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# Off to Work

## Commuting in Australia

Michael Flood

Claire Barbato

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## Summary

Over nine million Australians travel to work each week, commuting by car, bus, train, tram, bicycle, ferry or foot. These days, more than ever before, employees are commuting for longer, in traffic that is more congested, to reach workplaces that are further away.

Using data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey conducted by The Melbourne Institute of Applied Economic and Social Research in 2002, this paper explores patterns of commuting among adult Australians in paid work. The sample consists of 5898 people aged 18 to 64 years who participate in some kind of paid work.

**Stuck in traffic**

Commuting has negative impacts on at least three dimensions of Australian life:

1. people's psychological, emotional, and physiological wellbeing;

2. their relationships and interactions with their families, neighbourhoods, communities, and workplaces, and

3. the physical and social environment.

These impacts are at their worst when commuting journeys are lengthy, unpredictable or congested.

Lengthy and unpredictable commuting journeys take a toll on individuals both physically and emotionally. Employees whose journeys to and from work are longer show greater levels of bodily stress and perceived stress. Commuting strain is associated with feelings of nervousness and tension, physical pain and stiffness, irritability and fatigue, and poorer performance and satisfaction at work. Traffic congestion and crowding intensify all these effects.

Commuters travelling by car in some Australian cities are travelling for longer periods than they did a decade ago. Australia's roads are becoming more crowded, commuters are becoming more stressed, and they are increasingly likely to suffer 'road rage'.

Lengthy commuting removes people from their homes and families for longer periods, and limits their involvement in community affairs and informal social interaction.

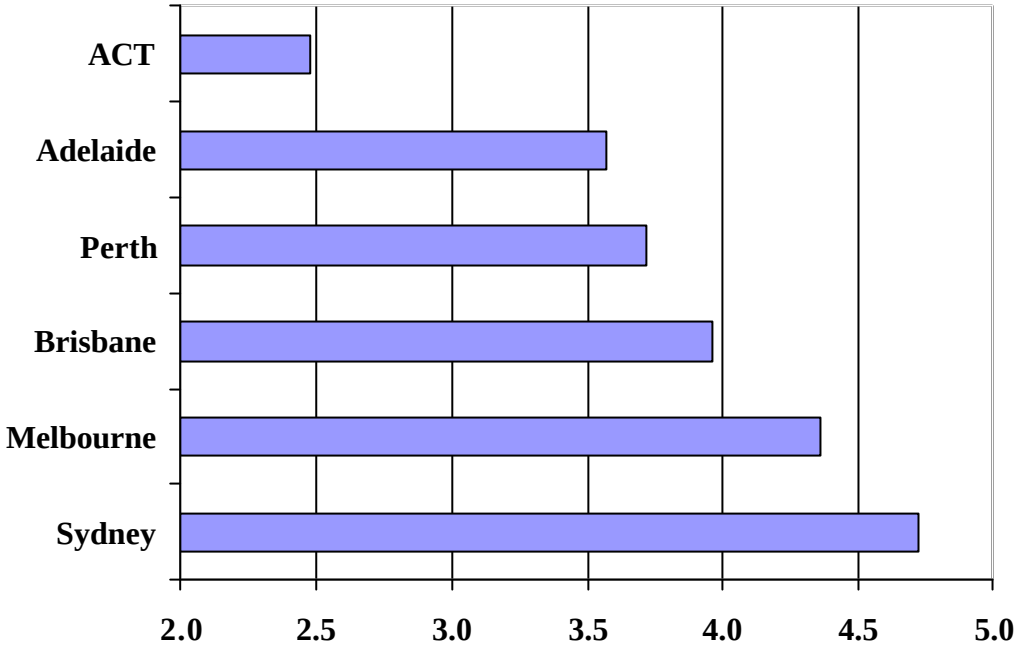
**Patterns of commuting**

Among Australians who travel to and from paid work, the mean commuting time is three hours and 37 minutes each week. Among full-time workers in paid employment for at least 35 hours per week, the mean commuting time is four hours and ten minutes per week.

People in Sydney endure the longest average commuting times of employees in the country. From longest to shortest, Australia's capital cities rank as follows: Sydney (four hours and 43 minutes), Melbourne (four hours and 22 minutes), Brisbane (three

hours and 58 minutes), Perth (three hours and 43 minutes), Adelaide (three hours and 34 minutes) and Canberra (two hours and 29 minutes).

**Figure S1 Average weekly commuting times in selected capital cities (hours)**




Two occupational groups stand out as having the longest travelling times to and from work – tradespeople and related workers and managers and administrators. They travel on average for four hours and 12 minutes per week between home and work.

Employees who work more days per week, and more hours per week, have longer commuting times than others. Employees with higher wages and salaries tend to have longer commuting times. Similarly, employees from areas of higher socioeconomic advantage typically have longer commuting times.

Men spend more time travelling to and from work each week than women. Men's average travel time to and from work is just over four hours per week, while for women it is three hours per week. This contrast reflects in part gender differences in participation in paid work but also the fact that men dominate the occupations with the longest commuting times, while women dominate the occupations with the shortest commuting times.

**Commuting and relationships**

Commuting exacerbates the negative impacts of long work hours and work stress on people's family lives and interpersonal relationships. The stress and strain of journeys that are long, unpredictable, congested or polluted take a toll on individuals and affect their relationships. They come home late, grumpy and worn-out, with little physical or emotional energy to participate in family life, friendships or other relational activities.

Each week over ten per cent of parents in paid employment spend more time commuting than they do with their children, travelling for between ten and 15 hours

weekly to and from work but spending less time than this supervising, caring for and transporting their children. There is an inverse relationship between the time that parents spend commuting and the time they spend in caring for and interacting with their children.

The analysis shows that the more time employees spend commuting, the less frequently they socialise with friends and relatives. Full-time workers with longer commuting times are less likely to be active members of sporting groups or community organisations. The more that people commute, the less likely they are to report high levels of satisfaction with the amount of free time they have.

**The wage value of commuting**

If employees were to be paid for their travel time to and from work at the same rate they are paid once they actually get to work, they would receive, on average, an extra $84 per week or $4 015 per year. Among all people in paid employment in Australia, the wage-equivalent time costs of commuting represent over $454 million per week or over $21 billion per year. This is the annual cost of commuting in Australia.

In Sydney the average weekly commuting cost is $123, amounting to an annual cost of $5 921 for each employee. The wage-equivalent costs for Sydney commuters are significantly greater than those in all other states and territories except Melbourne, where costs are $109 per week or $5 253 per year. The wage-equivalent time costs of commuting are in addition to direct transport costs which themselves have increased by 26 per cent over the period from 1993-94 to 1998-99.

**Commuting and the social life of cities**

As the populations of Australia's large urban centres increase, and as suburbs sprawl towards the horizon, the average commuting distance lengthens. This is especially true for workers living in outer suburban areas, whether in Sydney, Melbourne, Brisbane or elsewhere.

Suburbanisation has also exacted a toll on community. In high-commute communities there is less time for friends and neighbours, households are isolated and, depending on the time of day, streets are either empty or roaring with traffic. Individuals and families are less able to interact with others in their communities and to forge informal networks of communication and support.

Commuting does not encourage the kind of interpersonal interaction that sustains friendships and communities. It is frequently rushed and stressful, and often conducted in isolation, in the cocoon of one's car or among strangers on a bus or train.

**The future of commuting**

Two contemporary trends are intensifying the potential of commuting to suffocate the community. First, as the hours and pressure of paid work accumulate, employees increasingly see commuting time as another opportunity to squeeze yet more work into their day. Second, the growing use of portable information and communication technologies allows employees to work while in transit, such that the car, bus or train becomes just another workplace. Commuters also use these technologies for personal

entertainment and communication, in an adaptive response to the boredom, frustration, and isolation of commuting.

On the one hand, commuters are increasingly stressed employees spending their journeys doing unpaid work for their jobs. On the other, they are passive consumers of entertainment and advertising. Such trends imply that commuting journeys are not likely to be ones through which family relations, friendships, and communities are built.

The journey to and from work represents a significant investment in time and money for Australian employees. Lengthy commuting, in tandem with increasingly long and stressful work hours and urban sprawl, stifles any opportunity to participate in family and social interaction and to build informal networks and communities. The reform of commuting is a necessary step in the broader project of building sustainable cities and healthy communities.

**Reforming commuting**

Commuting reform requires systematic changes in patterns of transport, land use, and employment including:

1. reducing the car dependence that has long characterised Australian transport policy;

2. improving the availability, efficiency, and reliability of public transport and other travel modes;

3. reducing and managing demand for different types of travel;

4. integrating the planning of transport and land use; and

5. introducing changes to the funding and planning of Australia's transport systems necessary to develop forms of travel that are economically and environmentally sustainable.

As long as transport and land use policies are developed in isolation from each other, people's commuting journeys will continue to be lengthy and frustrating and their transport choices constrained and unduly car-focused.

# 1. Introduction: Commuting and travel in Australia

## 1.1 Overview

Over nine million Australians travel to work each week (ABS 2005), commuting by car, bus, train, tram, bicycle, ferry or foot. Over the past 40 years, the time spent travelling to and from work has increased remarkably and today Australians must negotiate traffic of a much greater volume, with increased congestion, to reach workplaces that are further away.

Commuting is a daily accompaniment to paid work for the vast majority of employees. But it imposes a wide range of personal, social, and environmental costs and impacts on at least three dimensions of Australian life:

1. people's psychological, emotional, and physiological wellbeing;

2. their relationships and interactions with their families, neighbourhoods, communities, and workplaces; and

3. the physical and social environment.

The impact of commuting is heightened when journeys are lengthy, unpredictable or congested, as Section 2 explores in more detail.

This paper examines the time Australians spend travelling to and from work using data from the Household, Income and Labour Dynamics in Australia (HILDA) survey conducted by The Melbourne Institute of Applied Economic and Social Research in 2002.

First then, what is the context for people's journeys to and from work?

## 1.2 Trends in travel

Over the past half-century, there have been enormous increases both in total travel in Australian cities and in travel by motor vehicles. The increase in total travel in Australia's urban areas over the 50 years 1945 to 1995 has been nine-fold and the increase in kilometres travelled by passenger cars fifteen-fold (Cosgrove 2000, p. 1). There has also been a steady increase in the proportions of the Australian population owning motor vehicles (Manins *et al.* 2001, p. 99). For example, an additional one million motor vehicles were registered in Australia between 1998 and 2002 (8.4 per cent) and over the same period the increase in kilometres travelled was in the order of 24317 million (14.5 per cent) (ABS 2003b, p. 3).

Since World War II, a shift has occurred from the use of public transport to the use of private motor vehicles (Gargett and Cosgrove 1999, pp. 1-2). For example, in 1945 rail accounted for over 40 per cent of city transport but had declined to four per cent by 1995, while cars which accounted for 40 per cent in 1945 had increased to over 80 per cent by 1995 (Gargett and Cosgrove 1999, p. 2).

Among commuters there has been a similar shift towards the use of private cars. Between 1976 and 2001, commuting by private vehicle increased from 51.5 per cent

of all commutes to 71.8 per cent with a corresponding large decline in commuting by public transport (Parker 2003, pp. 3-4). There has also been a significant increase in the number of commuters undertaking 'single occupant' car commutes to and from work, further contributing to congestion on the roads (Parker 2003, p. 8).

Of the kilometres travelled by Australian passenger vehicles, approximately half are for commuting and business purposes. Travel to and from work accounts for 25 per cent of kilometres travelled by passenger vehicles and business use accounts for 23.3 per cent (ABS 2003b, p. 4).

The increase in the time people spend travelling to and from work is an important aspect of a profound transformation in our working lives. The hours of full-time workers in Australia have been increasing, especially among men, since the late 1970s (Weston *et al*. 2004, p. 1), and there is a growing mismatch between actual and desired working hours (Denniss 2001; Wooden 2003, p. 7). The working week is longer, shopping hours have been extended, and shift work is increasingly common. Other workplace trends include increased job insecurity, work at unsocial times, frequent short-term travel, and expectations about 24-hour availability (Russell and Bowman 2000, pp. 1-2). Changing patterns of work and travel are having a profound impact on people's lives, their family involvement, and their relationships with friends, relatives and others in the community (Pocock 2003).

In Section 2 this paper assesses the personal, social, and environmental impacts of commuting while Section 3 introduces the HILDA survey. Section 4 then documents the patterns of commuting in Australia revealed by this data.

## 2. Commuting, health and social life

Across the literature on commuting and transport there is consensus that the journey to work imposes a range of negative effects depending on the nature of the commuting experience, but that it also involves some benefits.

It is well documented that journeys to work, and particularly journeys that are lengthy or involve delays and other stressors, are detrimental to physical and emotional wellbeing. Commuting can involve environmental stressors such as crowding and traffic congestion, noise and noise pollution (loud engines and road noise, beeping horns, and screaming drivers), air pollution, unpleasant weather (excessive heat, cold or humidity), and physical discomfort. Such environmental factors have a physical and emotional impact, affecting people's health, wellbeing, and performance (Koslowsky *et al*. 1995). Commuting is at its most stressful when journeys are lengthy, unpredictable, and out of the commuter's control.

Physiological and emotional symptoms associated with commuting strain include higher blood pressure, perceptions of nervousness and tension, reduced task performance, negative mood in the evening hours at home, self-reports of stiff necks and sore backs, tiredness, tension, irritability, and anger (Kluger 1998, p. 149). Stutzer and Frey (2003, p. 5) concur, noting that commuting is associated with:

> …raised blood pressure, musculoskeletal disorders, lowered frustration tolerance and increased anxiety and hostility, being in a negative mood when getting to work and arriving home in the evening, increased lateness, absenteeism and turnover at work, as well as with adverse effects on cognitive performance.

Recent German research finds that the longer people spend in traffic, the greater the risk that they will suffer a heart attack, up to two to three times more likely whether in a car, bus or other form of transport (Peters *et al.* 2004). This consequence is likely to be a result of the combined effects of stress, noise and traffic-related air pollution.

Commuting has been found to have negative impacts on people's workplace participation as well, affecting their behaviour (lateness, absenteeism and increased turnover), emotional wellbeing (increased anxiety and hostility), and attitudes towards employment (increased job dissatisfaction) (Koslowsky *et al*. 1995).

### 2.1 Stuck in traffic

People's experience of commuting is shaped in particular by the speed, difficulty, and predictability of their journeys to and from work. In the UK, a study among 370 workers, half travelling by car and half by public transport, indicated that the speed and level of interruption or 'impedance' of the commuting journey proved to be the best indicator of stress.

> Those experiencing more impedance report a more negative experience of commuting, higher general levels of stress, lowered life satisfaction, more hopelessness, less social support, and a less positive problem-solving style. They also report lower achievement

> motivation, less confidence, poorer attitude to fitness, less time spent at work, and more indicate more time spent at home, but higher levels of home stress. (Cassidy 1992)

When people's journeys to and from work are interrupted or vary unpredictably, the strain of the journey is greatly increased. As Kluger (1998, p. 161) summarises, 'lack of commute control – as indicated by lack of commute choice and by high commute variability – positively correlates with commute strain'.

Commuters travelling by car in some Australian cities are travelling for longer periods than they did a decade ago. The RACQ in Brisbane compared commuting times in 1993 and 2004. They found that the average length of the journey on major commuting routes had increased by six minutes in the morning and close to five minutes in the afternoon (RACQ 2004). The RACQ also reports that motorists are travelling at slower speeds but, as Mees (2000, p. 23) notes, slower traffic has benefits including reductions in noise and the intimidation experienced by pedestrians and cyclists.

Crowding and traffic congestion intensify the negative psychological and physiological effects of commuting. Whether commuters are crowded together in a train or bus, or behind the wheel of a car crawling through congested traffic, they report higher levels of perceived stress and their bodies show increased hormonal indicators of stress (Wener *et al.* 2003, pp. 205-6). Crowding and traffic congestion make commuting more stressful, in part because they intensify two important psychological mechanisms in stress, the lack of control and unpredictability experienced by commuters (Evans *et al*. 2002, p. 522). The existing research among car commuters finds that increased strain is induced by the amount of time spent driving in congested traffic at slow driving speeds, as well as longer times and distances travelled (Kluger 1998, pp. 148-9). As traffic congestion increases, car commuters report more negative effects (Evans *et al*. 2002, p. 522).

One of the symptoms of commuting stress is 'road rage', and there is evidence that road rage incidents are becoming increasingly common in Australia. Car insurer AAMI's survey of 1600 Australian drivers in 2003 found that nine out of ten had been road rage victims. Seventy-five per cent of Australian drivers had received rude gestures, 72 per cent had been tailgated, 58 per cent had been verbally abused, and five per cent had been physically assaulted by another motorist (AAMI 2003, p. 2). Sixty-eight percent of Australian motorists surveyed in 2003 thought that other motorists had become more aggressive in the previous 12 months. AAMI's recent survey, conducted in 2004, found that this perception had strengthened, with 73 per cent of Sydney drivers saying road rage had increased further in the past 12 months.[1] Road rage is shaped by factors additional to levels of commuter stress or traffic speed. The phenomenon is common in Los Angeles, where the average traffic speed is 45 km/h, but rare in Paris where the average speed is 26 km/h.[2]

The roads in Australia's cities are becoming increasingly crowded. As Cosgrove (2000, p. 1) reports:

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[1] 'Road rage is rife in the city of text maniacs', *The Sydney Morning Herald*, 20 October 2004.
[2] Pers. comm., Paul Mees, December 1, 2004.

> A large proportion of Australian urban car trips occurs during the morning and evening peak times. In addition, significant portions of the road networks of the major Australian cities (particularly Sydney) increasingly experience heavy traffic volumes throughout much of the day. Consequently, approximately half of total urban vehicle kilometres travelled are currently performed under congested traffic conditions.

In a recent survey of Sydney residents, over three quarters (78 per cent) believed that Sydney has significant transport and traffic problems, and they identified road congestion as the number one issue (Warren Centre 2001).

Traffic congestion will not be eased by building more roads. While this has been the favoured solution among Australian transport planners, new roads in urban areas simply generate additional traffic and thus cancel out any benefits gained (Mees 2000, p. 25). Sydney residents in the Warren survey agree, with two-thirds opting for management of travel demand rather than building more roads as the solution to congestion (Warren Centre 2001). Congestion is unlikely ever to be entirely eliminated in cities and, indeed, 'some level of congestion, together with restricted car parking, is probably desirable in urban areas' (Mees 2000, p. 28). Downs in *Still Stuck in Traffic* agrees, noting various benefits of peak-hour traffic congestion (Downs 2004, pp. 5-13)

Support for the argument that predictability in the commuting journey has a powerful influence on stress comes also from research among commuters travelling by mass transit. In a study among train passengers during the morning rush hour into New York city, Evans *et al.* (2002) found that men and women who saw their commute as more unpredictable felt greater tension and showed higher bodily stress (as measured by their cortisol levels). Among train travellers, there is some evidence that commuting stress is influenced also by whether they are sitting or standing during the journey and the number of times they change train lines or modes of transport (Kluger 1998, p. 149).

## 2.2 Longer trips and stress

A series of international studies has documented that people whose trips are of a longer duration are more likely to report a negative commuting experience and significantly higher levels of stress. A study based on longitudinal data in Germany finds that 'people with long journeys to and from work are systematically worse off and report significantly lower subjective wellbeing' (Stutzer and Frey 2003, p. 3). In an American study of train commuters in New York City, a group who switched to a new, shorter service were compared with a group who continued on the old route, and were found to show significant reductions in commuting stress and increased satisfaction with their commute to work. Reduced commuting time was the only variable to make a significant difference to commuters' stress (Wener *et al.* 2003, p. 212). A replication of the study using students randomly assigned to the two routes generated similar results.

Lengthy commuting times are not always seen as negative. In the UK study of 370 workers, longer-distance commuters reported various positive effects. Train travellers spoke of the time they had to read or to catch up on work, and did not perceive

themselves as any more stressed than travellers with shorter commutes (Cassidy 1992). People with long drives to work in rural areas or along uncongested roads may see the journey as an opportunity to have 'quiet time' to themselves (Kluger 1998, p. 160). At least anecdotally, people travelling home on the train from Sydney to the Blue Mountains are said to enjoy the time reading, playing cards and socialising; in fact, those who have become used to lengthy commutes over a longer time seem to report fewer negative and more positive experiences. It is important to note that a selection bias is probably at work here, as long-term commuters are likely to be more resistant to the strains of the journey and have continued to commute after others have given up. However, the UK commuters also reported that they had significantly less time to spend at home, socialise, and engage in leisure activities, and they perceived a more stressful home life (Cassidy 1992).

While there is not a simple relationship between commute length and psychological strain, there is a direct correlation between commute length and various negative physiological outcomes. Driving a car for long periods, for example, involves prolonged sitting, car vibrations and exposure to air pollution, and these elevate the risk of an acute herniated lumbar intervertebral disk, cardiovascular stress and various types of cancer (Kluger 1998, p. 161).

## 2.3 Pollution

One of the most significant costs of commuting is environmental with motor vehicles in particular being the major source of air pollutants in Australia. Cars, buses, trucks and motorcycles release more than 75 per cent of carbon monoxide emissions, most emissions of oxides of nitrogen, and are a significant contributor to emissions of organic compounds (Manins *et al.* 2001, p. 81). Pollutant emissions from road traffic are a threat to public health and wellbeing, particularly for the elderly, the very young and those suffering from respiratory illness (Newton *et al.* 2001, p. 83). In 2000, the economic burden of the health effects of traffic pollution in Australian capital cities amounted to $3.3 billion.[3] There were 1200 deaths, 2400 hospital cases and 21000 days of asthma attacks caused by traffic pollution (Amoako *et al*. 2003, p. 17).

Cars and trucks also represent the major cause of excessive noise in urban areas, generating more than 70 per cent of environmental noise pollution. The most recent Australian *State of the Environment* Report notes that 'one in 10 dwellings in Australia's cities experience levels of road traffic noise over an 18-hour period, which exceeds recommended levels' (Newton *et al.* 2001, p. 103).

Vehicle-generated pollution represents a social or environmental cost, part of which is borne directly by commuters themselves. A Sydney study which compared people travelling to and from work by five different modes of commuting – car, train, bus, bicycle and walking – found that those commuting by car showed the highest levels of exposure to air pollutants (Chertok *et al.* 2004). Participants in the study travelled for at least half an hour each to work and home, resulting in five hours minimum of exposure per week. Those individuals who travelled by train, walked or cycled all showed significantly lower levels of exposure than those travelling by car or bus, with

[3] This comprised $1228 million from the estimated cost of mortality (premature death as a result of air pollution), and $2 460 million for morbidity (the quality of life and/or productive capacity of victims impaired or reduced as a result of air pollution).

car commuters experiencing the highest levels. Exposure to pollutants is associated with a wide range of short- and long-term negative health outcomes, from adverse effects on the lungs and heart to headaches, eye irritation and cancer (Chertok *et al.* 2004, p. 63).

The Sydney study corroborates overseas studies documenting that exposure to air pollutants among commuters in motor vehicles is higher than that among commuters using other transport modes. And of course, it is motor vehicles that are responsible for much of the air pollution in the first place (Chertok *et al.* 2004, p. 63). The occupants of cars experience far higher levels of exposure because of contamination by pollutants generated directly from their own cars as well as exposure to pollutants from other vehicles on the road, particularly as cars tend to travel behind one another in a 'tunnel of pollutants' (Chertok *et al.* 2004, p. 65).

### 2.4 Stealing time

While commuting exerts a variety of negative psychological and physiological influences on people in paid employment, it impacts also on people's relationships and interactions within their families, neighbourhoods, communities and workplaces. Those individuals whose weekly journeys to and from work are longer, less controlled or more crowded are likely to come home in negative moods, to feel stiff and sore, and to be irritable and angry around family members (Kluger 1998, p. 149). As the studies described above document, many commuters have less time to be at home and to interact and socialise with family, friends and neighbours, and they see their home lives as more stressful than people whose travel to work is shorter (Cassidy 1992). While little research on commuting has directly investigated its influence on family and interpersonal relationships, the well-documented consequences of lengthy commuting times on personal wellbeing supports the point that there are wider impacts.

Lengthy commuting removes people from their homes and families for longer periods and, in tandem with longer working hours, has a direct negative impact on people's involvement in community affairs and informal social interaction (Pocock 2003, pp. 57-8). Commuting has repercussions for relationships and communities beyond those resulting from the stress and strain of the commuting experience itself. Commuting also steals time. Putnam (2000, p. 213) estimated that each additional ten minutes in daily commuting time cuts involvement in community affairs by ten per cent. In addition, inflexible work hours exacerbate the stress of commuting. A study among Atlanta commuters compared employees in work-hours programs allowing flexible start and finish times with employees in more inflexible working conditions. Those with flexible working hours reported lower levels of stress driving to and from work, and less feeling of time urgency (Lucas and Heady 2002, p. 569).

Commuting has negative effects on three dimensions of Australian life: on individuals' personal wellbeing, on the physical and social environment, and on people's relationships and interactions with their families, neighbourhoods, communities and workplaces. Having reviewed the impacts of the journey to and from work, this paper now turns to an examination of Australian data on commuting experiences.

# 3. National data on commuting: The HILDA survey

The data used for this analysis comes from the Household, Income and Labour Dynamics in Australia (HILDA) survey, a longitudinal survey focused on issues relating to family, employment and income. The HILDA survey, a large-scale, nationally-representative survey of Australian households, commenced in 2001. This paper is based on data collected in Wave 2 of the HILDA survey, released at the end of 2003 and representing over 13000 people in over 7200 households.[4] Comparison of the HILDA sample with population benchmark data from the Australian Bureau of Statistics (ABS) suggests that the sample is broadly representative of the Australian population with one disparity - residents of Sydney are under-represented (Wooden 2003, p. 3).

## 3.1 The HILDA survey and commuting

The HILDA survey has several strengths as a source of data on Australian commuting patterns including:

- nationally representative data that allows regional comparisons;
- a snapshot at one moment in time of commuting patterns across Australia (and as successive waves of data collection are completed, it will allow the examination of changes over time);
- data on the time spent commuting to and from work, while other data sources focus only on distance travelled; and
- the exploration of relationships between commuting and a range of variables, given the wealth of other data collected.

All household members over the age of 15 years are asked how much time they spend 'travelling to and from a place of paid employment' in a typical week and their answers comprise the data on which this paper is based. Other data on commuting patterns in Australia are available from the census conducted every five years by the ABS which provides data on the method of travel to work used on the census day by employed persons aged 15 and over. Further data are available from the ABS Time Use Survey, last conducted in 1997 (ABS 1998), the Sydney-based Household Travel Survey conducted annually by the Transport and Population Data Centre (2004), and

[4] Households were randomly selected using a multi-stage process described in detail by Watson and Wooden (2002). Face-to-face interviews were completed with at least one adult member of each household, and interviews were then sought with all household members over the age of 15 years. All persons completing an individual interview were also given a self-completion questionnaire. In Wave 1 of the HILDA survey a total of 11693 households were selected. Interviews were completed with all eligible members at 6872 of these households, and with at least one eligible member at a further 810 households. A total of 19 917 people were in the 7682 households at which interviews were conducted. Of these, 4790 were under 15 years of age and thus ineligible for a personal interview in Wave 1. This left 15127 persons eligible for an interview, of whom 13969 completed the Person Questionnaire (Watson and Wooden 2002, p. 14). Close to 90 per cent of the Wave 1 households sampled were followed into Wave 2 in 2002. A total of 13041 persons responded in Wave 2 from 7245 households.

the Victorian Activity and Travel Survey conducted annually by the Transport Research Centre.

The HILDA survey also has several limitations as a source of data on commuting because it does not include information on:

- how people travel to and from work;
- whether journeys have multiple purposes, such as dropping off children and going on to work;
- other, objective, characteristics of commuting such as distance travelled and traffic congestion; or
- subjective characteristics of commuting such as perceived stress.

Commuting time by itself is not necessarily a useful measure of the social, economic or environmental impacts of transport use, as the mode of transport is a significant moderator of impact. For example, one person may spend an hour each day travelling to and from work by bicycle, while another may spend 20 minutes per day commuting by car. Nevertheless, the HILDA survey does provide nationally representative and contemporary data on people's commuting times. National data of this kind are particularly valuable, given the evidence that commuting time is positively correlated with psychological stress, physiological strain and reduced involvement in family and community life.

### 3.2 The sample

For the purposes of this study, the sample was defined as people aged 18 to 64 years participating in some kind of paid work, whether full-time or part-time. Of the 13041 persons who responded in Wave 2 of the HILDA survey, 6588 persons were in part-time or full-time employment and aged 18 to 64 thus constituting a nationally representative sample of adult Australians of working age and in paid employment.

Among people in paid employment in Australia, the vast majority (98.7 per cent) report weekly commuting times of 15 hours or fewer per week. The much longer times of one or so per cent of the sample positively skew the spread of commuting times overall. To minimise the influence of these outliers on the analyses, the 88 individuals with weekly commuting times of more than 15 hours per week were excluded from all further tests, leaving a sample of 6500 people. In addition, nine per cent of people in paid employment report no commuting time. Given that the focus of this paper is on the variables affecting the journey to and from work and the impact of commuting itself, these people were also excluded from the analysis. This leaves a sample of 5898 people.

In summary, the final sample comprises people aged 18 to 64 years who participate in paid work and spend at least some time up to 15 hours commuting in a typical week. All statistical analyses refer to this group or to subsets of this group.

Before exploring the patterns of people's commuting journeys in greater detail, it is worth outlining how Australians usually travel to and from work, and how much they work.

### 3.3 How people get to and from work

The vast majority of Australians use a car to travel to and from work. The 2001 census showed that among employed people using only one form of transport to commute, the majority (82 per cent) did so by car. Most of these people are drivers but some travel as passengers. When trucks, motorbikes and scooters are included, 85 per cent of people who travel to work, using one method only, do so in a private vehicle (ABS 2001b). Overall, more than 70 per cent of commuters make the trip to and from work by car (Parker 2003, pp. 3-4). In Sydney, three quarters of employed people using one method of travel were in a car (74 per cent), compared with 82 per cent in Brisbane, 84 per cent in Melbourne, 86 per cent in Adelaide and 87 per cent in Perth (ABS 2001b).

Across Australia, only eight per cent of employed people (using one method of travel) took public transport on census day; either a train, bus, ferry or tram. Just under five per cent of commuters walked to work. Even fewer people travelled to work by bicycle (1.2 per cent).

The pattern of widespread car usage is apparent from Table 1, with relatively few people utilising public transport or walking or cycling to work. The exception is the Northern Territory, where nearly one in five employed people who travelled to work on census day either walked or cycled.

**Table 1 Travel to work by employed persons 2001 (%)**

| Mode of travel | Aust. | NSW | Vic | Qld | SA | WA | Tas | ACT | NT |
|---|---|---|---|---|---|---|---|---|---|
| Car | 78 | 73 | 81 | 81 | 83 | 82 | 84 | 83 | 70 |
| Train | 4 | 7 | 4 | 2 | 1 | 1 | 0 | 0 | 0 |
| Bus | 3 | 4 | 1 | 3 | 4 | 4 | 3 | 5 | 4 |
| Walk or bike | 6 | 6 | 5 | 6 | 5 | 5 | 8 | 7 | 18 |
| Other (one mode) | 3 | 4 | 4 | 5 | 5 | 5 | 3 | 3 | 6 |
| Two modes | 3 | 5 | 4 | 3 | 2 | 3 | 2 | 2 | 2 |
| Three modes | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

Source: ABS 2001b

### 3.4 Hours of work

Commuting is for most people a necessary corollary of work; patterns of workforce participation influence how much time is spent commuting. Among people in paid employment, just over a third (36 per cent) works between 35 and 44 hours per week. Another 20 per cent work between 45 and 54 hours per week. (Table 3 provides further detail, in the column 'Proportion of working population'.)

Just under one quarter of people work some of their usual hours at home (23 per cent). Of this group, 44 per cent do not travel to and from work in a typical week and, as previously described, have not been included in the analysis for this paper. The other 56 per cent put in hours at work and at home, commuting in between.[5]

[5] Of this group about one quarter have a formal arrangement with their employers to work at home while half work at home without any formal arrangement. The people in the remaining quarter are self-employed. Hours worked at home range between one and 90 hours a week; however three-quarters of employees work ten or fewer hours per week at home. On average, the weekly hours worked at home amount to 8.16. Managers and administrators put in the longest work hours at home (9.06 hours) followed by professionals (8.66 hours).

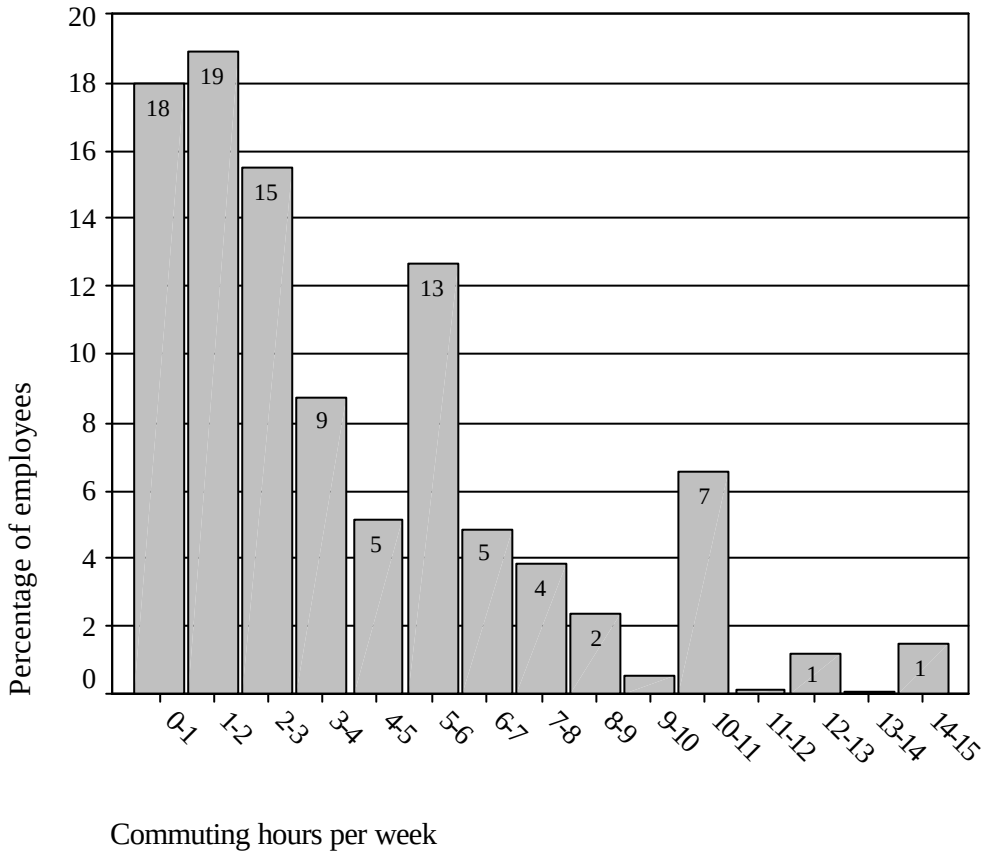
# 4. Patterns of commuting

## 4.1 Time spent commuting each week

Among Australians who travel to and from paid work, the mean commuting time each week is three hours and 37 minutes. About 80 per cent of employees have total commuting times of under six hours per week, and about 90 per cent have commuting times of under nine hours per week. Among full-time workers the mean commuting time is four hours and ten minutes per week while among people working less than 35 hours per week it is two hours and 20 minutes per week.

Figure 1 shows the overall distribution of all employees' commuting times.

**Figure 1 Employee commuting time per week**




Source: HILDA Survey Wave 2 (2002)

## 4.2 Regional variation in commuting

One of the most striking features of commuting in Australia is the regional variation in average commuting times. Sydney stands out as the city with the longest average commute of four hours and 43 minutes. Employees there endure significantly longer travel than employees in all other areas of Australia apart from Melbourne. They travel for longer each day worked and over each week than workers in Brisbane, Adelaide, Perth and Canberra, and longer than people living outside these cities in every state and territory.

Table 2 shows average travelling times per week for people in paid employment in different regions. Figures for 'Rest of state' refer to those people living outside the capital city of that state.

**Table 2 Average commuting hours per week by region**

| Region | Average weekly commuting hours |
|---|---|
| Sydney | 4.72 |
| Melbourne | 4.36 |
| Brisbane | 3.96 |
| Perth | 3.72 |
| Adelaide | 3.57 |
| Rest of Victoria | 3.07 |
| Rest of NSW | 2.90 |
| Rest of QLD | 2.78 |
| Tasmania | 2.67 |
| ACT | 2.48 |
| Northern Territory | 2.47 |
| Rest of WA | 2.36 |
| Rest of SA | 2.10 |
| Average | 3.62 |

Source: HILDA Survey Wave 2 (2002)

If we control for the number of days worked each week, Sydneysiders still have the longest journeys to and from work and travel for significantly longer periods than workers in all other cities and states. Workers in Sydney are travelling on average one hour and four minutes per day worked compared with about 59 minutes for their Melbourne colleagues. Brisbane commuters have the next highest commuting times per days worked at 50 minutes while the shortest commuting times are experienced by employees in Canberra.

The travel times per week of people living in Melbourne average out at four hours and 22 minutes, 21 minutes shorter than those of Sydneysiders but significantly longer than their colleagues in Perth, Adelaide, Canberra, the ACT and all country regions.[6] These differences hold if we examine commuting time per days worked. Residents of capital cities have longer weekly and daily commuting times than employees in the remainder of their respective states.

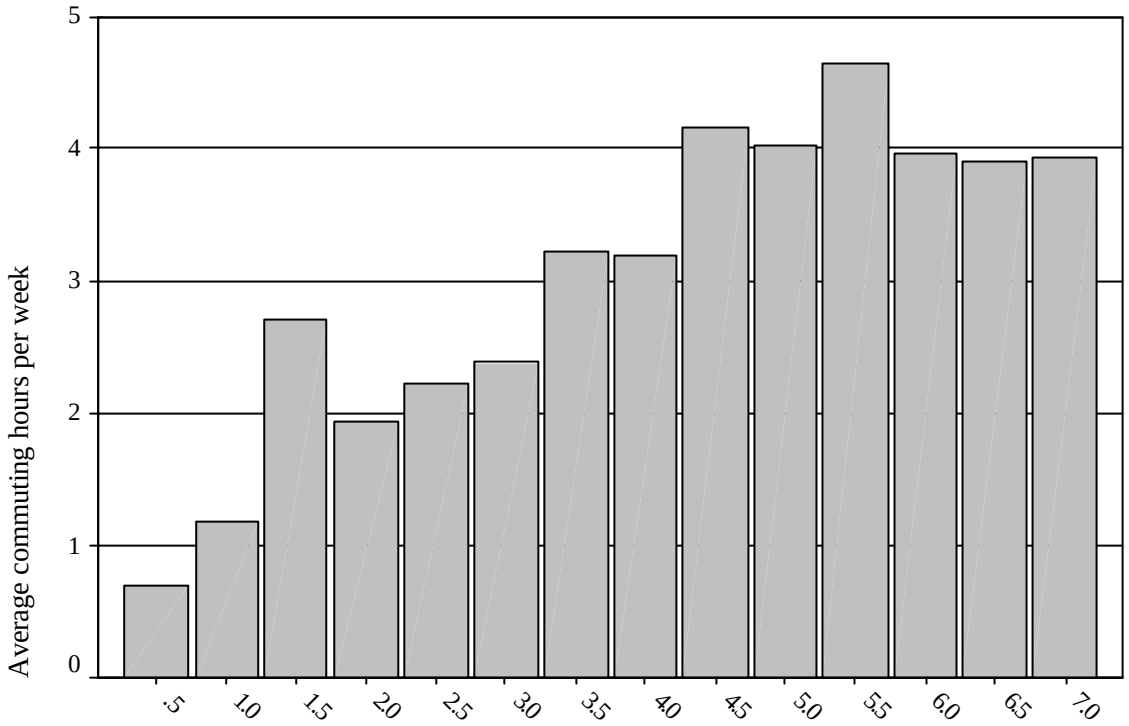
The following section explores the relationships between people's journeys to and from work and their working hours, working days, work schedules and occupations.

[6] Hobart is not counted separately in this data but included in a state-based count for Tasmania as a whole. Darwin is also included in the count for the Northern Territory. The same goes for Canberra, but this makes less potential difference as the outskirts of Canberra and the boundaries of the Australian Capital Territory are very close.

## 4.3 Working days, working hours and commuting

As one would expect, commuting hours increase when the number of days worked per week increases, as shown in Figure 2.[7] There is a significant and positive correlation between commuting times and days worked per week.[8]

**Figure 2 Days worked per week and commuting time**




Source: HILDA Survey Wave 2 (2002)

A similar relationship is evident with hours worked. Employees who work longer hours each week have longer commuting times, and there is a positive correlation between commuting time and hours worked.[9] However, this relationship holds only for those working from a few hours to 50 or so hours per week; above 50 hours the relationship becomes more complex. Table 3 shows mean travel times for employees working different hours per week.

[7] For the purposes of this chart, days worked per week were aggregated into half-day spans. Individuals with days worked per week of 0.01 - 0.5 days were recorded as 0.5 days, 0.51 – 1 days were recorded as one day per week, 1.01 – 1.5 days were recorded as 1.5 days per week, and so on.

[8] Values for days worked were skewed (skewness = -1.023), as were values for commuting times (skewness = 1.253). Thus, the Spearman rho statistic was calculated, $r_s$ (5894) = .201, $p$ = .000. The direction of the correlation was positive, indicating that employees who work for more days each week have longer commuting times.

[9] Values for commuting times were skewed (skewness = 1.253). Thus, the Spearman rho statistic was calculated, $r_s$ (5894) = .268, $p$ = .000, indicating a positive correlation.

**Table 3 Average commuting hours per week by hours worked**

| Hours worked per week in all jobs | Mean travel time (hours) | Proportion of working population |
|---|---|---|
| 0 - 4 | 0.67 | 1.05 |
| 5 - 9 | 1.31 | 3.22 |
| 10 - 14 | 1.88 | 3.97 |
| 15 - 19 | 1.91 | 4.63 |
| 20 - 24 | 2.57 | 6.31 |
| 25 - 29 | 2.94 | 4.09 |
| 30 - 34 | 3.09 | 6.45 |
| 35 - 39 | 3.88 | 16.49 |
| 40 - 44 | 4.05 | 21.25 |
| 45 - 49 | 4.37 | 11.08 |
| 50 - 54 | 4.41 | 9.65 |
| 55 - 59 | 4.18 | 3.75 |
| 60 - 64 | 4.35 | 4.70 |
| 65 - 69 | 4.34 | 1.05 |
| 70 and above | 4.53 | 2.32 |
| Total | 3.62 | 100 |

Source: HILDA Survey Wave 2 (2002)

There is, however, no significant relationship between commuting times and hours among full-time employees working a 35-hour week or longer.[10] An employee on 35 or more hours per week is likely to be working at least five days per week, and in this situation there is less variation in mean commuting times.

The number of hours and days worked has a greater impact on commuting than the number of jobs a person has. About one in ten people holds down more than one job but despite travelling to several workplaces, their weekly commuting time (three hours and 18 minutes) is less than average. This is partly explained by the higher proportion of part time workers (42 per cent) amongst people with more than one job compared with people who have only one job (28 per cent).

Given the positive association between working hours and commuting times, is it the case that the longer commuting times of employees in Sydney are the product of their longer working hours? There are no significant differences in the overall hours worked by people in different capital cities and regions in Australia so the longer travel times suffered by Sydneysiders are not a consequence of longer working hours. Nor are they a consequence of Sydney dwellers working more days each week.

[10] Employees are divided into full-time or part-time depending on the hours worked per week, where full-time designates paid work of 35 or more hours per week, in line with the ABS classification system (ABS 2001a, p. 42).

## 4.4 Commuting times and work schedules

The commuting times of employees may also be shaped by their typical work schedules. Most people (74 per cent) in paid employment have a regular daytime work schedule, as Table 4 shows.

**Table 4 Average commuting hours per week by work schedule**

| Work schedule | Mean hours of weekly travel | Proportion |
|---|---|---|
| A rotating shift | 3.76 | 7.56 |
| Irregular schedule | 3.75 | 8.66 |
| A regular daytime schedule | 3.71 | 74.47 |
| Other | 3.34 | 0.98 |
| Split shift | 2.98 | 1.27 |
| On call | 2.78 | 1.85 |
| A regular night shift | 2.51 | 1.87 |
| A regular evening shift | 2.30 | 3.34 |
| Total | 3.62 | 100 |

Source: HILDA Survey Wave 2 (2002)

If we look at all people in paid employment, both full-time and part-time, those on a rotating shift, an irregular schedule or a regular daytime schedule have significantly longer commuting hours than people with a regular evening shift and a regular night shift.

Most full-time employees (80 per cent) have a regular daytime schedule compared with three in five part-time employees (61.4 per cent). Looking only at people in full-time employment, the relationship between commuting times and work schedules varies.

Among full-time workers, employees with a rotating shift, an irregular schedule or a regular daytime schedule continue to have the longest commuting times, significantly longer than people with a regular night shift. But in contrast to the comparison involving all workers, the full-time workers with these three kinds of work schedules no longer show commuting times which are significantly longer than those of people working a regular evening shift.

**Table 5 Average commuting hours per week by work schedule, full-time employees**

| Work schedule | Mean hours of weekly travel | Proportion |
|---|---|---|
| Irregular schedule | 4.55 | 6.54 |
| A rotating shift | 4.25 | 7.72 |
| A regular daytime schedule | 4.16 | 79.98 |
| On call | 4.08 | 0.94 |
| Other | 3.94 | 1.04 |
| Split shift | 3.67 | 0.84 |
| A regular evening shift | 3.66 | 1.50 |
| A regular night shift | 2.61 | 1.45 |
| Total | 4.16 | 100 |

Source: HILDA Survey Wave 2 (2002)

### 4.5 Commuting times and occupation

Commuting times vary with the kinds of work that people do. A simple comparison of different occupational groups finds that two, tradespeople and related workers, and managers and administrators, have the longest travelling times. The shortest times are experienced by elementary clerical, sales and service workers. The commuting time of different occupational groups is shaped also by the hours and days they work each week and is examined in the following section. Our analysis of occupation uses the ABS *Australian Standard Classification of Occupations*, in which occupations are classified according to skill level and skill specialisation (ABS 1997, p. 5).[11]

Table 6 shows mean travelling times to and from work for people in various occupations, arranged from longest to shortest commute.

[11] The HILDA survey provides data based on both this and the International Labour Organisation's *International Standard Classification of Occupations 1988*. The results of our analysis were very similar for both systems of classification, so the remainder of this section reports only on the ASCO-based calculations.

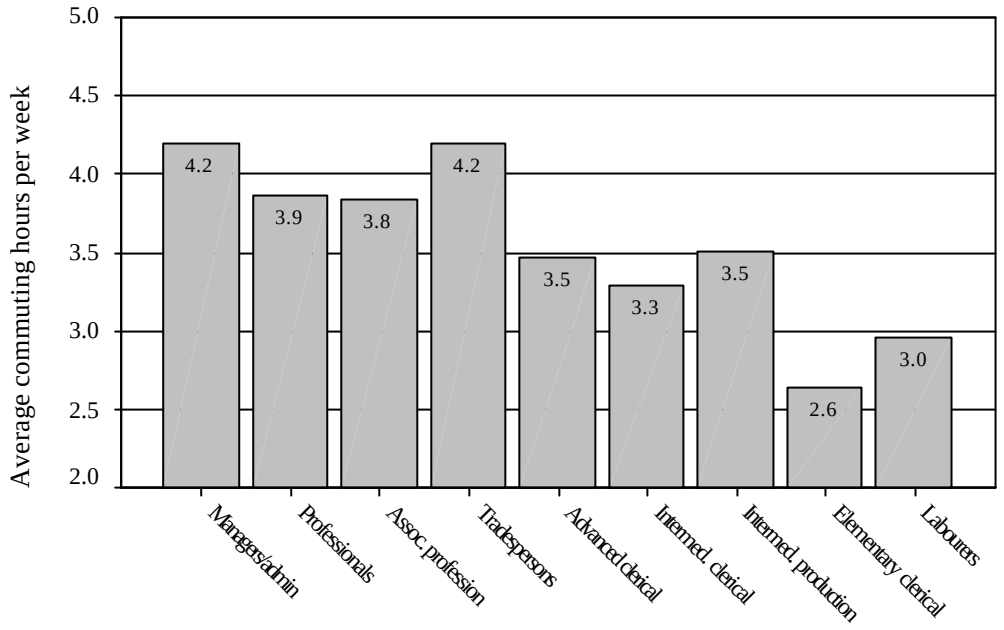
**Table 6 Average commuting hours per week by occupation (ASCO 2-digit)**

| Occupational group | Mean hours of weekly travel | Proportion |
|---|---|---|
| Construction tradespersons | 5.77 | 1.98 |
| Electrical and electronics tradespersons | 4.98 | 1.78 |
| Business and information professionals | 4.69 | 6.97 |
| Specialist managers | 4.52 | 4.97 |
| Science, building and engineering professionals | 4.44 | 2.09 |
| Mechanical and fabrication engineering tradespersons | 4.27 | 2.17 |
| Business and administration associate professionals | 4.20 | 4.90 |
| Science, engineering and related associate professionals | 4.19 | 1.97 |
| Social, arts and miscellaneous professionals | 4.17 | 3.80 |
| Generalist managers | 3.94 | 1.34 |
| Skilled agricultural and horticultural workers | 3.89 | 1.20 |
| Health and welfare associate professionals | 3.80 | 1.07 |
| Other associate professionals | 3.80 | 1.34 |
| Intermediate clerical workers | 3.78 | 9.17 |
| Road and rail transport drivers | 3.77 | 2.56 |
| Other advanced clerical and service workers | 3.68 | 1.56 |
| Intermediate plant operators | 3.63 | 1.88 |
| Intermediate sales and related workers | 3.63 | 1.29 |
| Automotive tradespersons | 3.38 | 1.00 |
| Factory labourers | 3.45 | 1.95 |
| Other tradespersons and related workers | 3.33 | 2.19 |
| Other intermediate production and transport workers | 3.30 | 2.64 |
| Managing supervisors (sales and service) | 3.28 | 4.22 |
| Secretaries and personal assistants | 3.28 | 1.64 |
| Elementary clerks | 3.20 | 1.19 |
| Education professionals | 3.19 | 6.90 |
| Health professionals | 3.12 | 4.80 |
| Intermediate machine operators | 3.03 | 0.85 |
| Other labourers and related workers | 2.87 | 3.26 |
| Elementary service workers | 2.80 | 1.19 |
| Cleaners | 2.67 | 2.26 |
| Food tradespersons | 2.67 | 1.03 |
| Intermediate service workers | 2.52 | 6.43 |
| Farmers and farm managers | 2.51 | 0.71 |
| Elementary sales workers | 2.49 | 5.71 |
| Total | 3.62 | 100.0 |

Source: HILDA Survey Wave 2 (2002)

To obtain a simpler picture of the relationship between occupation and commuting hours, we have aggregated these 36 classifications to produce nine occupational categories, as shown in Figure 3. The occupations are arranged according to the ASCO classification system, with levels of skill and skill specialisation decreasing from left to right.

**Figure 3 Average commuting hours per week by occupation (ASCO 1-digit)**[12]




Source: HILDA Survey Wave 2 (2002)

Two occupational groups have the longest commuting hours: managers and administrators, and tradespeople and related workers. Figure 3 shows that people in occupational groups with higher degrees of skill level and skill specialisation tend to have longer commuting hours.

## 4.6 Commuting times, occupation and hours worked

We have already established that there is a positive relationship between working hours and time spent travelling to and from work, at least for people working anywhere from one to 50 or so hours per week. We have also established that tradespersons and managers and administrators have significantly longer commuting times than other workers. Is it the case that the differences in the commuting times of occupational groups are shaped by the hours they work?

[12] Full ASCO 1-digit labels for the occupational classifications in Figure 3 are as follows: Managers and administrators; Professionals; Associate professionals; Tradespersons and related workers; Advanced clerical and service workers; Intermediate clerical, sales and service workers; Intermediate production and transport workers; Elementary clerical, sales and service workers; Labourers and related workers.

There are clear and significant differences in the mean hours worked by different occupational groups, from a high of over 48 hours per week to a low of 26 hours per week, as shown in Table 7. Across occupations, there are also significant differences in the numbers of days worked each week related to the differing prevalence of part-time work, the demands of the job, the nature of the industry and other factors.

**Table 7 Average hours and days per week worked in different occupations**

| Occupational group | Mean weekly hours worked | Mean weekly days worked |
|---|---|---|
| Managers and administrators | 48.19 | 5.12 |
| Professionals | 38.58 | 4.52 |
| Associate professionals | 42.89 | 4.98 |
| Tradespersons and related workers | 43.09 | 5.05 |
| Advanced clerical and service workers | 32.67 | 4.23 |
| Intermediate clerical, sales and service workers | 32.50 | 4.38 |
| Intermediate production and transport workers | 41.97 | 4.87 |
| Elementary clerical, sales and service workers | 26.38 | 3.97 |
| Labourers and related workers | 32.38 | 4.51 |
| Total | 37.95 | 4.63 |

Source: HILDA Survey Wave 2 (2002)

If we look only at full-time workers, the relationship between commuting times and occupational groups is somewhat different. As Table 8 shows, advanced clerical and service workers now have the longest travel times, longer even than those of professionals and tradespersons and related workers.

**Table 8 Average commuting hours per week by occupation (ASCO 1-digit), full-time employees**

| Occupational group | Mean hours of weekly travel | Proportion |
|---|---|---|
| Advanced clerical and service workers | 4.44 | 2.75 |
| Tradespersons and related workers | 4.41 | 14.23 |
| Professionals | 4.37 | 25.11 |
| Managers and administrators | 4.31 | 9.33 |
| Associate professionals | 4.03 | 16.21 |
| Intermediate clerical, sales and service workers | 4.03 | 13.39 |
| Elementary clerical, sales and service workers | 3.85 | 4.00 |
| Labourers and related workers | 3.76 | 5.74 |
| Intermediate production and transport workers | 3.75 | 9.24 |
| Total | 4.16 | 100.00 |

Source: HILDA Survey Wave 2 (2002)

Table 9 shows the average commuting times for different groups of full time employees, from longest to shortest. Again, this illustrates that two clusters of occupational groups have the longest commuting hours: tradespeople and related workers, and managers and administrators. Construction tradespeople have the longest commuting times of all full-time employees, on average travelling for nearly six hours per week.

**Table 9 Average commuting hours per week by occupation (ASCO 2-digit), full-time employees**

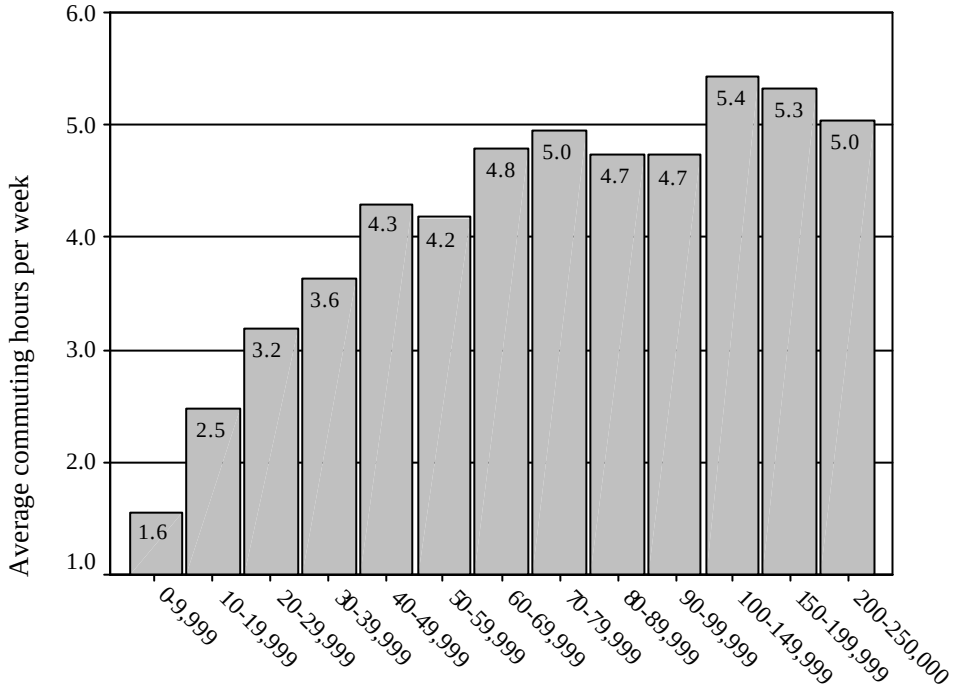
| Occupational classification | Mean hours of weekly travel |
|---|---|
| Construction tradespersons | 5.99 |
| Electrical and electronics tradespersons | 5.08 |
| Business and information professionals | 4.98 |
| Other advanced clerical and service workers | 4.89 |
| Social, arts and miscellaneous professionals | 4.70 |
| Specialist managers | 4.64 |
| Science, building and engineering professionals | 4.52 |
| Business and administration associate professionals | 4.45 |
| Intermediate clerical workers | 4.39 |
| Mechanical and fabrication engineering tradespersons | 4.32 |
| Skilled agricultural and horticultural workers | 4.24 |
| Elementary service workers | 4.20 |
| Science, engineering and related associate professionals | 4.17 |
| Health and welfare associate professionals | 4.14 |
| Road and rail transport drivers | 4.13 |
| Other associate professionals | 4.11 |
| Cleaners | 4.05 |
| Secretaries and personal assistants | 3.98 |
| Elementary sales workers | 3.94 |
| Health professionals | 3.91 |
| Generalist managers | 3.88 |
| Intermediate sales and related workers | 3.80 |
| Factory labourers | 3.73 |
| Intermediate plant operators | 3.69 |
| Other labourers and related workers | 3.68 |
| Other tradespersons and related workers | 3.68 |
| Other intermediate production and transport workers | 3.67 |
| Education professionals | 3.57 |
| Managing supervisors (sales and service) | 3.42 |
| Elementary clerks | 3.39 |
| Automotive tradespersons | 3.38 |
| Intermediate service workers | 3.08 |
| Intermediate machine operators | 2.98 |
| Food tradespersons | 2.86 |
| Farmers and farm managers | 2.65 |
| Total | 4.16 |

Source: HILDA Survey Wave 2 (2002)

## 4.7 Commuting and income

What is the relationship between commuting times and income? As one might expect from our analysis of working hours and commuting, there is a positive correlation between commuting times and income.[13] Individuals who work more days per week and longer hours also incur longer commuting times; however, once employees are earning wages and salaries of at least $70000 or so per annum, there are no differences between their commuting hours and those of employees on higher salaries, as Figure 4 shows.[14]

**Figure 4 Average commuting hours per week by income**




Source: HILDA Survey Wave 2 (2002)

If we look only at full-time workers and examine commuting hours per day worked, we find that a positive correlation between commuting times and income is

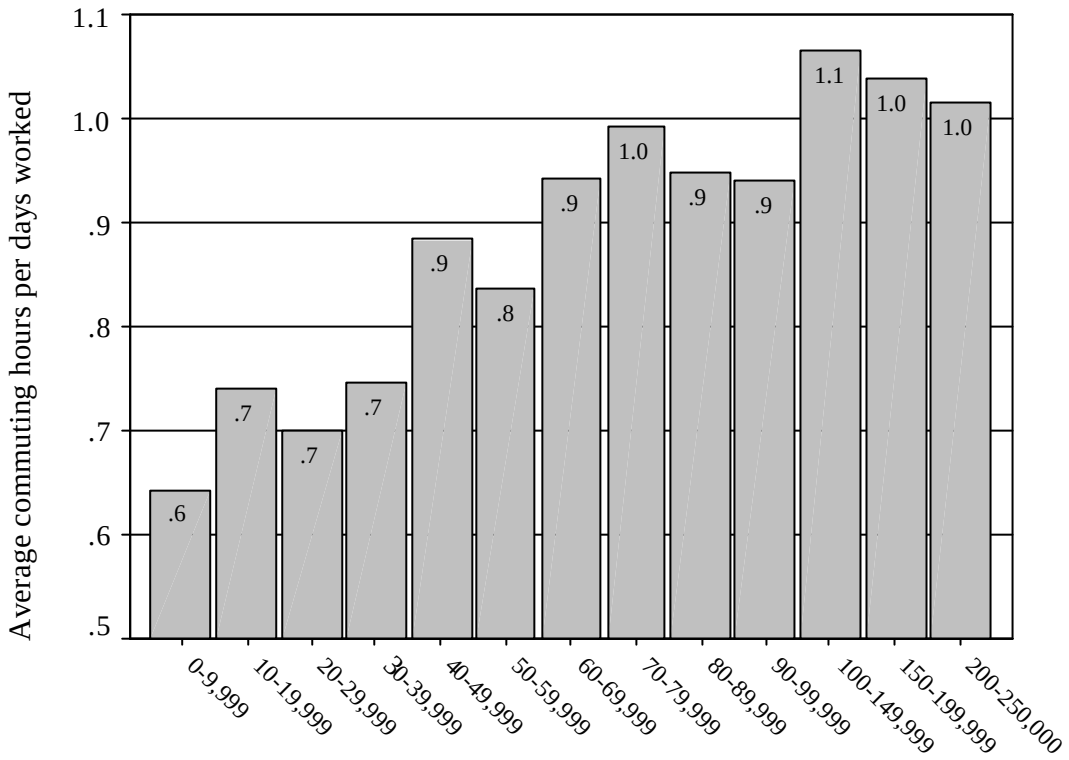
[13] A correlation was computed among employees with commuting times greater than zero and less than 15.01 hours per week. Values for income were skewed (skewness = 2.321), as were values for commuting times (skewness = 1.263). Thus, the Spearman rho statistic was calculated, $r_s$ (5572) = .332, $p$ = .000, indicating a positive correlation between commuting times and income.

[14] Three items should be noted in relation to these calculations:

- To preserve confidentiality in the HILDA survey, any individuals with annual wages and/or salaries of over $250000 per annum are 'top-coded' as being at $250000.
- Individuals classified as employed full-time or part-time in the HILDA survey and yet not receiving any income from wages and salary were excluded from these calculations of commuting time and income. Of the 6500 or so people classified as employed full-time or part-time in the HILDA Survey, 587 reported that they did not receive any income from wages and salary. These individuals may be working without pay in a family business or receiving payment in kind.
- Wages and salaries have been aggregated into spans of $10000 until they reach $100000, above which they are aggregated into spans of $50 000.

maintained[15] as shown in Figure 5. Research using ABS census data on Sydney journeys to work finds that employees in more prestigious occupations commute further on average, reflecting the larger geographical labour market for the hiring of professional, managerial, and other workers (Watts 2003, p. 20). At the same time, HILDA data suggest that, among the highest paid individuals earning between $70000 and $250000 per annum, there are no significant differences between the commuting hours of people on lower or higher salaries in this range.

**Figure 5 Average commuting hours per days worked per week by income, full-time employees**




Source: HILDA Survey Wave 2 (2002)

## 4.8 Poorer and richer areas

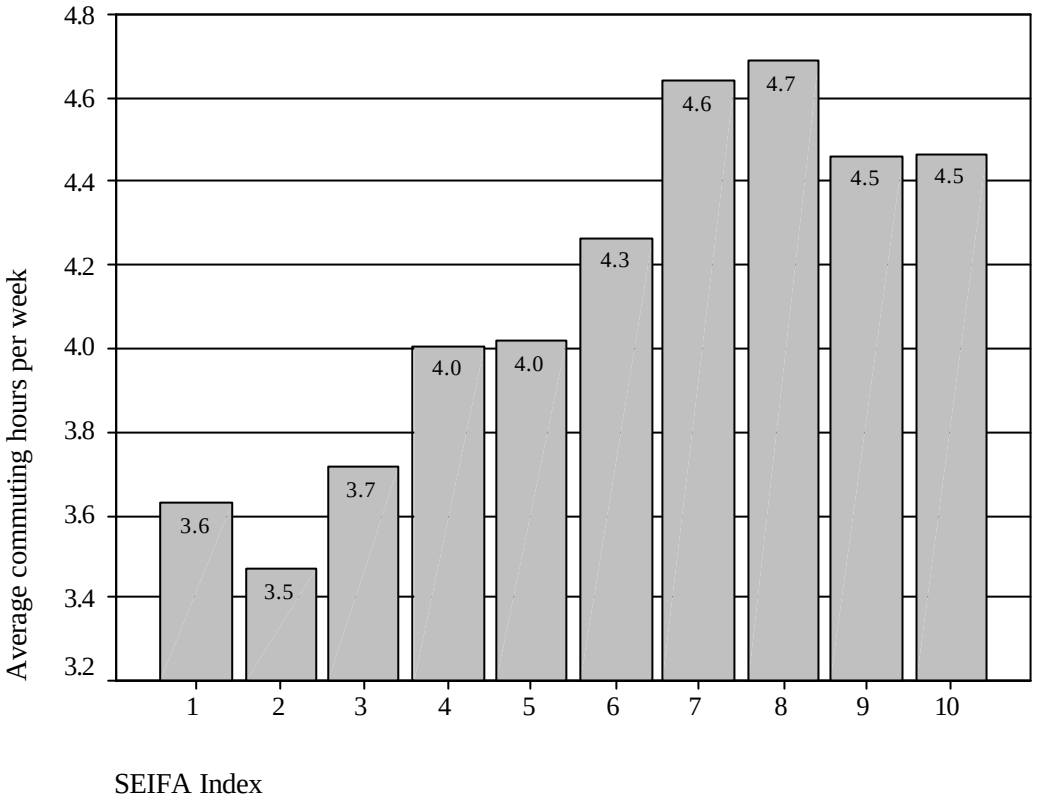
The HILDA survey includes data on the relative socio-economic disadvantage of the areas from which individuals are drawn using the ABS socio-economic indicators for areas (SEIFA). The SEIFA index focuses on attributes such as income, educational attainment and employment to construct indexes where the first (lowest) decile denotes an area of greatest socio-economic disadvantage and the tenth (highest) decile denotes an area of least socio-economic disadvantage (ABS 2003a, p. 4). While there

[15] We conducted the same computation of correlation as above, but only among full-time workers. Values for income were highly skewed (skewness = 2.673), as were values for commuting times (skewness = 1.028). The Spearman rho statistic was calculated, $r_s$ (3922) = .178, $p$ = .000, indicating a positive correlation.

are four indexes available, the most useful for our analysis is the Index of Relative Socio-Economic Advantage/Disadvantage.

If we compare the commuting times of full-time workers from areas of differing socio-economic advantage or disadvantage, we find that those from areas of higher advantage typically have longer commuting times as shown in Figure 6.

**Figure 6 Commuting times per week by SEIFA index, full-time employees**




Source: HILDA Survey Wave 2 (2002)

Areas ranked in the top four deciles of socio-economic advantage with more people on high incomes and greater proportions in skilled occupations, show commuting times that are significantly longer (28 per cent) than those of areas in the bottom three deciles.[16]

If we control for days worked per week, the pattern is identical. Full-time workers from the four areas of higher socio-economic advantage continue to have significantly longer commuting times per days worked than full-time workers from the three more disadvantaged areas.

## 4.9 Gender and commuting

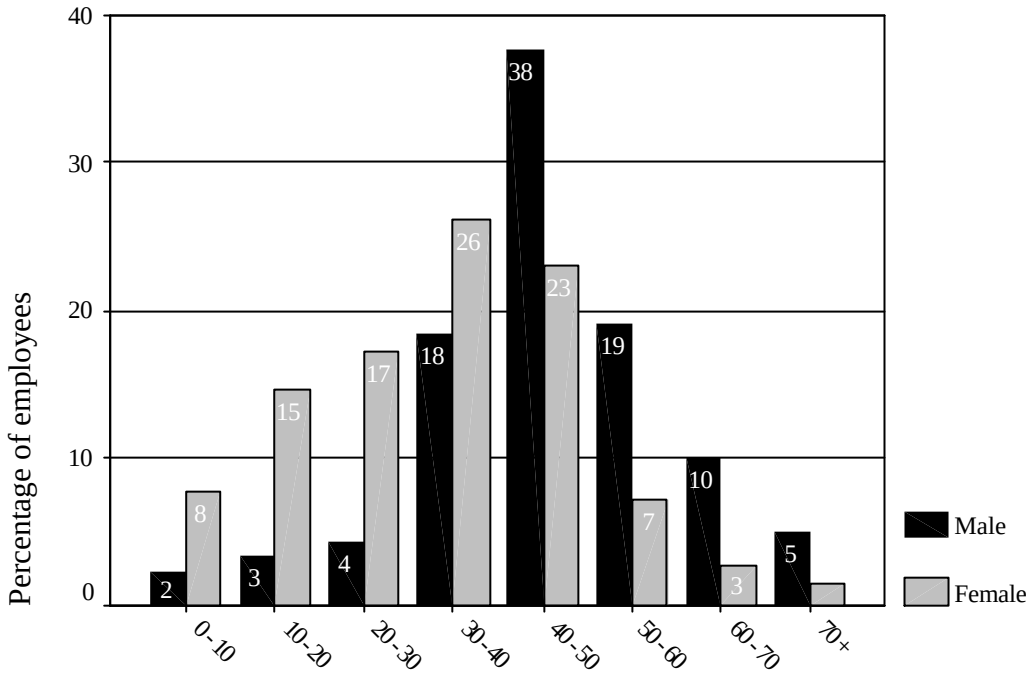
Men spend more time travelling to and from work each week than women. For men in paid employment, mean travel time to and from work is four hours and six minutes

[16] Values for commuting time were skewed (skewness = 1.253), while values for SEIFA were not (skewness = -.031). Thus, the Spearman rho statistic was calculated, $r_s$ (5896) = .138, $p$ = .000. The direction of the correlation was positive.

per week, while for women it is three hours per week; these travel times are significantly different.

Looking at full-time workers only, men show a mean travelling time to and from work of four hours and 22 minutes per week compared to three hours and 47 minutes among women. Figure 7 charts the contrast in men's and women's weekly hours of paid work.

**Figure 7 Men's and women's weekly hours of paid work**




Hours worked per week in all jobs

Source: HILDA Survey Wave 2 (2002)

Over half (56 per cent) of men in paid employment work between 40 and 60 hours a week compared with under one third (30 per cent) of women. A further 15 per cent of men work more than 60 hours per week compared with four per cent of women. This scenario is reversed if we examine part-time hours, where one in five women (22 per cent) works for less than 20 hours per week while only one in twenty men (six per cent) works hours in this range.

Given that patterns of commuting will be influenced by men's and women's respective involvements in paid work, what happens if we control for this? If we compare commuting time per days worked in a week, we find that men still experience significantly longer travel to work than women. For each day's work men will, on average, travel for about 50 minutes compared with women who will travel for about 44 minutes. If we control for hours worked per week, again men's commuting times per week are significantly longer than women's.

The explanation for this gender contrast lies in the differing kinds of work performed by women and men and the associated commuting times. The Australian labour force is characterised by both horizontal and vertical segmentation by gender (Heiler *et al.*

1999). Women's employment is concentrated in particular occupations, often in the lower status and poorer paid industries, and within any one sector men dominate managerial, administrative and executive positions. As it happens, the occupations with the longest commuting times are also the occupations dominated by men, while the occupations with the shortest commuting times are the occupations dominated by women. In other words, gendered patterns of occupational participation are driving the differences in men's and women's commuting times.

Some occupations have significantly longer journeys to and from work. The top six occupations in terms of commuting time are construction tradespersons, electrical and electronics tradespersons, business and information professionals, specialist managers, science, engineering and associate professionals and mechanical and fabrication engineering tradespersons. All of these occupations are dominated by men. In fact, there is not a single female in either of the first two occupations in our sample. In contrast, if we examine the six occupations with the shortest commuting times, three of them are dominated by women. Table 10 gives the breakdown by sex for these 12 occupations.

**Table 10 Selected occupations by sex (ASCO 2-digit)**

| Occupational group | Male (%) | Female (%) |
|---|---|---|
| *The six occupations with the longest commuting times* | | |
| Construction tradespersons | 100.0 | 0.0 |
| Electrical and electronics tradespersons | 100.0 | 0.0 |
| Business and information professionals | 64.7 | 35.3 |
| Specialist managers | 65.9 | 34.1 |
| Science, building and engineering professionals | 82.9 | 17.1 |
| Mechanical and fabrication engineering tradespersons | 99.2 | 0.8 |
| *The six occupations with the shortest commuting times* | | |
| Elementary service workers | 62.9 | 37.1 |
| Cleaners | 37.6 | 62.4 |
| Food tradespersons | 63.9 | 36.1 |
| Intermediate service workers | 21.4 | 78.6 |
| Farmers and farm managers | 88.1 | 11.9 |
| Elementary sales workers | 24.6 | 75.4 |

Source: HILDA Survey Wave 2 (2002)

While this analysis demonstrates a significant contrast in the patterns of men's and women's work-related travel, it conceals other aspects of commuting which take up a greater proportion of women's travel time and are more burdensome for them. Drawing on the Sydney Household Travel survey, Dowling and Lyth (2003, pp. 3-5) note that women make far more trips than men to 'serve' their households or children and are twice as likely to travel for shopping purposes and more likely to drop off or pick up household members. Men with children do substantially less dropping off and

picking up (or 'chauffeuring') than women with children. Such trips comprise one tenth of men's trips, but one fifth of women's (Dowling and Lyth 2003, p. 10). At the same time, gender differences in the overall numbers of trips made each week are declining over time as women's trip rates increase, at least according to data from the Sydney Household Travel Survey. This reflects women's growing participation in the workforce which has led to more complex travel patterns and increased reliance on cars (Raimond and Gee 2002, p. 5).

### 4.10 Predictors of commuting

This paper has documented a series of important relationships between people's working lives and their experience of commuting.

- Average commuting time per week is three hours and thirty-seven minutes.
- Sydneysiders spend more time commuting to work than people anywhere else in Australia.
- Employees in the city commute for longer than their colleagues in the country areas of their respective states.
- There is a positive correlation between the number of days worked and average commuting time.
- The two occupational groups with the longest average weekly commute are managers and administrators and tradespersons and related workers.
- There is a positive correlation between income and commuting time.
- Among full-time employees, those from areas of higher advantage typically have longer commuting times.
- Men spend more time than women travelling to work each week, and this can be explained by differing patterns of work and occupation.

Before moving to a consideration of the impact of commuting on personal and social life, we briefly examine the multivariate prediction of commuting time using HILDA data.

In order to understand better the relative contributions of multiple determinants of commuting, simultaneous multiple regression was conducted. Several variables that we have shown to correlate with commuting times could not be included either because they involved nominal data (work schedule and region) or their relationship with the dependent variable was not linear (occupational classification).[17] In addition, the HILDA survey does not provide data on other factors that are likely to have substantial effects on the length of people's commuting journeys such as the mode of travel used, the distance travelled, the location of people's dwellings, and the location of their workplaces.

[17] Our examination of occupations found a roughly bimodal distribution in which the longest commuting times were among two groups: tradespeople and related workers, and professionals and associate professionals.

Five independent variables were included in the multiple regression: hours worked in all jobs, annual wages and salary, index of relative socio-economic advantage or disadvantage, sex, and Sydney/not Sydney. The last variable is a dummy-coded variable to test the effect of region.[18] Individuals with annual wages and salary of zero dollars were excluded from the calculation. Details of the results can be seen in the Appendix.

These five variables significantly predict commuting times when all five are included. The adjusted *R* squared value was .113 indicating that 11.3 per cent of the variance in commuting time was explained by the model. According to Cohen (1988) this is a relatively small effect (cited in Morgan *et al.* 2004, p. 91). We also conducted a 'stepwise' multiple regression using the same five variables examined in the simultaneous multiple regression and all variables were found to contribute significantly to prediction of commuting time.[19]

[18] All people living in Sydney were coded as '1', while all people living outside Sydney were coded as '0'. The variable for major region could not itself be included in the multiple regression as its 13 geographical categories represent categorical data. We also conducted multiple-regressions using dummy coding for each of the other region values, but the inclusion of the 'Sydney/not Sydney' variable produced the highest prediction of commuting time.

[19] In stepwise multiple regression, independent variables are entered in the order of the magnitude of their bivariate correlation with the dependent variable, commuting time. The independent variable with the highest correlation is entered first, then the next highest, and so on. Variables are deleted at any step when they no longer contribute significantly to the regression (Kerr *et al*. 2002, p. 186).

# 5. Commuting and relationships

Thus far, we have considered a variety of factors that influence people's commuting times, among them regional, occupational and length of time worked. Here we examine the impact of commuting on personal and social life in terms of three dimensions:

- personal and social relationships;
- perceptions of time pressure and time satisfaction; and
- the monetary value of time spent.

## 5.1 Personal and social relationships

Commuting exacerbates the negative impacts of long work hours and work stress on people's family lives and interpersonal relationships. Today's lengthy journeys to and from work have added to the 'theft' of our time represented by increasingly long work hours and unpaid overtime (Pocock 2003, p. 135). In turn, inflexible work hours exacerbate the stressful effects of commuting, in that commuters with rigid working schedules report higher levels of driver stress and feelings of time urgency (Lucas and Heady 2002, p. 569). The stresses and strains of journeys that are long, unpredictable, congested or polluted take a toll on individuals as they tend to come home late, grumpy and worn out, without the physical or emotional energy to participate in family life, friendships or other relational activities. Hence their relationships also suffer.

The analysis below considers whether long commuting hours, in tandem with long work hours, are associated with;

- spending less time with children;
- spending less time socialising with friends and relatives;
- doing less voluntary or charity work; and
- participating less often in sporting groups and community organisations.

*Spending time with children*

Although it varies widely, parents in paid employment spend, on average, 13.5 hours a week caring for and playing with their children, nearly two hours a day.[20] Spending time with children is a much bigger part of most people's week than commuting (see Table 11). However, one in five men (21 per cent) who work full time and have children under 15 spend more time travelling to and from work than they do with their children. The vast majority of these men (96 per cent) are part of a couple family. On average, this group commutes for seven hours and 43 minutes a week compared to three hours and 54 minutes per week spent playing with their children.

[20] The HILDA definition includes helping children with their personal care, teaching, coaching or actively supervising them, or arranging child care, school or other activities.

Just over 40 per cent of this group of male commuters live in either Sydney or Melbourne, the two cities with significantly higher commuting times than the rest of the country. They also work in occupations associated with greater travel; professionals (24 per cent), tradespersons (22 per cent), and associate professionals (16 per cent). Two thirds of this group work between 40 and 54 hours a week and their long days at work are being exacerbated by commuting times that are more than double the national average. If we include fathers who do not live in the same household as their children but spend some time playing with them in a typical week, the proportion of all full-time male workers who are spending more time commuting than interacting with their children increases to 24 per cent.

Among all parents in paid work, there is a small negative correlation between weekly commuting and time spent playing with one's children.[21] In other words, the more time that parents spend travelling to and from paid work, the less time they spend caring for and interacting with their children.

*Socialising with friends and relatives*

The frequency with which people meet socially with friends and relatives is a second measure of the time people have to invest in personal and social relationships. Over 60 per cent of people who are in some kind of paid employment socialise at least weekly. Close to another 30 per cent see friends and relatives between one and three times a month while the remaining ten per cent socialise less often.

People who commute less are socialising more. For instance people who have daily contact with friends and relatives (who are not living with them) do significantly less commuting than people who socialise less often. They are also the only group with an average commuting time per week that is less than three hours (two hours and 45 minutes).

Both part-time and full-time work impact on people's ability to socialise with friends and relatives but if we look only at full-time workers, we find there is still an association between shorter commuting times and more frequent socialising. Among full-time workers, people who socialise several times a week have significantly shorter commuting times (three hours and 54 minutes per week) than the people who socialise two or three times a month (four hours and 30 minutes per week).

*Participating less often in sporting groups and community organisations*

Unpaid activities, such as participating in a sporting group, hobby or community based organisation, also provide the opportunity to build important social relationships. Looking again at full-time workers, people who are active members of social organisations have significantly shorter commuting times per week (three hours and 54 minutes) than those who are not members (four hours and 12 minutes).

*Caring and volunteering*

In general, people who are in paid work spend considerably more time commuting than they do in voluntary or caring activities. However, Table 11 shows that when

[21] Values for commuting times and time spent playing with children were skewed (skewness =1.218 and 2.423 respectively). Thus, the Spearman rho statistic was calculated, $r_s$ (2639) = -.069, $p$ = .000.

people do have caring responsibilities, for a spouse, relative or other people's children, it is more time-consuming than travelling to and from work. Discretionary time spent on voluntary or charity work is comparable with the average weekly commute of around three and a half hours a week.

**Table 11 Time spent on various activities in a typical week**

| Activity | Mean weekly hours for those who undertook the activity at all | Mean weekly hours for all employees |
|---|---|---|
| Playing with your children | 13.5 | 5.8 |
| Housework | 9.5 | 8.9 |
| Caring for spouse or relative | 6.9 | 0.2 |
| Looking after other children | 5.1 | 0.3 |
| Outdoor tasks | 4.4 | 3.7 |
| Commuting to/from paid work | 3.6 | 3.6 |
| Volunteer or charity work | 3.5 | 0.4 |
| Household errands | 3.3 | 3.0 |

Source: HILDA Survey Wave 2 (2002)

## 5.2 Feeling rushed and feeling dissatisfied

Most people in paid work feel rushed, at least some of the time, but those who feel most rushed also have the longest commuting times. Just over a third of people report they often feel rushed or pressed for time (35 per cent); a further 41 per cent say they sometimes feel this way; one in ten admits to feeling this way rarely, while another ten per cent report that they almost always feel rushed or pressed for time. Those who report often feeling rushed or pressed for time suffer significantly longer commuting times, on average travelling for three hours and 48 minutes a week compared with less than 3.5 hours for people who are sometimes or rarely rushed or pressed for time.

Another way to consider the impact of commuting is to examine people's satisfaction with the amount of free time they have.[22] Figure 8 shows that the more people commute, the less likely they are to report high levels of satisfaction with their available free time. In other words, there is a small, negative correlation between weekly commuting time and levels of satisfaction with free time.[23]

The average commuting time for people who travel to work is just over three hours and 37 minutes a week. People who report high levels of satisfaction with their amount of free time (giving ratings of seven out of ten or higher) commute fewer than average hours per week while those who rate their satisfaction very highly (at eight or nine) travel for significantly shorter periods than people whose rating levels are between one and six). The seven per cent who say they are totally satisfied with the

[22] Participants in the HILDA survey were asked to indicate their level of satisfaction on a scale of zero to ten where zero is total dissatisfaction with their amount of free time and ten is total satisfaction.
[23] Values for commuting times were skewed (skewness = 1.253). Thus, the Spearman rho statistic was calculated, $r_s$ (5894) = -.120, $p$ = .000.

amount of free time they have also have the lowest average commuting times of two hours and 54 minutes per week.

Longer commuting hours are associated with longer working hours, and it is the latter that are shaping people's levels of satisfaction with the amount of free time they have. People working anywhere from one hour per week to 39 hours a week report significantly higher levels of satisfaction than those working 50 hours a week or more. As employees' work hours increase, their levels of satisfaction steadily decline, as Figure 8 shows.

**Figure 8 Work hours per week and satisfaction with free time**


Source: HILDA Survey Wave 2 (2002)

## 5.3 The wage value of commuting

One method of assessing the value of commuting is to calculate what each person would be paid if their time were to be remunerated at the same level as their hours at work. In other words, what is the wage value of people's weekly commute? We have calculated this using the HILDA data on levels of wages and salaries actually received by individuals and their actual time spent commuting to and from work each week.[24] The derived figures represent the cost to each person, in terms of the wages and salaries they receive for their work, of their commuting time each week. While there are other ways of estimating the monetary value of travel time, our method represents

[24] Employees' hours worked each week were multiplied by 48, the standard number of weeks worked in paid employment per year, to generate an approximate annual figure, and this was then divided by their gross wages and salary per annum, to produce the wage value of each working hour. This number was then multiplied by employees' actual commuting time per week to arrive at a wage value for each person's weekly commute to and from work. The weekly wage value was multiplied by 48 to calculate the wage value for each person's annual commute.

a simple way of calculating the value of commuting based on time taken and wages received.[25]

Employees accumulate an average wage-equivalent commuting cost of $84 per week, or $4 015 per year. Among all people in paid employment in Australia, the wage-equivalent costs of commuting represent over $454 million per week or over $21.7 billion per year.[26] However, as shown in Table 12, there is significant regional variation in this cost.

**Table 12 Wage-equivalent commuting costs by region**

| Region | Wage value of weekly commute ($) | Wage value per year ($) |
|---|---|---|
| Sydney | 123.36 | 5921 |
| Melbourne | 109.43 | 5253 |
| Brisbane | 84.88 | 4074 |
| Perth | 84.00 | 4032 |
| Adelaide | 68.79 | 3302 |
| ACT | 66.70 | 3202 |
| Rest of NSW | 65.80 | 3158 |
| Rest of Victoria | 61.70 | 2962 |
| Rest of QLD | 54.13 | 2598 |
| Tasmania | 52.16 | 2504 |
| Northern Territory | 47.40 | 2275 |
| Rest of WA | 44.52 | 2137 |
| Rest of SA | 38.55 | 1850 |
| National average | 83.64 | 4015 |

Source: HILDA Survey Wave 2 (2002)

The average weekly cost for Sydney commuters is $123, a significantly greater cost than that of commuters in all other states and territories except Melbourne, amounting to an annual cost of $5 921. Melbourne has the second highest wage-equivalent commuting costs of $109 per week. Regional South Australia boasts the lowest

[25] The Bureau of Transport and Regional Economics (2002) notes there are various formulae with which to calculate the benefits and costs of time travelled, and that the valuation of time has been seen to vary by travel purpose and vehicle class. In addition, the value of time to an individual is complex. Taking five minutes fewer to get to one's destination may mean little to people who have time to spare, but for people who are trying to keep an appointment on time or for whom this is the only time to see their children, the significance might be considerable.

[26] The sample of HILDA respondents studied in this paper accounts for 42.73 per cent of the HILDA population. Applying this proportion to the ABS estimate of the Australian working age population of 12 649 776 equates to an estimated 5 405 249 individuals who have the same characteristics as the respondents in this analysis. Therefore, given an average wage equivalent cost per commuter of $4 015 per year, the total time cost of commuting is estimated to be $21.7 billion.

weekly commuting cost at $39 or $1850 per year, reflecting the fact that commuting costs in the regions are always lower than the major cities in their respective states.

Employees in Sydney receive higher wages on average than employees in Brisbane, Adelaide and regional areas and this goes some way towards explaining the higher wage value of their commuting journeys. However, Sydneysiders do not receive higher wages than employees in Melbourne, Perth or Canberra and commute for significantly longer periods than people in all these cities and areas other than Melbourne. This means that the wage-equivalent cost of their commutes is significantly higher. Not only do Sydneysiders endure longer trips to and from work each week, but their wage-equivalent commuting costs are 48 per cent higher than the national average, or close to half as much again.

The average wage-equivalent cost of time spent commuting is $102 for men and $64 for women. Again, this reflects the disparities in work hours and pay between men and women. But it also begins to illustrate the cumulative cost of commuting to a family or household with more than one person in paid employment.

Looking more closely at occupations, managers and administrators have the highest costs of commuting when their time spent travelling is valued by their hourly wage rate. The cost is $148 per week or $7107 per year. While tradespeople and related workers spend the longest time commuting (reported above), the time cost of their commuting per week valued at their actual hourly wage rates is, around average, $84 per week or $4013 a year. They spend more hours commuting but do so at lower wages than other occupations.

**Table 13 Wage-equivalent commuting costs by occupation (ASCO 1-digit)**

| Occupation | Wage value of weekly commute ($) | Wage value per year ($) |
|---|---|---|
| Managers and administrators | 148.06 | 7107 |
| Professionals | 108.57 | 5211 |
| Associate professionals | 89.21 | 4282 |
| Tradespersons and related workers | 83.61 | 4013 |
| Advanced clerical and service workers | 77.52 | 3721 |
| Intermediate production and transport workers | 69.61 | 3341 |
| Intermediate clerical, sales and service workers | 62.20 | 2986 |
| Labourers and related workers | 45.98 | 2207 |
| Elementary clerical, sales and service workers | 42.56 | 2043 |

Source: HILDA Survey Wave 2 (2002)

The wage-equivalent time costs of commuting are in addition to the direct transport costs incurred by commuters and, as a consequence, Australian households spend an average of $118 per week on transport. Significant elements of this expenditure include motor vehicle purchase ($43), petrol ($24) and vehicle registration and insurance ($20) (ABS 2000, p. 4), costs representing 17 per cent of all household

spending on goods and services.[27] In fact Australian household spending on transport is greater than spending on housing, recreation, household furnishings and equipment, and all other goods and services apart from food and non-alcoholic beverages (ABS 2000, p. 3). In general transport costs increased by 26 per cent during the period from 1993-94 to 1998-99 (ABS 2000, p. 5).

[27] The ABS also provides figures for household expenditure by household income quintile group, and these show that the proportion of household spending on transport accounts for a low of 14 per cent in the poorest 20 per cent of households, and a high of 18.2 per cent in the second-highest quintile of households (ABS 2000, p. 12).

# 6. Conclusions

## 6.1 Towards the horizon

Place of residence in Australia has a significant impact on people's journeys to and from work. Our analysis has established that people in Sydney have commuting times that are significantly longer than anywhere else in the country; in terms of average commuting time only Melbourne comes close. Sydneysiders spend longer periods in their cars or on public transport each working week, not because they work longer hours or more days, but because of the nature of the transport available and the journeys they must complete.

As the populations of Australia's large urban centres increase, and as suburbs sprawl towards the horizon, the average commuting distance travelled by employees will lengthen. This is especially true for workers living in outer suburban areas (Watts 2003, p. 1). In Sydney for example, throughout the 1990s there was a substantial increase in the distances people travelled to work (Watts 2003, p. 15). In part because of 'a consumer preference for low density outer urban living fuelled by land availability and cheap land costs' (Black and Suthanaya 2002, p. 4), the kilometres travelled to and from work by people living in the outer suburbs have exploded. If Sydney were to be divided into three concentric rings, residents of the outer ring would travel by car for total distances three times higher than those of residents in the middle ring and six times higher than those in the inner ring according to 1996 census data (Black and Suthanaya 2002, pp. 4-5). Journey-to-work travel in Sydney's outer ring has increased by an amount eighteen times higher than that recorded for the inner ring during the years 1991 to 1996. In Queensland, rapid growth in fringe metropolitan areas is resulting in a significant increase in vehicle volume on major arterial roads.[28]

Lengthy commuting has been exacerbated by suburbanisation and urban sprawl. Rapid growth in fringe metropolitan areas and poor planning of land use has meant that commuters in outer urban areas and in satellite cities face complex and poorly organised public transport systems.[29] The lack of public transport increases the comparative advantage of the car in accessing employment, such that cars come to be seen as the only feasible transport option for the employed (Parker 2003, p. 7). In Sydney, private transport has become the dominant mode of getting to work, and this is especially true for outer suburban commuters (Black and Suthanaya 2002, pp. 5-6). They are more likely to travel by car, and they travel long distances each day. The same situation applies in Melbourne where commuters in suburbanised fringe areas find that public transport is severely lacking and the provision of services lags years behind the building of houses (Morris *et al*. 2002, p. 21).

Historically, moving to the suburbs has been attractive because of the wider spaces, larger homes and other benefits they provide. But suburbanisation has also exacted a toll on community. Putnam (2000, p. 213) argues that high-commute communities pay a 'civic penalty', experienced even by those individuals in the community who do not commute. Urban sprawl contributes to civic disengagement in three ways:

[28] 'Carsguide: The key findings,' *The Courier-Mail*, 14 July 2004.
[29] 'Frustration as public transport lags behind population boom,' *The Courier-Mail*, 15 June 2004.

> First, sprawl takes time. More time spent alone in the car means less time for friends and neighbors, for meetings, for community projects, and so on… Second, sprawl is associated with increasing social segregation, and social homogeneity appears to reduce incentives for civic involvement, as well as opportunities for social networks that cut across class and racial lines… Third, most subtly but probably most powerfully, sprawl disrupts community 'boundedness.' Commuting time is important in large part as a proxy for the growing separation between work and home and shops. (Putnam 2000, p. 214)

Across Australia, HILDA survey data indicates that commuting times increase with:

- hours worked in paid employment each week (up to about 50 hours per week);
- days worked each week (up to about six days per week); and
- income (up to about $70000 per annum), a factor associated with both hours and days worked.

Among all workers in paid employment, the longest commuting times are experienced by people on rotating shifts or on a regular daytime schedule. Employees from areas of higher socio-economic advantage have longer travel times to and from work than those from areas of lower socio-economic advantage. Commuting times are longest among two broad occupational groups, tradespeople and professionals. The former group includes carpenters, bricklayers, painters and electricians for example, while the latter group includes sales representatives and managers, accountants, property professionals and managers (ABS 1997, pp. 28-35).

Lengthy commuting exacts a toll, physically and emotionally, on individuals. People with longer journeys to and from work display higher levels of bodily stress and strain, report emotional ill-effects such as irritability, anxiety and negative moods, and have less time to spend at home socialising and engaging in leisure activities. Our analysis of the HILDA data corroborates these findings. People with longer commuting times report feeling more pressed for time and less satisfied with the amount of free time they do have. They have fewer opportunities to play with their children and socialise with friends and relatives, and are not as likely to take part in sporting groups and community organisations.

Not all aspects of personal or social life should be assessed in terms of their monetary value. Nevertheless, assigning a monetary value to the hours that people spend travelling to work is one way of illustrating the opportunity cost of commuting time. If Sydneysiders were paid for the time they spend travelling to and from work at the same rate they are paid once they actually get to work, they would receive an extra $123 per week or $5921 per year. The wage-equivalent commuting costs of people in Sydney are significantly greater than are those for the rest of Australia. In fact, Sydneysiders would receive $85 more per week than commuters in regional South Australia, or $4080 a year.

Commuting has a negative effect on people's ability to participate in informal familial and social interaction and high levels of commuting harm local neighbourhoods and communities. Streets and suburbs become dormitories to large numbers of men and women who disappear each day to paid work (Pocock 2003, p. 50). Neighbourhoods

are depopulated and streets are empty during the day, increased street traffic in the mornings and afternoons means that neighbourhood life is more dangerous for children and adults alike, and individuals and families are less able to become known to others in their community and to forge informal networks of communication and support (Mees 2000, p. 17; Pocock 2003, pp. 69-70).

## 6.2 Reforming commuting

Reducing commuting time requires systematic changes in patterns of transport, land use and employment. This paper concludes by highlighting five areas of transport policy that deserve attention.

*Reduce car dependence*

First, we must reduce the car dependence that has long characterised Australian transport policy. This may seem counter-intuitive given the concern of this paper with lengthy commuting time, especially as cars are widely perceived to offer a quicker mode of transport than, for example, buses, trains or cycling. But this perception is not always correct, and where it is correct, it is a symptom of policy and planning decisions that have privileged car transport while neglecting public transport and allowing it to become inefficient or ineffective.

More widely though, car dependence exerts a fundamental limitation on the sustainability – the environmental protection, economic and social development – of Australian cities (Newman 2004; Mees 2000, p. 46). It has contributed to urban sprawl, intensified the consumption of fossil fuels and the production of greenhouse gases and smog, imposed high economic costs on city budgets and personal costs on household expenditure, contributed to an 'obesogenic' environment associated with diminished physical activity (Hinde and Dixon 2004, p. 2; Warren Centre 2002a), and exacerbated the loss of community (Laird *et al.* 2001, pp. 20-66). When the 'external' costs of different modes of travel (in terms of their effects on the environment, congestion, accidents, noise and other variables) are calculated, it is clear that car use imposes economic costs on government and community spending that are significantly higher than those of other modes of travel (NSW Government 2003, p. 89).

There is a widespread perception that it takes longer to get anywhere on public transport than in a car. However, in some rail-based cities such as Sydney, rail speeds match or even exceed average traffic speeds. In Sydney, average rail speeds are 42 kilometres per hour compared to 37 kilometres per hour for average traffic speeds (Laird *et al.* 2001, pp. 48-49). Journey times from point to point are often shorter on public transport than in a car, especially if one is travelling on a main link (Carter 2002). An NRMA comparison of trip times for inbound journeys to the Sydney CBD at morning peak time and outbound journeys at afternoon peak time, found that public transport was considerably quicker. For example, inbound travel from Strathfield takes 13 minutes by train, 38 minutes by bicycle, 38 minutes by car and 40 by bus. From Ryde, the journey takes 41 minutes by bus, 43 minutes by bicycle and 50 by car (Wise 2002, p. 51). However, rail times can be considerably slower for individuals who live far from a railway station or are travelling to destinations not well served by rail.

Some of the highest per capita car use in the world occurs in Australian cities (Laird *et al.* 2001, p. 46) because car reliance has been fostered by a systematic privileging of the car over other forms of mobility (Hinde and Dixon 2004, p. 7). Successive governments have failed to develop more diverse transport systems, funded roads at the expense of public transport, supported car dependence through tariff and budgetary assistance and the lessening of road-user charges and taxes, and assumed car dependence in their planning of land use (Mees 2000, pp. 29-45; Laird *et al.* 2001; Hinde and Dixon 2004). Over the past 30 years, in today's dollars the Federal Government has spent $58 billion on roads, about $2.2 billion on rail and about $1.8 billion on urban public transport (Laird 2004, p. 35). Car use has been intensified by occupational, demographic and cultural changes (Hinde and Dixon 2004; Morris *et al*. 2002; Raimond and Gee 2002).

Reducing car dependence relies on the achievement of four further goals.

*Improve public transport*

It is essential that we improve the availability, efficiency and reliability of public transport and other travel modes. In a situation where public transport systems have been neglected, under-funded and allowed to run down, it is not surprising that commuters turn to cars. In Melbourne and Sydney for example, train commuters report widespread dissatisfaction particularly with the unreliability of the rail system. In a survey of residents of Greater Sydney, almost three-quarters (73 per cent) believed that not enough money and resources are being invested in Sydney's public transport (Warren Centre 2001).

Transport systems are most likely to meet the diverse travel needs of city residents if they are 'comprehensive, easily understood, integrated, [and] multi-modal' (Warren Centre 2002e). City planners *can* get people out of their cars if they provide attractive transport alternatives. A study of 49 international cities found that people's use of public transport, walking and cycling increases in response to better public transport (such as improving public transport speeds with respect to private traffic speeds) and traffic demand measures (Laird *et al.* 2001, p. 139). In a survey of 500 residents aged 17 and over from the Greater Sydney region, two-thirds of drivers said that if public transport were as quick as car travel they would use public transport (Carter 2002).

Creating more road capacity by building new roads and widening existing ones does not reduce traffic congestion. Instead, it leads to more traffic because car use as a proportion of travel increases and car-based infrastructure just fills to capacity (Laird *et al.* 2001, pp. 135-143). For the price of one extra lane of car capacity, governments can build a rail system which has the capacity of six lanes of car traffic. While rail systems are seen as ideal for cities with high population densities, they also work well in low-density cities (Laird *et al.* 2001, p. 142). Rail services work best if they are integrated with feed-in services by bus, car and bike (Laird *et al.* 2001, pp. 143-144) and if integrated ticketing allows travel on a variety of public transport modes.

*Manage and reduce travel demand*

A range of measures at the local level can increase people's use of public transport, cycling and walking and reduce the demand for private vehicle travel. 'Travel Smart' programs are effective at encouraging commuters to favour more sustainable modes

of travel such as walking, cycling, public transport and ride sharing and to make shorter trips (Laird *et al.* 2001, p. 145; Marinelli and Roth 2002, p. 12). Other activities include 'walk to work days', the 'walking school bus', car pooling and 'car clubs' (Parker 2003, p. 14; Radbone and Hamnett 2003, pp. 15-16; Warren Centre 2002a). In Sydney, the experience of the 2000 Olympics showed that the community will accept well-managed, efficient transport programs that provide quality alternatives to car use (Warren Centre 2002b).

Changing the physical environment is an important way to encourage more sustainable methods of transport such as walking and cycling (Radbone and Hamnett 2003). Suburban traffic can be lessened by 'traffic calming' measures including landscaping streets, installing roundabouts and taking other steps to make streets safer for and give priority to pedestrians and cyclists. Transport policies can also cap the total capacity of parking spaces and reduce the supply of central city parking (Laird *et al.* 2001, pp. 139-145).

Local and federal pricing mechanisms must be adjusted to take account of the actual costs of urban car use and to ensure that road users pay these costs. Current road use pricing recognises the fact that motorists do not bear many of the costs associated with their car use such as congestion, pollution, road wear and tear, accidents, and the allocation of public space to roads and parking. Because this heavy subsidisation is invisible, road users avoid the 'price signals' that public transport users receive from fares, and this results in greater use of private vehicles and under-use of public transport (NSW Government 2003, p. 72). Laird *et al.* (2001) propose measures aimed directly at road users such as parking taxes in central business districts and prominent centres and congestion tolls on major urban roads.[30] They also argue for a reduction in federal taxation benefits for car ownership and usage and increased tax benefits for urban public transport use, together with an increase in both federal fuel excise and the level of road cost recovery from heavy vehicles (Laird *et al.* 2001, p. 159).

Such measures will be politically acceptable only if it is clear to the public that the funds raised are being used to improve the travelling conditions of commuters and to develop public transport. Two surveys of Sydney residents and one of Perth residents found that respondents want funding for better public transport, cycling and walking rather than for new or upgraded roads; significant proportions support road use pricing reforms providing the aim is to improve public transport (Carter 2002; Laird *et al.* 2001, p. 167; Wise 2002; Warren Centre 2002c).

*Integrate transport and land use*

As long as transport and land use policies are developed in isolation from each other, people's commuting journeys will continue to be lengthy and frustrating and their transport choices constrained and car-focused. The integration of transport provision and planning of land use is a key means to improve the efficiency and sustainability of transport behaviour (Warren Centre 2002d). Lengthy commuting in one sense represents 'the manifestation of the spatial imbalance between the location of jobs and

[30] Mees (2000, p. 70) points out that if such measures succeed in reducing congestion they may actually unleash suppressed demand for road use. In addition, road pricing can be inequitable as it works to price those with lower disposable incomes off the roads. Nevertheless Mees (2000, p. 72) does see planned road pricing as one useful ingredient in a package of measures to modify travel demand.

residence' (Watts 2003, p. 1). For example, Watts' analysis documents that for Sydney, the spatial imbalance of workers and jobs by occupation has a major impact on average commuting distances. Jobs tend to be located long distances from the workers who occupy them, or putting this the other way, workers tend to live long distances from the jobs in which they are employed. The total amount of car travel undertaken by Sydney commuters is influenced by factors to do with urban form and land use including distance from the CBD, accessibility to jobs, the ratio of residential workers to jobs, and the proportion of residential workers employed locally (Black and Suthanaya 2002, p. 8).

There is significant debate regarding the relationships between city size, density, internal structure and transport patterns, and considerable deliberation on the subject of appropriate policy responses. In encouraging more sustainable modes of travel, one school of thought calls for the promotion of 'compact' cities (Mees 2000, pp. 89-90; Radbone and Hamnett 2003, pp. 11-13). Compact urban areas are more supportive of sustainable modes of transport. They promote walking and cycling, allow for a wider range of facilities within easy walking or cycling distance, and make public transport more viable (Radbone and Hamnett 2003, pp. 3-5). In contrast to car-dominated cities, 'walking cities' encourage more physical activity, provide more attractive city centres for commerce and shopping, and allow greater opportunity for social interaction and social cohesion.[31] Mees however rejects the claim that low urban densities necessarily make car dominance inevitable, arguing that Australia's low-density suburbs and dispersed journey patterns are compatible with a well-designed public transport system. As a corollary, he notes that the greater urban densities of 'compact cities' may not be sufficient to produce the desired changes in travel patterns and that the form and structure of urban areas are also influential (Mees 2000, p. 91).

There is growing support therefore for strategies focused on creating transit-supportive land-use patterns. Watts (2003, p. 4) argues that an effective strategy to help reduce average commuting distances is to create mixes of housing and employment in newly developing areas and thus to improve the functioning of local labour markets. Similarly, Laird *et al.* (2001, p. 141) call for 'an urban form of nodal sub-centres along well defined corridors, like "beads on a necklace", to reduce travel in general as well as increase use of non-auto modes.' Mixed-use facilities can restrict development to urban nodes that are well served by public transport, and promote high density living near these nodes (Radbone and Hamnett 2003, p. 18). Mees notes that both 'compact city' advocates and many of their critics agree that it is desirable to promote 'strong secondary centres in the suburbs which cluster employment, retailing, social and cultural facilities together', located at focal points of the public transport system, thus promoting access by public transport and internal travel on foot (Mees 2000, p. 93).

*Reform Australia's funding and planning of transport*

Broader changes in the funding and planning of Australia's transport systems are necessary to develop forms of travel that are economically and environmentally sustainable. Laird *et al.* (2001, pp. 163-171) argue that transport systems should be based on regional and national plans, funding should be allocated on the basis of

[31] Forum Series Summary Paper Outline, Sustainable Transport: Exploring Sustainable Urban Transport Choices. Sustainable Transport Week, Hobart, 24-28 March 2003, p. 13.

evaluation and planning, and these processes should be transparent. State governments should abolish the planning powers, guaranteed funding, and direct access of their road agencies to Ministers, and integrate road agencies into broader departments of transport or infrastructure (Laird *et al.* 2001, p. 168).

If commuter journeys to and from work are to be reliable, predictable and sustainable, then transport provision must be both planned and integrated (Mees 2000, pp. 285-286). Mees' comparison of Melbourne and Toronto illustrates the contrasting impacts on these two cities of market-based and central planning approaches to transport. While Toronto and Melbourne have similar urban forms, levels of transport and land-use integration, and public transport infrastructure, Toronto has far out-performed Melbourne in public transport use (Mees 2000, pp. 177-228). For example, Toronto's urban rail system carries 17 times as many passengers for each kilometre of track as Melbourne's. What makes the difference is that, in Toronto, centralised planning of the transport system has produced predictability, efficiency, and integration. Within the interconnected and non-duplicating network, the rail system is fed passengers by the bus and tram systems which receive high patronage because of their role as rail-feeders, and the result is higher occupancy rates across all modes. In Melbourne, on the other hand, privatisation and deregulation have produced a series of disconnected routes and modes of travel, infrequent and inconvenient services, competition for passengers between different modes, and practical obstacles to multi-modal travel (Mees 2000, pp. 231-280).

### 6.3 The future of commuting

What then is the future of commuting? At the beginning of this paper we presented evidence showing that when commuting is lengthy, difficult or unpredictable it imposes a series of physical and emotional harms on individuals. In addition, lengthy commuting worsens the negative impacts of long work hours and work stress on people's family lives, interpersonal relationships and participation in community life.

Commuting itself does provide some limited opportunities for social interaction. Parents driving their children to childcare or school on the way to work may value this time. Some regular travellers on lengthy rail journeys create informal social groups. And a bus trip, walk or bike ride may provide opportunities for brief interactions and conversations with acquaintances or strangers. Nevertheless, commuting in general does not allow the kind of interpersonal interaction that sustains friendships and communities. One aspect of community membership is being *known* to others in that community. For individuals to be 'long-term witnesses to another person's life', they need both time and opportunity (Pocock 2003, p. 51). However, commuting is frequently rushed and stressful rather than relaxed and is often conducted in isolation, in the cocoon of one's car, or among strangers on a bus or train. Some people certainly sustain family relations and friendships while commuting but they do so despite its typical qualities rather than because of them.

Two contemporary trends are further undermining the community-building potential of commuting. The first is the expansion of paid work into home lives and travel. As work hours extend and the pressure and pace of paid work intensifies, people, particularly in white-collar work, are increasingly likely to take work home (Pocock 2003, p. 109). For overworked employees, commuting time can represent yet another opportunity to squeeze more work into their day.

The second trend, overlapping with and accelerating the first, is the growing use of portable information and communication technologies. Laptop computers, personal digital assistants (PDAs), and mobile phones allow employees to work while in transit so that the car, bus or train becomes just another workplace. The new technologies help to blur the divisions between work and leisure and make it 'increasingly difficult to prevent work responsibilities from intruding into non-work hours' (Wikle 2001, p. 127). For business users in particular, the commute to and from work may now be seen as wasted if it is not spent communicating with clients or customers (Wikle 2001, pp. 125-6). Transport providers themselves are assisting in the creation of mobile working environments with some new rail services in the UK providing power points for the use of laptop computers and mobile phones (Centre for Transport and Society 2004).

These technologies, as well as others such as games consoles and music systems, are also used for personal entertainment and communication while commuting. Individuals listen to music, play digital games or call and text each other. In addition, growing numbers of cars now include digital video disc (DVD) players, allowing passengers to watch television and films in transit. The growing use of such technologies represents an adaptive response to the boredom, frustration and isolation of commuting by enabling commuters and passengers to be entertained, 'connected' or simply distracted. It also expresses the modern cultural ethos that we must be constantly busy and productive, and that we cannot sit in silence or contemplation but must be stimulated by external media.

Such trends mean that commuting journeys are even less likely to be ones through which familial relations, friendships and communities are built. On the one hand, commuters increasingly are driven workers spending their journeys doing unpaid work for their jobs. On the other, they are passive consumers of entertainment and advertising. Use of mobile phones does mean that commuters can text or talk to friends and family, and other wireless technologies increasingly will allow them to e-mail or chat online with others. But there are debates about the nature and merits of the interactions and communities fostered by mobile phone and internet communications (Wellman *et al.* 2001). Despite the growing evidence that using mobile phones while driving is unsafe,[32] one in five drivers in an Australian survey of 1 600 drivers admitted to frequent use of their mobile phone without a hands-free kit while driving (AAMI 2003, p. 2). There is also increasing concern about the dangers posed by other in-car technologies such as internet facilities, portable e-mail, route guidance or satellite navigation systems and entertainment systems.[33] While these technologies allow new ways of sustaining community bonds, they do not replace the social and spatial bases for most communities, nor do they facilitate the face-to-face meetings through which many communities are cemented (Pocock 2003, p. 67).

The journey to and from work represents a significant investment of time and money for Australian employees. Particularly when this journey is lengthy, unpredictable or

[32] If commuters are using mobile phones while driving, whether hand-held or hands-free, they are more likely to be distracted, to commit driver errors, and to be involved in vehicle accidents than those not using phones (Abdel-Aty 2003; Wikle 2001, p. 126).

[33] See 'Car gadgets a safety hazard: study,' *The Australian*, 13 October 2004; 'Road safety bodies look to put the brakes on booming in-car gadgetry,' *The Age*, 14 October 2004; 'Car gadgets are driving us spare,' *The Age*, 14 October 2004; 'Gadgets fuel car hazards,' *The Herald-Sun*, 14 October 2004.

congested, commuting exacts a physical and psychological toll. Lengthy commuting, combined with increasingly long and stressful work hours and urban sprawl, stifles people's opportunities to participate in familial and social interaction and to build informal networks and communities. Reducing the personal, social and environmental costs of commuting requires change in how Australians travel to and from work, what travel options are made available to them, how transport and land use are managed, and how transport is funded and planned.

## References

AAMI 2003, *AAMI Crash Index*, No. 9, October.

Abdel-Aty, M. 2003, Investigating the Relationship Between Cellular Phone Use and Traffic Safety. *ITE Journal*, Institute of Transportation Engineers. Washington: Oct. Vol. 73, Iss. 10.

ABS 1997, *ASCO: Australian Standard Classification of Occupations*. Canberra: Australian Bureau of Statistics. Cat. no. 1220.0.

ABS 1998, *How Australians Use Their Time.* Canberra: Australian Bureau of Statistics. Cat. no. 4153.0.

ABS 2000, *Household Expenditure survey: Detailed Expenditure Items.* Canberra: Australian Bureau of Statistics. Cat. no. 6530.0.

ABS 2001a, *Labour Statistics: Concepts, Sources and Methods*. Canberra: Australian Bureau of Statistics. Cat. No. 6102.0.

ABS 2001b, *Census of Population and Housing, Basic Community Profiles and Snapshots.* Canberra, Australian Bureau of Statistics

ABS 2002, *Labour Force Status*. Canberra: Australian Bureau of Statistics. Cat. No. 2046.0.

ABS 2003a, *Census of Population and Housing: Socio-Economic Indexes for Areas, Australia*. Canberra: Australian Bureau of Statistics. Cat. No. 2039.0.

ABS 2003b, *Survey of Motor Vehicle Use, Australia*. Canberra: Australian Bureau of Statistics. Cat. No. 9208.0.

ABS 2005, *Labour Force.* Canberra: Australian Bureau of Statistics. Cat. No. 6202.0.

Amoako, J., A. Ockwell and M. Lodh 2003, The Economic Consequences of the Health Effects of Transport Emissions in Australian Capital Cities. *26th Australasian Transport Research Forum*, Wellington, 1-3 October.

Black, J., and P. Suthanaya 2002, Statistical and Spatial Modelling of Vehicle-kilometres of travel by car for the journey-to-work in Sydney, 1981 to 1996: Implications for sustainable transport targets. *25th Australasian Transport Research Forum*, Canberra, 2-4 October.

Bureau of Transport and Regional Economics 2002, *Facts and Furphies in Benefit-cost analysis: Transport*. Commonwealth of Australia.

Carter, R. 2002, Introduction. *Dollars & Sense: Transport Pricing Conference*. NRMA, 12 November.

Cassidy, T. 1992, Commuting-Related Stress: Consequences and Implications. *Employee Counselling Today,* 4(2).

Centre for Transport and Society 2004, Travel Time Use in the Information Age. URL: http://www.transport.uwe.ac.uk/research/projects/travel-time-use.htm. Accessed 14 October, 2004.

Chertok, M., A. Voukelatos, V. Sheppeard, and C. Rissel 2004, Comparison of Air Pollution Exposure for Five Commuting Modes in Sydney – Car, train, bus, bicycle and walking. *Health Promotion Journal of Australia*, 15(1).

Cosgrove, D. 2000, *Urban congestion: The implications for greenhouse gas emissions.* Information Sheet No. 16, Bureau of Economics, May.

Denniss, R. 2001, *Measuring Employment in the 21st Century: New measures of underemployment and overwork*. Canberra: The Australia Institute, Discussion Paper No. 36, February.

Dowling, R., and A. Lyth 2003, Geographies of household travel in Sydney. *State of Australian Cities National Conference*, Sydney, 3-5 December.

Downs, A. 2004, *Still Stuck in Traffic: Coping with peak-hour traffic congestion*. Washington, D.C.: Brookings Institution Press.

Evans, G.W., R.E. Wener, and D. Phillips 2002, The Morning Rush Hour: Predictability and Commuter Stress. *Environment and Behaviour*, 34(4), July, pp. 521-530.

Gargett, D., and D. Cosgrove 1999, Urban Transport: Looking ahead. Information Sheet No. 14, Bureau of Transport Economics, May.

Heiler, K., B. Arsovska, and R. Hall 1999, Casting a Little More Light… Do We Really Know What Enterprise Bargaining Has Meant for Women's Wages in Australia? *ACIRRT Working Paper* No. 56, July. Australian Centre for Industrial Relations Research and Training, The University of Sydney.

Hinde, S., and J. Dixon 2004 (in press), Changing the Obesogenic Environment: Insights from a cultural economy of car reliance. *Transportation Research* Part D-Transport and Environment.

Kerr, A., H.K. Hall, and S.A. Kozub 2002, *Doing Statistics with SPSS*. London: Sage.

Kluger, A.N. 1998, Commute Variability and Strain. *Journal of Organizational Behaviour*, 19(2), March, pp. 147-165.

Koslowsky, M., A. Kluger, and M. Reich 1995, *Commuting Stress: Causes, effects and methods of coping*. New York: Plenum Press.

Laird, P. (2004) Testimony, Productivity Commission (2004) *Inquiry Into National Competition Policy Reforms.* Transcript of Proceedings, Sydney, November 30. URL: http://www.pc.gov.au/inquiry/ncp/trans/sydney041130.pdf. Accessed 15 February, 2005.

Laird, P., P. Newman, M. Bachels, and J. Kenworthy 2001, *Back on Track: Rethinking transport policy in Australia and New Zealand*. Sydney: University of South Wales Press.

Lucas, J.L., and R.B. Heady 2002, Flextime Commuters and Their Driver Stress, Feelings of Time Urgency, and Commute Satisfaction. *Journal of Business and Psychology*, Summer, Vol. 16, Iss. 4.

Manins, P., R. Allan, T. Beer, P. Fraser, P. Holper, R. Suppiah, and K. Walsh 2001, *Atmosphere*, Australia State of the Environment Report 2001 (Theme Report), Canberra: CSIRO Publishing on behalf of the Department of the Environment and Heritage.

Marinelli, P., and M.T. Roth 2002, Travelsmart Suburbs Brisbane: A successful pilot of a voluntary travel behaviour change technique. *25th Australasian Transport Research Forum*, Canberra, 2-4 October.

Mees, P. 2000, *A Very Public Solution: Transport in the dispersed city.* Melbourne: Melbourne University Press.

Melbourne Institute of Applied Economic and Social Research, 2002, *Household Income and Labour Dynamics in Australia (HILDA) Survey, Wave 2*, University of Melbourne, Melbourne.

Morgan, G.A., N.L. Leech, G.W. Gloeckner, and K.C. Barrett 2004, *SPSS for Introductory Statistics: Use and interpretation*. Mahwah, NJ: Lawrence Erlbaum Associates.

Morris, J., F. Wang, and M. Berry 2002, Planning for Public Transport in the Future: Challenges of a changing metropolitan Melbourne. *25th Australasian Transport Research Forum*, Canberra, 2-4 October.

Newman, P.W. 2004, Keynote address. *Sydney Futures Forum*, 19 May.

Newton, P.W., S. Baum, K. Bhatia, S.K. Brown, A.S. Cameron, B. Foran, T. Grant, S.L. Mak, P.C. Memmott, V.G. Mitchell, K.L. Neate, A. Pears, N. Smith, R.J. Stimson, S.N. Tucker, and D. Yencken, D. 2001. *Human Settlements.* Australia State of the Environment Report 2001 (Theme Report), Canberra: CSIRO Publishing on behalf of the Department of the Environment and Heritage.

NSW Government 2003, *Ministerial Inquiry into Sustainable Transport in New South Wales: A framework for the future*. Sydney, December 2003.

Parker, A. 2003, Unsustainable Transport Trends in Census Data for the Journey to Work in Major Australasian Cities 1976 to 2001. *26th Australasian Transport Research Forum*, Wellington, New Zealand, 1-3 October.

Peters, P., S. von Klot, M. Heier, I. Trentinaglia, A. Hormann, H.E. Wichmann, and H. Lowel 2004, Exposure to Traffic and the Onset of Myocardial Infarction. *The New England Journal of Medicine*, Vol. 351 No. 17, October 21, pp. 1721-1730.

Pocock, B. 2003, *The Work/Life Collision*. Sydney: The Federation Press.

Putnam, R.D. 2000, *Bowling Alone: The collapse and revival of American community.* New York: Simon & Schuster.

RACQ 2004, Survey shows peak-hour delays getting worse. Media release, 11 June. URL: http://www.racq.com.au/13_news/articles/20040611_Survey_shows_pe.htm. Accessed 22 October, 2004.

Radbone, I., and S. Hamnett 2003, Land Use, Walking and Cycling: A review of recent research, Australian policies, and suggestions for future work. *26th Australasian Transport Research Forum*, Wellington, New Zealand, 1-3 October.

Raimond, T., and J. Gee 2002, Changing Travel Behaviour: Measures from the Sydney Household Travel Survey. *25th Australasian Transport Research Forum*, Canberra, 2-4 October.

Russell, G., and L. Bowman 2000, *Work and Family: Current Thinking, Research and Practice*. Department of Family and Community Services.

Stutzer, A. and B.S. Frey 2003, Stress That Doesn't Pay: The Commuting Paradox. Working Papers Series, No. 151, June. Institute for Empirical Research in Economics, University of Zurich. URL: http://www.iew.unizh.ch/wp/iewwp151.pdf.

Transport and Population Data Centre (TPDC) 2004, *2002 Household Travel Survey, Executive Summary*. Department of Infrastructure, Planning and Natural Resources.

Warren Centre 2001, *Community Values Research Report: What the community values in transport*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Warren Centre 2002a, *Healthy Transport, Healthy People*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Warren Centre 2002b, *Changing Travel Behaviour*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Warren Centre 2002c, *Transport Pricing: More than just a tax*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Warren Centre 2002d, *A City of Cities*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Warren Centre 2002e, *Moving People*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Warren Centre 2002f, *The Final Report: Towards a city of cities*. Sydney: Warren Centre for Advanced Engineering, University of Sydney.

Watson, N., and M. Wooden 2002, The Household, Income and Labour Dynamics in Australia (HILDA) Survey: Wave 1 Survey Methodology. *HILDA Project Technical Paper Series*, No. 1/02, May.

Watts, M. 2003, The Commuting Behaviour of Sydney Workers. *State of Australian Cities National Conference*, Sydney, 3-5 December.

Wener, R.E., G.W. Evans, D. Phillips, and N. Nadler 2003, Running for the 7:45: The effects of public transport improvements on commuter stress. *Transportation*, May, 30(2).

Wellman, B., A.Q. Haase, J. Witte, and K. Hampton 2001, Does the Internet Increase, Decrease, or Supplement Social Capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, Nov., 45(3).

Weston, R., M. Gray, L. Qu, and D. Stanton 2004, *Long Work Hours and the Wellbeing of Fathers and Their Families*. Research Paper No. 35, April. Melbourne: Australian Institute of Family Studies.

Wikle, T.A. 2001, America's Cellular Telephone Obsession: New geographies of personal communication. *Journal of American & Comparative Cultures*, Spring, Vol. 24, Iss. 1/2.

Wise, H. 2002, Australian and European Culture. Presentation to *Dollars and Sense: Transport Pricing Conference Proceedings*. Sydney: NRMA. 12 November.

Wooden, M. 2003, Balancing Work and Family at the Start of the 21st Century: Evidence from Wave 1 of the HILDA survey. Paper presented to *Pursuing Opportunity and Prosperity – The 2003 Melbourne Institute Economic and Social Outlook Conference*, 13-14 November.

# Appendix

Five independent variables were included in the multiple regression: hours worked in all jobs, annual wages and salary, index of relative socio-economic advantage/disadvantage, sex, and Sydney/not Sydney. The means, standard deviations, and intercorrelations for the multiple regression can be found in Table A15. When the combination of variables to predict commuting time included these variables, $F(5, 5567) = 143.3$, $p < .001$. The beta-coefficients are presented in Table B15.

The six independent variables significantly predict commuting times when all six are included. The adjusted *R* squared value was .113. This indicates that 11.3 per cent of the variance in commuting time was explained by the model.

**Table A1 Means, standard deviations and intercorrelations for commuting time and predictors variables (N = 5573)**

| Variable | M | SD | Wages and salary | SEIFA Index | Sex | Hours worked | Sydney / not Sydney |
|---|---|---|---|---|---|---|---|
| Commuting time | 3.59 | 3.20 | .25** | .11** | -.16** | .27** | .16** |
| Predictor variable | | | | | | | |
| 1. Wages and salary | 39818.90 | 27676.26 | -- | .2** | -.32** | .57** | .08** |
| 2. SEIFA Index | 5.65 | 2.87 | | -- | .02 | .04** | .27** |
| 3. Sex | 1.48 | .5 | | | -- | -.39** | .02 |
| 4. Hours worked | 8.29 | 2.94 | | | | -- | .01 |
| 6. Sydney / not Sydney | .16 | .37 | | | | | -- |

*Notes:* *$p < .05$; **$p < .01$.
Source: HILDA Survey Wave 2 (2002)

**Table A2 Simultaneous multiple regression analysis summary for region, hours worked in all jobs, annual wages and salary, index of relative socio-economic advantage/disadvantage, distance from public transport and sex predicting commuting time (N=5986)**

| Variable | B | SEB | β |
|---|---|---|---|
| Wages and salary | 1.248E-05 | .000 | .108 |
| SEIFA Index | 4.407E-02 | .015 | .040 |
| Sex | -.374 | .089 | -.058 |
| Hours worked | .202 | .017 | .186 |
| Sydney / Not Sydney | 1.202 | .113 | .139 |
| Constant | 1.526 | .226 | |

*Notes:*. $R^2$; = .11, $F$ (5, 5567) = 143.3, $p < .001$.
*$p < .05$; **$p < .01$.
Source: HILDA Survey Wave 2 (2002)

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