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The role of socio-demographic and spatial characteristics in Work from Home in Australia

September 2023

The Department of Infrastructure, Transport, Regional Development, Communications and the Arts acknowledges the Traditional Custodians of Country of the land on which we work and live.

We recognise and respect the continuing connections to land, waters and communities.
We pay our respects to them and their cultures and to their Elders both past and present and to all Aboriginal and Torres Strait Islander people.

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Acknowledgements

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The Department of Infrastructure, Transport, Regional Development, Communications and the Arts co-funded the previous Work from Home (WfH) research project called “Encouraging the continuation of work-from-home practices in a post-pandemic world” in partnership with iMOVE Co-operative Research Centre (CRC). The University of South Australia (UniSA) conducted the previous WfH project, which included collection of qualitative and quantitative data that is used in this current report. The author would like to acknowledge the important roles that iMOVE CRC and UniSA play in this report.

Executive Summary

During the COVID-19 pandemic in 2020, Work from Home (WfH) uptake surged significantly in Australia. As WfH practices become more common than before, it is important to understand the determinants of WfH in Australia, and to ensure that the consequences of increased WfH are taken into consideration in urban and regional development, infrastructure investment and transport policy making.

The Department co-funded a research project called "Encouraging the continuation of work-from-home practices in a post-pandemic world" in partnership with iMOVE in 2021. University of South Australia (UniSA) completed this project with the final report of Vij et al. (2022). Using the qualitative and quantitative (i.e. iMOVE UniSA survey) data on 17 large Australian cities, Vij et al. (2022) found that employment and employer characteristics—such as occupation, industry, firm size, income, full/part-time status and managerial/non-managerial employment—were key determinants of WfH capability and uptake, as the flowchart below shows.

This report extends the analysis of Vij et al. (2022), and finds that the socio-demographic and spatial factors shown in the flowchart below are also important determinants of WfH capability and uptake in Australian cities.

Individuals are considered to have *WfH capability* if they could have done their job remotely on some days in a week if appropriate company policies and resources for remote working were put in place. *WfH uptake* refers to the proportion of job tasks and activities that were done remotely at a given point in time. At the peak of the COVID-19 pandemic in the first half of 2020, 37 per cent of employed individuals had no WfH uptake, 18 per cent had 100 per cent uptake, and the remaining 44 per cent had some degree of WfH uptake. WfH uptake is measured for 4 different time periods—before the pandemic, at the initial peak of the pandemic in the first half of 2020, during survey week between December 2020 and May 2021, and in the future.

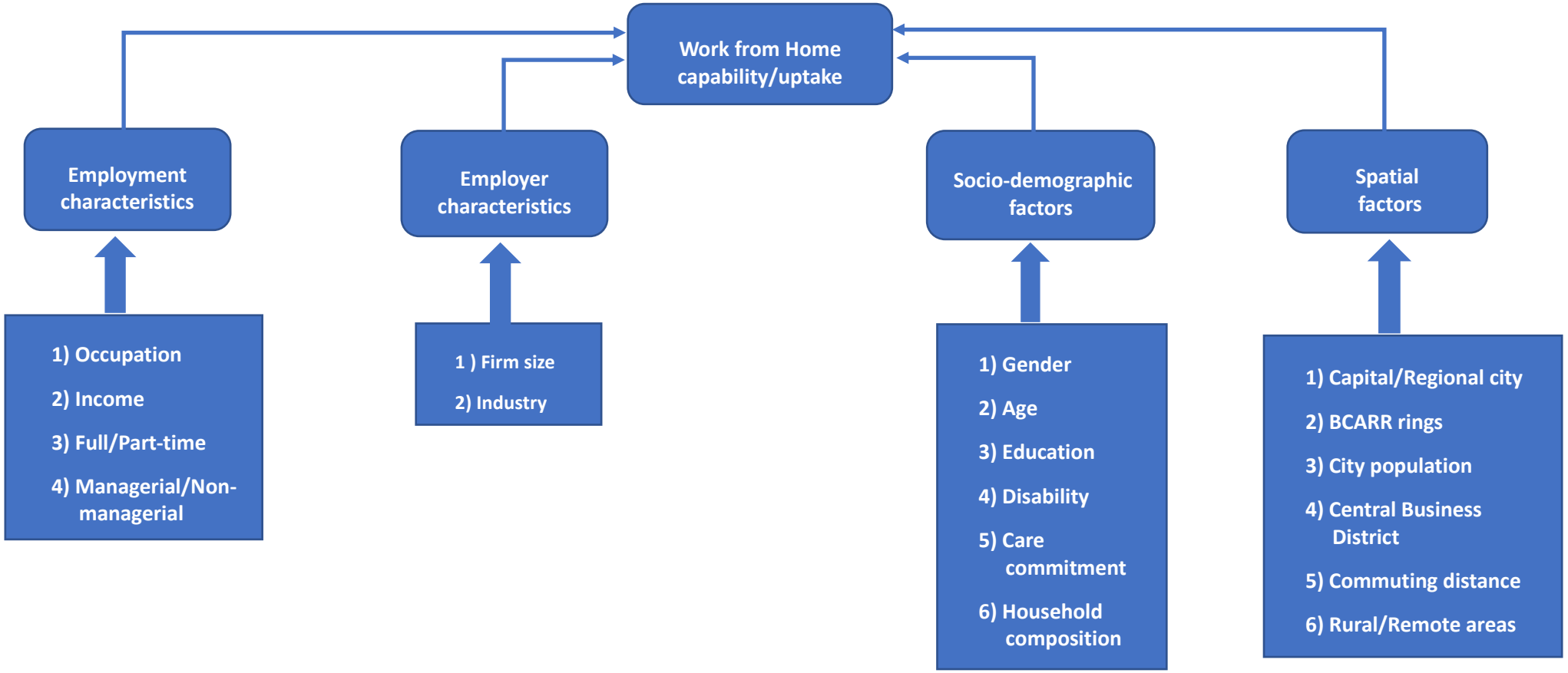
WfH uptake increased early in the pandemic, and was at its highest at the initial peak of the pandemic in early 2020 (averaging 38.4 per cent across all employed individuals), before gradually declining to 30.1 per cent during the survey period. Desired future WfH uptake is similar at 31.5 per cent.

The bivariate analysis shows that WfH capability and uptake are much higher for managerial employees than non-managerial employees. WfH capability is higher for female than male non-managerial employees (45.2 versus 39.4 per cent). Before the pandemic, WfH uptake was lower for female non-managerial employees (14.2 versus 16.3 per cent). At the peak of the pandemic, however, WfH uptake was higher for female non-managerial employees than their male counterparts (30.9 versus 26.9 per cent). This is also true during the survey week and into the future, and for managerial employees. Hence, the pandemic has accelerated females' WfH uptake.

The relationship between WfH and age is non-linear. WfH capability and uptake increase with age before reaching a turning point (typically at 40–44 years old), after which WfH capability and uptake decline with age.

WfH is positively related to educational attainment. WfH capability is higher for employees with a bachelor degree or higher qualification than for those with a secondary or primary qualification (55.1 versus 29.7 per cent). Across the 4 time periods, WfH uptake is also higher for employees with a bachelor degree or higher qualification than for those with a secondary or primary qualification (20–42 versus 11–19 per cent).

Flowchart: Determinants of Work from Home



Source: BCARR analysis.

People with a disability WfH more than those without a disability. For example, 52.3 per cent of non-managerial employees with a disability have WfH capability, whereas it is 42.0 per cent for those without a disability. For managerial employees, it is 94.4 per cent for those with a disability and 85.1 per cent for those without a disability. WfH uptake across the 4 periods is also higher for managerial and non-managerial employees with a disability than those without a disability.

For managerial employees, WfH capability and uptake are higher for those with a care commitment than for those without one. However, for non-managerial employees, WfH capability and uptake are lower for those with a care commitment. The result likely reflects the difference in job characteristics, occupations and seniority between non-managerial and managerial employees.

Employed individuals with a child WfH more than those without a child. For example, 46.0 per cent of non-managerial employees with a child have WfH capability whereas it is 39.6 per cent for those without a child. Across the 4 periods, WfH uptake is higher for non-managerial employees with a child (17–33 per cent) than those without a child (13–26 per cent).

WfH capability and uptake differ spatially. WfH capability is 55.5 per cent for capital cities, which is higher than for regional cities (44.8 per cent). This is true across the 4 periods, with WfH uptake for capital cities ranging from 22–40 per cent, and for regional cities from 18–30 per cent. Among the 17 surveyed cities, Sydney has the highest WfH capability (63 per cent) and uptake across the 4 periods (26–44 per cent). Across the BCARR rings of the five capital cities, 70.9 per cent of Inner ring residents have WfH capability whereas it is 57.9 per cent for Middle ring residents and 48.4 per cent for Outer ring residents. The same order remains in terms of WfH uptake across the 4 periods (33–54 per cent for the Inner ring, 23–43 per cent for the Middle ring and 17–32 per cent for the Outer ring).

WfH is positively related to the population size of a city. WfH capability is 55 per cent for the big cities with a population of over 250,000, which is higher than for the small cities with a population of under 250,000 (41 per cent). Across the 4 periods, WfH uptake is also higher for the big cities (22–39 per cent) than for the small cities (16–24 per cent). The 2021 census (when lockdowns were in place in Sydney and Melbourne) showed that WfH uptake was highest for major urban areas with populations over 100,000 (27.3 per cent), followed by the rural balance (16.2 per cent), bounded localities (12.1 per cent) and other urban areas (11.3 per cent).

Employed individuals' place of work affects their WfH behaviours. WfH capability is higher for employed individuals working in the Central Business Districts (CBDs) of the 5 big capital cities than for those working in non-CBD areas (68.9 versus 44.3 per cent). Additionally, WfH uptake across the 4 periods is higher for those with CBD workplaces than for those with non-CBD workplaces (21–56 versus 12–28 per cent). WfH capability and uptake are higher for people who commute between 20 and 50 km to work than for people who commute shorter distances to work.

Average weekly WfH hours increased significantly during the pandemic, with the increase most pronounced for the Major cities. Before the pandemic (2016–2019), average weekly WfH hours were 2.1–3.0 hours for Major cities, 1.8–2.5 hours for Inner regional areas and 0.8–1.6 hours for Outer regional areas. During the pandemic in 2020, it was 6.6 hours for Major cities, 3.5 hours for Inner regional areas and 2.9 hours for Outer regional areas.

Multivariate logistic regression results echo the findings of the bivariate analysis. Firstly, the logistic regression results show that job and employer characteristics (such as income, occupation and industry) and socio-demographic factors (such as age, educational attainment and disability status) are both important determinants of WfH capability and uptake in Australian cities. Secondly, regression results show that spatial variables (such as place of residence and place of work) are significant predictors of WfH capability and uptake. For example, living in Sydney or Melbourne, living in the Inner ring of the 5 big cities, and working in the Sydney or Melbourne CBDs, all had a strong positive impact on WfH uptake. Thirdly, the goodness of fit (R-squared) significantly increases after including the socio-demographic variables into the regression, highlighting the important role these variables can play in affecting WfH decisions of employed individuals.

WfH has a role to play in influencing relocation decisions. The preliminary evidence suggests that non-managerial employees with higher WfH capability and uptake were more likely to relocate during the pandemic (March 2020 to May 2021), and to have a stronger willingness to consider living further away from their workplace. Managers with higher WfH capability and uptake also have a stronger willingness to consider renting cheaper office space for their firm in a different location. Expanded WfH opportunities are likely to have contributed to the increased number of capital city dwellers who left capital cities to move to regional areas during the pandemic. However, net outflows from capital cities eased off in the June and September quarters of 2022.

Early in the pandemic, employers were generally sceptical about using the hybrid model (i.e. combination of working remotely and onsite) as a long-term strategy. As WfH becomes more common, some employers consider that the hybrid model can potentially be sustained longer-term. Relative to employers, employees are more accepting of WfH as a long-term strategy, with 79 per cent of managerial employees supporting changes in company policies that encourage or allow WfH in the long term. This belief is stronger for employees who reside in a capital city, or work in an office-based industry or for a large firm.

Recent evidence suggests that WfH has stabilised at around 1 day per week per worker nationally as of early 2023 (Institute of Transport and Logistics Studies, 2023), which is significantly above the pre-pandemic level (of around 0.2 days per week) (Hensher et al., 2023). WfH uptake differs across Australian cities. For example, WfH uptake remains particularly high in Sydney through to late 2022. For Brisbane and Melbourne, their WfH uptake is still well above their pre-pandemic levels. WfH, however, has a smaller role in the Perth and Adelaide LGAs, compared with the Sydney, Melbourne and Brisbane LGAs.

This report contributes new empirical evidence to show that socio-demographic factors such as the worker's age, educational attainment and disability status have a particularly important impact on WfH capability and uptake. Additionally, the empirical evidence in this report suggests that employed individuals' place of residence and place of work are also significant determinants of WfH capability and uptake. While this report provides preliminary evidence of the link between WfH and relocation, it does not offer insights into whether this link will continue post-pandemic. A related research project, Vij et al. (2023), provides a more detailed exploration of this issue.

Chapter 1 Introduction

Many employees in developed countries were encouraged to work from home (WfH) during the COVID-19 pandemic. As a result, many WfH studies have been published in the last few years. For example, Dingel and Neiman (2020), Chung et al. (2020) and OECD (2020a) analysed the effect of occupations and genders on WfH and the link between productivity and WfH. These studies focus on the US, UK and OECD countries, and empirical evidence about Australia is insufficient.

There have been a handful of major WfH studies focused on Australia since the onset of the pandemic. They include Productivity Commission (2021), Infrastructure Victoria (2021), Vij et al. (2022) and Hensher et al. (2022).[1] All these studies examined the effects of WfH on transport and the relationship between WfH and economic characteristics (e.g. income, occupation, industry and firm size). However, these studies did not present much evidence on the relationship between WfH and socio-demographic factors (such as age, gender, caring responsibility and education). Moreover, they generally did not include much spatial analysis or investigate the nexus between WfH and relocation.[2]

One of the challenges of studying WfH in Australia is to access a suitable dataset. BCARR obtained a comprehensive dataset from University of South Australia (UniSA) that contains WfH information from over 3,000 employees and managers. The purpose of this report is to explore this dataset to investigate the role of spatial and socio-demographic characteristics in shaping WfH behaviours. More specifically, this study will use the UniSA dataset to address the following research questions:

1) What are the roles of socio-demographic factors—such as age, gender, household composition, education and disability—in WfH capability and uptake? How important are socio-demographic factors relative to the economic factors (such as industry, occupation and firm size)?

2) How is WfH capability and uptake spatially distributed, and how does it depend on key spatial factors? The spatial factors to be considered include the city of residence, region type (e.g. urban centre size and remoteness), CBD and non-CBD workplace, and commuting distance.

3) What is the relationship between WfH capability and business/individual relocation?

The report follows Vij et al. (2022) in adopting the following definition of WfH:

> **"We define WfH as an organised work arrangement whereby some or all of the work that would normally have been done at a place of work such as an office, factory or institution is done at some other place such as home, café or an airplane, at conventional hours or at other times, and usually enabled by information and communication technologies (ICTs)."**

Another core concept for this research is WfH capability. Individuals are considered to have WfH capability if they could have done their job remotely on **some days** in a week if appropriate company policies and resources for remote working were put in place.[3]

This report has 6 chapters. Chapter 1 is the introduction. Chapter 2 summarises the iMOVE UniSA WfH project. Chapter 3 and 4 include analysis that examines the role of socio-demographic and spatial aspects of WfH in Australia, respectively. Chapter 5 presents new evidence to understand the link between WfH and relocation. Chapter 6 draws on different sources to discuss the post-pandemic prospects for WfH in Australia.

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1 Branigan (2022) summarised findings from studies about WfH in Australia.

2 Without this discussion, the studies would not be able to provide insights into the so-called "city exodus" that is driven by WfH. Vij et al. (2022) is an exception as it presents some analysis of spatial differences in WfH and of relocation.

3 Chapter 6 presents qualitative and quantitative evidence on firm's and manager's views on long-term changes to firm's WfH policies

Chapter 2 iMOVE UniSA work from home study

Key points

- The principal data source for this report is a research project called “Encouraging the continuation of work-from-home practices in a post-pandemic world” that the Department co-funded in partnership with iMOVE. UniSA conducted this research between September 2020 and July 2021.
- The iMOVE UniSA work from home (WfH) study found that WfH uptake increased significantly to 30 per cent at the peak of the pandemic, up from 2 to 8 per cent before the pandemic. About 51 per cent of employees believed that some of their work could be done remotely.
- WfH uptake and capability are more common in white-collar occupations (such as Manager, Professional or Clerical and administrative worker) and office-based service industries (such as Financial and insurance services and Professional, scientific and technical services). Additionally, employees from a large firm are more likely to work remotely.
- No significant reductions in productivity were found for individuals working remotely. However, many non-managerial employees (about 40–50 per cent) and managers (60–70 per cent) are concerned about the negative effects of WfH on supervision and coordination.
- WfH can decrease weekday commute travel by car and public transport by 12–17 per cent and 22–31 per cent, respectively, and can move 5 per cent of commutes outside morning peak periods and 10–20 per cent outside evening peak period.
- About 42 per cent of employees would consider relocating their places of residence further away from their workplaces if they could regularly WfH and 72 per cent of managers said firms would consider downsizing office space.
- The iMOVE UniSA WfH study concluded that future workplaces are likely to adopt a hybrid approach. At least 10 per cent of existing jobs could transition to permanent remote work, while up to 50 per cent of existing jobs could involve a mix of WfH and onsite work.
- The iMOVE UniSA WfH study revealed that employment characteristics (such as firm size, industry, occupation, part-time/full-time employment and income) were important influences on WfH behaviour.
- The analysis in this report extends UniSA’s original analysis of the survey dataset to explore the potential influence of employees’ socio-demographic characteristics on WfH capability and uptake, while also considering a wider range of spatial influences.

2.1 Background

The Department co-funded a research project called “Encouraging the continuation of work-from-home practices in a post-pandemic world” in partnership with iMOVE. UniSA conducted this project between September 2020 and July 2021. The scope of the study was restricted to Australian cities with a population of over 100,000. The final report was Vij et al. (2022).

This research project aimed to understand the advantages and disadvantages of WfH from the perspective of non-managerial employees and managers. It investigated how these advantages and disadvantages varied with employment, employer and employee characteristics. It considered the impact of WfH practice on productivity, transport and wellbeing in Australian cities. Finally, it explored what policies and practices could be used to encourage the continuation and greater adoption of different WfH arrangements (Vij et al. 2022).

This study involved a literature review, collection of qualitative data from employers to understand their experiences with remote working arrangements, and collection of quantitative data from a large-scale online survey of employees and managers to understand their WfH behaviours, attitudes and preferences. The survey examined WfH capability and changes in WfH uptake across four periods:

- Before the pandemic
- At the initial peak of the pandemic (in the first half of 2020)
- During survey week (between December 2020 and May 2021); and
- In the future

2.2 Methods and findings

Table 2.1 provides a summary of the project methods, and the main findings of the study.

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Table 2.1: iMOVE UniSA work from home study summary

Methods	Project major findings	
Literature review	WfH uptake	• Increased to 30–40 per cent during the pandemic from 2–8 per cent before pandemic.
	Policies to promote WfH	• A range of incentives, support programs and information campaigns have been used to encourage WfH.
Qualitative analysis: Interviewed 37 business owners, employers and managers from large Australian cities.	WfH capability	• Not every business can pivot to WfH. Respondents in the Construction, Manufacturing, Warehousing and Agriculture industries reported very limited WfH capability.
	Permanent (or temporary) change to WfH	• Making temporary changes to WfH was less challenging for all businesses. However, smaller businesses found it harder to make a long-term transition because they did not have sufficient resources to build the required technical infrastructure and organisational processes to enable remote working.
	Productivity	• No significant reductions reported.
	Future WfH preferences	• A small group of (mainly large) businesses planned to increase WfH in the future, typically by adopting a hybrid model, involving a mix of WfH and onsite work.
Quantitative analysis: Surveyed 2,694 non-managerial employees and 1,159 managers from 17 largest Australian cities across different occupations and industries from 11/12/2020–4/5/2021.	WfH capability	• About 51 per cent of employees believed that some of their work could be done remotely.
	WfH arrangements	• Only 22 per cent of employees had a formal WfH agreement with their employers
	WfH uptake	• Uptake in capital cities was higher than in non-capital cities by 5–7 per cent. • Uptake in white-collar occupations/industries and in large firms was higher than in blue-collar occupations/industries and small firms. •Uptake had a u-shaped relationship with income, being lowest for middle income earners.
	Impact of WfH on productivity and job performance	• No significant reductions in productivity were reported. • About 40–50 per cent of employees and 60–70 per cent of managers were concerned about the potential impacts of WfH on supervision, coordination, performance appraisal and loyalty.
	Impact of WfH on health and wellbeing	• About 55–60 per cent of employees reported improved work-life balance after WfH. • About 40–50 per cent of employees reported WfH exacerbated feelings of isolation.

Continued overpage

Table 2.1: iMOVE UniSA work from home study summary (continued)

Methods	Project major findings	
Quantitative analysis: Surveyed 2,694 non-managerial employees and 1,159 managers from 17 largest Australian cities across different occupations and industries from 11/12/2020–4/5/2021.	Impact of WfH on mobility and space	• WfH reduced car and public transport use during weekdays by 12–17 and 22–31 per cent, respectively. • Impacts are likely to be greatest for commutes made to CBD-based workplaces. • About 42 per cent of employees considered relocation, while 72 per cent of managers considered downsizing their office space.
	Future WfH preferences	• About 34 per cent of employees preferred the hybrid approach in the future. Only 8 per cent want to work remotely all the time. The remaining 58 per cent either do not have WfH capability or would prefer to work completely onsite. • Around 45 per cent of managers saw their companies focusing on hiring more workers that work remotely.

Source: BCARR analysis of Vij et al. (2022)

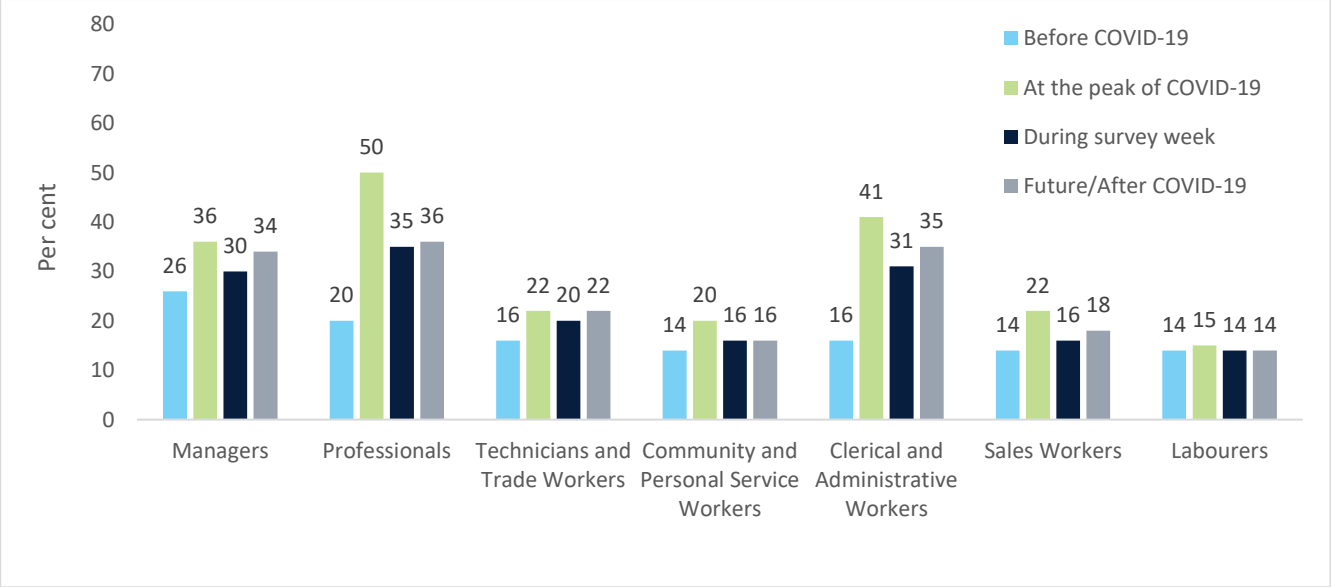
The UniSA study investigated how WfH capability and uptake depended on employment and employer characteristics, focusing on occupation, industry, firm size and wage income. As noted by Productivity Commission (2021, 9.12):

> **"The ability for people to do their job from home is strongly tied to their occupation, and ultimately to the tasks that they are required to perform. Working from home — where someone works either part, or all, of their regular work time in their primary place of residence — is particularly suited to office-based workers such as managers, professionals and clerical and administrative workers, where workers typically use computers, interact less with the public, do not perform outdoor work or physical activity, and do not work with large structures, materials or equipment."**

Reflecting this, occupation emerged as the key driver of WfH capability and uptake in the UniSA study. Beck and Hensher (2022) and Balbontin et al. (2022) also found that occupation and income are positively related to WfH in Australia. To illustrate its significance, Figure 2.1 shows how the UniSA measures of WfH uptake vary across occupations.[4] WfH uptake also varied widely across industries, as illustrated by Figure 2.2.[5] Finally, Figures 2.3 and 2.4 summarise the relationship of WfH with income and firm size, respectively. We have reproduced these charts from Vij et al. (2022) to provide important context for the analysis that follows in Chapter 3 and 4.

This study recognises that these employment and employer characteristics are key drivers of WfH capability and uptake. The analysis in Chapter 3 extends UniSA's original analysis of this survey dataset to explore the potential influence of employee's socio-demographic characteristics on WfH capability and uptake, while the analysis in Chapter 4 extends the original analysis to consider a wider range of spatial factors.

Figure 2.1 WfH uptake by occupations



Source: BCARR analysis of Vij et al. (2022)

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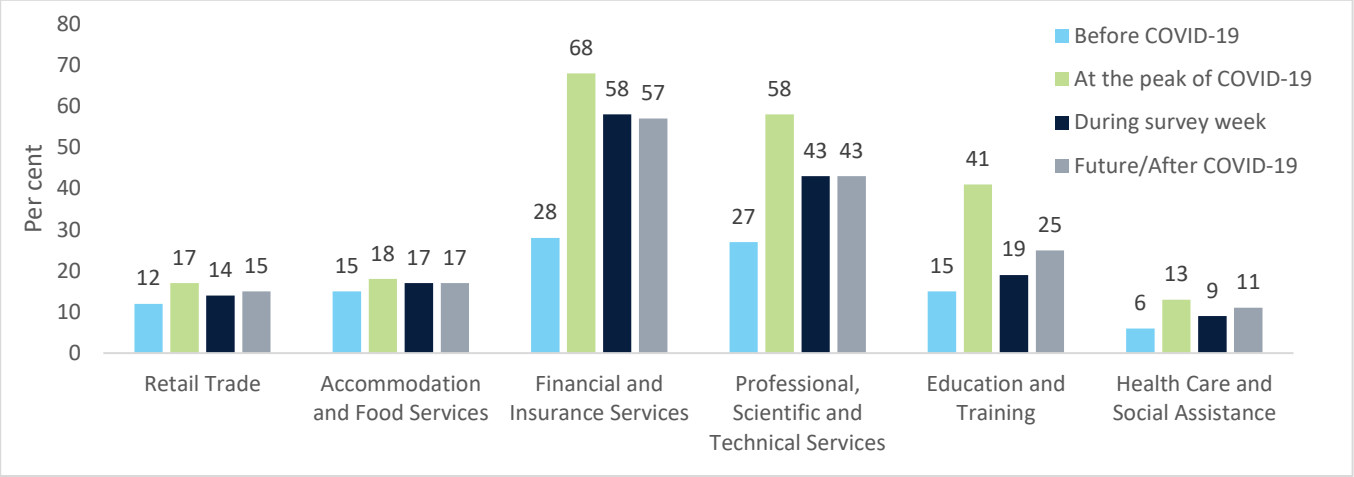
4 Note that the specific UniSA capability and uptake metrics presented in this chapter are slightly different to those used by BCARR in the remainder of this study. Further details of the metrics used in this study are provided in Chapter 3.

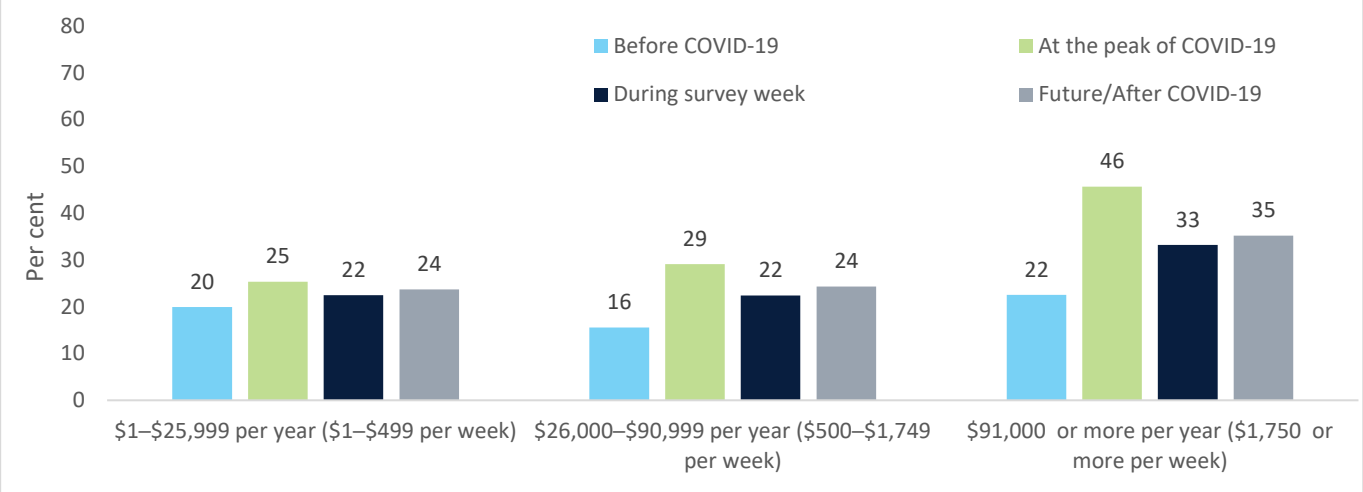
5 Figure 2.2 only includes the industries with a sample size of over 150 observations.

Figure 2.2: WfH uptake by industries



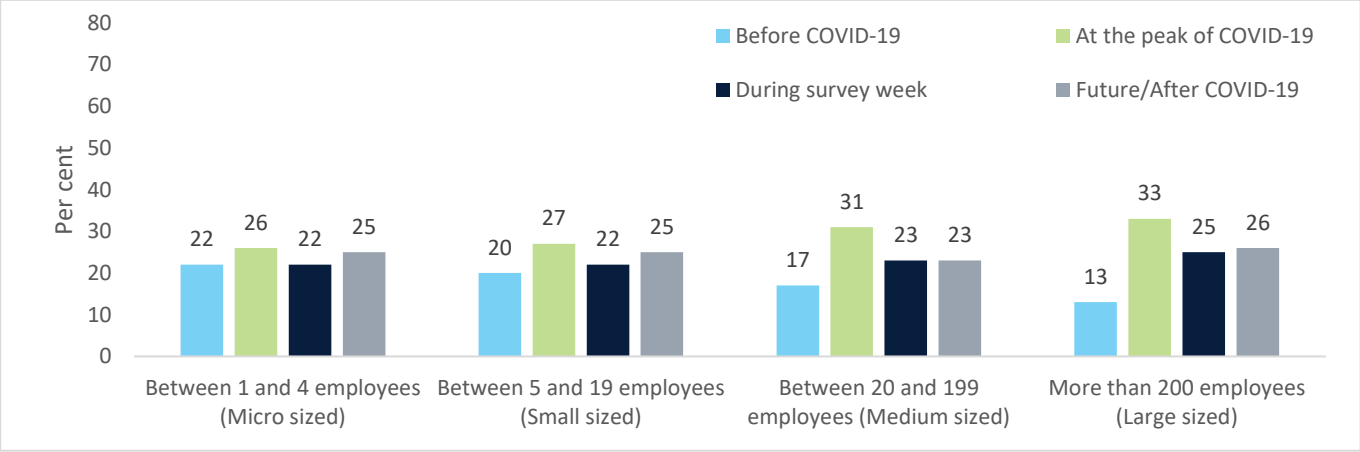
Note: Excludes industries with a sample size of under 150 observations.
Source: BCARR analysis of Vij et al. (2022)

Figure 2.3: WfH uptake by non-managerial employees' income classes



Source: BCARR analysis of Vij et al. (2022)

Figure 2.4: WfH uptake by firm size



Source: BCARR analysis of Vij et al. (2022)

Chapter 3 The role of socio-demographic characteristics in working from home

Key points

- This chapter examines the role of socio-demographic characteristics (such as gender, age, education, household composition and disability) as drivers of working from home (WfH) capability and uptake.
- Individuals have *WfH capability* if they could have done their job remotely on some days in a week if appropriate company policies and resources for remote working were put in place. *WfH uptake* refers to the proportion of job tasks and activities that were done remotely at a given point in time.
- Four time periods are considered: before the pandemic, at the peak of the COVID-19 pandemic in the first half of 2020, during survey week between December 2020 and May 2021, and into the future. WfH uptake was lowest before the COVID-19 pandemic and highest at the peak of the pandemic, while taking on mid-range values during survey week and into the future.
- WfH capability and uptake are higher for managerial employees than for non-managerial employees.
- Female non-managerial employees have higher WfH capability than male non-managerial employees (45.2 versus 39.4 per cent). Before the pandemic, WfH uptake was lower in female non-managerial and managerial employees than in male non-managerial and managerial employees. However, female non-managerial employees' WfH uptake was higher than males at the peak of the pandemic (30.9 versus 26.9 per cent) and their desired uptake remains higher than males into the future (25.6 versus 21.4 per cent). This is also true for managerial employees.
- The relationship between WfH behaviours and age is non-linear. WfH capability and uptake increase with age before reaching a turning point (typically at 40–44 years old), after which WfH capability and uptake decline with age.
- While 29.7 per cent of employees with a secondary or primary qualification have WfH capability, 55.1 per cent of employees with a bachelor degree or higher qualification have WfH capability. At the peak of the pandemic, WfH uptake was much greater in employees with a bachelor or higher qualification than in employees with a secondary or primary qualification (41.3 versus 18.4 per cent). Desired future WfH uptake is also greater for employees and managers with a bachelor or higher qualification.
- WfH capability for employees with a disability (52.3 per cent) is higher than for those without a disability (42.0 per cent). This is also the case for managerial employees (94.4 versus 85.1 per cent). WfH uptake across the four periods is also generally higher for managerial and non-managerial employees with a disability than those without one.
- For managerial employees, WfH capability and uptake are higher for those with a care commitment than those without one. However, for non-managerial employees, WfH capability and uptake are lower for those with a care commitment.
- WfH capability is higher for employees with a child than for those without a child (46.0 versus 39.6 per cent). Similarly, across the 4 periods, WfH uptake is higher for employees with a child than those without a child.
- Multivariate logistic regression analysis confirms that job and employer characteristics (such as occupation, income and industry) are important determinants of WfH capability and uptake in Australian cities.
- Socio-demographic variables are also highly significant predictors of WfH capability and uptake. The goodness of fit (R-squared) significantly increases after including socio-demographic variables in the regression, highlighting the important role these factors can play in affecting WfH behaviours.
- The worker's age, educational attainment and disability status are the socio-demographic factors that have the greatest impact on WfH capability and uptake in the context of Australian cities.

3.1 Introduction

This chapter utilises the iMOVE UniSA WfH survey data and different analytical tools (e.g. summary charts/tables and multivariate logistic regression) to investigate the role of socio-demographic characteristics in WfH capability and uptake in large Australian cities. It does so using a weighted version of the survey dataset (see Box 3.1 for further detail). The socio-demographic characteristics considered include gender, age, education, household composition, disability, personal care provision and COVID-19 payment receipt status.[6]

Box 3.1: What is the weighted sample and why is it important?

Using the sample size of about 3000 individuals in the iMOVE UniSA dataset cannot fully represent the targeted population (e.g. individuals who were over 18 years old from 17 Australian cities). To correct the differences between the iMOVE UniSA data sample and the targeted population, the same weighting method as used by Vij et al. (2022) was employed in the analysis below. Firstly, the weighting factor was computed by taking the ratio of the likelihood of observing the individual's demographic characteristics in the total population to the associated likelihood in the iMOVE UniSA data sample. Next, the weighting factor was used to reweight each individual in the iMOVE UniSA data sample by correcting for the difference mentioned above.

3.2 Work from home snapshot

It is important not to consider WfH purely as a binary outcome (i.e. either someone works from home or they do not). Rather WfH is a continuum of potential outcomes, ranging from someone who works entirely from home, through to individuals who work some days from home and some days onsite at their workplace, and also potentially capturing individuals who travel to their workplace every day but will do some extra work from home when needed. This section presents evidence on the distribution of WfH across individuals, based on reported WfH capability and the proportion of job tasks and activities that were done remotely at various points in time.

The majority of individuals in the survey considered themselves as having WfH capability. Individuals are considered to have WfH capability if they could have done their job remotely on some days in a week if appropriate company policies and resources for remote working were put in place. Note that a slightly different concept of capability was used in Vij et al. (2022), which considered someone to have WfH capability if they could have done their job remotely for some hours or some days in a week. BCARR's choice to use the narrower concept of capability reflects our Department's specific interest in the potential implications of WfH for reducing transport demand, which come into play if a person can work one or more days a week from home. As Figure 3.1 shows, 61.8 per cent of individuals believed that they had WfH capability.[7] About 38.2 per cent did not believe so.

To explore the distribution of WfH uptake in the dataset, this chapter categorises WfH uptake into six groups based on individuals' responses (see Figure 3.2 below).[8] Additionally, two scenarios are considered here. The first scenario considers all employed individuals with or without WfH capability. The second scenario includes only the individuals with WfH capability.

In the first scenario, Figure 3.2 shows that, across the four time periods, 37–48 per cent of employed individuals did not WfH at all (i.e. zero per cent WfH uptake). The share of employed individuals with zero per

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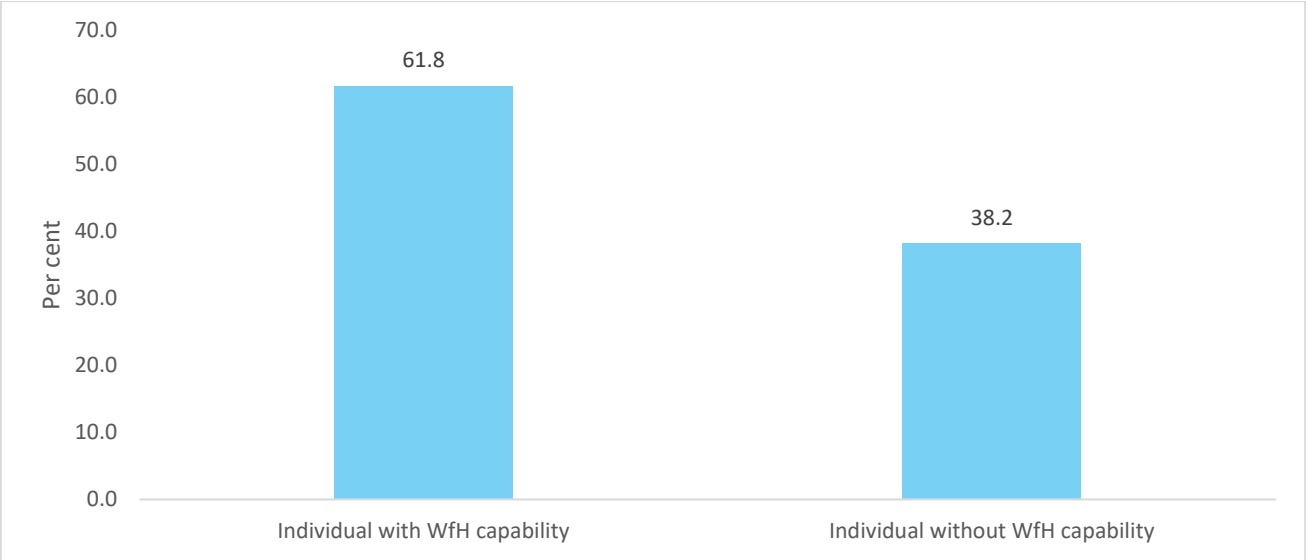
[6] The sample for each socio-demographic characteristic analysed in this chapter is over 150 observations, unless otherwise noted.

[7] WfH capability in this study is larger than in UniSA's because the analysis in this study included managers and was restricted to individuals who did not change their jobs during the pandemic.

[8] The restricted sample (i.e. employed individuals who worked for the same employer before and during the pandemic) is utilised.

cent WfH uptake was highest before COVID-19 (47.3 per cent) and was lowest at the peak of COVID-19 (37.4 per cent).

Figure 3.1 Work from home capability



Source: BCARR analysis of iMOVE UniSA survey data

Employed individuals who work solely from home would fit into the 81–100 per cent WfH uptake category. The share of employed individuals with 81–100 per cent WfH uptake was 11.4 per cent before the pandemic[9]. This increases to 29.5 per cent at the peak of the pandemic, but stands at around 16–19 per cent during survey week and for a post COVID-19 future. This reflects the initial surge in WfH uptake at the start of the pandemic not being sustained as the pandemic progressed.

In the second scenario, the share of employed individuals who had WfH capability but zero per cent WfH uptake reduces significantly from 20.0 per cent before COVID-19 to 5.5 per cent at the peak of the pandemic. The share of zero per cent WfH uptake across the four periods in the second scenario is much smaller than in the first scenario (reflecting the exclusion of employed individuals without WfH capability). Most notably, there are very few individuals with capability that prefer zero per cent uptake in the future (6.7 per cent). The proportion of employed individuals with WfH capability who had high (81–100 per cent) WfH uptake surges to 44.6 per cent at the peak of the pandemic. High WfH uptake is preferred in the future by about one-quarter of employed individuals with WfH capability.

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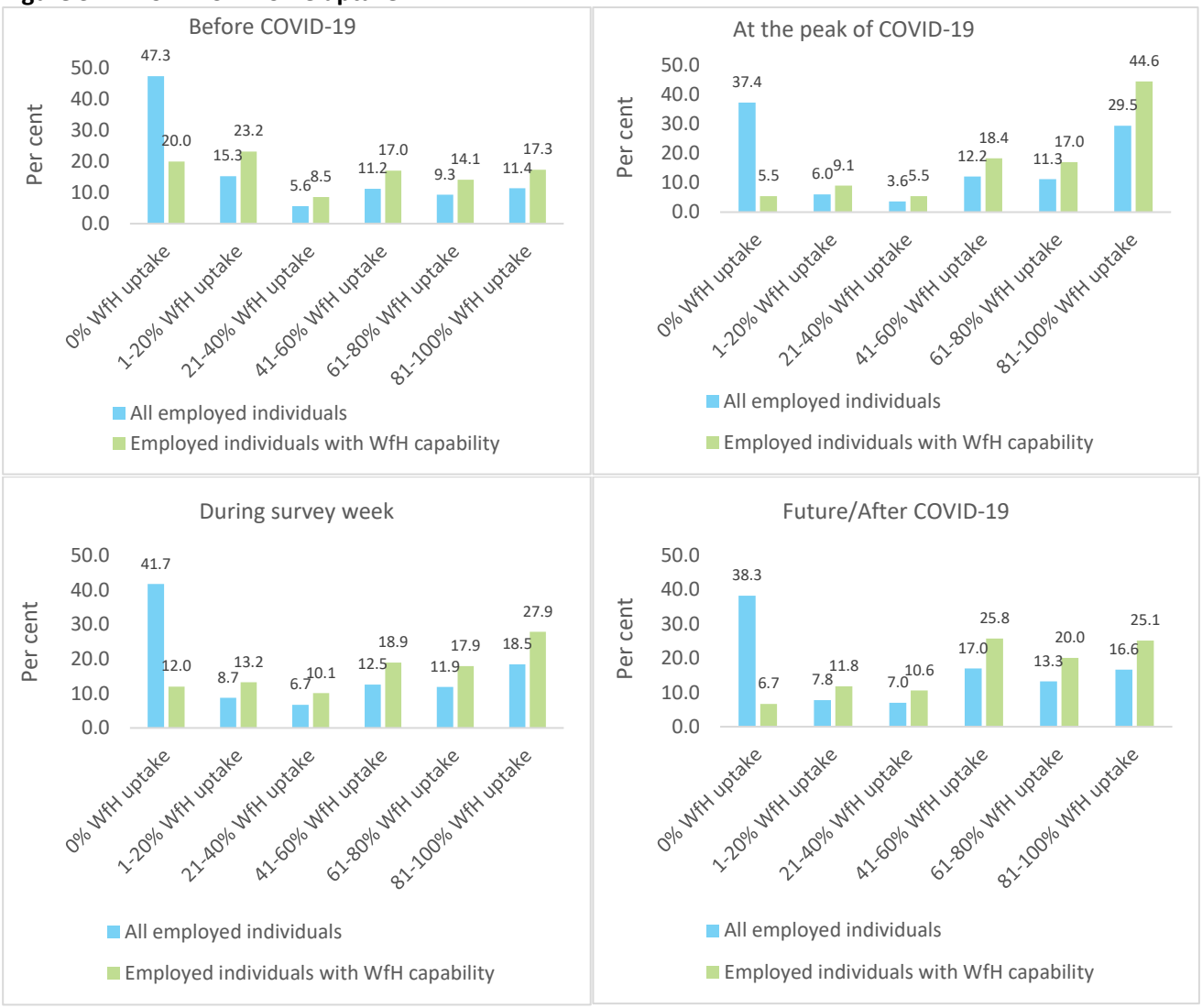
[9] The survey results for the "before the pandemic" time period should be treated with some caution, as they may be subject to recall bias. Data that was collected pre-pandemic (such as the 2016 Census of Population and Housing) tends to show a lower rate of WfH of around 2 to 8 per cent (Vij et al. 2022).

Figure 3.2: Work from home uptake



Source: BCARR analysis of iMOVE UniSA survey data

3.3 Employees and managers

The iMOVE UniSA survey was restricted to employed individuals, and captured both employees and self-employed persons. The analysis in this chapter excludes self-employed individuals. All identified employees were asked whether they had company employees currently reporting to them, and those with at least one employee reporting to them were classified as a managerial employee. The analysis in this chapter is restricted to employees, and covers both managerial employees (i.e. employees who have at least one direct report) and employees who are not managers.[10]

While the preceding section presented information on the overall distribution of WfH uptake across individuals, the remainder of this chapter relies on an average measure of WfH uptake for each population sub-group. Figure 3.3 shows that the average WfH capability is 42.4 per cent for employees, 86.9 per cent for managers, and 54.2 per cent for all employed persons. Figure 3.4 illustrates WfH uptake in employees and managers across the four periods. The figures indicate that WfH capability and uptake are higher for managers than for non-managerial employees across the four periods. Additionally, WfH uptake increases after the onset of COVID-19 for managers and non-managerial employees.

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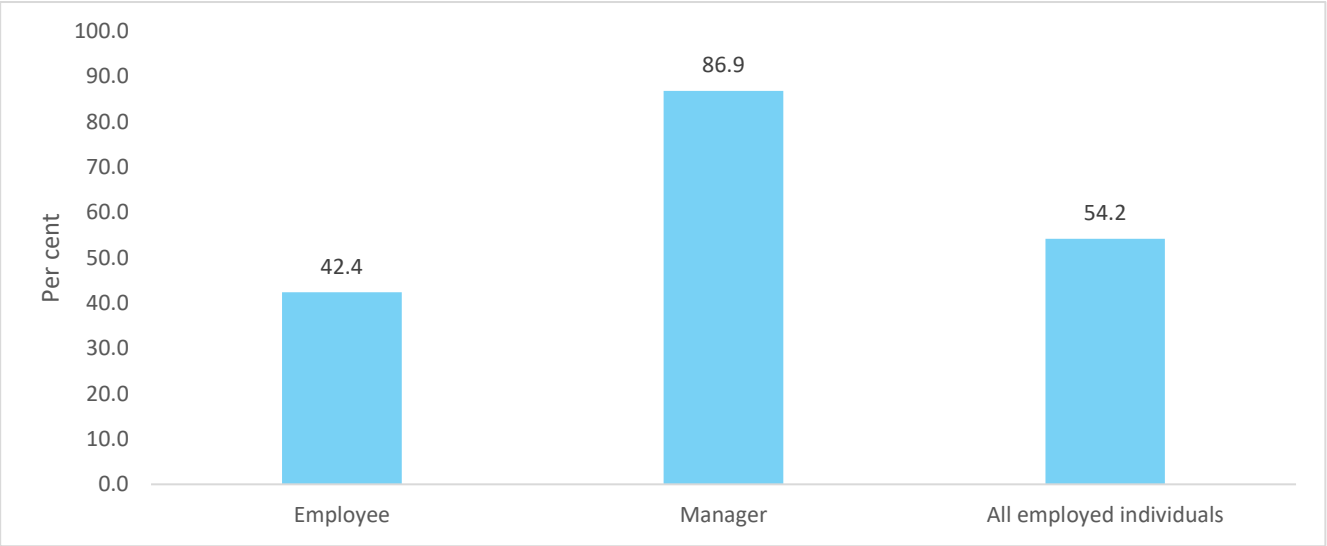
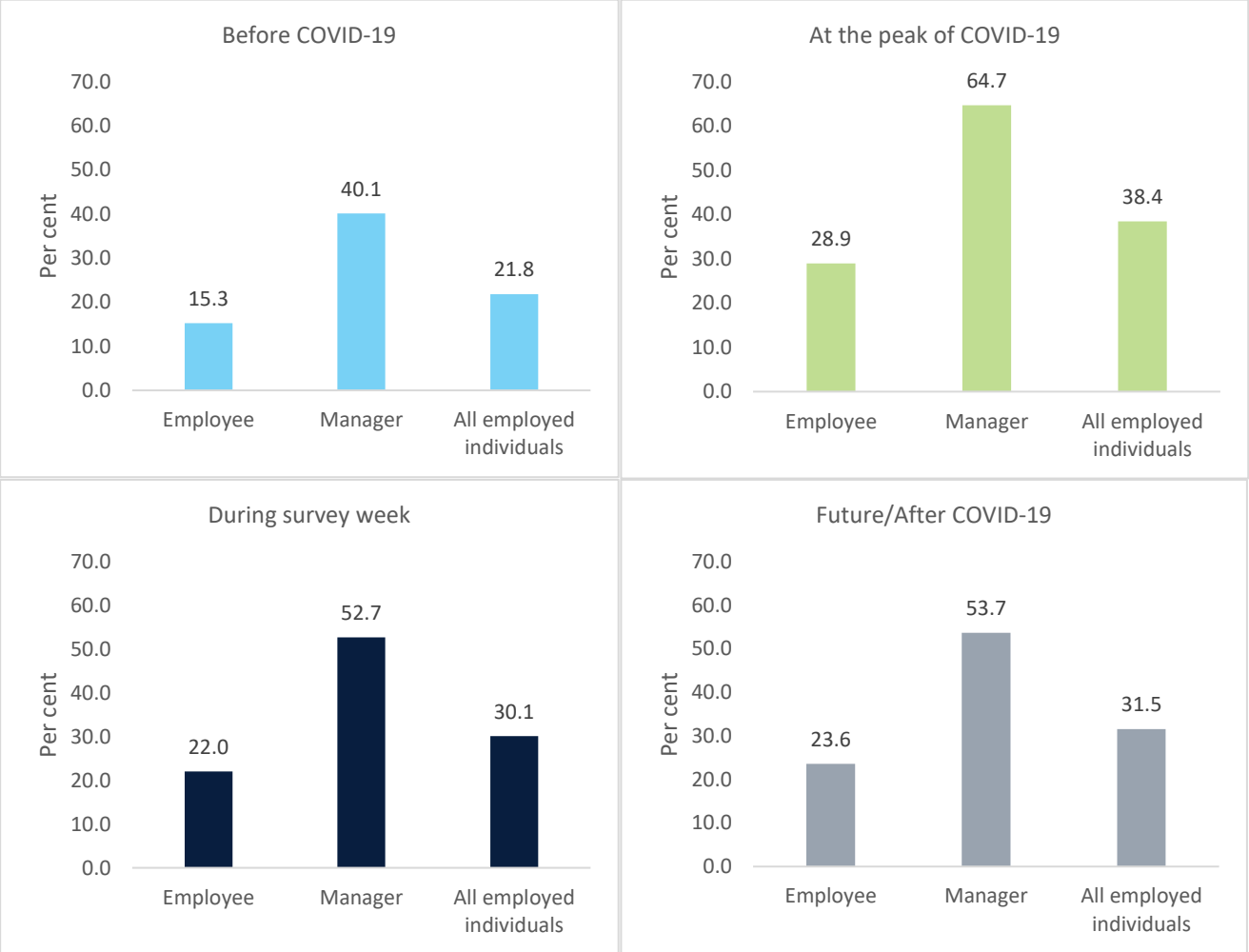
[10] Note that the majority of those with at least one direct report were channeled to the manager sub–survey, but about one in five were instead channeled to the employee sub–survey. BCARR's analysis identifies managers based on whether they have a direct report or not, and not on which sub–survey they were asked to fill out.

Figure 3.3: Work from home capability of employees, managers and all employed individuals



Note: Exclude self-employed persons. The terms 'employees' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 3.4: Work from home uptake of employees, managers and all employed individuals

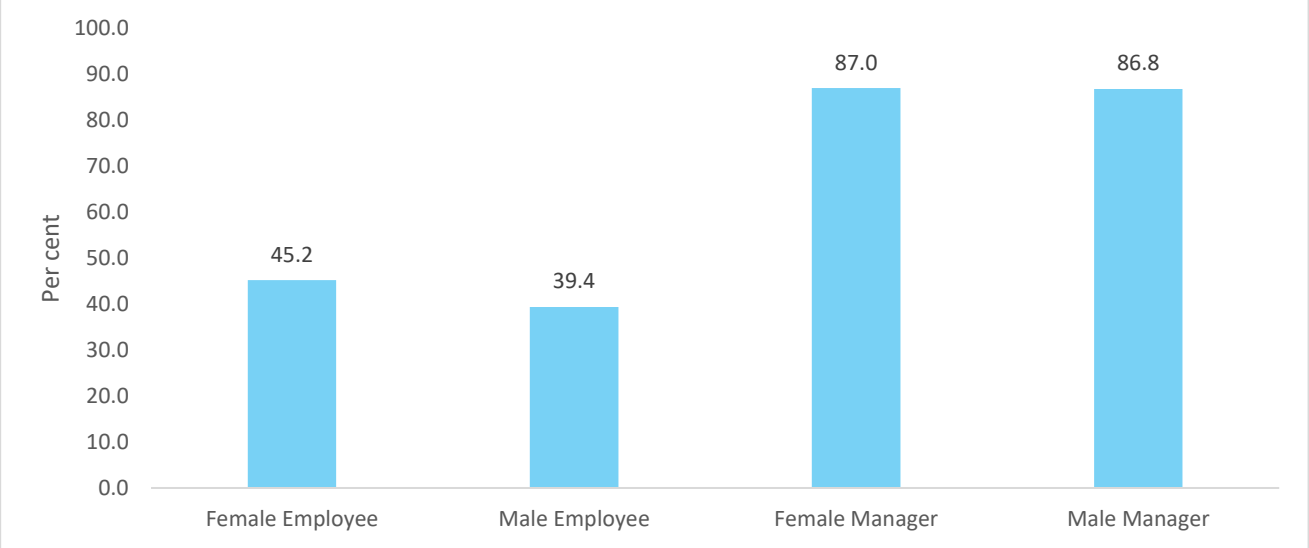


Note: Excludes self-employed persons. The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

3.4 Gender

Figure 3.5 indicates that WfH capability in female employees is higher than in male employees, at 45.2 versus 39.4 per cent. WfH capability in female and male managers is about the same (87.0 versus 86.8 per cent). WfH uptake in female employees is lower than in male employees before the pandemic (14.2 versus 16.3 per cent). However, at the peak of the COVID-19 pandemic, female employees' uptake is higher than male employees' (30.9 versus 26.9 per cent). This is also true in the case of managers (66.8 per cent in female managers versus 63.3 per cent in male managers). Lastly, WfH uptake is higher in female employees and managers than in male employees and managers, both during the survey week and into the future.

Figure 3.5: WfH capability by gender



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 3.6: WfH uptake by gender

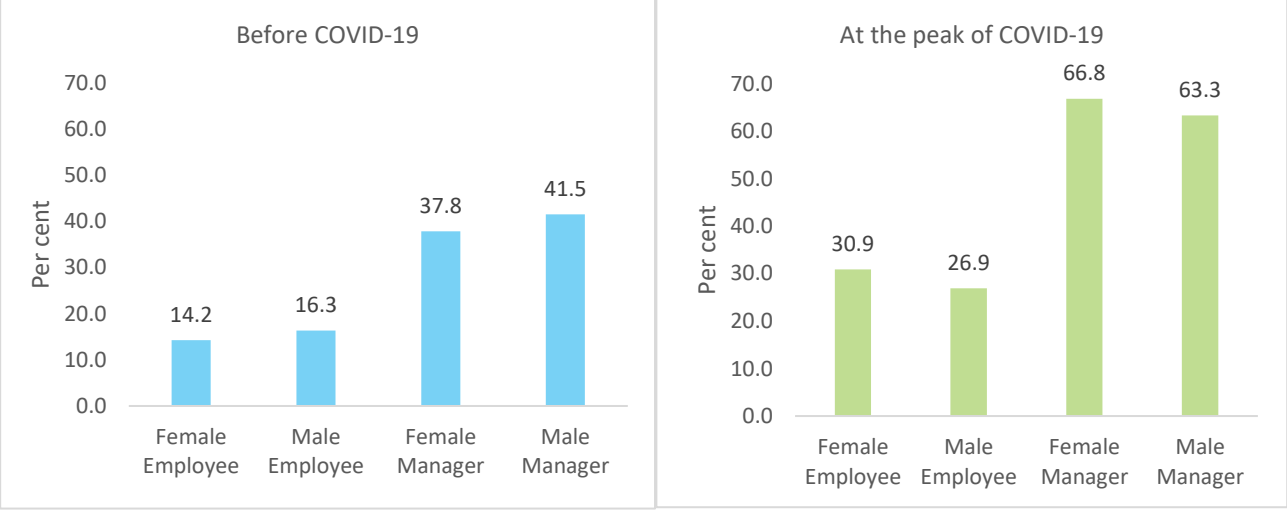


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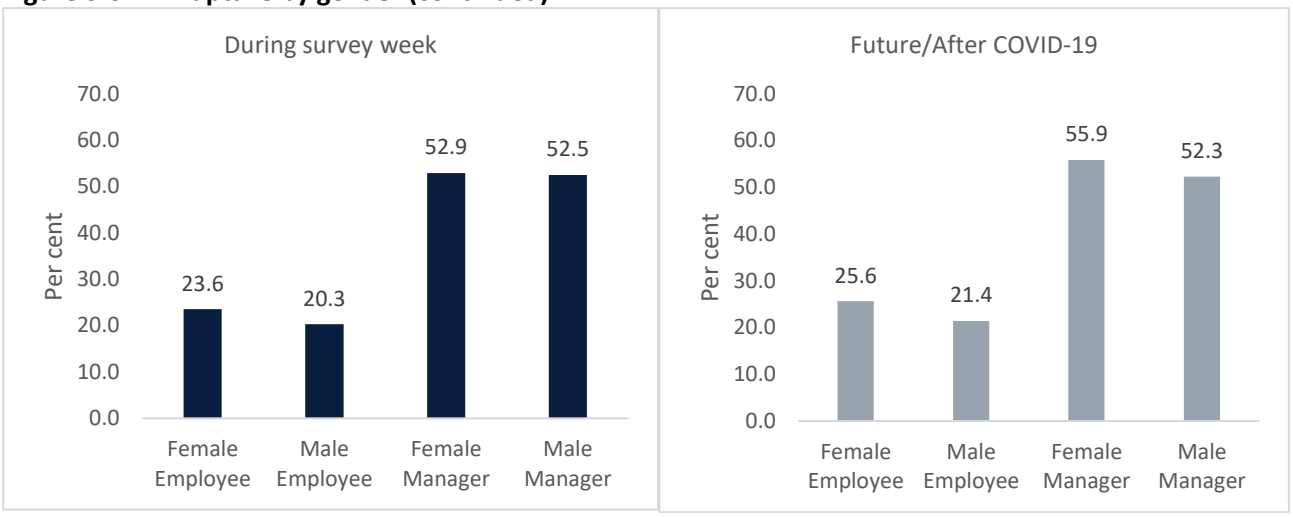
Figure 3.6 WfH uptake by gender (continued)



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data.

Prior to the pandemic, the WfH capability of female employees was higher than that of male employees, but this was not reflected in the actual WfH uptake. The pandemic appears to have been a catalyst that converted WfH capability into WfH uptake for many female employees, and the available data suggests that a higher rate of female WfH uptake has continued throughout the survey period and the preference of female employees is that it will be sustained into the future.[11] Box 3.2 discusses some of the reasons why WfH uptake is higher for females than males.

[11] A higher rate of female WfH uptake also reflects that females put a higher value on WfH (Aksoy et al. 2022).

Box 3.2: Why is WfH uptake higher for females than males?

One of the reasons WfH uptake is higher in females is because WfH capability is significantly higher for females (see Figure 3.5), reflecting the nature of the jobs and occupations females are employed in. For example, at the time of the 2016 Census, Australian Bureau of Statistics (2016a) demonstrated that 26 per cent of females worked as Professionals (compared to 19 per cent of males), and 22 per cent worked as Clerical and administrative workers (compared to 6.0 per cent of males). These are the two occupations that had the highest WfH uptake during the pandemic (Vij et al. 2022).

Another contributor to the higher WfH uptake is that females are more likely than males to be a caregiver. According to data from Australian Bureau of Statistics (2018), about 6.8 per cent of females who were over 15 years old provided care to someone with a disability or an older Australian in 2015, compared to only 2.9 per cent of males. Additionally, females with a care commitment were more likely than males with a care commitment to work part-time (27 versus 14 per cent). Childcare responsibilities also tend to fall more on females than males.

Focusing on those who care for a person with a disability or older Australians, Table 3.1 shows that WfH uptake in females with a care commitment was slightly higher than in males with a care commitment before the pandemic. At the peak of the pandemic, WfH uptake in females with a care commitment is higher than in males with a care commitment (19.8 versus 16.4 per cent). The gap between them remains in the future too (19.5 versus 14.7 per cent).

Table 3.1: WfH uptake by gender and care commitment

	WfH uptake before COVID–19 (per cent)	WfH uptake at the peak of COVID–19 (per cent)	WfH uptake during survey week (per cent)	WfH future uptake (per cent)
Female with care commitment	13.5	19.8	15.9	19.5
Male with care commitment	13.2	16.4	14. 7	14.7

Source: BCARR analysis of iMOVE UniSA weighted survey data

It is likely that caring responsibilities for children also have a different effect on WfH uptake for males and females. Matheson et al. (2020) found that working remotely is helpful for carers in balancing their job and duties at home during the pandemic in Australia. However, while the UniSA survey collects data on whether there are children in the household, it does not collect any information on the division of child care responsibilities within the household that would enable quantification of any such effect.

3.5 Age

Table 3.2 summarises how WfH capability and uptake vary with age. Three patterns are observed:

- Firstly, WfH capability and uptake are higher in managers than in employees across all age groups. For instance, WfH capability in managers is 78–90 per cent whereas in employees it is 33–53 per cent. At the peak of the pandemic, WfH uptake in managers is 61–70 per cent, whereas in employees it is in the range of 19–39 per cent, depending on age.
- Secondly, WfH capability and uptake tend to increase with age before reaching a turning point, after which WfH capability and uptake decline with age. For example, during the survey period, employees' WfH uptake is 21.5 per cent for 18 to 24 years old, rising to 29.9 per cent for 40 to 44 years old, and then declining with age to reach 14.0 per cent for those aged 55 and over. There is significant volatility around this overall pattern, reflecting small sample sizes for some age categories.[12]
- Thirdly, for employees and managers, WfH capability and uptake across the four time periods are higher for the young cohort (i.e. 18–24) than the old cohort (i.e. 55 and over).

Table 3.2: Work from home capability and uptake by age

	Employee					Manager				
	WfH capability	WfH uptake before COVID-19	WfH uptake at the peak of COVID-19	WfH uptake during survey week	WfH in the future	WfH capability	WfH uptake before COVID -19	WfH uptake at the peak of COVID-19	WfH uptake during survey week	WfH in the future
Age	per cent					per cent				
18–24	43.3	17.3	29.6	21.5	23.8	90.0	43.7	63.7	52.4	55.4
25–29	49.2	18.9	33.4	25.8	27.7	86.0	46.8	67.1	53.0	59.7
30–34	49.0	17.6	38.8	27.9	31.4	89.9	49.2	64.4	54.1	59.9
35–39	52.9	19.3	38.1	29.0	28.4	90.1	44.0	66.1	59.6	55.1
40–44	49.5	19.8	35.3	29.9	31.5	84.6	44.9	64.2	57.6	56.2
45–49	49.1	18.4	35.7	28.7	31.2	89.3	37.9	62.8	50.0	50.3
50–54	32.8	11.2	20.1	14.6	17.6	87.5	23.1	70.2	46.2	49.0
55 +	32.5	9.5	19.2	14.0	14.2	77.9	22.8	61.0	44.3	41.0

Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

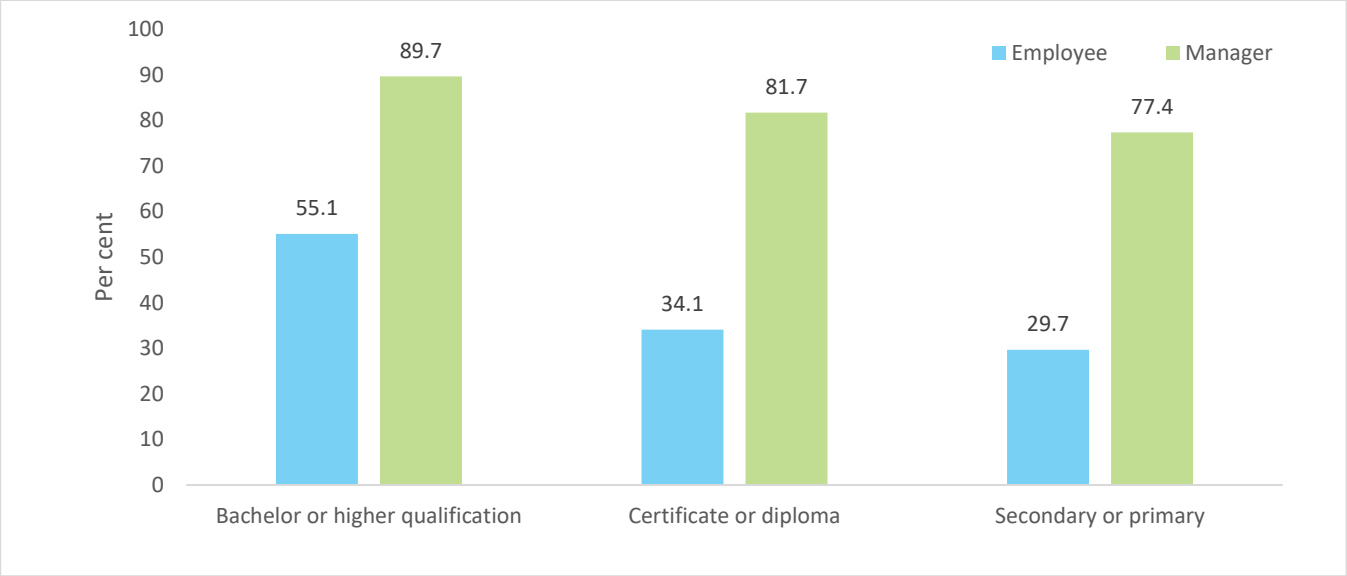
3.6 Education

Employed individuals with a higher education qualification are more likely to WfH.[13] Figure 3.7 shows that WfH capability is 55.1 per cent for employees with a bachelor's degree or higher qualification. However, only 29.7 per cent of employees with no post-school qualification have WfH capability. For managers, it is 89.7 versus 77.4 per cent.

---

12 For example, there are only 97 and 115 managers who are aged 18 to 24 and 25 to 29 years old, respectively.
13 This could be because employed individuals with a higher education qualification put a higher value on WfH (Aksoy et al. 2022).

Figure 3.7: Working from home capability by educational attainment



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

WfH uptake is also higher for non-managerial employees or managers with a bachelor's degree or higher qualification than for those without it. For example, Figure 3.8 shows that WfH uptake during the survey week for employees with at least a bachelor's degree is 30.7 per cent, compared to 15.5 per cent for those with a certificate or diploma, and 14.4 per cent for those with only a primary or secondary education. For managers, the WfH uptake during survey week is 57.5 per cent, 41.3 per cent and 43.7 per cent, respectively, across the three education categories.

Figure 3.8 Working from home uptake by educational attainment

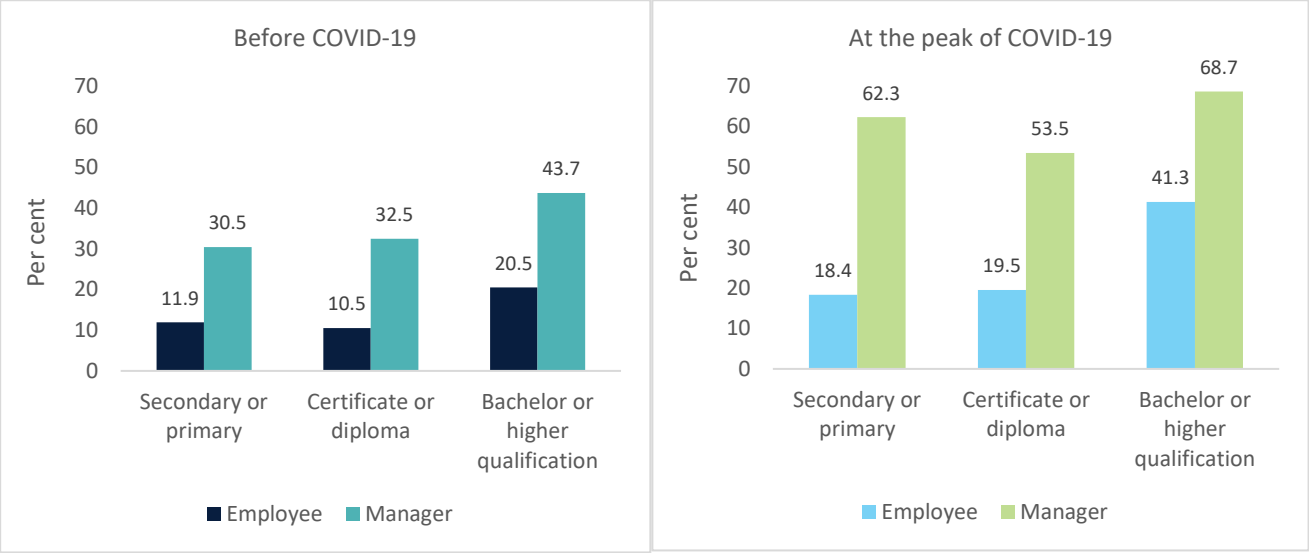


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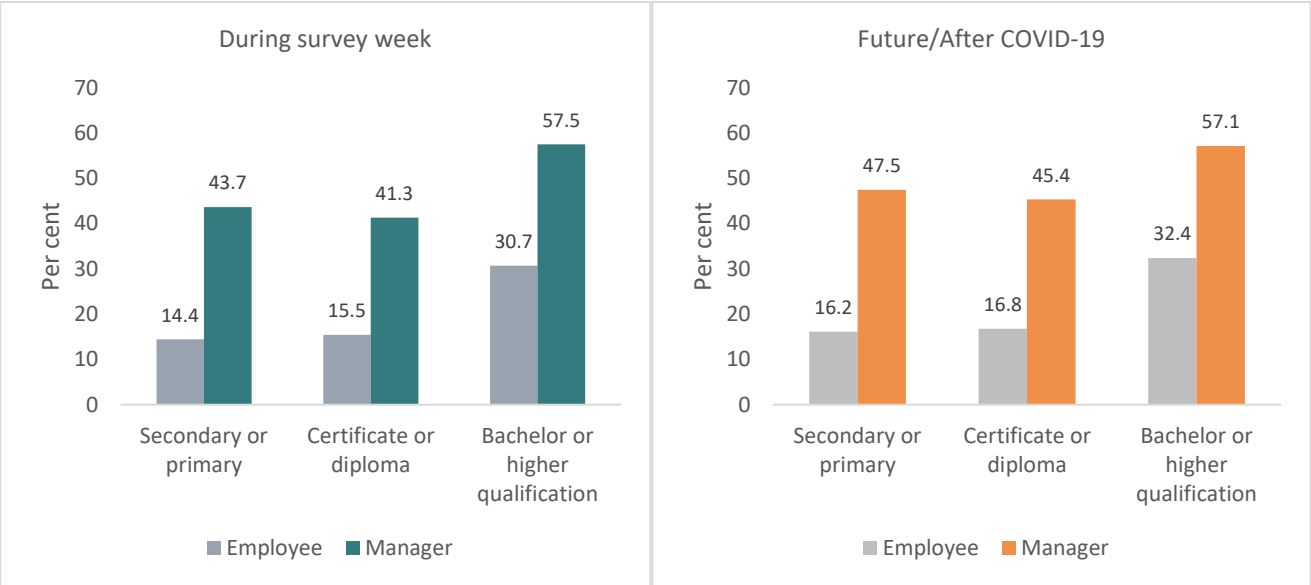
Figure 3.8 Working from home uptake by educational attainment (continued)

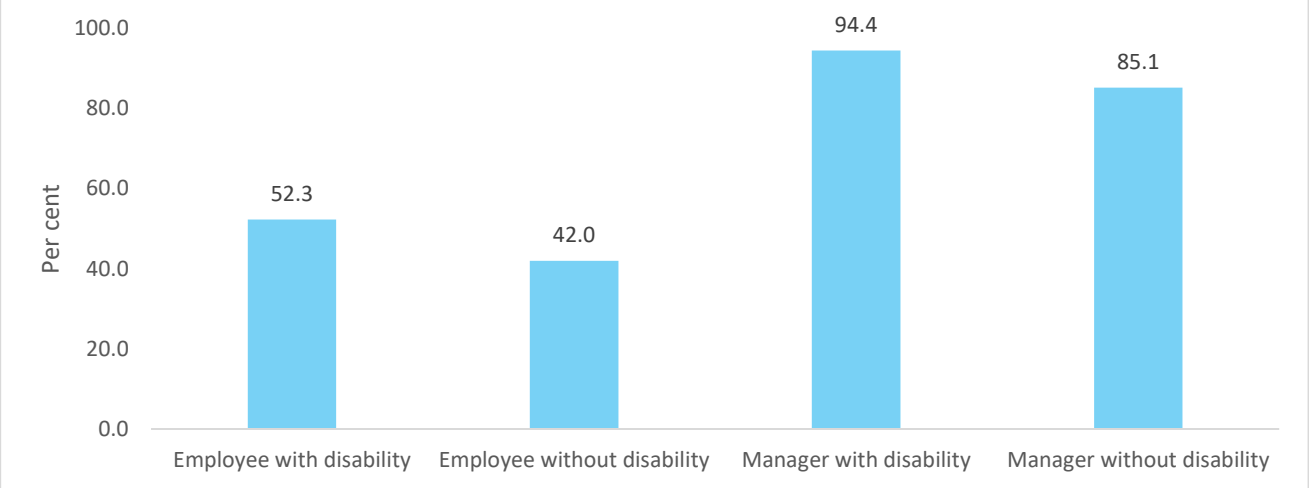


Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

3.7 Disability

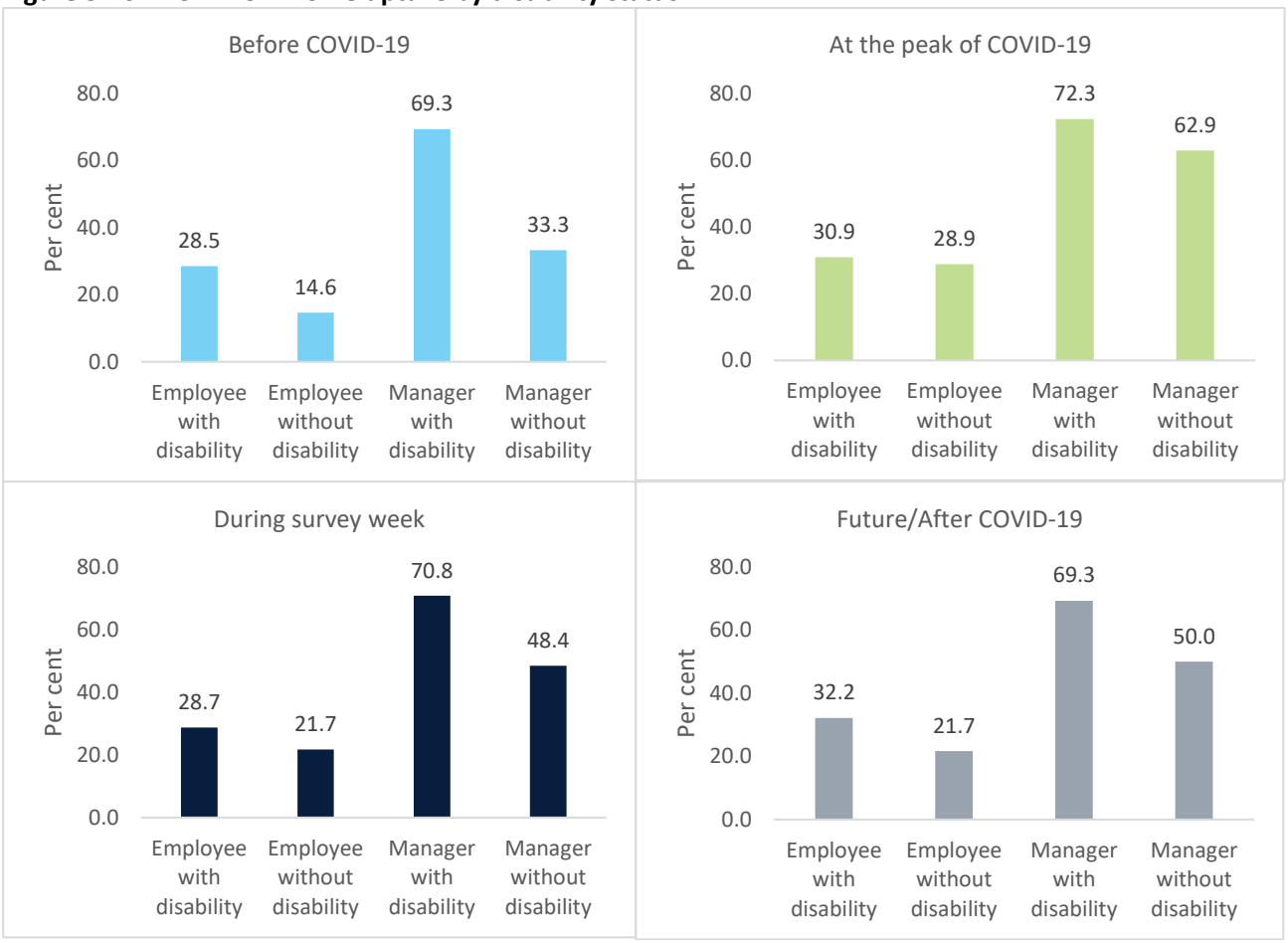
People with a disability work remotely more than other employed persons without a disability. Figure 3.9 shows that WfH capability for employees with a disability is 52.3 per cent, but WfH capability for employees without a disability is 42.0 per cent. WfH capability for managers with a disability is 94.4 per cent, whereas for managers without a disability it is 85.1 per cent. Figure 3.10 shows that WfH uptake is consistently higher for employees and managers with a disability than for those without a disability, across all 4 time periods. It is noteworthy that the gap in WfH uptake between those with and without a disability narrowed significantly at the peak of the pandemic, and then widened during survey week.

Figure 3.9: Work from home capability by disability status



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 3.10: Work from home uptake by disability status



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

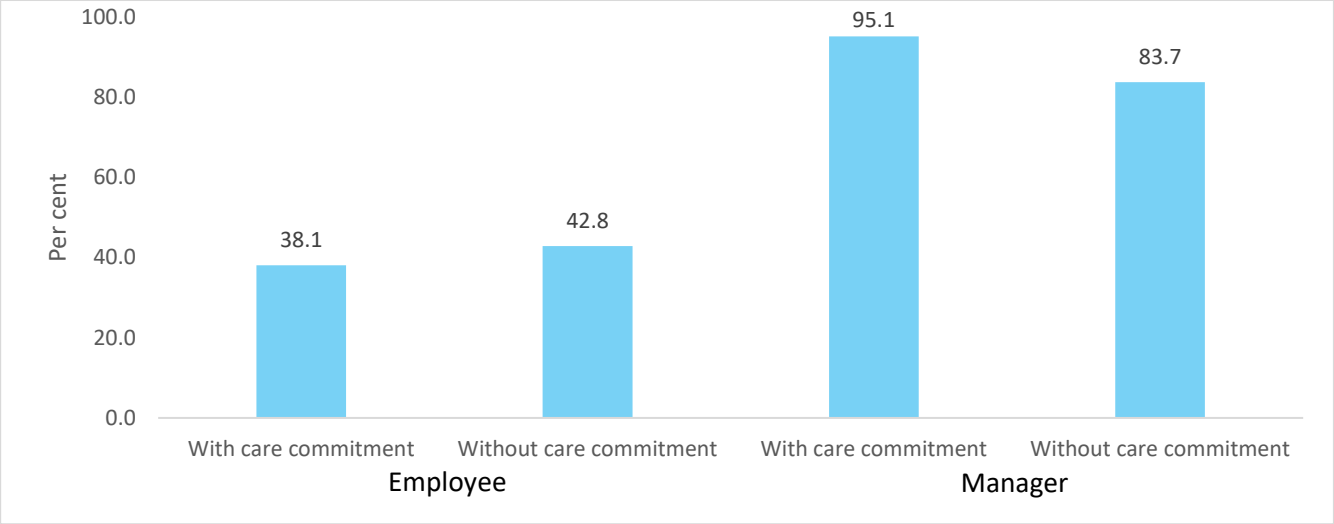
3.8 Care commitment

The survey identified individuals who provided unpaid care, help or assistance to family members or others with a disability, long term health condition or problems related to old age. As Figure 3.11 shows, WfH capability in employees with a care commitment is lower than in employees without one (38.1 versus 42.8 per cent). WfH uptake in employees with and without a care commitment was about the same before the pandemic (14.7 versus 15.3 per cent). WfH uptake at the peak of the pandemic, during the survey week and into the future is a little lower for employees with a care commitment than for employees without one.

Managers with a care commitment have higher WfH capability and are more likely to WfH than managers without a care commitment. For instance, WfH capability in managers with a care commitment is 95.1 per cent, whereas in managers without a care commitment it is 83.7 per cent. WfH uptake is consistently higher across the four periods for managers with a care commitment, compared to managers without one. While the gap between those with and without a care commitment narrowed at the peak of the pandemic, it widened again after that.

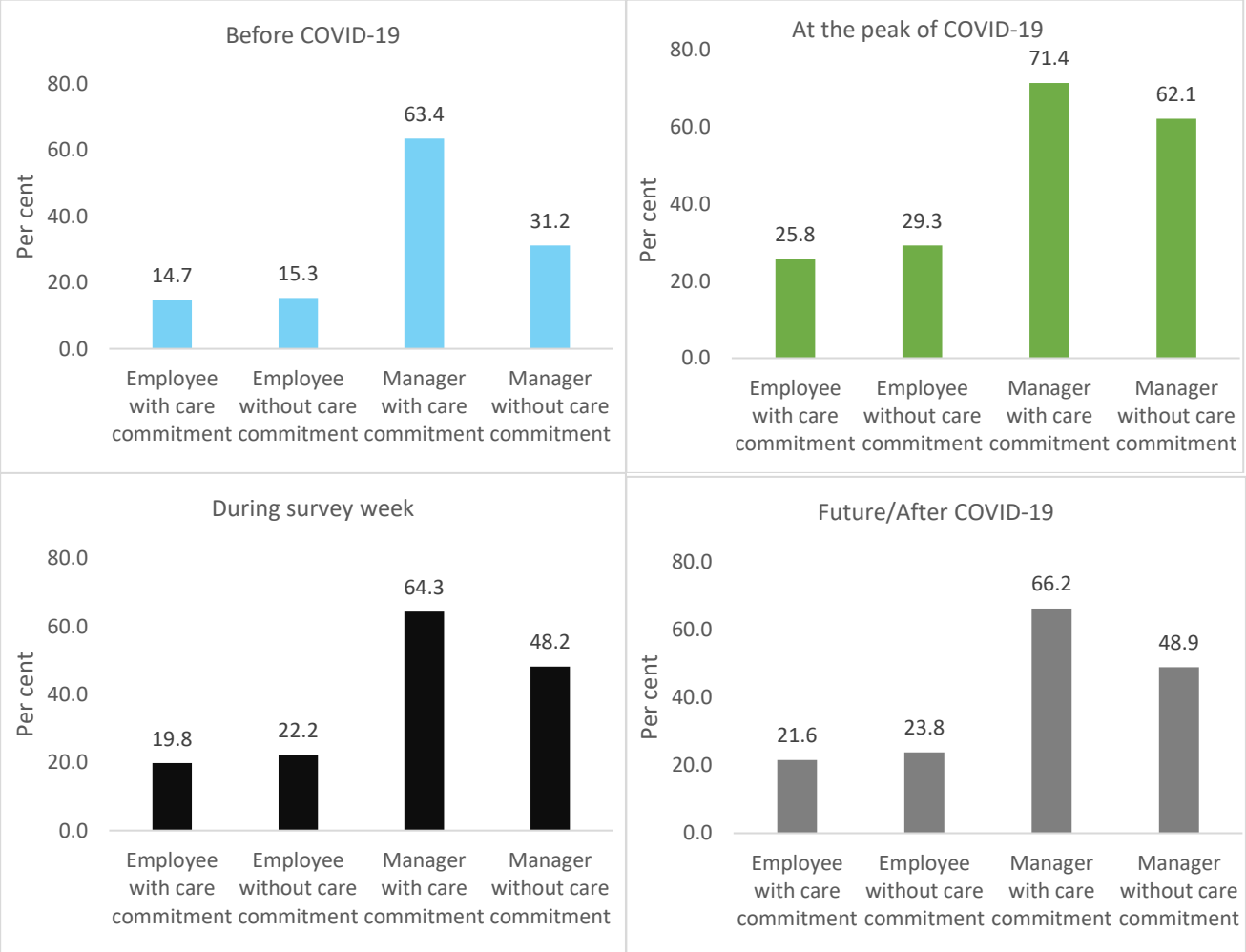
The difference in how WfH uptake relates to care commitments for employees and managers reflects the differences in WfH capability, which in turn are likely to reflect differences in job characteristics, occupations and seniority.

Figure 3.11: Work from home capability by care commitment



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 3.12: Work from home uptake by care commitment

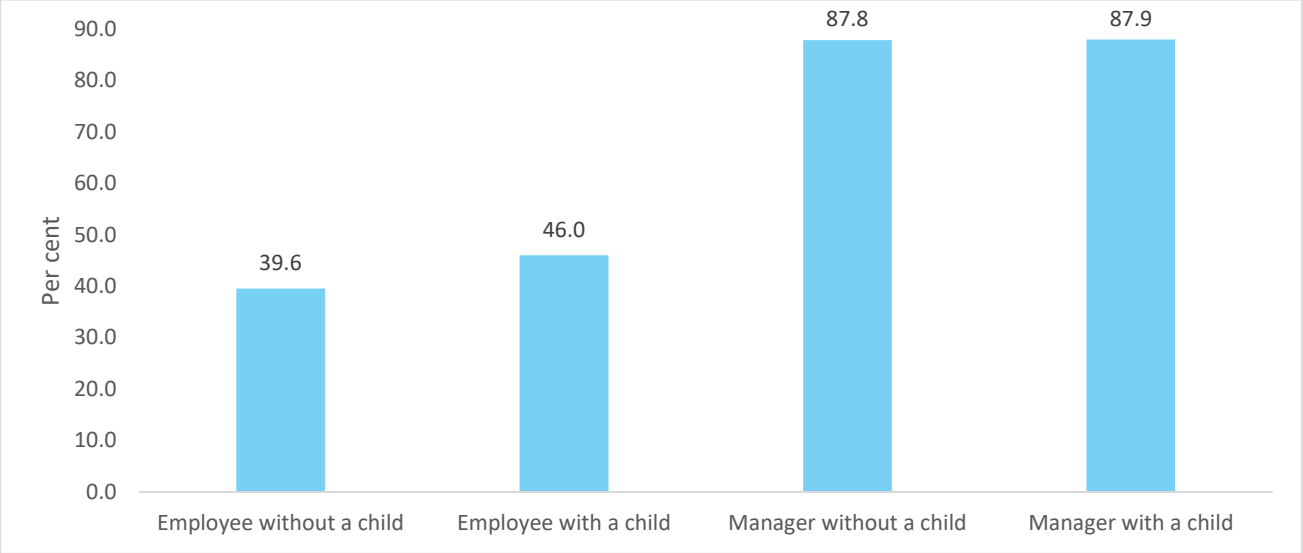


Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

3.9 Household composition

WfH can potentially help parents to better balance their work and family responsibilities. As Figure 3.13 shows, WfH capability is 39.6 per cent for employees without a child living in their household. For employees with a child in the household, it is 46.0 per cent. However, WfH capability for managers with a child is similar to that for managers without a child (87.8 versus 87.9 per cent).

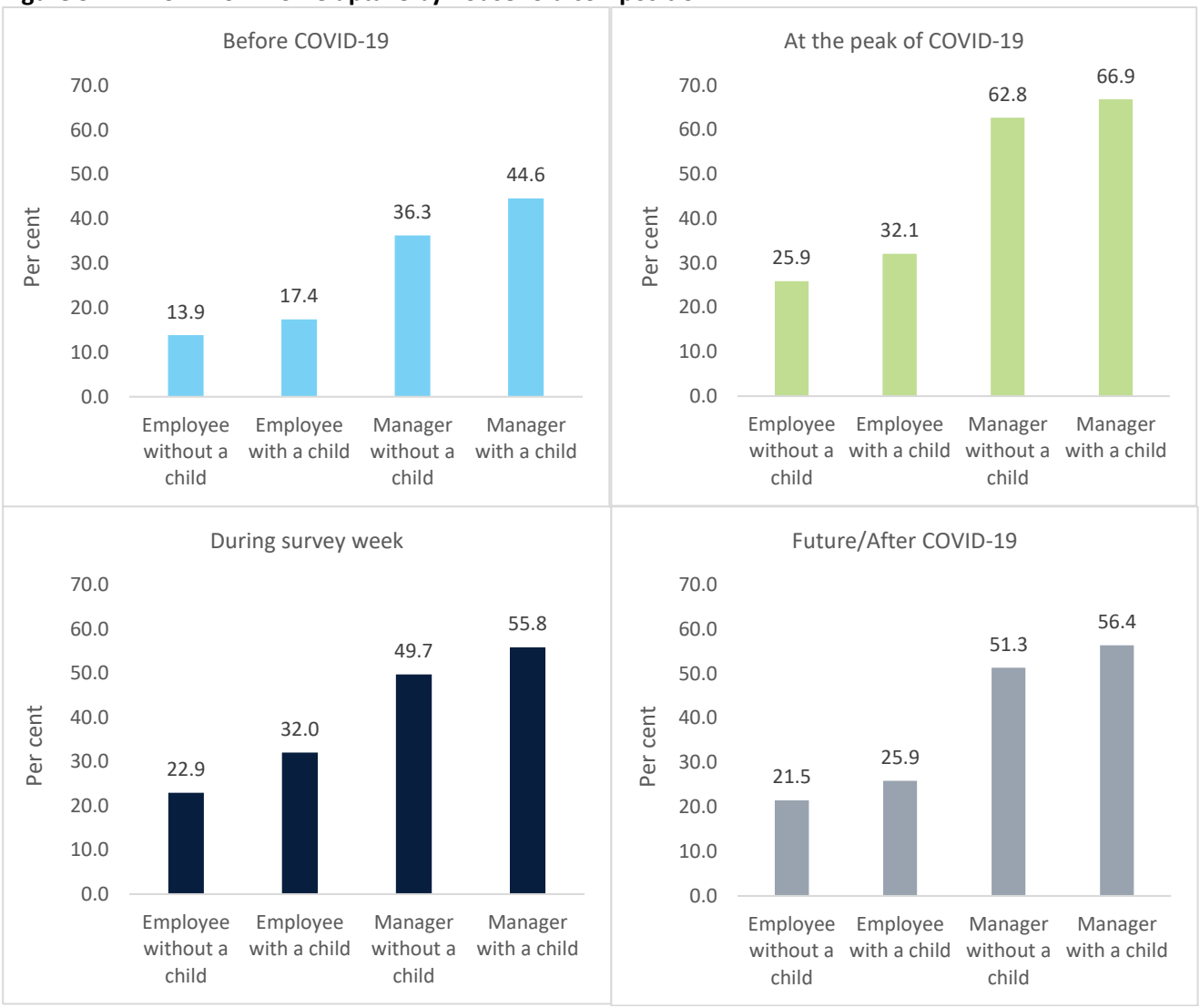
Figure 3.13: Work from home capability by household composition



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 3.14 shows that WfH uptake tends to be higher for both employees and managers with a child living in the household, and this pattern holds across the four time periods. For example, during the survey week, WfH uptake was 32.0 per cent for employees with a child, compared to 22.9 per cent for employees without a child.

Figure 3.14: Work from home uptake by household composition



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Australian Bureau of Statistics (2021) can also provide some insight into the relationship between WfH uptake during the pandemic and household composition. Box 3.3 provides an introduction to what the 2021 census reveals about the relationship between WfH uptake and key socio-demographic variables, and explores the similarities and differences with results from the iMOVE UniSA WfH survey.

Box 3.3: What does the 2021 Census data say about the role of socio-demographic characteristics in working from home?

More than half of the Australian population was in lockdown at some stage during the 2021 Census enumeration period (Australian Bureau of Statistics 2022), and the 2021 census data reveals that the COVID-19 pandemic caused a large increase in the proportion of employed people working from home in Australia. The 2021 census data indicates that 23.9 per cent of Australian employed persons worked from home on the 2021 census date, while only 5.3 per cent of employed individuals worked from home on the 2016 census date. A strong surge in WfH uptake during the pandemic is also documented in Vij et al. (2022).

The Australian Bureau of Statistics (2021) suggests that 27.0 per cent of employed individuals from the 17 in-scope cities (from the iMOVE UniSA study) worked from home on 2021 census day while only 4.6 per cent of employed individuals worked from home on the 2016 census date (Australian Bureau of Statistics 2016b). The 2021 census data also shows that economic, employment and socio-demographic characteristics play an important role in affecting WfH uptake (Australian Bureau of Statistics 2021). For example:

- About 33 per cent of employed people earning a median income or above (i.e. annual income is above $52,000) WfH, whereas about 14 per cent of employed people earning below median income WfH. Over 53 per cent of high-income earners (i.e. annual income is $182,000 or more) WfH.
- Employed people from the office-based industries WfH more than employed people from other industries (50.0 versus 17.7 per cent).
- Employed people from the office-based occupations WfH more than employed people from other occupations (42.4 versus 7.4 per cent).
- About 30 per cent of full-time employees WfH and about 21 per cent of part-time employees do so.
- Employed persons in a medium/large firm (i.e. employee size is 20 or more) WfH more than employed persons in a small firm (i.e. employee size is 1-19) (28.1 versus 24.4 per cent).
- About 31 per cent of female employed persons WfH whereas less than 24 per cent of male employed persons do so.
- WfH uptake is highest for employed persons whose age is between 40 and 44. Before this age range (i.e. 18-39), uptake increases with age and varies from 12 to 33 per cent. For employed persons whose age is between 45 and 65, their WfH uptake declines with age and varies from 32 per cent to 26 per cent.
- About 42 per cent of employed people with a bachelor degree or higher qualification WfH. However, less than 6 per cent of employed people with a Year 9 or below education WfH.
- Employed people who do not have a need for assistance with core activities WfH marginally more than employed people who do need assistance with core activities (27.2 versus 26.4 per cent).
- WfH uptake is higher for employed people with a care commitment (i.e. provide unpaid assistance) than for employed people without a care commitment (31.3 versus 26.7 per cent).
- WfH uptake for employed persons who live in a household with a child is higher than for those without a child (31.9 versus 30.0 per cent).

Continued overpage

Box 3.3: What does the 2021 Census data say about the role of socio-demographic characteristics in working from home? (continued)

The 2021 census results, the bivariate analysis results presented previously in this chapter, and the key findings of Vij et al. (2022) show consistent conclusions about WfH uptake changes and the impact of economic and socio-demographic characteristics on WfH in Australia. Firstly, WfH uptake rises notably in Australia during the pandemic. Secondly, WfH uptake is positively associated with income, educational attainment and firm size. WfH uptake in office-based industries and occupations is higher. Employed people who have a child or a care commitment WfH more often. During the pandemic, women had higher WfH uptake than men. Thirdly, the relationship between age and WfH uptake is nonlinear where WfH uptake increases with age before reaching a turning point (i.e. 40–44 years old), after which WfH uptake declines with age.

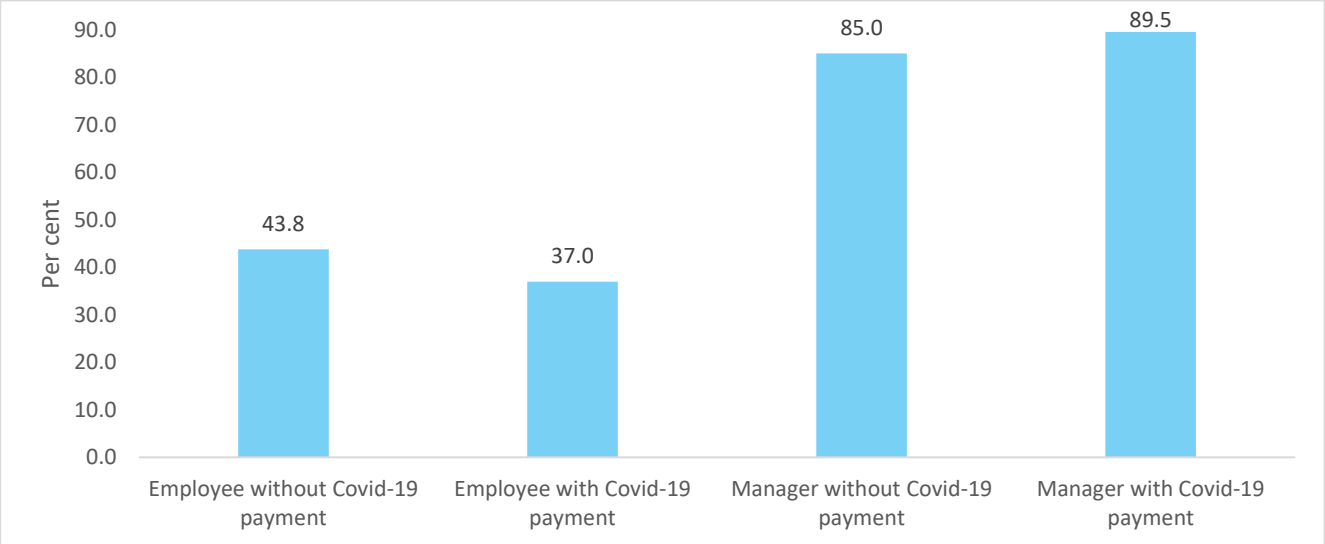
While many key findings from the 2021 census and this chapter's bivariate analysis reflect each other, the impact of disability on WfH differs across the two data sources. The Australian Bureau of Statistics (2021) captures people who have a need for assistance with core activities (which may reflect factors other than disability), whereas the iMOVE UniSA survey simply asks the respondent if they have a disability. The bivariate analysis suggests that WfH uptake for employed people with a disability is higher than for employed people without a disability. However, the 2021 census result indicates the opposite where WfH uptake for people who do not need assistance with core activities is slightly higher than for people who do need assistance.

Source: BCARR analysis of ABS Census of Population and Housing data for 2016 and 2021 and iMOVE UniSA survey data.

3.10 Receipt of COVID-19 payment

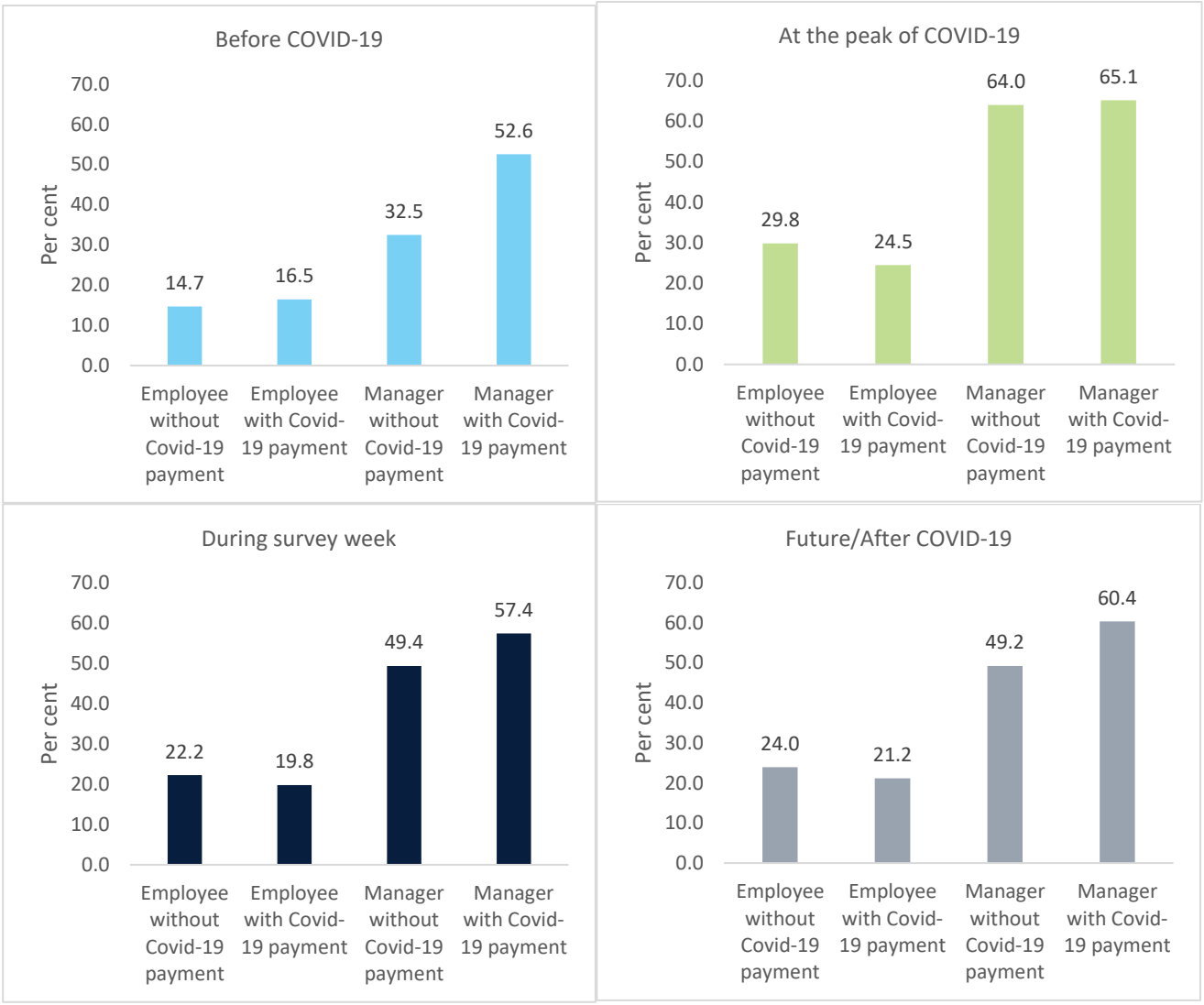
Figure 3.15 shows that employees receiving COVID-19 payment (e.g. Jobkeeper or Jobseeker) have lower WfH capability than employees who did not (37.0 versus 43.8 per cent). However, WfH capability is higher in managers receiving the payment than those who are not (89.5 versus 85.0 per cent). Figure 3.16 shows that employees who are not in receipt of a COVID-19 payment experience higher WfH uptake at the peak of the pandemic, during survey week and into the future. In contrast, WfH uptake in managers without a COVID-19 payment is lower than in managers who received it.

Figure 3.15: Working from home capability by receipt of COVID-19 payment



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 3.16: Working from home uptake by receipt of COVID-19 payment



Note: The term 'employee' refers to persons employed in non-managerial roles.
Source: BCARR analysis of iMOVE UniSA weighted survey data

3.11 Logistic regression results

Previous sections have presented bivariate analysis of the relationship between WfH capability/uptake and a range of socio-demographic variables. Given the large number of significant relationships identified and the interconnectedness of many of these variables, there is value in undertaking multivariate regression analysis to distinguish the relative importance of these different socio-demographic variables in influencing WfH outcomes.

The remainder of this chapter presents the results of regression analysis of individual's WfH capability and uptake, using the logistic regression technique (see Box 3.4 below). The independent variables included in the regressions are:

- Economic variables describing employment and employer characteristics (e.g. occupation, industry, income, firm size), which were the key focus of Vij et al. (2022) as summarised in Chapter 2.
- Socio-demographic variables describing the characteristics of survey respondents that have been the focus of the preceding parts of this chapter (e.g. gender, age, educational status, household type, disability, care status).

The survey respondents include managerial employees (i.e. those with at least one direct report) as well as non-managerial employees.

With a large number of potential explanatory variables being considered, multicollinearity is a potential issue. This was assessed not to be a problem in these regressions with the highest pairwise correlation between explanatory variables being 0.52 between disability and care status. The models presented in this chapter represent the preferred specifications which were settled on after experimenting with a wide range of different model specifications and variable combinations.

Box 3.4: What is logistic regression and how to interpret its coefficients?

Logistic regression is a statistical model to estimate the expected probability for the occurrence of an outcome (e.g. WfH) conditional on certain determinants (e.g. socio-demographic and economic variables in this chapter). The logistic regression allows the dependent variable to be zero. As many individuals in the iMOVE UniSA dataset did not have WfH capability or uptake (for example, Figure C1 in Appendix C shows that 47 per cent of survey participants have zero WfH uptake), using logistic regression was considered more suitable than OLS. While logistic regression is typically used for binary dependent variables (such as WfH capability), it can also be used for limited continuous dependent variables (such as WfH uptake, which is constrained to values between 0 and 100 per cent).

The logistic regression coefficient measures the log odds ratio change in the dependent variable from the change in the independent variables. To interpret the logistic regression coefficients, the logistic regression results are first transformed into the (non-log) odds ratio and then the inverse logit/probability format. The odd ratio for the WfH capability is documented in Figure D1 in Appendix D. However, the odd ratios for WfH uptake across the four periods are not included as they are not meaningful for truncated continuous dependent variables like the WfH uptake metric in this study.

A reference person approach is used to interpret the coefficients. The reference person has a value of zero for all of the variables in the regression. For example, in Table 3.3, the reference person works full-time, has below-median income, has no direct reports, works for a small or medium firm and is not employed as a Manager, Professional or Clerical or Administrative worker or in an office-based service industry. Table A.1 shows that the reference person's probability of having WfH capability is 27 per cent. If we take an otherwise identical person who instead works part-time, the positively signed regression coefficient on the part-time variable in Table 3.3 (+0.15) shows that person will have a higher probability of having WfH capability than the reference person. More specifically, Table A.1 shows that the part-time workers probability of having WfH capability is 30 per cent. Table A.1 also provides a worked-through example of how to calculate the predicted impact on WfH capability/uptake from the regression coefficient.

Table 3.3 shows the logistic regression results for the full sample (i.e. managerial and non-managerial employees) when only the job and firm characteristics variables are included in the regression. While all of the regressions are statistically significant, the explanatory power of the regression based on the pseudo R–squared statistic is in the range of 13 to 19 per cent. Thus, economic variables relating to job and firm characteristics are only capable of explaining a relatively small proportion of the variation in WfH capability and uptake.[14] Individuals who have the same broad employment and employer characteristics display considerable heterogeneity in their WfH outcomes.

Of the five models, the pre-COVID-19 WfH uptake model has the lowest goodness of fit, possibly reflecting this being the dependent variable that is the most likely to be subject to recall issues.

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[14] If the economic variables were specified in greater detail (e.g. individual occupations and industries), a higher goodness of fit could be obtained (i.e. the pseudo R- squared statistic could increase by 5 percentage points for each model specification). However, a parsimonious model specification was preferred to support a focus on high-level drivers and to aid communication of results.

Table 3.3 shows that the income, industry, occupation, firm size, managerial status and part-time employment variables are statistically significant across all five regression models. However, the significance levels of the part-time employment variable are not as high as those of other explanatory variables across the five models.

The regression results show that being employed on a part-time basis, having an above-median income, being a managerial employee, and being employed in one of the office-based service industries,[15] or in one of the selected office-based occupations (i.e. Managers, Professionals or Clerical and administrative workers) are all positively associated with WfH capability and uptake. However, employed individuals who work at a large firm (with more than 200 employees) have lower WfH capability and uptake than those who work for a small or medium firm, holding other factors constant.

The regressions in Table 3.3 form the baseline set of regressions against which other results will be compared to assess the relative contribution that socio-demographic variables can make to explaining WfH outcomes, when the economic variables are controlled for.

Table 3.4 presents the logistic regression for the full sample when both the economic and socio-demographic variables are included in the regression. The first thing to note is that the goodness of fit of all the models has increased notably with the inclusion of the socio-demographic variables, with the pseudo R-squared now in the range of 18 to 23 per cent. The pre-COVID-19 uptake regression again has the lowest goodness of fit. Most of the coefficients in the five regression models are highly statistically significant.

Likelihood ratio tests were undertaken to determine if the set of seven socio-demographic variables included in Table 3.4 were jointly significant.[16] That is, do socio-demographic factors have a significant role to play in helping to explain WfH outcomes, above and beyond the contribution of the economic variables? The results show that the socio-demographic factors (considered as a group) are highly significant predictors of WfH capability and uptake. While Table 3.3 previously demonstrated the economic variables were important determinants of WfH capability and uptake, Table 3.4 demonstrates that socio-demographic factors also play an important role in determining WfH capability and uptake in Australian cities.

Table 3.4 presents the coefficients of the economic and socio-demographic variables in the logistic regression. To interpret these coefficients and to understand the quantitative impact of the economic and socio-demographic variables on WfH capability and uptake, the coefficients in Table 3.4 are transformed into the inverse logit/probability form in Table A.2 (refer to Box 3.4 above for more details). The coefficient of female is –0.33 in Table 3.4 when the dependent variable is WfH uptake before the COVID-19 pandemic. By referring to Table A.2, it can be seen that the model predicts pre-pandemic WfH uptake of 25 per cent for the male reference person, compared to 19 per cent for a female with an otherwise identical set of economic and socio-demographic characteristics.

Gender was not a statistically significant driver of WfH capability, once other factors were controlled for, but it did have a significant influence on WfH uptake. The gender gap in WfH uptake narrowed as a result of the pandemic. As Table A.2 shows, the gap of WfH uptake before the pandemic is 6 per cent. At the peak of the pandemic, the gap narrows to 3 per cent, and is also around 3 per cent for desired future WfH uptake.

Age affects WfH capability and uptake. WfH capability is lower for employed persons over 50 years old than for those between 24 and 50 years old. Additionally, WfH uptake across the four periods is lower for employed persons over 50 years old than for those between 24 and 50 years old.

Educational attainment is positively related to WfH. The coefficient of Bachelor's degree or higher qualification in Table 3.4 is 0.52 when the dependent variable is WfH capability. This suggests that the average probability of having WfH capability is 38 per cent for individuals with a bachelor's degree or higher qualification, which is

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[15] The office-based service industries are Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services, Administrative and support services, and Public administration and safety.

[16] Likelihood ratio tests are analogous to F-tests in simple ordinary least squares regressions.

significantly higher than for those without such a qualification (27 per cent as Table A.2 shows). Across the 4 periods, WfH uptake is higher for individuals with a degree or higher qualification (36–42 per cent) than for those without such a qualification (23–27 per cent).

People with a disability and people with a care commitment had significantly higher WfH capability and uptake. Specifically, Table A.2 shows that the average probability of having WfH capability in people with a disability (47 per cent) is higher than in people without a disability (27 per cent), holding other factors constant. The average probability of having WfH capability is higher for people with a care commitment (33 per cent) than for those without such a care commitment (27 per cent). Across the 4 periods, WfH uptake in people with a disability is 39–47 per cent, which is higher than in those without a disability (23–27 per cent). WfH uptake is higher for people with a care commitment (32–36 per cent) than for those without such a commitment (23–27 per cent) across the 4 periods as Table A.2 indicates. These findings about the positive link between disability/care provision and WfH are consistent with the findings in Productivity Commission (2021).

Individuals with children in the household also had significantly higher WfH capability and uptake, reflecting the influence of their child care commitments. Table A.2 shows that the average probability of having WfH capability is 32 per cent for a household with a child whereas it is 27 per cent for a household without a child. For a household with a child, WfH uptake across the 4 periods is between 27 and 32 per cent whereas for a household without a child it is between 23 and 27 per cent.

Overall, the results indicate that the worker's age, educational attainment and disability status are the socio-demographic factors that have the greatest impact on WfH capability and uptake in the context of Australian cities.

All the economic variables remained statistically significant in the more comprehensive set of regressions in Table 3.4, apart from the part-time employment variable, which was only statistically significant in two of the five regressions. While the characteristics of the job and employer are important determinants of WfH capability and uptake, it is also clear that considering the social and demographic characteristics of workers—such as their age, education and disability status—can add a lot to our understanding of what is driving WfH outcomes in Australian cities.

Table 3.3: Logistic regression results for full–sample (managers and non-managerial employees together) when only job and firm characteristics included

	WfH capablity		WfH uptake before COVID-19		WfH uptake at the peak of COVID-19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant	Coefficient	Statistically significant	Coefficient	Statistically significant	Coefficient	Statistically significant	Coefficient	Statistically significant
Part-time individual	0.15	Yes (p<0.100)	0.40	Yes(p<0.001)	0.23	Yes (p<0.010)	0.38	Yes (p<0.001)	0.23	Yes (p<0.010)
Individual with median income or above	0.75	Yes(p<0.001)	0.67	Yes (p<0.001)	0.79	Yes (p<0.001)	0.69	Yes (p<0.001)	0.67	Yes (p<0.001)
Office-based service industries	1.34	Yes(p<0.001)	0.91	Yes(p<0.001)	1.43	Yes (p<0.001)	1.26	Yes (p<0.001)	1.43	Yes (p<0.001)
Manager, Professional or Clerical and administrative Worker	1.22	Yes(p<0.001)	0.60	Yes(p<0.001)	1.01	Yes (p<0.001)	0.81	Yes (p<0.001)	1.03	Yes (p<0.001)
Large firm	–0.34	Yes(p<0.001)	–0.42	Yes(p<0.001)	–0.39	Yes (p<0.001)	–0.27	Yes (p<0.001)	–0.35	Yes (p<0.001)
Managerial employee—has direct report	0.84	Yes(p<0.001)	0.91	Yes(p<0.001)	0.91	Yes(p<0.001)	0.99	Yes(p<0.001)	0.83	Yes(p<0.001)
Constant	–0.99	Yes(p<0.001)	–1.14	Yes(p<0.001)	–0.95	Yes (p<0.001)	–0.17	Yes (p<0.001)	–0.98	Yes (p<0.001)
Pseudo R–squared	0.19		0.13		0.19		0.17		0.18	
N	3002		3044		3044		3044		3044	

Note: individuals with median income or above are those who earned over $1249 weekly. Office-based service industries are Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services, Administrative and support services, and Public administration and safety. Large firms are firms with over 200 employees. P stands for P–value that measures the probability of obtaining a test statistic result to reject the null hypothesis.

Source: BCARR analysis of iMOVE UniSA unweighted survey data.

Table 3.4: Logistic regression results for the full sample (managers and non-managerial employees together)

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?
Female	–0.12	No	–0.33	Yes (p<0.001)	–0.18	Yes (p<0.050)	–0.27	Yes (p<0.010)	–0.20	Yes (p<0.050)
Age (less than 24)	–0.03	No	0.19	No	0.17	No	0.24	Yes (p<0.010)	0.16	No
Age (over 50)	–0.60	Yes (p<0.001)	–0.69	Yes (p<0.001)	–0.65	Yes (p<0.001)	–0.59	Yes (p<0.001)	–0.66	Yes (p<0.001)
Bachelor's degree or higher qualification	0.52	Yes (p<0.001)	0.61	Yes (p<0.001)	0.67	Yes (p<0.001)	0.63	Yes (p<0.001)	0.61	Yes (p<0.001)
Individual with a child	0.25	Yes (p<0.010)	0.21	Yes (p<0.05)	0.22	Yes (p<0.01)	0.19	Yes (p<0.050)	0.18	Yes (p<0.050)
Individual with disability	0.87	Yes (p<0.001)	0.71	Yes (p<0.001)	0.60	Yes (p<0.010)	0.76	Yes (p<0.001)	0.83	Yes (p<0.001)
Individual with care commitment	0.27	Yes (p<0.050)	0.47	Yes (p<0.001)	0.39	Yes (p<0.010)	0.44	Yes (p<0.010)	0.38	Yes (p<0.010)
Part-time worker	0.03	No	0.32	Yes (p<0.001)	0.13	No	0.29	Yes (p<0.010)	0.12	No
Individual with median income or above	0.65	Yes (p<0.001)	0.53	Yes (p<0.001)	0.67	Yes (p<0.001)	0.55	Yes (p<0.001)	0.55	Yes (p<0.001)
Office-based service industries	1.30	Yes (p<0.001)	0.84	Yes (p<0.001)	1.39	Yes (p<0.001)	1.21	Yes (p<0.001)	1.39	Yes (p<0.001)

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Table 3.4: Logistic regression for the full sample (managers and non-managerial employees together) (continued)

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?
Manager, Professional or Clerical and administrative Worker	1.06	Yes (p<0.001)	0.55	Yes (p<0.001)	0.93	Yes (p<0.001)	0.76	Yes (p<0.001)	0.98	Yes (p<0.001)
Large firm	–0.31	Yes (p<0.001)	–0.38	Yes (p<0.001)	–0.36	Yes (p<0.001)	–0.23	Yes (p<0.010)	–0.32	Yes (p<0.001)
Managerial employee—has direct report	0.60	Yes (p<0.001)	0.63	Yes (p<0.001)	0.66	Yes (p<0.001)	0.73	Yes (p<0.001)	0.57	Yes (p<0.001)
Constant	–1.00	Yes (p<0.001)	–1.09	Yes (p<0.001)	–0.98	Yes (p<0.001)	–1.19	Yes (p<0.001)	–0.97	Yes (p<0.001)
Pseudo R–squared	0.22		0.18		0.23		0.21		0.23	
Likelihood ratio test of null hypothesis that socio-demographic variables have coefficients of zero	219.06 (p<0.001)		324.2 (p<0.001)		263.37(p<0.001)		301.22 (p<0.001)		253.14 (p<0.001)	
N	3002		3044		3044		3044		3044	

Note: individuals with median income or above are those managers who earned over $ 1249 weekly. Office-based service industries are Information media and telecommunications, Financial and insurance services, Rental, hiring and real estate services, Professional, scientific and technical services, Administrative and support services, and Public administration and safety. Large firms are firms with over 200 employees. P stands for P–value that measures the probability of obtaining a test statistic result to reject the null hypothesis. The F statistics were testing against the null hypothesis where all the socio-demographic variables were not included in the logistic regression models.

Source: BCARR analysis of iMOVE UniSA unweighted survey data

3.12 Conclusion

This chapter uses the iMove UniSA survey dataset and analytical tools to investigate the link between socio-demographic characteristics and WfH in Australia. While previous research has established how WfH capability and uptake depend strongly on job and employer characteristics (such as occupation, industry, income and firm size), this chapter has demonstrated that the socio-demographic characteristics of workers play an important additional role in explaining WfH outcomes. More specifically, gender, age, educational attainment, the presence of children in the household, disability and carer status were all found to be significant predictors of WfH capability and uptake in the Australian context.

In the next chapter, we extend this analysis to consider how WfH capability and uptake vary spatially, and whether spatial factors (such as place of residence, place of work and commuting distance) are useful predictors of WfH outcome.

Chapter 4 The role of spatial characteristics in working from home

Key points

- This chapter investigates the role of spatial factors, such as place of residence, place of work, city population size and commuting distance, in influencing work from home (WfH) in Australia.
- Bivariate analysis results show that WfH capability is higher for capital cities than for regional cities (55.5 versus 44.8 per cent). Across the 4 periods (i.e. before and at the peak of the COVID–19 pandemic, during survey week and into the future), WfH uptake is higher for capital cities (22–40 per cent) than for regional cities (18–30 per cent). Across the 4 periods, Sydney has the highest WfH capability (63 per cent) and uptake (26–44 per cent).
- WfH practice varies across the inner, middle and outer suburbs of the 5 biggest capital cities. WfH capability is 70.9 per cent for residents of the Inner ring, 57.9 per cent for the Middle ring and 48.4 per cent for the Outer ring. Across the 4 periods, the Inner ring has the highest WfH uptake (33–54 per cent), followed by the Middle ring (23–43 per cent) and the Outer ring (17–32 per cent).
- WfH capability is higher for the big cities with a population of over 250,000 than for the small cities with a population of under 250,000 (55 versus 41 per cent). Across the 4 periods, WfH uptake is also higher for the big cities than for the small cities (22–39 versus 16–24 per cent).
- WfH capability for employed individuals working in the Central Business Districts (CBDs) of the 5 big capital cities is higher than for those working in non-CBD areas (68.9 versus 44.3 per cent). Across the 4 periods, WfH uptake is higher for those with CBD workplaces than for non-CBD workplaces (21-56 versus 12–28 per cent).
- WfH capability and uptake are generally higher for people who commute between 20 and 50 km to work than for people who commute shorter distances to work.
- At the time of the 2021 census (when lockdowns were in place in Sydney and Melbourne), WfH uptake was highest for big urban areas with populations over 100,000 (27.3 per cent), followed by the rural balance (16.2 per cent), bounded localities (12.1 per cent) and other urban areas (11.3 per cent). Some of the larger regional cities had relatively high WfH uptake of over 20 per cent, such as Illawarra (i.e. Wollongong), Newcastle and Lake Macquarie, and Geelong SA4s.
- Prior to the pandemic, average weekly WfH hours tended to be relatively high in the Major cities (2.1–3.0 hours), lower in Inner regional areas and lower again in Outer regional areas. In 2020, average weekly WfH hours rose markedly in the Major cities (to 6.6 hours), exceeding average weekly WfH hours in Inner regional, Outer regional and Remote and very remote areas (0.1–3.5 hours). This reflects the effects of the COVID-19 pandemic and lockdowns on the Major cities.
- Regression results show that spatial variables (such as place of residence and place of work) are significant predictors of WfH capability and uptake. The goodness of fit (R-squared statistics) increases after including spatial variables in the regression, highlighting the role spatial factors can play in affecting WfH behaviour. More specifically, living in Sydney or Melbourne has a strong positive impact on recent and future WfH uptake, while living in the Inner ring of the five big cities had a strong positive impact on both WfH capability and uptake. Having a workplace in the Sydney or Melbourne CBDs was associated with higher WfH capability and uptake for non-managerial employees.

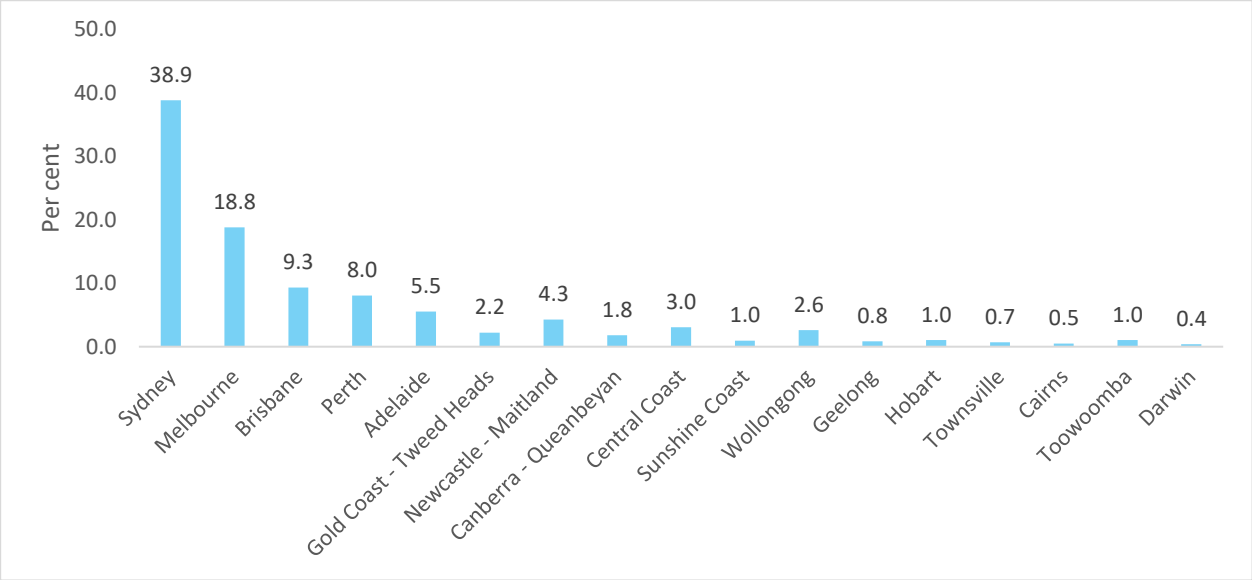
4.1 Introduction

This chapter extends the previous analysis to investigate the role of spatial factors in work from home (WfH) practice. In particular, this chapter will utilise different analytical tools (e.g. summary charts/tables and multivariate logistic regression) with iMOVE UniSA survey data to examine if employed individuals' place of residence (e.g. capital/regional city, BCARR rings and city population scale), place of work (e.g. Central Business District (CBD)/Non-CBD areas) and commuting distance are determinants of WfH capability and uptake. Additionally, this chapter will explore different data sources such as the ABS 2016 and 2021 census data, and the Household, Income and Labour Dynamics in Australia (HILDA) survey data (wave 16–20) to understand the spatial variation of WfH uptake in Australia.

4.2 Sampling snapshot

The respondents in the iMOVE UniSA survey dataset are located in 17 cities.[17] Figure 4.1 shows that 38.9 per cent of respondents are from Sydney and 18.8 per cent from Melbourne. Between 5 and 10 per cent are from each of Brisbane, Perth and Adelaide. About 80.5 per cent of the sample lives in one of Australia's 5 biggest capital cities (i.e. Sydney, Melbourne, Brisbane, Perth or Adelaide). The non-capital cities of Gold Coast-Tweed Heads, Newcastle-Maitland, Central Coast, Sunshine Coast and Wollongong, each contribute between 2 and 5 per cent of the sample.

Figure 4.1: Distribution of respondents by city

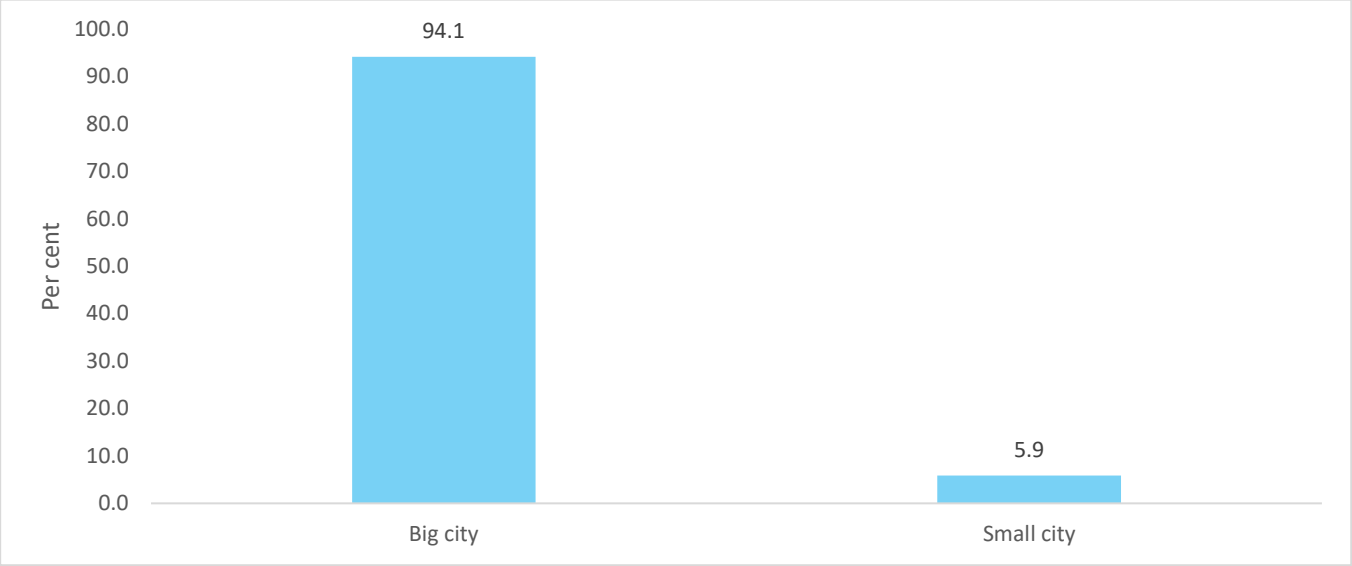


Notes: Only non-managerial and managerial employees who did not change their job during the pandemic are included here. Cities are based on SUA boundaries.
Source: BCARR analysis of iMOVE UniSA survey data

[17] The definition of cities in this chapter is Significant Urban Areas (SUA).

The great majority (94 per cent) of the respondents in the survey dataset are from big cities with populations of 250,000 or more (see Figure 4.2). For the 5 biggest capital cities, the BCARR ring classification can be used to understand the distribution of the population across the inner, middle and outer suburbs.[18] [19] Of the respondents who reside in the 5 biggest capital cities, 43.9 per cent live in BCARR's Outer ring, 33.0 per cent in the Middle ring and 23.1 per cent in the Inner ring (see Figure 4.3).

Figure 4.2: Distribution of respondents by city population size

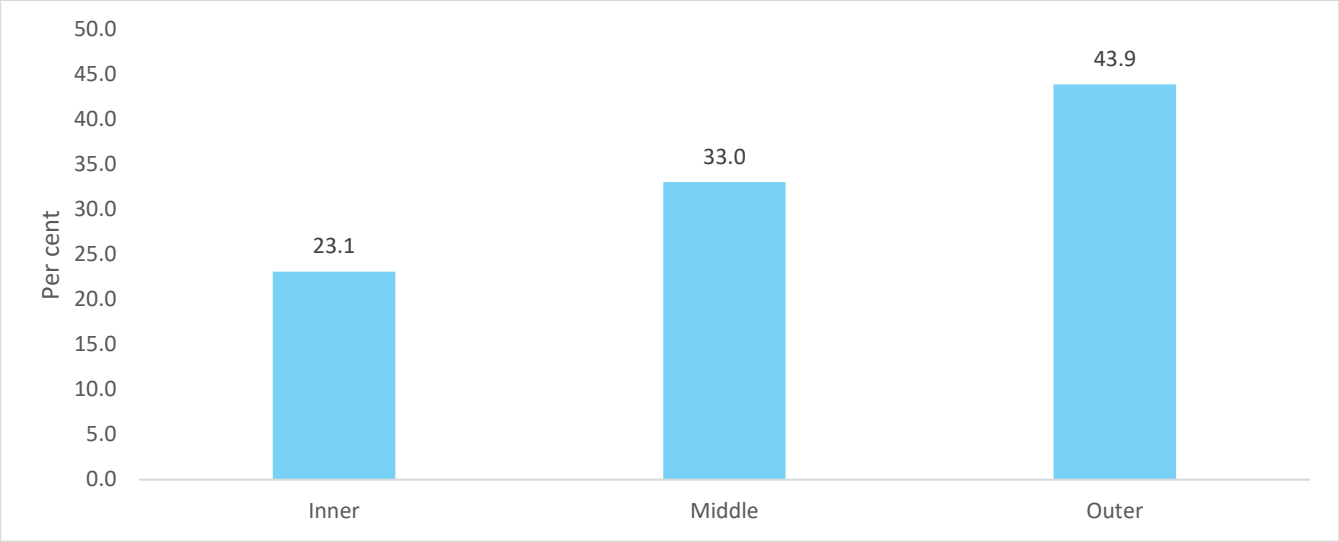


Notes: Big cities are cities with a population of above 250,000 whereas small cities are cities with a population of below 250,000 in 2016. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA survey data

[18] Appendix B maps the BCARR rings for the 5 big capital cities. The classification is based on 2016 ABS' Australian Statistical Geography Standard (ASGS) boundaries. BCARR has classified each of the SA2s within the 5 biggest Greater Capital City Statistical Areas (GCCSAs) to either the Inner, Middle or Outer ring.

[19] BCARR rings are coded at the SA2 level whereas the iMOVE UniSA dataset is coded at the postcode level. To code the iMOVE UniSA data into BCARR rings for the analysis here, the following steps were undertaken. Firstly, the SA2-postcode concordance was combined with the SA2-ring concordance to create a postcode-ring concordance. Secondly, the postcode-ring concordance was linked with the postcode variable in the iMOVE UniSA dataset. Consequently, each respondent in the iMOVE UniSA dataset from a specific postcode attaches to its corresponding ring. However, for the postcodes that spread across multiple rings, the following rule was applied to assign the postcode to a specific ring. If 60 per cent or above of a postcode's population belongs to a specific ring, the postcode was assigned to that ring. For example, 70 per cent of postcode 6163's population belongs to the Perth Outer ring, 13 per cent belongs to the Perth Inner ring and 17 per cent belongs to the Perth Middle ring. Applying the above rule will identify postcode 6163 as belonging to Perth Outer ring. Even when the above rule is applied, some postcodes still cannot be clearly assigned to a ring, and so some respondents (46 in total) were excluded from this analysis.

Figure 4.3: Distribution of respondents by BCARR rings for five biggest capital cities



Notes: Excludes respondents who live outside the five biggest capital cities. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA survey data

The iMOVE UniSA dataset contains more employed individuals working outside the Central Business Districts (CBDs) of the 5 big capital cities than working in the CBDs.[20] [21] Figure 4.4 shows that 75.4 per cent of employed individuals' (who have a designated workplace in one of the 5 big capital cities) work in non-CBD areas of the 5 big capital cities. About 24.6 per cent of respondents report their workplace is in the CBD of one of the five big capital cities.

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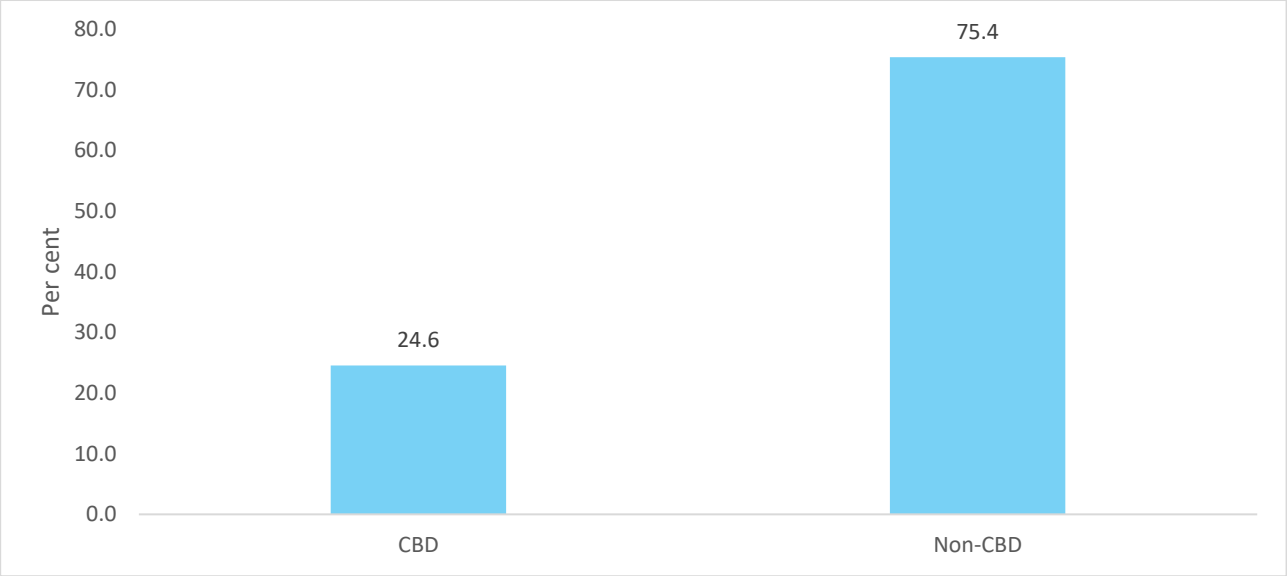
[20] In defining the geographic area of CBDs, BCARR has adopted a functional approach. For each of the 5 biggest capital cities, the definition starts with the central SA2, and adds adjoining SA2s that serve a similar function to the central SA2s, as reflected in a CBD-like industry structure and high job density. This functional definition captures only the central SA2 in Perth and Adelaide, but captures 2 additional SA2s in Brisbane, and 6 additional SA2s in each of Sydney and Melbourne. The SA2-based functional definitions of CBDs are as follows (based on 2016 boundaries and data):
Sydney CBD: Sydney – Haymarket – The Rocks, Darlinghurst, Potts Point – Woolloomooloo, Pyrmont – Ultimo, Redfern – Chippendale, Surry Hills, North Sydney.
Melbourne CBD: Melbourne, Docklands, Southbank, East Melbourne, South Yarra West, South Melbourne, Albert Park.
Brisbane CBD: Brisbane City, Fortitude Valley, Spring Hill.
Perth CBD: Perth City.
Adelaide CBD: Adelaide

[21] BCARR's standard definition of CBDs is SA2-based, but the iMOVE UniSA survey data collects place of work data at the postcode scale. The postcodes corresponding to BCARR's SA2-based CBD definitions were identified based on the ABS postcode to SA2 concordance, and people who nominated working in one of those CBD postcodes were identified as having a workplace in the CBD.

Figure 4.4: Distribution of respondents in CBD and non-CBD areas of five big capital cities



Notes: Only non-managerial employees from five big capital cities who have a designated workplace and did not change their job during the pandemic in the survey are included here. Managerial employees were not asked about the location of their workplace. Details of the definition of CBDs are provided in footnotes 20 and 21.
Source: BCARR analysis of iMOVE UniSA survey data

The iMOVE UniSA survey dataset includes respondents who experience different travelling distances between their residence and workplace. An indicative measure of travel distance was constructed for non-managerial employees based on reported postcode of residence and postcode of work.[22] Figure 4.5 shows that less than 18.4 per cent of respondents travel less than 5 kilometres (km) from their residence to workplace. About 57.9 per cent of respondents travel between 5 and 20 km. About 18.5 per cent of respondents commute 20–50 km. The dataset does not contain many respondents who travel a longer distance to their workplace, with only 5.1 per cent of respondents commuting over 50 km to their workplace.

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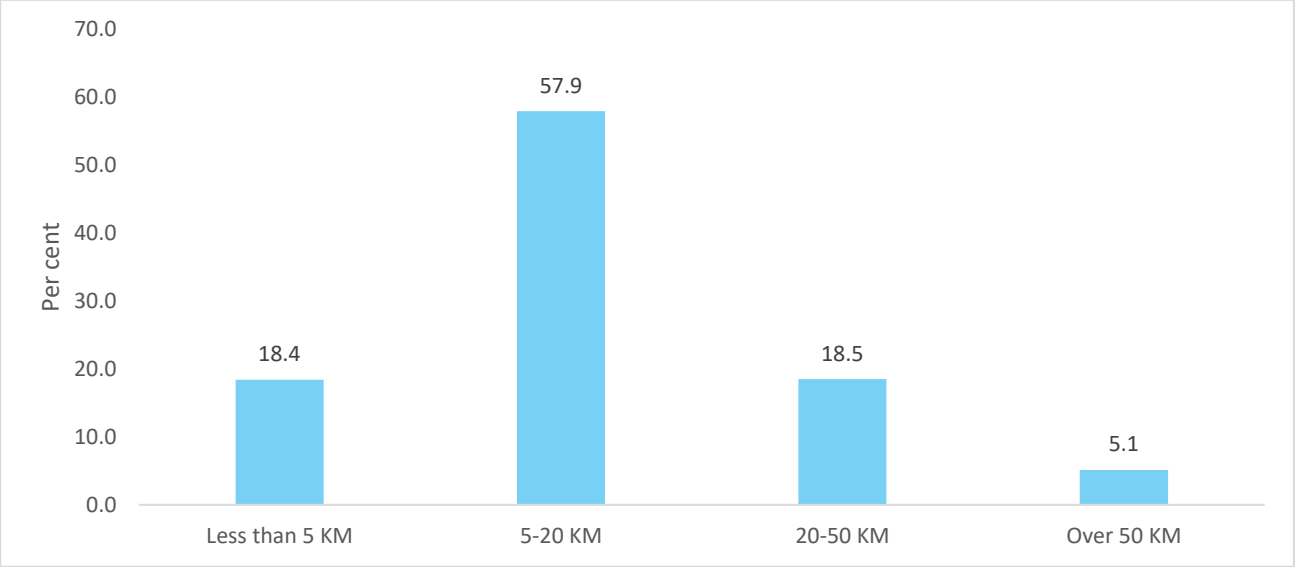
[22] The following procedure was used to estimate travel distance.
1). The population-weighted centroid of an individual's residence postcode was constructed using 2016 census mesh block population counts.
2). The geographic centroid of an individual's workplace postcode was computed.
3). The travel distance between an individual's residence and workplace was computed based on the results of steps 1 and 2. People with the same residential and workplace postcode were excluded from the analysis.
This process generates a measure of travel distance that is imprecise (given the relatively large size of postcodes), but enables us to distinguish between shorter and longer distance commutes, and to explore the impact of travel distance on WfH.

Figure 4.5: Distribution of commuting distance between respondents' place of residence and their place of work



Notes: To compute the travel distance between a respondent's place of residence and place of work, the procedure described in footnote 22 was used. Only non-managerial employees who have a fixed workplace and did not change their job during the pandemic are included here. Managerial employees were not asked about the location of their workplace.
Source: BCARR analysis of iMOVE UniSA survey data

4.3 Capital and regional cities

Working remotely is more common in capital cities than in regional cities.[23] Vij et al. (2022) found that WfH capability and uptake for non-managerial employees residing in **capital cities** was higher than for non-managerial employees living in **regional cities**.

The analysis in this section is based on data for managerial and non-managerial employees. In the iMOVE UniSA survey, sample sizes were sufficiently large to report reliable WfH estimates for six individual SUAs: Sydney, Melbourne, Brisbane, Perth, Adelaide and Newcastle. Estimates have also been provided for the SEQ and Western Sydney regions, as they are the focus of City Deals.

Figure 4.6 shows that WfH capability is highest for Sydney (63.1 per cent), while Melbourne, Adelaide and Western Sydney all have WfH capability of around 54 per cent. WfH capability is lowest for Brisbane, SEQ and Perth (47–48 per cent).

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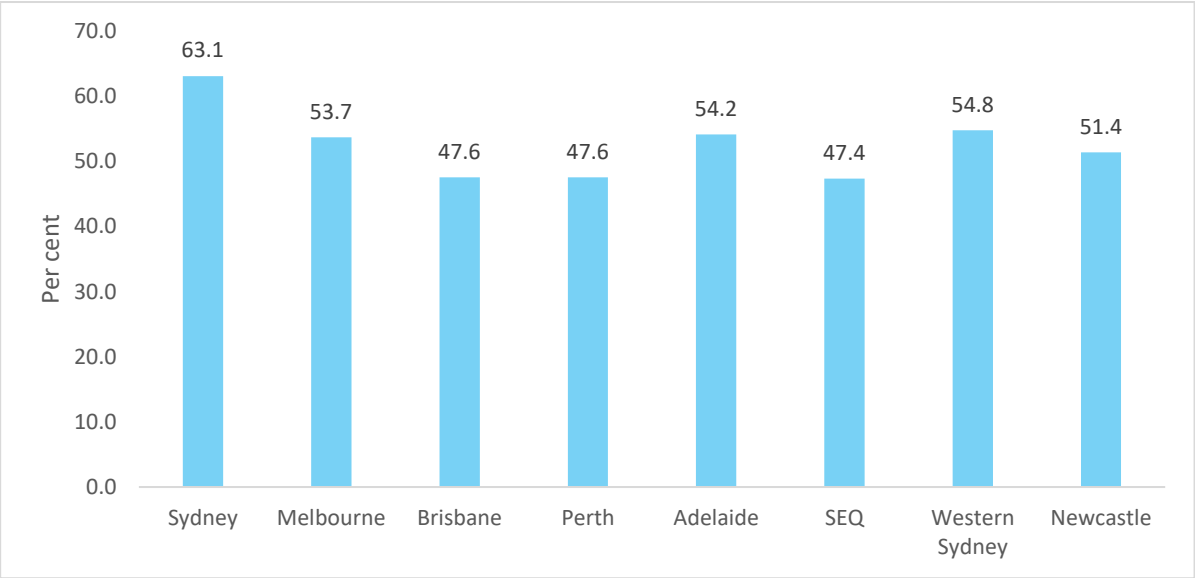
[23] A key reason is that many capital city residents are employed in the office-based service industries where WfH uptake is high. The fact most lockdowns were focused on the capital cities would have also influenced the WfH uptake results.

Figure 4.6: Work from home capability for individual cities

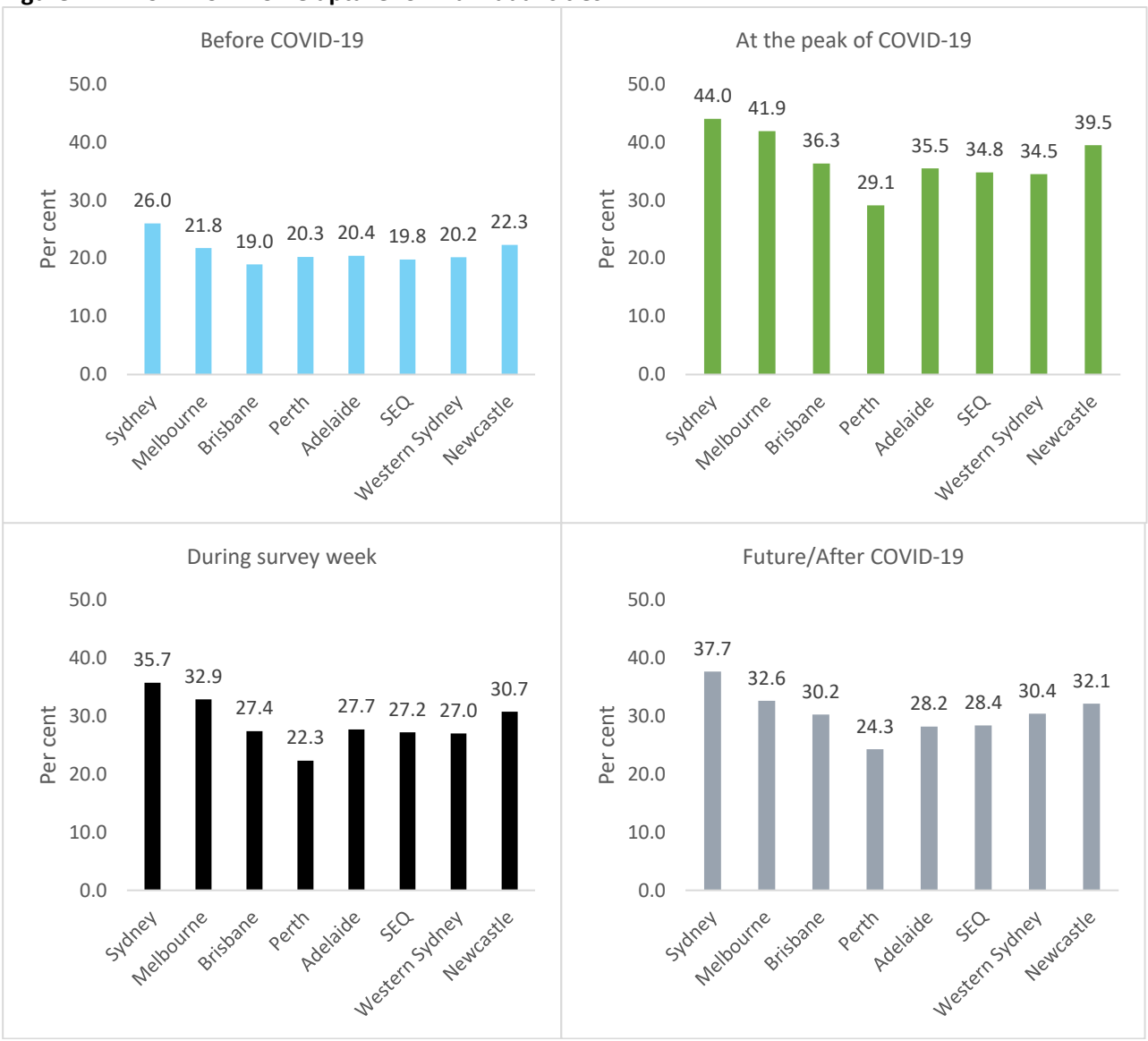


Notes: South East Queensland (SEQ) has 12 Local Government Areas (LGAs), which are Brisbane, Gold Coast, Ipswich, Lockyer Valley, Logan, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba. However, the iMOVE UniSA dataset only contains respondents from Brisbane, Gold Coast, Ipswich, Logan, Moreton Bay, Noosa, Redland, Sunshine Coast and Toowoomba LGA. Western Sydney was defined as the aggregate of the following 8 LGAs: Penrith, Liverpool, Fairfield, Campbelltown, Camden, Wollondilly, Hawkesbury and Blue Mountains. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Before the pandemic, WfH uptake was significantly higher in Sydney (26.0 per cent) than in any of the other cities reported on in Figure 4.7 (19–23 per cent). While WfH uptake levels for all cities significantly increased at the initial peak of the pandemic in early 2020, WfH uptake was significantly higher for Sydney (44.0 per cent) and Melbourne (41.9 per cent), compared to the other cities. WfH uptake at the peak of the pandemic in Perth was just 29.0 per cent, which is considerably lower than the other cities reported on in Figure 4.7. During the survey period (December 2020 to May 2021), Sydney continued to have the highest WfH uptake (35.7 per cent), followed by Melbourne (32.9 per cent), with Perth having the lowest uptake (22.3 per cent). The relatively low WfH capability and uptake levels for Perth (and to a lesser extent, Brisbane) are likely to reflect the fact the COVID-19 pandemic had not heavily affected those cities at the time when the iMOVE UniSA data was collected between December 2020 and May 2021.

Figure 4.7 also presents information on desired future WfH uptake. Sydney has the highest desired future WfH uptake (37.7 per cent), followed by Melbourne (32.6 per cent) and Newcastle (32.1 per cent), while Perth has the lowest desired future WfH uptake of just 24.3 per cent.

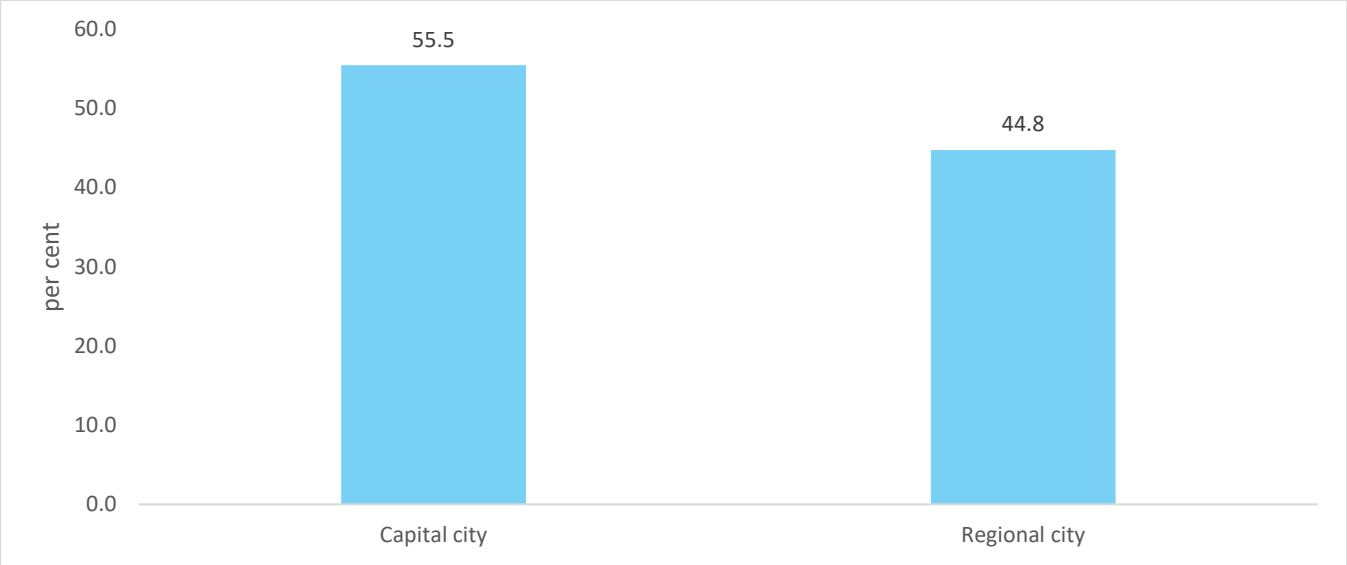
Figure 4.7: Work from home uptake for individual cities



Notes: South East Queensland or SEQ has 12 Local Government Areas or LGAs, which are Brisbane, Gold Coast, Ipswich, Lockyer Valley, Logan, Moreton Bay, Noosa, Redland, Scenic Rim, Somerset, Sunshine Coast and Toowoomba. However, the iMOVE UniSA dataset only contains respondents from Brisbane, Gold Coast, Ipswich, Logan, Moreton Bay, Noosa, Redland, Sunshine Coast and Toowoomba LGA. Western Sydney was defined as the aggregate of the following 8 LGAs: Penrith, Liverpool, Fairfield, Campbelltown, Camden, Wollondilly, Hawkesbury and Blue Mountains. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

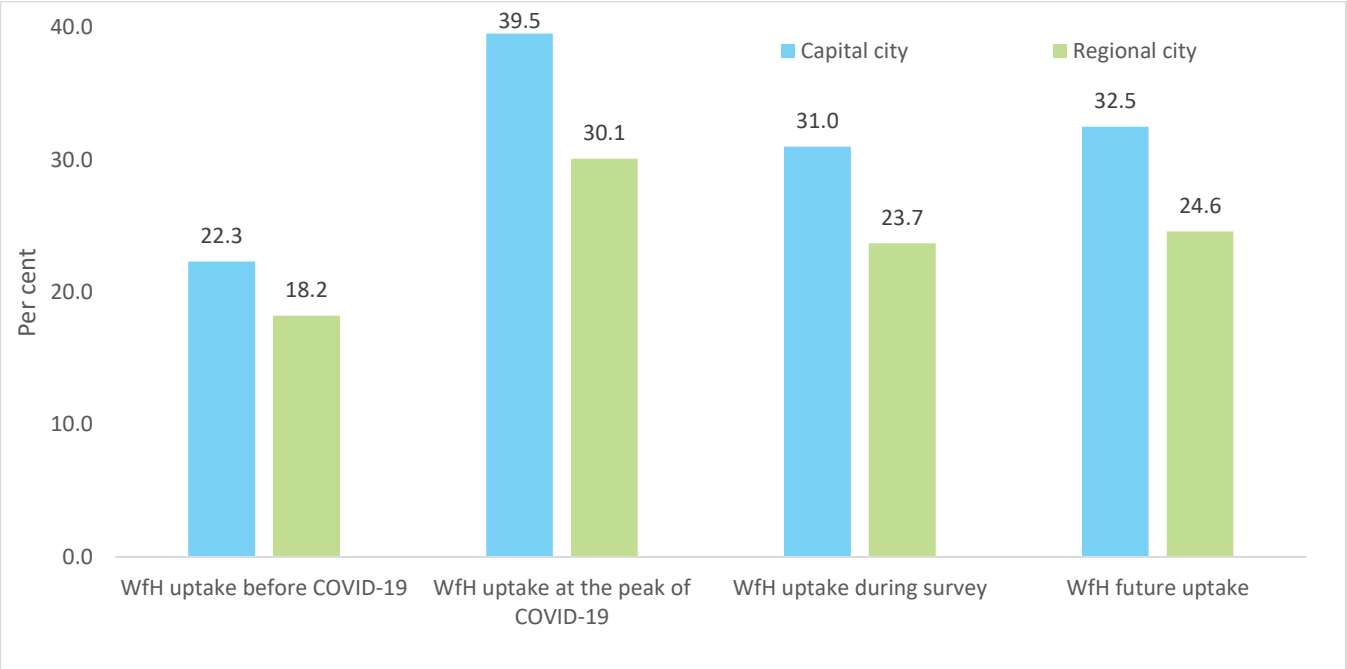
The analysis in Figures 4.8 and 4.9 categorises respondents into two groups. The first group includes the respondents from one of the 8 capital cities and the second group includes the respondents from a regional city (i.e. Gold Coast-Tweed Heads, Newcastle-Maitland, Central Coast, Sunshine Coast, Wollongong, Geelong, Townsville, Cairns or Toowoomba). WfH capability is higher for the capital cities than the regional cities (55.5 versus 44.8 per cent). Across all four time periods, WfH uptake is higher for capital cities (22–40 per cent) than for regional cities (18–30 per cent). The gap between capital cities and regional cities WfH uptake was most pronounced at the peak of the pandemic (9 percentage point), but a significant gap persists into early 2021 and into the future (7–8 percentage points).

Figure 4.8: Work from home capability in capital cities and regional cities



Notes: The capital cities are Sydney, Melbourne, Adelaide, Perth, Brisbane, Canberra, Darwin and Hobart. The regional cities are Gold Coast-Tweed Heads, Newcastle-Maitland, Central Coast, Sunshine Coast, Wollongong, Geelong, Townsville, Cairns and Toowoomba. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 4.9: Work from home uptake in capital cities and regional cities



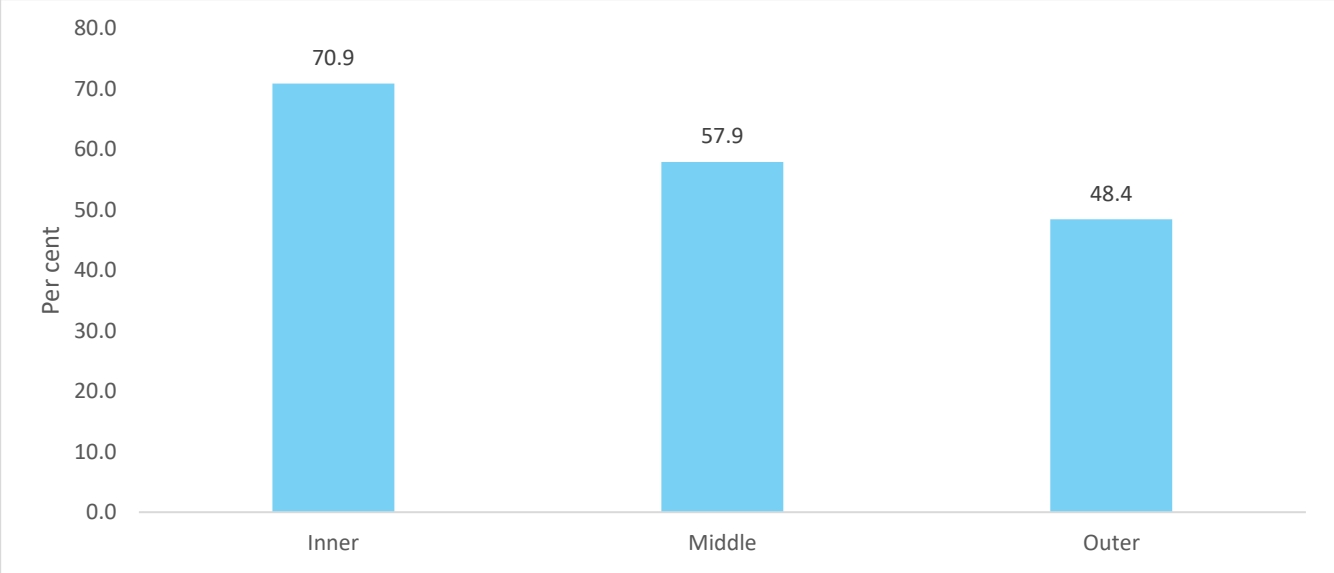
Notes: The capital cities are Sydney, Melbourne, Adelaide, Perth, Brisbane, Canberra, Darwin and Hobart. The regional cities are Gold Coast-Tweed Heads, Newcastle-Maitland, Central Coast, Sunshine Coast, Wollongong, Geelong, Townsville, Cairns and Toowoomba. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

4.4 BCARR rings

WfH practice varies across the inner, middle and outer rings of the 5 big capital cities. Based on the BCARR ring classification,[24] Figure 4.10 shows that WfH capability is highest for residents of the Inner ring (70.9 per cent), followed by the Middle ring (57.9 per cent) and the Outer ring (48.4 per cent). Figure 4.11 indicates that before COVID-19, WfH uptake was highest for the Inner ring, lower for the Middle ring and lower again for the Outer ring. While WfH uptake significantly increases across all rings at the peak of the pandemic, the same ordering remains with WfH uptake being highest for Inner ring resident (53.6 per cent) and lowest for Outer ring residents (31.5 per cent). For the early 2021 survey period, WfH uptake is lower than at the peak of the pandemic, but remains well above pre-pandemic levels across all 3 rings. The desired future WfH uptake also remains well above pre-pandemic levels, and is highest for the Inner ring (44.9 per cent), lower for the Middle ring (33.3 per cent) and lower again for the Outer ring (27.1 per cent).

The clear and consistent message from this analysis is that the closer people live to the CBD (with its large cluster of office-based jobs), the higher their WfH capability and uptake tend to be.

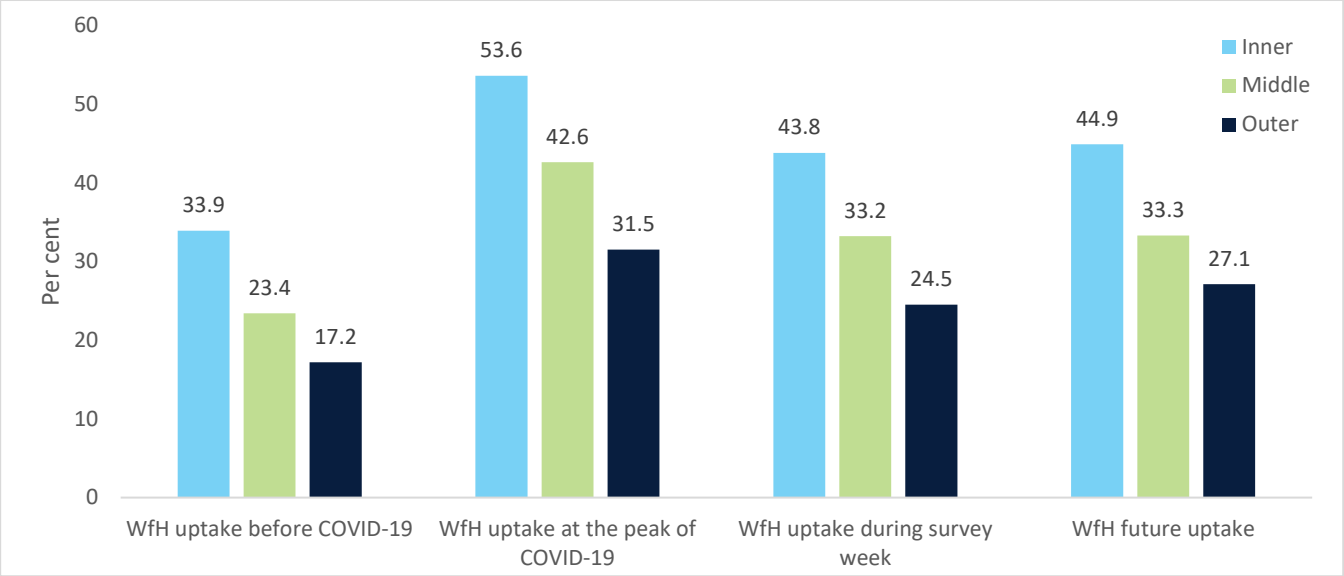
Figure 4.10: Work from home capability by BCARR rings of 5 biggest capital cities



Notes: This BCARR ring geography is an SA2-based classification using 2016 geographies that has been used in a number of BITRE and BCARR publications. The BCARR rings are mapped in Appendix B. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

[24] Details of the BCARR ring classification are provided in Appendix B, and footnotes 18 and 19 of this report.

Figure 4.11: Work from home uptake by BCARR rings of 5 biggest capital cities

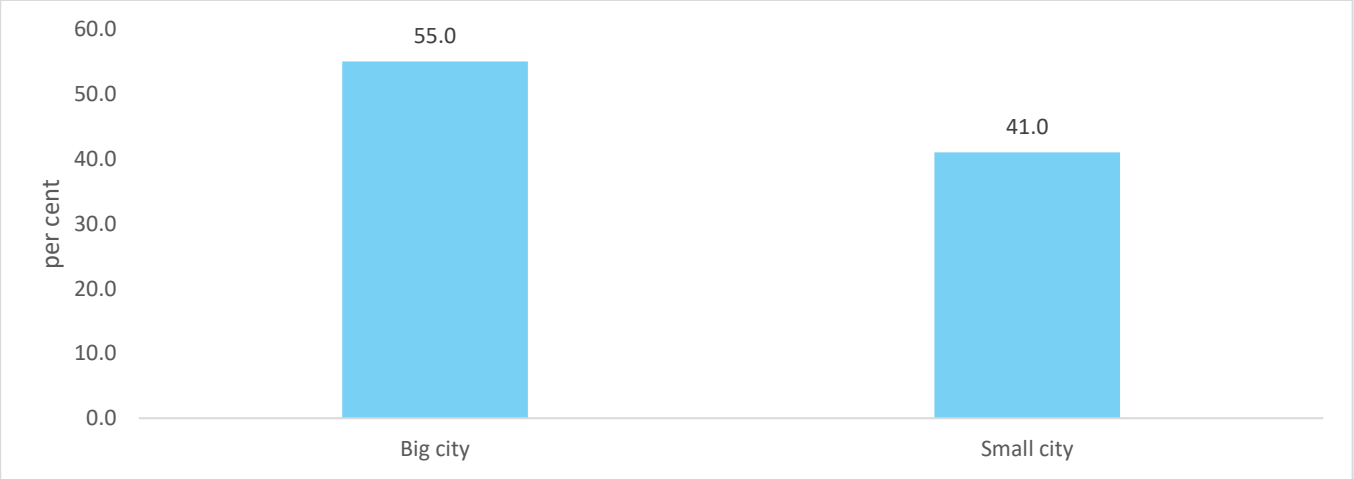


Notes: This BCARR ring geography is an SA2-based classification using 2016 geographies that has been used in a number of NITRE and BCARR publications. The BCARR rings are mapped in Appendix B. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

4.5 City population

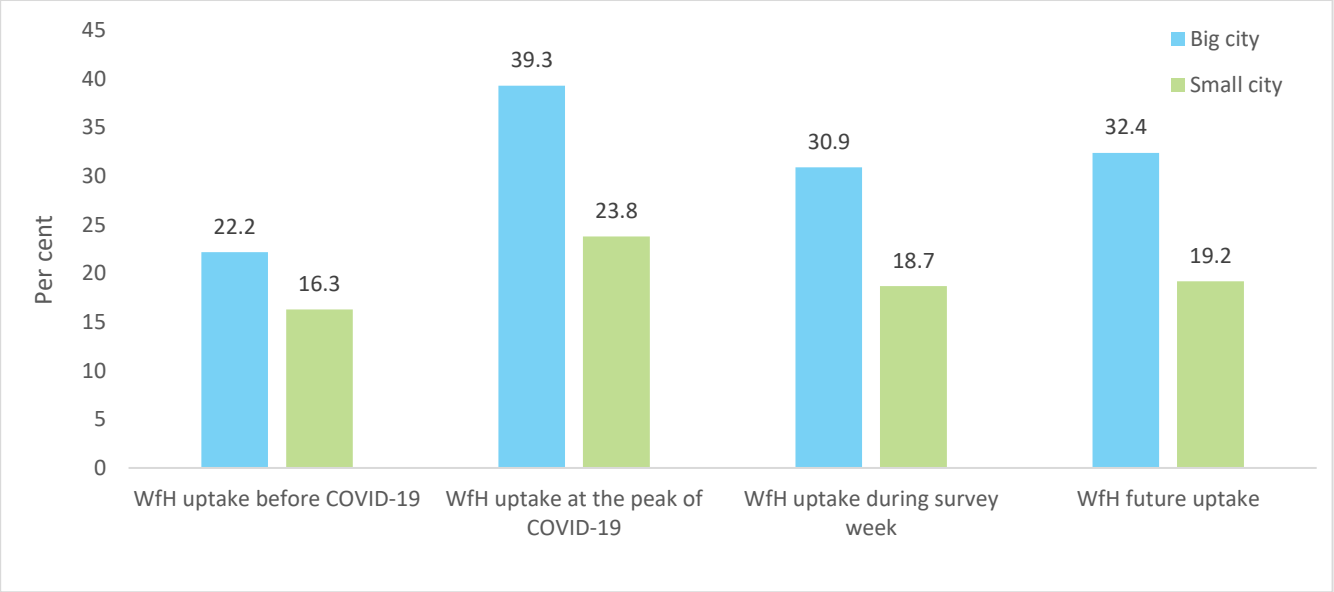
The population size of a city is positively related to WfH. Figure 4.12 shows that WfH capability is higher for the big cities with a population of over 250,000 than for the small cities with a population of under 250,000 in 2016 (55.0 versus 41.0 per cent). Figure 4.13 shows that WfH uptake before the pandemic was higher for the big cities than for the small cities (22.2 versus 16.3 per cent). At the peak of the pandemic, the WfH uptake gap between big and small cities widens (39.3 versus 23.8 per cent). The gap narrowed somewhat during the early 2021 survey period (30.9 per cent for big cities versus 18.7 per cent). However, the difference in desired future WfH uptake between big and small cities remains large (32.4 versus 19.2 per cent).

Figure 4.12: Work from home capability by city population size



Notes: Big cities are the cities with a population of above 250,000 in 2016. Small cities are the cities with a population of below 250,000 in 2016. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 4.13: Work from home uptake by city population size



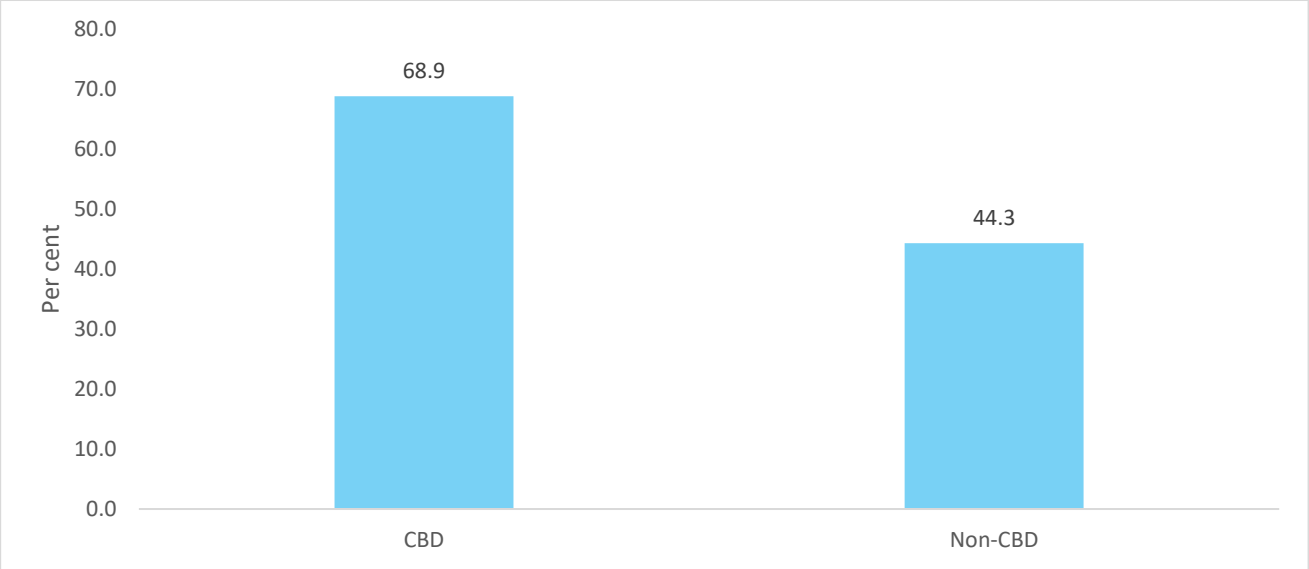
Notes: Big cities are the cities with a population of above 250,000 in 2016. Small cities are the cities with a population of below 250,000 in 2016. Only non-managerial and managerial employees who did not change their job during the pandemic are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

4.6 Central Business District

WfH outcomes can vary significantly based on an employee's place of work. Vij et al. (2022) found that people working in Sydney or Melbourne's Central Business District (CBD) have higher WfH uptake than employees working in either city's non-CBD areas.

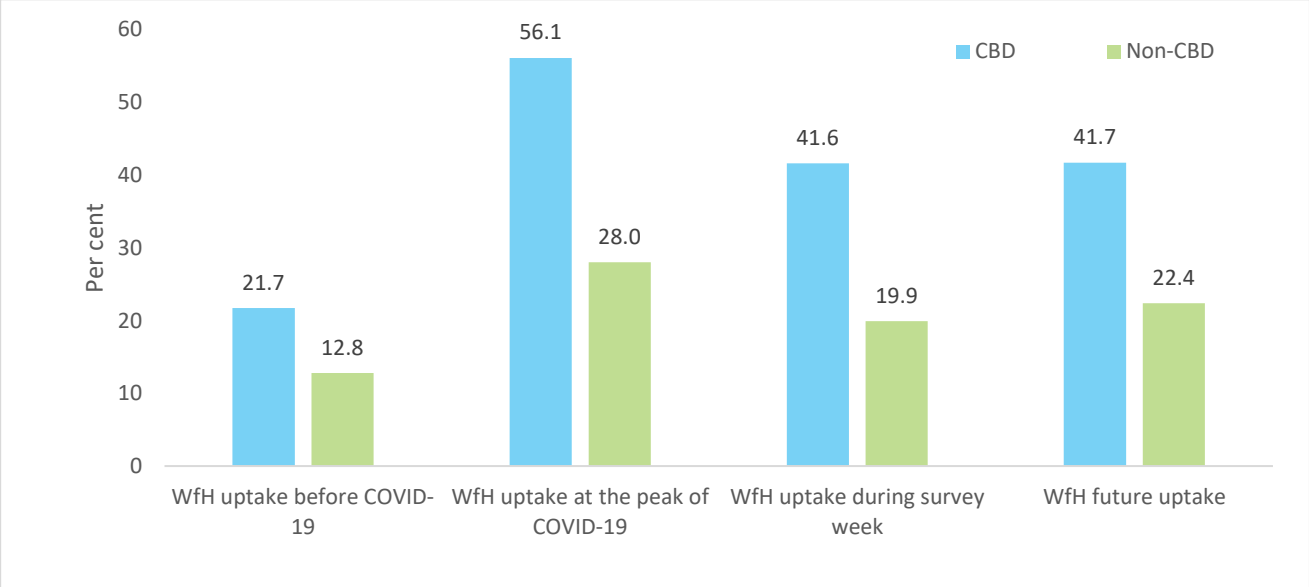
The analysis here extends to all five big capital cities. It relates only to non-managerial employees, as the survey instrument did not ask managerial employees for their place of work. As Figure 4.14 shows, WfH capability is higher for people whose workplace is in the CBDs of the five big capital cities than for those who work in non-CBD areas of those cities (68.9 versus 44.3 per cent). Figure 4.15 reveals that WfH uptake is higher in the CBDs than outside the CBDs across all 4 time periods. For example, at the peak of the pandemic, WfH uptake was 56.1 per cent for CBDs, which is significantly higher than for people with a non-CBD workplace (28.0 per cent). WfH uptake during the survey week and into the future remains significantly higher for people with CBD workplaces than for those with non-CBD workplaces.

Figure 4.14: Work from home capability in CBD and non-CBD workplaces of five biggest capital cities



Notes: The analysis here considers only CBD and non-CBD areas of the five big capital cities. Details of the definition of CBDs are provided in footnotes 20 and 21. Non-managerial employees who have a designated workplace and did not change their job during the pandemic are included here, as managerial employees were not asked about the location of their workplace.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 4.15: Work from home uptake in CBD and non-CBD workplaces of five biggest capital cities



Notes: The analysis here considers only CBD and non-CBD areas of the five big capital cities. Details of the definition of CBDs are provided in footnotes 20 and 21. Non-managerial employees who have a designated workplace and did not change their job during the pandemic are included here, as managerial employees were not asked about the location of their workplace.
Source: BCARR analysis of iMOVE UniSA weighted survey data

4.7 Commuting distance

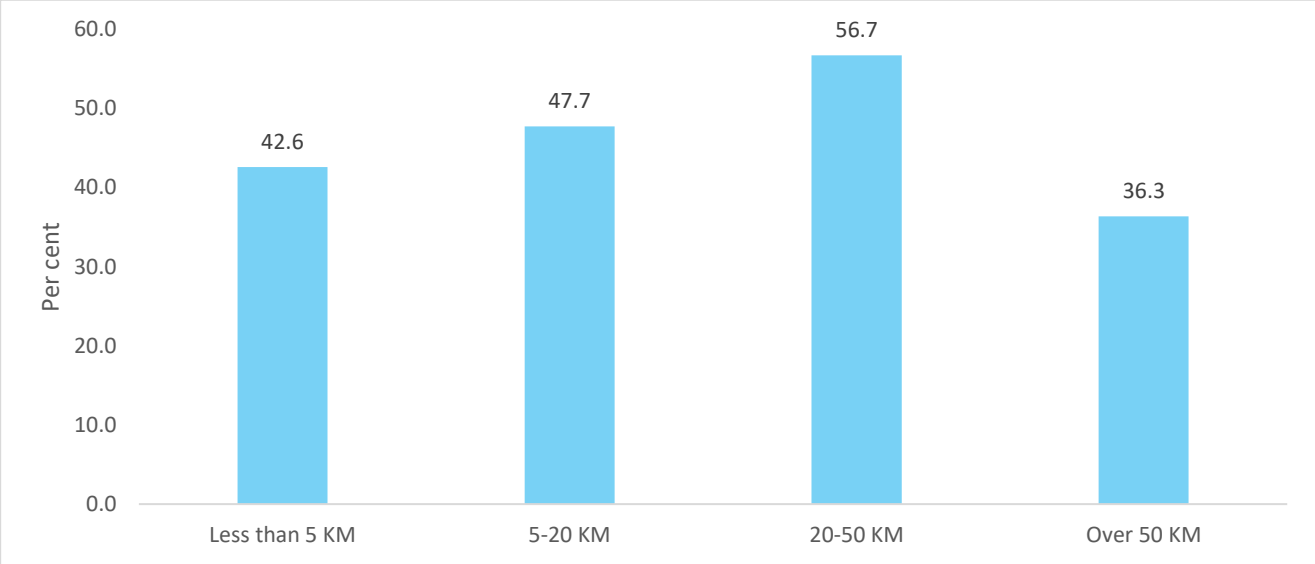
WfH is interrelated with commuting costs and patterns. On one hand, WfH can change commuting costs and patterns. For example, Productivity Commission (2021) and Infrastructure Victoria (2021) note that working remotely can reduce commuting costs. Vij et al. (2022) shows that working remotely can decrease weekday commute travel by car and public transport. On the other hand, commuting patterns and costs can affect decisions on WfH. Intuitively, travelling costs are higher for an employee who resides further away from his/her workplace. Consequently, employees who experience higher travelling costs have more incentive to work remotely.

This section provides empirical analysis on the impact of commuting distance (between an employed individual's place of residence and place of work) on WfH. The analysis only relates to non-managerial employees with a designated workplace.

As Figure 4.16 shows, WfH capability is highest for employees with commuting distance of 20–50 km (56.7 per cent). Figure 4.17 shows that at the peak of the pandemic, uptake for the commuting distance of 20–50 km is 40.3 per cent, which is much higher than for commuting distance of less than 5 km (29.9 per cent) and 5–20 km (32.4 per cent). During the survey week and into the future, the WfH uptake rises as commuting distance increases, and then declines beyond the 50 km threshold. The analysis here indicates that the effect of commuting distance on WfH is positive between 0 and 50 km.

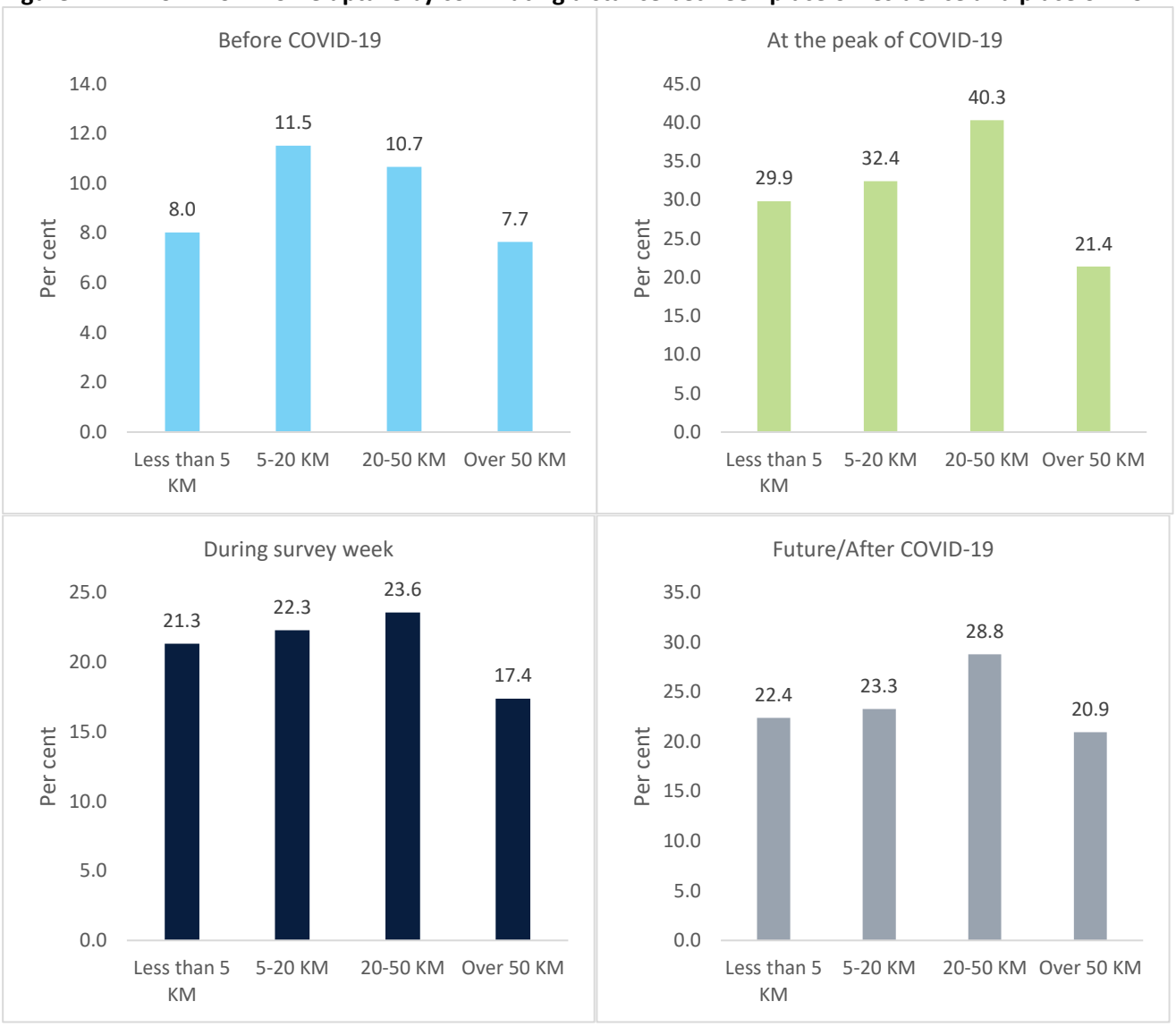
Please note that WfH capability and uptake are low for individuals with a commuting distance of over 50 km. For example, WfH capability is 36.3 per cent for the commuting distance of over 50 km. Across the 4 periods, WfH uptake is between 7 per cent and 21 per cent for those with commuting distances over 50 km. The category has a very small sample size in the iMOVE UniSA survey dataset, and results should be treated with caution.

Figure 4.16: Work from home capability by commuting distance between place of residence and place of work



Notes: To compute the distance between a respondents' place of residence and place of work, the following procedure is considered.
Step 1: The population-weighted centroid of an individual's residence postcode was computed using 2016 census mesh block population counts.
Step 2: The geographic centroid of an individual's workplace postcode is computed.
Step 3: The travel distance between an individual's residence and workplace is computed based on the results of Steps 1 and 2.
This process generates a measure of travel distance that is imprecise (given the relatively large size of postcodes), but enables us to distinguish between shorter and longer distance commutes, and to explore the impact of travel distance on WfH. Only non-managerial employees who did not change their job during the pandemic with different place of work and place of residence postcodes are included. The results for the over 50 km category are based on a very small sample size.
Source: BCARR analysis of iMOVE UniSA weighted survey data

Figure 4.17: Work from home uptake by commuting distance between place of residence and place of work



Notes: To compute the distance between respondents' place of residence and place of work, the following procedure is considered. Step one: the population-weighted centroid of an individual's residence postcode using 2016 census mesh block population counts is computed. Step two: the centroid of an individual's workplace postcode is computed. Step three: the travel distance between an individual's residence and workplace based on the results of Step one and two. The result for the category of over 50 km is based on a very small sample size. Only non-managerial employees who did not change their job during the pandemic with different place of work and place of residence postcodes are included here.
Source: BCARR analysis of iMOVE UniSA weighted survey data

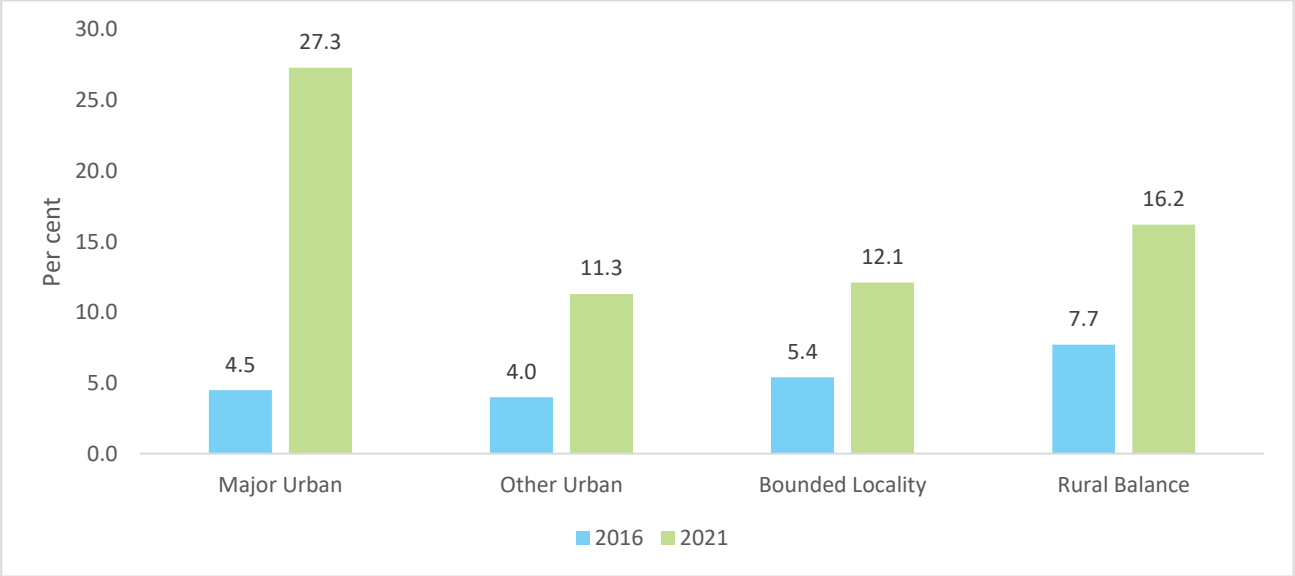
4.8 Rural or remote areas

Glover et al. (2022) suggest that having WfH opportunities encourages Australian employees to reside in and work remotely from rural or coastal areas that have desirable natural amenities (e.g. beaches, coastlines and favourable climates). When employees are offered WfH opportunities, they prefer to live in a place with better natural amenities and accessibility to services. Hence, a region's natural amenities and access to services could be key factors affecting its WfH uptake level.

This section uses the *ABS Census of Population and Housing 2016* and *2021* data to explore the impact of rurality and remoteness on WfH uptake (Australian Bureau of Statistics 2016b and 2021). The ABS's Section of State (SOS) classification categorises individual's place of residence into the classes of Major Urban, Other Urban, Bounded Locality and Rural Balance. The Major Urban and Other Urban classes correspond to 'urban' Australia and the Bounded Locality and Rural Balance to 'rural' Australia. A person is considered a resident of 'urban' Australia if they live in an urban centre with a population of 1,000 or more. Some parts of 'rural' Australia are regarded as having high levels of natural amenity, particularly those along the coast.

As Figure 4.18 indicates, the WfH of the Rural Balance was 7.7 per cent in 2016, which was the highest among all the classes. WfH uptake was 5.4 per cent for Bounded Locality whereas it was 4.5 per cent for Major Urban and 4.0 per cent for Other Urban in 2016. In 2021, WfH uptake rises across all the classes. In particular, Major Urban's WfH uptake grows the most to 27.3 per cent, reflecting the impact of COVID-19 related lockdowns in the major east coast cities around the time of the 2021 census. WfH uptake is 16.2 per cent for Rural Balance, which is higher than for Other Urban (11.3 per cent) in 2021. More information on spatial variation in WfH uptake at the time of the census is provided in Box 4.1.

Figure 4.18: Work from home uptake by Section of State, 2016 and 2021



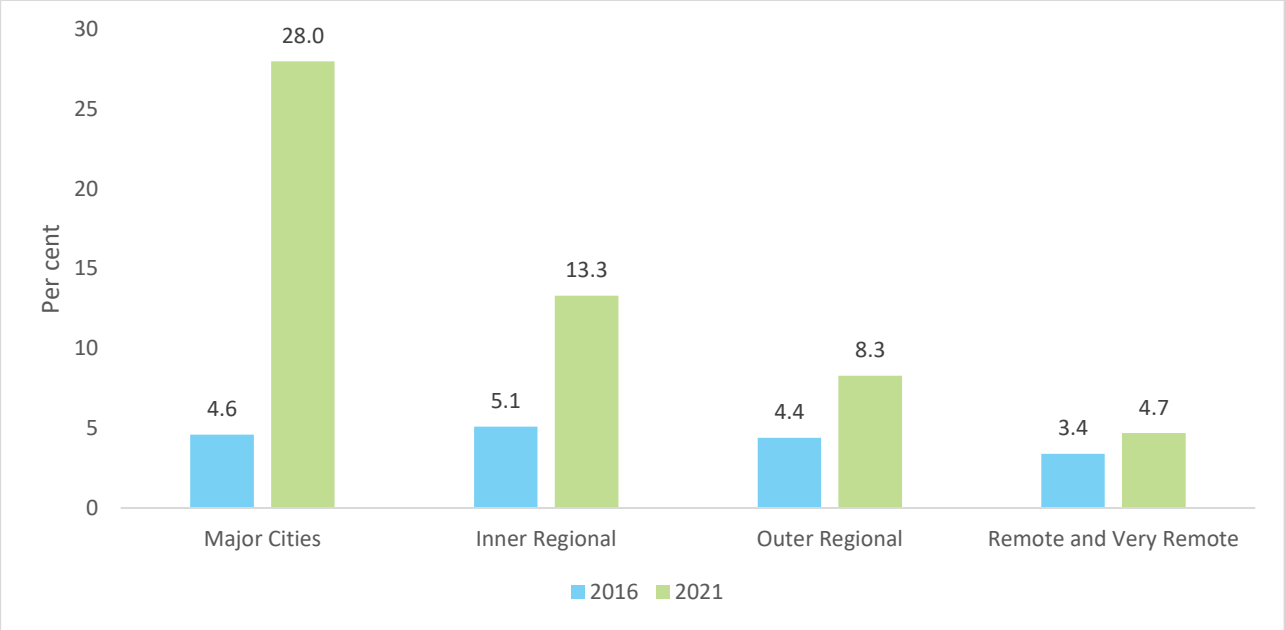
Notes: There are four classes of Section of State (SOS) according to Australian Bureau of Statistics (2017). They are Major Urban, Other Urban, Bounded Locality and Rural Balance. The classification is based on population size and is created by grouping Urban Centres and Localities (UCLs) together. Major Urban comprises UCLs with a population of 100,000 or more, Other Urban comprises UCLs with a population of 1,000 to 99,999, and Bounded Localities are localities with a population of between 200 and 999. Major Urban and Other Urban are considered as 'Urban' Australia while Bounded Locality and Rural Balance are considered as 'Rural' Australia. The results here exclude the Agriculture, Forestry and Fishing industry.

Source: BCARR analysis of 2016 and 2021 Census data (Australian Bureau of Statistics (2016b,2021)).

The ABS also categorises an individual's place of residence into different classes of Remoteness Areas or RA (i.e. Major Cities, Inner Regional, Outer Regional, Remote and Very Remote) based on their level of accessibility to services (Australian Bureau of Statistics 2023b). Major Cities have the highest level of accessibility to services, while Very Remote areas have the lowest. Figure 4.19 shows that Major Cities experienced a significant increase in WfH uptake to 28.0 per cent in 2021 from 4.6 per cent in 2016, reflecting the impact of COVID-19 related restrictions in the major cities at the time of the 2021 census. WfH uptake for Remote and Very Remote areas is lowest of all the RA classes in 2016 and 2021 (less than 5 per cent).

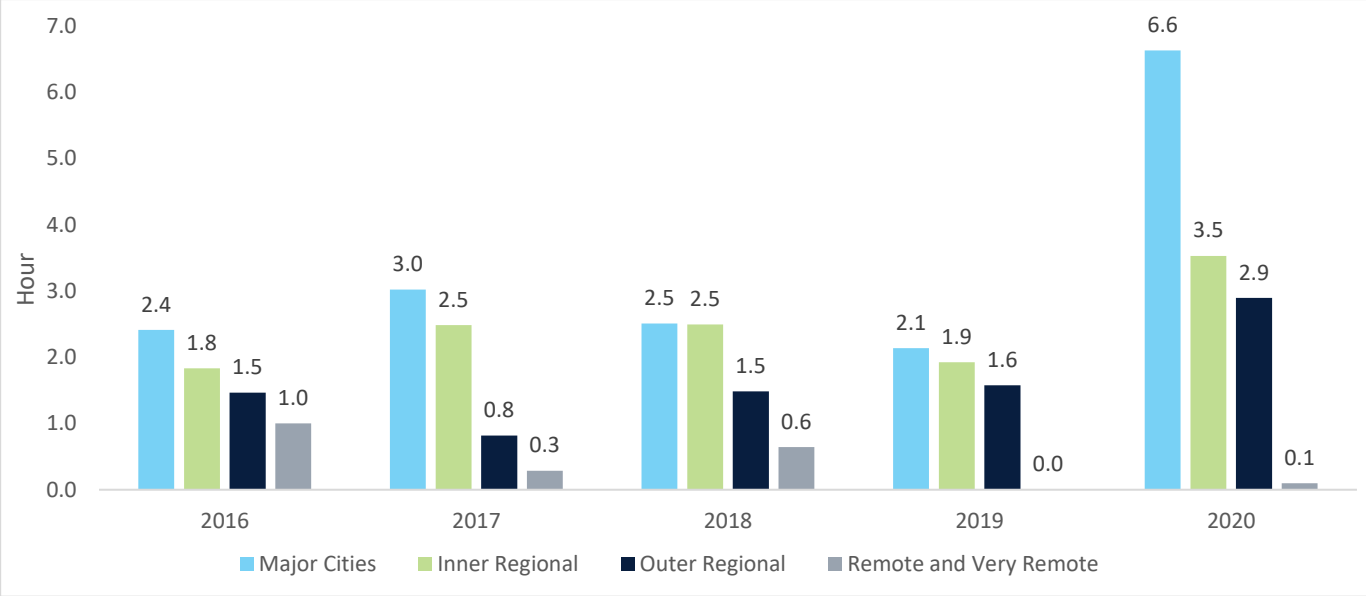
Using the HILDA survey, we can explore the time-series movements in WfH uptake across the RAs. Figure 4.20 presents the hours each week usually worked at home by RA between 2016 and 2020 in HILDA. From 2016 to 2019, Major Cities had the longest weekly work-at-home hours (between 2.1 and 3.0 hours) whereas Remote and Very Remote had the shortest (between 0 and 1.0 hour). During the pandemic in 2020, the number of weekly work-at-home hours increased across all RA classes except Remote and Very Remote. More importantly, Major Cities with the highest level of accessibility to services had the longest weekly work-at-home hours during the pandemic (6.6 hours).

Figure 4.19: Work from home uptake in 2016 and 2021 by Remoteness Areas



Notes: There are five classes of Remoteness Areas (RA) according to Australian Bureau of Statistics (2023). They are Major Cities, Inner Regional, Outer Regional, Remote and Very Remote. The classification is based on the Accessibility and Remoteness Index of Australia. In this analysis the Remote and Very Remote classes are combined into a single category. The result here excludes the Agriculture, Forestry and Fishing industry.
Source: BCARR analysis of 2016 and 2021 Census data (Australian Bureau of Statistics (2016b,2021)).

Figure 4.20: Weekly hours usually worked at home by Remoteness Areas, from 2016 to 2020



Notes: There are five classes of Remoteness Areas (RA) according to Australian Bureau of Statistics (2023b). They are Major Cities, Inner Regional, Outer Regional, Remote and Very Remote. The classification is based on the Accessibility and Remoteness Index of Australia. In this analysis the Remote and Very Remote classes are combined into a single category. The results here exclude the Agriculture, Forestry and Fishing industry.
Source: BCARR analysis of Household, Income and Labour Dynamics in Australia (HILDA) Survey (Watson and Wooden 2012)

Box 4.1: What does the 2021 Census data say about the role of spatial characteristics in working from home?

The Australian Bureau of Statistics' Census of Population and Housing 2021 (ABS 2021) shows that 27.2 per cent of employed people whose age is between 18 and 65 from the 17 cities (the same cities in the iMOVE UniSA dataset) worked from home on census day. In 2016, it was only 4.3 per cent. A strong growth in WfH uptake during the pandemic for these cities is also recorded in Vij et al. (2022).

The 2021 census results need to be interpreted with caution because 'many parts of south eastern Australia moved in and out of lockdown restrictions throughout the Census 'response window' in early August 2021' (Harding et al. 2022). The journey to work question from which WfH uptake is derived was particularly heavily impacted by the lockdowns.

The Australian Bureau of Statistics (2021) shows that WfH uptake varies spatially. For example:

- Sydney has the highest WfH uptake (46.8 per cent) followed by Melbourne (33.0 per cent). However, WfH uptake for some cities (e.g. Perth, Hobart, Toowoomba, Darwin and Townsville) is less than 10 per cent.
- WfH uptake for the capital cities is higher than for the regional cities (28.4 versus 19.6 per cent). The 10 SA4s with the highest WfH uptake are all in Sydney and Melbourne (see Table 4.1). However, several regional cities have WfH takeup of more than 20 per cent (i.e. Illawarra, Newcastle and Lake Macquarie, and Geelong SA4s).
- WfH uptake is highest for residents of the Middle ring of the 5 biggest cities (32.0 per cent), followed by the Inner ring (31.0 per cent) and is lower in the Outer ring (23.6 per cent).
- WfH uptake is higher for the big cities with a population of over 250,000 than for the small cities with a population of under 250,000 (28.5 versus 11.3 per cent).
- WfH uptake is higher for employed people working in the CBD of the 5 biggest capital cities than for employed people working in non-CBD areas of those cities (58.0 versus 23.4 per cent).

The 2021 census results, the bivariate analysis in this chapter and the key findings of Vij et al. (2022) show consistent conclusions about the link between WfH uptake and spatial characteristics. Firstly, WfH uptake is higher in capital cities than in regional cities. Among the capital cities, Sydney has the highest WfH uptake. Secondly, WfH uptake is positively associated with city population. Thirdly, WfH uptake in CBD workplaces is higher than in non-CBD workplaces. Although many key findings from the 2021 Census and the bivariate analysis in this chapter echo each other, the conclusion about WfH uptake across the BCARR rings is different. In this chapter's bivariate analysis, WfH uptake in the Inner ring is significantly higher than in the Middle ring. However, the 2021 census data shows that WfH uptake is slightly higher in the Middle ring than in the Inner ring, perhaps reflecting a temporary impact of lockdowns in several big cities around the time of the census, or differences in the measurement of WfH takeup across the data sources.

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Box 4.1: What does the 2021 Census data say about the role of spatial characteristics in working from home? (continued)

Table 4.1: Top ten SA4s of residence with the highest WfH uptake in 2021

Rank	Capital city	WfH uptake (per cent)	Regional	WfH uptake (per cent)
1	Sydney - North Sydney and Hornsby	60.9	Illawarra	29.4
2	Sydney - Eastern Suburbs	56.8	Newcastle and Lake Macquarie	25.9
3	Sydney - City and Inner South	55.9	Geelong	22.7
4	Sydney - Ryde	54.5	Bendigo	19.4
5	Sydney - Inner West	53.3	Richmond - Tweed	19.0
6	Sydney - Northern Beaches	50.3	Southern Highlands and Shoalhaven	18.8
7	Sydney - Baulkham Hills and Hawkesbury	49.4	Ballarat	18.6
8	Melbourne - Inner	47.7	Hunter Valley exc Newcastle	18.5
9	Sydney - Sutherland	43.5	Sunshine Coast	17.3
10	Melbourne - Inner South	43.4	New England and North West	17.1

Source: BCARR analysis of Australian Bureau of Statistics Census of Population and Housing 2021 data (ABS 2021)

4.9 Logistic regression results

The bivariate analysis presented so far in this chapter has revealed that each spatial variable studied has an important influence on WfH capability/uptake. However, these spatial variables are highly interconnected, and it is possible that only some of the variables have an independent effect on WfH. This section will utilise multivariate logistic regression to investigate the determinants of WfH capability/uptake. These potential determinants include:

- All the economic and socio-demographic variables (included in the previous regression model in Chapter 3)
- All the spatial variables[25] – place of residence (e.g. capital/regional city and BCARR rings), city population scale, place of work (e.g. Central Business District (CBD)/Non-CBD areas), and commuting distance.

The regression model here will add all the spatial variables to the previous regression model in Chapter 3. By adding these spatial variables to the model, we can assess whether they make a jointly significant contribution to explaining WfH capability/uptake, once the economic and socio-demographic variables are controlled for. The regression analysis will also identify the spatial variables that independently influence WfH capability and uptake, and distinguish the relative importance of these different spatial variables in influencing WfH outcomes.

Table 4.2 presents the logistic regression results for the full sample when the economic, socio-demographic and place of residence variables are included in the regression. As shown, most economic and socio-demographic variables are statistically significant and have the expected signs. The Pseudo R–squareds in the regression models for the dependent variables of WfH capability and uptake at the peak of the pandemic and during survey week have increased after adding the place of residence variables (relative to Table 3.4),

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[25] The role of remoteness and rurality are not investigated here as these variables are not included in the iMOVE UniSA survey data.

although the improvement is marginal. The higher R-squareds in Table 4.2 suggest that including the place of residence variables into the regression model can slightly enhance the overall model performance.[26]

Conducting likelihood ratio tests is useful to understand if the place of residence variables (together as a group) are important predictors of WfH capability/uptake. Table 4.2 shows that the likelihood ratio test for all five independent variables has a very small p-value. The results show that the place of residence variables (considered as a group) are significant predictors of WfH capability and uptake. While Tables 3.3 and 3.4 previously demonstrated the economic and socio-demographic variables were important determinants of WfH capability and uptake, Table 4.2 demonstrates that where a person lives also plays an important role in determining WfH capability and uptake in Australian cities.

The results of Table 4.2 show that having a place of residence in Sydney or Melbourne has a significant positive effect on WfH uptake, compared to living in the other cities, across all four time periods. However, living in Sydney or Melbourne does not impact WfH capability. Table 4.2 presents the coefficients of the logistic regression. To interpret these coefficients and to understand the quantitative impact of the place of residence variables on WfH capability and uptake, the coefficients are transformed into the probability/inverse logit form as in Table A.3. For example, the coefficient of the Sydney or Melbourne variable is 0.33 when the dependent variable is WfH uptake at the peak of COVID-19. Referring to Table A.3 shows that the reference person who lives outside Sydney and Melbourne has a predicted pandemic peak WfH uptake of 20 per cent. This compares to a predicted uptake of 26 per cent for an otherwise identical person who lives in either Sydney or Melbourne.

WfH capability and uptake varies across BCARR rings of the five biggest capital cities. Living in the inner ring has a significant positive effect on WfH capability. Table 4.2 shows that the coefficient of the Inner ring variable is 0.40 when the dependent variable is WfH capability. Referring to Table A.3 shows that the predicted probability of the reference person who lives outside the 5 biggest capital cities having WfH capability is 20 per cent, compared to 27 per cent for an otherwise identical person who lives in the Inner ring of one of the 5 biggest cities. Living in the inner ring also has a significant positive effect on WfH uptake at the peak of the pandemic, in the early-2021 survey period and into the future. However, it does not impact on WfH uptake pre-pandemic. Living in the middle and outer rings of one of the five biggest capital cities was not significant in any of the regression models.

Living in a big city with a population of over 250,000 does not have a statistically significant impact on either WfH capability or uptake. This implies that the higher WfH capability and uptake seen in the bivariate analysis for cities with populations of over 250,000 (see Figures 4.12 and 4.13) is likely to largely be due to Sydney and Melbourne being included in that category.

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[26] However, the Pseudo R–squareds do not penalise or control for the number of independent variables in the logistic regression.

Table 4.2: Logistic regression results when economic, socio-demographic and place of residence variables are included in the regression

	WfH capability		WfH uptake before COVID-19		WfH uptake at the peak of COVID-19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?
Female	-0.08	No	-0.30	Yes (p<0.001)	-0.13	No	-0.24	Yes (p<0.010)	-0.15	No
Age (less than 24)	0.04	No	0.23	Yes (p<0.100)	0.19	No	0.28	Yes (p<0.050)	0.18	No
Age (over 50)	-0.58	Yes (p<0.001)	-0.67	Yes (p<0.001)	-0.63	Yes (p<0.001)	-0.58	Yes (p<0.001)	-0.65	Yes (p<0.001)
Bachelor's degree or higher qualification	0.44	Yes (p<0.001)	0.56	Yes (p<0.001)	0.59	Yes (p<0.001)	0.55	Yes (p<0.001)	0.53	Yes (p<0.001)
Individual with a child	0.29	Yes (p<0.010)	0.23	Yes (p<0.010)	0.26	Yes (p<0.010)	0.23	Yes (p<0.010)	0.21	Yes (p<0.050)
Individual with disability	0.90	Yes (p<0.001)	0.72	Yes (p<0.001)	0.62	Yes (p<0.010)	0.79	Yes (p<0.001)	0.86	Yes (p<0.001)
Individual with care commitment	0.32	Yes (p<0.050)	0.51	Yes (p<0.001)	0.45	Yes (p<0.010)	0.49	Yes (p<0.001)	0.43	Yes (p<0.010)
Part-time worker	0.01	No	0.29	Yes (p<0.010)	0.11	No	0.26	Yes (p<0.010)	0.11	No
Individual with median income or above	0.65	Yes (p<0.001)	0.51	Yes (p<0.001)	0.66	Yes (p<0.001)	0.53	Yes (p<0.001)	0.55	Yes (p<0.001)
Office-based service industries	1.31	Yes (p<0.001)	0.83	Yes (p<0.001)	1.41	Yes (p<0.001)	1.23	Yes (p<0.001)	1.40	Yes (p<0.001)
Manager, Professional or Clerical and administrative Worker	1.06	Yes (p<0.001)	0.56	Yes (p<0.001)	0.92	Yes (p<0.001)	0.76	Yes (p<0.001)	1.00	Yes (p<0.001)

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Table 4.2: Logistic regression results when economic, socio-demographic and place of residence variables are included in the regression (continued)

	WfH capability		WfH uptake before COVID-19		WfH uptake at the peak of COVID-19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?
Large firm	-0.30	Yes (p<0.010)	-0.37	Yes (p<0.001)	-0.36	Yes (p<0.001)	-0.21	Yes (p<0.050)	-0.29	Yes (p<0.010)
Managerial employee—has direct report	0.58	Yes (p<0.001)	0.62	Yes (p<0.001)	0.65	Yes (p<0.001)	0.71	Yes (p<0.001)	0.57	Yes (p<0.001)
Sydney or Melbourne	0.15	No	0.23	Yes (p<0.001)	0.33	Yes (p<0.050)	0.29	Yes (p<0.010)	0.23	Yes (p<0.050)
Inner	0.40	Yes (p<0.050)	0.12	No	0.34	Yes (p<0.100)	0.34	Yes (p<0.100)	0.40	Yes (p<0.050)
Middle	0.26	No	-0.06	No	0.19	No	0.25	No	0.27	No
Outer	0.01	No	-0.15	No	-0.12	No	-0.14	No	0.01	No
City population over 250,000	0.17	No	-0.02	No	0.25	No	0.15	No	0.02	No
Constant	-1.38	Yes (p<0.001)	-1.39	Yes (p<0.001)	-1.40	Yes (p<0.001)	-1.56	Yes (p<0.001)	-1.27	Yes (p<0.001)
Pseudo R–squared	0.23		0.18		0.24		0.22		0.23	
Likelihood ratio test of null hypothesis that all the place of residence variables have coefficients of zero	19.93(p<0.001)		18.80(p<0.005)		26.18(p<0.001)		36.12(p<0.001)		23.62(p<0.001)	
N	2979		2979		2979		2979		2979	

Note: individuals with median income or above are managers who earned over $ 1249 weekly. Office–based service industries are Information Media and Telecommunications, Financial and Insurance Services, Rental, Hiring and Real Estate Services, Professional, Scientific and Technical Services, Administrative and Support Services, and Public Administration and Safety industry. White-collar occupations are individuals working as Managers, Professionals and Clerical and Administrative Workers. Large firms are firms with over 200 employees. The BCARR Inner, Middle and Outer rings are mapped in Appendix B. P stands for P–value that measures the probability of obtaining a test statistic result to reject the null hypothesis. The F statistics were testing against the null hypothesis where all the place of residence variables were not included in the Logistic regression models.
Source: BCARR analysis of iMOVE UniSA unweighted survey data.

In the next regression, shown in Table 4.3, place of work and distance variables are added to the regression. The sample size (N) significantly reduces to 1,092, because the workplace postcode information was not collected for managerial employees and was not reported by some non-managerial employees. Some economic, socio-demographic and place of residence variables are no longer statistically significant (e.g. the large firm, individual with a disability, Sydney or Melbourne, and Inner variables). The Pseudo R–squareds are also much lower. For example, the R-squared for WfH uptake before COVID-19 decreases to 0.12 in Table 4.3 from 0.18 in Table 4.2 (when place of work and distance variables are omitted). The coefficients of the distance variable (e.g. distance between place of work and residence is greater than 20 km) are not statistically significant with inconsistent signs across the 5 regression models. Therefore, a significant decrease in sample size after adding the place of work and distance variables to the models weakens the regression model's performance in Table 4.3.

However, adding place of work and distance variables to the regression model can still provide constructive insights into the role of these variables in WfH capability/uptake. While Table 4.3 is restricted to non-managerial employees, the likelihood ratio tests do show that for this subgroup of employees the spatial variables make a jointly significant contribution to explaining variation in WfH capability and uptake. Table 4.3 and Table A.4 show that employees working in the Sydney CBD or Melbourne CBD have significantly higher WfH capability than those that work in other locations. Additionally, Table 4.3 suggests that employees working in the Sydney CBD have significantly higher WfH uptake across all 4 periods (e.g. before and at the peak of COVID, during survey week and into the future), while employees working in the Melbourne CBD have significantly higher WfH uptake in 3 of the 4 periods (at the peak of COVID, during survey week and in the future).

Inclusion of the place of work variables led to each of the place of residence variables becoming individually statistically insignificant in Table 4.3. This could be a result of the analysis being restricted to the much narrower subset capturing only non-managerial employees who reported their place of work. However, it is suggestive of place of work potentially being a more important determinant of WfH than place of residence. While the relative importance of place of residence and place of work can't be properly addressed in the current analysis due to the partial collection of place of work data in the dataset, it remains an open question for future research.

Irrespective of the relative importance of place of work and place of residence as drivers of WfH, it is clear that considering spatial characteristics can add to our understanding of what is driving WfH outcomes in Australian cities.

Table 4.3: Logistic regression results when economic, socio-demographic, place of residence and place of work variables are included in the regression

	WfH capability		WfH uptake before COVID-19		WfH uptake at the peak of COVID-19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?
Female	0.09	No	-0.09	No	0.09	No	0.02	No	0.10	No
Age (less than 24)	-0.02	No	0.26	No	0.18	No	0.35	No	0.20	No
Age (over 50)	-0.56	Yes (p<0.010)	-0.54	Yes (p<0.001)	-0.59	Yes (p<0.001)	-0.50	Yes (p<0.010)	-0.53	Yes (p<0.001)
Bachelor's degree or higher qualification	0.50	Yes (p<0.010)	0.53	Yes (p<0.001)	0.68	Yes (p<0.001)	0.57	Yes (p<0.001)	0.56	Yes (p<0.001)
Individual with a child	0.20	No	0.32	Yes (p<0.050)	0.22	No	0.19	No	0.19	No
Individual with disability	0.27	No	-0.17	No	-0.10	No	0.30	No	0.44	No
Individual with care commitment	-0.16	No	-0.18	No	0.01	No	0.12	No	-0.06	No
Part-time worker	-0.36	Yes (p<0.050)	-0.03	No	-0.23	No	-0.18	No	-0.24	No
Individual with median income or above	0.47	Yes (p<0.01)	0.57	Yes (p<0.010)	0.61	Yes (p<0.050)	0.42	Yes (p<0.050)	0.49	Yes (p<0.010)
Office-based service industries	1.13	Yes (p<0.001)	0.60	Yes (p<0.001)	1.15	Yes (p<0.010)	0.94	Yes (p<0.001)	1.13	Yes (p<0.001)
Manager, Professional or Clerical and administrative Worker	1.26	Yes (p<0.001)	0.61	Yes (p<0.001)	1.18	Yes (p<0.001)	0.95	Yes (p<0.001)	1.23	Yes (p<0.001)
Large firm	-0.16	No	-0.17	No	-0.21	No	0.08	No	-0.06	No
Managerial employee—has direct report	-0.63	Yes (p<0.001)	-0.04	No	-0.39	Yes (p<0.050)	-0.23	No	-0.41	Yes (p<0.050)

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Table 4.3: Logistic regression results when economic, socio-demographic, place of residence and place of work variables are included in the regression (continued)

	WfH capability		WfH uptake before COVID-19		WfH uptake at the peak of COVID-19		WfH uptake during survey		WfH future uptake	
	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?	Coefficient	Statistically significant?
Sydney or Melbourne	-0.10	No	0.14	No	-0.03	No	0.03	No	-0.10	No
Inner	0.32	No	0.17	No	0.25	No	0.12	No	0.31	No
Middle	0.14	No	-0.08	No	0.08	No	0.21	No	0.21	No
Outer	0.09	No	-0.20	No	-0.13	No	-0.17	No	0.09	No
City population over 250,000	0.37	No	0.13	No	0.46	No	0.51	No	0.09	No
Place of work in Sydney CBD	0.57	Yes (p<0.050)	0.68	Yes (p<0.010)	0.74	Yes (p<0.010)	0.78	Yes (p<0.010)	1.02	Yes (p<0.001)
Place of work in Melbourne CBD	0.84	Yes (p<0.050)	0.44	No	1.42	Yes (p<0.010)	0.92	Yes (p<0.010)	0.74	Yes (p<0.100)
Distance between place of work and residence is greater than 20 km	0.01	No	-0.19	No	-0.25	No	-0.09	No	-0.16	No
Constant	-1.40	Yes (p<0.010)	-1.45	Yes (p<0.050)	-1.47	Yes (p<0.010)	-2.02	Yes (p<0.001)	-1.44	Yes (p<0.010)
Pseudo R–squared	0.20		0.12		0.22		0.17		0.20	
Likelihood ratio test of null hypothesis that all place of residence and work and distance variables have coefficients of zero	8.56(p<0.05)		11.01(p<0.05)		21.30 (p<0.001)		15.45(p<0.002)		21.11(p<0.001)	
N	1092		1092		1092		1092		1092	

Note: Individuals with median income or above are managers who earned over $1,249 weekly. Office-based service industries are Information Media and Telecommunications, Financial and Insurance Services, Rental, Hiring and Real Estate Services, Professional, Science and Technical services, Administrative and Support Services, and Public Administration and Safety industry. White-collar occupations are individuals working as Managers, Professionals and Clerical and Administrative Workers. Large firms are firms with over 200 employees. The BCARR Inner, middle and Outer rings are mapped in Appendix B. P stands for P– value that measures the probability of obtaining a test statistic result to reject the null hypothesis. The F statistics were testing against the null hypothesis where all the place of residence and work and distance variables were not included in the Logistic regression models.
Source: BCARR analysis of iMOVE UniSA unweighted survey data

4.10 Conclusion

This chapter employed multiple data sources (i.e. iMOVE UniSA survey data, census data and HILDA wave 16-20) to investigate the relationship between WfH and spatial characteristics such as place of residence, place of work, city population size and commuting distance in Australia.

Previous chapters have established how WfH capability and uptake depend strongly on job, employer and socio-demographic characteristics of workers, and this chapter has demonstrated that spatial characteristics play a significant additional role in explaining WfH outcomes. More specifically, living in Sydney or Melbourne had a strong positive impact on WfH uptake before the pandemic and over the course of the pandemic, as well as on desired future WfH uptake. Living in the Inner ring had a strong positive impact on both WfH capability and uptake. For non-managerial employees, working in the Sydney or Melbourne CBDs was similarly associated with higher WfH capability and uptake.

In the next chapter, we extend our analysis of spatial factors to consider the available evidence on whether there is a link between WfH and relocation decisions of workers.

Chapter 5 The link between working from home and relocation

Key points

- Net internal migration flows (i.e. the number of arrivals less the number of departures) were negative for capital cities before and during the pandemic. The number of capital city dwellers who had left capital cities to move to a regional area was larger during the pandemic than before the pandemic.
- Before the pandemic, Greater Sydney had a net internal migration outflow of 7,277 persons each quarter on average. During the pandemic, this increased to 8,215. Quarterly net internal migration for Greater Melbourne decreased to –5,712 during the pandemic from +583 before the pandemic. Quarterly net inflows to Greater Brisbane fell slightly to 3,352 during the pandemic from 3,563 before the pandemic.
- Regional Australia experienced strong positive net internal migration flows during the pandemic. The net internal migration inflows were stronger during the pandemic than before the pandemic, but this effect was driven by Queensland. Average quarterly net internal migration to the Rest of Queensland significantly increased to 4,702 during the pandemic from 1,704 before the pandemic.
- Net internal migration outflows from the capital cities peaked in 2021. Recent data for the June and September quarters of 2022 reveal an easing of net outflows from the capital cities.
- UniSA's in-depth interviews revealed that increased WfH during the pandemic did not result in downsizing office space in the short-term as business owners consider not only WfH practice but also many other factors in making decisions about downsizing or relocating their offices. In the long run, business owners and managers were more open to assessing the role of WfH in office space use.
- Managers with higher personal WfH uptake indicated a stronger willingness to consider renting cheaper office space for the firm in a different location.
- The quantitative evidence reveals that non-managerial employees with WfH capability were more likely to relocate their home during the pandemic than employees without any WfH capability (18 versus 12 per cent). Non-managerial employees with WfH capability were also more likely to consider living further away from their workplace if they could regularly work remotely (49 versus 33 per cent).
- Non-managerial employees with higher WfH uptake are more likely to relocate. Across the four time periods (before the pandemic, at the peak of the COVID-19 pandemic, during survey week and into the future), WfH uptake is higher for non-managerial employees with a recent relocation experience (33–51 per cent) than for those without it (12–31 per cent).
- The evidence that individuals with WfH capability/uptake were much more likely to relocate during the pandemic points to how expanded WfH opportunities could have contributed to increased internal migration outflows from cities to regions during the pandemic. Since lockdowns ceased, WfH uptake has gradually declined and the net migration outflows from the cities have also eased. The evidence is not yet in as to whether this link between WfH and relocation will persist post-pandemic, or whether higher ongoing rates of WfH will impact on settlement patterns in the longer-term. The potential impacts of WfH on internal migration flows post-pandemic will be addressed in a related research project (Vij et al. 2023).

5.1 Introduction

During the COVID-19 pandemic, internal migration from capital cities to regional cities significantly increased. For example, Regional Movers Index (2022) indicated that the number of capital city residents who had moved to regio/nal Australia during the pandemic was 15.4 per cent more than before the pandemic. Additionally, Stephens, Cansdale and Forbes (2022) revealed that the number of people moving from the capital city of Sydney to regional cities increased by over 50 per cent in 2021.

This chapter provides preliminary evidence about the role of work from home (WfH) in relocation.[27] Firstly, ABS internal migration data are used to examine the link between the COVID-19 pandemic and relocation. Secondly, qualitative (i.e. interviews) and quantitative (i.e. the iMOVE UniSA survey) data from Vij et al. (2022) are examined to investigate the relationship between WfH and relocation. The qualitative and quantitative analyses are brought together to address the following questions:

- Do the people who have moved to a new home during the pandemic have higher WfH capability/uptake?
- Would non-managerial employees consider living further away from their workplace if they could regularly work remotely?
- Would managers consider renting cheaper office space in a different location if employees could regularly work remotely?

5.2 The link between the COVID-19 pandemic and relocation

Net internal migration refers to the difference between the number of arrivals and the number of departures, with positive values representing a net inflow and negative values a net outflow. Figure 5.1 shows that quarterly net internal migration to greater capital cities was between –3,848 and –7,981 persons before the pandemic (i.e. from March 2016 to December 2019), representing a significant net outflow from the capital cities to the Rest of State areas. This outflow changed to between –7,138 and –11,846 persons during the pandemic (i.e. from March 2020 to September 2022). The quarterly net internal migration inflow to Rest of State areas was between 3,848 and 7,981 persons before the pandemic. During the pandemic, this increased to between 7,138 and 11,846 persons per quarter.

Figure 5.1 suggests that the pandemic-related net internal migration outflows from the capital cities peaked in 2021. Recent data for the June and September quarter 2022 reveals an easing of net internal migration outflows from the capital cities. Outflows are similar to levels seen in 2018 (but continue to exceed 2019 outflows).

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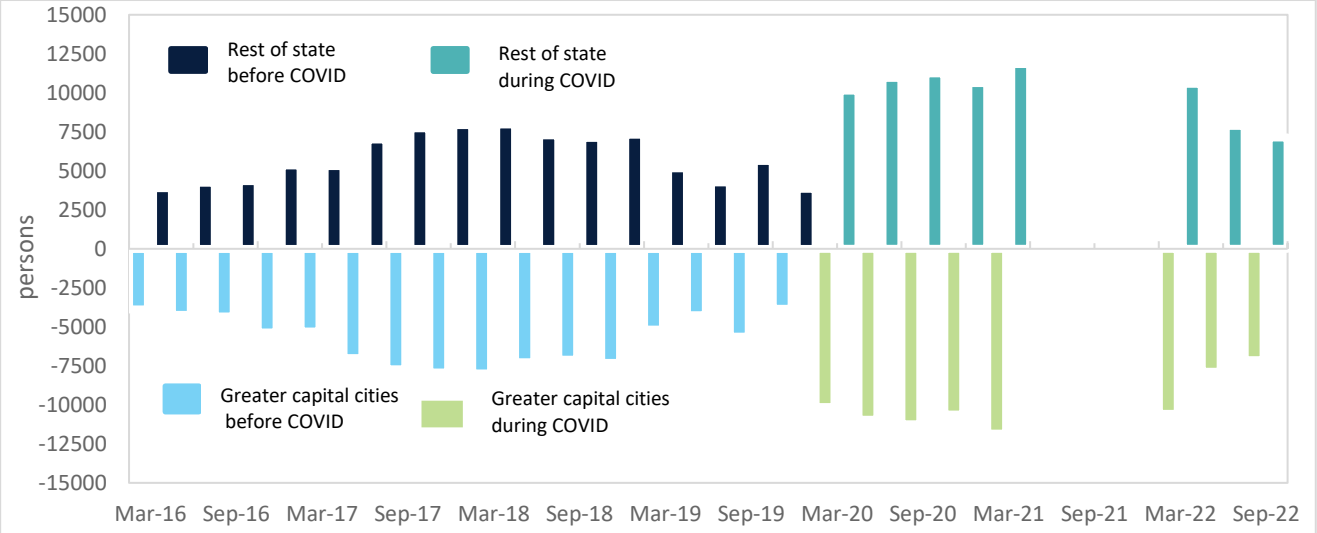
[27] A more recent project, 'The Future of Australian cities and regions in a post-pandemic world', funded by the Department and the iMOVE CRC, and conducted by UniSA, will provide more evidence to understand the determinants of business and household settlement patterns from the long-term perspective in Australia (Vij et al. 2023).

Figure 5.1: Net internal migration to Capital cities and Rest of States before and during the pandemic



Notes: Before the pandemic is from March 2016 to December 2019 and during the pandemic is from March 2020 to September 2022. Net internal migration is the difference between the number of arrivals and the number of departures. The data from June to December 2021 is missing.
Source: BCARR analysis of ABS Regional internal migration estimates (Australian Bureau of Statistics 2023a).

Before the pandemic, net internal migration varied across capital cities. Table 5.1 shows that average quarterly net internal migration was –7,277 for Greater Sydney, –1,276 for Greater Adelaide and –1,156 for Greater Perth. For Greater Darwin, its average quarterly net internal migration level was negative and low (–570). In contrast, Greater Melbourne and Greater Brisbane experienced a net internal migration inflow (583 to Greater Melbourne and 3,563 to Greater Brisbane each quarter on average). For Greater Hobart, its net internal migration inflow was modest before the pandemic (136 each quarter on average).

During the pandemic, some capital cities continued to experience net internal migration outflows (–8,215 per quarter for Greater Sydney, –235 for Greater Adelaide and –226 for Greater Darwin). For Greater Melbourne, its average quarterly net internal migration dramatically decreased to –5,712 during the pandemic from +583 before the pandemic. For Greater Hobart, the decrease was marginal (–264). However, Greater Brisbane and Greater Perth become favoured destinations during the pandemic as 3,352 and 1,461 persons relocated to Greater Brisbane and Greater Perth, respectively, each quarter on average (see Table 5.1).

Table 5.1: Net internal migration to capital cities before and during the pandemic

Time	Greater Sydney	Greater Melbourne	Greater Brisbane	Greater Adelaide	Greater Perth	Greater Hobart	Greater Darwin
				(persons)			
Mar-16	–5,977	2,167	2,752	–1,761	–1,362	287	–215
Jun-16	–5,904	2,411	3,425	–2,214	–2,081	272	–290
Sep-16	–4,687	1,099	2,495	–1,314	–2,107	249	–219
Dec-16	–7,433	3,280	3,465	–2,086	–2,851	218	–630
Mar-17	–6,742	2,103	2,854	–1,540	–1,983	249	–549
Jun-17	–7,060	726	2,987	–1,612	–2,250	387	–287
Sep-17	–7,554	–414	3,494	–1,174	–1,652	155	–390
Dec-17	–10,243	379	5,215	–1,562	–1,687	214	–706
Mar-18	–9,094	–291	4,046	–966	–1,121	170	–846
Jun-18	–7,765	–480	3,231	–968	–946	217	–726
Sep-18	–6,895	–1,316	2,781	–578	–388	190	–437
Dec-18	–8,610	210	3,321	–1,155	–662	–21	–883
Mar-19	–7,278	–74	4,154	–847	–57	76	–962
Jun-19	–6,943	150	4,370	–748	24	–203	–872
Sep-19	–6,215	–985	3,687	–1,093	165	–185	–583
Dec-19	–8,032	361	4,736	–799	464	–105	–521
Mar-20	–8,087	–2,163	1,874	–446	–72	–166	–562
Jun-20	–6,378	–7,994	3,189	–181	408	–42	–202
Sep-20	–7,782	–7,445	3,215	–334	1,388	–162	8
Dec-20	–9,317	–8,491	4,770	–247	1,794	–92	259
Mar-21*	–8,169	–8,273	3,274	59	1,554	–289	–139
Mar-22*	–10,675	–4,528	3,963	–184	2,369	–460	–426
Jun-22	–6,780	–4,250	3,416	–454	1,855	–498	–451
Sep-22	–8,534	–2,554	3,113	–93	2,393	–402	–298
Average: Mar 16-Dec 19 (before pandemic)	–7,277	583	3,563	–1,276	–1,156	136	–570
Average: Mar 20-Sep 22 (during pandemic)	–8,215	–5,712	3,352	–235	1,461	–264	–226

Notes: Net internal migration is the difference between the number of arrivals and the number of departures. * The data from June to December 2021 is missing.
Source: BCARR analysis of ABS Regional internal migration estimates (Australian Bureau of Statistics 2023a)

Regional Australia experienced a strong net internal migration inflow before the pandemic. For example, 2,484 persons relocated to Rest of NSW while 3,116 persons moved to Rest of VIC each quarter on average before the pandemic as Table 5.2 shows. For Rest of QLD, it was 1,704. For Rest of TAS, the increase was modest (306 persons each quarter on average). However, 1,318 persons left Rest of WA and 303 persons left Rest of NT each quarter on average. For Rest of SA, the net internal migration outflow was modest (93 persons each quarter before the pandemic on average).

During the pandemic, net internal migration was positive for most of regional Australia. As Table 5.2 shows, net internal migration to Rest of QLD increased by nearly 3,000 to 4,702 persons each quarter on average. Net internal migration remained positive for Rest of NSW and Rest of VIC, although the quarterly average inflows during the pandemic were slightly lower than pre-pandemic inflows. Both regional NSW and VIC saw a significant uplift in internal migration inflows during the first 6-12 months of the pandemic, but inflows were more modest during 2022. For Rest of SA, the average quarterly net internal migration flows became positive during the pandemic. For Rest of TAS, the increase was modest to 408. Rest of WA and Rest of NT continued to

experience net migration outflows, but the size of those outflows fell during the pandemic. The overall increase in net internal migration inflows to regional areas during the pandemic (as seen in Figure 5.1) was therefore largely driven by the large increase in inflows to regional Queensland.

Table 5.2: Net internal migration to Rest of state before and during the pandemic

Time	Rest of NSW	Rest of VIC	Rest of QLD	Rest of SA	Rest of WA	Rest of TAS	Rest of NT
				(persons)			
Mar-16	2,715	2,435	435	–104	–1,149	–47	–397
Jun-16	2,764	2,768	5	111	–1,342	118	–203
Sep-16	2,295	2,056	997	–42	–779	1	–188
Dec-16	3,180	2,723	1,463	–336	–1,462	129	–341
Mar-17	2,361	3,131	1,354	57	–1,415	188	–373
Jun-17	2,925	3,075	2,180	95	–1,087	101	–280
Sep-17	3,568	3,344	1,908	–130	–1,088	387	–266
Dec-17	3,446	4,042	2,518	–205	–1,656	202	–412
Mar-18	3,506	4,238	1,656	–125	–1,499	580	–376
Jun-18	2,464	3,498	2,630	–21	–1,651	457	–109
Sep-18	2,468	3,915	2,239	–183	–1,356	340	–308
Dec-18	2,029	3,435	3,892	–228	–1,880	589	–531
Mar-19	1,592	3,592	1,021	–55	–1,085	406	–300
Jun-19	1,574	2,286	1,053	–164	–1,047	631	–78
Sep-19	1,606	3,015	1,783	101	–1,111	323	–86
Dec-19	1,249	2,304	2,124	–256	–1,477	495	–592
Mar-20	2,547	2,753	4,394	229	–152	464	–93
Jun-20	2,423	4,952	3,561	285	–635	429	–58
Sep-20	3,672	3,696	4,022	411	–757	342	–139
Dec-20	4,049	1,955	4,993	381	–589	391	–555
Mar-21*	3,706	3,409	3,761	589	85	566	–271
Mar-22*	1,228	1,178	7,108	616	6	616	–174
Jun-22	925	1,294	5,072	517	38	330	–295
Sep-22	431	2,070	4,704	315	27	126	–536
Average: Mar 16-Dec 19 (before pandemic)	2,484	3,116	1,704	–93	–1,318	306	–303
Average: Mar 20-Sep 22 (during pandemic)	2,373	2,663	4,702	418	–247	408	–265

Notes: Net internal migration is the difference between the number of arrivals and the number of departures. * The data from June to December 2021 is missing.
Source: BCARR analysis of ABS Regional internal migration estimates (Australian Bureau of Statistics 2023a)

5.3 The impact of work from home on relocation

The availability of WfH options may encourage workers to relocate to areas of higher amenity. As Glover et al. (2022) points out, when WfH options are given to employed city residents, some may choose to relocate to a regional area to allow them to enjoy natural amenities and to improve their work-life balance. Additionally, people with WfH options do not need to experience lengthy commute to their workplaces. Consequently, they are more likely to relocate to outer suburbs (Lennox 2020).

Firms may also choose to change their locational footprint in response to changed WfH practices. For example, businesses may consider reducing office space in expensive locations if employees were regularly working remotely or could consider renting cheaper office space in a different location (Vij et al. 2022).

5.3.1 In-depth interview analysis

In Vij et al. (2022), qualitative data collected in late 2020 and early 2021 from 10 in-depth interviews was used to investigate past, current and emerging WfH practice from the firm's perspective. Specifically, interview participants were asked their opinions on WfH and its effects on productivity, supervision, well-being and office space use for their organisation.

Interview participants were business owners, employers or managers. Additionally, they all indicated that WfH practices were part of their workplace arrangement before 2020 or WfH practice was considered to be a long-term shift in their organisation. Table 5.3 shows that these 10 participants come from different business types. Some participants are from a small or a medium firm (i.e. less than 50 full-time employees) whereas some are from a large firm (i.e. over 400 full-time employees). Lastly, these participants are from Queensland, New South Wales, Victoria, South Australia or Western Australia.

Table 5.3: Information about interview participants

Business Type	Location	Business Size (FTE equivalent)
Local Government (Community Services)	Queensland	30 employees and 100+ volunteers
Retail business	Queensland	12 staff (4 FT + 8 part time/casual)
Education provider	New South Wales	45 staff
Health Care provider	New South Wales	23 staff
Engineering firm	New South Wales	37 staff
Architect firm	New South Wales	15 staff
Health Care provider	Victoria	800 staff
Advocacy service	Victoria	15
Finance & Insurance	South Australia	400 staff + 5,000 in call centre
Law firm	Western Australia	30 staff

Source: Extracted from Vij et al. (2022)

Some interview participants believed that WfH would not result in office space downsizing *in the long term*. For example, one participant said that

> **"We will always need the office space we have now - the nature of our business means there will always be a need for meeting rooms close to the courts. "**

Another commented

> **"I don't see how staff working one or two days a week from home would change our office"**

Some participants believed the impact of WfH on office space use was limited *in the short run*. However, office space use needs to be reviewed periodically. For example, one participant commented that

> **"I imagine we will review this in time but at the moment we are not looking to downsize or move premises."**

Other participants also expressed similar opinions

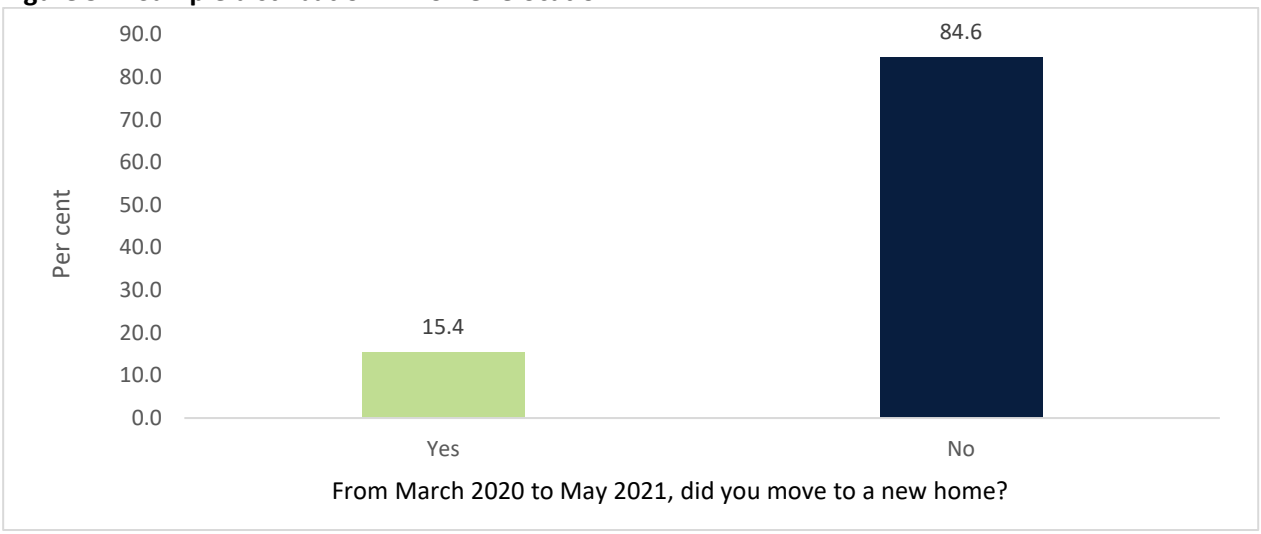
> **"Not sure at this stage. We would need to see how things turn out once the changes brought about by the pandemic settle down."**

5.3.2 Quantitative analysis

5.3.2.1 Residential moves

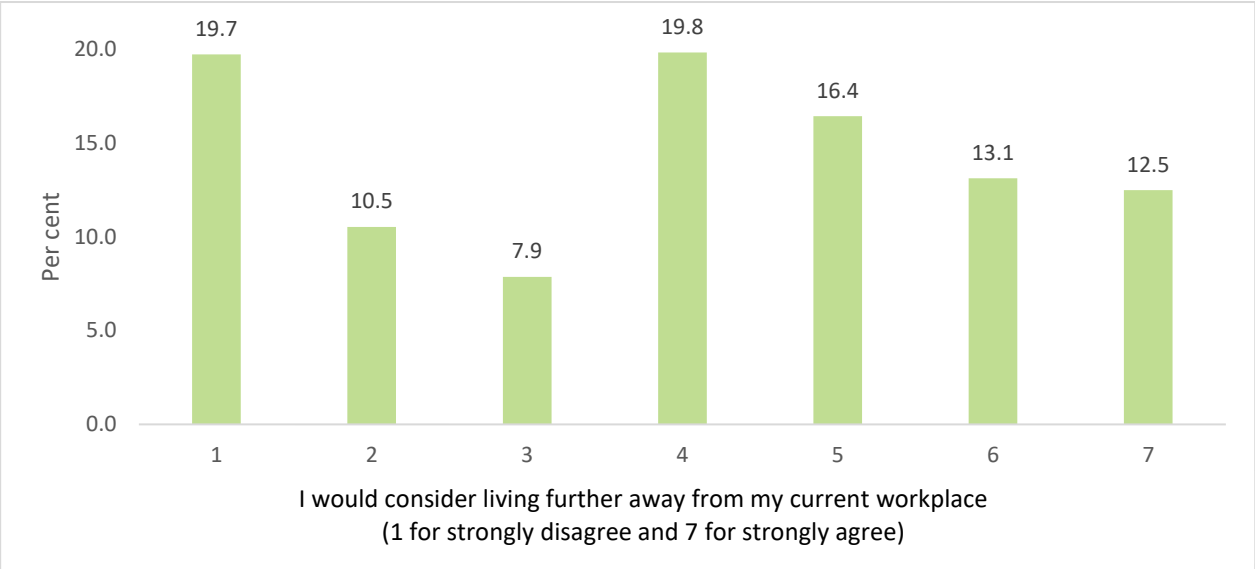
This section examines responses to survey questions about residential relocation in the iMOVE UniSA survey dataset. Employed non-managerial individuals were asked if they had moved to a new home from March 2020 to May 2021. As Figure 5.2 shows, about 15 per cent of non-managerial employees had moved to a new home in that period. Additionally, non-managerial employees were asked to indicate on a 1-to-7 scale about whether they agree to consider living further away from their workplace if they could regularly work remotely (1 for strongly disagree and 7 for strongly agree). As Figure 5.3 shows, over 42 per cent of respondents at least somewhat agree (i.e. respondents who selected 5 or above) they would consider living further away from their workplace if they could regularly work remotely.

Figure 5.2: Sample distribution in home relocation



Note: Only non-managerial employees who did not change their job during the pandemic are included here. Managerial employees are excluded here as they were not asked about their home relocation history in the survey.
Source: BCARR analysis of iMOVE UniSA survey data

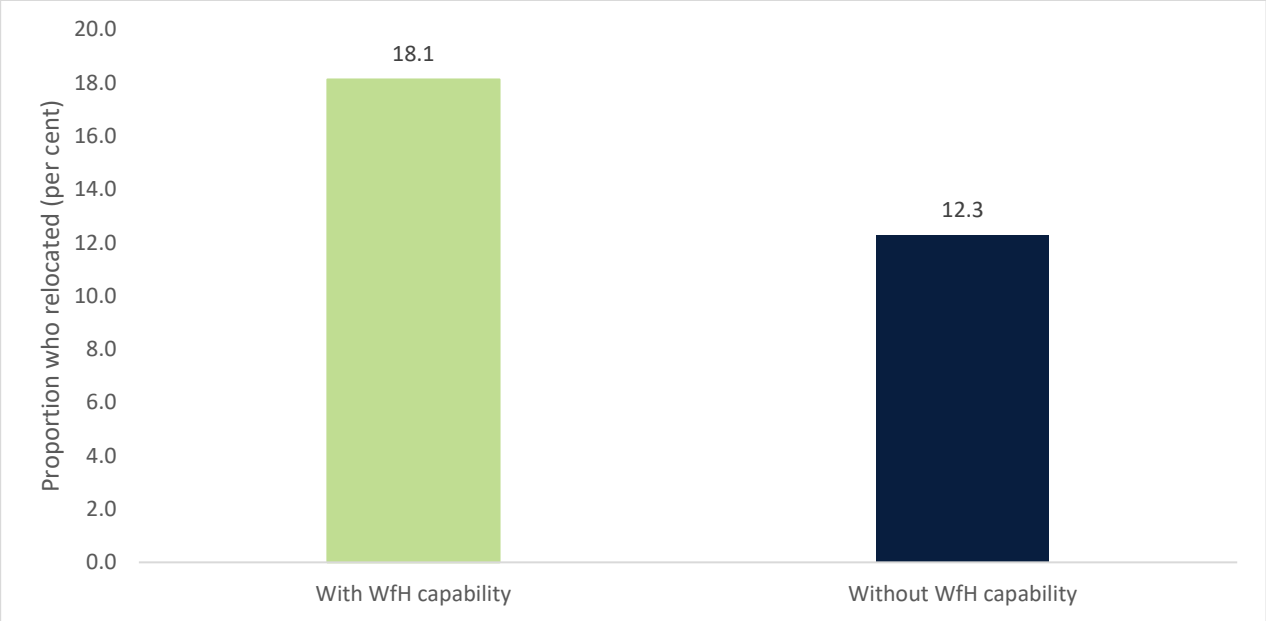
Figure 5.3: Sample distribution in living further away from workplace



Note: 5 means respondents somewhat agree to consider living further away from current workplace if they could regularly work remotely. Only non-managerial employees who did not change their job during the pandemic are included here. Managerial employees are excluded here as they were not asked about their home relocation history in the survey.
Source: BCARR analysis of iMOVE UniSA survey data

Employed individuals with WfH capability are more likely to relocate. Figure 5.4 shows that non-managerial employees with WfH capability were more likely to relocate their home during the pandemic than employees without WfH capability (18 versus 12 per cent). Non-managerial employees with a home relocation experience (from March 2020 to May 2021) similarly have a higher probability of having WfH capability than those who didn't move (63 versus 47 per cent).

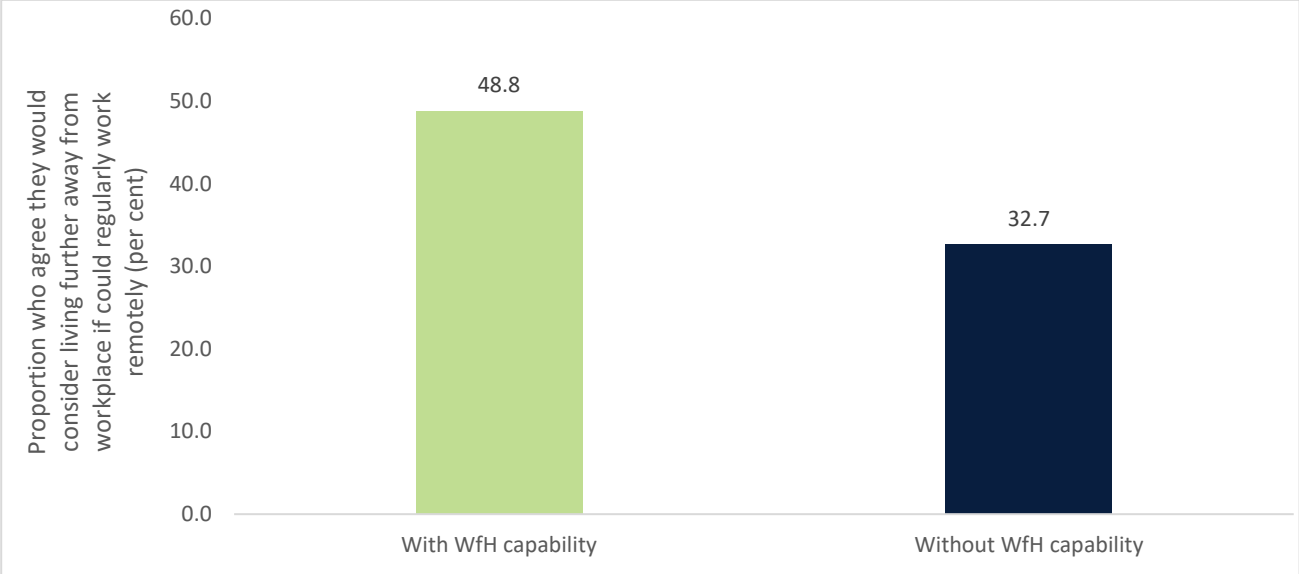
Figure 5.4: The proportion who relocated during the pandemic by WfH capability



Note: Only non-managerial employees who did not change their job during the pandemic are included here. The relocation needed to have occurred between March 2020 and May 2021. Managerial employees are excluded here as they were not asked about their home relocation history in the survey.
Source: BCARR analysis of iMOVE UniSA survey data

Additionally, Figure 5.5 shows that non-managerial employees with WfH capability are more likely to consider living further away from their workplace if they could regularly work remotely (49 per cent), as compared to those without WfH capability (33 per cent).

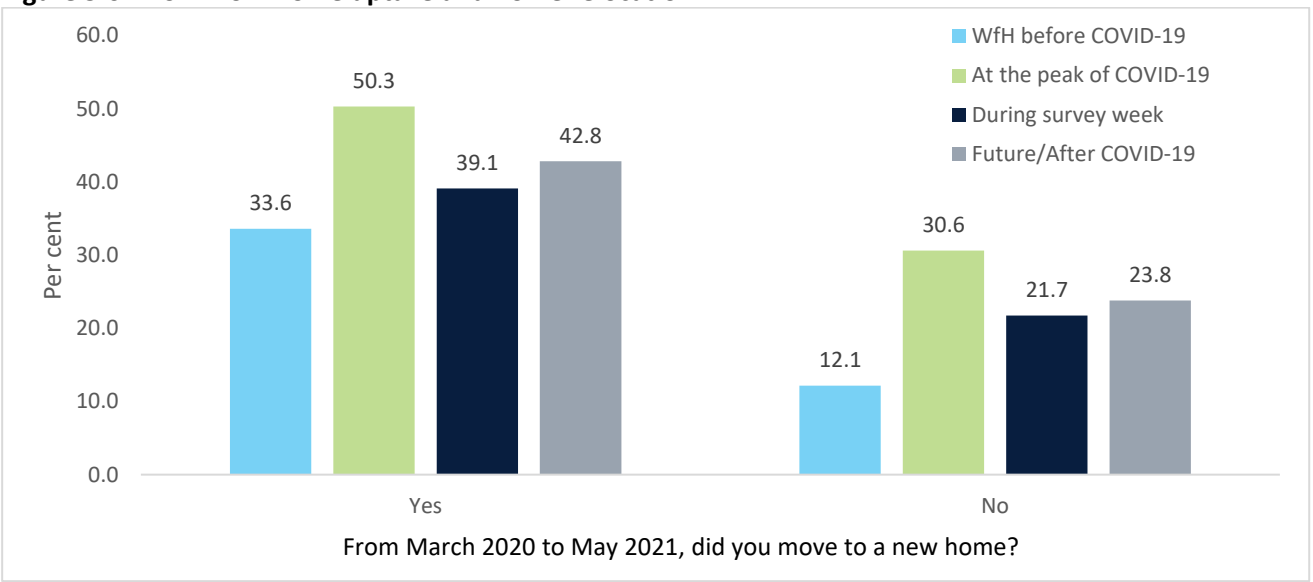
Figure 5.5: The proportion who agree they would consider living further away from workplace if they could WfH regularly by WfH capability



Note: Respondents who selected 5, 6 or 7 were categorised as agreeing they would consider living further away from their current workplace if they could regularly work remotely. 5 means respondents somewhat agree with the statement. Only non-managerial employees who did not change their job during the pandemic are included here. Managerial employees are excluded here as they were not asked about their home relocation history in the survey.
Source: BCARR analysis of iMOVE UniSA survey data

Employed individuals with higher WfH uptake are more likely to relocate. Figure 5.6 shows that non-managerial employees with a home relocation experience between March 2020 and May 2021 consistently have higher WfH uptake than those who didn't move (across all 4 time periods). For example, during the survey week in the first half of 2021, WfH uptake was much higher for non-managerial employees with a recent home relocation history (39.1 per cent) than for those without it (21.7 per cent).

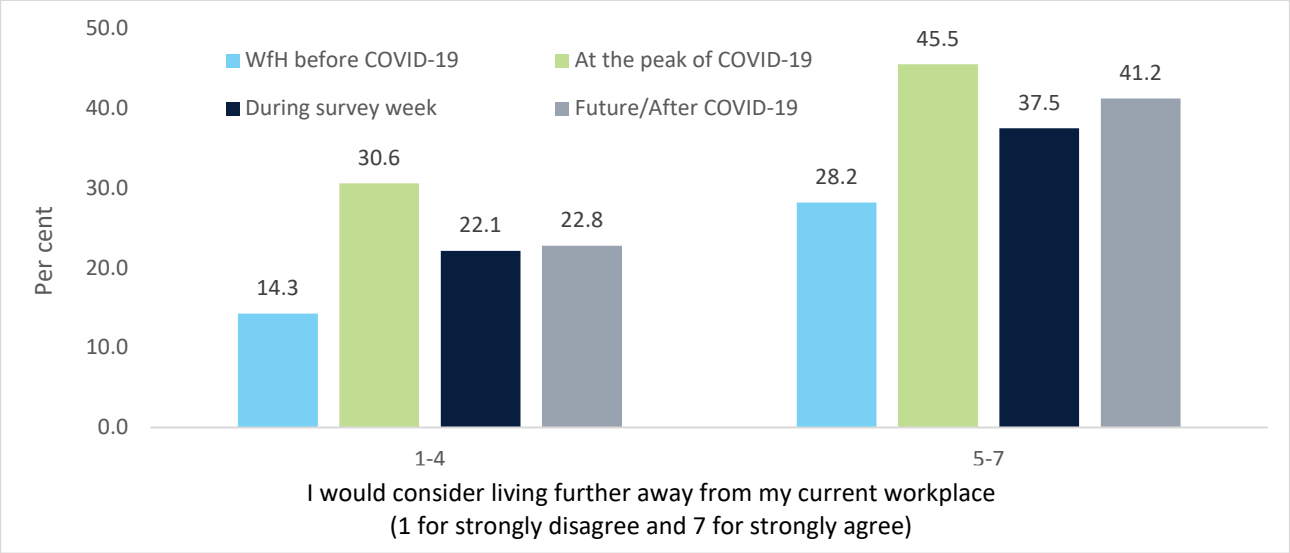
Figure 5.6: Work from home uptake and home relocation



Note: Only non-managerial employees who did not change their job during the pandemic are included here. Managerial employees are excluded here as they were not asked about their home relocation history in the survey.
Source: BCARR analysis of iMOVE UniSA weighted survey data.

Across the 4 time periods, Figure 5.7 shows that WfH uptake is higher for non-managerial employees who agree to consider living further away from their workplace if they could regularly work remotely (28–46 per cent) than for those who do not agree (14–31 per cent).

Figure 5.7: Work from home uptake and living further away from workplace

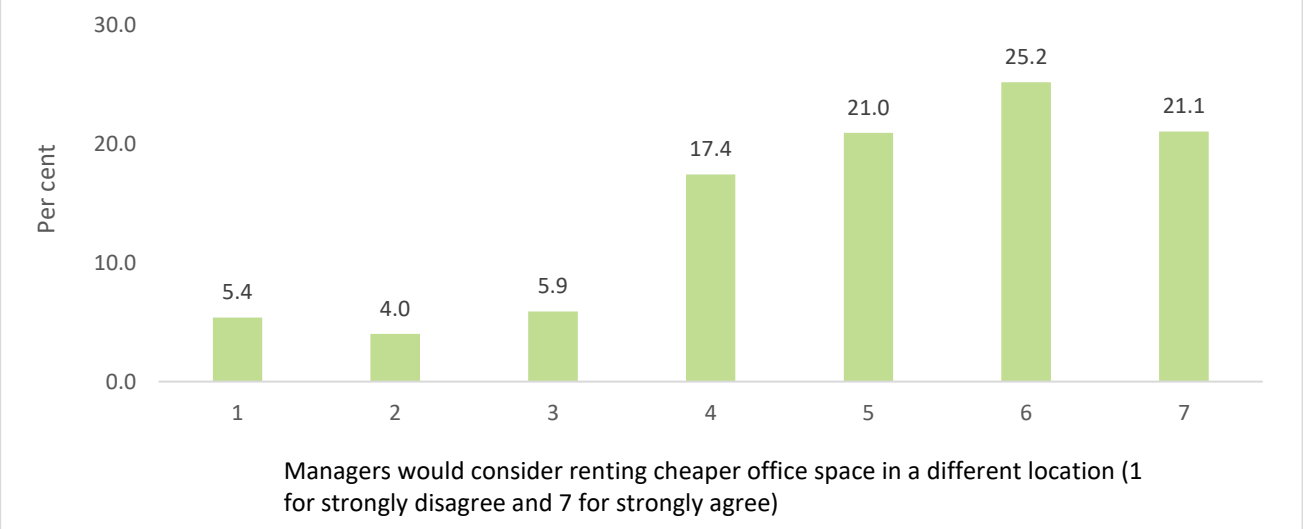


Note: Respondents who selected 5, 6 or 7 were categorised as agreeing they would consider living further away from their current workplace if they could regularly work remotely. 5 means respondents somewhat agree with the statement. Only non-managerial employees who did not change their job during the pandemic are included here. Managerial employees are excluded here as they were not asked about their home relocation history in the survey.
Source: BCARR analysis of iMOVE UniSA weighted survey data.

5.3.2.2 Office relocation

In the iMOVE UniSA survey, managerial employees were asked to indicate on a 1-to-7 scale whether the company agrees they would consider renting cheaper office space in a different location if their employees could regularly work remotely (1 for strongly disagree and 7 for strongly agree). Figure 5.8 shows that over 60 per cent of managers agreed (i.e. respondents who elected 5 or above) on considering office relocation if their subordinates could regularly work remotely.[28]

Figure 5.8: Sample distribution for office relocation



Note: Respondents who selected 5, 6 or 7 were categorised as agreeing their companies would consider renting cheaper office space in a different location if their employees could regularly work remotely. 5 means respondents somewhat agree with the statement. Only managerial employees who did not change their job during the pandemic are included here. Non-managerial employees are excluded here as they were not asked about office relocation in the survey.
Source: BCARR analysis of iMOVE UniSA survey data

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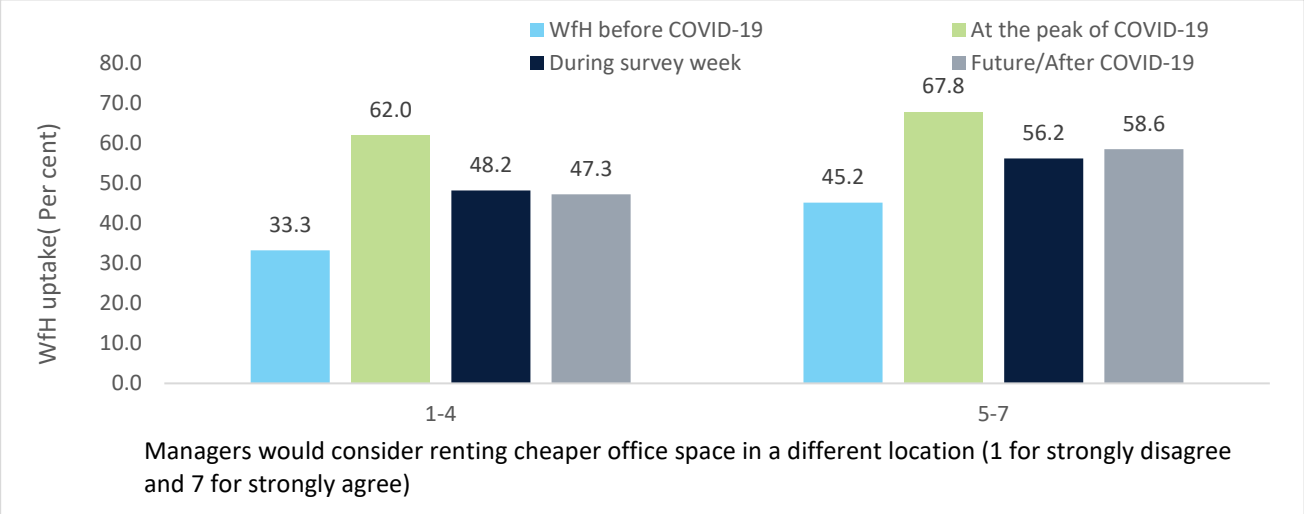
[28] The result here is different to Vij et al. (2022) as the analysis here used a smaller sample size (i.e. managers who did not change their job during the pandemic).

Figure 5.9 shows that managers who agree to consider renting cheaper office space in a different location (i.e. respondents who selected 5 or above) have higher WfH uptake across the four periods. This suggests that higher WfH uptake is associated with managers having a higher willingness to consider firm relocation, just as higher WfH uptake is associated with a higher rate of residential relocation for non-managerial employees. The evidence from this study is limited, but suggests the role of WfH as a potential influence on residential and firm relocation is one that warrants further research.

Figure 5.9: Work from home uptake and office relocation



Note: Respondents who selected 5, 6 or 7 were categorised as agreeing their companies would consider renting cheaper office space in a different location if their employees could regularly work remotely. 5 means respondents somewhat agree with the statement. Only managerial employees who did not change their job during the pandemic are included here. Non-managerial employees are excluded here as they were not asked about office relocation in the survey.
Source: BCARR analysis of iMOVE UniSA weighted survey data

5.4 Discussion

This chapter used the latest internal migration data to investigate the impact of the COVID-19 pandemic on relocation, as well as qualitative and quantitative analysis of the iMOVE UniSA survey data to examine the link between WfH and relocation.

It was found that most capital cities experienced net internal migration losses before the pandemic. During the pandemic, these losses were exacerbated. Sydney and Melbourne recorded particularly large net internal migration losses during the pandemic, but Brisbane and Perth recorded strong net internal migration gains during the pandemic. Regional Australia (defined as areas outside the capital cities) experienced net internal migration gains before the pandemic. During the pandemic, the net internal migration gains increased, principally due to gains in regional Queensland. For example, nearly 3,000 extra persons relocated to the Rest of QLD each quarter on average during the pandemic (compared to pre-pandemic averages).

The in-depth interviews revealed that increased WfH during the pandemic did not result in downsizing office space in the short-term as business owners consider not only WfH practice but also many other factors (i.e. the nature of business, lease agreement and the uncertainties driven by the pandemic) in making decisions about downsizing or relocating their offices. In the long run, business owners and managers were more open to considering and assessing the role of WfH in office space use. The quantitative data showed that managers who personally had higher WfH uptake were more likely to agree they would consider renting cheaper office space in a different location if their employees were working remotely.

The quantitative analysis also showed that having WfH capability and uptake was associated with a higher likelihood of residential relocation (between March 2020 and May 2021) for non-managerial employees.

This evidence on the positive link between WfH capability/uptake and residential relocation during the pandemic also points to the potential role that expanded WfH opportunities could have played in contributing

to increased internal migration outflows from cities to regions during the pandemic. Since lockdowns ceased, WfH uptake has gradually declined[29] and the net migration outflows from the cities have also eased. The evidence is not yet in as to whether this link between WfH and relocation will persist post-pandemic, or whether higher ongoing rates of WfH will impact on residential relocation patterns in the longer-term. This issue is being investigated by the iMOVE study on 'The Future of Australian cities and regions in a post-pandemic world', funded by the Department, and conducted by UniSA (Vij et al. 2023).

The next chapter will investigate post-pandemic prospects for WfH in Australia. In particular, information and data will be collected from different sources to understand WfH trends and prospects in Australia.

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[29] Further information on recent WfH trends is provided in Chapter 6.

Chapter 6 Post-pandemic prospects

Key points

- Several key Australian Work from Home (WfH) studies have argued that the hybrid model (i.e. the combination of working remotely and onsite) will be commonly adopted in Australia beyond the pandemic.
- Early in the pandemic, business owners and employers were generally sceptical about using the hybrid model as a long-term strategy, beyond the pandemic. However, some employers considered that the hybrid model could potentially be sustained longer-term, at least for some roles in the organisation.
- Managerial employees (who have at least one direct report) were more supportive of WfH than employers, with 79 per cent of managers supporting changes in their company policies to encourage or allow WfH in the long term. Managerial employees were more likely to support such changes to company policies if they lived in a capital city, or worked in an office-based industry or for a large firm.
- Google Community Mobility Report data shows there were about 10 per cent less visitors to workplaces nationally in October 2022 (relative to the pre-COVID baseline). However, this figure reflects growth in employed persons over the period. In the absence of employment growth, the number of visitors to workplaces in October 2022 would have been around 15 per cent below the baseline, or 0.7 fewer days per week spent at workplaces per worker. This could translate fairly directly into extra days spent WfH.
- Recent evidence from late 2022 and early 2023 points to WfH stabilising nationally at around 1 day WfH per worker per week, which is well above pre-pandemic levels of around 0.2 days per week (Hensher et al. 2023). Based on data collected during late-2022, Vij et al. (2023) similarly concludes that roughly 20 to 25 per cent of the workforce of Australian cities of over 20,000 population was working remotely on any given day.
- There is variation in this pattern across cities. WfH takeup remains particularly high in Sydney through to late 2022. The available evidence also suggests WfH takeup remains well above pre-pandemic levels in Brisbane and Melbourne. However, WfH appears to have a lesser role for the central Perth and Adelaide LGAs, relative to the Sydney, Melbourne and Brisbane LGAs.

The future role of Work from Home (WfH) in Australia has implications for urban and regional planning, infrastructure investment and transport and land use after the pandemic. Looking forward, Productivity Commission (2021) and Vij et al. (2022) argue that the hybrid model (i.e. the combination of working remotely and onsite) will be commonly adopted in Australia. About 50 per cent of employees are expected to use the hybrid model in Australia in the future (Future Forum 2022 and Vij et al. 2022). In the long term, Vij et al. (2023) argues that firms in the Central Business Districts (CBDs) of the five capital cities are more likely to allow their employees to WfH than firms based outside the CBDs or in regional areas. Beck and Hensher (2021) and Hensher et al. (2022, 2023) argue that the initial WfH response during COVID is evolving into a long-term structural change to the way we live and work, with future WfH uptake likely to be significantly higher than pre-pandemic levels in Australia. According to the Transport Opinion Survey, WfH uptake has stabilised nationally, with 27% of all working hours being WfH in March 2023 and 26% in September 2022, down from 43% in March 2022 (Institute of Transport and Logistics Studies 2023).

This chapter will investigate the feasibility of firms using WfH as a long-term strategy after the pandemic. Firstly, this chapter will draw on the qualitative data from Vij et al. (2022) to address the following questions from the business owners and employers' view:

- Is the hybrid workplace the most likely outcome that suits both employees and employers in your organisation beyond 2021?
- Is working from home a long-term strategy for business?

Secondly, this chapter will use the quantitative data (i.e. iMOVE UniSA survey dataset) to understand desired future WfH practices from the point of view of managerial employees. In particular, the quantitative analysis will address the following question:

- In the long term, will managers support changes in company policies to encourage or allow remote working as a result of the pandemic?

Lastly, this chapter will use the Google Community Mobility Report and Transport Opinion Survey data to shed light on WfH trends in Australia.

6.1 Future work from home uptake: the employers' view

At the time the qualitative research was undertaken in late 2020 and early 2021, few employers believed that the hybrid model would continue after 2021. Business owners and employers were generally sceptical about using the hybrid model as a long-term strategy, beyond the pandemic. Some employers strongly rejected the idea of WfH as a long-term strategy, stating:

> **"I do not think this (i.e. WfH) should be a strategy for our college long term".**

> **"Definitely not an option."**

> **"Not in any long-term way, only as needed."**

> **"It would not, unless we have to because of long term COVID implications."**

Some employers recognised the need for ongoing adaptation and flexibility, given the uncertainty caused by the COVID-19 pandemic.

> **"I would see this mix as an ongoing working strategy - particularly as the pandemic continues to be an unknown influence in the community."**

> **"I can see that we would probably be quite accepting of people wanting to work from home one or maybe two days a week as long as it did not impact on their ability to get their work done. This is easier for some roles than others. If the pandemic was to go away and life return to normal, I think we would review the need to work from home on a case by case basis."**

Other employers considered that the hybrid model could potentially be sustained longer-term, at least for some roles in the organisation:

> **"I think, where possible, we will continue to offer the opportunity to work from home at least for part of the week for those that want to do and who's job allows them to do this. For some parts of the organisation this is easier than others. For example, finance, HR and planning probably have more people working from home, while the depot, reception and community centre teams have more contact with people and need to be at work. So, it is never going to be an option organisation wide."**

> **"I think there will be a mix of office based, interstate travel and working from home."**

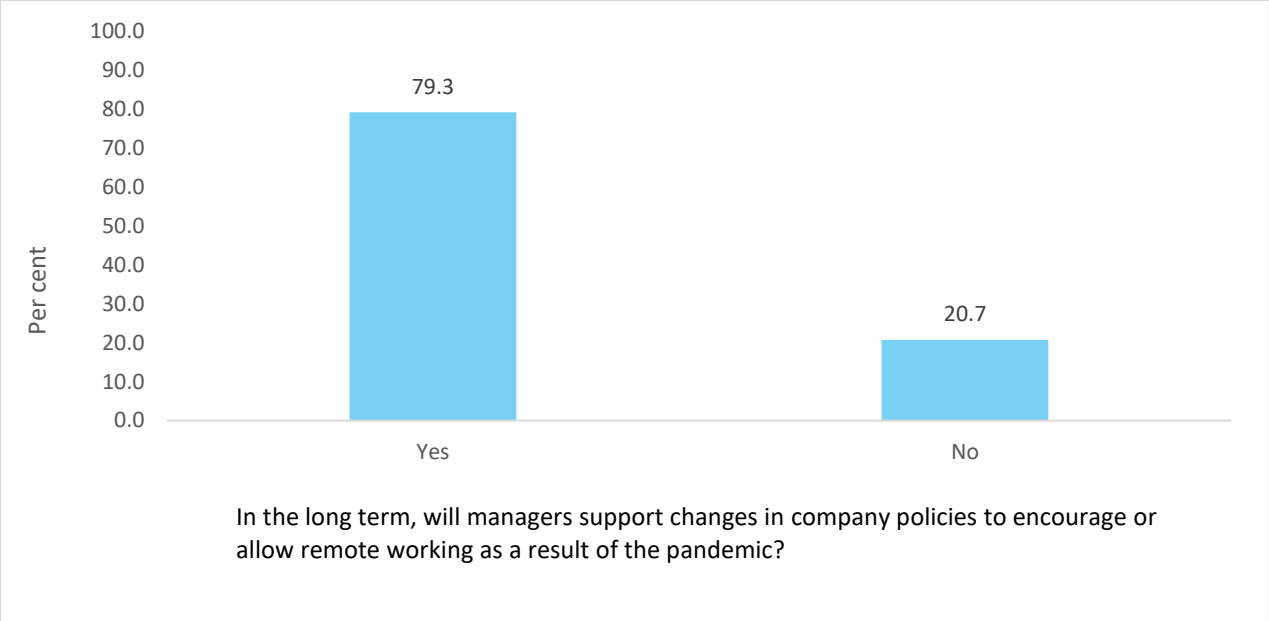
> **"Perhaps, it has certainly proven do-able. Although I would not say at this stage that we have strategies around what that would look like."**

6.2 Future work from home uptake: view of managerial employees

Employees and employers hold different views on using WfH as a long-term strategy. Relative to employers, managerial employees (who have at least one direct report) are more supportive of WfH in the future. Figure 6.1 shows that 79.3 per cent of managers support changes in their company policies to encourage or allow WfH in the long term.

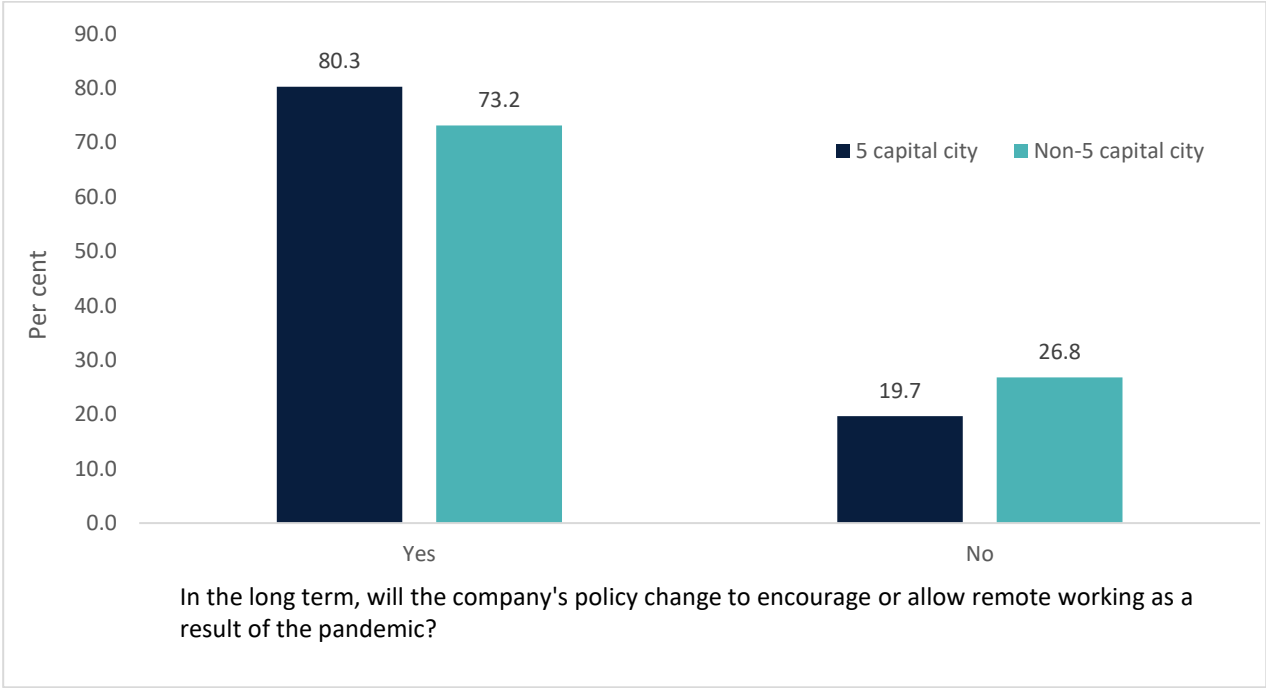
Managers' place of residence affects their view on using WfH as a long-term strategy. Figure 6.2 shows that 80.3 per cent of managers in one of the 5 biggest capital cities support changes in their company policies to encourage or allow WfH in the long run. For managers in other cities, it is 73.2 per cent.

Figure 6.1: Managerial employees' view on work from home practice in the long term



Source: BCARR analysis of iMOVE UniSA survey data

Figure 6.2: Managerial employees' view on work from home in the long term by city types



Source: BCARR analysis of iMOVE UniSA survey data

Managers in the office-based industries are more supportive of WfH in the long run.[30] Figure 6.3 shows that 85.2 per cent of managers in the office-based industries support WfH in the long term. For managers in the non-office-based industries, it is 74.7 per cent.

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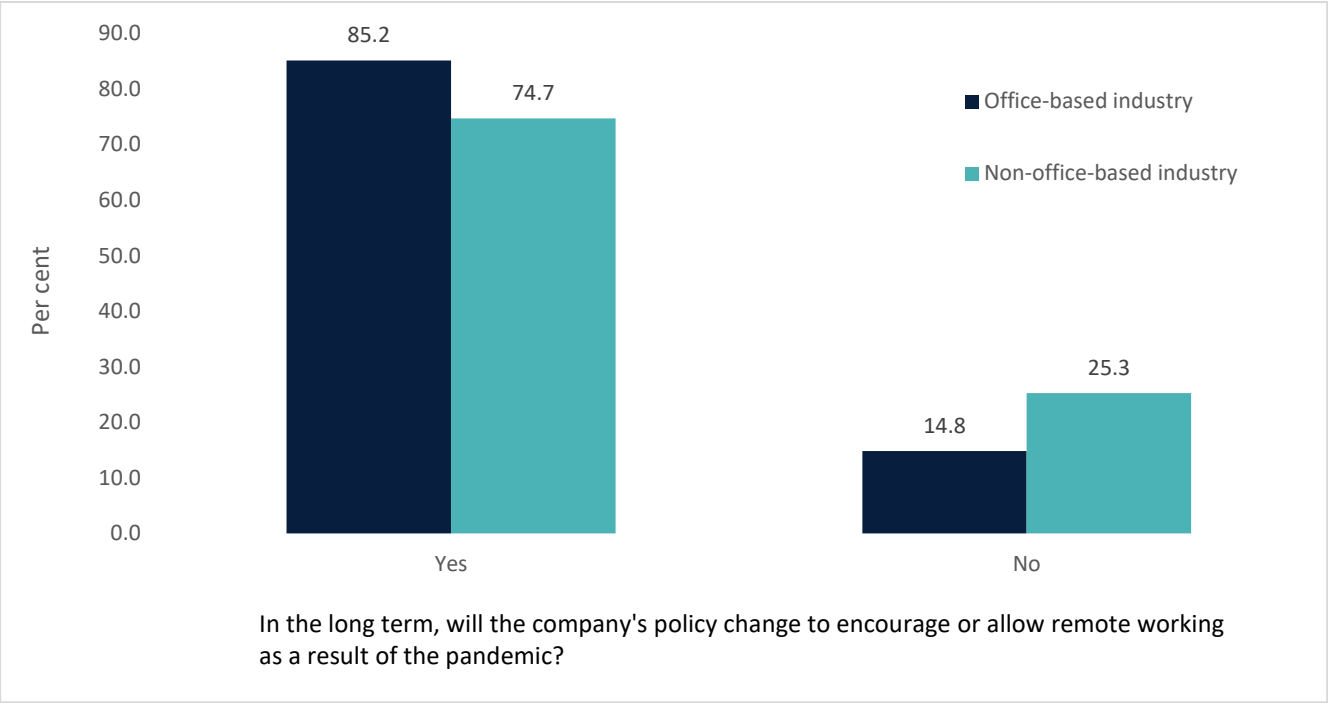
[30] Office-based industries refers to the Information Media and Telecommunications, Financial and Insurance Services, Rental, Hiring and Real Estate Services, Professional, Scientific and Technical Services, Administrative and Support Services, and Public Administration and Safety industries.

Figure 6.3: Managerial employees' view on work from home in the long term by industry type



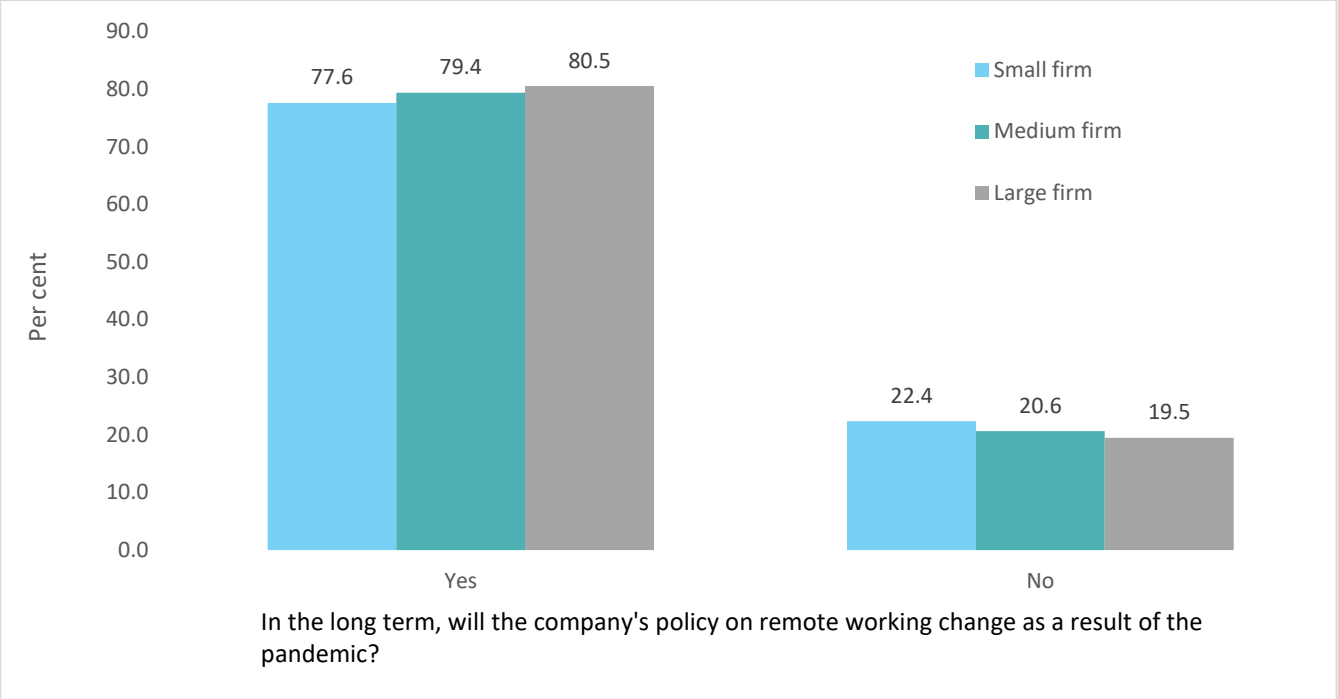
Notes: Office-based service industries are Information Media and Telecommunications, Financial and Insurance Services, Rental, Hiring and Real Estate Services, Professional, Scientific and Technical Services, Administrative and Support Services, and the Public Administration and Safety industry.
Source: analysis of iMOVE UniSA survey data.

Managers in large firms (i.e. the employee size is over 200) are more supportive of WfH in the long term. Figure 6.4 shows that about 81 per cent of managers from a large firm support WfH in the long term. For managers in medium-sized firms (i.e. the employee size is 20–199) or small firms (i.e. employee size is 0–19), it is 79.4 per cent and 77.6 per cent, respectively.

It is worth noting that managerial employees tended to have very high personal WfH uptake during the pandemic, much higher than non-managerial employees. For example, Figure 3.4 previously showed that WfH uptake was 52.7 per cent for managerial employees during the survey week and 22.0 per cent for non-managerial employees. This personal experience likely influences managers views about the suitability of WfH for their firm in the longer term.

Looking forward beyond the pandemic, managerial employees continued to have a very high level of desired future personal WfH uptake (53.7 per cent). Non-managerial employees had a lower level of desired future WfH uptake (23.6 per cent, see Figure 3.4). For employees as a whole, desired future WfH uptake was 31.5 per cent (as of early 2021).

Figure 6.4: Managerial employees' view on work from home in the long term by firm size



Notes: Large firms are firms with over 200 employees. Medium firms are firms with 20-199 employees and small firms are firms with 0-19 employees.
Source: analysis of iMOVE UniSA survey data.

6.3 Recent work from home trends

The analysis above used individual-level (or disaggregated) data to examine the employers and employees' views on WfH as a long-term strategy in the future workplace. This section uses aggregated data to understand WfH trends in cities and potential future WfH uptake levels. The initial analysis uses the Google Community Mobility Report data for Australia and for the central LGAs of the 5 biggest capital cities, followed by a presentation of WfH trend data from the Transport Opinion Survey. Box 6.1 below presents more details about the Google Community Report data.

Box 6.1: Google Community Mobility Report data

This data tracks movement trends over time across six different categories of places (retail and recreation, groceries and pharmacies, parks, public transport stations, workplaces, residential). It shows the number of visitors to different places changes compared to a pre-COVID baseline (3 Jan to 6 Feb 2020). The changes are calculated using the same aggregated and anonymised data that is used to show popular times for places in Google Maps (i.e. from users who have opted in to location history for their google account). The Google Community Mobility Report provides the daily data only. Using the daily data would be highly volatile so that trends cannot be easily spotted. Hence, the analysis here uses the monthly value by taking the average of the daily value. The Google Community Mobility Report data covers the period from February 2020 to October 2022, and was discontinued after that point.

The data is available at the LGA, state and national level. The analysis here is based on the central LGAs of Sydney, Melbourne, Brisbane, Adelaide and Perth, as well as data for the whole of Australia. The Sydney, Melbourne, Adelaide and Perth LGAs correspond to a broadly-defined Central Business District (CBD) region. The Brisbane LGA is geographically much larger, encompassing Brisbane's inner and middle suburbs as well as its CBD.

The analysis here chooses people's visits to their workplace over the duration of staying at their residence to provide insights into the WfH uptake level. The reason is that people stay at home for more than just working. Hence, using the data of duration of staying at home would overestimate the WfH uptake level. An increase (or a reduction) in visits to workplaces can more directly be interpreted as a reduction (or an increase) in the WfH uptake level.

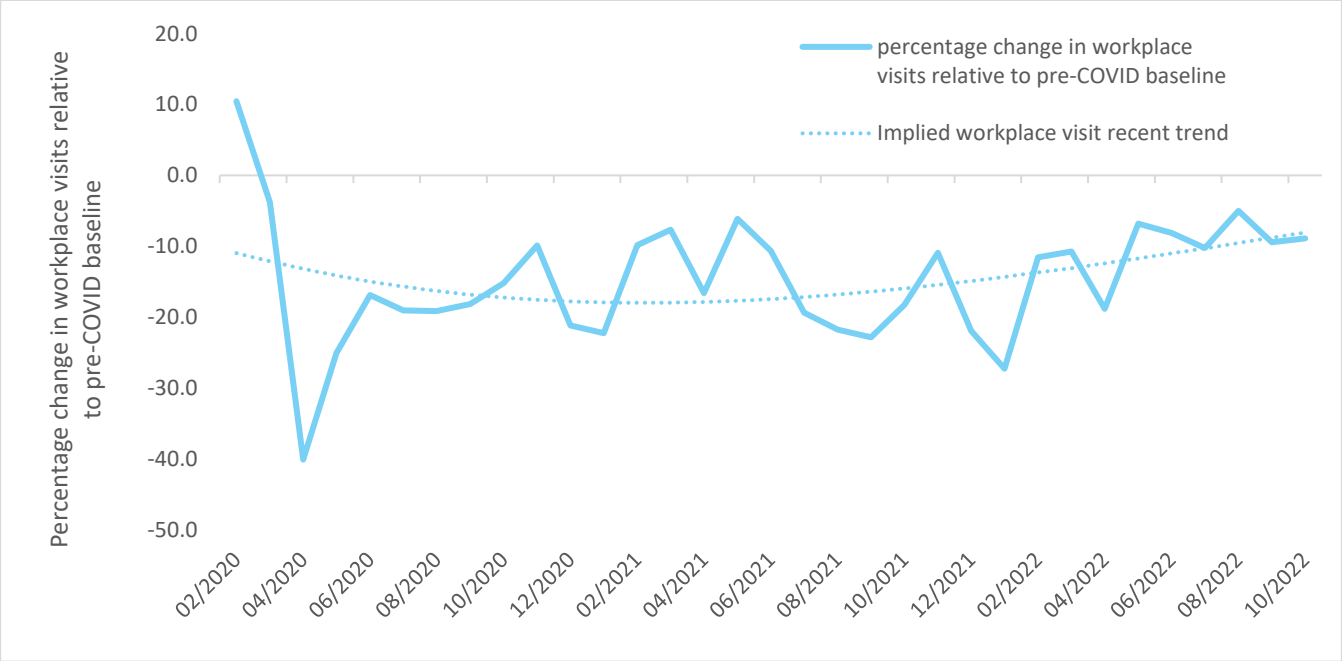
However, factors other than WfH can also influence the number of visitors to workplaces, particularly enforced business closures (involving stand downs of employees) during lockdowns. For this reason, the Google data for workplaces should only be considered broadly indicative of movements in WfH takeup, and should provide a better guide outside of lockdown periods. The workplace data is also more likely to reflect other factors (such as relocation and growth in employment), the further away one moves from the baseline. According to the Australian Bureau of Statistics (2023c), the number of employed persons in Australia increased by 5.8 per cent between February 2020 and October 2022 (seasonally adjusted). The number of visitors to workplaces will reflect this overall employment growth, and therefore is likely to understate the expansion in WfH.

Lastly, the analysis below employs polynomial trendlines to understand WfH trends across the five capital cities.

Figure 6.5 presents national time-series data from February 2020 to October 2022 showing the percentage change in visits to workplaces relative to the pre-COVID baseline. The Google Community Mobility Report data shows that there were about 10 per cent less visitors to workplaces in October 2022 (relative to the pre-COVID baseline), equivalent to about half a day a week on average. In the absence of employment growth, the number of visitors to workplaces would have been around 15 per cent below the baseline, with around 0.7 fewer days per week being spent at workplaces in October 2022 per worker, relative to the pre-COVID baseline. Given the absence of lockdowns in the second half of 2022, it is reasonable to assume that would translate fairly directly to extra time spent WfH. The available evidence suggests pre-COVID WfH takeup was in the range of 2 to 8 per cent (Vij et al. 2022), implying current takeup of 0.8 to 1.2 days per worker per week as of October 2022.[31] Note that the trendline suggests that visitors to workplaces were trending upwards at the national level in the months leading up to October 2022. This implies the nation's WfH uptake levels were trending downward in the months leading up to October 2022, and that there may be further declines before WfH stabilises nationally.

[31] This is broadly in line with other Australian evidence (e.g. Institute of Transport and Logistics Studies 2023 and Vij et al. 2023).

Figure 6.5: Recent trends in visitors to workplaces in Australia, February 2020 to October 2022



Notes: The polynomial trendlines are used to approximate WfH trends. The series was discontinued from October 2022.
Source: BCARR analysis of Google Community Mobility Report data on time spent at workplaces (Google 2022).

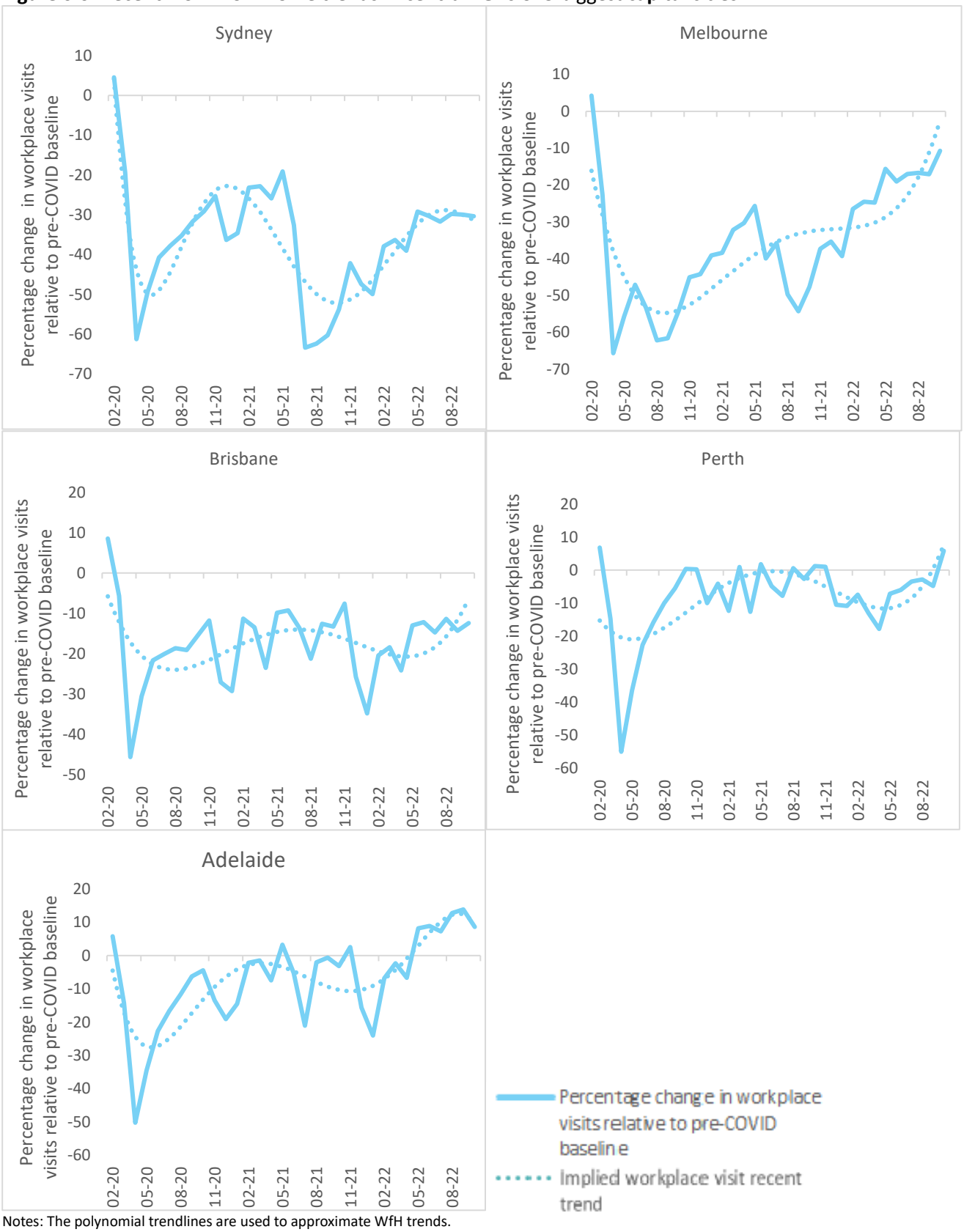
The time-series data from February 2020 to October 2022 presented in Figure 6.6 reveals different trends across the central LGAs of the five biggest capital cities.[32] As of October 2022, the number of visitors to workplaces in the Sydney LGA remained around 30 per cent lower than pre-pandemic levels, implying that the Sydney LGA's WfH uptake remained much higher than its pre-pandemic uptake. The trend was fairly stable over the previous few months, suggesting that WfH uptake may be stabilising for those with a designated workplace in the Sydney LGA and could remain relatively high into the future.

In contrast, the number of visitors to workplaces has trended upward recently for the Brisbane and Melbourne LGAs. Visitors to workplaces in both cities remained 10–15 per cent below the pre-COVID baseline as of October 2022, implying a significantly expanded role for WfH (relative to the pre-COVID baseline). However, the trend line shows a reversion towards pre-COVID levels over the most recent months.

For the Perth and Adelaide LGAs, the number of visitors to workplaces has returned to pre-COVID levels in the second half of 2022. Beyond the initial national lockdown and its aftermath in 2020, the pandemic appeared to have only a limited impact on WfH in the Perth LGA, with visitors to workplaces remaining within 20 per cent of pre-pandemic levels during 2021 and 2022. Workplace impacts in Adelaide during 2021 and 2022 were a little larger, with visitors to workplaces remaining within 25 per cent of pre-pandemic levels. While it may be that people employed in central Perth and central Adelaide had fully returned to their workplaces by October 2022, the results are also consistent with a scenario which combines employment growth in these locations with a small ongoing increase in WfH takeup (relative to pre-pandemic levels). Nevertheless, the results imply that WfH has a less significant current and future role in these LGAs in comparison to the Sydney, Melbourne and Brisbane LGAs.

[32] These charts do not control for growth in the number of employed persons, which is likely to have varied across the LGAs.

Figure 6.6: Recent work from home trends in central LGAs of 5 biggest capital cities

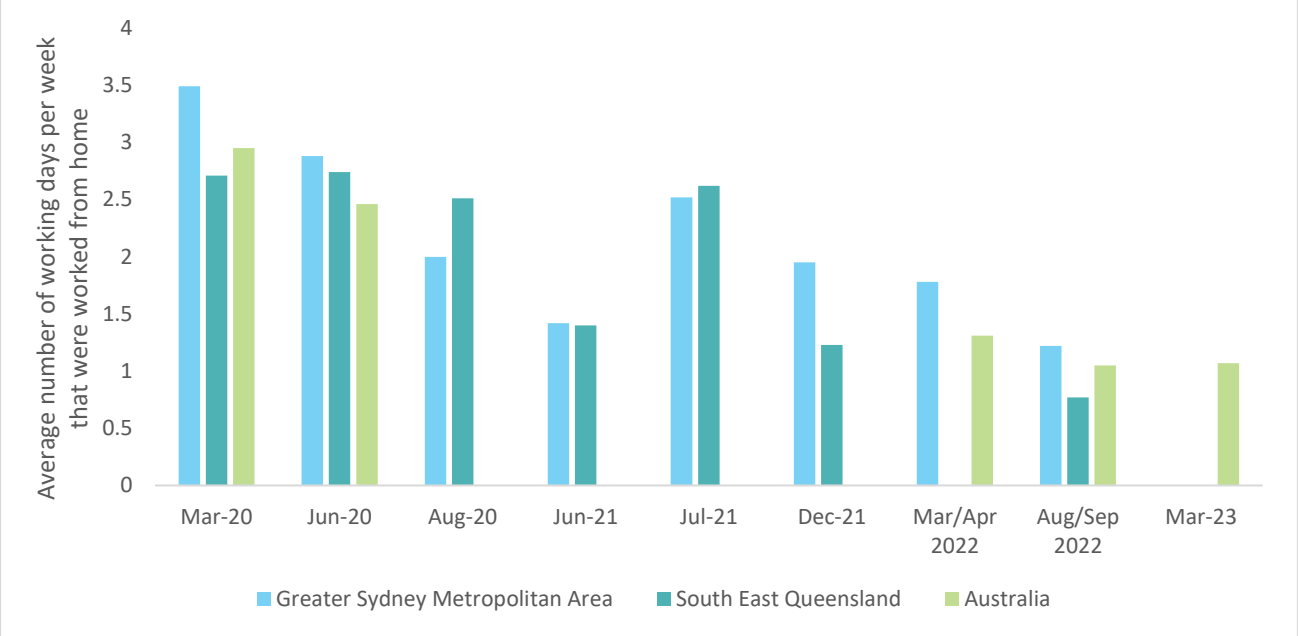


Notes: The polynomial trendlines are used to approximate WfH trends.
Source: BCARR analysis of Google Community Mobility Report data on time spent at workplaces (Google 2022).

Another time-series data source that provides useful insights into recent changes in WfH in Australia is the *Transport Opinion Survey* (Institute of Transport and Logistics Studies 2023) and the research program of the Institute of Transport and Logistics Studies more broadly (Hensher et al. 2023, 2022). Figure 6.7 provides a summary of how WfH has evolved in the Greater Sydney Metropolitan Area, South East Queensland and Australia between March 2020 and March 2023. The highest rates of WfH were observed in the very early

stages of the pandemic in early 2020, but there was a second peak in July 2021 when there were lockdowns in the major east coast cities. The incidence of WfH has trended downward since then in all 3 locations, and appears to be stabilising nationally at just over 1 day WfH per week. This is well above pre-pandemic WfH uptake of around 0.225 working days per week (Hensher et al. 2023). The latest survey data shows that WfH remains higher in Sydney, Melbourne and Brisbane than other locations, and is higher for Professionals than other occupations (Institute of Transport and Logistics Studies 2023).

Figure 6.7: Recent trends in average days per week worked from home, March 2020 to March 2023



Notes: Pre-COVID an average of approximately 0.225 working days per week on average were worked from home.
Source: Adapted by BCARR from Hensher et al. (2023), and supplemented with national data from the *Transport Opinion Survey* (ITLS 2023).

Recent research by the University of South Australia comes to a similar conclusion. Based on qualitative and quantitative data collected from firms and workers during late-2022, Vij et al. (2023) concludes that roughly 20 to 25 per cent of the workforce was working remotely on any given day, which is significantly higher than comparable pre-pandemic estimates of 2-8 per cent.

6.4 Conclusion

This chapter has explored the prospects for WfH in Australia. Employers and managerial employees held different views on the longer-term prospects for WfH. Early in the pandemic, business owners and employers were generally sceptical about using the hybrid model as a long-term strategy beyond the pandemic. Relative to employers, managerial employees (who have at least one direct report) held a more positive outlook, with 79 per cent of managers supporting changes in their company policies to encourage or allow WfH in the long term.

Recent evidence from late 2022 and early 2023 points to WfH stabilising nationally at around 1 day WfH per week per worker, which is well above pre-pandemic levels of around 0.2 days per week (Hensher et al. 2023). There is variation in this pattern across cities, with WfH uptake remaining particularly high in Sydney through to late 2022, while changes in WfH uptake seem to have been relatively modest in Perth and Adelaide.

This study's key contribution has been in providing new evidence on the social, demographic and spatial drivers of WfH in Australian cities, that complements our existing understanding of how job and firm characteristics (such as occupation, industry, firm size and income) influence WfH outcomes. The socio-demographic factors found to have the greatest impact on WfH capability and uptake in the context of Australian cities are the worker's age, educational attainment and disability status. A person's place of residence and place of work are also significant predictors of WfH uptake, with the strongest positive impacts associated with living in Sydney or Melbourne or the Inner ring of one of the five big cities.

This study also undertook some preliminary exploration of the link between WfH and relocation. It presented evidence that individuals with WfH capability/uptake were much more likely to relocate during the pandemic, showing how expanded WfH opportunities could have contributed to increased internal migration outflows from cities to regions during the pandemic. The question of whether this link between WfH and relocation will persist post-pandemic is beyond the scope of the current study. However, a related research project (Vij et al. 2023) investigates the likely medium-term impacts of expanded WfH takeup on internal migration flows and settlement patterns, finding that WfH is likely to play an ongoing role in influencing residential relocation beyond the pandemic.

While this study has provided new evidence on the role of socio-demographic and spatial characteristics in WfH in Australian cities, it also identified a number of gaps in the existing evidence base. Issues that would potentially benefit from further research include

- How do gender and caring responsibilities (for children, or others) combine to influence WfH preferences, capability and uptake?
- What is the relative importance of place of residence and place of work in determining WfH outcomes?
- Does having a longer commuting distance (or commuting time) to the usual workplace serve as an incentive for higher WfH uptake?
- Will the link between WfH and relocation persist post-pandemic? If it does persist, which areas will gain/lose population, and how significant will those population changes be?
- How are employer's views and policies on WfH evolving over time?

Finally, to understand how WfH uptake is changing over time, and the implications for Australian cities and regions, regular and ongoing data collection is crucial. In this study, we used two key data sources to directly monitor changes in WfH over the past few years—the HILDA survey and the Transport Opinion Survey.

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Appendix A Details of interpreting logistic regression coefficients

Table A.1: Details of interpreting coefficients in Table 3.3

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Part-time individual	0.15	0.30	0.40	0.32	0.23	0.33	0.38	0.55	0.23	0.32
Individual with median income or above	0.75	0.44	0.67	0.38	0.79	0.46	0.69	0.63	0.67	0.42
Office-based service industries	1.34	0.59	0.91	0.44	1.43	0.62	1.26	0.75	1.43	0.61
Manager, Professional or Clerical and administrative worker	1.22	0.56	0.60	0.37	1.01	0.51	0.81	0.65	1.03	0.51
Large firm	-0.34	0.21	-0.42	0.17	-0.39	0.21	-0.27	0.39	-0.35	0.21
Managerial employee—has direct report	0.84	0.46	0.91	0.44	0.91	0.49	0.99	0.69	0.83	0.46
Constant	-0.99	0.27	-1.14	0.24	-0.95	0.28	-0.17	0.46	-0.98	0.27

Notes: To transform the coefficient into the probability of having WfH capability and the proportions of the tasks done remotely (or the inverse logit value), the following steps are conducted. Step one, add up the coefficient of the variable with the constant. Step two, compute the exponential value (or the odd ratio) for the step one result. Step three, compute the inverse logit value by dividing the step two result by (1+ the step two result). For example, the coefficient of part-time individual is 0.15 when the dependent variable is WfH capability. step one is equal to –0.84 (or 0.15–0.99). Step two is equal to 0.43 (or exponential of –0.84). Step three is equal to 0.30 (or 0.43/ (1+0.43)). The constant is for a non-managerial employed individual who works full-time in a small or medium firm and works in a non-office-based service industry and occupation with below-median income.
Source: BCARR analysis of iMOVE UniSA survey data.

Table A.2: Details of interpreting coefficients in Table 3.4

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Female	–0.12	0.25	–0.33	0.19	–0.18	0.24	–0.27	0.19	–0.20	0.24
Age (less than 24)	–0.03	0.27	0.19	0.29	0.17	0.31	0.24	0.28	0.16	0.31
Age (over 50)	–0.60	0.17	–0.69	0.14	–0.65	0.16	–0.59	0.14	–0.66	0.16
Bachelor's degree or higher qualification	0.52	0.38	0.61	0.38	0.67	0.42	0.63	0.36	0.61	0.41
Individual with a child	0.25	0.32	0.21	0.29	0.22	0.32	0.19	0.27	0.18	0.31
Individual with disability	0.87	0.47	0.71	0.41	0.60	0.41	0.76	0.39	0.83	0.47
Individual with care commitment	0.27	0.33	0.47	0.35	0.39	0.36	0.44	0.32	0.38	0.36
Part-time worker	0.03	0.28	0.32	0.32	0.13	0.30	0.29	0.29	0.12	0.30
Individual with median income or above	0.65	0.42	0.53	0.36	0.67	0.42	0.55	0.35	0.55	0.40
Office-based service industries	1.30	0.58	0.84	0.44	1.39	0.60	1.21	0.50	1.39	0.60
Manager, Professional or Clerical and administrative Worker	1.06	0.52	0.55	0.37	0.93	0.49	0.76	0.39	0.98	0.50

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Table A.2: Details of interpreting coefficients in Table 3.4 (Continued)

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Large firm	–0.31	0.21	–0.38	0.19	–0.36	0.21	–0.23	0.19	–0.32	0.22
Managerial employee—has direct report	0.60	0.40	0.63	0.39	0.66	0.42	0.73	0.39	0.57	0.40
Constant	–1.00	0.27	–1.09	0.25	–0.98	0.27	–1.19	0.23	–0.97	0.27

Notes: To transform the coefficient into the probability of having WfH capability and the proportions of the tasks done remotely (or the inverse logit value), the following steps are conducted. Step one, add up the coefficient of the variable with the constant. Step two, compute the exponential value (or the odd ratio) for the step one result. Step three, compute the inverse logit value by dividing the step two result by (1+the step two result). For example, the coefficient of female is –0.12 when the dependent variable is WfH capability, step one is equal to –1.11 (or 0.12–0.99). Step two is equal to 0.33 (or exponential of –1.11). Step three is equal to 0.25 (or 0.33/(1+0.33)). The constant is for a male non-managerial employed individual between 24 and 50 who works full-time in a small or medium firm, in a non-office-based service industry and occupation with below-median income, and does not have a Bachelor's degree or higher qualification, a child, a disability or a care commitment.
Source: BCARR analysis of iMOVE UniSA survey data.

Table A.3: Details of interpreting coefficients in Table 4.2

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Female	–0.08	0.19	–0.30	0.15	–0.13	0.18	–0.24	0.14	–0.15	0.19
Age (less than 24)	0.04	0.21	0.23	0.24	0.19	0.23	0.28	0.22	0.18	0.25
Age (over 50)	–0.58	0.12	–0.67	0.11	–0.63	0.12	–0.58	0.11	–0.65	0.13
Bachelor's degree or higher qualification	0.44	0.28	0.56	0.30	0.59	0.31	0.55	0.27	0.53	0.32
Individual with a child	0.29	0.25	0.23	0.24	0.26	0.24	0.23	0.21	0.21	0.26
Individual with disability	0.90	0.38	0.72	0.34	0.62	0.31	0.79	0.32	0.86	0.40
Individual with care commitment	0.32	0.26	0.51	0.29	0.45	0.28	0.49	0.26	0.43	0.30
Part-time worker	0.01	0.20	0.29	0.25	0.11	0.22	0.26	0.21	0.11	0.24
Individual with median income or above	0.65	0.33	0.51	0.29	0.66	0.32	0.53	0.26	0.55	0.33
Office-based service industries	1.31	0.48	0.83	0.36	1.41	0.50	1.23	0.42	1.40	0.53
Manager, Professional or Clerical and administrative Worker	1.06	0.42	0.56	0.30	0.92	0.38	0.76	0.31	1.00	0.43

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Table A.3: Details of interpreting coefficients in Table 4.2 (continued)

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Large firm	–0.30	0.16	–0.37	0.15	–0.36	0.15	–0.21	0.15	–0.29	0.17
Managerial employee—has direct report	0.58	0.31	0.62	0.31	0.65	0.32	0.71	0.30	0.57	0.33
Sydney or Melbourne	0.15	0.23	0.23	0.24	0.33	0.26	0.29	0.22	0.23	0.26
Inner	0.40	0.27	0.12	0.22	0.34	0.26	0.34	0.23	0.40	0.30
Middle	0.26	0.25	–0.06	0.19	0.19	0.23	0.25	0.21	0.27	0.27
Outer	0.01	0.20	–0.15	0.18	–0.12	0.18	–0.14	0.15	0.01	0.22
City population over 250,000	0.17	0.23	–0.02	0.19	0.25	0.24	0.15	0.20	0.02	0.22
Constant	–1.38	0.20	–1.39	0.20	–1.40	0.20	–1.56	0.17	–1.27	0.22

Notes: To transform the coefficient into the probability of having WfH capability and the proportions of the tasks done remotely (or the inverse logit value), the following steps are conducted. Step one, add up the coefficient of the variable with the constant. Step two, compute the exponential value (the odd ratio) for the step one result. Step three, compute the inverse logit value by dividing the step two result by (1+ the step two result). For example, the coefficient of female is –0.08 when the dependent variable is WfH capability. step one is equal to –1.46 (or –0.08–1.38). Step two is equal to 0.23 (or exponential of –1.46). Step three is equal to 0.19 (or 0.23/ (1+0.23)). The constant is for a male non-managerial employed individual between 24 and 50 who works full-time in a non-office-based service industry and occupation for a below-median income, works in a small or medium firm and in a city with a population of under 250,000 persons, and does not have a Bachelor's degree or higher qualification, a child, a disability or a care commitment.
Source: BCARR analysis of iMOVE UniSA survey data.

Table A.4: Details of interpreting coefficients in Table 4.3

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Female	0.09	0.21	–0.09	0.18	0.09	0.20	0.02	0.12	0.10	0.21
Age (less than 24)	–0.02	0.19	0.26	0.23	0.18	0.22	0.35	0.16	0.22	0.23
Age (over 50)	–0.56	0.12	–0.54	0.12	–0.59	0.11	–0.50	0.07	–0.53	0.12
Bachelor's degree or higher qualification	0.50	0.29	0.53	0.28	0.68	0.31	0.57	0.19	0.56	0.29
Individual with a child	0.20	0.23	0.32	0.24	0.22	0.22	0.19	0.14	0.19	0.22
Individual with disability	0.27	0.24	–0.17	0.17	–0.10	0.17	0.30	0.15	0.44	0.27
Individual with care commitment	–0.16	0.17	–0.18	0.16	0.01	0.19	0.12	0.13	–0.06	0.18
Part-time worker	–0.36	0.15	–0.03	0.19	–0.23	0.15	–0.18	0.10	–0.24	0.16
Individual with median income or above	0.47	0.28	0.57	0.29	0.61	0.30	0.42	0.17	0.49	0.28
Office-based service industries	1.13	0.43	0.60	0.30	1.15	0.42	0.94	0.25	1.13	0.42
Manager, Professional or Clerical and administrative Worker	1.26	0.47	0.61	0.30	1.18	0.43	0.95	0.26	1.23	0.45

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Table A.4: Details of interpreting coefficients in Table 4.3 (continued)

	WfH capability		WfH uptake before COVID–19		WfH uptake at the peak of COVID–19		WfH uptake during survey		WfH future uptake	
	Coefficient	Probability of having WfH capability	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely	Coefficient	Proportion of tasks working remotely
Large firm	–0.16	0.17	–0.17	0.17	–0.21	0.16	0.08	0.13	–0.06	0.18
Managerial employee—has direct report	–0.63	0.12	–0.04	0.18	–0.39	0.13	–0.23	0.10	–0.41	0.14
Sydney or Melbourne	–0.10	0.18	0.14	0.21	–0.03	0.18	0.03	0.12	–0.11	0.18
Inner	0.32	0.25	0.17	0.22	0.25	0.23	0.12	0.13	0.34	0.25
Middle	0.14	0.22	–0.08	0.18	0.10	0.20	0.21	0.14	0.21	0.23
Outer	0.09	0.21	–0.20	0.16	–0.13	0.17	–0.17	0.10	0.10	0.21
City population over 250,000	0.37	0.26	0.13	0.21	0.46	0.27	0.51	0.18	0.08	0.20
Sydney CBD	0.57	0.30	0.68	0.32	0.69	0.31	0.78	0.22	1.07	0.41
Melbourne CBD	0.84	0.36	0.44	0.27	1.42	0.49	0.92	0.25	0.92	0.37
Distance between place of work and residence is greater than 20 KM	0.01	0.20	0.20	0.22	0.27	0.23	–0.09	0.11	–0.17	0.17
Constant	–1.40	0.20	–1.45	0.19	–1.47	0.19	–2.02	0.12	–1.44	0.19

Notes: To transform the coefficient into the probability of having WfH capability and the proportions of the tasks done remotely (or the inverse logit value), the following steps are conducted. Step one, add up the coefficient of the variable with the constant. Step two, compute the exponential value (or the odd ratio) for the step one result. Step three, compute the inverse logit value by dividing the step two result by 1+the step two result. For example, the coefficient of female is –0.09 when the dependent variable is WfH capability. step one is equal to –1.31 (or –0.09–1.40). Step two is equal to 0.27 (or exponential of –1.31). Step three is equal to 0.21 (or 0.27/ (1+0.27)). The constant is for a male non-managerial employed individual between 24 and 50 who has a designated workplace (with a travel distance between place of work and residence over 20kms) and works full-time in a non-office-based service industry and occupation for a below-median income, works for a small or medium firm in a city with a population of under 250,000 persons, and does not have a Bachelor's degree or higher qualification, a child, a disability or a care commitment,.

Source: BCARR analysis of iMOVE UniSA survey data.

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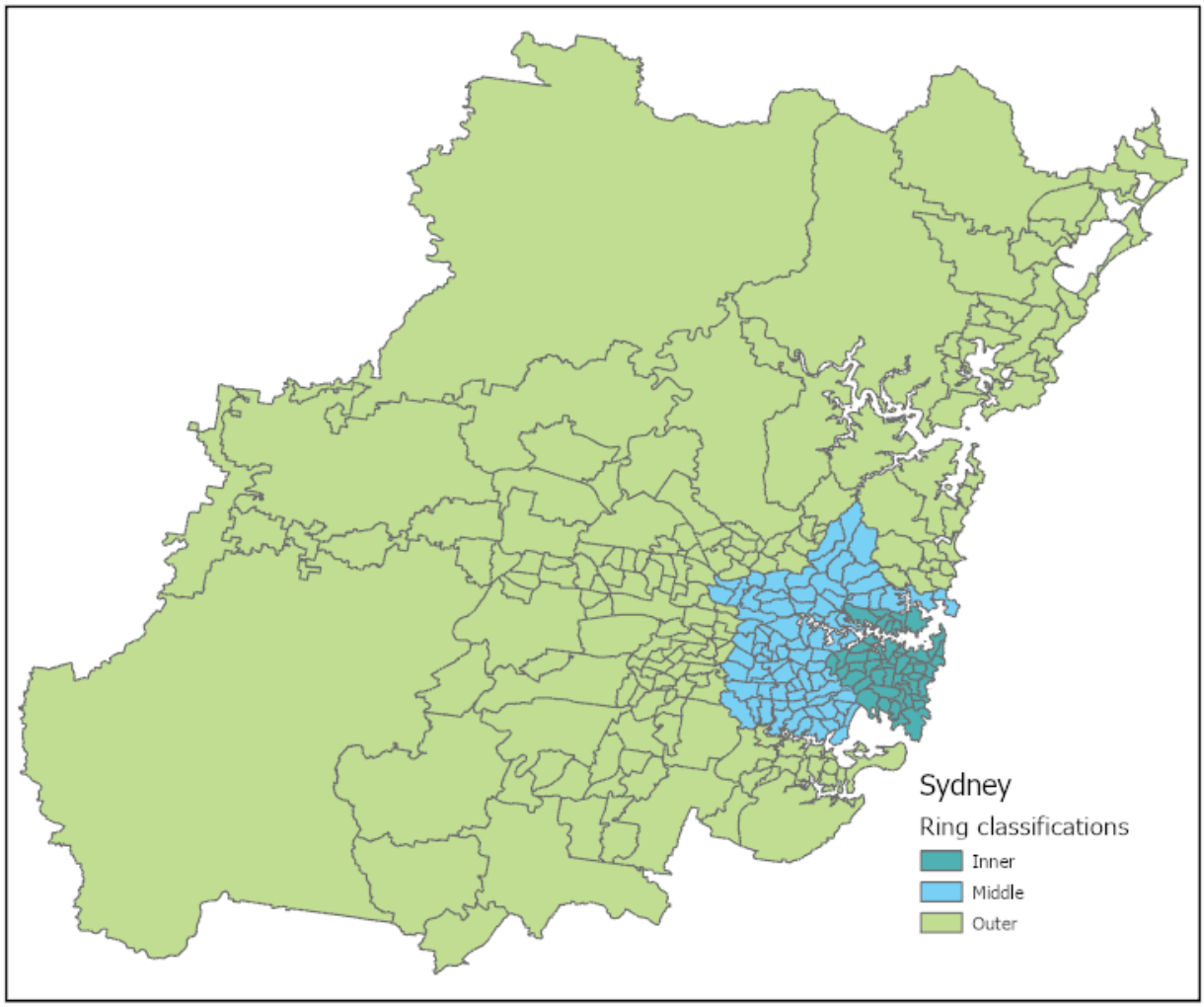
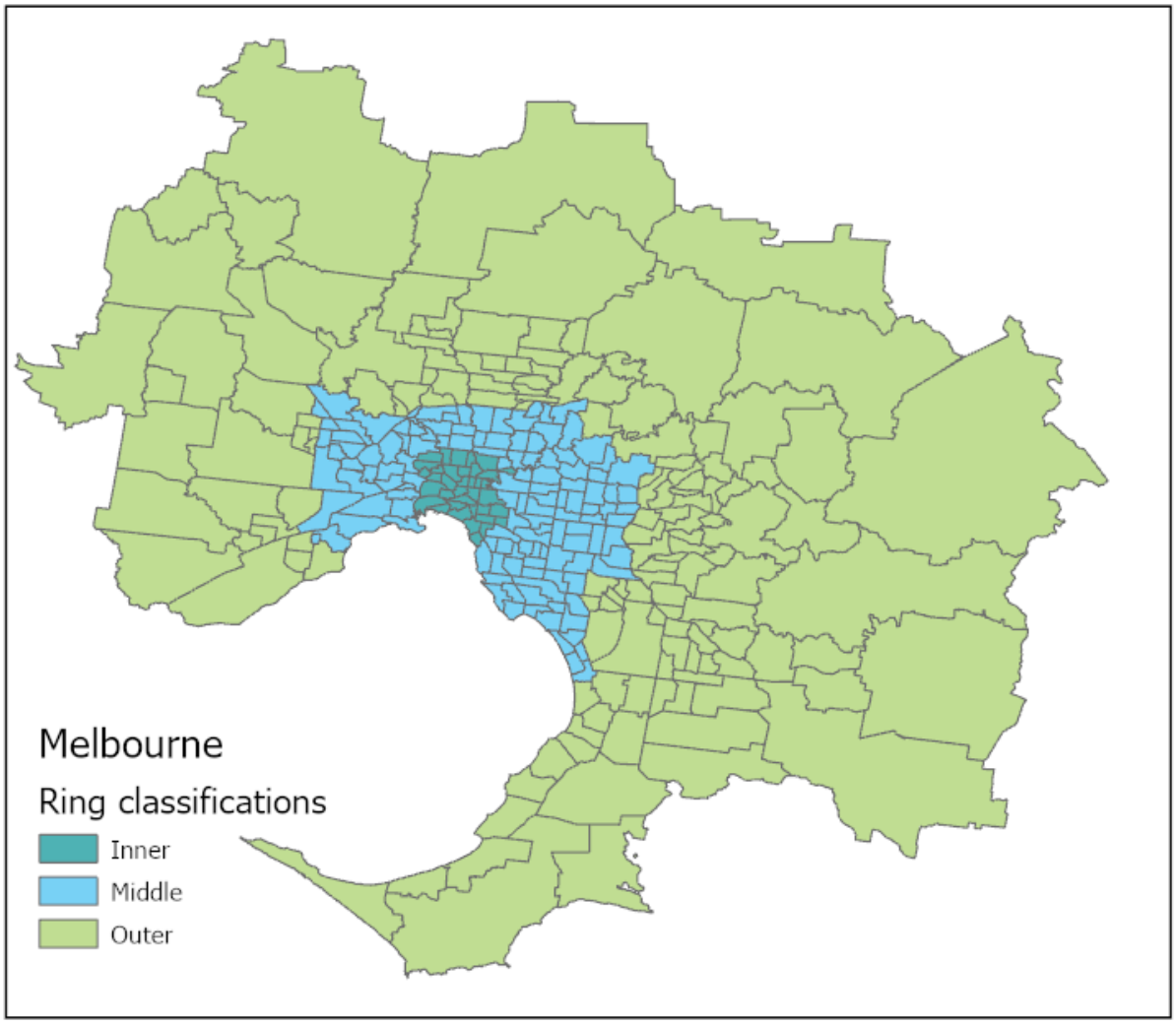
Appendix B Map of Inner, Middle and Outer sectors

Map B.1 Inner, Middle and Outer sectors of Sydney



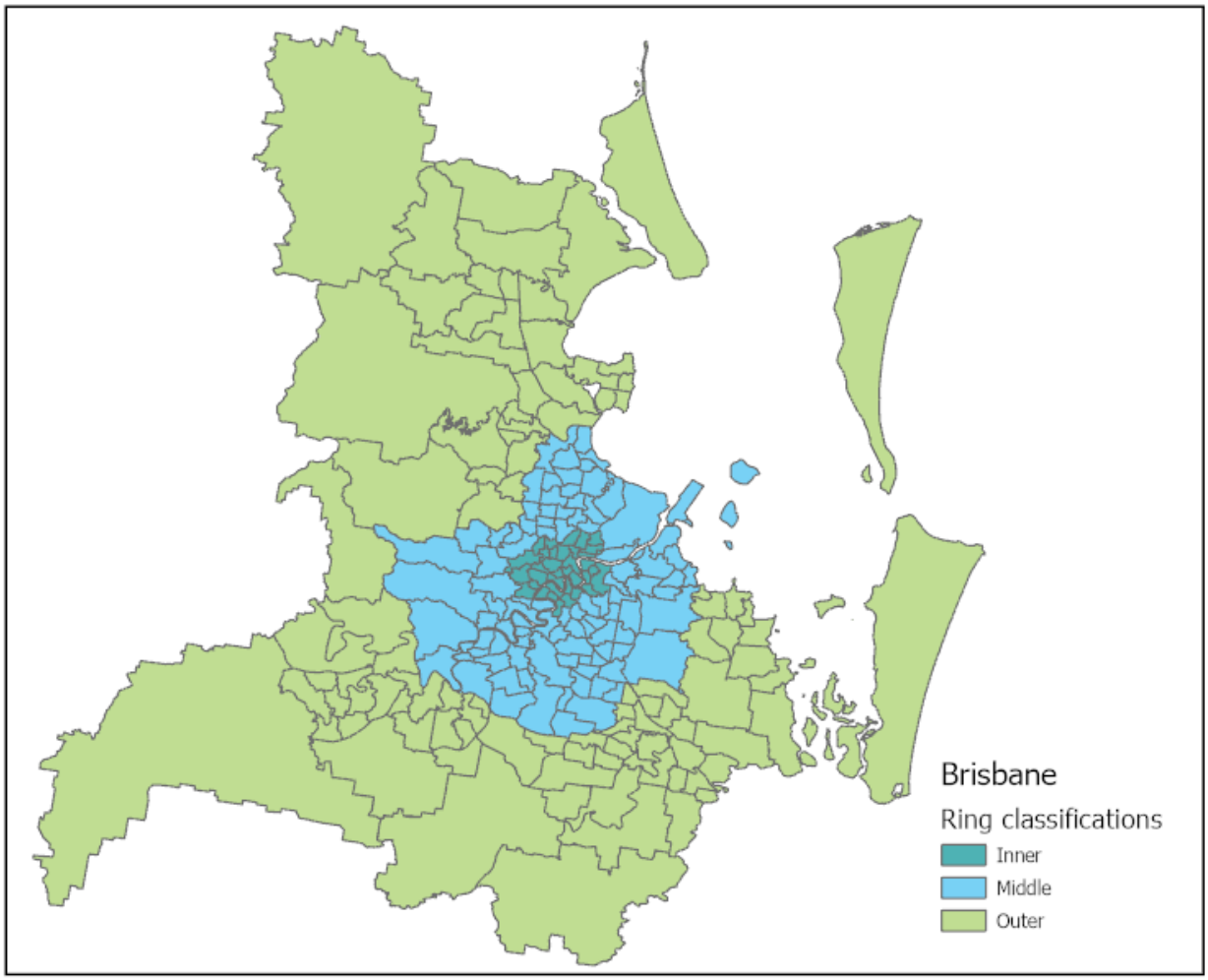
Note: Sydney has been disaggregated into BCARR's Inner, Middle and Outer Sectors, based on ABS 2016 GCCSA Statistical Area 2 (SA2) boundaries.
Source: BCARR analysis of ABS 2016 SA2 boundaries.

Map B.2 Inner, Middle and Outer sectors of Melbourne



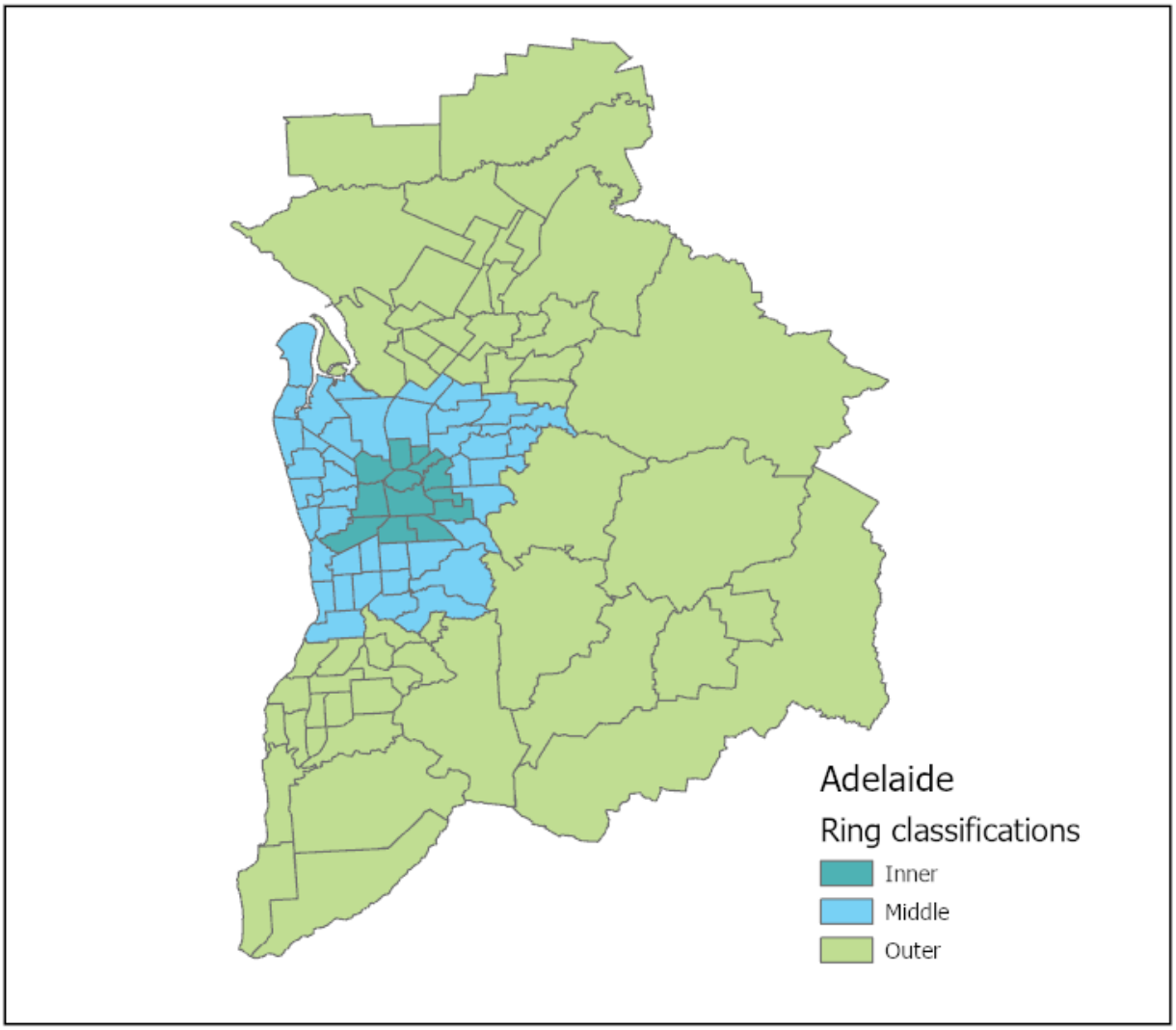
Note: Melbourne has been disaggregated into BCARR's Inner, Middle and Outer Sectors, based on ABS 2016 GCCSA Statistical Area 2 (SA2) boundaries.
Source: BCARR analysis of ABS 2016 SA2 boundaries.

Map B.3 Inner, Middle and Outer sectors of Brisbane



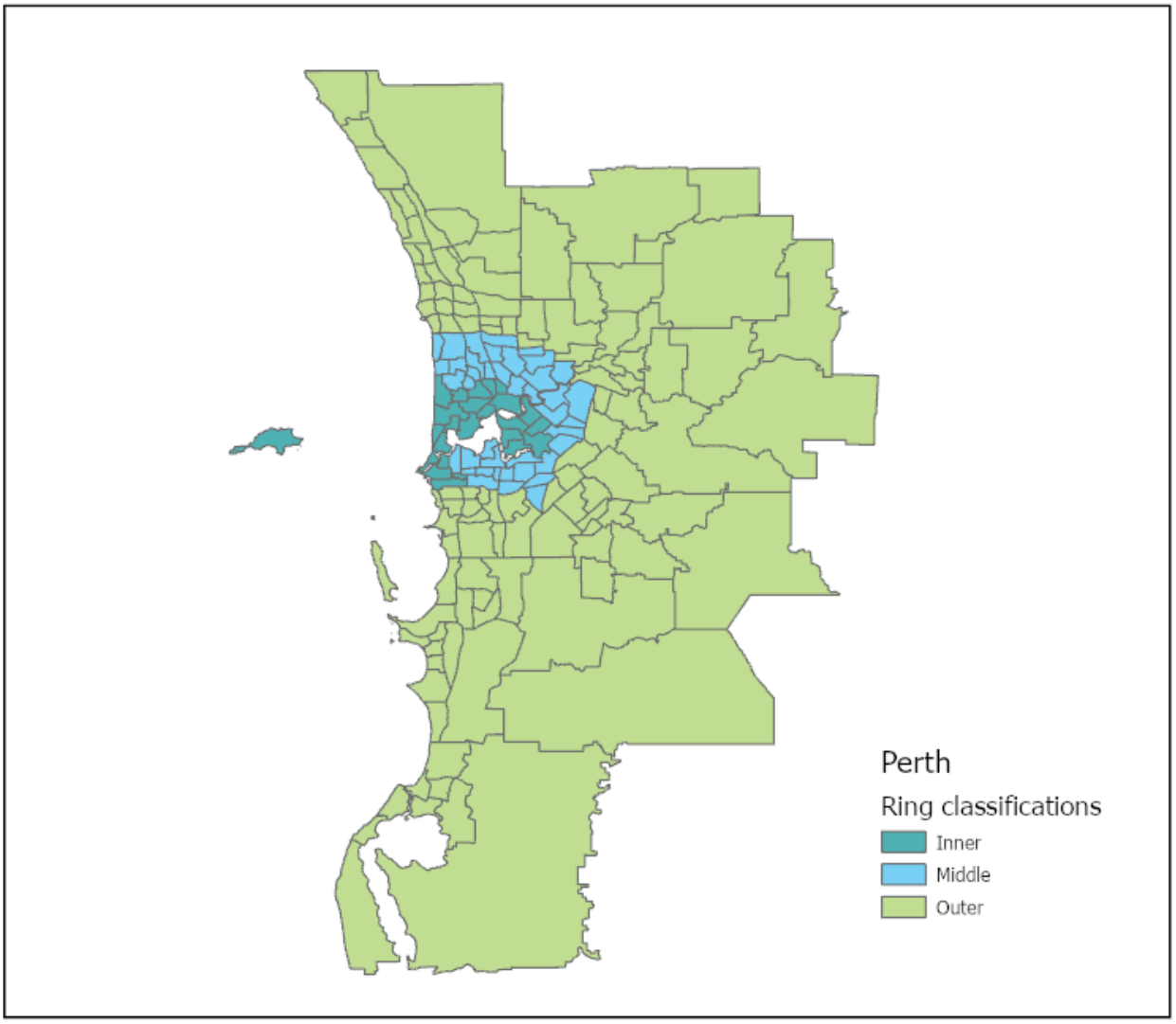
Note: Brisbane has been disaggregated into BCARR's Inner, Middle and Outer Sectors, based on ABS 2016 Statistical Area 2 (SA2) boundaries.
Source: BCARR analysis of ABS 2016 SA2 boundaries.

Map B.4 Inner, Middle and Outer sectors of Adelaide



Note: Brisbane has been disaggregated into BCARR's Inner, Middle and Outer Sectors, based on ABS 2016 GCCSA Statistical Area 2 (SA2) boundaries.
Source: BCARR analysis of ABS 2016 SA2 boundaries.

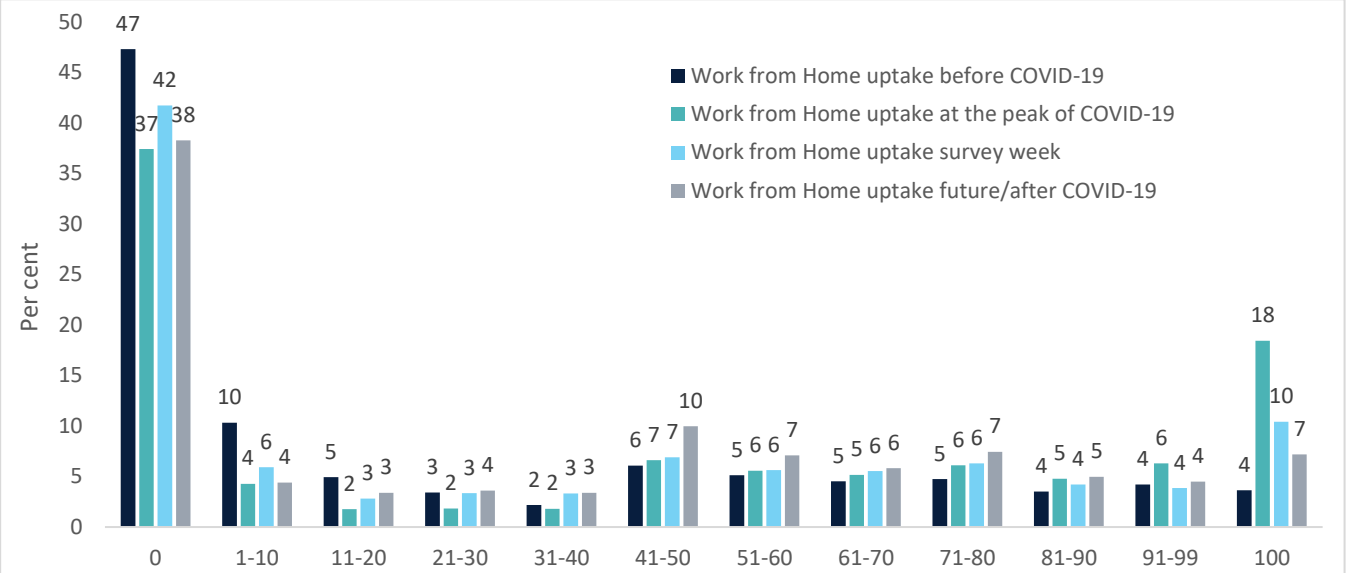
Map B.5 Inner, Middle and Outer sectors of Perth



Note: Brisbane has been disaggregated into BCARR's Inner, Middle and Outer Sectors, based on ABS 2016 GCCSA Statistical Area 2 (SA2) boundaries.
Source: BCARR analysis of ABS 2016 SA2 boundaries.

Appendix C Histogram of Work from Home uptake

Figure C.1 Work from Home uptake histogram



Source: iMOVE UniSA unweighted survey data

Appendix D Odds ratio of Work from Home capability

Figure D1 Odds ratio of Work from Home capability in logistic regression

	Table 3.3	Table 3.4	Table 4.2	Table 4.3
Part-time individual	1.16	1.03	1.01	-0.70
Individual with median income or above	2.12	1.92	1.92	1.60
Office-based service industries	3.82	3.67	3.71	3.10
Manager, Professional or Clerical and administrative Worker	3.39	2.89	2.89	3.53
Large firm	-0.71	-0.73	-0.74	-0.85
Managerial employee—has direct report	2.32	1.82	1.79	-0.53
Female		-0.89	-0.92	1.09
Age (less than 24)		-0.97	1.04	-0.98
Age (over 50)		-0.55	-0.56	-0.57
Bachelor's degree or higher qualification		1.68	1.55	1.65
Individual with a child		1.28	1.34	1.22
Individual with disability		2.39	2.46	1.31
Individual with care commitment		1.31	1.38	-0.85
Sydney or Melbourne			1.16	-0.90
Inner			1.49	1.38
Middle			1.30	1.15
Outer			1.01	1.09
City population over 250,000			1.19	1.45
Sydney CBD				1.77
Melbourne CBD				2.32
Distance between place of work and residence is greater than 20 km				1.01
Constant	-0.37	-0.37	-0.25	-0.25