attract appropriately skilled workers from far afield places and fairly quickly—especially during the start-up phases of projects,

minimise production costs by providing temporary rather than permanent infrastructure and services and the opportunity to maximise benefits from short-term high return mining projects by drawing from a non-local pool of skilled workers (Bill, Mitchell and Watts, 2007). Hogan and Tedesco (2003, p. 528) noted that several of the employment centres that attract long distance commutes such as mine sites are located in remote areas near discrete indigenous communities. The local supply of labour from such areas are hampered by the 'lack of work fitness (including drug, alcohol and other health issues), low education levels (particularly low literacy and numeracy skill levels), inadequate skills and poor work experience, inconsistent and unreliable attendance at work (including lack of adjustment to a roster based work system, and failure to return to the mine site after work breaks)'.

DSEWPAC (2011) notes that one crucial aspect of long distance commuting and the associated non-resident workforce 'is the impact on communities within the local or regional area, where the provision of infrastructure, services and housing to the temporary non-resident population, often drives up the cost of living for local residents'. For example according to some sources, the rental accommodation in Karratha, Western Australia averaged around $1,800 per week[1]. Furthermore, as noted by a number of researchers and practitioners, long distance commuting has very little socio-economic development impact at the destination regions. DSEWPAC (2011) and Story (2001) noted that while the non-resident workforce generates significant wealth from resource projects in the destination region, permanent residents there may not all realise benefits from the economic activities occurring in their region. Roche (2011) noted that 'mining industry workers can afford higher housing costs because of their higher wages and a range of rental and home purchase assistance provided by their employers,' but 'the real concern should be the impact the housing shortage is having on the people providing essential goods and services and not earning mining wages' (Roche 2011, p. 1). A notable consequence of long distance commuting is that, the earlier practice of establishing new mine townships in mineral rich remote regions has virtually ceased and the long distance commuters have become an established transient sub-group of population (O'Faircheallaigh 1995, DEEWR 2010). Consequently, these commuters do not contribute in any substantial way to the civic life of the hosting community (DEEWR 2010).

Long distance commuting offers many socio-economic challenges (Watts 2004). There are measures that governments, employers and communities could possibly take to manage these effectively. These measures would entail better planning prior to the establishment of mine sites and other resource development ventures. Literature suggests that such planning should: incorporate appropriate regional workforce planning; and undertake consultation with local communities to explore means of making them better-off while achieving the stipulated objectives of the industries concerned (DSEWPAC 2011, Story 2001, OESR 2010).

3. Data sources and issues

The paper uses 2006 Census 'Journey-to-work' data, sourced from the ABS 'TableBuilder' online tool. It uses journey to work data to explore spatial variation of long-distance commutes and to group commutes of over 100 kilometres according to their origins and destinations. The socio-economic and demographic information for profiling of the commuters was obtained from TableBuilder.

As noted in ABS (2007), the journey-to-work data has been compiled by cross-tabulating data on 'place of work' (i.e. where a person goes to work) by data on 'place of residence' (i.e. the place where a person usually lives for 6 months or more[2]). Therefore this data enables us to estimate the commuting distances between origins (e.g. Statistical Local Area

[1] DSEWPAC (2011) quotes Anglicare WA, (2011) as the source of this information.

[2] It may, or may not be the place where the person was counted on Census night (see ABS 2007a). Therefore visitors and transient workers are excluded from population counts.

[SLA] of residence) and destinations (e.g. the SLA to which the person commutes for work) by identifying origin-destination pairs as well as determining the volumes of commuter flows between SLAs of origin and SLAs of work.

The Census data does not provide information on frequency of commuting. It also does not separately identify flying as a method of travel to a place of work. In the available data, flying is classified along with less frequent commuting modes under the variable name 'other'. As acknowledged in literature (e.g. Bell 2000), these data issues may pose problems in studies of long distance commuting, and if not correctly interpreted, could impair planning and policy formulation to support important physical and social infrastructure, particularly in the areas of healthcare, housing, education and transport services.

Data on the method of travel to work refers to the day of the Census and the data on place of work refers to the place where a person works during the week prior to the Census Night (ABS 2007). Therefore a worker who arrives at a remote location from a capital city by flying two weeks before the Census night if asked to state the method of commuting to work on that day, his answer would be one of many forms of land-based commuting modes—but would not be flying! His place of work would be the mine site (because he was there a week before the census night) and his usual place of residence would be the capital city (if he spends at least six months of the year there)[3]. Table 1 highlights this anomaly. The workers place of enumeration would be the worker accommodation provided at the remote location.

Table 1: The method of commuting to work from Perth statistical division to East Pilbara on day of Census, 2006

Method of commuting to East Pilbara	Managers	Professionals	Technicians and trades workers	Machinery operators and drivers	Labourers	Others	Total
Train	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bus	0.3	0.2	2.6	3.4	0.2	0.5	7.2
Car, as driver	5.1	8.2	11.9	9.7	4.2	10.8	50.0
Car, as passenger	0.2	1.7	2.1	2.0	1.4	2.0	9.3
truck	0.2	0.0	0.5	0.5	0.0	0.0	1.2
Motorbike/scooter	0.1	0.1	0.5	0.3	0.1	0.3	1.5
Bicycle	0.2	0.6	1.5	1.2	0.5	0.6	4.6
Walked only	2.3	2.8	1.8	0.8	9.2	7.1	23.9
Other methods	0.0	0.2	0.6	1.0	0.1	0.3	2.2
Total	8.5	13.9	21.3	18.9	15.8	21.6	100.0

Source: BITRE estimates based on ABS TableBuilder data (ABS 2007)

As shown in Table 1, for about 24 percent of workers who reside in Perth but work in East Pilbara, walking is the method of commuting to work. This is not meaningful. It is a result of different reference times used in eliciting commuting distance information (i.e. the distance between the usual place of residence and the place of work during the week before the Census night) and mode of commuting information (i.e. on the day of the Census). Although the 2006 Census indicates the total number of commuters to East Pilbara was 1,650, the actual number would have been higher as suggested by ABS (2009). ABS (2009, p. 10) noted that 'the quality of census data is adversely affected by undercounting, non-response and self-reporting. For this reason, the number of people who state on a census form that

[3] 2011 Census aims to address this issue by requiring fly-out workers who spend or intend to spend more than six months of 2011 on site to complete their own Census form, giving the address where they are staying when on-site. This means their spouses, partners or family who live elsewhere should not include such workers on their form (ABS 2011).

they are employed in the mining industry will be lower than ABS Labour Force Survey and industry estimates of the size of the mining industry workforce'. Thus, Census data is likely to understate the impacts of long distance commutes on regional development. In this paper, we are essentially assuming that the socio-economic and demographic characteristics of those long distance commuters captured in the Census data provide a useful guide to the characteristics of all long distance commuters between the origin and destination pair.

The ABS approach to safeguarding confidentiality through randomisation of small cells (i.e. where the number of respondents is 1, 2 or 3) impacts on commuter counts —which is particularly an important issue in a study of long-distance commuting where the number of long distance commutes between many origin-destination pairs are relatively small.

TableBuilder enables cross-tabulation of Census data using a number of socio-economic and demographic variables. That is, it enables identification of the socio-economic characteristics of population in a certain geographic area, which creates a risk of identification of individuals where the number of respondents is very small. Therefore, to avert any risks of respondent identification, BITRE has exercised caution to report only aggregate results (e.g. when reporting results of case studies).

4. Extent and spatial variation of long distance commuting

Table 2 shows that a majority of commutes are within a 50 kilometre range from the place of residence and possibly within own statistical local areas (SLAs) and between neighbouring SLAs. The analysis in this paper is confined to commutes of 100 kilometres or more to ensure the analysis is focused on inter-regional commutes. A lower cut-off (e.g. 50km) would mean the analysis was dominated by intra-city and intra-region commutes (e.g. Penrith to Sydney CBD, Mandurah to Perth CBD). As shown in Table 2, the number that commuted 100 kilometres or more to work in 2006 was about 2 per cent of eight million work-related commuters. It is likely that few commutes of more than 250km take place on a daily basis, but daily commuting would be more common for commutes of 100km to 250km.

Table 2: A general profile of long distance commutes in Australia, 2006

Distance commuted*	Number of commutes	Number of commutes as a per cent
Less than 50km	7,635,897	95.4
50-100km	225,348	2.8
100-150km	31,317	0.4
150-250km	28,148	0.4
250-500km	22,261	0.3
500-1000km	28,457	0.4
>1000km	30,997	0.4
Total commutes	8,002,425	100.0

Note: * These are straight line distances between centroids of origin SLAs and destination SLAs.

Source: BITRE analysis of ABS Census of Population and Housing unpublished data

Distance was measured as the straight line distance between the geographic centroid of the origin SLA and that of the destination SLA. This centroid based distance calculation can be misleading, particularly for SLAs that are geographically large, and have population or jobs concentrated in one part of the SLA. A particularly extreme example is how the method leads to a distance measure of 244km between the geographic centroids of the Roxby Downs and Unincorporated Far North SLAs, whereas in practice most of the commuting

flows would be between the town of Roxby Downs and the Olympic Dam mine site which are located just 10km apart. This issue is more pronounced for long distance commutes of between 100 and 500km than for commutes of over 500km and it is often an issue for commutes between remote SLAs. In the case studies which make up the bulk of this paper, care has been taken to focus on inter-regional commutes which in practice do actually involve travel of more than 100 kilometres.

Table 3 gives the total distribution of long distance commuters allocated according to a regional classification used by BITRE (see BITRE 2011b). Capital cities generate the most long distance commuters in aggregate, but only a very small fraction of capital city employed residents are long distance commuters (1 per cent compared to 7 per cent of remote employed residents). The most common places of work for long distance commuters are capital cities and remote locations. However, while less than one per cent of capital city workers are long distance commuters, around 20 per cent of those who work in remote locations have commuted more than 100 km to their place of work.

Table 3: Number and the share of workers that commuted 100 kilometres or more from a place of residence to a place of work, by regional centre, 2006

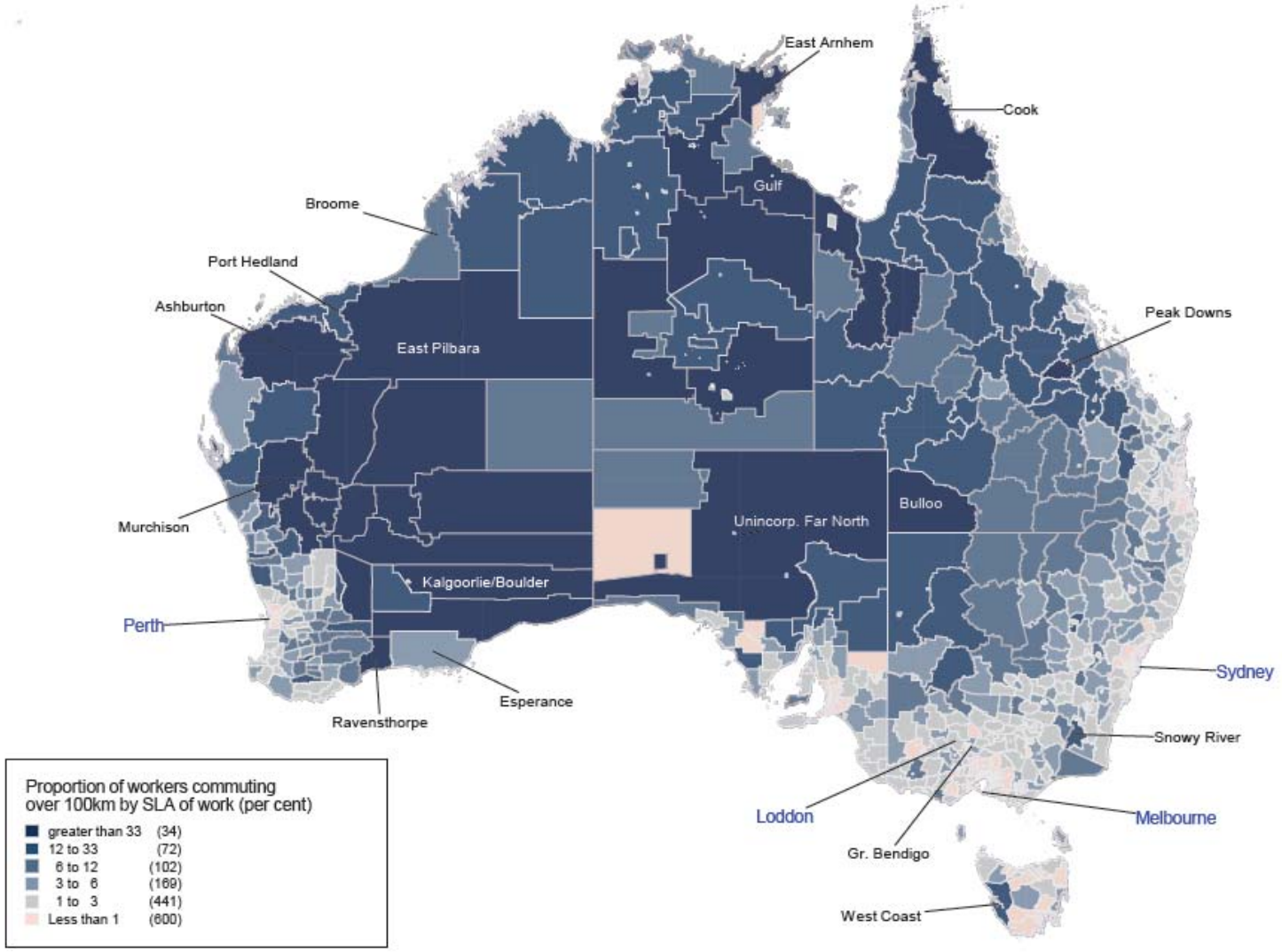
Regional classification	Long distance commutes by place of residence	As a percentage of total employed residents in the area	Long distance commuters by place of work	As a percentage of total workers in the area
Capital city	51,633	0.95	45,922	0.87
Coastal city	25,643	2.37	12,585	1.20
Inland regional city	20,969	4.10	13,165	2.58
Coastal country	8,700	2.52	6,854	1.99
Inland country	20,566	3.49	22,511	3.82
Remote	14,160	6.99	40,634	20.05
Total	141,671	1.73	141,671	1.77

Note: Details of regional classification are available in BITRE 2011

Source: BITRE analysis of ABS Census of Population and Housing unpublished data

Figure 2 shows the SLAs to which workers commute 100 kilometres or more for work. It shows that long distance commuters account for a very small fraction of the workforce in most capital city and coastal locations. Figure 2 also highlights that remote resource development areas, particularly in Western Australia, Queensland and South Australia have attracted a high proportion of their workforce from more than 100km away.

Figure 2: Percentage of workers commuting 100 kilometres or more for work by place of work, 2006



Source: BITRE

Table 4 provides the most popular capital city and non-capital city destinations and the number of regular work-related long distance commutes from multiple origins to those destinations in 2006.

Table 4: Most popular capital city and non-capital city destinations with commutes of over 100 km from all origins, 2006

Capital city destination	Number of commutes	Non-capital city destination	Number of commutes
Sydney and surrounds	16,173	**Laverton, Leonora and Menzies**	2,813
Melbourne and surrounds	11,285	**East Pilbara**	2,282
Brisbane and surrounds	6,685	**Ashburton**	2,148
Perth and surrounds	4,055	**Newcastle and surrounds**	1,834
Canberra and surrounds	3,292	**Belyando**	1,799
Adelaide and surrounds	2,447	**Cairns and surrounds**	1,728
Darwin and surrounds	1,272	**Roebourne**	1,564
		Townsville and surrounds	1,419
		Gold Coast-Tweed	1,372
		Toowoomba and surrounds	1,213
		Wiluna	1,121
		Snowy River	1,109
		Broadsound	1,106
		Mackay and surrounds	1,085
		Duaringa	1,061
		Emerald	980
		Banana	979
		Ravensthorpe	938
		Wagga Wagga and surrounds	920
		Rockhampton and surrounds	915
		Cloncurry	908
		Kalgoorlie-Boulder	904
		Bowen	900

Note: Only the Capital city and non-capital city destinations attracting commutes of 900 or more are shown. The regions are BITRE working zones (BITRE 2008).

As noted before, for large SLAs, the straight line distances between centroids of origin and destination SLAs may exaggerate the actual commuting distances. The working zones of East Arnhem, Cape, Peak Downs, Cape, Far North and Mareeba have been excluded from this list because the actual commuting distance was known to be less than 100km for most long distance commuters. Other working zones may be subject to the same issues.

Source: BITRE analysis of ABS Census of Population and Housing unpublished data

5. Typology of long distance commuting

For purposes of empirical analysis, work-related long distance commutes of 100 to 500 kilometres and 500 kilometres or more from one region (origin) to another (destination) were grouped. Out of these groups, only those origin-destination pairs representing a relatively large percentage of commutes (i.e. popular) compared to the total commutes of over 100 km were selected. Of the many origin-destination pairs, only five commuting pairs were chosen. These pairs represented as high as 97 per cent of all long distance commutes of over 100 km recorded in 2006 ABS Census (Table 5). The two principal types of commutes of more than 500 km together represent 32 per cent of all commutes of more than 100km. The three

principal types of commutes of between 100 and 500km together represent 27 per cent of all commutes of more than 100 km. The remaining long distance commuting flows were very diverse. These commuting flows in many cases were clearly influenced by distance measurement issues, particularly in instances where the centroid to centroid distance was over 100km, but in practice most of the commutes between the origin-destination pair would have involved travel of less than 100km.

Table 5: Most popular capital city and remote destinations with commutes of over 100 km

Origin region	Destination region	Total > 100 km	100 to 500 km		> 500 km	
			Number	Per cent of total	Number	Per cent of total
Any	Capital city	45,922	24,176	17	21,746	15
Any	Remote area	40,634	16,484	12	24,150	17
Capital city	Inland or coastal country	12,026	9,019	6	3,007	2
Any coastal or inland area	Capital city	28,644	21,424	15	7,220	5
Remote	Remote	9,660	8,501	6	1,159	1
Other origins	Other destinations	4,785	2,740	2	2,045	1
Total		141,671	82,344	58	59,327	42

Source: BITRE analysis of ABS Census of Population and Housing unpublished data

6. Demographics of long distance commuters

This section presents and discusses the socio-economic and demographic aspects that characterise individuals who undertake different types of long distance commuting. TableBuilder does not support socio-economic and demographic profiling of all long distance commuters or broad categories as given in Table 5 (e.g. those commuting more than 500km to a Capital city from various origins). Therefore case studies of commuter groups that are drawn from the five regional classifications are presented. These case studies represent all common forms of long distance commutes, except long distance commutes of less than 100km as frequently occurring from peri urban areas or outer suburbs to Capital cities for work. These peri urban-Capital city type long distance commuting are occurring daily and as noted in BITRE (2010, 2011a and 2011c) are largely driven by factors such as a person's propensity to commute long distances, availability of suitable employment for multiple workers in the family in and around where they live, highly paid city positions, frequency of public transport, freeway connections, housing affordability in close proximity to workplace, access to schools and social amenities. The peri-urban commutes considered in this paper are not necessarily driven by the same factors governing daily long distance commutes of less than 100 kilometres.

6.1. Case studies

The long distance commutes that occur in Australia are not homogenous in many respects. Therefore aggregate analysis of national data may not reveal important influences that characterise long distance commutes specific to a certain regional area. In order to profile long distance commuters according to socio-economic and demographic aspects that characterise them, this study, of necessity, undertakes a number of case studies. These case studies have been chosen from commuting clusters representing Australia's key regional geographies (see Table 3). The five case studies chosen are summarised in Table 6. Some of the selected origins and destinations were at the statistical division (SD) level and others such as Snowy River and Esperance were at statistical local area (SLA) level.

Table 6: Case studies of long distance commuters, 2006

Case study type	Origins	Destinations	Number of commuters	Distance commuted
Case study 1 More than 500km commute to Capital City workplace	Melbourne SD	Sydney SD	1,919	600km to 800km
Case study 2 More than 500km commute to Remote workplace	Perth and Surrounds working zone	East Pilbara	1,654	1,300km to 1,400km
Case study 3 100 to 500km commutes from Capital City to Inland and/or Coastal Country	Sydney SD	Snowy River (NSW ski fields)	310	Around 300km
Case study 4 100 to 500km commute from any coastal/inland area to Capital City	Loddon SD	Melbourne SD	8,678	100km to 200km
Case study 5 100 to 500km commutes from Remote to Remote	Esperance	Ravensthorpe and Dundas	130	220km to 230km

Note: The distances provided are those between the centroids of origin and destination SLAs.

Source: BITRE analysis of ABS Census of Population and Housing unpublished data

The chosen case studies represent long distance commutes of 100 to 500 kilometres and those above 500 kilometres. Case studies were chosen only from the clusters that had a large proportion of long distance commutes. Such clusters in total covered over 57 per cent of all long distance commutes of 100 kilometres or more. Further caution was exercised when selecting cases by avoiding those in which the distance between centroids of the origin and destination overly exceeded the actual distances commuted between a residence and an employment centre such as a mine (e.g. Emerald to Peak Downs, although it has a distance of 127km between centroids, the actual distance commuted to a mine in Peak Downs is about 68km). The distances between residential areas to mines were confirmed by referring to the Australian Standard Geographic Classification (ASGC) maps published by ABS (2010) and to published information on the locations of minerals and energy projects (see for example Lampard 2010).

For each case study, Table 7 provides a breakdown of commutes according to the occupations that were most in demand at each employment site. Accordingly, it shows that the demand for managers and professionals was much higher in capital city work locations such as the Sydney and Melbourne SDs than in other case study areas. The demand for occupations such as technicians and trades workers and machinery operators and drivers was high in mining and resource project locations of East Pilbara, Ravensthorpe and Dundas. The seasonal tourist location of Snowy River mostly attracted community and personal service workers from far afield places in the Sydney SD.

Table 7: Number of long distance commutes between selected origins and destinations in 2006, by occupation

Occupation	Melbourne SD to Sydney SD	Perth and surrounds to East Pilbara	Sydney SD to Snowy River	Loddon SD to Melbourne SD	Esperance to Ravensthorpe and Dundas
Managers	25.4	5.4	8.4	15.8	20.8
Professionals	31.6	10.6	6.5	23.7	10.8
Technicians and Trades Workers	6.3	31.9	15.8	14.8	11.5
Machinery Operators and Drivers	1.6	34.5	6.5	6.7	32.3
Community and Personal Service Workers	9.6	2.8	37.4	8.9	0.0
Clerical and Administrative Workers	7.7	3.6	4.8	16.5	10.8
Sales Workers	13.9	0.2	11.9	7.4	0.0
Labourers	3.2	10.2	7.7	5.0	8.5
Inadequately described	0.8	0.7	1.0	1.0	5.4
Not stated	0.0	0.0	0.0	0.1	0.0
Not applicable	0.0	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

The age distribution of long distance commuters in the five selected case studies are in Table 8. In general, a majority of the long distance commuters were in the age range of 20 to 60 years. Nevertheless, a majority (54 per cent) of those who commuted from Sydney to Snowy River were 20 to 29 years old. The table also shows that those who commuted from Loddon to Melbourne and those who commuted from Esperance to Ravensthorpe and Dundas were much older (40 to 50 years) than the bulk of the commuters in the other case studies.

Table 8: Age distribution of those commuting between selected origins and destinations in 2006

Age group	Melbourne SD to Sydney SD	Perth and surrounds to East Pilbara	Sydney SD to Snowy River	Loddon SD to Melbourne SD	Esperance to Ravensthorpe and Dundas	Total
15-19 years	1.2	3.9	15.1	2.8	3.0	3.1
20-29 years	19.5	23.8	54.3	12.8	21.6	17.7
30-39 years	31.4	27.8	13.6	22.5	23.9	25.0
40-49 years	27.1	26.0	7.7	31.1	31.3	28.7
50-59 years	16.0	15.2	6.2	24.6	14.9	20.4
60-69 years	4.5	3.0	3.0	5.9	5.2	4.8
70-79 years	0.3	0.2	0.0	0.4	0.0	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

Table 9 shows grouping of male and female commuters according to three levels of qualifications. Bachelor or higher degree qualifications were most prominent for long distance commuters to Melbourne and Sydney, whereas certificate level qualifications were more prominent in the remaining three case studies. Females were more highly represented amongst long distance commuters with bachelor or higher degree qualifications than in the other qualification categories. In contrast, certificate level qualifications were dominated by male long distance commuters. The long distance commuter population appears to show a

strong gender bias towards males in the mining-related case studies and a slight bias towards males in the remaining case studies.

Table 9: Percentage of long distance commutes between selected origins and destinations, by type of qualification and gender, 2006

Qualification	Gender	Melbourne SD to Sydney SD	Perth and surrounds to East Pilbara	Sydney SD to Snowy River	Loddon SD to Melbourne SD	Esperance to Ravensthorpe and Dundas
Bachelor or higher degree	Male	15.1	6.9	8.3	13.0	3.6
	Female	14.9	7.5	13.1	12.4	6.6
	Total	30.0	14.3	21.4	25.4	10.2
Advanced Diploma and Diploma Level	Male	4.8	2.0	4.2	6.4	5.8
	Female	6.0	2.6	4.2	4.4	2.2
	Total	10.8	4.6	8.3	10.8	8.0
Certificate Level	Male	12.0	23.5	24.0	18.2	29.9
	Female	6.2	4.4	9.2	4.9	0.0
	Total	18.2	27.9	33.2	23.1	29.9
Level of education inadequately described or not stated	Male	2.5	2.2	1.5	2.7	0.0
	Female	3.0	2.2	0.0	2.1	2.2
	Total	5.4	4.5	1.5	4.8	2.2
Not applicable	Male	17.7	26.5	19.3	19.5	38.7
	Female	17.9	22.1	16.3	16.4	10.9
	Total	35.6	48.6	35.6	35.9	49.6
Total	Male	52.2	61.1	57.3	59.8	78.1
	Female	47.8	38.9	42.7	40.2	21.9
	Total	100.0	100.0	100.0	100.0	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

A case by case analysis of the indigenous status of long distance commuters showed that except about 4 per cent of those who commuted from Esperance to Ravensthorpe and Dundas, the percentage of indigenous people (i.e. Aboriginal and Torres Strait Islander people) who commuted over 100km for work was considerably low.

A case by case analysis of the main economic aspects characterising long distance commuters are in the sub-sections that follow.

6.1.1 Case study 1: Melbourne to Sydney

Key economic characteristics of the long distance commutes to Sydney Statistical Division from the Melbourne Statistical Division in Victoria are presented in Table 10. It shows that most commuters (54 per cent) earned over $1,300 per week and very few (16 per cent) earned between $150 and $600 per week. The transport and warehousing industry attracted most commuters. A large percentage of commuters working in this industry also earned the highest level of weekly income. Such high levels of weekly incomes were enjoyed by commuters from the next two dominant industries—namely the professional, scientific and technical service industry and the manufacturing industry. This observation suggests that long distance commuting, among other drivers, is prompted by wage differentials between the origin and destination locations.

Table 10: Income profile of long distance commutes from Melbourne SD to Sydney SD in 2006, by amount of weekly income

Industry type	Proportion of commutes from Melbourne SD, by industry	Proportion of commuters according to weekly income (per cent)			Total
		$150 to $600	$600 to $1,300	$1,300 to > $2,000	
Agriculture, forestry and fishing	0.0	0.0	0.0	0.0	NA
Mining	1.1	0.0	25.0	75.0	100.0
Manufacturing	18.3	18.8	29.2	52.1	100.0
Professional, scientific and technical services	19.4	12.3	29.1	58.6	100.0
Transport, postal and warehousing	30.5	6.6	29.2	64.3	100.0
Accommodation and food services	3.6	44.7	23.7	31.6	100.0
Construction	6.3	4.5	50.7	44.8	100.0
Electricity, gas, water and waste services	2.4	23.1	23.1	53.8	100.0
Rental, hiring and real estate services	2.8	23.3	23.3	53.3	100.0
Administrative and support services	9.3	36.4	28.3	35.4	100.0
Health care and social assistance	6.2	27.3	36.4	36.4	100.0
Total/average	100.0	16.1	30.3	53.6	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

6.1.2 Case study 2: Perth to East Pilbara

Mining was the dominant industry that attracted long distance commutes to East Pilbara. Table 11 also shows that higher weekly income seem to be an important driver of long distance commutes to East Pilbara.

Table 11: Income profile of long distance commutes from Perth and surrounds to East Pilbara, by amount of weekly income

Industry type	Proportion of commutes from Perth and surrounds, by industry	Proportion of commuters according to weekly income (per cent)			Total
		$150 to $600	$600 to $1,300	$1,300 to > $2,000	
Agriculture, forestry and fishing	0.6	30.0	30.0	40.0	100.0
Mining	72.5	0.9	19.0	80.1	100.0
Manufacturing	2.7	0.0	13.6	86.4	100.0
Professional, scientific and technical services	3.4	0.0	38.2	61.8	100.0
Transport, postal and warehousing	0.4	0.0	100.0	0.0	100.0
Accommodation and food services	6.0	6.2	68.0	25.8	100.0
Construction	10.1	5.5	22.1	72.4	100.0
Electricity, gas, water and waste services	0.5	0.0	0.0	100.0	100.0
Rental, hiring and real estate services	0.4	0.0	0.0	100.0	100.0
Administrative and support services	2.6	0.0	28.6	71.4	100.0
Health care and social assistance	0.7	0.0	50.0	50.0	100.0
Total/average	100.0	1.7	23.5	74.8	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

This case study is characterised by the dominance of a single industry (mining) and a high proportion of long distance commuters on a weekly wage of over $1300 (75 per cent).

6.1.4 Case study 3: Sydney to Snowy River

In contrast, for commutes to Snowy River ski fields in New South Wales from Sydney SD, income differentials are not a dominant driver of seasonal long distance commutes. The most demanding occupation in this case study location (community and personal service work) is not a high wage earner, and nor is the most common industry (accommodation and food services). The number of long distances commuters on the highest weekly wage of over $1,300 was only 6.5 per cent (Table 12) and 60 per cent earned only $150 to $600 a week. Perhaps leisure activities, life style aspects and the like may have significantly influenced work-related long distance commutes to places such as the Snowy River SLA.

Table 12: Income profile of long distance commutes from Sydney SD to Snowy River, by amount of weekly income

Industry type	Proportion of commutes from Sydney SD, by industry	Proportion of commuters according to weekly income (per cent)			Total
		$150 to $600	$600 to $1,300	$1,300 to > $2,000	
Agriculture, forestry and fishing	3.8	42.9	57.1	0.0	100.0
Mining	0.0	0.0	0.0	0.0	0.0
Manufacturing	0.0	0.0	0.0	0.0	0.0
Professional, scientific and technical services	0.0	0.0	0.0	0.0	0.0
Transport, postal and warehousing	3.8	0.0	42.9	57.1	100.0
Accommodation and food services	70.8	57.3	36.6	6.1	100.0
Construction	0.0	0.0	0.0	0.0	0.0
Electricity, gas, water and waste services	8.6	75.0	25.0	0.0	100.0
Rental, hiring and real estate services	4.3	50.0	50.0	0.0	100.0
Administrative and support services	8.6	100.0	0.0	0.0	100.0
Health care and social assistance	0.0	0.0	0.0	0.0	0.0
Total/average	100.0	59.5	34.1	6.5	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

6.1.4 Case study 4: Loddon to Melbourne

The case study on long distance commutes to Melbourne SD from Loddon SD (includes the City of Bendigo) in Victoria shows that the long distance commuters from Loddon SD participate in a much wider range of industries than other case study origins (see Table 13). This may be a reflection of limited employment opportunities for workers to use their skills and qualifications (and be sufficiently compensated) in the area where they live.

Information presented in Table 13 also shows that remuneration is not as high as those covered by the first and second case studies. Most of the commuters are within daily commuting distances. To them, the cost and duration of commuting matter more than to those in other case study destinations—hence publicly provided infrastructure and facilities could significantly lower their commuting costs and the duration of commuting.

Table 13: Income profile of long distance commutes from Loddon SD to Melbourne SD, by amount of weekly income

Industry type	Proportion of commutes from Loddon SD, by industry	Proportion of commuters according to weekly income (per cent)			Total
		$150 to $600	$600 to $1,300	$1,300 to > $2,000	
Agriculture, forestry and fishing	0.5	30.4	39.1	30.4	100.0
Mining	0.3	0.0	50.0	50.0	100.0
Manufacturing	22.6	17.0	50.6	32.4	100.0
Professional, scientific and technical services	13.5	17.4	38.7	43.9	100.0
Transport, postal and warehousing	21.3	20.5	46.1	33.4	100.0
Accommodation and food services	4.3	61.6	37.0	1.4	100.0
Construction	11.1	16.7	54.4	28.9	100.0
Electricity, gas, water and waste services	1.6	7.6	48.1	44.3	100.0
Rental, hiring and real estate services	2.5	23.8	46.8	29.4	100.0
Administrative and support services	4.8	28.1	44.2	27.7	100.0
Health care and social assistance	17.5	35.7	48.9	15.4	100.0
Total/average	100	23.5	47.1	29.4	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

6.1.5 Case study 5: Esperance to Ravensthorpe and Dundas

This case study considers long distance commutes to Ravensthorpe and Dundas in Western Australia from Esperance in WA. Mining dominates this case study area with a relatively large presence of accommodation and food services industries. The number of long distance commuters to the case study location is relatively small. Although not as high as the other mining-related case study (case study 2), over 40 per cent of the long distance commuters from Esperance earn a weekly wage of over $1,300 (Table 14).

Table 14: Income profile of long distance commutes from Esperance to Ravensthorpe and Dundas, by amount of weekly income

Industry type	Proportion of commutes from Ravensthorpe and Dundas, by industry	Proportion of commuters according to weekly income (per cent)			Total
		$150 to $600	$600 to $1,300	$1,300 to > $2,000	
Agriculture, forestry and fishing	7.3	37.5	25.0	37.5	100.0
Mining	43.6	0.0	26.0	74.0	100.0
Manufacturing	1.8	0.0	100.0	0.0	100.0
Professional, scientific and technical services	0.0	0.0	0.0	0.0	100.0
Transport, postal and warehousing	2.3	0.0	100.0	0.0	100.0
Accommodation and food services	23.6	59.6	26.9	13.5	100.0
Construction	3.2	0.0	57.1	42.9	100.0
Electricity, gas, water and waste services	1.4	0.0	100.0	0.0	100.0
Rental, hiring and real estate services	0.0	0.0	0.0	0.0	100.0
Administrative and support services	2.7	100.0	0.0	0.0	100.0
Health care and social assistance	14.1	41.9	48.4	9.7	100.0
Total/average	100	25.5	33.6	40.9	100.0

Source: BITRE analysis of ABS Census data from TableBuilder

7. Conclusions and some policy implications

With the exception of the 'tourism-related case study', all other case studies presented in this paper suggest that differentials in incomes between origins and destinations and higher skills/higher level of education are dominant factors prompting long distance commutes in Australia. The latter observation accords with studies from other countries that suggest that the highly skilled people are more geographically mobile (O'Faircheallaigh 1995; Sandow and Westin 2010). Alternatively, as evident from a report commissioned by the Fair Pay Commission (FPC) in 2008, "low-skilled workers are less likely to engage in long commuting behaviour relative to all other workers ..." (FPC 2008, p. 3). Our case studies largely support this proposition of low skills and poor geographic mobility.

Notwithstanding the fact that most female long distance commuters in the five case studies were more educated than their male counterparts, males were a majority in each of the cases studied in this paper. Clearly there was a gender bias towards males in all case studies.

Due to data issues and deficiencies, Australian studies (including this one) on modes and modal share of long distance commuting are marred by the lack of statistical evidence relating to fly-in-fly out type commuting behaviour. Empirical literature (see for example Thomas 2005; SMH 2011) suggest that charter planes, train and bus were dominant transport modes of those who commuted distances or periods that were longer than what could be achieved by the daily long distance commuter. The lack of data to directly assess the mode of commuting and the modal share is an important issue that needs to be addressed from the points of view of transport and other infrastructure planning and regional development.

The five commuting cases studies in this paper each displayed distinctive and contrasting information on socio-economic and demographic characteristics. The analysis presented in the paper suggests that commuting behaviour seems to have been driven by a complex combination of factors that are specific to jobs on offer at a certain site. In East Pilbara for example, the higher average weekly income appeared to have played a dominant role in attracting long distance commuters while negating any ill effects of commuting over 1,000km to a work place which is less endowed with amenities than the commuting origin – Perth! On the other hand, lifestyle and recreational aspects appeared to have attracted long distance commutes to employment nodes such as Snowy River, rather than the average weekly income or other economic drivers.

Socio-economic and demographic profiling of long distance commuters was undertaken in this paper to explore the extent to which such profiling could contribute to planning and policy making in infrastructure and regional development in areas that attract long distance commuters. It highlights the contrasting nature of the drivers of long distance commuting, thus suggesting that rather than developing '*top down*' policies on regional development, it would be more meaningful to adopt '*bottom up*' approaches that result in regional policies that are more akin to a specific region.

As noted by the Minerals Council of Australia (2011) long distance commuting, especially fly-in-fly-out will continue to be a 'response to local skills shortages and the systemic lack of investment in infrastructure and service delivery in remote and regional communities' (Minerals Council of Australia 2011, p. 8). As long distance commuting will continue to grow as a mobility concept, the debate on the impact of long distance commuting on regional development and infrastructure in regional areas will continue (see also Story 2001; ACIL Tasman 2009). Therefore it would be advantageous to researchers and practitioners, such as planners and policy makers, if data on long distance commuting is collected by an independent body such as the ABS. At present, various organisations, especially resource development companies and state governments are engaged in collecting long distance commuting data.

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