Skill Utilisation in Australia: A Response to the Proposed 3Ps Solution to the Implications of Population Ageing

by

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Submitted in fulfilment of the requirements for the Doctor of Philosophy, Arts

University of Tasmania March, 2018

Declaration of originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

1 March 2018

Preface and acknowledgements

This has been a labour of love. While it had been an aspiration of mine for some years, the actual PhD journey started six and a half years ago, following the birth of my son. Studying for a PhD allowed me to balance caring for my son with maintaining a connection with the world of work in a flexible way (whilst also appreciating and enjoying adult interaction). The journey included many life events and turning points, including separation and divorce, periods of self-employment and employment, and re-partnering, and all the while being a mother. So far, over my life course, my research has always kept me grounded and has enabled me to stay connected with my identity and my interests. As my life continues on its path, I hope I can always continue to choose the adventure that will let me use my 'accumulated human capital' effectively as well as balance it with my family commitments to maximise the chances of a 'successful life outcome' for us all.

Like the work-life course, the journey of this PhD has not been a solo one. There are many people who have been with me and whom I must acknowledge and thank. First and foremost is Professor Natalie Jackson. While Natalie's reputation preceded her, we met at a speed networking event for women in the early 2000s. It was then that my life as a workforce demographer began. Next are my parents, Hugh and Kaye, for their unwavering support in everything I do. Their mantra as I was growing up still echoes in my mind today: "The best gift we can give you as parents is an education." To my son, Rory, my greatest teacher, who always keeps me grounded and is a reminder of what is important in life.

Thanks must go to the Australia Population Association, first for the grant that enabled me to purchase the dataset for this research, but mostly for the network of professional and academic support and friendship it has provided me over many years – with particular mentions to Alison, Kim and (the late) Graeme. Thanks also to those at the School of Social Sciences, particularly to my supervisor Bruce, for your measured and valued insight (and also for taking on a population-level analyst!). My thanks to Daphne, Richard and Emily for your interest and support over the years, and to my PhD compatriots, Brendan and Susan, for your moral support, friendship and wise counsel in all things pertaining to academia and life. To my sister, Anna, and my brother-in-law, Matt, and to my great friends, Karen, Liv and Frances, for being you on my journey. And finally to Dave, my new love; thank you for showing me what life is really about.

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List of acronyms

3Ps	Three Ps - productivity, participation and population
ABS	Australian Bureau of Statistics
ACLD	Australian census longitudinal dataset
ACMID	Australian Census and Migrants Integrated Dataset
ANZSCO	Australia New Zealand Standard Classification of Occupations
AQF	Australian qualifications framework
ASCED	Australian Standard Classification of Education
AWPA	Australian Workplace and Productivity Agency
DC	Dependent children
DoE	Department of Employment
EAW	Employed, away from work
EFT	Employed, full time
EPT	Employed, part time
FoSOQ	Combination of field of study mismatch and over-qualification
FoSUQ	Combination of field of study mismatch and under-qualification
GDP	Gross domestic product
HCT	Human capital theory
IGRs	Intergenerational reports
ISCO	International Standard Classification of Occupations
NC	No children
NDC	Non-dependent children
NILF	Not in the labour force
OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
VET	Vocational education and training

Abstract

The solution proposed by successive Australian governments to the challenges of an ageing demographic is to foster economic growth through a policy framework designed to increase the Three Ps (3Ps) – productivity, participation and population. Raising the skill level of a population has become the primary objective of national economic policies to increase productivity, yet current understandings of the optimal use of skills are limited and based on a relatively weak knowledge base.

This thesis explores whether the existing complement of education and skills held by Australians is being effectively utilised in the Australian labour market to determine the existence of any foregone productivity growth. The return on human capital investment in the form of skill utilisation is an indicator of potential successful life outcomes for an individual over their life course, and is also as an indicator for macro-level productivity performance and for economic and social well-being.

Using a conceptual framework based on human capital theory and principles of the life course, this thesis develops an indicator of skill utilisation which enables analysis of the Australian population aged 25 to 64 years of age with post-school qualifications. The indicator also enables the type of skill mis-utilisation to be identified; either field of study mismatch (skill mismatch), over-qualification or under-qualification (education mismatch) or a combination of skill mismatch and education mismatch. Skill utilisation is examined by occupation, labour force status, educational attainment, field of study and sex.

Using demographic and life course variables, the thesis explains how factors such as ageing, the presence of a partner, and/or the presence of a child affect skill utilisation over the lifespan, how the experience differs for men and women, and how they engage with work.

The thesis finds that just two in five Australians are effectively utilising their complement of skills in the workforce. In other words, three in five Australians are not maximising their potential successful life outcomes, compromising productivity performance at the macro level. Those employed full time experienced the highest level of skill utilisation – predominantly men. Skill utilisation was the lowest for those employed part time (and not employed at all) – predominantly women. Notably, those employed part time were twice as likely to experience a combination of field of study mismatch and over-qualification as those employed full time. Regardless of human capital accumulation, it is the presence of a partner and/or the presence of a child and the associated level of engagement with the workforce, different for men and women, which is ultimately correlated with the level of skill utilisation experienced by each population group.

The high level of under-utilisation of skills in Australia suggests further investment in education and skills will not automatically equate to improved productivity. Targeted skill investment and the improvement of skill utilisation, as well as workplace reform, are viable, complementary policy alternatives for increasing productivity, and subsequently economic growth, in response to the challenges of an ageing population.

Chapter one
Introduction

The solution of successive Australian governments to the challenges of an ageing population has been to foster economic growth through a policy framework that increases the three Ps (3Ps): productivity, (labour force) participation and population. Raising the educational attainment and skill level of a population has become a primary objective of national economic policies to increase productivity, yet current understandings of the optimal use of skills is limited, and is based on a relatively weak knowledge base.

The purpose of this thesis is to explore whether the existing education and skills of Australians are being effectively utilised in the Australian labour market. This will enable the identification of any foregone productivity growth and provide input to future policy development for improved productivity. This is particularly important given that investing in human capital accumulation over a lifespan is theorised to improve both social and economic outcomes at both individual and macro levels (Deloitte Access Economics 2005; Becker 1964; Heinz 2001; Pallas 2003; Smith 1991 [1776]). This thesis will expand the identification of the following types of skill under-utilisation: field of study mismatch (skill mismatch); over- qualification (education mismatch); or a combination of skill and education mismatch. It also identified instances of under-qualification. For simplicity throughout the thesis, under-qualification is included in the population considered to be under-utilised. This inclusion is justified on the basis that under-qualified persons' productivity potential may not be maximised requiring a policy intervention. The thesis will also provide a socio-demographic profile of those population groups not effectively utilising their complement of skills in the workforce over their lifespan.

This research is underpinned by Human Capital Theory (Becker 1964) and the principles of the life course (Elder, Johnson & Crosnoe 2003), more specifically, the theory of rational choice. Individuals have an interest in ongoing investment in a successful life, and this investment benefits from previous life course decisions and from valid expectations of future opportunities (Heinz 2001). Ultimately, it is an individual's choice to invest in human capital accumulation and their life decisions which affect their engagement with the labour market and the subsequent deployment of their skills.

This chapter sets out the research problem to be addressed in this thesis. It provides an overview of the perceived challenges of population ageing before outlining the Australian Government's proposed solution. This chapter will then introduce the concept of skill utilisation and explain its

relationship with productivity, as well as with the development of an indicator of skill utilisation. Next, the contribution of this research and its potential for wider application will be addressed, and the structure for the remainder of the thesis set out.

The contribution of this thesis to the literature is a quantitative measure of skill utilisation which can be replicated and used to compare skill utilisation across jurisdictions, as well as to inform the development of a tool for benchmarking and evaluating policy implementation. More specifically, the research provides evidence of the under-utilisation of Australians' education and skills in the labour market over the lifespan, which can be used to inform an alternative, complementary way to increase productivity growth, namely by improving skill utilisation.

Research problem

Background

In a survey of 970 demographers, Van Dalen and Henkens (2011) identified that the most important issue confronting demographers today is population ageing. Understandably, much debate therefore surrounds the causes and implications of, the opportunities presented by, and solutions to population ageing. Population ageing is the final iteration of a global, four phase process known as the demographic transition, underpinned by a theoretical framework initially formulated by Frank Notestein (1945). However, while this demographic transition is a worldwide phenomenon, there is vast disparity in how it is experienced, resulting in the world's regions becoming increasingly demographically diverse (United Nations 2013a, 2015).

Given the projected change in the age structure of the Australian population and the associated decline in labour force participation rates, it is assumed that productivity growth will be the greatest contributor to economic growth in the future (Commonwealth of Australia 2015; Productivity Commission 2013), despite prolonged slowing of the productivity growth rate (Eslake & Walsh 2011; Parham 2012; Productivity Commission 2017).

Population ageing

Population ageing is a relatively slow but certain and profound change in the age structure of a society. Defined as an increase in the median age of a population over time, population ageing causes a fundamental shift in population trends towards an older age structure. The ageing of a population is further described as either numerical or structural. Numerical ageing refers to the absolute increase in the number of elderly people, and is primarily caused by improvements in life expectancy. Structural ageing refers to the relative increase in the proportion of the population that

is older, and is primarily caused by a decline in fertility rates, which decreases the proportion of the population that is young (Henry 2004; Jackson 2001, 2007). However, it is the decline in fertility rates that is currently having the largest effect on population ageing (McDonald 2016).

Compared with other OECD countries, Australia is well positioned to manage the challenges of population ageing. This is primarily due to the fertility rate being relatively higher than other countries (around 1.8 compared with the very low fertility rate of 1.5 births per woman in Japan and some European countries), a demand-driven migration programme, and a relatively stronger economy (Gong & Kendig 2016; McDonald 2012a, 2016; Piggott 2016). Even so, policy makers have responded slowly to population ageing, which may have restricted Australia's capacity to respond constructively (Gong & Kendig 2016).

The literature varies widely with respect to the implications of population ageing. Generally there is consensus regarding the economic implications of population ageing in terms of the ability to fund increasing demand for health- and aged care-related services and retirement support from a diminishing supply of labour while maintaining infrastructure and the government's fiscal position (Productivity Commission 2013). It is in the extent of the implications and the degree of policy change required to mitigate them where debate arises. That said, social, political, cultural and economic circumstances within countries differ considerably, and therefore emulating policies from another country may not be successful, particularly with respect to the uniqueness of each country's health, retirement and welfare systems. In fact, the fiscal implications of population ageing are likely to result from the institutional framework supporting these systems (Mitchell & Mosler 2003, 2006). Therefore, this debate is grounded on the extent to which the implications of population ageing, and the solutions to it, challenge the very foundations of the social system (Piggott 2016).

Rowland (2009) refers to population ageing as the 'inconvenient truth' of demographic change, a change that presents both economic and social challenges, not just in the form of increasing dependency on public resources, but also in the threat it poses to future economic prosperity, standards of living and the ability of the population to maintain itself. In the worst case scenario, population ageing will decrease the supply of labour, decrease consumption, decrease savings rates, decrease business profits, reduce production, decrease asset values, decrease wages, increase debt and decrease economic development, resulting in declining economic growth and diminishing standards of living (Bloom 2011; Bloom, Canning & Fink 2010; Eberstadt 2012; Herrmann 2012; Reher 2011, 2012; United Nations 2013a).

Early intervention in policy frameworks such as retirement age, pensions, health care, labour market and workplace arrangements, business practices, social support, innovation and technology, capital efficiency and investment all potentially provide ways to mitigate the risks associated with population ageing (United Nations 2013b). However, failure to adequately account for a changing composition of dependency could result in ineffective policy responses (Herrmann 2012; Piggott 2016). Some even go so far as to suggest that population ageing poses a greater political risk than any economic challenge, implying that any policy adjustments could be more costly than allowing the implications themselves to go unchecked (Lee 2011). This is particularly so given that public services are generally funded on a 'pay-as-you-go' basis, a system of intergenerational transfers described as a redistribution of wealth in which current benefits are paid by current taxation (Creedy 2000). Given the larger proportion of older voters in an ageing population, policy adjustments such as increasing taxes and health care contributions could lead to the disenfranchisement of youth, and potentially to political and economic upheaval (Herrmann 2012; Lee 2011; Lee, Mason & Cotlear 2010; Piggott 2016). As such, the general consensus is to focus on policy adjustments aimed at fostering increased economic growth, which may or may not include labour market policies.

3Ps policy framework

The productivity, (labour force) participation and population policy directions under the 3Ps policy framework, designed to increase economic growth in Australia, are derived from fiscal and demographic projections set out in four periodic Intergenerational Reports (IGRs) (Commonwealth of Australia 2002, 2007, 2010, 2015), a requirement under the Australian Government's *Charter of Budget Honesty Act 1998*. These IGRs are intended to both inform and justify future policy development. Since the first IGR, released by the Howard government in 2002 (which formed the 5th budget paper within the annual budget process), the reports have evolved. These changes reflect not only changes in projected demographic and economic circumstances, but also in government ideology, from the Liberal/National Coalition in 2002 and 2007, to Labor in 2010, then back to the Coalition in 2015. Over time, the IGRs have become increasingly political, being used as tools to drive successive governments' political and fiscal priorities, and treating the ageing population as a scapegoat (Kendig 2010, 2017; Kendig & Woods 2015). While a significant contribution of the IGRs has been introducing demographic change and its implications into the public discourse (Gruen & Spender 2012), this also has the potential to fuel intergenerational conflict (Piggott 2016).

The overall objective of the IGRs is to provide an explanation of how the Australian Government will balance future federal expenditures and revenues over a forty-year period while taking demographic influences into consideration. The IGRs make assumptions regarding population growth, age

structure, productivity growth, economic growth, and the cost of government services, particularly those services most sensitive to population change: health, education and welfare support. Each successive report has suggested an improved fiscal position, subject to policy intervention, but also increasing challenges as a result of demographic change, even though each report has simultaneously projected a population relatively younger than the previous one (McDonald 2016). As such, governments have asserted that by increasing the 3Ps both the economy and society will benefit, as not only will economic growth be stimulated, but standards of living will also increase.

The latest IGR (Commonwealth of Australia 2015) projects that the number of people aged 65 to 84 by 2054/55 will be more than double 2015 figures, and that the number of people aged over 85 will more than quadruple, to 4.9 per cent of the population. Thus, the ratio of people of working age to people of old age will fall from 4.5 in 2015 to 2.7 by 2054/55 (compared with 7.5 in 1970). Given these structural changes, the 2015 IGR projects that the labour force participation rate will fall to 62.4 per cent, compared with 64.6 per cent in 2015. Further, population growth will slow to 1.3 per cent per annum (compared with a 40 year average of 1.4 per cent per annum), and labour productivity growth will be maintained at 1.5 per cent per annum, considerably slower than the 2.2 per cent average during the 1980s and 1990s.

Since the first IGR in 2002, the reports have projected vastly differing outcomes, both fiscally and in terms of population, highlighting how quickly scenarios can change. The most recent report (2015) suggests a much improved position (upon implementation of proposed policies) compared with earlier reports. The gap between revenue and expenditure has been projected to close from 5.5 per cent of gross domestic product (GDP) in 2002 to a 'sustained surplus from 2019/20' in the 2015 report, and the economic growth rate has been projected to be from between 2.0 per cent per annum in the 2002 report to 2.8 per cent per annum in the 2015 report. Whether these differences have occurred as a result of policy positions, changes in methodology, or changes in demographic inputs is another matter. While the IGR model treats demographic inputs as exogenous and not influenced by the economic or social outcomes of the model, the demographic assumptions between the four reports are vastly different. This indicates that demographic inputs can change in a relatively short timeframe (McDonald 2016). Further, some theorists suggest the IGR projections are a product of the reports' assumptions, rather than on realistic scenarios, meaning that little credibility can be attached to the figures. Others go so far as to assert that the IGR process suffers from 'assumption myopia' (Chomik & Piggott 2012b), with a complete lack of clarity regarding the assumptions and the methodology employed. These assumptions are based on policies designed to increase labour productivity growth, mature age labour force participation rates, female labour force

participation rates, and demographic inputs such as immigration and fertility. As such, there is much debate in the literature as to the validity of the IGRs, from both a fiscal and demographic perspective.[1]

Throughout the four IGRs, the Australian Government refers to increasing economic growth being achieved from growth in GDP per capita, thus increasing the living standards of all people. Growth in GDP per capita is expressed in the IGRs as the product of growth in hours worked per person (labour utilisation), and growth in GDP per hour worked (productivity). This is based on the premise that the level of an individual's educational attainment and skills is a key determinant of their participation in the labour force, and that improving educational attainment and skills also contributes to increased productivity. This interpretation of growth in GDP assumes that a person is maximising the use of their human capital (skills) for every hour worked. There is evidence, however, that this is not the case.

Productivity

While few specific policy initiatives are suggested in the IGRs, the 2015 report maintains that the ongoing improvement of Australian living standards will remain primarily contingent upon continuous improvement in productivity and will also require every effort to increase labour force participation rates (Commonwealth of Australia 2015).

The identification of productivity as the key driver for economic growth appears to be more a process of elimination than of strategic foresight, given that as the population ages, the other 'Ps' – participation and population – are projected to reduce GDP growth. Specific policies to achieve increased productivity are scant, or take the form of sweeping statements of intent: 'better use of technology', efficient provision of infrastructure' and 'regulatory reform', as well as 'improving human capital investment' (Commonwealth of Australia 2015); though admittedly this is a positive shift from the 'improving the skills base of the workforce' statement in the 2010 report (Commonwealth of Australia 2010).

In addition to the IGRs, the Australian Government has a range of vehicles it can use to facilitate policy development in order to enhance productivity, and the Productivity Commission (PC) is perhaps the most powerful of these. Given that the primary objective of the PC is to enhance the

[1] For further discussion with regard to the validity of the IGR process see Birrell and Betts (2015); Birrell et al. (2011); Chomik and Piggott (2012a, 2012b); Kendig (2010, 2017); Kendig and Woods (2015); McDonald (2012b, 2016); McDonald and Dowrick (2002); Mitchell and Mosler (2003, 2006); Wilson (2009).

quality of life of Australians, it makes its recommendations on the basis of two criteria: 1) that they ensure net benefits for Australians, and 2) that the recommendations are superior to any alternative policy option.

As David Gruen of the Department of the Treasury put it in a 2012 speech, the broad role of government in improving productivity is to get the underlying policy settings right. This sentiment was echoed by the treasurer, Scott Morrison, at the release of the Productivity Commission's (Productivity Commission 2017, p. 3) first five-yearly productivity review:

> *Governments have an important influence on productivity growth, including through policies and regulations that affect investment in human and physical capital and the functioning of markets, including with respect to trade, competition and other regulatory constraints and incentives.*

These five-yearly reviews are designed to "shift the dial" on the underlying causes of Australia's mediocre productivity, and will be a microeconomic complement to the periodic IGRs (Productivity Commission 2017, p. 32).

The challenge of increasing labour productivity is dependent upon the relationship between the education and training system and the labour market. Banks (2012) suggests that improvements in labour productivity begin in the workplace and can only really be achieved through change within individual enterprises and organisations. The role of all levels of government is to create an environment, and set the framework, in which institutions and enterprises operate to enable sound decision-making through policy development, regulation and legislation to provide macroeconomic stability, microeconomic frameworks and investment in infrastructure (Australian Treasury 2009; Commonwealth of Australia 2010; Productivity Commission 2017). The government is also able to influence productivity-enhancing measures by providing incentives and flexibility to institutions and enterprises which motivate change, enabling them to change. The implication here is that change must occur from the employer's perspective, but there is little employers can do without regulatory reform. This suggests that the development of policy to improve productivity must be undertaken concurrently with regulatory reform, as well as with the development of education and training policy. Moreover, Parkinson (2011) argues that reform needs to be a continuous process, not a one-off event, given the lag between reform and measurable productivity improvements, which themselves require ongoing monitoring, management and refinement.

Skill utilisation

'Skill utilisation' under that name is a relatively new concept in scholarship and practice. As yet, there is no consensus on a conceptual framework for skill utilisation, despite considerable effort (see, for example, Buchanan et al. (2010); Payne (2010); (Payne 2017); Scottish Government Social Research (2008); Skills Australia (2011, 2012)). Even so, there has been a significant shift in policy discourse to link the supply of skills to their effective deployment in the workplace on the basis that skills must be effectively utilised if those skills are to be used to achieve the overall policy objectives of increasing economic and social well-being in an interdependent economic environment (Buchanan et al. 2017; Payne 2012; Scottish Government Social Research 2008). That said, efforts to improve skill utilisation through appropriate policy development is in "relatively uncharted territory"; policy makers being unfamiliar with the concept, and there being a lack of explicit research into how to measure and evaluate it (Keep 2016, p. 7). Livingstone (2009, 2017) suggests that the most powerful and useful framework for analysing skill utilisation is that of skill *under*-utilisation. The under-utilisation of skills represents a loss to the individual, the employer, the economy and society (Skills Australia 2012) and is a growing policy concern (Buchanan et al. 2017; Skills Australia 2010).

This thesis makes a considerable contribution to the scholarship on the nexus between skill utilisation and productivity, and does so while incorporating a life course perspective.

Purpose

In order to determine the completeness of the Australian Government's 3Ps policy framework to address the implications of population ageing, this thesis explores whether the existing level of education and complement of skills held by Australians is being effectively utilised in the Australian labour market. This will enable the identification of any foregone productivity growth and provide input to future policy development for improved productivity.

Using demographic techniques, the research will investigate whether the skills of Australians are effectively utilised in the labour market, and, if not, whose skills are under-utilised. This thesis will expand the identification of the following types of skill under-utilisation: field of study mismatch (skill mismatch); over- qualification (education mismatch); or a combination of skill and education mismatch. It also identified instances of under-qualification. For simplicity throughout the thesis, under-qualification is included in the population considered to be under-utilised. This inclusion is justified on the basis that under-qualified persons' productivity potential may not be maximised

requiring a policy intervention. The thesis will also provide a socio-demographic profile of those population groups not effectively utilising their skills in the workforce over their lifespan.

As such, the intention of this research is to clearly conceptualise and operationalise skill utilisation to provide empirical evidence of the level of skill utilisation in Australia.

The research will be significant for three primary reasons. It will:

1. Develop a population-level indicator of skill utilisation that will be replicable, susceptible to multivariate analysis, and comparable with other jurisdictions;
2. Have the potential to inform future policy development by providing empirical evidence of the socio-demographic factors which contribute to the under-utilisation of skills over the lifespan; and
3. Enable the development of a quantifiable framework to both benchmark and evaluate skill utilisation, as well as of a tool to evaluate policy interventions over time.

Thesis structure

This thesis comprises eight chapters. Following this introductory chapter, which sets out the research problem to be explored, Chapter Two provides the theoretical context. Chapter Three then contains a literature critique. Chapter Four details the method used to develop the indicator of skill utilisation and provides the analytical framework. Chapters Five and Six present the results. Chapter Seven discusses the four key findings, and Chapter Eight concludes the thesis, linking the research problem to the findings and potential policy solutions and identifying areas for further investigation.

Chapter Two lays the foundations for the theoretical framework used to conceptualise and analyse skill utilisation for the purpose of achieving economic growth and improved productivity over the longer term. The chapter draws upon previous studies to progress the evolution of the key theoretical approaches to economic growth – predominantly Human Capital Theory and the role of education – with the purpose of extending the theoretical and conceptual framework to include skill utilisation. Integrated within this theoretical framework is the life course perspective, because the prime determinant of the trajectory of the life course is the social organisation of labour. The chapter concludes by outlining the research questions to be explored, analysed and discussed throughout the thesis.

Chapter Three undertakes a critique of the empirical literature on the nexus between productivity and skill utilisation. Increasing productivity by raising output by workers is discussed. It begins with an overview of the importance of productivity and the factors which influence productivity

performance, followed by a discussion of skill utilisation, including conceptual clarity of the associated terminology, its evolution and current challenges as well as the factors which constitute the under-utilisation of skills.

Chapter Four outlines how the theoretical framework elaborated in Chapter Two will be operationalised to develop an indicator of skill utilisation, as well as the analytical approach used to identify and profile the utilisation of skills in Australia. The chapter begins with an overview of the various methods of skill measurement used in previous empirical research, before detailing the measurement approach to be undertaken in this thesis, as well as the selected data source. It then explains the multiple variables to be used to develop an indicator of skill utilisation in Australia. The second section of the chapter explains the analytical approach that will be used in the subsequent empirical chapters. Specifically, it details the socio-demographic variables to be used to describe the level of skill utilisation in Australia over the lifespan.

Chapter Five presents the results regarding the degree of skill utilisation in Australia – that is, the extent to which the existing complement of education and skills held by Australians is being utilised in the Australian labour market – in order to determine the existence of any foregone productivity growth. Using the indicator of skill utilisation developed in Chapter Four, this chapter addresses the research questions set out in Chapter Two – to what extent are Australians' skills utilised in the labour market? The chapter details how skill utilisation differs by occupation, educational attainment and field of study for men and women, and discusses the connection between skill utilisation and Human Capital Theory.

Chapter Six presents the findings of how skill utilisation changes with life course events, as per the life course principles of linked lives, agency and lifespan. For example, how do factors such as ageing, the presence of a partner, and/or the presence of a child affect skill utilisation over the lifespan, and how does the experience and manner of engaging with work differ for men and women? Skill utilisation is then decomposed to explain the differences in skill utilisation and type of utilisation. The chapter concludes with a discussion of skill utilisation in Australia as a culmination of all the variables analysed.

Chapter Seven discusses four key findings from this research:

1. The high level of under-utilisation of Australians' complement of skills being best explained by a mismatch between the supply of and demand for skills;
2. The difference in skill utilisation between those employed full time and part time, variation over the lifespan, and the clear gender disparity explained by 'linked lives';
3. The disparity in skill utilisation among young Australians, including their delayed and protracted entry into full time work; and
4. The high level of under-qualification in 'skill level one' occupations, and the impact on productivity of under-utilisation.

Chapter Eight concludes the thesis' exploration of how effectively the existing level of education and complement of skills held by Australians are being utilised in the Australian labour market. The chapter links the findings to the research problem set out in the introductory chapter, and makes specific suggestions for policy to improve productivity in Australia. Finally, Chapter Eight addresses areas for further research given the considerable presence of under-utilisation of skills over the lifespan.

Conclusion

Investment in human capital accumulation over the lifespan through education and training has been considered one of the easiest policy levers to manipulate to achieve improved economic and social outcomes at the individual and macro levels, particularly in response to the implications of population ageing. That said, there is evidence that the increase in the supply of qualified labour has not resulted in a corresponding increase in productivity growth, as was expected by policy makers (Buchanan et al. 2017; Keep, Mayhew & Payne 2006). This suggests that an alternative policy lever should be considered. A greater understanding of the utilisation of a person's complement of skills in the labour market will contribute to improved policy development in response to the problem of population ageing.

Chapter two
A theoretical and conceptual framework for analysing skill utilisation: Human capital theory and the principles of the life course

Introduction

This chapter sets the foundations for the theoretical framework this thesis uses to conceptualise and analyse skill utilisation for the purpose of achieving economic growth and improved productivity over the longer term. Despite 'skill' being a dominant construct in very early theory as far back as the 18th Century (for example in Smith (1991 [1776]), most sociological and economic accounts acknowledge that skill utilisation is relatively under-theorised (Desjardins & Rubenson 2011; Goldthorpe 2014). As such, this chapter draws upon previous studies to progress the evolution of the key theoretical approaches to economic growth, predominantly Human Capital Theory and the role of education, with the purpose of extending the theoretical and conceptual framework to include skill utilisation. Integrated within this theoretical framework is the life course perspective: the multidimensional concept of interdependent factors and trajectories shaping individuals, society and the economy across time (Elder 1985, 1995; Elder, Johnson & Crosnoe 2003). The prime determinant of the trajectory of the life course is the social organisation of labour (Heinz 2001; Kohli 2007; Moen 2016). Both theories of human capital and of the life course are underpinned by the theory of rational choice, and the concept that individuals have an interest in ongoing investment in a successful life which benefits from previous life course decisions and valid expectations of future opportunities (Heinz 2001). Ultimately, it is individuals' choice to invest in accumulating human capital and to make life decisions which affect their engagement with the labour market and their subsequent deployment of skills. As such, this chapter sets the theoretical framework for the discussion on skill utilisation (or lack of it) in Australia, as well as the parameters for an extensive review of the theoretical and empirical literature on the nexus between skill utilisation and productivity in Chapter Three. This chapter concludes by outlining the research questions to be explored, analysed and discussed throughout the thesis.

Human capital theory

The foundations for the theoretical framework linking education to economic growth and productivity, referred to as Human Capital Theory (HCT), was formally established in the late 1950s and early 1960s by economists Theodore Schulz, Jacob Mincer and Gary Becker (Dalziel 2017). The realisation of this link resulted from their inability to determine the cause of a significant proportion of the United States' economic growth by conventional means of economic measurement (Blaug

1976; Sweetland 1996). Even so, references to the value of human input in generating economic wealth extend back to Adam Smith (1991 [1776], p. 9) and his explanation of the effects of the division of labour on the wealth of nations: "The greatest improvement in the productive powers of labour, and the greater part of the skill, dexterity, and judgement with which it is any where directed, or applied, seem to have been the effects of the division of labour." However, Becker is considered to have provided the leading theoretical work in his 1964 monograph, *Human Capital*.

The overarching premise of HCT is that both individuals and the broader society and economy derive benefit from investment in people, such as in education and health. The benefit attached to individuals is evident in improved lifetime earnings, and to the economy in the form of economic growth. As such, the theory focuses on the productivity enhancing attributes of investment in human capital, and on their centrality to long term, broader economic development – where human capital can be defined as productive wealth embodied in labour, skills and knowledge (Rosen 1989). As such, HCT is embedded within the general framework of neoclassical economics, in which labour is integrated as a factor of production. However, as Bowles and Gintis (1975) explain, HCT extends these foundations by acknowledging that labour is a constructed means of production, thereby rejecting the previous assumption of labour's homogeneity (i.e., that all labour inputs are the same) to focus on the differentiation of labour characteristics in the labour force while also attempting to incorporate social institutions such as family and education into the realm of economic analysis.

An individual's human capital is considered to be their personal stock of knowledge, skills and characteristics which contributes to their economic productivity and earnings capacity. As such, HCT postulates that individuals will invest, based on rational choice assumptions, in their own acquisition of human capital. This involves incurring direct costs and foregoing short term earnings to maximise lifetime earnings (the rate of return on the investment), including, but not limited to, investment in education and training (Rosen 1989).

Further, HCT argues that the benefits of investment in human capital extend beyond national economic growth to produce positive externalities, such as higher national productivity, lower unemployment, and greater social mobility (Tan 2014). That is, the impact of increased human capital on aggregate output is greater than the sum of its parts. This concept can also be linked to Smith's (1991 [1776], p. 423) doctrine of enlightenment, referred to as the 'invisible hand', in which he says "As every individual endeavours as much as he can to employ his capital, [and] intends only his own gain, he is led by an invisible hand to an end which was not part of his intention. By pursuing his own interest he frequently promotes that of society more effectively."

Returning to the inability to attribute a cause to a significant proportion of economic growth, efforts to identify the residual growth differential in the mid-20th Century were influenced by accounting for intangible capital inputs, predominantly human capital, and, more specifically, education and advances in knowledge. This was recognised in 1962, when Denison modified the aggregate production function[1] to include education. As a result, education consistently emerged as the prime human capital component for empirical analysis (Sweetland 1996), despite the founders of HCT acknowledging that human capital is a function of numerous attributes, including "schooling, on-the-job training, medical care, vitamin consumption and acquiring information on the economic system" (Becker 1962, p. 9), as well as health facilities and services, formal (i.e. apprenticeships) and informal schooling, including primary, secondary and tertiary, adult education and study programmes, years of work experience, and the propensity for mobility to follow work opportunities (Shultz 1971).

The HCT empirical framework takes the form of regressing earnings of individuals by a range of variables, most notably schooling and education. Blaug (1976, p. 839) refers to this as a "reduced form" equation, because it ignores the nature of demand in the labour market. Early empirical efforts attempted to incorporate variables such as specialised field of study, occupational choice, life cycle, on-the-job training, as well as social variables, such as family background, native ability and place of residence, but these attempts were limited by inability to access data to quantify and measure such variables. Data availability now enables the use of qualifications as a key variable in contemporary methods of empirical analysis.

In addition to the above challenges within the theoretical framework of human capital, HCT also assumes a scenario in which productivity is maximised by the achievement of equilibrium between supply and demand of human capital (Becker 1962). That is, the labour market distributes jobs and pay on the basis of an individual's accumulated human capital, that organisations will respond to changes in the supply of labour by adjusting their internal processes to ensure that full utilisation of the skills of their workforce is achieved, and that organisational level productivity is maximised. More specifically, HCT asserts that an individual's wages will always equate to that worker's marginal product as determined by their accumulated level of human capital. However, as Blaug (1976) points out, the empirical evidence does not support the claim that yields are equalised at the margin.

[1] The aggregate production function determines the output of an economy (described as total real gross domestic product (real GDP)) depending on available inputs: capital, labour, human capital, and technology.

While the age structure of earnings provides evidence of the evolution of earnings over the lifespan (in line with human capital accumulation associated with work experience and effective utilisation), and that human capital investment choices could be made throughout the lifespan, the lack of data, either cross-sectional or, more importantly, longitudinal, restricts causal empirical analysis. As such, resorting to using educational attainment as a proxy for human capital, combined with the inability to clearly define the problem, led Blaug (1976, p. 845) to conclude that, in terms of empirical analysis of HCT, "everyone has been wrong and everyone has been right because the problem proved to be more complicated than was originally envisaged."

More recent empirical research has used alternative methods to the traditional earnings functions to investigate the link between human capital and productivity (Australian Workforce and Productivity Agency 2013; Nyberg & Wright 2015; OECD 2015; Taylor 2012); demographic effects, such as cohort size, on the supply of labour (Chomik, Piggott & McDonald 2017; Day & Dowrick 2004; Lee & Mason 2010; McDonald & Temple 2008), the changing nature of the division of labour in the home (Baird, Williamson & Heron 2012; Cunningham 2008; Guest & Parr 2012; Johnston, Schurer & Shields 2014; Laat & Sanz 2007), as well as skill utilisation and its various forms (Adalet McGowan & Andrews 2015; Aznar et al. 2015; House of Commons 2015; Keep, Mayhew & Payne 2006).

In terms of skill utilisation, or any potential under-utilisation, some human capital theorists argue that in the long run, market forces correct any mismatch between the supply of and demand for human capital to ensure that skills are fully utilised so that productivity at an individual, organisational or aggregate state level is maximised. That is, any mismatch is considered short term and temporary, and will instigate an adjustment process in which an organisation responds to disequilibrium and changes in the supply of labour to fully utilise the human capital available. Alternatively, an under-utilised worker will actively seek employment which matches their accumulated human capital.

There are many criticisms of Human Capital Theory (for concise summaries see Blaug (1976); Dalziel (2017); Tan (2014)), largely influenced by its emphasis on the supply side of labour and the assumption of a perfectly competitive labour market (Buchanan et al. 2017). As a result, it is often conceded that the contribution of education to economic growth may be overestimated. The underlying concern of these criticisms is that HCT has resulted in education policy being driven by (potential) economic outcomes. These economic outcomes could be argued to have been ineffective at both an individual and public level, given the inability to quantify and measure other tangible and intangible contributors to human capital development, as well as persuasive empirical evidence of

over-qualification, skill under-utilisation, skill shortages and skill mismatches (Adalet McGowan & Andrews 2015; Bryson 2017; Desjardins & Rubenson 2011; Green & McIntosh 2002; Holmes & Mayhew 2015; Mavromaras et al. 2010; Montt 2015; Quintini 2011a, 2011b). Furthermore, a slowing in national productivity rates despite increased participation in higher education (Commonwealth of Australia 2015; Eslake & Walsh 2011), as well as a weakening relationship between education and destination in the social mobility OED (origin, education, destination) framework (Bukodi et al. 2014; Goldthorpe 2014) suggest that a mismatch in qualification or skill level is actually a "substantive and durable" problem (Tan 2014, p. 430). This is opposed to the conceptualisation of this as a temporary or transitional phenomenon, as suggested by Human Capital Theory, which therefore threatens individual, organisational and national productivity. The relationship between education, skill utilisation and productivity is explored in the next chapter.

Given both theorists and critics recognise there are limitations in Human Capital Theory and the associated empirical methodology, alternative approaches should be pursued to increase confidence in the results of analysis (Shultz 1971). Sweetland (1996, p. 355) suggests that rather than an optimal methodological approach being established, the conceptual framework has extended laterally through the development of a multitude of alternative, or complementary, theories and methods, such as screening, signalling, job competition and assignment theory, concluding that HCT is "highly theoretical in an empirical sense… [and] does not provide bottom line answers or solutions." Schultz and Sweetland each attempt to find solutions to the weaknesses identified in HCT.

Screening and signalling theory (Arrow 1973; Spence 1973) are attempts to incorporate labour demand into the theoretical framework. Under the screening premise, employers focus on identifying how productive workers use educational attainment and qualifications as probabilistic indicators of intangible assets, such as ability, motivation and personal attributes, rather than just cognitive skills (Desjardins & Rubenson 2011). Advocates of screening theory suggest, therefore, that correlations between education and earnings, as per HCT, may actually disguise correlations between earnings and personal attributes (Blaug 1976; Goldthorpe 2014).

Theorists argue that using educational attainment as a screening device leads to credentialism, whereby the stated level of educational attainment needed to undertake a job is not equivalent to the actual level required. As a result, increasing educational attainment is unlikely to have an impact on earnings differentials. Even so, given that wage differentials between levels of education remain similar, Goldthorpe (2014) points out that increased investment in educational attainment does not automatically translate into an increase in economic growth.

From a prospective employee perspective, education can also be used as a signalling device to potential employers. Signalling enables prospective workers to communicate their individual attributes and characteristics, because education is considered to provide a process of classification and grading of individuals' abilities, enabling potential productivity to be predicted (Goldthorpe 2014). However, given that screening and signalling theories focus on educational attainment and not advances in knowledge and/or skill through work experience, these theories are restricted to analysing entry to the labour market only.

Job competition theory (Thurow 1976) further extends the demand side of signalling and screening theories to suggest that earnings are not the function of the individual's education or productivity, but of the job itself, and that the job's characteristics determine wages and earnings. Therefore, individuals compete for jobs in the labour market by signalling their credentials and committing to investment in their human capital so that they can continue to compete for better paying jobs (Desjardins & Rubenson 2011; Goldthorpe 2014; Montt 2015; Quintini 2011a).

Assignment theory (Sattinger 1979, 1993) provides a model to match supply and demand in the labour market. It argues that productivity and wages will be determined by market forces, that is by the quality of the match between the job and the worker and the respective supply and demand of each. Assignment theory acknowledges the heterogeneity of workers and jobs through the matching process, which HCT effectively suggests would occur through an adjustment process over the longer term. The difference is that assignment theory acknowledges that adjustment may not occur, and that therefore mismatch and under-utilisation may result. Even so, this theory has not been tested using a direct measure of skill (Desjardins & Rubenson 2011).

Despite the range of approaches developed to counter or complement HCT, Blaug (1976, p. 850) predicted that:

> *…the human capital research program will never die, but it will gradually fade away to be swallowed up by the new theory of signalling, the theory of how teachers and students, employers and employees, and indeed all buyers and sellers select each other when their attributes matter but when information about these attributes is subject to uncertainty. In time, the screening hypothesis will be seen to have marked a turning point in the "human investment revolution in economic thought," a turning point to a richer, still more comprehensive view of the sequential lifestyle choices of individuals.*

Even though Blaug (1976) may not have foreseen the restructuring of the global economy now occurring, the way in which workers and employers engage in education and employment is being

redefined (Heinz 2001, 2003; Moen 2016; Moen & Sweet 2004). Pressures from globalisation, population ageing and neoliberalism are forcing employers to reorganise their workforces in response to demand, including the rise of nonstandard employment arrangements, such as part time, contract and temporary work (O'Rand & Bostic 2016). The changing nature of work and skill requirements and increasing participation in higher education are affecting the recruitment process, transforming it into one focused on immediate need, demanding a filtering system such as that provided by screening and by signalling from the available supply of labour. This results in a model similar to that hypothesised by assignment theory.

While an alternative, unified theory has not yet been developed to counteract HCT, it continues to be considered a strong, insightful theory (Quintini 2011a). Recalling that the human capital concept was formalised by the inability to account for increases in economic growth, the eventual explanation lay essentially in the heterogeneity of an individual's complement of skills, skills that are accumulated over a lifetime through participation in schooling, further formal education, work experience, on-the-job training, and other intangible variables such as health and ability. What is evident, however, from the decades of theoretical and empirical evaluation of HCT, is that the original conceptualisation of human capital in the form of labour has been lost, likely due to a fixation on the need to measure and quantify human capital through earnings. Given that most empirical testing so far has relied on the homogenous variable of level of educational attainment, it is worth attempting to encapsulate an empirical framework that can incorporate the original concept of human capital: 'skill'. This will be the focus of the fourth chapter.

Principles of the life course

The life course perspective was formally introduced into sociology in the 1960s, pioneered by Glen Elder. The life course approach provides an integrated framework for studying what is now a dynamic and heterogeneous process of ageing and human development over time (Alwin 2012). This framework has become indispensable in the study of social structure across many disciplines (Kohli 2007), as is evident from the emerging proliferation of cross-disciplinary studies applying a life course perspective, particularly in education (Crosnoe & Benner 2016). Applying a life course approach provides a valuable means to cohere disparate areas of research within a discipline. The life course theoretical orientation is considered a cumulative and multidimensional concept, influenced by the complex interplay of interdependent factors to form a sequence of life phases and transitions, resulting in individual life trajectories (Elder 1985, 1994; Elder, Johnson & Crosnoe 2003). These life trajectories are influenced by social, political and economic conditions, demographic change, welfare state regulations and provisions, biographical decisions, and investment in life

circumstances (Heinz 2001; Kohli 2007; O'Rand 2012). At an individual level, 'life course' refers to a person's passage through a sequence of events and life phases as they age and develop. These individual life trajectories can be aggregated up to a macro (or population) level to identify trends or expected (normative) ways that groups of like people may experience these life events and passages (Crosnoe & Benner 2016).

The life course framework enables both theoretical and empirical investigation of the interrelationship between individuals and society across time (Elder, Johnson & Crosnoe 2003; Heinz 2001). While theorists argue that the complexity of life patterns prevents the development of a unified theory of the life course and associated methodologies, the conceptual framework provides a set of heuristics, tools and guiding principles to enable empirical analysis at the macro, meso and micro levels (Crosnoe & Benner 2016; Heinz 2001; Mayer 2009). The complexity of the theoretical framework is able to be disaggregated into three distinct areas of interdependence: 1) time (past, present and future), 2) life domains, and 3) institutional or structural conditions (Heinz 2001).

The original conceptualisation of the life course assumed an orderly sequence of social status, allocated on the basis of age and time (life period). The life course was tripartite, highly structured, chronological and predictable, shaped by three rigid periods: 1) schooling and education, 2) work, and 3) retirement (Settersten Jr 2003), corresponding to an industrialised capital market (Heinz 2003). This orderly process was further reinforced by cultural and social norms; creating, reinforcing and perpetuating different life courses for men and women (Moen 2016). Life decisions were made by individuals based on normative patterns and in relation to institutionalised, standardised pathways (Elder, Johnson & Crosnoe 2003). The tri-phasic model reflects the typical 20th Century male biography, a "lock step life course" centred on the world of work, whereas the model of women's biography focusses on family in a normative sequence: education, employment, family, employment (Heinz 2001, 2003; Moen 2016, p. 265).

Glen Elder's (Elder, Johnson & Crosnoe 2003) seminal work articulates five principles that underpin life course research: (1) the principle of lifespan development; (2) the principle of agency; (3) the principle of time and place; (4) the principle of timing; and (5) the principle of linked lives. These principles overlap with the theoretical literature on human capital and thus demonstrate their import for a broader framework to conceptualise skill utilisation over the life course.

The first principle of the life course contends that lifespan development is a long term, lifelong process in which humans develop and age. Individuals' biological, psychological and social development is not confined to one period of time, rather individuals continue to develop

throughout their lives as a result of variation in sequences of social status and life conditions (Elder, Johnson & Crosnoe 2003; O'Rand 2012). This evolutionary process is meaningful and is referred to as 'life biographies' (Elder, Johnson & Crosnoe 2003).

The capacity of individuals to influence their own lives is a fundamental tenet of life course research, and this capacity is founded on a subjective sense of control (Hitlin & Kwon 2016). Based on the premise that individuals are not passive participants in the social world and that their behaviour is not determined by social circumstances (Elder, Johnson & Crosnoe 2003), the principle of agency asserts that individuals make choices; they act intentionally, planfully and reflectively in a temporal mode (Heinz 2016). Heinz (2016) goes further, putting agency at the forefront of life course research by connecting agency and biography using a two-stage approach. First, individuals recognise opportunities and challenges concerning transitions, pathways and life phases, and then, second, they make choices, act, and appraise the consequences of their actions in terms of their self and in relation to social contexts which are embedded in institutions and markets. This capacity of individuals to make rational choices and compromises based on multiple and often competing options has important consequences for future decision making and subsequent life trajectories (Elder, Johnson & Crosnoe 2003; Heinz 2016; O'Rand & Bostic 2016).

A life course perspective emphasises the importance of time and place, because individuals' lives cannot be understood without context. Individuals' lives are shaped by their biological and historical time. As Elder and Giele (2009, p. 12) observe, "[t]his principle underscores the multiple layers of human experience; the social hierarchies, cultural and spatial variations; and the social/biological attributes of individuals." Individuals' life courses are embedded in the timing, duration and sequences of life phases by age, but also by historical events or periods with a salient social impact (O'Rand 2012). The experience of these events is further influenced by the phase of the life course or age of the individual at the time of the event (O'Rand 2012) and continues to shape individuals' lives well after the events themselves (Elder, Johnson & Crosnoe 2003). This principle of the life course is very similar to the tenets of the cohort historical perspective, which recognises that birth cohorts (a subgroup of a population born in the same year/period) experience particular events and live through distinctive historical periods at the same point in their lives (Elder & George 2016; Elder, Johnson & Crosnoe 2003; Moen 2016; O'Rand 2012). These experiences influence life trajectories. This temporal, age-graded perspective produces a 'cohort effect', which distinguishes birth cohorts from one another (Elder 1994). The distinctiveness of birth cohorts means that greater differences occur over the life course across cohorts rather than within cohorts, in accordance with the economic and social resources at the time (Heinz 2016).

The temporal, age-graded perspective can be extended to the principle of social timing. Social timing is the socially constructed and institutionalised process associated with life transitions into, and out of, roles (Moen 2016); the incidence, duration and sequence of life events, combined with societal expectations about when these aspects of social life should occur – 'timing norms' (Elder 1994; Moen 2016). The consequences of these experiences vary for individuals depending on when they occur over the life course (Elder, Johnson & Crosnoe 2003). It is not only timing, but also sequencing – the patterned order – of transitions and events that affects individuals and future moments over their life courses (Marshall & Mueller 2003). Timing also allows for "strategic adaption", whereby individuals respond to events in a purposeful way to meet life goals (Elder & Giele 2009, p. 14), for example having a child may instigate a move to part time employment.

According to Elder (1994, p. 6) no principle of "life course study is more central than the notion of interdependent lives." Individuals do not exist in isolation from each other (Settersten Jr 2015); the embedding of human lives in social relationships both horizontally (within cohorts or generations) and vertically (across generations) intimately links life decisions, actions and meanings over the lifespan so that these life experiences and transitions are reciprocally related (Crosnoe & Benner 2016; Elder 1994; Laub 2016; Settersten Jr 2015). That is, the interdependence of individuals in micro-level settings shapes not only their own life events and transitions but also the events, transitions and life course of others (Elder, Johnson & Crosnoe 2003).

These five principles provide a conceptual map to move from cohort or age-specific studies to understanding life course dynamics. It enables the study of the life course to build upon interdisciplinary research within the framework of trajectories and pathways comprising life domains, phases, events, transitions and turning points (Elder, Johnson & Crosnoe 2003). Life course trajectories are age-graded pathways that represent long-term patterns of change and/or stability over the course of an individuals' life (Elder & Giele 2009). Pathways are repeated sequences of transitions that are shaped by cultural and structural forces (Elder 1985). Importantly, trajectories are an attribute of an individual, whereas pathways are an attribute of a social system (Pallas 2003). Pathways are particularly useful in identifying patterns at a macro level. Further, each life domain, such as education, work, family and so forth, has its own trajectory, and each trajectory is comprised of 'linked states' or statuses that reflect an individual's social location (Elder 1995; Elder & Giele 2009), for example 'employed', 'unemployed' or 'retired'. Linked together, these states of employment form an employment history that represents a trajectory across the life course (the 'work-life course'). Aggregated, trajectories represent the life pathway of similar groups of people at a macro level. Social and historical forces shape life course trajectories; trajectories are not linear

and individuals may move back and forth between states (Elder & Giele 2009; Elder, Johnson & Crosnoe 2003). Further, as Elder (1985) observes, trajectories do not prejudge the direction, degree, or rate of change of their course. The redirection of life course trajectories is marked by life course transitions (Crosnoe & Benner 2016). These are discrete and bounded changes from one state to another (Elder & Giele 2009), such as the transition from employed to unemployed or from employed to retired. Transitions are often highly correlated with age, and come about as the result of life events, which are significant occurrences involving abrupt change that may produce serious and long-lasting effects, for example partnering and/or having a child. Transitions "are embedded in trajectories that give them distinctive meaning and form" (Elder 1995, p. 105). Transitions are often anticipated or planned, and may be considered a normal part of the life course, such as the transition from full-time schooling to the labour market, but they may also be unplanned, particularly in cases in which individuals become suddenly and unexpectedly unemployed (Elder & Giele 2009). Transitions may be small, such as a change in jobs, or large, such as becoming a parent. The significance of a life transition to an individuals' life depends on the nature of the life event. The impact and effect of life course transitions upon individuals needs to be understood within the wider context of individuals' lives. Transitions during adolescence or young adulthood may have lasting effects on an individual and their future social trajectories (Elder, Johnson & Crosnoe 2003) or transitions. For example, the loss of a job may have different meanings for different groups of people – for breadwinners whose families are dependent on them, or for expectant parents who will be leaving the labour market (Elder & Giele 2009). Transitions may also mark more than just changes in states or status, but also changes in identity. They may also be catalysts for greater change in individuals' behaviour (Elder, Johnson & Crosnoe 2003). Some transitions may in fact be turning points which involve a significant shift in an individuals' life and represent a substantial change or discontinuity in the direction of an individuals' life course trajectory (Elder & Giele 2009; Elder, Johnson & Crosnoe 2003). Moreover, transitions in one life domain can influence transitions in other life domains (O'Rand 2012). Historically, transitions were highly correlated with age, but changing demographic and economic conditions are weakening the correlation of some life transitions so that they now occur across ages, associated with the interdependence of life transitions across domains (O'Rand 2012).

More recently, the global economic restructuring of the 21st Century and associated process of modernisation have eroded the previous concept of a lifetime model of employment (Settersten Jr 2003) so that life courses are no longer standardised or predictable. The life course structure and associated timing and duration of transitions are increasingly influenced by the interdependence of life transitions across domains such as family, schooling, higher education, and participation in

employment, rather than by age markers (Heinz 2016; O'Rand 2012). The diminishing association of age with life transitions, cultural modernisation, flexibilisation of careers, different family trajectories and the weakening of institutional timetables has influenced this de-standardisation and accelerated the heterogeneity and individualisation of the modern life course (George 2003; Heinz 2016; O'Rand 2012). As such, O'Rand and Bostic (2016) believe that the tri-phasic construction of the life course is no longer an appropriate framework to study the growing variations in life transitions and the pace of change in human development and ageing. Kohli (2007) disagrees. While his review of empirical research concluded that the increasing variability in individual's engagement with employment has a greater impact on the destandardisation of the life course than do demographic change and family formation decisions, he strongly believes that the tri-phasic model is still an appropriate research framework. He goes so far as to suggest that female life courses are converging with the male, tri-phasic norm, apart from differences in labour force participation and in the work-family nexus, contradicting most theoretical assumptions (Kohli 2007). Moen and Sweet (2004) suggest it is these differences in labour force participation and the work-family nexus which is creating a 'neo-traditional' arrangement in the home, giving priority to the male partner's work-life course when family time requirements increase, reinforcing and exacerbating the existence of gendered work-life course models.

Successful life course outcomes are dependent on social and material resources which can only be provided by participating in the labour market (Heinz 2003). An individual's life chances and achievement of quality of life over the lifespan is therefore dependent upon the individuals' occupation or career trajectory (Moen & Sweet 2004). As such, employment provides the framework for organising and integrating all aspects of social existence across the life course (Moen 2016; O'Rand 2012). Life course transitions and sequences in the 21st Century are increasingly defined by changing opportunities associated with supply and demand in the labour market, as well as the associated level of participation in the institutionalised fields of education and employment (Crosnoe & Benner 2016; Heinz 2003, 2016; Moen 2016; Pallas 2003). O'Rand and Bostic (2016, p. 718) suggest that the tri-phasic model of the life course should be replaced by an "extended work-education sequences" model across the life course. Regardless of model, understanding the relationship between human capital accumulation, employment and life decisions over the lifespan is critical to informing the framework for analysing skill utilisation.

Conflating Human Capital Theory and the life course

Although the life course approach was conceptualised in the same era as Human Capital Theory, each evolved in parallel with the other, with little integration. Further, while life course scholars acknowledge Human Capital Theory and market forces in their framework, some scholars suggest that economists do not utilise the life course perspective to guide their work, instead explaining demographic behaviour as a result of rational choices made to optimise life time economic rewards (Hogan & Goldscheider 2003). Even so, the social organisation of labour remains the prime determinant of the structure of life courses in modern society (Kohli 2007). People's employment trajectories and ultimate life outcomes are explained by factors such as social origin, educational attainment, occupation and gender, as well as, increasingly, by the principles of linked lives, agency and lifespan (Heinz 2003, 2016).

Initial orientations of the life course framework were highly correlated with economic capitalist markets, given that the life course trajectory was highly standardised, regulated and predictable throughout the mid-20th Century (Heinz 2003). Both Human Capital Theory and the life course framework assert that individuals make life decisions to maximise life outcomes; rational choices based on the economic theory of investment and return (Heinz 2003; Kohli 1986). Mayer (2009) argues, however, that attempts to incorporate rational choice into the life course framework are limited to a single event transaction. O'Rand and Bostic (2016) disagree, and suggest that these choices are cumulative and manifest in life sequences, creating transitions and turning points at each juncture, contributing to heterogeneity over time. The principle of agency, rational choice, plays a significant role in how the relationship between education and employment ultimately transpires over the life course.

As life course research matures, its conceptual framework is extending to explore the trajectories of individual life domains; more specifically, the interdependence within and between domains, such as education and employment. From a skill utilisation perspective, the nexus between work and the life course needs to take into account the fact that an individual's career trajectory is not only dependent upon opportunities in the labour market, but also that the structure of the work-life course is an outcome of institutional pathways, individual decision making, social networks and linked lives – so much so that occupation, education and family trajectories often occur simultaneously (Heinz 2003; Moen & Sweet 2004).

As Crosnoe and Benner (2016) point out, at a macro level, education levels gauge the extent of a society's investment in its people, and forecast current and future economic productivity, social stability and well-being, as per Human Capital Theory. According to Pallas (2003), the purpose of

participating in education at an individual level is to socialise young people to become productive adults. More broadly, education dictates time use, facilitates skill acquisition, and develops social networks and interpersonal relations, paving the way for future socio-economic prospects (Crosnoe & Benner 2016). As Pallas (2003, p. 166) affirms, when status attainment is coupled with Human Capital Theory, "there is little doubt about the effects of educational attainment on socio-economic outcomes." The Wisconsin Model of status attainment, founded in studies of family and kinship (Pallas 2003) and a forebear of the linked lives principle of the life course, further links socio-economic outcomes to class-linked socialisation. Missing from the Wisconsin Model, however, is the context in which decisions about education and work are formulated (Pallas 2003). In addition, the traditional conceptualisation of education and human capital lags behind present day patterns of learning and tacit knowledge acquisition through cognitive and non-cognitive aspects of social life (O'Rand & Bostic 2016). Given that participation in education and training corresponds with patterns of work careers and associated socialisation, and that the variability of transition markers is a key characteristic in the education-to-work passage across the life course, greater understanding of the mechanisms explaining these sequences is required. Moen (2016, p. 250) asserts that there is a "fundamental mismatch" between the social organisation of education and employment and the 21st Century workforce and economic realities.

While the purpose of education may be to prepare individuals for the labour market and to become contributors to the economic and social productivity of a nation, how education and skills are acquired and utilised in that labour market is increasingly dependent on the interplay of a range of social pathways, and on navigation of the education and employment systems (Crosnoe & Benner 2016).

The work-life course is undergoing an evolution from the normative sequence of work trajectories: a lifelong occupational ladder and hierarchy – a product of industrialisation – which followed definitive age, gender and social structures, creating a tri-phasic life course model, is giving way to an increasingly dynamic and relational work trajectory consisting of various forms of discontinuous careers interspersed with periods of full time or part time work or non-work activities (Kohli 2007; Moen 2016; Moen & Sweet 2004). With the restructuring of the economy, the work-life course is less defined by age markers and more by individuals as they respond to opportunities within the social institutions of education, work and family (Heinz 2003). More often than not, work-life courses are not solo journeys but part of multiple, interlocking pathways resulting from linked lives (Heinz 2003). This is creating challenges for workers and working families, particularly in relation to how families adapt to their conflicting roles as they navigate their work and family domains

simultaneously over the life course (Moen & Sweet 2004). Work trajectories are now essentially co-constructed by personal decisions and institutional frameworks, as evident from the variable timing and duration of participation in education and employment (Heinz 2003). Critically, social expectations have not evolved at the same pace as the post-industrial economy. Work trajectories remain embedded in outdated gender, occupational and labour market regimes (Moen & Sweet 2004). Men and women experience vastly different work trajectories, with linked lives and traditional gendered roles extending the mismatch between the social organisation of education and work to an unequal distribution of employment and family roles (Heinz 2001, 2016; Moen 2016). Differing life decisions for the same life event create distinctively different turning points and work trajectories for men and women, and these differences are also exacerbated by cohort differences (Moen 2016). Work trajectories can be characterised by interruptions and breaks at transition points, and it is at these points that women are more likely to experience a career break to raise children, while men are more likely to experience a break as a result of unemployment, rather than family formation (Heinz 2016; Moen 2016). Moen (2016) explains the gender differences through the theories of socialisation and allocation, as well as through strong selection processes whereby men and women make decisions based on learned gender roles. Gendered work identities manifest themselves in the differing fields of study, occupations and levels of engagement with the labour market of men and women. This highlights gender as a key factor affecting participation in employment and career paths over life biographies and, ultimately, skill utilisation.

Individuals' career pathways, and thus their life courses, are highly dependent on opportunities available in the labour market, the associated governance structures relating to education, training and social policy, and the decision making process the individual employs (Heinz 2003). These decisions differentiate between projected and realised life trajectories (Heinz 2016). While Human Capital Theory suggests life outcomes will be maximised by investment in education and engagement in work, the life course framework suggests this opportunity is affected by linked lives and associated decision making requirements over the lifespan. The relationship between life decisions and skill utilisation will be addressed extensively in the discussion chapter.

Summary

The combination of Human Capital Theory and the life course perspective provides a new and exciting theoretical framework within which to explore skill utilisation. While both theories of human capital and the life course are founded on the assumption of rational choice and return on investment, congruence between neoclassical economics and social theory is both theoretically and empirically challenging. As Borghans and Heijke (2005, p. 140) suggest: …the growing importance of

knowledge in the society, the increased uncertainty in the labour market and the more complicated ways in which people acquire skills… requires economists to investigate the production and use of human capital more explicitly. Many questions that at first sight appear to be educational, turn out to have important economic aspects.

To maximise life course outcomes, individuals rationally commit to acquiring competence, credentials and credibility to transition successfully through the life course (Heinz 2016). This investment in life course outcomes predominantly takes the form of education. However, in spite of the association between education and later life outcomes, the selective role of education and how it relates to employment is becoming problematic, particularly given the crossover of relative educational attainment levels for men and women in recent cohorts, and the changing nature of work affecting the job market and education and skill requirements (O'Rand & Bostic 2016). Nowadays, the probability of making beneficial life course decisions based on rational choice assumptions is becoming less predictable, considering the process of modernisation and the uncertainty of future outcomes, particularly when projecting future labour demand. Rational choice at a point in time for some individuals may result in a mismatch between current and future opportunities. The matching of people and jobs in the labour market, and ultimately their skill utilisation, may be determined in two ways: an institutional, structured pathway, or a market model, with informal linkages matching supply and demand (Heinz 2003). Life course research provides a valuable framework for understanding how skill utilisation is affected by life events, building upon the foundations of theoretical and empirical research on human capital accumulation and economic outcomes undertaken by economists and social scientists. As both the economic and social spheres continue to restructure and evolve, it is increasingly unclear which factors explain the relationship between work and life at its different stages. Factors such as employment opportunities, educational attainment, skills and ability, and social and economic policy at a given point in time all cumulatively influence the pattern of evolving work sequences and trajectories (Heinz 2003). These same factors affect individuals' differences depending on their stage in the work life. Utilising a life course perspective allows for a more integrated understanding of engagement with employment, and potential skill utilisation, that incorporates transitions in and out of life phases, such as changes in marital status or parenthood, as well as cohort differences.

Research questions

As outlined in the introductory chapter, the purpose of this thesis is to explore whether the existing complement of education and skills held by Australians is being effectively utilised in the Australian labour market. This is in response to successive Australian governments' solution to the challenges of an ageing demographic being to foster economic growth through a policy framework to increase the 3Ps: productivity, (labour force) participation and population. An indicator of skill utilisation in Australia will enable the identification of any foregone productivity growth, and provide input to future policy development for improved productivity. As discussed in this chapter, this is particularly important given that investment in human capital accumulation over a lifespan is theorised to improve both social and economic outcomes at both the individual and macro levels.

Skill utilisation in Australia will be affected by how individuals respond to the opportunities and restrictions concerning pathways in different life, education and work domains. In order to analyse skill utilisation using an integrated human capital and life course theoretical framework, economic and demographic variables, such as educational attainment, labour force status, occupation, age and gender, need to be supplemented by life course variables, reflecting the extent to which lives are linked and biological life choices, such as partnering and child-bearing, affect individual outcomes. Ideally, the analysis of modern life requires an empirical research strategy that considers social structure, institutions and personal biographies over time through longitudinal designs, and both quantitative and qualitative methods. To connect at both a macro and micro level, a common theoretical and empirical framework must map the structural and institutional dimensions to the social contexts of biographical decisions and outcomes (Heinz 2001). However, as Mayer (2009, p. 416) points out, "methodological breakthroughs are badly needed." This thesis builds on the combined theoretical framework of human capital and the life course to attempt just such a methodological breakthrough in order to empirically analyse skill utilisation in Australia. As such, the research questions for this thesis are informed by the intersection of Human Capital Theory (predominantly through educational attainment and field of study) and the life course principles of lifespan, agency (rational choice) and linked lives.

The following two chapters will outline how skill utilisation will be formally conceptualised and operationalised in order to undertake empirical analysis to answer the following research questions.

With a focus on skill utilisation in Australia:

1. To what extent are Australians' skills utilised in the labour market?
2. How does skill utilisation differ by sex and age?
3. How does skill utilisation differ by occupation, educational attainment, field of study and labour force status?
4. How is skill utilisation affected by the presence of a partner?
5. How is skill utilisation affected by the presence of a child?

Conclusion

This chapter has set out the theoretical framework within which to conceptualise and analyse skill utilisation for the purpose of achieving improved productivity and economic growth in response to the challenges of an ageing population. The integration of Human Capital Theory and the principles of the life course provides a new and robust framework from which to investigate the utilisation of people's skills over the life course. The next chapter will undertake a critique of the empirical literature on the nexus between productivity and skill utilisation. The culmination of this theoretical framework and the critique of the literature informs the methodological and analytical framework set out in Chapter Four, before the findings are presented in Chapters Five and Six, and the results discussed in Chapter Seven.

Chapter three
Literature review

Introduction

This chapter contains a critique of the empirical literature pertaining to the nexus between productivity and skill utilisation. Krugman (1994, p. 11) claimed, "Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise output per worker." While academic researchers have been lauding the importance of skills and skill utilisation for economic progress for several decades (Borghans, Green & Mayhew 2001; Buchanan et al. 2010; Gallie 1991; Keep 2016; Keep, Mayhew & Payne 2006; Payne 2010; Skills Australia 2012; Warhurst & Findlay 2012), take up of the concept has been slow. Until recently, skill utilisation has been confused with increasing productivity through investment in the *supply* of skills, that is, through increasing education and training to improve the stock of human capital. Those who have accepted and acknowledged the notion of skill utilisation, and its importance, also acknowledge that there is not an automatic relationship between skills and productivity (Keep, Mayhew & Payne 2006). However, while this observation indicates that there may be a shift in official thinking, there is little to suggest that there are high level intentions to initiate the wider improvement of skill utilisation to increase productivity (Keep 2016; Keep, Mayhew & Payne 2006).

In this chapter, increasing productivity by raising output per worker[1] is discussed. Beginning with an overview of the importance of productivity and the factors which influence productivity performance, the chapter proceeds with a discussion of skill utilisation, including the conceptual clarity of the associated terminology, its evolution, and current challenges, as well as the factors which go into the under-utilisation of skills, and the framework that is considered best for analysing skill utilisation. The chapter concludes with a discussion of the intersection of productivity and skill utilisation.

[1] Output per worker is the level of total output (such as GDP) divided by the number of workers employed. Other measures of labour productivity include output per capita (output divided by population) and output per worker hour (output divided by total hours worked).

Productivity

The importance of productivity growth is not contested in the literature; it is the various levers and means of achieving productivity growth that attract the greatest discussion. Productivity growth is argued to be important because it offers both economic and societal benefits (Commonwealth of Australia 2015; Gruen 2012; Productivity Commission 2016a, 2017). Central to most governments' economic policy framework is achieving a strong productivity growth trajectory, as this is considered, as the source of per capita real income growth, to be the prime determinant of a country's standard of living. Increased productivity provides higher real income per worker without a corresponding increase in hours worked or foregone consumption through increased savings or investment (Green, R, Toner & Agarwal 2012). In addition, productivity growth indirectly provides a greater pool from which to redistribute increased income due to wage growth through the tax transfer system, as well as for a corresponding increase in public spending (Productivity Commission 2016a, 2016b). This contributes to improving social inclusion, reduces inequality and alleviates poverty. Productivity growth provides the most sustainable means of achieving long run improvements in living standards, and offers a viable solution to the implications of population ageing (Commonwealth of Australia 2004, 2015; Productivity Commission 2013).

While productivity is complex and difficult to quantify, there are two primary measures: labour productivity and multifactor productivity. Labour productivity is calculated as real gross domestic product (GDP) per hour worked. Multifactor productivity incorporates capital into the measure, and is calculated as real GDP per unit of labour and capital. Labour productivity is the most commonly used measure (Australian Treasury 2009), and is influenced by the composition of the workforce, age-specific participation rates, population age distribution, and hours worked (labour utilisation). Labour productivity is further influenced by the stock of human capital and its deployment in the workforce, as well as by the sectoral composition of the economy.

According to Eslake and Walsh (2011), productivity growth is the only sustainable source of improvements in material well-being in the long run, and, according to Banks (2012), there are only two ways to increase per capita income: producing more per person and achieving higher world prices from production. Recently, growth in productivity has slowed or stopped globally. Across the OECD, growth in GDP per hour worked was lower in the decade to 2016 than in any other decade since 1950 (Productivity Commission 2016a). The productivity growth increases of the mid-1990s in Australia have been attributed to the opening up of international trade, adoptions of information and communication technologies, and increases in research and development (Rahman, Stephen & Tunny 2009), opening up trade and capital markets, increasing competitiveness through National

Competition Policy reform, and the undertaking of labour market reform (Valadkhani 2003), as well as partial deregulation, commercialisation, and privatisation of state-owned enterprises (Eslake & Walsh 2011; Gordon 2016; Productivity Commission 2016b). However, Quiggin's (2001) empirical analysis found no evidence to support the claim that reforms to the labour market, trade nor the financial sector contributed to improvements in productivity.

Since the turn of the century, multifactor productivity in Australia has stagnated, with labour productivity explaining less than half of the growth in average incomes compared to an average of around 90 per cent of income growth over the four previous decades (Dolman & Gruen 2012). Over that time, Australia's terms of trade increased by over 80 per cent due to the resource boom (Parham 2013), which supported income growth and countered the sluggish performance of labour productivity. At the same time, growth in the share of the population achieving higher levels of educational attainment improved the stock of human capital (Gordon 2016), but not labour productivity. Since 2011, the terms of trade have been falling, threatening future income growth unless labour productivity is improved. In addition, given the strong correlation between investment and terms of trade performance, any slowing of investment due to declining terms of trade will reduce the rate of capital deepening and put further pressure on labour productivity (Gordon 2016).

There is little consensus to explain the inability to improve labour productivity in a period of extensive knowledge and technological advancement experienced by much of the developed world. In Australia's case, there is also little evidence that slower productivity growth has been the result of inadequate investment in skills, education and innovation more broadly (Banks 2012; Commonwealth of Australia 2015), particularly given that the Australian Government increased education spending by 50 per cent in real terms over the five year period to 2010 compared with the previous five (Commonwealth of Australia 2010). In fact, the under-utilisation of skills is linked to the deterioration of productivity performance (Banks 2012; Eslake & Walsh 2011; Green, R, Toner & Agarwal 2012). Eslake and Walsh (2011) suggest that recent declines are the result of a lack of ongoing productivity-enhancing reforms since the previous microeconomic reforms in the 1980s and 1990s, as well as of underinvestment in infrastructure and a decline in take-up of productivity-improving technologies. On the other hand, whereas Banks (2012) suggests that the decline is caused by cyclical and structural forces that are temporary and reversible (drought and resource booms, for example). Others suggest it is the excessive increase in legislation and regulation which is stifling productivity growth (Eslake & Walsh 2011; Garnaut 2005; Green, R, Toner & Agarwal 2012), most notably in the form of the industrial relations regulations and their influence on work

arrangements (Banks 2012). Regardless of the cause, productivity growth is declining and there is no room for complacency, which, Garnaut (2005) suggests, is precisely the attitude being taken.

Given the projected slowdown in labour force participation and the average hours worked due to population ageing), as well as the easing of the contribution of the terms of trade to productivity, improving labour productivity performance becomes even more critical. Eslake and Walsh (2011) and Green, R, Toner and Agarwal (2012) assert that aggregate economic performance is underpinned by the ability to raise output per worker through the deployment of skills in the workplace. The growth rate of labour productivity is then dependent upon the supply and use of human and physical capital and on the state of technology; on capital intensity (Taylor 2012). Taylor (2012) surmises, however, that while there is evidence which links education to employment, there is little understanding of the transmission process to achieve improved labour productivity from education and human capital formulation, i.e., skill utilisation.

Skill utilisation

Introduction

The skill and skill utilisation literature tends to focus on determining the level and complexity of skills and their subsequent impact on such things as wage determination, job satisfaction, turnover, absenteeism or human resource management, rather than on identifying the deployment – or not – of the complement of skills held by individuals, or groups of individuals, in the labour market (Attewell 1990; Keep, Mayhew & Payne 2006; OECD 2012; Skills Australia 2011; Spenner 1990; Watson 2008).

While there is an underlying acceptance and belief in the developed world that increasing the stock of education and skills is the driver of economic growth, there is evidence that suggests that the existing skills and qualifications in the workplace and wider population are not delivering as expected; that is, the historic investment in education and skills is not being effectively utilised in the workplace to ensure maximum economic output. This suggests that there is actually an over-supply of skills and qualifications, including a mismatch between the demand for, and supply of, skills (Borghans 2000; Groot & Maassen Van Den Brink 2000; House of Commons 2015; Keep, Mayhew & Payne 2006; Linsley 2005a, 2005b; Mavromaras, McGuinness & Fok 2009; Mavromaras et al. 2010; Quintini 2011a; SkillsIQ 2017; Voon & Miller 2005; Warhurst & Findlay 2012). Or, indeed, the inverse may be true: that relatively low levels of skill usage, limited evidence of skill shortages, and potentially comparatively low demand for skills relative to their supply indicates a demand-side weakness (Herrmann 2012; Payne 2010).

Scholarship on skills and their deployment in the workplace has evolved considerably since the first extensive literature review undertaken by the Scottish Government (Scottish Government Social Research 2008, p. 1), which was influenced by a lack of evidence that increased investment in skills (qualifications used here as a proxy for skills) produces a "conclusive and causal correlation" with increased productivity. The Scottish Government recognised that the relationship between skills and productivity is complex, and that it involves both the acquisition of skills (stock of human capital) and their deployment in the workplace (skill utilisation). The Scottish Literature Review clearly identified a resurgence in the explicit (and implicit), use of the term 'skill utilisation' in policy discourse. However, it also concluded that there was no clear consensus on a conceptual framework for or definition of skill utilisation (Scottish Government Social Research 2008). In fact, there is a tendency to rely on proxies as both a definition for, and measurement of, skill utilisation; over or under educated/qualified, over-skilling or under-skilling, or skill mismatch. The majority of the literature reviewed related to the overarching policy and management practices to achieve improved business performance through the effective application of skills, rather than to the identification and evaluation of skills utilisation. While the literature review undertaken by the Scottish Government provided the impetus for a more holistic approach to skill utilisation policy development (which focussed on the supply of, demand for, and utilisation of skills), almost a decade after the Scottish Government review and development of its skills policies, consensus on a conceptual framework for skill utilisation and effective policy development remains elusive. As Keep (2016, p. 7) stated in his reflection on improving skill utilisation in the UK, skill utilisation policy is in "relatively uncharted territory" due to policy makers lack of familiarity with the concept of skill utilisation, and to the lack of explicit research into what best practice actually is. The ability to achieve a universally accepted definition for skill utilisation would enable the development of a direct measure, allowing replication and critique by others, as well as effective policy development.

Defining skill

A significant contributing factor to the inability to achieve consensus on a definition of skill utilisation lies with the notoriously complex and widening concept of 'skill' itself. According to Felstead, Gallie and Green (2017), there is no adequate definition or measurement of skill stock that comprehensively covers the diversity of skill concepts. The extensive literature on the meaning of skill confirms that the concept remains highly contested (see for example Attewell 1990; Bryson 2015, 2017; Felstead, Gallie & Green 2004; Gallie 1991; Green 2011; Grugulis, Warhurst & Keep 2004; Lloyd & Payne 2004; Payne 2017; Spenner 1990; Warhurst, Tilly & Gatta 2017; Westwood 2004). The tension exists between two paradigms: unidimensional or multidimensional skills (Spenner 1983). Unidimensional skills are the featured skills of a job role – occupation-specific and

technical, based on task complexity and level of autonomy, which can be objectively evaluated and observed (see for example Braverman (1974); Gallie (1991); Spenner (1983, 1990)). Multidimensional skills, on the other hand, and best defined by Cockburn (1983), can be thought of as a combination of those attributes which reside in an individual, the demands by the job role itself (which may or may not match the skill of the worker), and those skills which are politically leveraged or socially constructed, all of which evolve and accumulate over time. Grugulis, Warhurst and Keep (2004, pp. 10–11) suggest that there is the potential for a wider conceptualisation of skill to "become trapped in an inflationary spiral" whereby previously undervalued skills would be revalued upwards due to the social construction of skill. Payne (2017) argues that the multidimensional paradigm risks losing any analytical or operational meaning. Warhurst, Tilly and Gatta (2017) argue that Payne's productionist view of skills ignores the structural changes which have occurred in developed economies; employment growth and skill demand moving away from the industrial to the services sector which requires a new social construction of skill, one which more adequately reflects the changing skill mix of occupations that require both technical and social competency. The interpretation of skill has been an evolutionary process, influenced initially by the industrial revolution and machination, and then by the age of technology and digital disruption. More recent efforts to define skill have resulted in a broad, integrated definition, influenced by more current discourses dominated by skill for vocational purposes as the key driver of economic competitiveness, productivity growth and social cohesion. This evolution will be outlined in the following section.

Attewell's (1990) seminal work 'What is skill?' presents a comprehensive sociological analysis which set the foundations for defining the meaning of skill. In it, Attewell (1990, p. 422) discusses four distinct theoretical conceptions of skill – positivist, ethnomethodologist, Weberian and Marxist – and asserts that skill is theorised according to the disciplinary paradigm, and that each is "blind to [its] own preconceptions." At the same time, Attewell's thesis provides a nexus between the unidimensional and multidimensional paradigms.

To the positivist, skills must be able to be observed, experienced and verified; a positivist must be able to use deductive logic to test their theories using empirical means, measures which will stand up to their rigorous methodological requirements regarding reliability and validity. Skills are defined by positivists in terms of their level of complexity and the need for problem solving and cognitive analysis. Where there is a lack of skill, this is demonstrated by the routinisation of the work process, which, it is deemed, means that no thought is required. On the other hand, the ethnomethodologist believes all skills need to be learned. Skills which to the positivist would be considered a given, are accomplishments to the ethnomethodologist, requiring high levels of abilities such as co-ordination,

perception, concentration, physical movement, and patience. Skills such as walking, having a conversation, writing and counting are all skills that need to be learned. These are examples of highly complex activities which are taken for granted as habit and unconscious (or even nonconscious) ability. To the ethnomethodologist, skill, in the context of work, is the ability to undertake a task or respond to an issue without thinking about it. While to the positivist, deductive logical pondering would demonstrate the highest level of skill due to the complexity of the problem solving and cognitive analysis required, the enthomethodogist would argue that the need to think about a task indicates incomplete training. Ethnomethodologists do not need conscious deliberation to consider a task complex. Ethnomethodologists argue that skills require the individual to subconsciously assess and translate the specific requirements of a task so that they fall under a known routine or rule. The individual then applies their acquired skills to complete the task. The more skilled a worker is, the more (nonconscious) routines or rules they know, and therefore, when confronted with an exceptional or unique task, the skilled worker would be able to apply more rules or routines than the less skilled worker, and therefore to complete the task with a higher level of certainty of outcome. Conversely, positivists argue that routines and certainty of outcome indicate a lack of skill, as it is the uncertainty of outcome that requires high levels of problem solving, complexity and cognitive analysis and therefore high levels of skill. Ethnomethodologists would assert, in this case, that positivists would have to apply certain work processes (routines) and logic (rules) to undertake such high levels of problem solving, complexity and cognitive analysis, and that these processes would be undertaken intuitively with no need for consciousness.

Another dimension to the interpretation of skill is that of the Weberian or social constructionist, who take skill to be a social category, and consider it equivalent to status in society and vice versa. Weberians believe that status of skill has been achieved through the supply of and demand for certain skills or professions and occupations, as well as through ideological causes. Uncertainty of outcome also features in Weberian theory of skill, based on the concept of virtuosity and the ability to deliver the desired outcome. The premise of this theory is that if the outcome was always successful, then the status of the skill would diminish. Uncertainty of outcome implies that an appropriate routine is yet to be developed (and then learned) to deal with the problem. This lack of predetermined or guaranteed outcome increases the demand for skills to attempt to achieve the desired outcome; where success is achieved it is credited to the professional, and where failure occurs it is due to the difficulty of the task. The challenge in understanding the concept of skill in the Weberian model is delineating what aspects of skill level are based on social construction, or on the real skill or the complexity of the task.

The final theory of skill discussed by Attewell is inspired by Marxism. Attewell claimed that classical Marxism does not specifically discuss theory of skill, however hints at his thoughts as to the notion of wages, skill and supply of labour, ranging from both positivist to social constructionist thinking. It is Marx's theory of alienation (loss of control) which differentiates his understanding of skill from positivism and social constructionism. To many Marxists, if a worker could not participate in minor decision making activities within the workplace, then they lacked not only control, but skill as well. This conclusion is derived from the assumption that the lack of decision making ability is a result of being employed in a rule-governed, predictable and routinised job, with the only requirement being the ability to follow instructions (ethnomethodologists would argue that this is a complex skill in itself). Marxists, therefore, believe that skill and autonomy are equivalent, reflecting alienation and the differential between education and class. Others reject this notion, given that autonomy control does not reflect human capabilities and is not able to be learned or taught (Spenner 1990).

Marx's theory of control closely associates with the Weberian, insofar as skills are seen to be aligned with social standing; the more skilled a person is, the greater their status within society, both requiring long periods of education and training to achieve skills.

Much of the discussion in Attewell's article focuses on the level of skills rather than on defining skill per se. Even so, this approach is successful in explaining the dynamics of skill. Underlying each theory is the concept of complexity. Positivists agree that the greater the complexity of a task, the greater the skill required. For Weberians, the greater the skill complexity, the greater the social standing. Marxists agree with this on the basis that complexity is reduced as the degree of routine, automation or instruction is increased. Ethnomethodologists believe all tasks are of a complex nature, and that all have to be learned in their most basic form before they can be mastered, even the most mundane.

Subsequent efforts to ascribe meaning to the concept of skill have further developed the theoretical foundations initially set by Attewell, with a view to providing clarity to support consistent application and analysis for policy development (Bryson 2015; Green 2011; Payne 2017). In more recent times, there has been movement towards adopting a more holistic and integrated perspective on skill beyond the dominant task complexity dimension. Many theorists have suggested that the fundamental changes in the labour market resulting from structural change in the industry composition of economies requires a departure from the traditional neoclassical model, as it misses the social context of skill (Green 2011; Warhurst, Tilly & Gatta 2017; Westwood 2004). Even so, Adler (2004) argues that the social construction component of skill should be viewed as a superstructural overlay, and that there are two key components of skill: complexity of task and

collaborative interdependence. To add to the conceptualisation discussion, the OECD further distinguishes skills into foundation skills (literacy and numeracy) and occupation-specific skills, determined by field of study (Desjardins & Rubenson 2011; Montt 2015).

A number of frameworks for conceptualising skill have since been developed which focus on the outcome of skill as a value rather than solely as an input of economic production. Mounier (in Buchanan et al. 2010) developed the three logics of skill, technical, behavioural and cognitive, which are embedded in labour relationships and broader social structures and can be compared over time and space. Green, (2011) proposed a functional concept of skill as a personal quality, a definition which puts value at its core: being productive, expandable and social (PES). Bryson (2015) developed a human capability approach based on having the means and opportunity to achieve. This consists of three major elements: functioning, capability and agency. Bryson (2017) introduced a cross-disciplinary lens approach; the political economy, organisational and learning environment. Lastly, Warhurst, Tilly and Gatta (2017) proposed a simplified achieved skill (using 'qualification' as a proxy) and ascribed skill (social competence) model. Each of these frameworks is functional, multidimensional and cross-disciplinary in nature so as to build on commonalities. Each is also situated within the realm of political economy, using skill to achieve an economic outcome through the institutional linkages between government agencies, the education and training system, and labour market regulations (Lloyd & Payne 2004). These frameworks also allow for the evolution of skill over time as individuals navigate between their working and non-working spheres over the life course. Even so, critics of the multidimensional approach to skill suggest that the inclusion of social competence skills in the conceptual framework risks devaluing the notion of skilled work and blurring the distinction between low skilled and high skilled work (Lloyd & Payne 2004; Payne 2017). These critics argue that the definition of skill needs to provide for direct measurement and must offer clarity about the level of skill required to perform a job. This, they argue, is more readily achieved by focusing on the task complexity of a job (technical competence and knowledge), rather than the complement of skills held by an individual (Felstead, Gallie & Green 2004; Lloyd & Payne 2004; Payne 2017). Payne (2017, p. 55) argues that:

> *…there is a need for a robust and meaningful concept of skill that can be applied to both manufacturing and service-based settings, one which sets skill in its societal and workplace context, is rooted in political economy and takes seriously issues of power, job complexity, and worker autonomy.*

Defining skill utilisation

Like the term 'skill', there is little conceptual clarity in the literature with regard to 'skill utilisation'. Examination of the literature suggests that the idea of skill utilisation is relatively new in policy terms (Skills Australia 2012), and that the relevant literature is 'patchy and disparate' (Buchanan et al. 2010), with a relatively sparse evidence base (Findlay & Warhurst 2012).

Critically, the literature tends to focus on the practices that characterise skill utilisation and on policy development to achieve effective skill utilisation through better human resource management systems,[2] rather than on establishing the cornerstones for policy to function effectively: determining a universally accepted definition of skill utilisation, then identifying the existence of skill utilisation and how to measure its presence (Payne 2013).

Numerous efforts have been made to define skill utilisation and its various constructs (see for example McGuinness, Pouliakas and Redmond (2017)), but consensus has not yet been achieved. Payne (2010) suggests taking an inductive reasoning approach to first understand what skill utilisation (or not) looks like, then developing a measurement and evaluation framework, whereas Warhurst and Findlay (2012) suggest a deductive reasoning approach to distinguish between skills held by people and those required by jobs in order to understand any differences, then the development of policy responses. Regardless, there has been a significant shift in policy discourse to link the supply of skills to their effective deployment in the workplace on the basis that skills must be effectively utilised if the overall policy objectives of increasing economic and social well-being in an interdependent economic environment are to be achieved (Buchanan et al. 2017; Payne 2012; Scottish Government Social Research 2008). Broad characterisations of skill utilisation include: ensuring the most effective application of skills in the workplace (Scottish Government Social Research 2008); that people are employed in jobs that use their skills and capabilities effectively (Skills Australia 2011); the need to match the skills possessed by the worker and the skills needed to do the job (Findlay & Warhurst 2012; Warhurst & Findlay 2012), including the degree of match between the complement of skills and opportunity to use them (Scottish Government Social Research 2008), which involves a combination of ability, motivation and opportunity (AMO) to deploy skills in the workplace (adapted by Warhurst and Findlay (2012). This lack of consensus represents a challenge in resolving the gaps between policy intentions and practice and measurement.

[2] For example, high performance workplaces, skill eco-systems and workforce development programmes.

Livingstone (2009, 2017) suggests that the most powerful and useful framework for analysing skill utilisation is that of skill under-utilisation. The under-utilisation of skills represents a loss to the individual, the employer, the economy and society (Skills Australia 2012) and is a growing policy concern (Buchanan et al. 2017; Skills Australia 2010). To add to the complexity, the identification and measurement of skill under-utilisation also differs, with various terms used to describe similar situations: over-/under-education, skilling, training or qualification and skill/occupation mismatch (Borghans 2000; Borghans & de Grip 2000; Borghans, Green & Mayhew 2001; Green & McIntosh 2002). In addition, the interpretation may differ between employer and worker (Livingstone 2017).

Skill under-utilisation

Considerable conflation exists in the literature between skills, qualifications and the level of educational attainment in identifying skill under-utilisation (Livingstone 2017). As a result, the more easily quantifiable measure of over-education is often used as a proxy for skill under-utilisation, which is a poor indicator of a worker's capabilities. The simplistic approach that a certain occupation requires a certain level of education does not reflect the evolution of skill formation in an individual over time, nor the changing skill mix requirements of a job over time, including type of education, actual skills gained or lost (through atrophy), work experience, and formal and informal learning over the life course (Desjardins & Rubenson 2011; Felstead, Gallie & Green 2017).

According to Livingstone (2017), skill under-utilisation can be either time-based or skill-based. Time-based skill under-utilisation relates to those people either not participating in the labour force, the unemployed or the underemployed. The idea of skill-based under-utilisation applies to employed people whose capabilities are not being effectively deployed in the workplace. That is, they have a surplus of skills, education and/or knowledge compared to that required to do their job, as opposed to getting a job. Livingstone (2017) further disaggregates skills under-utilisation into four gaps: the credentials gap, the performance gap, the relevance gap and the subjective gap. A credentials gap exists when there is a discrepancy between the level of educational attainment required to do the job and that required to get the job, i.e. when the worker is over- or under-educated or qualified. A performance gap exists when the capabilities of the worker do not match those required to do the job, i.e. when they are over- or under-skilled. A relevance gap, or field of study mismatch, exists when the preparatory education and/or training or body of knowledge held by the worker is in a different discipline from that required for the job. The subjective gap refers to a worker's personal evaluation of job requirements compared with their qualifications and capabilities (Livingstone 2017). Importantly, these four dimensions are not mutually exclusive. For example, a worker can experience both a credentials gap (be over- qualified) and a relevance gap (a mismatch of skills) for

their occupation. Further, a worker may have the required skills and qualifications for the job but suffer a performance gap. This scenario indicates that the worker's capabilities are not sufficient to the job even if their credentials suggest they are.

The literature suggests that there should be a reference level of education for each occupation equal to the level required for adequate job performance (Voon & Miller 2005). However, the widening of access to, and participation in, higher education has led to an increase in both the number and skill heterogeneity of graduates entering the labour market, leading to the use of the level of educational attainment as a proxy for job requirements. Evidence suggests this has also led to the rise of credentialism, or qualification inflation, whereby the stated level of educational attainment required to undertake a job is not equivalent to the actual level required. Furthermore, where worker capabilities are not sufficient to undertake the requirements of a job, evidence suggests that educational requirements for the job increase (but not the job content). This is known as qualification or education inflation. These issues compound to produce a perceived general deterioration of education standards and a change in the education and skill content of qualifications, referred to as 'grade-drift' (Green, McIntosh & Vignoles 1999). This education inflation has contributed to more highly educated workers accepting lower level jobs, effectively 'bumping down' the lower skilled into even lower skilled jobs, or 'crowding them out' altogether into unemployment (Linsley 2005a), and into being referred to as 'overqualified'. The converse is true for those who have not achieved the level of education required to undertake the job, but under-education is less prevalent than over-education (Green, McIntosh & Vignoles 1999; McGuinness 2006).

While some of the theories 'explaining' over-education (such as Human Capital Theory, discussed in Chapter Two) suggest that over-education is a temporary phenomenon, with individuals transitioning to the 'right' match of job either through eliminating imperfect information or gaining the necessary experience and skills, Green and McIntosh (2002) suggest that this is not the case, and that there generally appears to be a degree of permanence of over-education. Other evidence suggests that over-education is a pervasive feature of labour markets in industrialised economies and results in an inefficient allocation of human capital resources, causing significant cost to both individuals and economies (Linsley 2005b). At the heart of the over-education debate is the inability of over-education measures to control for unobserved ability (Mavromaras & McGuinness 2012; Mavromaras, McGuinness & Fok 2009; Mavromaras et al. 2010), the performance gap, nor its ability to account for the degree of fit between the type of qualification and the qualification requirement for the job; the credentials gap (Wilkins & Wooden 2011). In her review of the literature, Quintini

(2011) found significant variation in empirical studies that used qualifications as a proxy for competence. A number of studies concluded that the correlation between educational mismatches and skill mismatches is low (Allen & Van der Velden 2001; Green & McIntosh 2002; McGuinness & Wooden 2009), most likely due to skill heterogeneity within qualifications (Green & McIntosh 2002; Quintini 2011a). At the same time, however, education mismatches and skill mismatches are not mutually exclusive, and increasing levels of over-qualification do not automatically equate to under-utilisation of skills (Livingstone 2017; Lloyd & Payne 2016). In fact, despite qualifications being extensively used as a proxy for skills, Adalet McGowan and Andrews (2015a) determined in their study that a qualification mismatch may not reflect a skill mismatch. Mismatch and skill heterogeneity within qualifications (the lack of occupation-specific skills required to undertake a job) are becoming increasingly evident as contributing causes of over-qualification (Green & McIntosh 2002; Quintini 2011a). Allen and Van der Velden (2001, p. 449) concluded in their research that "educational mismatches are neither a necessary nor a sufficient condition for skill mismatches" and that the importance of distinguishing between education and skills in empirical analysis is "beyond reasonable doubt". Montt (2015) asserts that skill mismatches occur as a response to the broader labour market context, and may, or may not, co-exist with over-qualification. Field of study mismatch is an outcome of both demand and supply factors; the degree of saturation of a particular field of study and the level of generic skills within the field of study can predict the occurrence of field of study mismatch.

Adding to the challenges of providing clarity on and measurement of skill utilisation is that the existence of over- or under-education does not automatically equate to under-utilisation of skills, or vice versa. Workers all possess skills, regardless of their level of educational attainment – it is how effectively the array of qualifications and skills is deployed which determines skill utilisation. Livingstone (2017) concluded that under-utilisation is widespread and persistent for both skill-based and time-based mismatches. According to Mavromaras, Sloane and Wei (2015), the persistence of skill under-utilisation varies by the level of educational attainment of the mismatched worker. Given that education inflation is projected to continue, Livingstone (2017) believes in the absence of policy intervention that skills under-utilisation is likely to deteriorate rather than improve.

Skill utilisation and productivity

Given the lack of conceptual clarity for both skill and skill utilisation, it is not surprising that there is limited literature dealing with the nexus between skill utilisation and achieving productivity growth. The majority of the literature which does attempt to find correlation between productivity and skill utilisation does so indirectly through empirical analysis of other correlates of productivity; for example, wages, turnover or job satisfaction (Adalet McGowan & Andrews 2015b; Hartog 2000; Mahy, Rycx & Vermeylen 2015).

Given that the increase in the stock of human capital has not resulted in the expected growth in productivity, it can be inferred that there is considerable scope to improve productivity through more efficient allocation of human capital (Keep, Mayhew & Payne 2006).

An extensive international review of skills and productivity by Aznar et al. (2015) for the UK Department for Business, Innovation and Skills provided evidence of a strong and positive effect linking the stock of education and skills with productivity, using a range of methodologies to estimate the contribution to productivity growth. Cross country differences were explained by different labour inputs – quantity and quality as well as their rates of change – whereby quality labour inputs were a derivation of hours worked and average wages, as well as education level and type as a proxy for skills, instead of the complement of skills to be utilised.

Despite the strong correlation between the stock of human capital and productivity growth, the significant incidence of under-utilisation of skills provides the potential for greater productivity gains at an aggregate economy level through more effective allocation of human capital (Adalet McGowan & Andrews 2015a; Mahy, Rycx & Vermeylen 2015). However, the potential gain is unclear (Adalet McGowan & Andrews 2015a).

Mahy, Rycx and Vermeylen (2015) identified that skill utilisation (or not) can have differing impacts at the individual, organisational (firm) or economy-wide level. Ineffective skill utilisation at the aggregate economy level indicates ineffective or wasted investment in education and training; at the organisational level, compromised or greater profitability depending on type of mismatch; and, at an individual level, job satisfaction, wages, turnover and absenteeism – all of which are correlates for productivity.

At the organisational level, an overqualified or over-skilled worker may be beneficial to productivity, assuming no other adverse effects, like low morale, offset any productivity gains at the individual level, however, at an aggregate economy level, the inefficient allocation of skills may have a different effect. Greater productivity at an organisational level does not automatically translate to

greater aggregate productivity if ineffective allocation of human capital constrains the growth of other organisations (Adalet McGowan & Andrews 2015a; Mahy, Rycx & Vermeylen 2015).

As explained by Allen and Van der Velden (2001, pp. 449), while higher education is assumed to raise productivity in general, the actual level of productivity realised is also determined by the match between education level and job level, and they go so far as saying that "the apparent effects of over- and under-education are spurious, masking unmeasured ability differences as the real determinants of productivity." Working in a job below a person's education level imposes a ceiling on the worker's productivity by limiting the deployment of his or her complement of skills. Working in a job above a person's education level raises the productivity ceiling, which is then limited by the ability, knowledge and experience of the individual worker.

While research into the impact of the type of skill under-utilisation (education or skill mismatch) on productivity is also scant (Mahy, Rycx & Vermeylen 2015), emerging research suggests a strong, negative correlation between mismatch and labour productivity (Adalet McGowan & Andrews 2015a). Even so, education mismatch and skill mismatch have different impacts on productivity despite qualifications having been used extensively as a proxy for skills in the past. Adalet McGowan and Andrews (2015a) found that high skill and qualification mismatches are associated with lower productivity at an organisational level, with over-skilling and under-qualification accounting for the majority of lost productivity. Given that the emerging empirical evidence focuses exclusively on the impact of mismatches on productivity within an organisation, the impact of mismatches on aggregate productivity is less understood. However, Adalet McGowan and Andrews (2015a) also concluded that misallocation of skills potentially accounts for a 'non-trivial' share of cross-country labour productivity gaps, further explained by differences in the respective policy environments (Adalet McGowan & Andrews 2015b). As such, the ineffective allocation of human capital and lack of investment in appropriate education and training may also contribute to potentially significant economic structural issues given the strong, negative correlation of skill under-utilisation with productivity at an organisational level.

Conclusion

While public investment in education and training has been considered one of the easiest policy levers to pull in response to stagnating economic performance and the implications of population ageing, the increase in the supply of qualified labour has not resulted in corresponding increases in productivity as policy makers expected, suggesting an alternate policy lever should be considered. As human capital is the driving force of productivity, the appropriate matching and utilisation of the supply and demand for job-specific skills is critical to maximising productivity (Stasz 2001). While direct evidence of the impact of skill under-utilisation on productivity is limited to three studies at an organisational level, the strong negative correlation between mismatch and productivity at an organisational level, and indirect evidence at a broader level, suggests the existence of inefficient utilisation of human capital which, with reallocation of education and skills and appropriate investment in skill development, could offer the chance for greater productivity growth at an aggregate, economy level.

The next chapter will outline how skill utilisation is formally conceptualised and operationalised in this thesis in order to undertake an empirical analysis to answer the research questions set out in Chapter Two.

Chapter four
Method and analytical approach

Introduction

Chapter Two outlined the theoretical framework for analysing skill utilisation based on an integration of Human Capital Theory and the life course approach. This chapter outlines how that theoretical framework will be operationalised to develop an indicator of skill utilisation in Australia, as well as the analytical approach that will be used to identify and profile that utilisation.

This chapter begins with an overview of the various methods of skill measurement used in previous empirical research, including the strengths and weaknesses of each approach, before detailing the measurement approach to be taken in this thesis and the selected data source. It then explains the multiple variables to be used to develop an indicator of skill utilisation in Australia, including the type of under-utilisation – field of study mismatch (skill mismatch), over-qualification or under-qualification (education mismatch) or a combination of skill mismatch and education mismatch. The second section of this chapter explains the analytical approach that will be used in the subsequent empirical chapters. It details the socio-demographic variables to be used to describe the utilisation of skills (or not) in Australia. The assumptions and limitations associated with the approach are also outlined.

Background

As explained in the introductory chapter, raising the skill level of a population has become a primary objective of national economic policies to increase productivity, yet current understandings of skill utilisation are based on a relatively weak knowledge base (Desjardins & Rubenson 2011) and a sound theoretical framework linked to labour market theory is lacking (Borghans, Green & Mayhew 2001; Green, McIntosh & Vignoles 2002; Hartog 2000). As a result, empirical measurement of skill and its use are relatively under-developed (Borghans, Green & Mayhew 2001) and hinders policy advice and development (Green, McIntosh & Vignoles 2002). Measures of over-education have been used to assess several outcome variables, indirect indicators of productivity, including wages, job satisfaction, training participation and mobility (Verhaest & Omey 2006), but not to directly investigate foregone productivity.

While educational attainment provides a unidimensional and convenient measure, with data readily available to enable comparative analysis, education measures assume a homogenous stock of human capital and are insensitive to the heterogeneity of workers skills. Further, like skill and skill

utilisation, the lack of a clear definition of 'over-education' leads to differences in operationalisation. In fact, different measures of over-education result in considerable differences in outcomes (Desjardins & Rubenson 2011; Verhaest & Omey 2006). Moreover, the magnitude and significance of the explanatory variables diverge between different measures, and thus contradictory results are not uncommon (Verhaest & Omey 2006).[1] Allen and Van der Velden (2001) found that wage differentials could be explained by over-education but not skill under-utilisation, and that job satisfaction and job mobility were more likely to be affected by skill under-utilisation than over-education. In addition, Halaby (1994) found the relationship between over-education and skill utilisation to be weak, and argued that measures of over-education lack content validity as measures of skill utilisation. In her review of literature on over-qualification and under-skilled, Quintini (2011a) concluded that over-qualification could either hide real skill under-utilisation (both over-qualified and over-skilled) or skill heterogeneity (overqualified but with appropriate skills for the job). She also identified that a number of studies have provided evidence that over-qualification can be attributable to field-of-study mismatch, suggesting that a lack of occupation-specific skills may be a contributor to over-qualification.

Green, McIntosh and Vignoles (2002) suggest that the measurement challenges associated with over-education can be overcome by focusing on skills rather than education, arguing that the comparison between an individual's level of skill with the skill requirements to do a job will enable identification of skill utilisation. This argument is supported by a growing body of literature. However, given the lack of consensus on the definition of skill, and limited data availability, attempts to measure skill/s have focused on particular aspects of skills, rather than attempting to measure the full range of skills, such as literacy and numeracy, technical, job-specific skills, and 'soft skills' (Allen & Van Der Velden 2005). Even so, the conceptualisation and operationalisation challenges of over-education extend to skill utilisation, given that education is just one component of an individual's complement of skills. That said, scholarship on skill utilisation measurement is scarce, and typically reinforces the critical methodological challenges that affect skill measurement and empirical analysis, rather than helping to identify a definitive solution. Halaby (1994) suggests that the basis for measuring skill and for identifying any mismatch should seek to combine education with market, institutional and socio-demographic forces, using all available information. This is consistent with the principles of the life course approach. However, as Borghans, Green and Mayhew (2001, p. 376)

[1] For examples, see Table 1 in Groot and Maassen Van Den Brink (2000), which lists 25 different studies of over-education, all with variable outcomes, in which over-qualification ranges from 13 per cent using a statistical approach to 42 per cent using a self-assessment approach for entry level workers.

note “widening the term makes measurement more important and more difficult” due to the addition of variables. Once again, the choice of measure for skill utilisation has been influenced by data availability rather than by theoretical relevance and research design. Measures have included highest level of educational attainment, experience, participation in training, testing, self-assessment, occupational title, case studies using sociological or ethnographic methods, job analysis and/or wage differentials and, more recently, field of study mismatch (Montt 2015). However, there is still no agreement on how to measure skill and its utilisation. Like measurement of over-education, different methods of skill utilisation operationalisation can lead to considerably different conclusions regarding key policy issues (Borghans, Green & Mayhew 2001). Both Hartog (2000) and Sgobbi and Suleman (2013) argue that while skills are multidimensional, productivity is affected by differing job characteristics. That is, because human capital is the driving force of productivity, the appropriate matching and utilisation of the supply of and demand for job-specific skills is critical in maximising productivity (Stasz 2001).

Payne (2013) suggests that there is a need to develop new metrics with which to both measure and benchmark skill utilisation, and that there is a need for a quantifiable framework in which to measure and evaluate skill utilisation across different scales (e.g. national versus regional, cross-sectoral, etc.), as well as for a tool to evaluate policy interventions over time. However, like other theorists, he admits that “there is no denying that the measurement and evaluation of skill utilisation constitutes a major challenge” (Payne 2013, p. 150). In this chapter, an indicator of skill utilisation is developed which provides a quantifiable and comparison-friendly tool to assess and analyse skill utilisation at a population level, across and within jurisdictions.

Measurement of skill utilisation

There have been numerous approaches to conceptualising and operationalising over-education and skill utilisation. These methods have been synthesised and grouped by Hartog (2000) into three main approaches, each of which has been further developed and adapted over time (Quintini 2011a), incorporating measurement of skill mismatch (Desjardins & Rubenson 2011) and field of study mismatch (Montt 2015).

Hartog (2000) categorises the measurement methods as:

1. Job Analysis – defined as a normative approach by Quintini (2011a);
2. Worker assessment (direct or indirect); and
3. Realised matches – defined as a statistical approach by Quintini (2011a).

Importantly, studies that have utilised more than one method of measurement have not always found the conclusions to be robust and comparable to alternate methods, that measurement error considerably affects findings, and that the conceptual frameworks are deficient (Borghans, Green & Mayhew 2001). As such, greater effort is required to develop a rigorous method for measuring skill utilisation.

Job analysis method

Hartog (2000) explains the job analysis approach as a systematic evaluation process to specify the level and type of education required for individual occupations using standardised classification systems, such as the US Dictionary of Occupation Titles (as first used by Rumberger (1987) to estimate the penalty of over-education on earnings) and its successor, the Occupational Information Network (O*NET), the International Standard Classification of Occupations (ISCO), as used by Montt (2015)[2] and Elias and McKnight (2001),[3] as well as the Dutch Central Bureau of Statistics (CBS), as used by Verhaest and Omey (2006).[4]

While some (Groot & Maassen Van Den Brink 2000; Hartog 2000; Montt 2015) argue that the job analysis method is explicitly objective, with clear definitions, precise categorisations and measurement instructions, Desjardins and Rubenson (2011) suggest that it is a qualitative, subjective approach, but that, at the same time, the method provides for some level of subjectivity control by using the schematic process, or theoretical deduction (Quintini 2011a). Regardless, the approach enables distinction between education requirements (level or vertical mismatch) and skill

[2] This study identifies field-of-study mismatch by categorising jobs based on the field of study and the ISCO-08 occupation using a systematic coding process and individuals' responses to the Programme of International Assessment of Adult Competencies (PIIAC) Survey of Adult Skills.

[3] This study used occupation as a proxy for skill, aligning the UK Standard Occupational Classification (SOC) with the ISCO using two dimensions of skill to determine the ability to competently carry out the tasks and duties of a specific job: skill level and skill specialisation (field of knowledge required to complete job-specific tasks).

[4] This study used the Dutch CBS occupation classification system to distinguish five occupational levels corresponding to five education levels to develop a comparable job analysis measure. The job classification process was based on tasks to be completed rather than on job title, which led to a relatively homogenous educational requirement within each occupational code.

requirements (type of education or horizontal mismatch) to do a specific job (Allen & Van der Velden 2001, 2005; Desjardins & Rubenson 2011). Even so, the method is concerned with the requirements to do the job rather than with the skills held by the individual doing the job, and fails to distinguish between required and actual education or skill levels nor any tacit knowledge and skills acquired through experience on the job (Borghans, Green & Mayhew 2001; Livingstone 2009b). As such, the job analysis method assumes relatively homogenous skill requirements within each occupational classification (Quintini 2011a; Verhaest & Omey 2006). However, as Sgobbi and Suleman (2013) note, these clusters of homogenous jobs enable job-specific skills to be identified and assessed for appropriate matches at a broader level. In terms of improving productivity and utilisation of skills, it is the job-specific characteristics and core skills that affect individual performance rather than their level of education and their generic, supplementary skills (Hartog 2000; Sgobbi & Suleman 2013). Further, job requirements provide a better basis to identify demand shifts than do industry-based restructures (Hartog 2000).

The job analysis approach to measuring education and skill utilisation or mismatch has its limitations. The approach is dependent upon a number of factors, predominantly the level of precision of the method of measurement in accounting for the considerable differences between jobs and occupations, and the associated risk of measurement error, the level of aggregation and the ability to be flexible and adjust to changes in job requirements over time (Borghans, Green & Mayhew 2001; Hartog 2000; Livingstone 2009b; Verhaest & Omey 2006). An additional risk is that the job analysis method fails to capture the heterogeneity of skills and the transformation of skill requirements of the same job over time (Green & McIntosh 2002). Further, operationalisation of this method has proven difficult due to an insufficiency of data containing the multiple variables required (Desjardins & Rubenson 2011). Emerging data collection methods, such as the Programme of International Assessment of Adult Competencies Survey of Adult Skills (PIIAC), and greater efforts to align national occupational codes with international classification systems for both occupations and level and type of education are enabling improved conceptualisation and operationalisation frameworks to be developed. However, Livingstone (2009b, p. 38) argues that "there are chronic uncertainties involved in assigning separate and distinct skill levels to standardised sets of occupations and in determining what capacities (or skills) are used in jobs", and that thus "estimating the equivalence between required skill capacities and formal education levels of each grouping becomes even more arbitrary." Even so, a number of studies have used a normative approach to develop a coding strategy to match fields of study and education levels with International Standard Classification of Occupations (ISCO) three-digit occupations so that each occupation is matched to one or more fields of education to identify skill or education mismatches

(Elias & McKnight 2001; Montt 2015; Quintini 2011b; Wolbers 2003). These developments also enable cross-national comparisons at a broad level of aggregation at least. However, lower levels of aggregation may result in considerable measurement error due to inconsistencies with coding procedures (Elias & McKnight 2001; Hartog 2000; Montt 2015) for different nations.

Regardless, Elias and McKnight (2001) conclude from their study that because occupation-based measures can incorporate a range of skills required to perform a job competently, occupational classification provides a robust method for the measurement and analysis of skill utilisation. Furthermore, the job analysis method enables the identification of any credential, performance or relevance gaps, as per Livingstone's (2017) disaggregation of skill under-utilisation.

Realised matches method

The statistical or realised match method of measuring over- or under-education identifies the required level of education through the distribution of workers' educational levels within an occupation (Desjardins & Rubenson 2011; Halaby 1994; Hartog 2000; Quintini 2011a; Verhaest & Omey 2006). In this approach, over- or under-education is determined by an arbitrary, blunt measure above or below the mean or mode, usually plus or minus one standard deviation from the mean (as originally used by Clogg and Shockey 1984). As a result, the statistical approach finds symmetry between over- and under-education. While the realised matches method is the most objective – and aligns with the theoretical framework of assignment theory and the interaction between supply and demand (Borghans & de Grip 2000; Hartog 2000) – it is also the most problematic (Desjardins & Rubenson 2011). The realised match required level of education is determined by the characteristics of the employees in the job rather than by the actual requirements of the occupation, as per the job analysis approach. As such, the statistical approach does not consider the technical requirements of the job, nor does it consider the acquired human capital or skill level of workers. It is therefore not appropriate for measuring skill utilisation. The realised matches statistical approach assumes homogeneity between jobs and educational requirements, and is sensitive to cohort effects and changes in required educational levels, and is dependent on aggregation levels for reliability (Quintini 2011a).

Worker self-assessment method

The worker self-assessment method was originally conceptualised and operationalised to assess over- and under-education. Hartog (2000) defined worker self-assessment to be a self-reporting process that was either a direct assessment (of whether a worker held the required level of education to perform in the job) or an indirect assessment (of how the worker's education

compared with that required by the job). However, since its inception, the worker assessment method has been extended to apply to identification of skill mismatch and/or under-utilisation (Allen & Van der Velden 2001; Green, McIntosh & Vignoles 2002; Mavromaras, McGuinness & Fok 2009; Mavromaras et al. 2010; Mavromaras, Sloane & Wei 2015; Sgobbi & Suleman 2013), the 'subjective gap' in Livingstone's (2017) disaggregation of skill under-utilisation.

Self-report measures of over- or under-education or skill mismatch are usually sourced from questions in large scale surveys seeking responses to questions on a range of issues (Buchanan et al. 2010). These surveys are often secondary sources of data. As such, the framework for conceptualising and operationalising the worker self-assessment method is dependent upon the survey and the type of questions asked, resulting in a lack of rigorous methodological instruction (Hartog 2000). For example, Allen and Van der Velden (2001) use the self-report questions in the Higher Education and Graduate Employment in Europe survey to identify four different types of mismatch: match, shortage, surplus and mismatch. Green, McIntosh and Vignoles (2002) use a range of datasets to identify over-education: the Social Change and Economic Life Initiative (SCELI), the Employment in Britain Survey and the UK Skills Survey. The advantage of these datasets is that the questions about the educational requirements of the job and the qualifications held by the respondent are asked identically, enabling comparative analysis. Mavromaras and others (see, for example Mavromaras & McGuinness (2012); Mavromaras, McGuinness & Fok (2009)) use the Household, Income and Labour Dynamics in Australia (HILDA) survey extensively to identify the presence of skill under-utilisation in Australia. HILDA also enables multivariate analysis to identify explanatory or causal reasons for skill under-utilisation, for example, the relationship between disability and under-utilisation (Jones et al. 2014), or the experience of specific cohorts, such as university graduates (Mavromaras et al. 2013), and the relationship of skill under-utilisation with other socio-demographic factors, such as unemployment and low wages (Mavromaras, Sloane & Wei 2015).

Halaby (1994) asserts that the worker assessment method explicitly captures the difference between skills of the worker and those required to perform competently in the job without the need to aggregate relativities of skills to education for both individuals and occupations, avoiding the assumption of homogeneous job roles. While Payne (2013, p. 151) suggests that the best data on skill utilisation is likely to come from employees themselves, such as from a self-report assessment survey, he acknowledges that "surveys provide, at best, a series of broad, impressionistic 'trend indicators'." On the other hand, the advantages of using the worker self-assessment method (as against the job analysis method) to identify over-/under-education or skill mismatch and under-

utilisation are the data availability, its currency at a point in time, and its ease of use and relative cost (Hartog 2000; Livingstone 2009b). However, there are a number of limitations of the method, with subjectivity being the most serious – carrying with it the risk of bias. Sgobbi and Suleman (2013) attempted to mitigate this subjective bias in their study of Portuguese retail bankers by requiring each surveyed worker's supervisor to report on the performance and skills of the worker, arguing that this method reduced bias and increased the reliability of the data. In addition, the worker self-assessment method does not enable the extent of over-/under- education or skill mismatch/utilisation to be identified; the specific level, or baseline, education or skill requirement is unknown, and is limited to an individual's understanding of the education and skills required for a particular job, yet the method still treats workers' responses as accurate (Allen & Van der Velden 2001, 2005; Buchanan et al. 2010; Hartog 2000; Livingstone 2009b; Sgobbi & Suleman 2013; Verhaest & Omey 2006). As McGuinness (2006) points out, even where benchmarks are available, respondents may be applying differing criteria when assessing their job requirements. Verhaest and Omey (2006) suggest that the worker self-assessment method cannot account for changing requirements over time, because it may also capture the effects of screening and selection behaviour by the employer. Livingstone (2009b) disagrees, suggesting that worker self-assessment can more directly reflect job changes over time because the classification rating schemes used in the job analysis method are not responsive to change. In addition, the subjectivity risk may also reflect dissatisfaction in other areas of employment rather than levels of education or skill – for example, wages or hours of work (Montt 2015). However, Spenner (1990) argues that self-reports are a good measure of skills, as there is little evidence to suggest that workers distort reports of their job requirements and characteristics. Critically, however, under the worker self-assessment method, over/under education, skill mismatch or under-utilisation can only be assessed among the employed population (Allen & Van Der Velden 2005; Livingstone 2009b). As such, worker self-assessment methods fail to identify, or measure, the utilisation of education and skills of those not in the labour force.

Population level method

While not considered by Hartog (2000) in his review of measures of education and skill, national statistics collections, like censuses, provide a way to measure the skills and skill utilisation of a whole population (Buchanan et al. 2010; Elias & McKnight 2001). While the primary objective of censuses is to accurately measure the number and geographical location of people in a population at a point in time to provide a reliable basis for the estimation of the population (ABS 2011), censuses also provide important information on the socio-demographic characteristics of the population. This

information supports the planning, administration, policy development and evaluation activities of governments and other users.

What is unique about censuses is the ability to connect one characteristic with other characteristics so that any relationships that exist between them can be identified and explored. While information on some characteristics is available from other sources, only a census can provide information on a standard basis for the population as a whole across a range of variables (Pink 2011). This ability eliminates the need for statistical significance as required in empirical analysis using surveys.[5]

The main disadvantage of national statistics collections is that it is difficult to account in them for information on work experience or education and training in acquiring tacit knowledge and skill development over time; for example, years in the workforce, on-the-job training and so forth. Even so, a population-level method provides an empirical, behavioural measure of skill and its utilisation, overcoming the concerns of subjectivity associated with the more common method of worker self-assessment (Elias & McKnight 2001).

In addition, national statistics collections should also enable cross-national comparison, though, care should be taken to ensure there are equivalencies in educational attainment level, qualification, fields of study and occupations across countries and over time (Buchanan et al. 2010; Elias & McKnight 2001).

Summary

In his assessment of the various methods of measuring over-education, Hartog (2000) concluded that job analysis is the superior method of measurement, despite the number of deficiencies identified. Even so, theorists agree that statistical confidence can be increased, and measurement error minimised, by combining methods of measurement (Allen & Van Der Velden 2005; Montt 2015; Sgobbi & Suleman 2013; Verhaest & Omey 2006), as demonstrated in the meta-analysis of 25 studies by Groot and Maassen Van Den Brink (2000), and in the 30 studies reviewed by McGuinness (2006). For example, in his attempt to address the challenge of the assumed homogeneity of workers and jobs associated with empirical research in over-education, Chevalier (2003) refined the measure of over-education using the job analysis method to identify the existence of over-education and then applied the worker self-assessment method to identify satisfaction with the match. Sgobbi and Suleman (2013) developed a measure of job-specific skill requirements for retail bankers in

[5] Inferential statistics tests are not necessary as a census essentially compares the entire population of a given country.

Portugal using the job analysis method, and then applied supervisor assessment to identify mismatch or under-utilisation of job-specific, rather than supplementary, generic skills. Verhaest and Omey (2006) used the job analysis method to identify educational requirements for occupations, and then applied worker self-assessment to determine any over- or under- education among Flemish graduates in their transition from education to work. Each of these studies improved statistical significance and minimised measurement error to provide greater insight into the presence of over-/under-education and/or skills, the associated penalties and the difference between the two.

In summary, a combination of methods enables multidimensional assessment of the relationship between job-specific skill requirements and worker capabilities to estimate macro-level trends and patterns (Livingstone 2009a). These can then be used to inform policy development, particularly for economic growth priorities to increase productivity and labour force participation, including policy on education and training.

Operationalising skill utilisation

In the context of improving labour productivity through better utilisation of skills in response to the challenges associated with population ageing, the measure of skill and its utilisation used in this study will focus on job-specific skills; those required to do a job as opposed to those required to get a job and those literacy and numeracy skills or 'soft', employability skills – 'foundation skills', as they are called by the OECD (Adalet McGowan & Andrews 2015).

The normative, job analysis method of matching education level and fields of study to occupation – used to varying degrees by Elias and McKnight (2001), Chevalier (2003), Quintini (2011b) and Montt (2015) –, is used to develop the indicator of skill utilisation.

In order to identify the extent of skill utilisation or mismatch at a population level, as well as to account for those not participating in the labour force (i.e. those not employed and therefore not utilising their education or skills in the paid workforce), data from the ABS Census of Population and Housing was used to develop the indicator of skill utilisation for this thesis. Uniquely of all forms of surveys, the census allows relationships between multiple variables to be identified and explored.

For the purpose of developing the indicator of utilisation of job-specific skills, 'skill' is defined by the ABS as a product of skill level (determined by the highest level of educational attainment) and skill specialisation (determined by field of knowledge) in the Australia New Zealand Standard Classification of Occupations (ANZSCO) (ABS 2013).

ANZSCO was developed by the ABS in conjunction with Statistics New Zealand as a skill-based classification system used to identify and categorise all occupations and jobs in the Australian and New Zealand labour markets, and is consistent with ISCO-08. All jobs and occupations undertaken for pay or profit in the Australian and New Zealand labour markets are within the scope of ANZSCO, including the occupations of the self-employed. ANZSCO has five hierarchical levels: major, sub-major, minor, unit and occupation. The most detailed level of classification is 'occupation' (referred to as the 'six-digit' level), in which 1,023 occupations are specified. Occupations are sets of jobs which involve the performance of a common set of tasks. These are grouped together to form unit groups (four-digit level), which are grouped in turn into minor groups (three-digit level), then sub-major groups (two-digit level), and finally, at the highest level, into major groups (one-digit level), of which there are eight. Major groups are identified using a combination of skill level and skill specialisation, creating groupings that are meaningful and useful for most (statistical and administrative) purposes (ABS 2013).

The following table shows the distribution of each hierarchical level within the respective major groups identified in ANZSCO**.**

Table 4.1. Australia New Zealand Standard Classification of Occupations (ANZSCO) hierarchical levels

Major Group	Sub-Major Groups	Minor Groups	Unit Groups	Occupations
1 Managers	4	11	38	99
2 Professionals	7	23	100	318
3 Technicians and Trades Workers	7	21	66	179
4 Community and Personal Service Workers	5	9	36	105
5 Clerical and Administrative Workers	7	12	33	80
6 Sales Workers	3	5	19	37
7 Machinery Operators and Drivers	4	7	22	77
8 Labourers	6	9	44	128

Source: ABS (2013) ANZSCO Australian and New Zealand Standard Classification of Occupations, Version 1.2, Cat. No. 1220.0

While ANZSCO does not measure the skill level of an individual – referring instead to the level of skill that is typically required to perform the tasks required to do a particular occupation –, the identified skill level does provide an indication of the minimum level of education and/or experience (number of years of work) required by an individual to perform the relevant tasks. Therefore, the ANZSCO skill level can be used as a component of the indicator of skill utilisation.

ANZSCO allocates a level of skill that is typically required to competently perform the tasks of a particular occupation. The level of skill is then further defined as a function of the range and complexity of the associated tasks, with the greater range and complexity requiring a greater level of skill. This level of skill is determined either by the minimum level of educational attainment required, as set out in the Australian Qualifications Framework (AQF), by the number of months or years of experience in a similar occupation or during on-the-job training, or by a combination of the three. As a generalisation, the greater the range and complexity of occupation-specific tasks, the greater the level of educational attainment, experience and/or on-the-job training that is required. The skill levels are ranked from one to five. Occupations at the highest skill level, one, have a level of skill commensurate with a bachelor's degree or higher qualification. At least five years of relevant experience may substitute for the formal qualification. In some instances, relevant experience and/or on-the-job training may be required in addition to the formal qualification. Occupations at

the lowest skill level, five, have a level of skill commensurate with NZ Register Level 1 qualification, with AQF Certificate I, or with compulsory secondary education (see Table 4.2, below).

The ABS defines skill specialisation as a function of the field of knowledge that is essential for the satisfactory completion of occupation-specific tasks, the tools and equipment used to undertake these tasks, the materials worked with to complete the tasks, and the product and/or service produced or provided as an output of the tasks.[6] Each occupation is distinguished from others on the basis of detailed skill specialisation.

At each of the five hierarchical levels within ANZSCO (major, sub-major, minor, unit and occupation), a rigorous assessment of skill level and skill specialisation is applied, with broader skill specialisation for the sub-major group, and an increasingly finer degree of skill specialisation and, where necessary, skill level, for each subsequent disaggregated group.

Occupations are distinguished from one another by differences between the tasks performed at the occupation level as indicated by skill specialisation. All occupations have one skill level. Virtually all unit groups are also at one skill level, and thus data can be aggregated by skill level at the unit group level with a high degree of validity, providing an accurate indication of skill level. Minor groups are distinguished from each other based on a finer application of skill specialisation, rather than skill level. Data at the minor group level will therefore provide a satisfactory indication of skill level when aggregated for analytical purposes (ABS 2013).

For the purposes of this research, the utilisation of a person's complement of skills is determined by whether they are employed in an occupation which is appropriately matched with their level of skill and specialisation. Figure 4.1, below, illustrates how skill utilisation will be operationalised for this study. The combination of skill specialisation and level with age will indicate an occupation, or range of occupations, that would appropriately utilise the complement of skills in the workplace. Age is incorporated as a proxy for skills, experience and tacit knowledge obtained formally and informally through on-the-job training and experience over the life course and is used to explain differences in

[6] In developing the skill specialisation criteria for ANZSCO, employability skills were considered as a possible additional dimension of skill specialisation. There are two facets to employability skills: personal attributes, such as loyalty, commitment and motivation; and generic skills, including communication, team work and problem-solving. Employers are increasingly using employability skills in conjunction with technical or job-specific skills when assessing the suitability of an individual for a particular occupation. Since these employability skills are applicable to most occupations, it was decided not to include them as classification criteria for ANZSCO (ABS 2013).

level and type of utilisation (or not) over the lifespan. This model enables both skill mismatch – using the field of study variable – and of over- or under-qualification – using the educational attainment variable – to be identified.

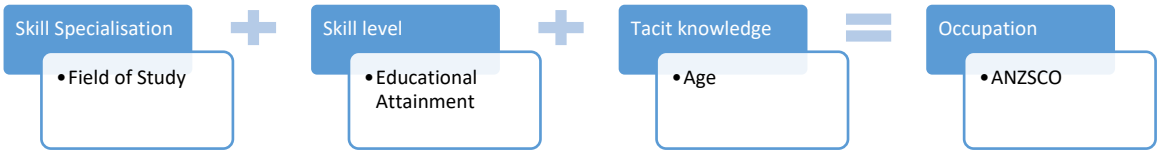

Figure 4.1. Operationalisation diagram for the indicator of skill utilisation

Dataset

As outlined in Chapter Two, analysis of the life course requires an empirical research strategy that comprises social structure, institutions and personal biographies over time through a longitudinal design. However, at the same time, scholars of both Human Capital Theory and the life course recognise the challenges associated with this approach given the lack of appropriate data. Given these challenges, this thesis undertakes a quantitative analysis of secondary data, specifically from the ABS 2011 Census of Housing and Population.

Secondary data analysis is the analysis of previously collected data. While some sociologists and theorists view quantitative and secondary data analysis as an inappropriate model with which to study social life (Phillips 2011), the Census allows examination of relationships between many variables using population-level data. Inferential statistics are not relevant, as the Census enumerates the entire population. As such, all findings and inferences made are based on the whole Australian population (Jackson 2013).[7]

Given the requirement of multiple variables to both operationalise an indicator of skill and its utilisation, as well as undertake empirical analysis over the life course, a complex data set is required. The data used to develop the indicator for skill utilisation is drawn from an unpublished, customised dataset purchased from the ABS 2011 Census of Housing and Population. The dataset is limited to the population aged 25 to 64 years with post-school qualifications, and to occupation,

[7] Sources of error in the Census are addressed in the 'Assumptions and limitations of the data' section of this chapter.

labour force attachment, educational attainment and field of study, and includes partnered and un-partnered males and females, with and without children[8].

Data for the indicator of skill utilisation

The variables used to develop the indicator of skill utilisation are 'Non-School Qualification: Field of Study' and 'Non-School Qualification: Level of Education, Age and Occupation'. Further explanation of the key variables is provided below.

Occupation

In the 2011 Census, the occupation variable is coded using the Australian and New Zealand Standard Classification of Occupations (ANZSCO), First Edition, Revision 1. The Occupation code assigned to a response is based on the occupation title and tasks of the main job held during the week prior to Census Night.

In this research, Occupation at Minor Group (three-digit) level is used. There are 97 different minor groups (see Appendix A for the full list). While minor groups are distinguished from each other based on a finer application of skill specialisation rather than skill level, they do have a predominant skill level. Data at the minor group level will therefore provide a satisfactory indication of skill level when aggregated for analytical purposes (ABS 2013). In addition, international studies generally use ISCO-08 three-digit level data, which will enable cross-national comparison to be undertaken (see, for example, Elias and McKnight (2001); Montt (2015)).

The 'not stated' or 'inadequately described' occupation categories are removed from the data set to ensure that the assessment of skill utilisation in Australia is based on the assumption of full knowledge of the variables contributing to the indicator.

For analytical purposes, occupation variables are aggregated up to one-digit level.

[8] The customised dataset is as follows; a Customised Table from the 2011 ABS Census of Population and Housing of Persons Aged 25 - 64 Years by Narrow Field of Study of Highest Non-School Qualification (4 Digit) by Broad Level of Highest Non-School Qualification (1 Digit) by Occupation Minor Group (3 Digit) by Sex by Five Year Age Group by Labour Force Status by Social Marital Status (With Partner, Not With Partner) by Children in Family (Dependent Child(ren), Non-Dependent Child(ren) Only, No Children) for Australia

Non-school qualification: Field of study

In the 2011 Census, the field of study variable is coded using the Australian Standard Classification of Education (ASCED) Field of Education Classification. This describes the field of study of a person's highest completed non-school qualification.

In this research, the Narrow Field of Study at the Highest Non-School Qualification variable is used at the four-digit level (see Appendix B for a list).

The 'not stated' or 'inadequately described' field of study categories are removed from the data set to ensure the assessment of skill utilisation in Australia is based on the assumption of full knowledge of the variables contributing to the indicator.

Non-school qualification: Level of education

In the 2011 Census, the level of education variable is coded using the Australian Standard Classification of Education (ASCED) Level of Education Classification. This describes the level of a person's highest completed non-school qualification.

The 'not stated' or 'inadequately described' level of education categories are removed from the data set to ensure the assessment of skill utilisation in Australia is based on the assumption of full knowledge of the variables contributing to the indicator.

Age

In the 2011 Census, age is a person's age at last birthday, and is collected for each person. Age is calculated from date of birth, but if this was not provided, stated age is used. If neither is provided, age is imputed by the ABS.

In this research, the age variable is used both to inform the indicator of skill utilisation and for the empirical analysis. Age data are provided in five-year age groups, from 25 years of age to 64 years of age. These ages were selected on the assumption that ages 25 to 64 are the prime working ages, and that by the age of 25 individuals will have undertaken post-school qualifications and/or obtained the necessary years of experience as required for the ANZSCO skill level education classification.

For the purposes of informing an indicator of skill utilisation for this research, all those in the dataset are aged 25 and over, and therefore meet the skill level and experience requirements.

Data for the analytical approach

The data used to undertake the empirical analysis of skill utilisation in Australia are drawn from the same unpublished, customised dataset purchased from the ABS 2011 Census of Housing and Population used to develop the indicator of skill utilisation. In addition to the variables used to develop the indicator of skill utilisation, a number of other variables are used to undertake an analysis informed by the principles of the life course. These variables include age, sex, labour force status, social marital status and presence of children.

For analytical purposes, occupation variables are aggregated up to one-digit level.

Age

Age data provides insight into skill utilisation over the lifespan, which will enable any age, cohort and/or period effects to be identified.

Sex

In the 2011 Census, each person's sex, either male or female, is recorded. If sex is not stated it is imputed by the ABS. This variable will enable differences in skill utilisation to be analysed by sex.

Labour force status

In the 2011 Census the labour force status of all people aged over 15 the week prior to Census Night is recorded.

For the purposes of this research, the variables used are 'employed full time, employed part time, employed, away from work,[9] unemployed, and not in the labour force.

Social marital status

In the 2011 Census the relationship status of all persons aged over 15 years is recorded based on their current living arrangements. Where a couple relationship exists in the household, the type of relationship is identified. For the purposes of this research, social marital status identifies 'linked lives', and is defined as 'partnered' (including married and de-facto couples) or 'not-partnered'.

[9] Note that the category 'employed, away from work' also includes persons who have stated that they worked but who did not state their number of hours worked.

Presence of a child

To determine the impact of children on skill utilisation for both men and women, the presence of a child variable for this research is determined from the *Relationships in Household* question in the 2011 Census.

The question records the relationship of each person in a family to the family reference person, or, where a person is not part of a family, that person's relationship to the household reference person.

For the purposes of the Census, a child is considered a person of any age who is a natural, adopted, step, foster or nominal son or daughter of a couple or lone parent, usually resident in the same household. A child is also any individual under 15, usually resident in the household, who forms a parent-child relationship with another member of the household. A child is also a dependent student who is a natural, adopted, step, or foster child, 15 to 24 years of age, and who attends a secondary or tertiary educational institution as a full-time student, and for whom there is no identified partner or child of his/her own usually resident in the same household.

For this research, and from the life course perspective, the presence of children reveals 'linked lives'. Three aggregated categories are used in this research: dependent children (those aged 0 to 14 and those aged 15 to 25 participating in full time study), non-dependent children only (those aged 15 to 24 not in full time study), and no children living in the household.

Assumptions and limitations of the data

Using Census data will enable cross-sectional analysis of population-level data – that is, an observational study of a population at a point in time rather than a longitudinal study (which provides the mechanism to observe changes over time). Under the principles of the life course, longitudinal data are particularly relevant for lifespan analysis. Even so, the cross-sectional approach will enable cohort and period effects to be identified, given that the age variable is included in the dataset. Importantly, the ABS Australian Census Longitudinal Dataset (ACLD) will bring together data from the 2006, 2011 and 2016 Censuses to create a research tool for exploring how Australian society is changing over time. As a result, it will be possible to apply the methodology of this indicator of skill utilisation longitudinally in the future.

There are a number of assumptions and limitations within the dataset that prevent a definitive assessment of skill utilisation in Australia. These assumptions and limitations result directly from the large, complex dataset that is required to both develop an indicator of skill utilisation *and* undertake empirical analysis. The extent of desirable variables and associated levels of dis/aggregation required data to be selected strategically. Key assumptions and limitations are outlined below.

Data

Because Census data are collected with a high reliance on self-enumeration, content error[10] will be apparent. However, given that the Census covers the entire population, it is also considered to have high levels of reliability and validity (Jackson 2013). In this thesis, content errors have been reduced to a minimum by using data from the customised datasheet provided by the ABS.

To ensure the dataset is complete, with full knowledge of each of the variables used to develop the indicator and the empirical analysis, all 'not stated' and 'inadequately described' categories are removed from each variable.

Age variable

The age variable is used to construct a 'synthetic' lifespan from which to analyse skill utilisation over the life course. This approach could be argued to be problematic, given the cross-sectional rather than longitudinal nature of the data, because it cannot capture the change in individuals' skill utilisation over time as they transition through life events. Analysis of longitudinal data provides the ability to correct for the 'cohort effect' (Kupper et al. 1985), that is, it allows for analysis of the individual components – cohort, period and age –, and accounts for the impact of each separately. This is of particular concern for women given the considerable changes in their participation in education and work since the 1950s. While the increase in female labour force participation rates can be explained by cohort, period and age effects, several studies suggest that any further increases will become smaller and smaller for subsequent cohorts, and that there hasn't been the revolution in women's work that the participation rates may suggest (see for example Chevalier & Viitanen 2002; Daley, McGannon & Ginnivan 2012; Euwals, Knoef & Van Vuuren 2011; Macran, Joshi & Dex 1996; Parr 2012; Tapper 2010). As historical increases were primarily due to cohort effects, such as changing social norms and legislative changes (e.g. working after marriage, sex discrimination and equal pay), these are no longer as relevant to successive, younger generations. Even so, women are likely to continue to transition in and out of education and work over their lifespan as they balance work and family (Johnes 2006; Moen 2016; Treas & Widmer 2000; Yerkes 2010).

To alleviate these concerns, this research utilises a cohort, period and age effect lens in the analysis of the findings. More specifically, the thesis does not infer that skill utilisation increases/decreases over the lifespan, but rather that skill utilisation is higher/lower at certain points in the lifespan for

[10] Potential sources of error in the Census are: undercounting, respondent error, processing error and introduced random error. The effect of such errors on overall census results is generally insignificant and does not impair the usefulness of census data (ABS 2006c).

different socio-demographic profiles. Where relevant, these differences are explained by age, period or cohort effects.

Importantly, in the absence of longitudinal data to investigate skill utilisation, cross-sectional data offer the best available proxy for examining skill utilisation over the life course.

Occupation variable

Due to size restrictions with the dataset, the occupation data are limited to the minor group (three-digit) level rather than to a greater level of disaggregation, such as unit level, in which occupations have only one skill level; the unit level would provide much greater ability to match both skill level and skill specialisation. Even so, the ABS (2013) states that the minor group provides a satisfactory indication of skill level when aggregated for analytical purposes. The indicator for skill utilisation is developed using occupation categories at the three-digit level, and occupations are aggregated up to one-digit level for analytical purposes.

Level of education and field of study

In this research, Broad Level of Highest Non-School Qualification is used at the one-digit level (see Appendix C for a list). To align with the skill level classification within ANZSCO, the Highest Non-School Qualification at the one-digit level is further grouped to align with the five ANZSCO skill levels, as detailed in Table 4.2, below. As the table shows, there is no clear delineation of ANZSCO skill and education level requirements and ASCED at the one-digit level. Greater delineation would have been possible at the ASCED two-digit level, but access to data at this level was constrained in terms of size and by budget, when incorporating data requirements for the empirical analysis (see the 'Analytical framework' section, below, for further information on data for the empirical analysis). Given that the field of study variable will identify any skill mismatch, regardless of education level, data priority was given to occupation at the three-digit level and to field of study at the four-digit level to ensure a greater disaggregation of occupations by skill specialisation.

Table 4.2. ANZSCO skill level and educational requirements

ANZSCO Skill level	ANZSCO Education requirements	ASCED Highest Non-School Qualification
1	Bachelor's degree or higher qualification At least five years of relevant experience may substitute for the formal qualifications listed above.	Postgraduate Degree level Graduate Diploma and Graduate Certificate level Bachelor's Degree level
2	NZ Register Diploma or AQF Associate Degree, Advanced Diploma or Diploma. At least three years of relevant experience may substitute for the formal qualifications listed above. In some instances relevant experience and/or on-the-job training may be required in addition to the formal qualification.	Advanced Diploma and Diploma level
3	NZ Register Level 4 qualification AQF Certificate IV or AQF Certificate III including at least two years of on-the-job training. At least three years of relevant experience may substitute for the formal qualifications listed above. In some instances relevant experience and/or on-the-job training may be required in addition to the formal qualification.	Certificate level
4	NZ Register Level 2 or 3 qualification, or AQF Certificate II or III. At least one year of relevant experience may substitute for the formal qualifications listed above. In some instances, relevant experience may be required in addition to the formal qualification.	Certificate level
5	NZ Register Level 1 qualification AQF Certificate I, or Compulsory secondary education.	Certificate level

Source: ABS (2013) ANZSCO Australian and New Zealand Standard Classification of Occupations, Version 1.2, Cat. No. 1220.0

In addition, the Census only allows respondents to specify one (1) highest level of educational attainment, and associated field of study, and does not account for additional or multiple post-school qualifications undertaken by individuals. As a result, matching field of study and educational attainment to occupation using the indicator of skill utilisation is limited to one highest level of educational attainment and one field of study, rather than to the most recent or applicable to the individual's current occupation. The Census does not currently enable longitudinal tracking of transitions into and out of education and employment, and assumes a linear progression from schooling to work. This does not reflect the global economic restructuring of the 21st Century, job redesign, nor the proposed 'extended work-education sequences' model across the life course (O'Rand & Bostic 2016).

Presence of children

Using the presence of a child variable from the *Relationships in Household* question in the 2011 Census enables the impact of children on skill utilisation for both men and women to be assessed, but the variable is problematic for a number of reasons. In that question, children are recorded as part of a family unit living in the same dwelling. Therefore, the existence of non-dependent children not living in the same dwelling as their mothers or fathers cannot be identified from this question. If a child is no longer living in the same dwelling as their mother or father, it is not possible to identify the existence of a child over the life course of a mother or father, nor any resultant impact on skill utilisation. While the age of youngest child or number of children ever born questions may have been more apt from a life course perspective, these questions are only applicable for women; any impact of the presence of a child on the skill utilisation of a father would not be able to be ascertained.

Given the broad definition of a child, and restricted data availability, definitive conclusions about the impact of the presence of a child on the skill utilisation of men and women over the life course are not possible, especially for older cohorts who may have had children who no longer live in the family household. However, the cross-sectional nature of the dataset does allow inferences to be made.

Method

Indicator of skill utilisation

The indicator of skill utilisation is developed in a two stage process.

First, using both the job analysis method and the statistical analysis approach, the occupation variable at the three-digit level is matched to one or more of the field of study categories at the one-digit level. The job analysis approach utilises intuitive reasoning, while the statistical approach provides an indicative or arbitrary cut-off for inclusion of the field of study based on the field of study pursued by those employed in the occupation being assessed (see Appendix D for a list of matched field of study categories by occupation).

Second, using the Field of Study, Level of Education and Occupation variables, a detailed coding system is applied to identify if the complement of skills is utilised. If it is not, the model then determines if that under-utilisation is due to field of study mismatch (skill mismatch) and/or to over- or under-qualification (education mismatch). Skill mismatch and education mismatch are not mutually exclusive.

There are two equations for identifying the presence of skill utilisation. All equations are applied to the data using Microsoft Excel. Where any field of study is applicable to the occupation in question, the equation model for identifying skill utilisation is:

$$IF(AND(FoS=FoS_O,LoE<=SL_O),"Y","N") \quad [1a]$$

Where there are either single or multiple, yet finite, field/s of study for the occupation in question, the equation model for identifying the presence of skill utilisation is:

$$=IF(OR(FoS=FoS_{O,}n) *AND(LoE<=SL_O),"Y","N") \quad [1b]$$

Where FoS is the field of study in question, FoS_O is the Field of Study/ies identified through the job analysis and statistical analysis process for Occupation 'O' (see Appendix E), *n* is each field of study for the occupation in question, LoE is the level of education in question and SL_O is the minimum ANSZSCO skill level required for Occupation 'O' where '1' is the highest skill level. 'Y' indicates that the complement of skills is utilised and 'N' indicates that the complement of skills is not utilised.

If not utilised (i.e. 'N') in equations [1a] or [1b], the equation model for identifying skill mismatch is:

$$=IF(SU_O="N",AND(FoS\neq FoS_O), TRUE, FALSE) \quad [2]$$

Where SU_O is the indicator of skill utilisation for Occupation 'O' determined from equations [1a] or [1b]. If 'true', skill mismatch is present, if 'false', skill mismatch is not present, yet given that skills are not utilised as determined from equations [1a] or [1b], education mismatch must exist.

There are two equations for identifying education mismatch: overqualified or underqualified. If not utilised (i.e. 'N') in equations [1a] or [1b], the equation models for identifying education mismatch are:

$$=IF(SU_O = "N", AND(LoE > SL_O), FALSE, OVERQUALIFIED) \quad [3a]$$

$$=IF(SU_O = "N", AND(LoE < SL_O), FALSE, UNDERQUALIFIED) \quad [3b]$$

The indicator of skill utilisation determines whether an individual's complement of skills is utilised in the labour market or not. If not, the indicator further determines whether the individual is experiencing a skill mismatch or an education mismatch, or a combination of skill and education mismatch.

Analytical framework

The purpose of the empirical analysis in this thesis is to answer the research questions set out in Chapter Two: to what extent are Australians' skills utilised in the labour market, and how utilisation may differ for a range of socio-demographic reasons over the life course (age, sex, presence of a partner and/or presence of a child in the household). And, more specifically, how the principles of lifespan, agency and linked lives may affect skill utilisation in Australia.

To do this, the thesis combines positivist and critical social science approaches (Nueman 1991). This means that the thesis uses quantitative data and techniques to determine the type of relationships between the variables, but also looks beyond the findings to consider what they might indicate about underlying societal structures and constraints.

Cross-tabular analysis is used to identify the relationship between skill utilisation and the labour market in Australia, and how it may differ between men and women, taking into account occupation, educational attainment, field of study, labour force status, age, and the presence or absence of a partner and/or child. Cross-tabular analysis also illustrates the nature of the association between the variables (Phillips 2011).

The method employed directly compares the utilised population with the not utilised population under different combinations of circumstances to explain the difference in skill utilisation. The process adds an additional variable for each analytical step. The analytical process culminates in the

analysis of skill utilisation for men and women by the presence, or not, of a partner and presence, or not, of a child by labour force status and age. This approach provides the framework in which the effect of linked lives and rational choice decisions on skill utilisation over the lifespan can be explored.

While undertaking multivariate analysis using a regressions model would enable the net effect of each of the independent variables on skill utilisation to be estimated (de Vaus 2014), after controlling for the interrelationship between them, the aggregated nature of the customised dataset does not easily facilitate such computations. As such, this will be a focus of future research using 2016 Census data tailored for multivariate analysis.

Summary

Skill utilisation, and its optimisation over the life course, is an indicator for potential successful life outcomes for an individual – that is, the return on human capital investment –, and is also an indicator for macro-level productivity performance and economic and social well-being. The methodological approach outlined in this chapter develops an indicator of skill utilisation in Australia and allows the empirical analysis deployed in the next two chapters to answer the research questions set out in Chapter Two: to what extent are peoples' skills utilised in the labour market in Australia? Chapter Five presents the results of the analysis of skill utilisation under the theoretical framework of Human Capital Theory, including the types of under-utilisation, as well as how skill utilisation differs by occupation, educational attainment, field of study, labour force status and sex. Chapter Six incorporates the principles of the life course approach to analyse skill utilisation over the lifespan, focusing on the linked lives perspective, and analyses how skill utilisation differs according to the presence, or not, of a partner and the presence, or not, of a child, as well as how it differs for men and women.

Chapter five
Skill utilisation in Australia

Introduction

Improving productivity by increasing the educational attainment of Australians is a priority policy position of the Australian Government (Commonwealth of Australia 2015). This chapter analyses whether the existing complement of education and skills held by Australians is being utilised in the Australian labour market in order to determine the existence of any foregone productivity growth. The presence of under-utilisation of skills suggests that alternative policy positions should also be considered to improve productivity in Australia.

Using the indicator of skill utilisation developed in Chapter Four, this chapter addresses the research questions set out in Chapter Two: are peoples' skills utilised in the labour market in Australia? The chapter details how skill utilisation differs by occupation, level of educational attainment and field of study for men and women, and discusses the connection between skill utilisation and Human Capital Theory. More specifically, the chapter provides a quantitative analysis of skill utilisation for the Australian population aged 25 to 64 with post-school qualifications, and of whether their skills were utilised or not utilised. The degree of utilisation may be due to a field of study mismatch (skill mismatch), being over-qualified or under-qualified (education mismatch), or a combination of the two, for the occupation in which they were working at the time of the 2011 ABS Census of Population and Housing. An analysis of how skill utilisation differs by labour force status is also presented.

The implications of skill under-utilisation will be addressed in the discussion chapter of this thesis.

Skill utilisation overview

Over six million (6,010,364) Australians aged between 25 and 64 completed the questions in the ABS 2011 Census of Population and Housing, and it is this cohort which will is used to determine the status of skill utilisation according to field of study, highest level of post-school educational attainment and occupation. This represents 58 per cent of the 10,407,515 Australians aged 25 to 64 years.

In terms of skill utilisation, around two in five Australians, or 40.4 per cent, were employed in an occupation appropriate for their complement of skills, as compared to their level of educational attainment and field of study. The remaining three in five Australians, 59.6 per cent, were not working in an occupation which was appropriately matched to their complement of skills. This

indicates that most Australians are not maximising the opportunities available from their investment in post-school education, as Human Capital Theory hypothesises. Moreover, the under-utilisation of skills contributes to foregone productivity growth at a broader, macro-economic level.

Skill under-utilisation is further decomposed by type – field of study (skill) mismatch or education mismatch (over- or under-qualified) –, disaggregated by Livingstone (2017) as either relevance gap and credential or performance gap respectively. The 3,582,511 under-utilised people were either not employed (unemployed or not in the labour force) or working in an occupation in which they either had a field of study mismatch (15.3 per cent), were over-qualified (6.0 per cent) or under-qualified (9.2 per cent), or experienced a combination of field of study and education mismatch (over- or under-qualified – 26.7 per cent and 2.5 per cent respectively). That is, over one in four Australians with post-school qualifications are both over-qualified and have a field of study mismatch (see Figure 5.1, below). This indicates that the choice individuals make in relation to education and field of study (the principle of agency from the life course perspective) may not provide the opportunity, through employment, to maximise their return on investment for a successful life outcome. This evidence also suggests that the majority of Australians with post-school qualifications are not utilising their complement of skills in the workforce and, as such, that potential productivity growth has been foregone, contradictory to Human Capital Theory.

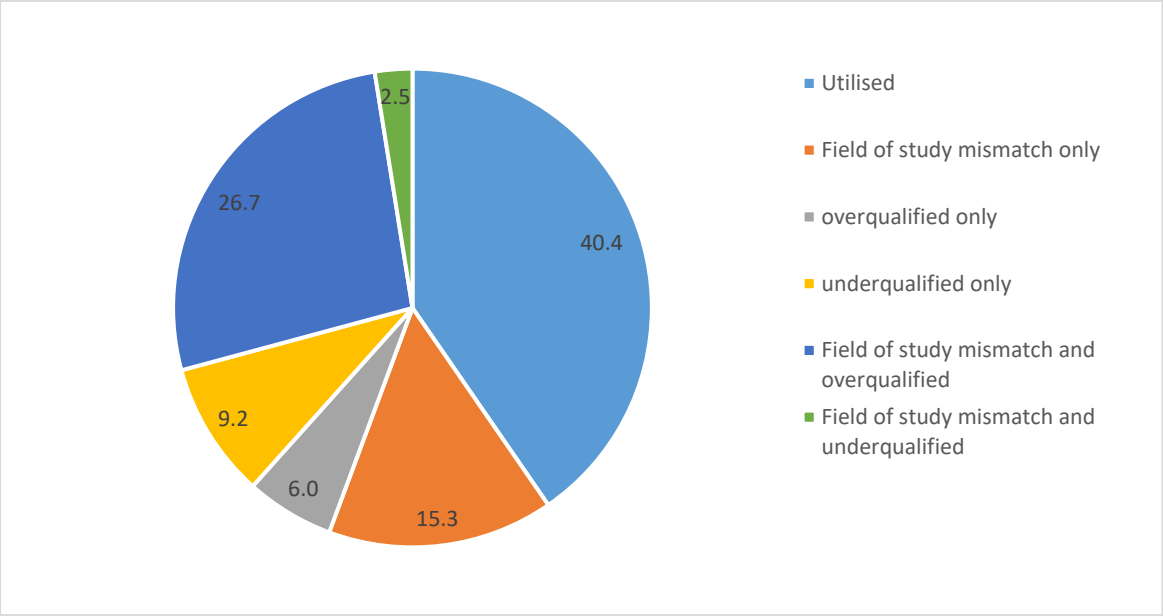

Figure 5.1. Skill utilisation in Australia

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by labour force status

An individual's complement of skills can only be utilised through employment in the workforce. Moreover, skill utilisation differs by level of engagement with the labour force, reducing productivity potential. Of the 6,010,364 Australians 25 to 64 years of age with post-school qualifications, 82.9 per cent were employed. Almost three in five Australians were employed on a full-time basis (58.2 per cent), one in five was employed part time (20.4 per cent), 4.3 per cent were employed but away from work,[1] and almost one in five (17.1 per cent) was not working – either unemployed (3.1 per cent) or not in the labour force (14.1 per cent) (see Figure 5.2, below).[2]

Figure 5.2 also shows skill utilisation (utilised and type of under-utilisation) by proportion of population by labour force status. Almost one in three (29.3 per cent) Australians worked full time and was effectively utilised in the labour market, 8.9 per cent of Australians worked part time and were effectively utilised. One in ten (10.6 per cent) Australians was working full time in an occupation which did not match their field of study, 6.9 per cent were under-qualified, and 5.4 per cent had a combined field of study over-qualification mismatch. Part time workers were more likely to have a field of study mismatch (3.9 per cent of the population), or a combined field of study over-qualification mismatch (3.6 per cent of the population), than to experience under-qualification. All those who were not employed were not utilised in the labour market at all (17.1 per cent of the population or 1,029,631 people), were deemed to have a combination of field of study and over-qualification mismatch, and were therefore not productive contributors to the economy. Excluding those not in the workforce, the combination of field of study mismatch and over-qualification accounted for one tenth (9.5 per cent) of the population.

[1] The category 'Employed, away from work' includes persons who were away from work at the time of the Census, and these people are categorised as either employed full time or part time based on usual hours worked. 'Away from work' also includes persons who stated they worked but who did not state the number of hours worked (ABS 2011)

[2] FoSOQ is a combination of field of study mismatch and over-qualification; FoSUQ is a combination of field of study mismatch and under-qualification.

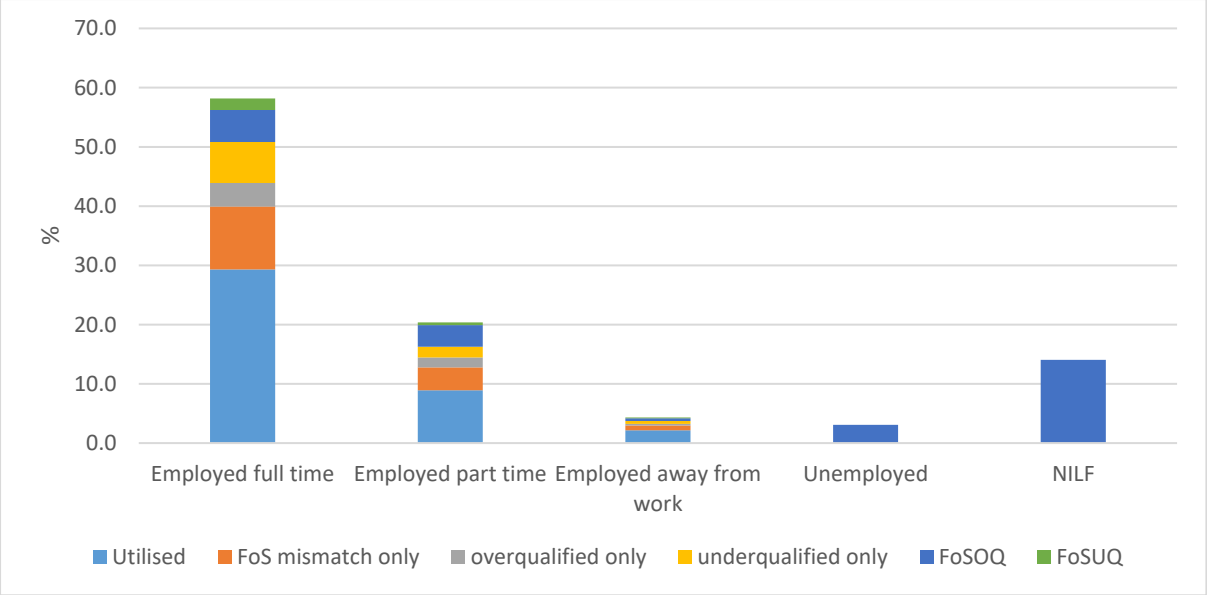

Figure 5.2. Skill utilisation and type of utilisation, proportion of the population by labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Around half of those employed full time were effectively utilised in the labour force (50.4 per cent), while 43.8 per cent of those working part time were utilised. Half of the relatively small proportion of the population who were employed but away from work were effectively utilised in their respective occupations. Field of study mismatch, the relevance gap, was the greatest contributor to under-utilisation for the employed workforce; 18.2 per cent of those employed full time, and 18.9 per cent of those employed part time (see Figure 5.3, below). Each of the employed categories experienced a similar distribution for each type of under-utilisation, except for the combination of field of study mismatch and over-qualified, where those employed part time had almost twice the proportion of under-utilisation compared to those employed full time (17.8 per cent compared with 9.3 per cent). This suggests that the decision to work part time, as per the principle of agency, increases the likelihood of skill under-utilisation, and a field of study mismatch combined with over-qualification, leading to subsequent impacts on potential successful life outcomes and productivity. How linked lives, as per the principles of the life course, may influence the level of engagement with the labour market will be examined in the next chapter.

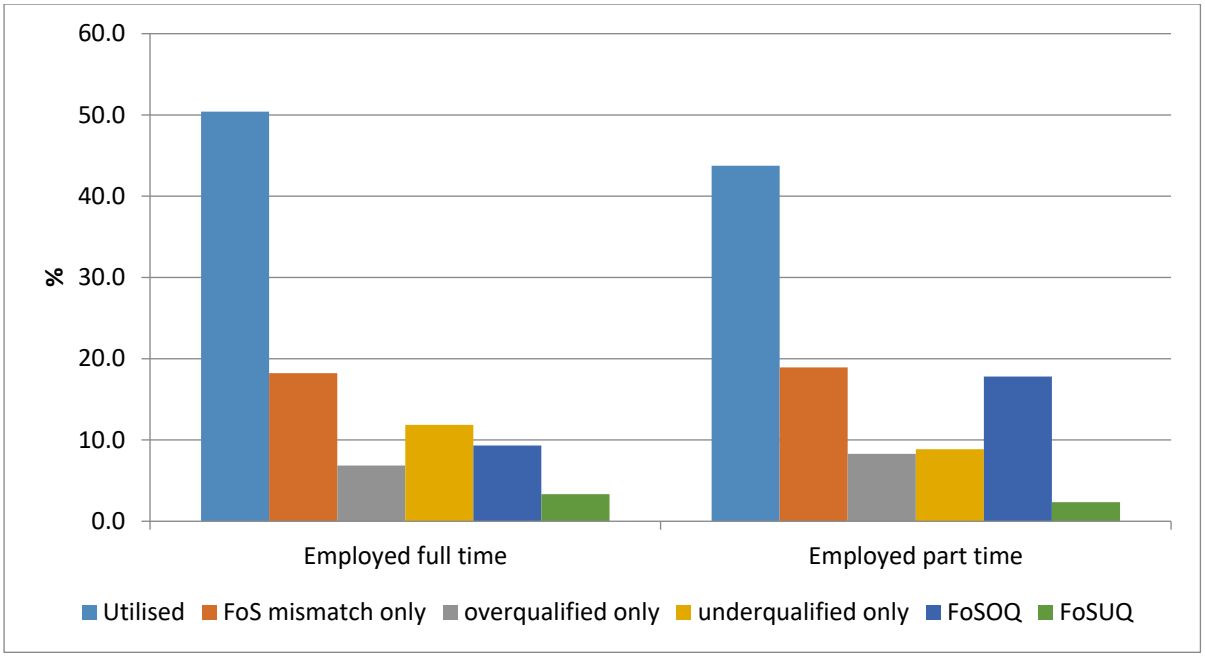

Figure 5.3. Skill utilisation and type, employed full time and part time

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by occupation

In addition to participation in the workforce, skill utilisation differs by the occupation in which people are employed. Figure 5.4 shows the proportion of the population by occupation groups and the respective contribution to skill utilisation. The greatest proportion of the population is employed in a professional occupation (28.3 per cent), followed by trade and technical workers (13.7 per cent) and managers (12.3 per cent). Of the 40.4 per cent of the population which was effectively utilised in the labour market, almost half (19.8 percentage points) were employed as professionals. Technicians and trade workers accounted for almost a quarter of all utilised employees (9.5 percentage points). Not only do occupations which require task-specific skills make up the greatest proportion of the labour market, they contribute the highest proportion of utilised workers. For the 59.6 per cent of the population who were not effectively utilised, in addition to the 17.1 per cent of the population not employed, professionals, managers, and clerical and administrative workers represent around a sixth each of those not effectively utilised (8.5, 8.2 and 8.5 percentage points respectively).

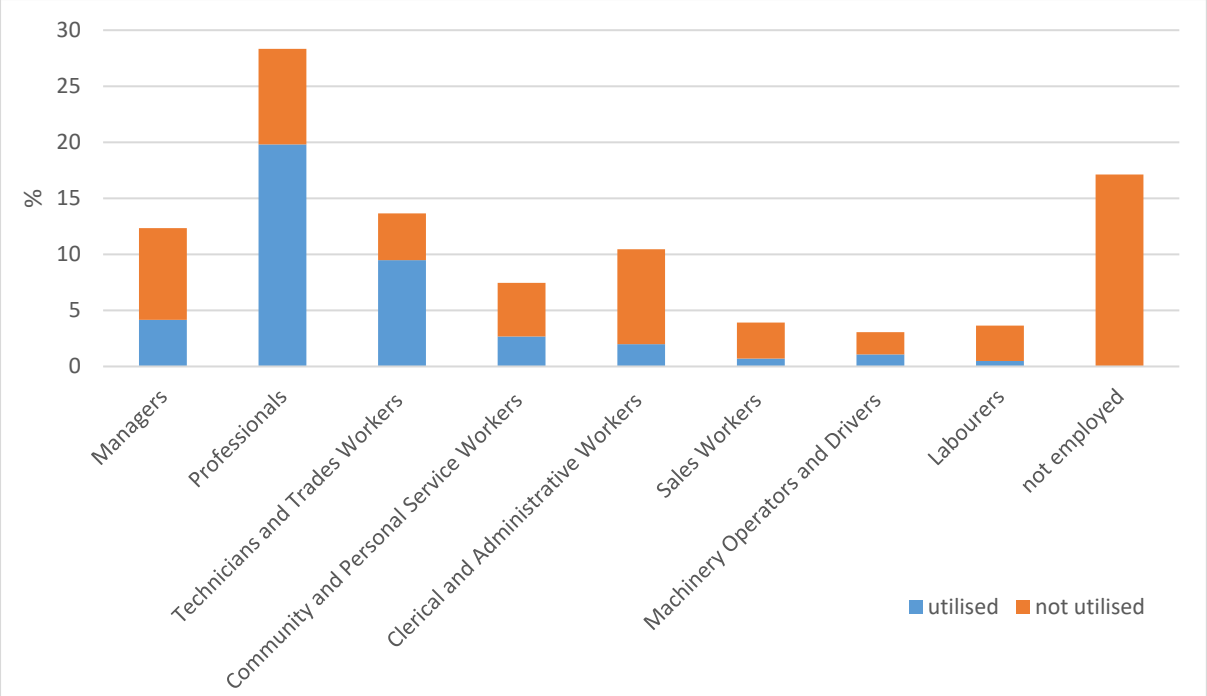

Figure 5.4. Skill utilisation, proportion of the population by occupation

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The proportion of skill utilisation and type of under-utilisation for each occupation group is shown in Figure 5.5, below. As shown, the highest level of skill utilisation is experienced by those in professional occupations (69.9 per cent) and technicians and trade workers (69.5 per cent). While representing a smaller proportion of the population, less than half of community and personal services workers (35.8 per cent), machinery operators and drivers (35.3 per cent), and managers (33.7 per cent) utilise their skills effectively in the workforce. For the lower skilled occupation groups, while also making up a smaller proportion of the workforce, the majority of labourers (86.4 per cent), sales workers (82.0 per cent), and clerical and administrative workers (81.0 per cent) do not effectively utilise their skills in the labour market.

The type of utilisation differs further by occupation grouping. The combination of field of study mismatch (relevance gap) and over-qualification (credential gap) is the greatest contributor to skill under-utilisation, with over one in four Australians (26.7 per cent) either not working or employed in occupations in which they were both over-qualified and experienced a field of study mismatch. For those occupations with job-specific skill requirements, the combination of field of study mismatch and over-qualification is almost nil for professionals (0.03 per cent) and 6.8 per cent for technicians and trade workers. Even so, people employed in professional occupations were more likely to be under-qualified: 14.4 per cent were under-qualified and 10.6 per cent had a combination of field of study mismatch and under-qualification.

For managers, while a third (33.7 per cent) were utilised, 29.8 per cent were under-qualified, and a quarter (23.6 per cent) had a field of study mismatch. Field of study mismatch combined with over-qualification is the greatest type of under-utilisation for community and personal services workers (23.6 per cent), clerical and administrative workers (33.8 per cent), and sales workers (34.1 per cent). All also have a high proportion who were over-qualified only (18.9 per cent, 21.4 per cent and 19.6 per cent respectively), and field of study mismatch only (17.8 per cent, 23.0 per cent and 28.4 per cent respectively). Field of study mismatch only was the highest for machinery operators (39.1 per cent) and labourers (52.0 per cent), followed by the combination of field of study mismatch and over-qualification (21.5 per cent and 32.2 per cent respectively).

While the high proportion of effective skill utilisation for occupations which require job- or task-specific skills suggests that productivity is more likely to be optimised in those roles, relatively higher levels of under-qualification may also indicate the opportunity for productivity performance improvement. This may be achieved through further investment in education and training. At the same time, lower skilled occupations and those requiring skills less specific to the job have lower levels of skill utilisation, indicating a mismatch between supply and demand for educational attainment and/or field of study requirements. As such, people are working in occupations which do not match their complement of skills, reducing their ability to maximise both successful life outcomes and macro-level productivity.

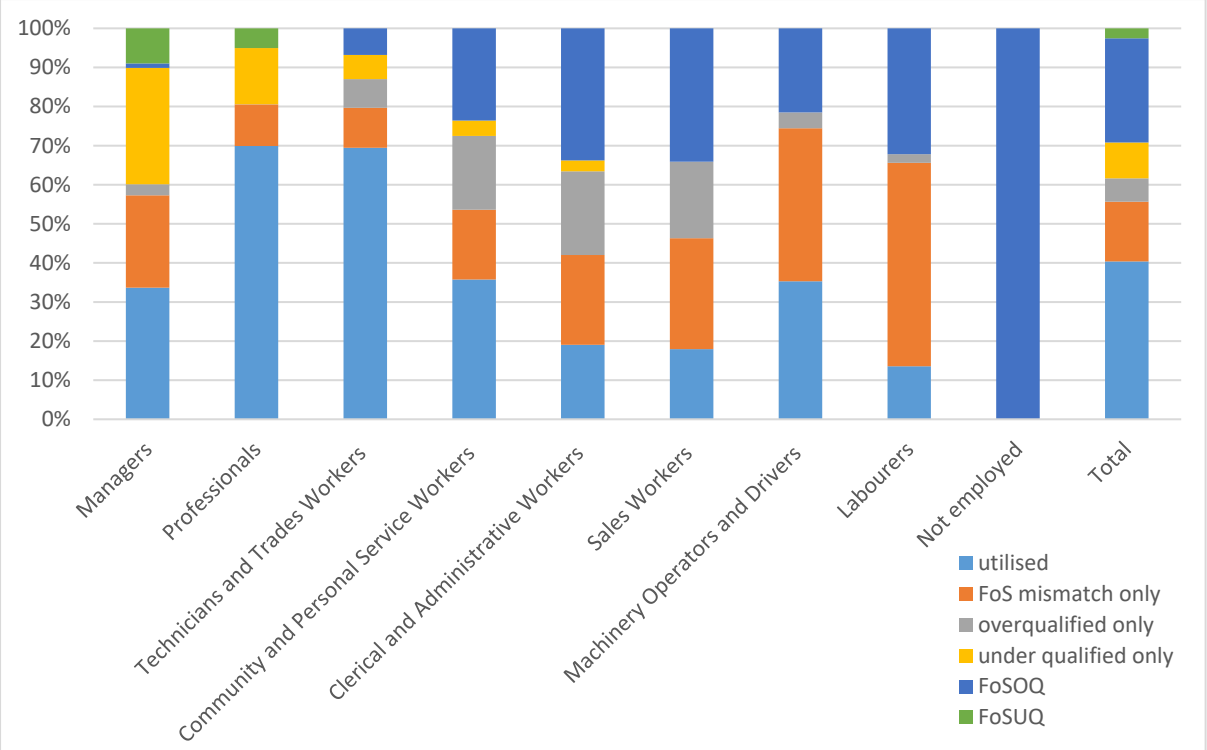

Figure 5.5. Type of utilisation by occupation

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Figure 5.6, below, shows the proportion of the population by occupation group and labour force status, as well as the proportion of each group effectively utilised. For each occupation group, a greater proportion were employed full time than part time, but only marginally so for community and personal services workers (3.5 per cent and 3.4 per cent of the population respectively). Almost one in five Australians (19.7 per cent) was employed full time in a professional occupation, of which 70.5 per cent effectively utilised their complement of skills, equivalent to over a quarter (13.9 percentage points) of the 40.4 per cent utilised population. Similarly, for the 10.9 per cent of Australians employed as technicians and trade workers, 70.8 per cent were effectively utilised in the workforce, equivalent to 7.7 percentage points of the 40.4 per cent utilised population. One in ten Australians was employed full time in a managerial occupation, though only a third (34.6 per cent) were effectively utilised. Essentially, of the population effectively utilised, over half (21.6 percentage points of the 40.4 per cent) were employed full time in a professional occupation or as a technician or trade worker. Professionals employed part time (7.1 per cent of the population) also had a high level of utilisation (68.1 per cent), representing a tenth (4.8 percentage points) of the 40.4 per cent effectively utilised.

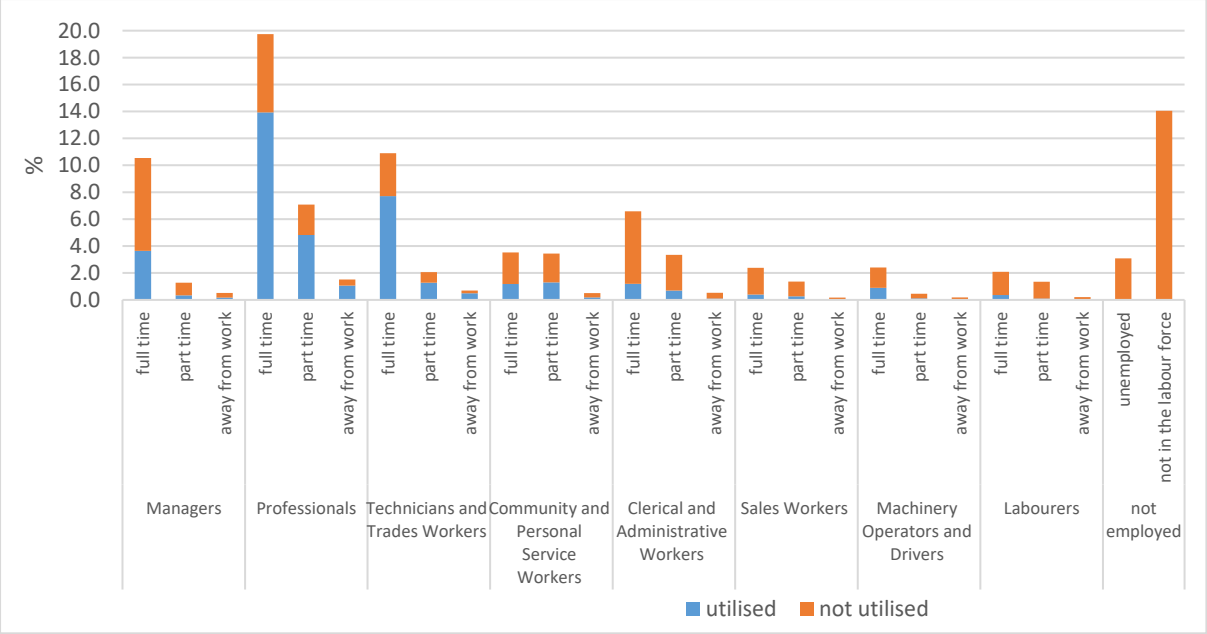

Figure 5.6. Skill utilisation, proportion of the population by occupation and labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

While the pattern of skill utilisation was similar for occupation groups for those employed full time or part time, part time workers had a lower level of skill utilisation than full time workers, except for community and personal services workers, clerical and administrative workers, and sales workers, as shown in Figure 5.7, below. As pointed out above, for technician and trade workers, 70.8 per cent of those employed full time were effectively utilised, whereas only 61.9 per cent of those employed part time are utilised. Similarly for those employed in professional occupations, 70.5 per cent of those employed full time were effectively utilised and 68.1 per cent of those employed part time were utilised. Conversely, for community and personal services workers, 37.9 per cent of those employed part time were effectively utilised, compared with 33.4 per cent of those employed full time. People employed in occupations which require job-specific skills (professionals and technicians and trade workers) had relatively higher levels of utilisation than those with lower level, more generic skills, and this was also truer for those employed full time than part time.

The type of utilisation by occupation and labour force status followed a similar pattern, with marginal difference in types of under-utilisation for each occupation group. Under-qualification was the dominant type of under-utilisation for higher skilled occupations groups, regardless of labour force status. Among managers employed full time, 30.4 per cent were under-qualified, while 24.2 per cent of those employed part time were under-qualified. For professionals employed full time, 13.4 per cent were under-qualified, while 17.0 per cent of those employed part time were under-

qualified. Field of study mismatch combined with over-qualification was the dominant type of under-utilisation for medium-skilled occupation groups, particularly for those employed part time: community and personal services workers (22.9 per cent and 24.7 per cent respectively), administrative and clerical workers (32.3 per cent and 36.6 per cent respectively), and sales workers (30.5 per cent and 40.4 per cent respectively). For low skilled occupation groups, such as machinery operators and drivers and labourers, field of study mismatch was the dominant type, regardless of labour force status.

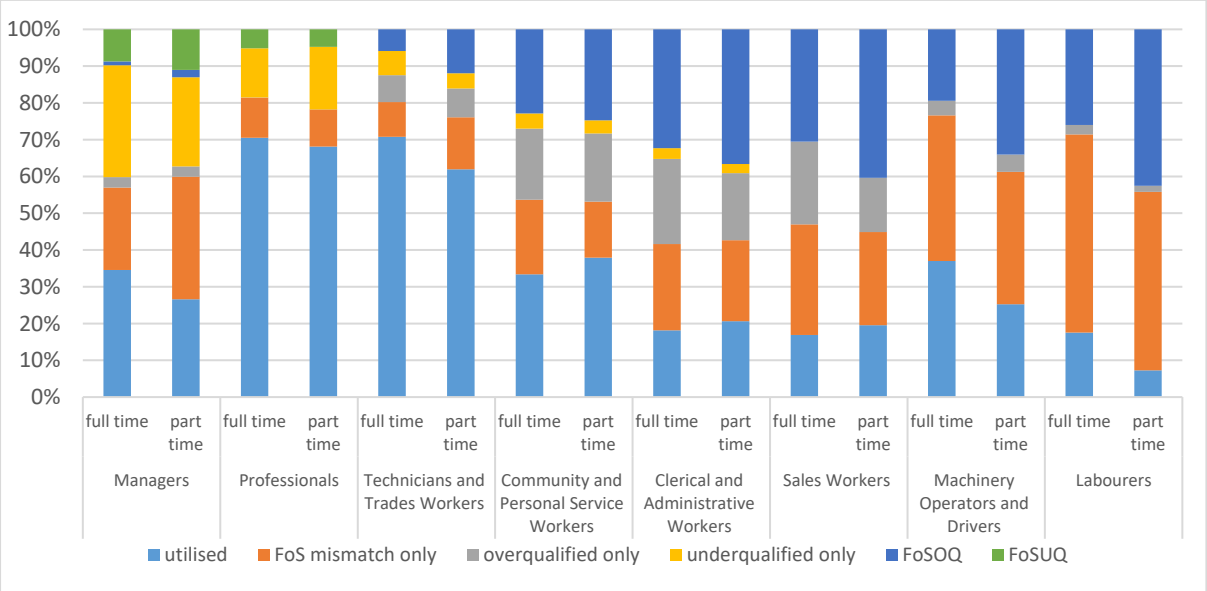

Figure 5.7. Type of utilisation by occupation and labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The high proportion of under-qualification among higher-skilled occupation groups, such as managers and professionals, suggests that the opportunity to improve productivity at a macro-level will be limited without further investment in education and/or training. Furthermore, under-qualification combined with a field of study mismatch suggests a lack of technical expertise for some occupations, which is also compromising productivity growth.

High levels of over-qualification for mid- and lower-skill occupations suggests the presence of credentialism and/or performance gap (Livingstone 2017), supply and demand mismatch (Keep, Mayhew & Payne 2006), or, as Quintini (2011) concluded, that over-qualification could either hide real skill under-utilisation (both over-qualified and over-skilled) or skill heterogeneity (over-qualified but with appropriate skills for the job). Over-qualification can also be attributable to field-of-study mismatch, suggesting that a lack of occupation-specific skills may be a contributor to over-qualification, as indicated by the combination of skill and education mismatch. Over-qualification

also suggests the failure of the Human Capital Theory hypothesis, and foregone productivity improvements.

Skill utilisation by educational attainment

The opportunity to improve productivity is associated with increasing the educational attainment of Australians. This section provides insight into the utilisation of existing education credentials and identifies the presence of over- or under-qualification. Figure 5.8, below, shows skill utilisation by distribution of the population according to highest level of educational attainment. The greatest proportion of the population achieved a certificate level qualification (37.1 per cent), followed by those with a bachelor's degree (31.5 per cent). Even so, while both had the highest proportion of skill utilisation, they also experienced the highest level of under-utilisation. Those with bachelor's degrees or certificate level qualifications accounted for over a third each of the 40.4 per cent of the population which was effectively utilised in the labour market (15.8 percentage points and 14.8 percentage points respectively). Of the 59.6 per cent of the population not effectively utilised, those with certificate level qualifications accounted for over a third (22.4 percentage points), as did those with tertiary qualifications (21.6 percentage points). Those with advanced diplomas or diploma level qualifications accounted for a quarter of those not effectively utilised (15.6 percentage points).

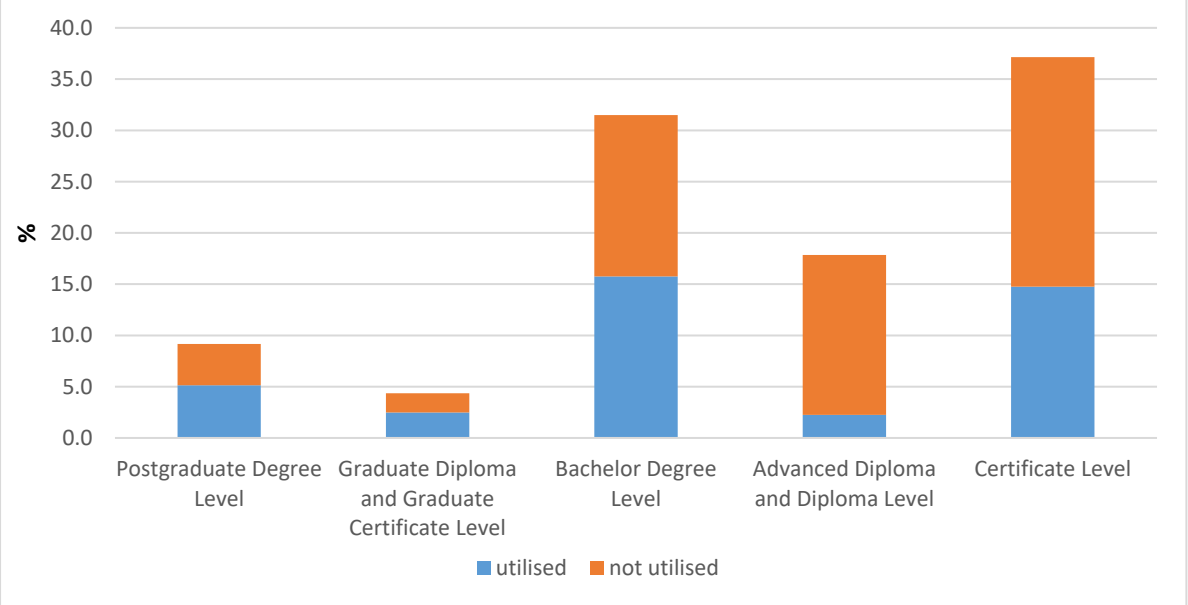

Figure 5.8. Skill utilisation, proportion of population by highest level of post school educational attainment

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Of the population, those with tertiary qualifications have the highest level of skill utilisation in the labour market: bachelor's degree (50.0 per cent), graduate diploma and graduate certificate (56.8 per cent), and postgraduate degree (56.1 per cent). Advanced diploma and diploma level qualifications have the lowest level of utilisation (12.6 per cent), as shown in Figure 5.9, below.

When the type of under-utilisation is considered for tertiary level qualifications, field of study combined with over-qualification is the dominant type of under-utilisation (25.4 per cent for those with postgraduate qualifications, 26.0 per cent for graduate diploma and graduate certificate qualifications, and 31.1 per cent for bachelor's degrees), whereas for advanced diploma and diploma qualifications the dominant type is also field of study combined with over-qualification together with under-qualification (23.2 per cent were under-qualified only, and 6.2 per cent experienced a combination of field of study mismatch and under-qualification). For those with certificate level qualifications, 24.4 per cent experienced a field of study mismatch only and 18.5 per cent were also over-qualified with a field of study mismatch, 13.6 per cent were under-qualified, and 3.8 per cent experienced a field of study mismatch combined with under-qualification.

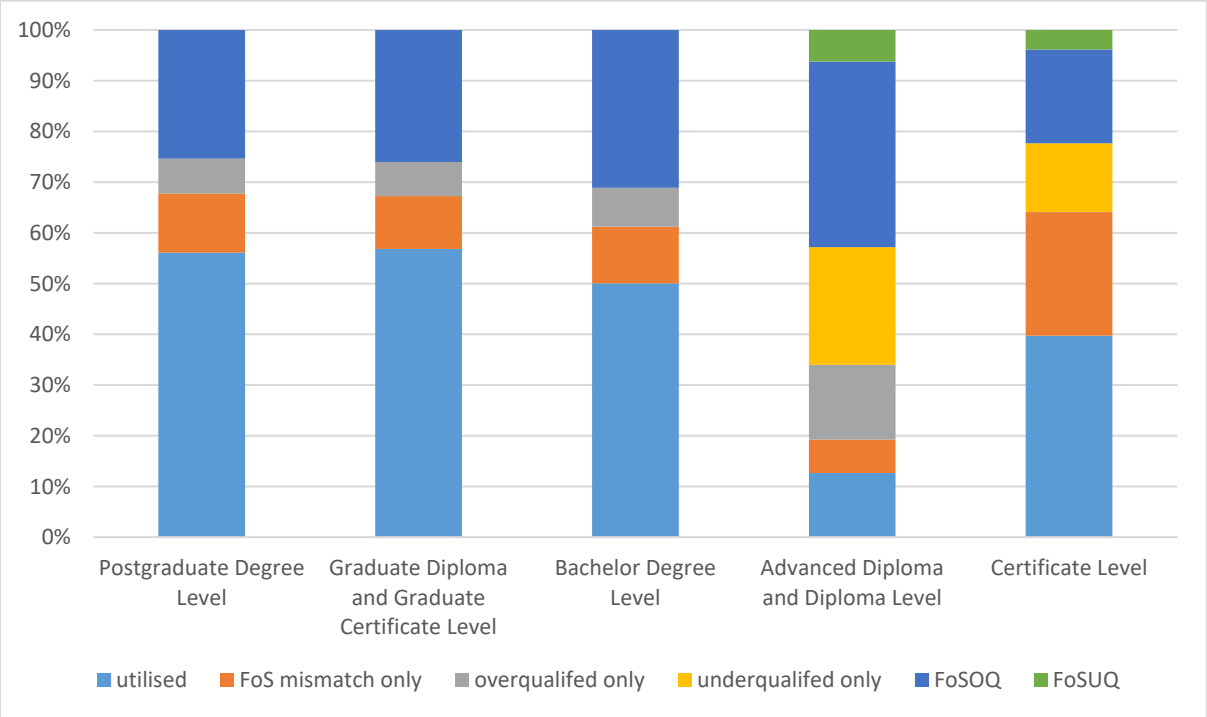

Figure 5.9. Type of utilisation by educational attainment

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Regardless of the level of educational attainment, over-qualification, either by itself or combined with field of study mismatch, is the dominant form of skill under-utilisation in Australia; almost a third of the population (32.6 per cent) is over-qualified for the occupation in which they are

employed. Over half of those with advanced diplomas or diplomas (51.3 per cent), two in five with bachelor's degrees (38.8 per cent), and a third of all those with graduate diplomas or graduate certificates (32.8 per cent) and post-graduate degrees (32.2 per cent), are over-qualified. As previously discussed, over-qualification suggests the presence of credentialism, performance gap (Livingstone 2017), supply and demand mismatch, or skill heterogeneity (over-qualified but with appropriate skills for the job). Over-qualification can also be attributable to field-of-study mismatch; a lack of occupation-specific skills may be a contributor to over-qualification, as indicated by the combination of skill and education mismatch. In any case, the utilisation of Australians' existing levels of educational attainment is not optimal, likely contributing to Australia's poor productivity performance (Eslake & Walsh 2011).

In addition, over one in ten Australians (11.7 per cent) were under-qualified for the job in which they were employed, constraining productivity potential. While under-qualified workers may have gained appropriate skills through experience and/or on-the-job training over their life span, further investment in education and training may contribute to improved productivity performance at a meso and macro level.

Skill utilisation by occupation and educational attainment

Analysis of the utilisation of education qualifications by occupation provides an insight into productivity performance and the spread of educational attainment across occupational groupings, particularly for the under-utilised population. Figure 5.10, below, shows skill utilisation by proportion of the population by occupation, where those not effectively utilised are decomposed by highest level of educational attainment. In terms of under-utilisation, almost one in ten Australians held either a postgraduate degree (1.3 per cent), graduate diploma or graduate certificate (0.8 per cent) or a bachelor's degree (7.1 per cent) yet were employed in occupations which did not require tertiary level qualifications. A further 6.8 per cent of the population held tertiary level qualifications but were not employed at all. Over one tenth (11.2 cent) of the population was employed in skill level 1 occupations – managers and professionals, however had not achieved the required level of educational attainment for the job; they were under-qualified.

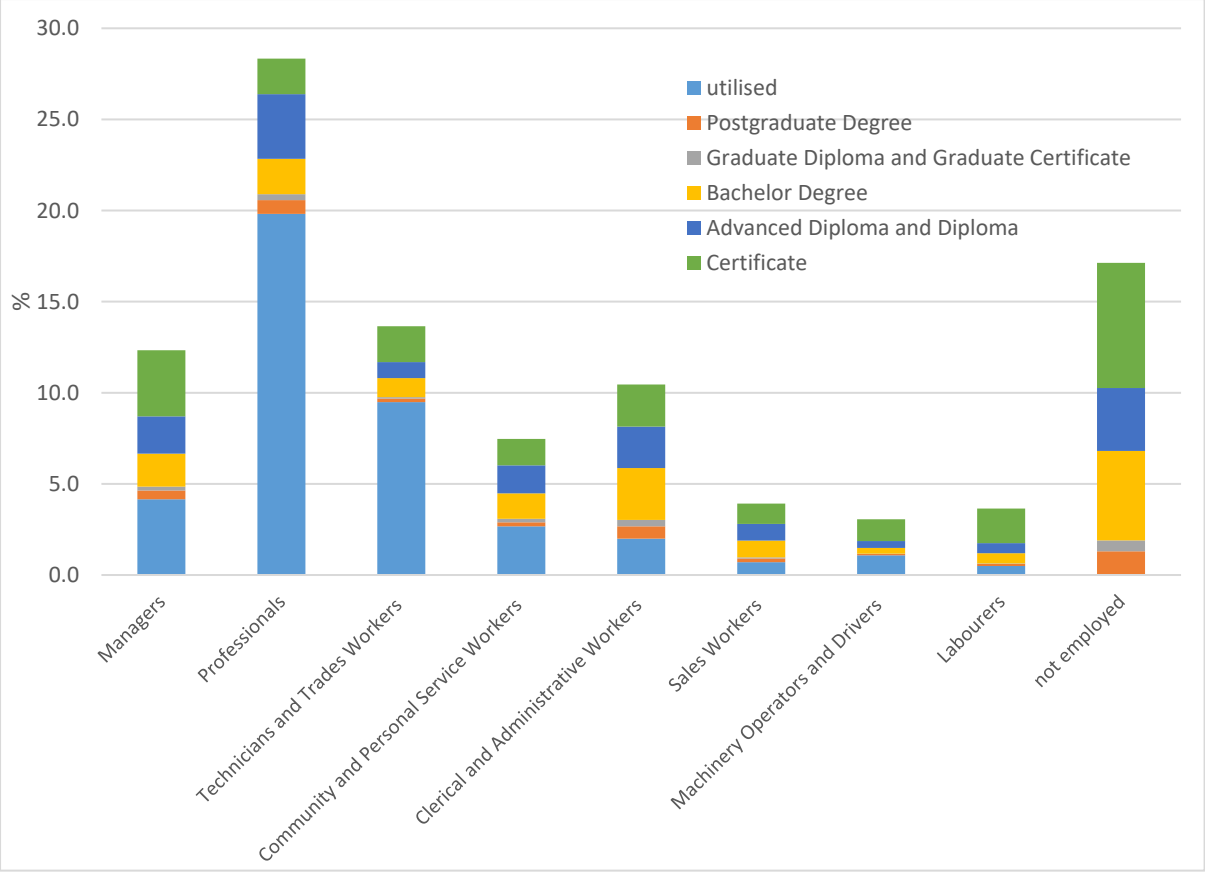

Figure 5.10. Skill utilisation, proportion of the population by occupation, utilised and not utilised by educational attainment

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Figure 5.11, below, shows the proportion of under-utilisation for each occupation group, and the level of educational attainment not utilised. Of the two thirds of managers who were under-utilised (66.3 per cent), most were under-qualified; 29.4 per cent of all managers had certificate level qualifications and 16.6 per cent had advanced diploma or diploma level qualifications. For professionals, one in five was under-qualified (19.4 per cent). For technicians and trades workers, nearly ten per cent were over-qualified. For community and personal services workers, a quarter were over-qualified; 3.0 per cent held post graduate degrees, 2.5 per cent had graduate diploma or graduate certificate, and 18.7 per cent had a bachelor's degree. Nearly two in five clerical and administrative workers were over-qualified (37.1 per cent); 6.5 per cent held post-graduate degrees, 3.4 per cent had a graduate diploma or graduate certificate, and 27.2 per cent had a bachelor's degree. A third of sales workers (30.2 per cent) were over-qualified; 5.1 per cent held post graduate-degrees, 1.8 per cent had a graduate diploma or graduate certificate, and 23.3 per cent had a bachelor's degree.

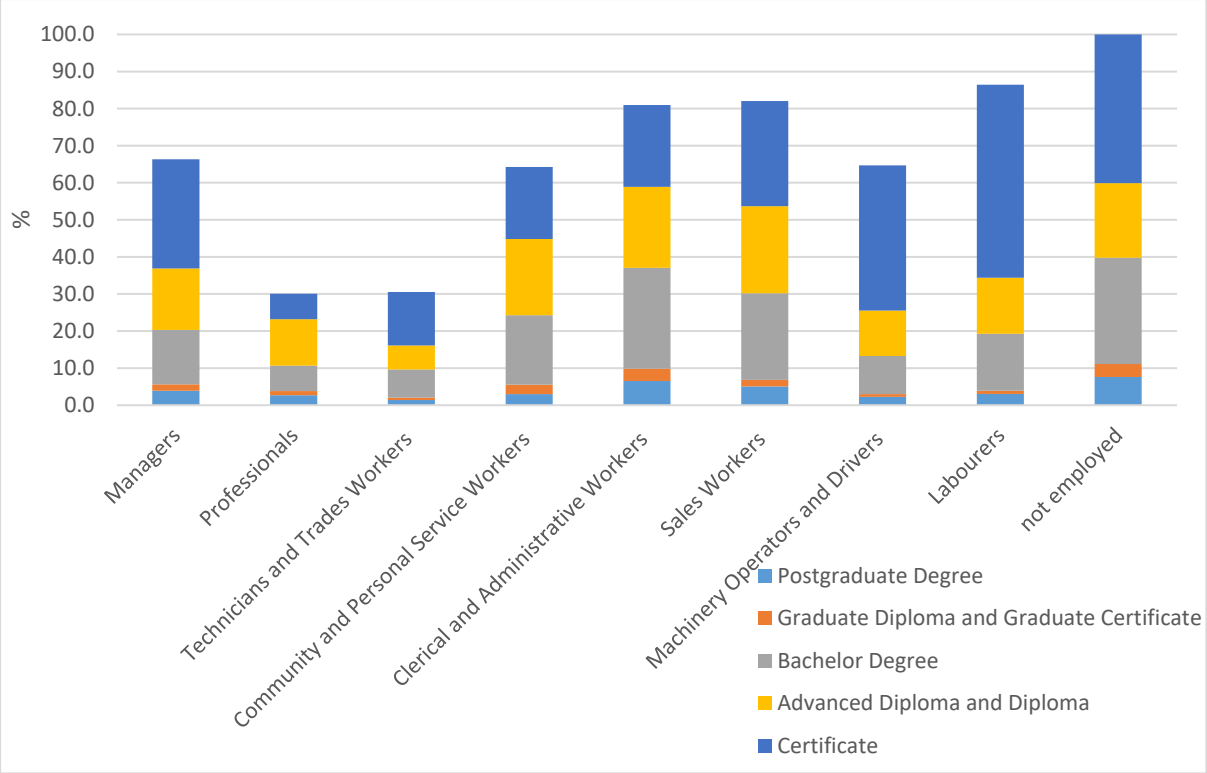

Figure 5.11. Under-utilisation for occupation group, proportion not utilised by educational attainment

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Under-qualification in skill level one occupations can have a detrimental effect on productivity. While individuals may have acquired occupation-specific skills over their lifespan through on-the-job training and/or experience, evidence suggests that poor skill utilisation and inadequate education and training in managerial and leadership roles not only harms individual performance, but also has the potential to reduce the effectiveness of management, skill utilisation of others, and productivity more broadly (Adalet McGowan & Andrews 2015; Australian Workforce and Productivity Agency 2013; Skills Australia 2012).

The extent of over-qualification across occupation groups suggests that mismatch between demand for, and supply of, educated and skilled workers is considerable; this is contradictory to the premise of many human capital theorists that higher levels of educational attainment provide for greater social and economic prosperity at an individual and societal level.

Skill utilisation by field of study

Effective skill utilisation is affected by the match of field of study qualification to occupation. Many fields of study provide narrow, job-specific skills to effectively undertake the task requirements of a specific occupation or group of occupations, whereas others provide a broader knowledge base which can be matched to a wider range of occupations (see Chapter Four and Appendix D for details on occupations with matched fields of study). Figure 5.12, below, shows the proportion of the population by field of study and the respective contribution to skill utilisation. The under-utilised population consists of either field of study (skill mismatch), or education mismatch, or a combination of both. The greatest proportion of the population achieved qualifications in management- and commerce-related fields of study (22.1 per cent), followed by engineering and related technologies (18.3 per cent), and society and culture (13.0 per cent). Both management and commerce and engineering and related technologies fields of study contributed the greatest proportion of the 40.4 per cent of the population whose skills were appropriately utilised (7.8 percentage points, and 8.2 percentage points respectively). Even so, these fields also accounted for the greatest proportion of the population whose skills were not effectively utilised in the labour market – 14.2 percentage points for the management and commerce discipline, almost a quarter of the whole under-utilised population, 10.0 percentage points for the engineering and related technologies discipline, and 8.4 percentage points for the society and culture discipline.

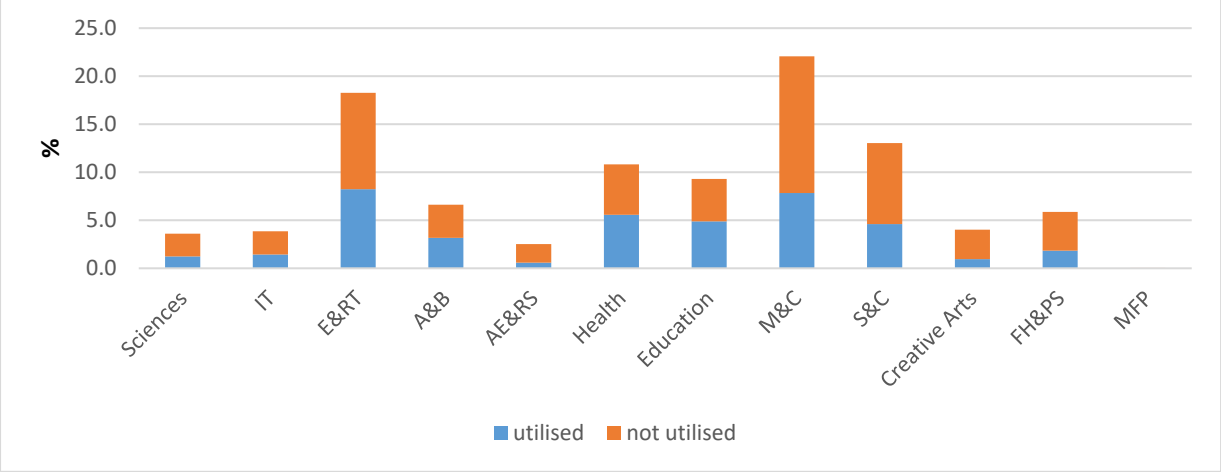

Figure 5.12. Skill utilisation, proportion of the population by field of study[3]

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

[3] Engineering and related technologies (ER&T); architecture and building (A&B); agriculture, environment and related studies (AE&RS); management and commerce (M&C); society and culture (S&C); food, hospitality and personal services (FH&PS); mixed field programmes (MFP).

When the type of utilisation for the fields of study is considered, as in Figure 5.13, below, the disciplines with the highest level of utilisation were those associated with occupations requiring job-specific skills: education (52.6 per cent), health (51.6 per cent), architecture and building (47.9 per cent), and engineering and related technologies (45.1 per cent). The lowest level of utilisation was experienced in agriculture, environment and related studies (23.0 per cent), creative arts (23.8 per cent), and food, hospitality and personal services (31.3 per cent).

The field of study mismatch combined with over-qualification is the dominant type of under-utilisation for the majority of fields of study. For engineering and related technologies and for agriculture, environment and related studies, field of study mismatch only is the dominant type of under-utilisation (19.6 per cent and 28.6 per cent respectively). The highest level of field of study mismatch (either skill mismatch or combined skill and education mismatch) was experienced by those with creative arts qualifications (65.4 per cent), followed by agriculture, environment and related studies (60.6 per cent), sciences (60.5 per cent), food, hospitality and personal services (59.7 per cent), and society and culture (54.9 per cent). In other words, for each of these fields of study, over half of the population is not employed in an occupation which matches their discipline-specific skills. The high levels of field of study mismatch indicate extensive mismatch between supply of and demand for skilled labour from both a worker and industry perspective.

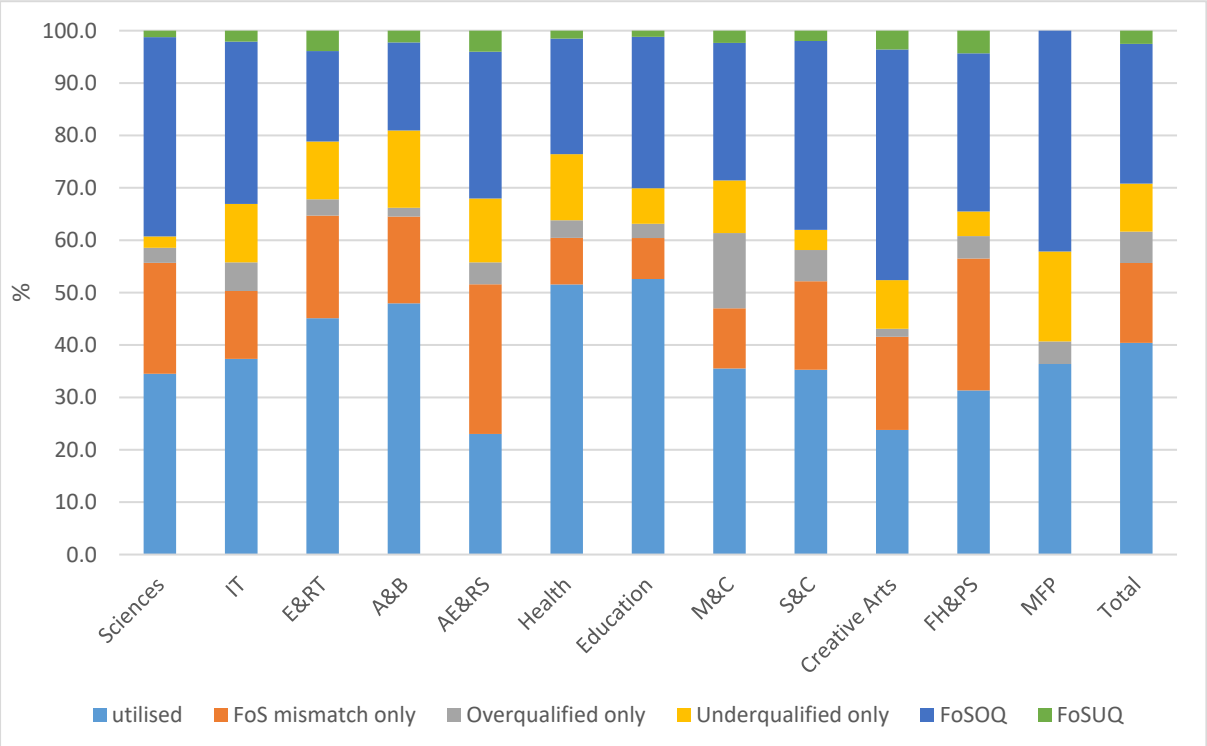

Figure 5.13. Type of utilisation by field of study

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by sex

Skill utilisation in Australia differs considerably by sex – influenced by labour force status, field of study and occupation. Of the population under analysis, 3,083,741 (51.3 per cent) were male and 2,926,623 (48.7 per cent) were female. Of the men, 87.9 per cent were employed, as were 77.6 per cent of the women. Substantial differences existed between men and women by their labour force status; 73.2 per cent of men were employed full time, compared with 42.3 per cent of women, and 10.6 per cent of men were employed part time compared with 30.5 per cent of women. Similar rates existed for those men and women employed but away from work (3.9 per cent and 4.8 per cent respectively).

Men experienced a higher rate of skill utilisation in the labour market: 43.8 per cent were effectively utilised in the workforce compared with 36.8 per cent of women. The higher level of under-utilisation of skills for women is primarily due to a comparatively higher proportion of the population not employed or in the labour force (22.4 per cent of women compared with 12.1 per cent of men). When those not employed are discounted, men's and women's rates of skill utilisation are more comparable: 49.8 per cent for men and 47.4 per cent for women.

The type of under-utilisation differed for men and women. Considerably more women experienced a combination of field of study mismatch and over-qualification than men (over a third (33.4 per cent) of women compared with a fifth (20.3 per cent) of men). Women were also more likely to be over-qualified only than men (7.2 per cent of women compared with 4.8 per cent of men), whereas nearly one fifth (17.5 per cent) of men experienced field of study mismatch only compared with 12.9 per cent of women. Men were also more likely to be under-qualified than women: 10.6 per cent compared with 7.7 per cent. See Figure 5.14, below.

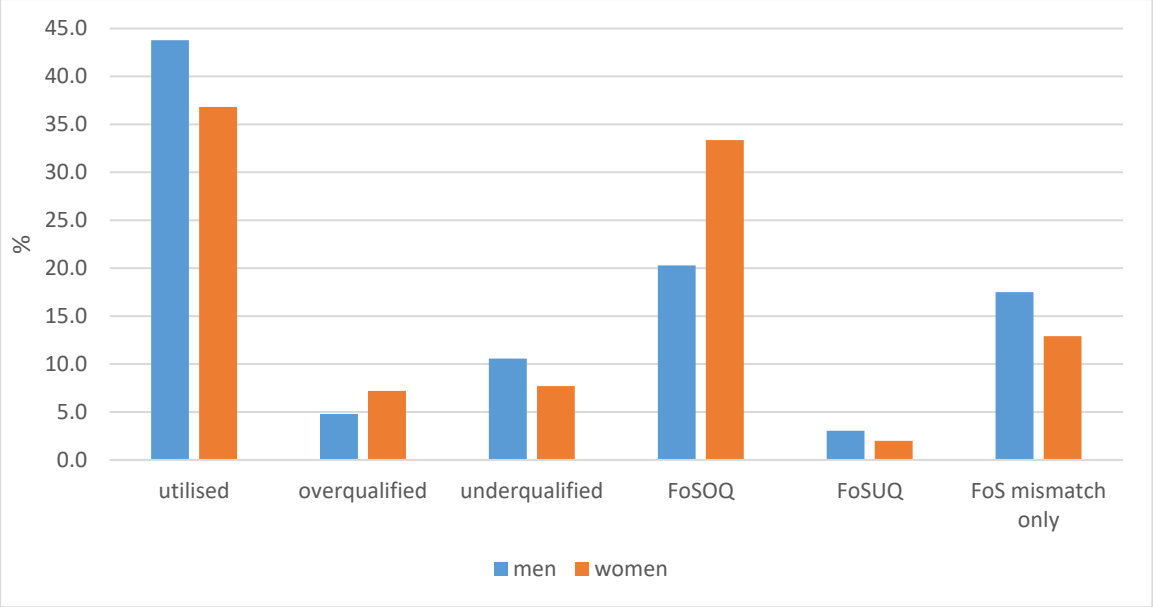

Figure 5.14. Skill utilisation and type of under-utilisation, men and women

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by labour force status and sex

Skill utilisation differs considerably for men and women when further disaggregated by labour force status. Figure 5.15, below, shows skill utilisation by proportion of the population by labour force status and sex. Of the analysis population, 37.5 per cent were men employed full time, while 20.6 per cent were women working full time, 14.9 per cent were women working part time, and 9.4 per cent were women not in the workforce at all.

Overall, men accounted for over half of the 40.4 per cent of the effectively utilised population (22.5 percentage points), with those employed full time contributing 19.2 percentage points, while women employed full time accounted for a quarter (10.1 percentage points), and those women working part time, 6.7 percentage points. For the 59.6 per cent of the population which was under-utilised, around a third (18.4 percentage points) were men working full time, and a sixth each were women working full time (10.5 percentage points), part time (8.5 percentage points) or not at all (9.4 percentage points).

Figure 5.15. Skill utilisation, proportion of the population for men and women by labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

In terms of type of utilisation, there is marginal difference between employed men and women, regardless of labour force status. Men had a relatively higher level of utilisation than women for those working full time (51.2 per cent compared with 49.0 per cent), whereas women had a higher level of utilisation than men for those employed part time (44.8 per cent compared with 40.9 per cent), as shown in Figure 5.16, below. For both full time and part time employment, a higher proportion of men experienced a field of study mismatch than women, while a higher proportion of women were over-qualified than men.

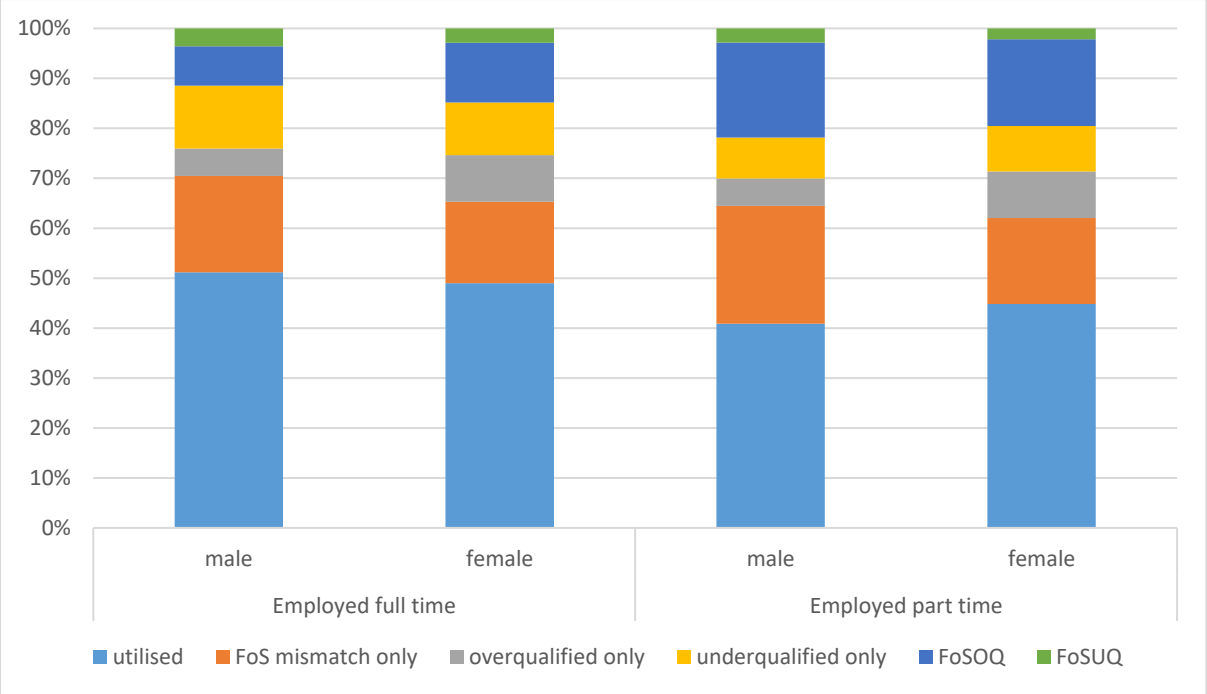

Figure 5.16. Type of utilisation for men and women by labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Lower levels of labour force participation and workforce engagement by women, and the resulting lower level of skill utilisation, particularly over-qualification, reflect the principle of linked lives from a life course perspective, as well as gendered work lives (Moen 2016) and the associated occupational downgrade (Dex & Joshi 1999; Dex et al. 2001; Tomlinson, Olsen & Purdam 2009) experienced by women following child-bearing (which are to be further analysed and discussed in Chapters Six and Seven).

Skill utilisation by occupation and sex

The proportion of the population employed by occupational grouping differs by sex, as does the respective contribution to skill utilisation. Men dominated management occupations, and far outweighed women as technicians and trade workers, machinery operators and drivers and labourers, while women dominated community and personal services, clerical and administrative work. Women also predominated among those not employed, as shown in Figure 5.17, below. Women in professional occupations make up the greatest proportion of the workforce (15.6 per cent), followed by men in professional occupations (12.8 per cent) and men employed as technicians and trade workers (11.9 per cent). Further, together they contribute to over three quarters of the 40.4 per cent of the population which is effectively utilised in the labour market (11.2 percentage

points, 8.7 percentage points and 8.6 percentage points respectively). Those women and men not employed contributed the greatest proportion to the 59.6 per cent of the population which is not effectively utilised (10.9 percentage points and 6.2 percentage points respectively). Female clerical and administrative workers (5.9 percentage points) and male managers (5.5 percentage points) also made a considerable contribution to the proportion of the population which is not effectively utilised in the labour market.

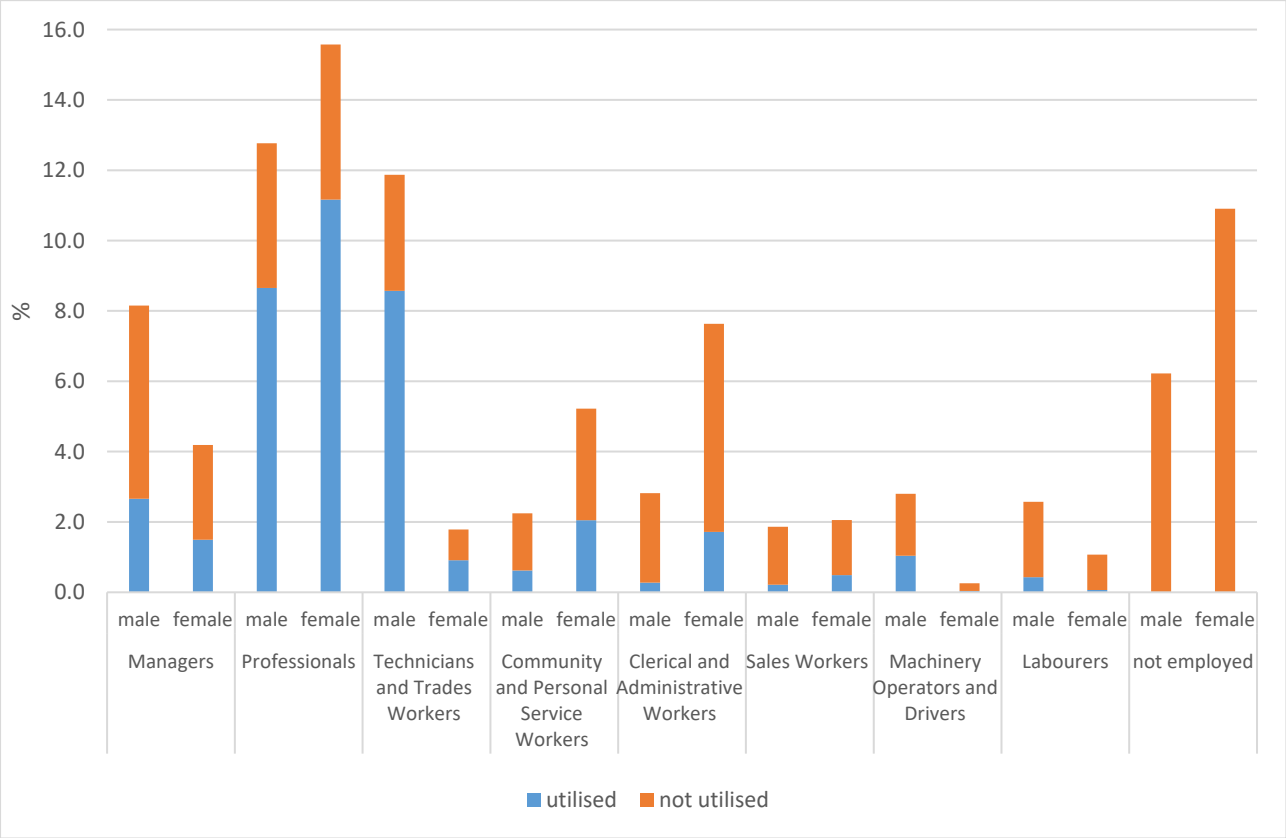

Figure 5.17. Skill utilisation, proportion of the population by occupation by sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Considerable differences also exist between the level and type of utilisation by sex within occupation groupings, particularly for gendered occupations. While 72.2 per cent of male technicians and trade workers were utilised, only 51.0 of female technicians and trade workers were. Similarly, for machinery operators and drivers, 37.2 per cent of men were utilised compared with 15.2 per cent of women. Women had higher rates of utilisation than men for feminised occupations: community and personal services workers (39.3 per cent compared with 27.6 per cent for men), clerical and administrative workers (22.5 per cent compared with 9.7 per cent for men), and sales workers (23.7 per cent compared with 11.6 per cent for men).

While men and women employed as managers had similar levels of utilisation (32.7 per cent and 35.7 per cent respectively), the type of under-utilisation differed, with men more likely to be under-qualified (34.3 per cent compared with 20.1 per cent for women), and women more likely to experience a field of study mismatch than men (30.5 per cent compared with 20.1 per cent for men).

For the male-dominated occupation groupings with higher levels of utilisation for men than women – technicians and trade workers, machinery operators and drivers and labourers – females working in these groups were more likely to experience the combination of field of study mismatch and over-qualification types of under-utilisation than men. For the female dominated occupation groupings with higher levels of utilisation for women than men – community and personal services workers and clerical and administrative workers –, men were more likely than women to experience the field of study mismatch only type of under-utilisation.

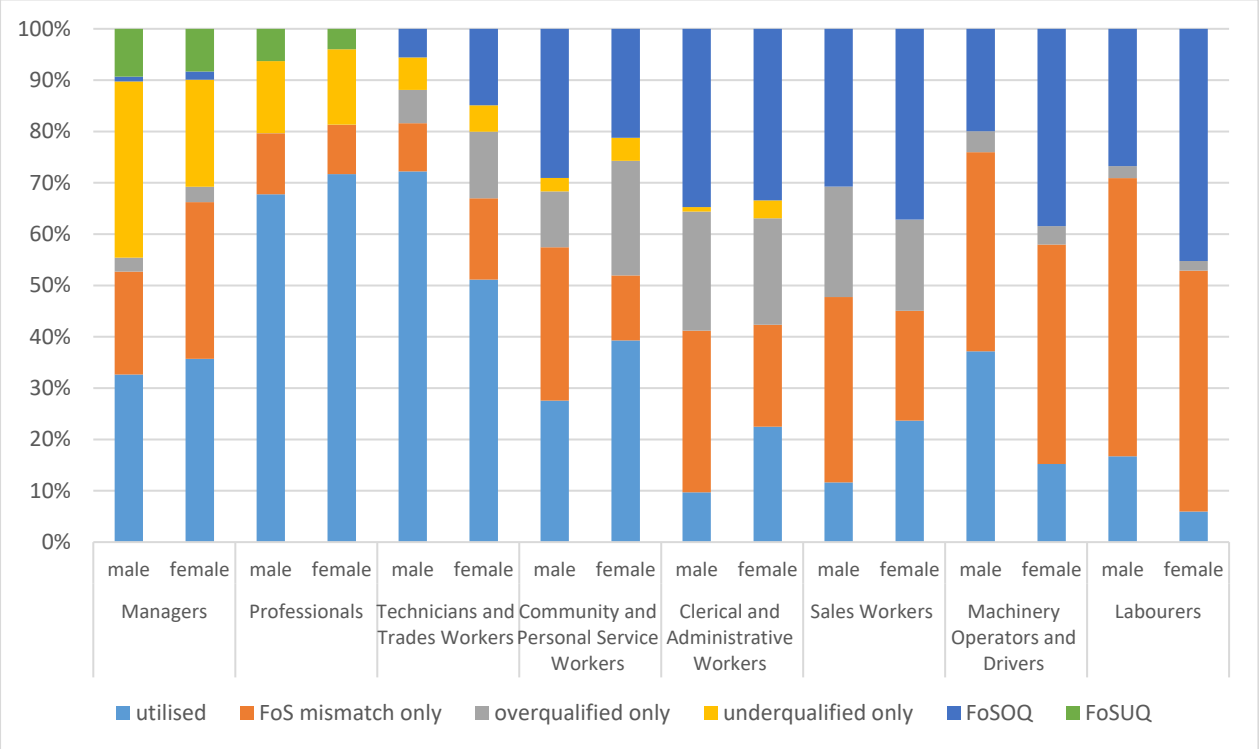

Figure 5.18. Type of utilisation by occupation by sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

When skill utilisation by labour force status is considered by occupation and sex, in male-dominated occupations, full time managers, technicians and trade workers, machinery operators and drivers and labourers, had higher levels of skill utilisation than those employed part time. In female-dominated occupations (community and personal services workers, clerical and administrative

workers and sales workers), those who worked part time had a higher level of skill utilisation than those who worked full time.

Regardless of labour force status, women had higher levels of skill utilisation than men in all occupation categories other than the male-dominated occupations; technicians and trade workers, machinery operators and drivers and labourers – see Figure 5.19, below.

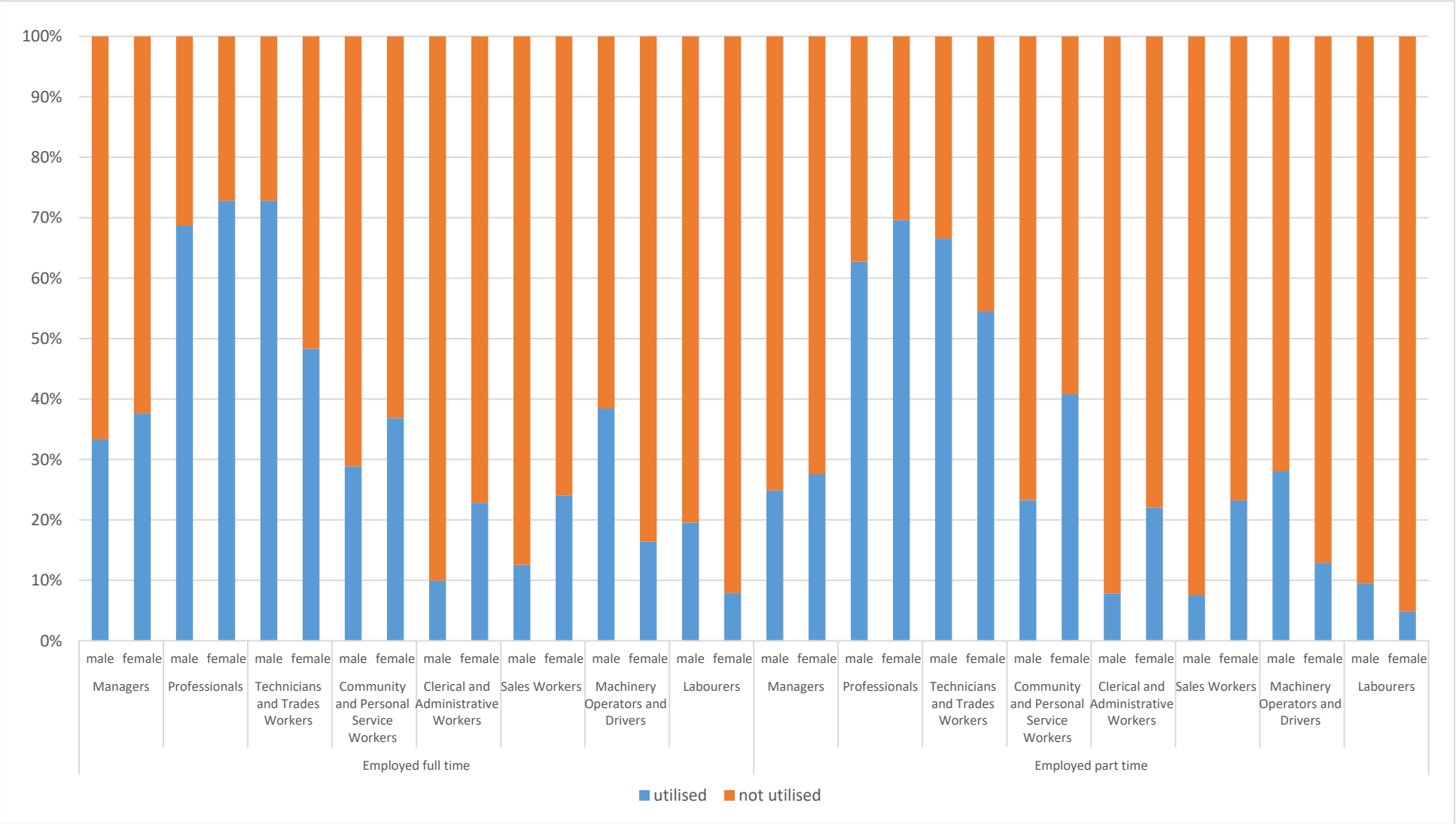

Figure 5.19. Skill utilisation for men and women by occupation and labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by educational attainment and sex

Skill utilisation for men and women also differs by educational attainment, with women more highly qualified than men yet experiencing lower levels of skill utilisation. Figure 5.20, below, shows skill utilisation by proportion of the population by educational attainment and sex. As shown, almost a quarter of the population were men with a certificate level qualification (23.6 per cent) and almost a fifth (17.7 per cent) were women with bachelor's degree qualifications. While both together contributed to almost half of the 40.4 per cent of the population whose skills were appropriately utilised (10.3 percentage points and 8.5 percentage points respectively), they also contributed over a third of the 59.6 per cent of the population whose skills were not effectively utilised (13.4 percentage points and 9.2 percentage points respectively). The men and women with diplomas or advanced diplomas made up over a quarter of those not-utilised persons (6.2 percentage points and 9.4 percentage points respectively). Men with bachelor's degree qualifications accounted for 13.8 per cent of the population and contributed considerably to both those effectively utilised (7.3 percentage points) and those not utilised (6.6 percentage points). These findings indicate a high level of under-utilisation of educational achievements, either through over or under-qualification or as a result of field of study mismatch disguising education mismatch.

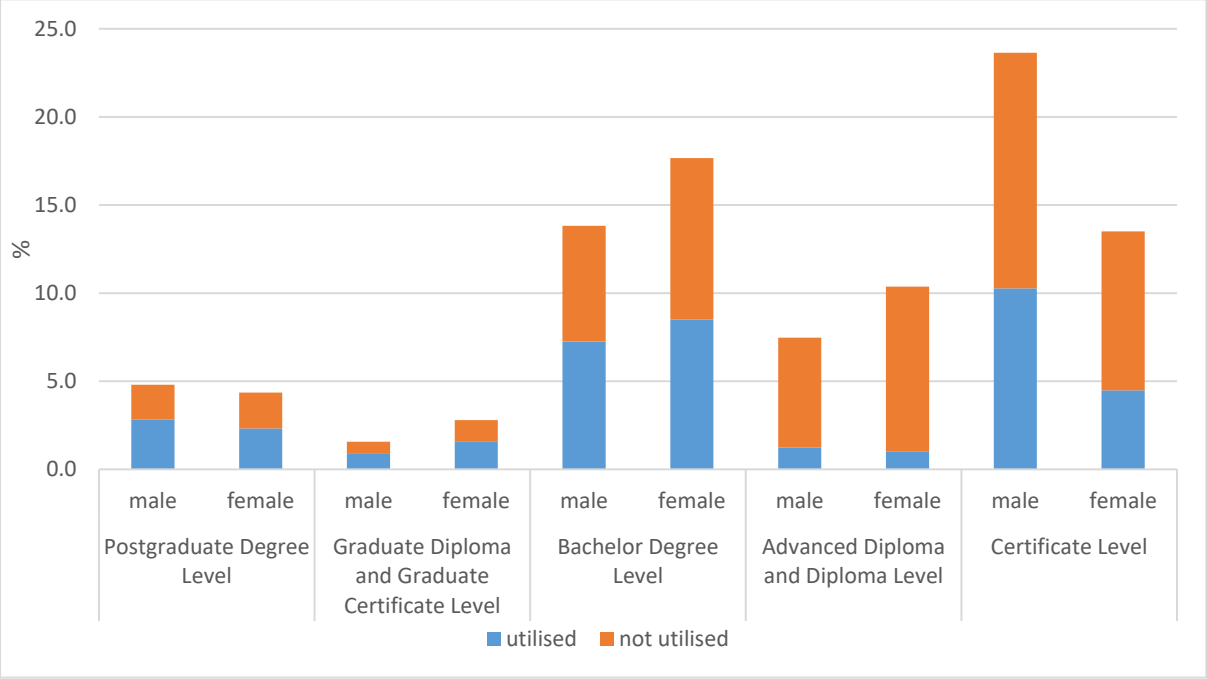

Figure 5.20. Skill utilisation, proportion of the population by educational attainment by sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

For all levels of educational attainment (except for those with graduate diploma or graduate certification level qualifications), women had a lower level of utilisation than men, but the difference was marginal. Those with advanced diploma, diploma and certificate level qualifications had much lower rates of skill utilisation than those with tertiary qualifications. In terms of the type of under-utilisation overall, women were more likely to be over-qualified or have a combination of field of study mismatch and over-qualification, whereas men were more likely to be under-qualified or have a combination of field of study mismatch and under-qualification. For those with advanced diploma or diploma qualifications, three in ten men (29.9 per cent) and two in five women (41.4 per cent) had a combination of field of study mismatch and over-qualification, and a quarter of men (26.9 per cent) and a fifth of women (20.5 per cent) were under-qualified. These diverse findings suggest that advanced diploma or diploma level qualifications do not meet the skill requirements of occupations, with either credentialism and relevance gap resulting in a greater level of qualification and skill set than actually required, or a performance gap resulting from people not being appropriately skilled and experienced for the job.

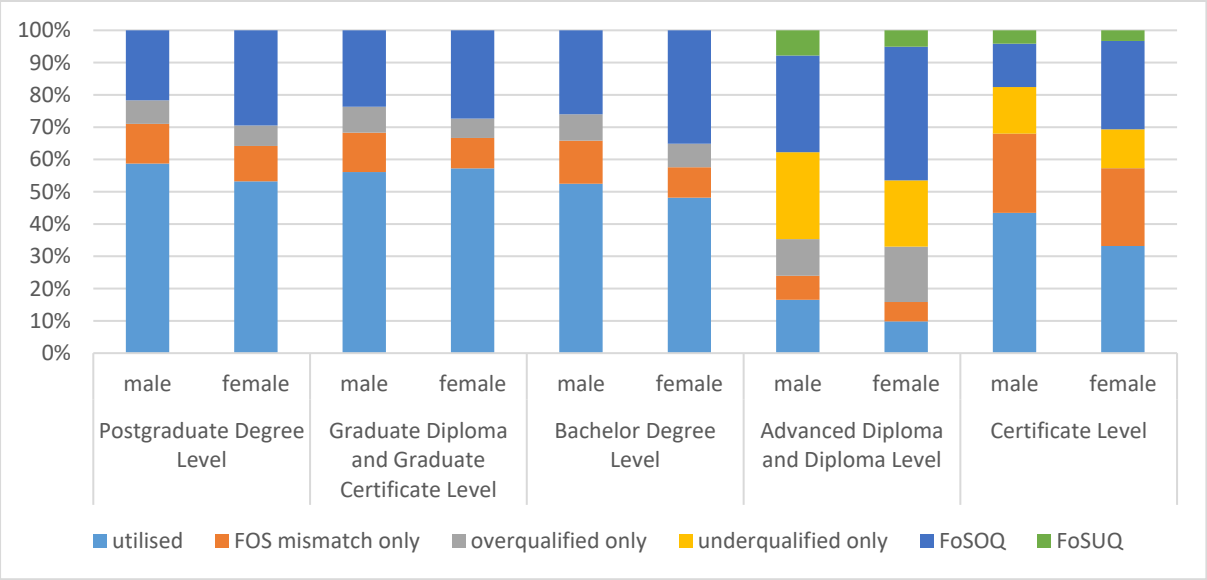

Figure 5.21. Type of skill utilisation, by educational attainment and sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Of the 1,029,631 people not employed, around one third (36.3 per cent) were men and two thirds (63.7 per cent) were women. Figure 5.22, below, shows the educational attainment of the not-employed men and women. Over a fifth of those not employed were women with a certificate level qualification (21.6 per cent) or a bachelor's degree (20.2 per cent). Almost a fifth were men with certificate level qualifications (18.5 per cent). Those with advanced diploma or diploma qualifications

also accounted for a fifth of those not employed (14.6 per cent were women and 5.5 per cent were men).

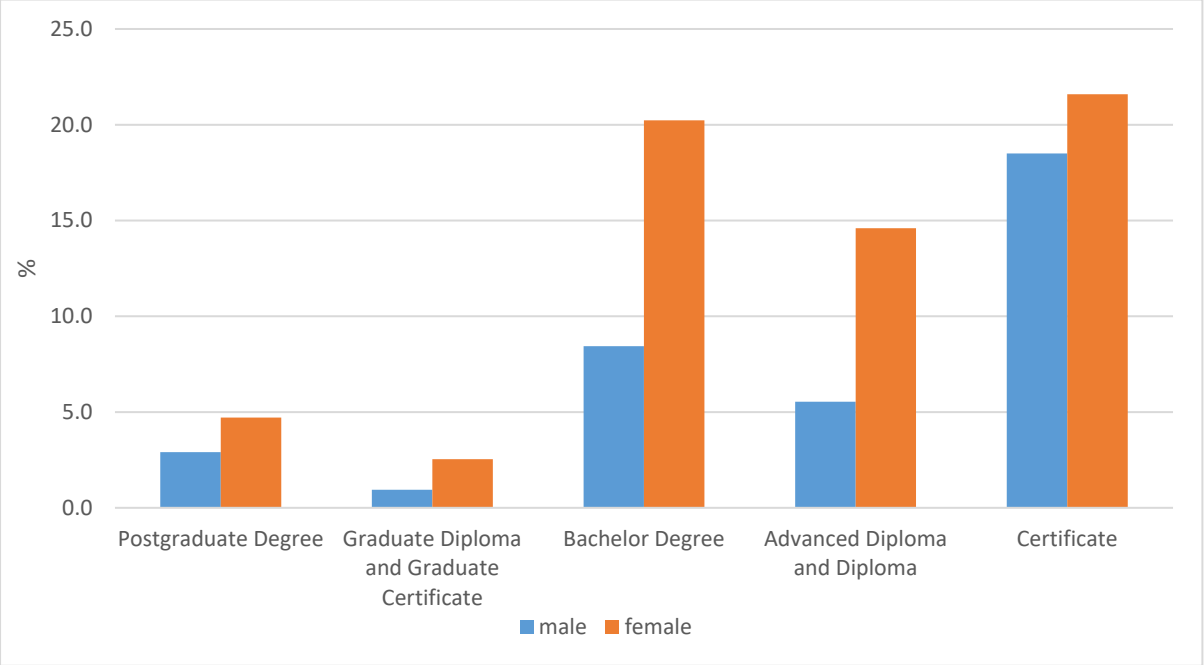

Figure 5.22. Those not employed, by educational attainment and sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Given that a greater proportion of women are tertiary qualified than men, the lack of participation and attachment to the workforce among women, particularly mothers, is a significant economic constraint; these women are undeniably an untapped source of potential productivity improvements (Baird, Williamson & Heron 2012; Daley, McGannon & Ginnivan 2012; Tapper 2010). To explain the effect of linked lives on women's skill utilisation over the life course, further analysis will be undertaken in the next chapter.

Skill utilisation by field of study and sex

As for gendered occupations, there were considerable differences between dominant fields of study for men and women and their respective rates of skill utilisation. Figure 5.23, below, shows the proportion of the population by field of study and sex and the respective levels of skill utilisation. Men dominated qualifications in engineering and related technologies and architecture and building qualifications, accounting for 17.1 per cent and 6.1 per cent of the population respectively (compared with 1.2 per cent and 0.6 per cent for women). On the other hand, women dominated the management and commerce, society and culture, health and education and training disciplines,

accounting for 13.0 per cent, 8.9 per cent, 8.3 per cent and 7.1 per cent of the population respectively (compared with 9.1 per cent, 4.1 per cent, 2.5 per cent and 2.2 per cent for men).

In terms of skill utilisation, while men with engineering and related technologies qualifications contributed the greatest proportion to the 40.4 per cent of the population which is effectively utilised (8.0 percentage points), they also contributed the highest proportion to the 59.6 per cent not effectively utilised (9.1 percentage points). Additionally, women with management and commerce qualifications contributed the second highest proportion of skill utilisation (4.3 percentage points), but they also contributed the second highest rate of under-utilisation (8.7 percentage points), followed by women with society and culture qualifications (6.0 percentage points) and men with management and commerce qualifications (5.5 percentage points).

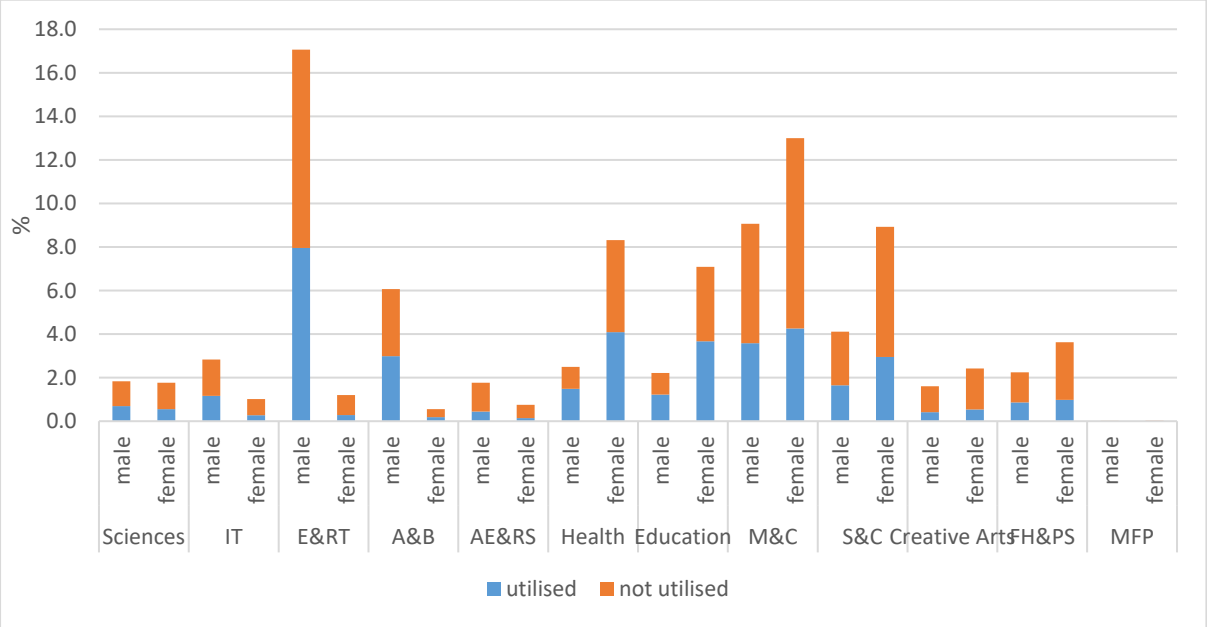

Figure 5.23. Skill utilisation, proportion of the population by field of study and sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

For all fields of study, men experienced a greater level of utilisation than women, except for food, hospitality and personal services – see Figure 5.24, below, which shows the type of utilisation for each field of study for men and women. That is, men were more likely than women to be working in an occupation which matched their field of study and level of educational attainment. In terms of type of under-utilisation, for all fields of study under-utilised women were more likely than men to be working in jobs that they were over-qualified for, or which did not match their fields of study, whereas under-utilised men were more likely to be working in a job that did not match their field of study, except for the male-dominated fields of study (IT, engineering and related technologies and

architecture and building). For all fields of study other than health, men were also more likely to be under-qualified in a job that matched their discipline than women, indicating potential for productivity improvement through investment in education and training. For women with qualifications in male-dominated fields of study (engineering and related technologies, architecture and building, agriculture, environment and related studies and IT), the level of utilisation is substantially lower than for other fields of study, and also when compared with men. The dominant type of under-utilisation in this instance is field of study mismatch and/or education mismatch, suggesting that those women who pursue educational qualifications in male-dominated fields of study, despite being a smaller proportion of the population, are considerably less likely than men to work in occupations requiring the job-specific skills related to the field of study, particularly for the architecture and building field of study. This reinforces the presence of the culture of gendered occupations.

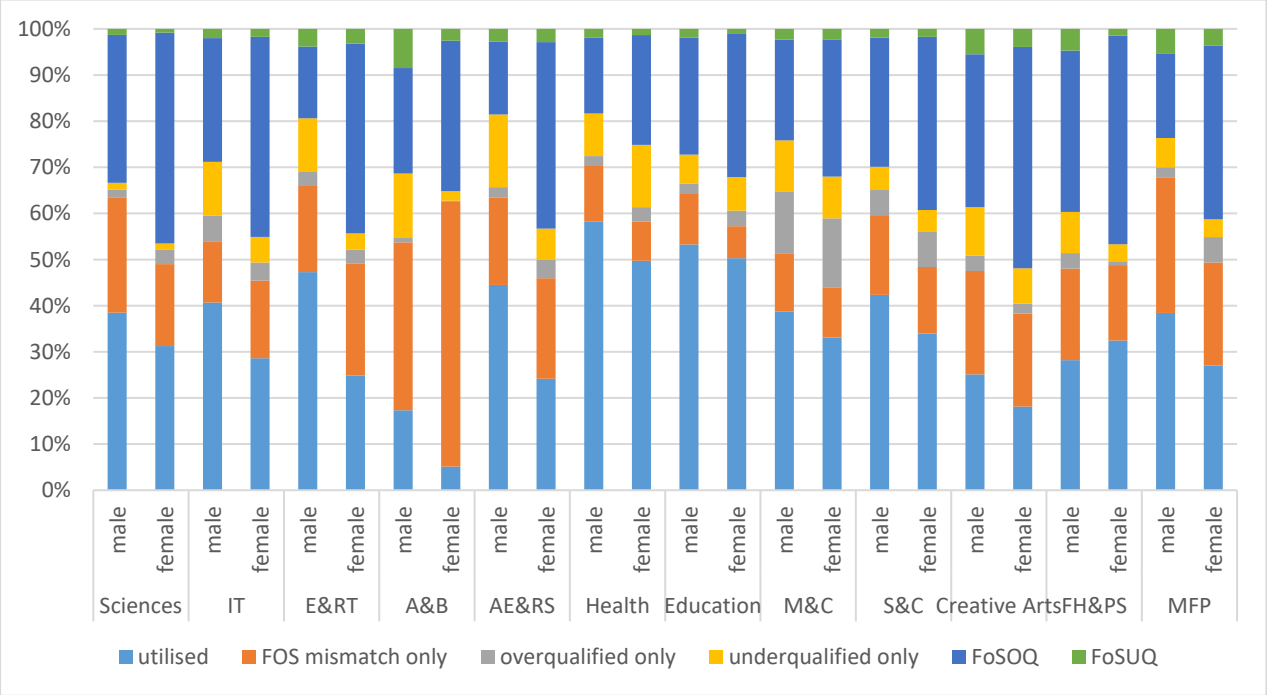

Figure 5.24. Type of utilisation by field of study and sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Summary

While two in five Australians aged 25 to 64 with post-school qualifications were employed in an occupation that effectively utilised their complement of skills (the combination of educational attainment and field of study), three in five did not.

Of the 40.4 per cent of the population who were effectively utilised in the workforce, around three quarters were employed full time (72.6 per cent) and 22.1 per cent employed part time. The high rate of under-utilisation is influenced by the proportion of the population not working; almost one in five people were either unemployed or not in the labour force (17.1 per cent of the population). Of the 59.6 per cent of the population not effectively utilised, around half (48.4 per cent) were employed full time, 19.2 per cent were employed part time and 26.7 per cent were not working at all. Not only does this indicate that considerable productivity potential was foregone, but also that individual prosperity, as per Human Capital Theory and the life course perspective, was not achieved for a significant proportion of the population.

While skill utilisation is predominantly associated with occupation and field of study, labour force status and sex make a considerable impact, with the interrelated nature of the two revealing prominent gendered patterns of skill utilisation.

The difference in the rate of skill utilisation between full and part time workers was considerable: 6.6 percentage points. Around half of those employed full time were effectively utilised in the labour force (50.4 per cent), while 43.8 per cent of those working part time were utilised. Greater differences occur when the type of under-utilisation is factored in, with those employed part time being twice as likely to experience the combination of field of study mismatch and over-qualification than those employed full time – corresponding with the level of engagement with the workforce by women. Those employed full time were more likely to be under-qualified, corresponding with the level of workforce participation by men, occupation and their respective level of educational attainment. This will be further examined in the next chapter, which will explore the age, period and cohort effects on skill utilisation over the lifespan.

Men experienced a higher rate of skill utilisation in the labour market; 43.8 per cent were effectively utilised in the workforce compared with 36.8 per cent of women. While men have a greater level of overall skill utilisation than women (7.0 percentage points more), the high proportion of women not working considerably reduces their overall skill utilisation rate. When those not in the labour force are discounted, the difference between men and women is reduced to 2.4 percentage points (49.8 per cent and 47.4 per cent respectively). The type of under-utilisation differed for men and women; over a third of women experienced a combination of field of study mismatch and over-qualification compared with a fifth of men. Women were also more likely to be over-qualified only than men (7.2 per cent of women compared with 4.8 per cent of men), whereas nearly one fifth of men experienced field of study mismatch only, compared with 12.9 per cent of women. Men were also more likely to be under-qualified than women (10.6 per cent compared with 7.7 per cent). These

results reflect the respective levels of engagement with the labour market and educational attainment. Further gendered differences in skill utilisation occur when occupation, labour force status, field of study and educational attainment are considered. Even so, when employed, and regardless of labour force status, women had higher rates of skill utilisation than men for all occupation groups other than the male-dominated occupations (technicians and trade workers, machinery operators and drivers and labourers). Compared with overall skill utilisation rates, in which men have higher levels, this discrepancy is explained by the proportionate distribution of occupations in the population.

Those in higher skilled occupations experienced higher rates of utilisation compared with those in lower skilled occupations, which corresponds to those with tertiary level qualifications experiencing higher levels of skill utilisation. Even so, evidence of over-qualification for medium skilled occupations indicates credentialism, occupational downgrade, or supply and demand mismatch. Further, occupations that require job-specific skills through fields of study had higher levels of skill utilisation than those with more generic skill requirements, with two important provisos: first, gendered occupations and fields of study have much higher rates of utilisation for the dominant sex than the non-dominant sex, that is, men had higher rates of utilisation than women for male-dominated occupations (e.g. technicians and trade workers); and women had higher rates of utilisation than men for feminised occupations. In addition, in the male-dominated occupations (managers, technicians and trade workers, machinery operators and drivers and labourers), full time employees had higher levels of skill utilisation than those employed part time. For female dominated occupations (community and personal services workers, clerical and administrative workers and sales workers), those who worked part time had a higher level of skill utilisation than those who worked full time. Even when women achieved a qualification in a male-dominated field of study, they were less likely than men to work in an occupation appropriately matched to that field of study. The reverse was true for men and female-dominated fields of study (health, education, society and culture and creative arts). Men had higher levels of utilisation than women in each of these fields of study, despite a considerably smaller proportion of the population studying the discipline than women. Second, while job-specific fields of study had high proportions of utilisation, they also contributed relatively high proportions to under-utilisation, predominantly because of the combination of field of study mismatch and over-qualification. This suggests there is also an oversupply of labour with job-specific skills compared with the demand for those skills.

While those with tertiary qualifications experienced higher rates of skill utilisation than those with vocational qualifications, there were high rates of under-qualification for men who predominantly

held vocational qualifications, and of over-qualification for women, who were more likely to hold tertiary qualifications. When combined with field of study mismatch, this indicates a supply and demand disconnect between the education system and the labour market, as well as considerable productivity performance implications.

While Human Capital Theory contends that both individuals and the broader society and economy derive benefit from investment in education, with improved productivity being central to long term, broader economic development, evidence presented in this chapter suggests that the existing human capital in Australia is not being effectively utilised in the labour market. As such, it is likely that there have been foregone productivity gains, and that future productivity growth potential resulting from additional investment in education and training is unlikely without policy intervention to improve utilisation.

The next chapter incorporates the life course perspective in the analysis of skill utilisation to gain a greater insight into the factors associated with the under-utilisation of human capital in Australia.

Chapter six
Skill utilisation over the life course

Introduction

How an individual's complement of skills is utilised over the lifespan differs because life events influence the way in which people engage with the workforce. These life events affect men's and women's skill utilisation differently. Understanding the relationship between human capital accumulation, employment and life decisions over the lifespan is critical to improving productivity performance at a macro level. In other words, a greater understanding of the levers of skill utilisation at a micro level is required.

This chapter presents the findings on how skill utilisation is associated with different life course events, as per the life course principles of linked lives, agency and lifespan. For example, how do factors such as ageing, the presence of a partner, and/or the presence of a child affect skill utilisation over the lifespan, and how does the experience differ for men and women and how they engage with work. Skill utilisation is decomposed by variables to explain the differences in skill utilisation and the type of utilisation. The chapter begins with an analysis of skill utilisation over the lifespan, and then incorporates the linked lives variables: the presence, or not, of a partner, and then the presence, or not, of a child living in the household. It concludes with a discussion of the picture of skill utilisation in Australia that emerges from the culmination of all variables.

Importantly, as explained in Chapter Four, because census data are cross-sectional rather than longitudinal, the age variable is used to construct a 'synthetic' lifespan from which to analyse skill utilisation over the life course. While this research cannot capture the change in skill utilisation over time by individuals as they transition through life events, this chapter utilises a cohort, period and age effect lens to analyse the findings.

Skill utilisation over the lifespan

Skill utilisation in Australia differs substantially over the lifespan on the basis of age and sex. Figure 6.1, below, shows that the level of skill utilisation reduces with each step up in age. Skill utilisation is highest for those aged 24 to 29 years of age, at 43.7 per cent, indicating that at the time of entry into the workforce people are more likely to be employed in an occupation that matches their complement of skills, field of study, and level of educational attainment than any other age group. The proportion of the population utilising their skills in the workforce lowers for each age group up

to 50 to 54 years (to 40.9 per cent), and then drops considerably to 37.0 per cent for those aged 55 to 59 years, and to 26.8 per cent for 60 to 64 year olds. When disaggregated by sex, skill utilisation differs further for men and women, reducing for each successive age group for men and fluctuating for women in each age group. The skill utilisation trajectory for men and women over the lifespan is almost inverse until 50 to 54 years of age, when they assume the same trajectory. For all age groups, men had a higher rate of skill utilisation than women.

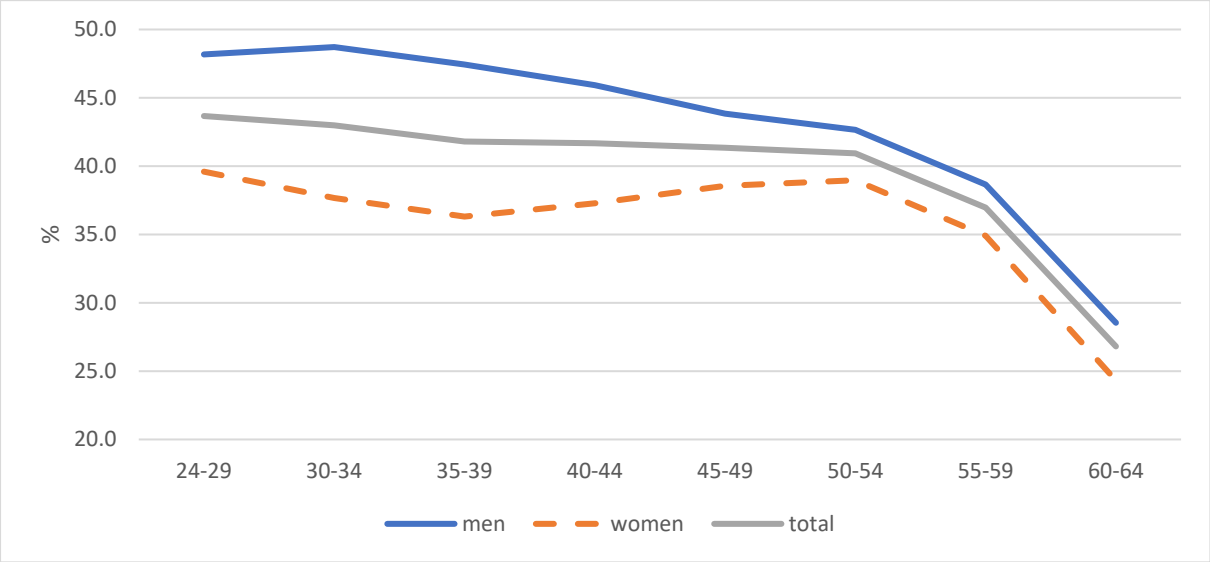

Figure 6.1. Skill utilisation by age and sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Women had the highest level of skill utilisation while aged 25 to 29 years (39.6 per cent), while men peaked at 30 to 34 years of age (48.7 per cent). The level of skill utilisation for women reduced by age group to 35 to 39 years (36.3 per cent), and then increased by age group to the ages of 50 to 55 years (40.9 per cent), before declining considerably to 24.3 per cent for those aged 60 to 64 years. After peaking at age 30 to 34 years, men's skill utilisation reduced with each age group gradation to 42.7 per cent for those aged 50 to 54 years, then dropped to 28.5 per cent for 60 to 64 year olds. These differences will be explained further as additional variables are included in the analysis. At first glance, these findings challenge some associations with the theory of human capital; that the labour market distributes jobs on the basis of individuals' accumulated human capital, and that, over the long run, market forces correct any mismatch between supply of and demand for human capital, regardless of sex. The inability to optimise skill utilisation over the lifespan prevents people from maximising their potential successful life outcomes and broader economic objectives for improved productivity performance.

When the type of utilisation is examined (Figures 2a and 2b, below), clear differences between men and women are apparent for all age groups.

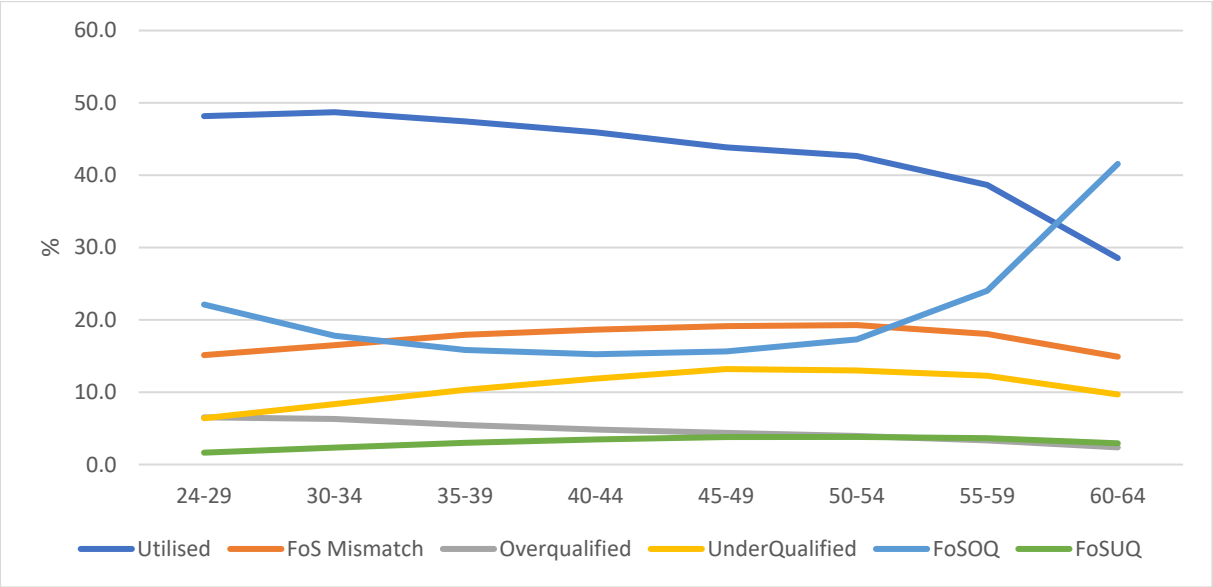

Figure 6.2a. Type of skill utilisation by age, men

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

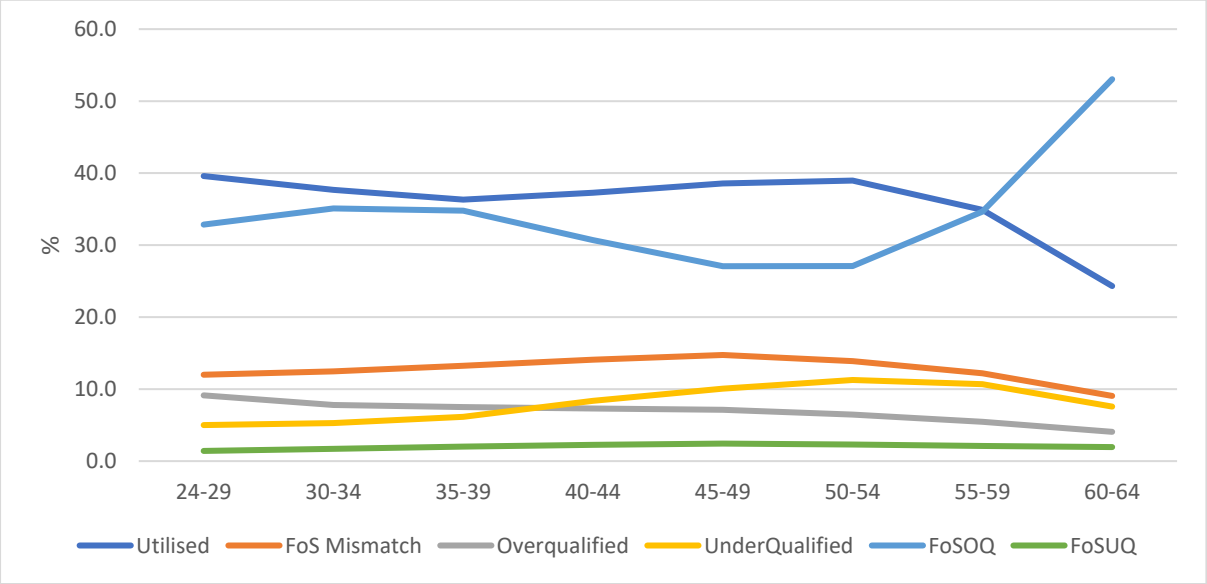

Figure 6.2b. Type of skill utilisation by age, women

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Men have higher levels of field of study mismatch than women, increasing for each age group, and more so among older men: 15.1 per cent for those aged 25 to 29 years to 19.3 per cent for those aged 50 to 54 years, before declining to 14.9 per cent for 60 to 64 year olds. The same pattern is

evident for the under-qualified, and for those with a combination of field of study mismatch and under-qualification: for all age groups, men have higher rates than women in the same age group, increasing until the 50 to 54 years age group. For all age groups, women had higher rates of over-qualification than men, but the proportion for each subsequent age group decreased – from 9.1 per cent for those aged 24 to 29 years to 4.1 per cent for 60 to 64 year olds. As both men and women get older, the proportion who were underqualified for their job increased until the 55 to 59 age group, for men more so than women. This indicates lower levels of educational attainment for older age groups, as well as promotion into job roles with a higher skill level than required by their formal level of educational attainment, on the basis of experience, informal learning and on-the-job training. Even so, high levels of under-qualification suggest that there is an opportunity to improve productivity, potentially by investing further in education and training.

As will be explained in the subsequent sections of this chapter, the fluctuating combination of field of study mismatch and the over-qualification type of under-utilisation for women is largely explained by their fluctuating levels of labour force participation in each age group. This provides evidence of women's increasingly interrupted careers pre- and post-childbearing, highlighting the potential impact of linked lives on skill utilisation. For men, the relatively lower but stable level of field of study mismatch combined with the over-qualification type of under-utilisation is explained by higher levels of labour force participation for the age groups 30 and 50 years of age compared with women. The substantial increase in the level of field of study mismatch combined with over-qualification for the age groups from 50 to 59 years and 60 to 64 years for both men and women is explained by decreases in labour force participation rates for these age groups as they reach 'retirement age'. Increases in under-qualification and field of study mismatch for each successive age group suggest the continuing presence of the typical 20th Century male biography, a 'lock step life course' centred on the world of work and the lifelong occupational ladder and hierarchy (Kohli 2007; Moen 2016; Moen & Sweet 2004). Together, these findings support the suggestion by Moen and Sweet (2004) that it is these differences in labour force participation and in the work-family nexus that is creating a 'neo-traditional' arrangement in the home, giving priority to the male partner's work-life course when family time requirements increase, reinforcing and exacerbating the existence of gendered work-life course models.

Skill utilisation by labour force status over the lifespan

The level and type of skill utilisation differs over the lifespan as individuals move in and out of the workforce, affecting both current and future skill utilisation potential. As an individual's complement of skills can only be utilised through employment in the workforce, the level and type of skill utilisation in the population changes considerably when those not employed are discounted. As Figure 6.3, below, shows, for the employed population, the level of skill utilisation was greatest for those aged 25 to 29 (51.5 per cent), and then declined for subsequent age groups (to 47.1 per cent for 45 to 49 year olds), before slightly increasing for those aged 50 to 54 years (to 47.3 per cent). Skill utilisation then declined again to 44.2 per cent for 60 to 64 year olds.

For the employed population, skill utilisation also differs for men and women over the life course. For all age groups, men had a higher rate of skill utilisation than women, with both peaking in 25 to 29 year olds (53.6 per cent and 49.3 per cent respectively). The difference between men and women was greatest for those aged 25 to 29 (4.3 percentage points), decreasing for each subsequent age group to 0.2 percentage points for those aged 60 to 64 years. While the level of skill utilisation decreased for both men and women between age groups 25 to 29 years and 45 to 49 years, the level of skill utilisation was higher for women aged 50 to 59 years yet lower for men. Skill utilisation for men and women almost converges between the ages of 50 and 64 years. This phenomenon will be explained in later sections of this chapter with the inclusion of life course variables in the analysis.

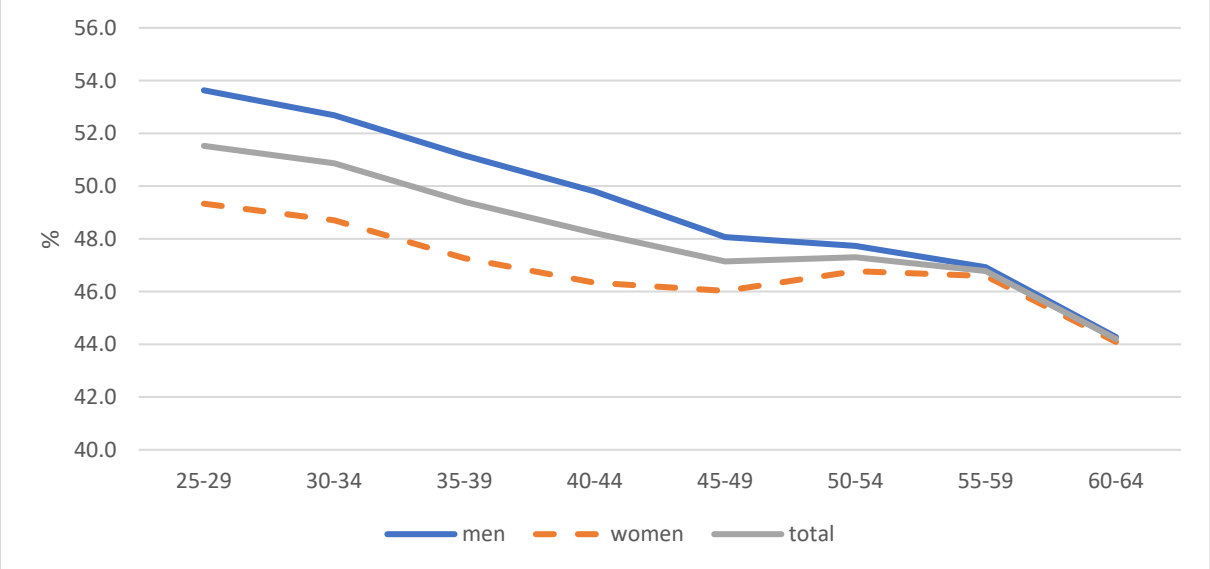

Figure 6.3. Skill utilisation, employed persons, by age and sex

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

When the employed population is disaggregated by labour force status, skill utilisation differs considerably between those employed full time and part time (Figure 6.4, below). Those employed full time had a greater level of skill utilisation than those employed part time in all age groups, peaking at 55.0 per cent for those aged 25 to 29 years. Skill utilisation for those employed part time peaked at ages 35 to 39 years, at 46.2 per cent. The greatest difference between those employed full time and part time was for 25 to 29 year olds (16.5 percentage points), after which the inverse relationship between full time and part time employment converged towards a similar trajectory. The lower levels of skill utilisation in younger cohorts could be explained either by their inability to secure full time employment post study, or by their combining part time work with further higher education. Regardless, the delayed and protracted entry into full time work for people in younger age groups, combined with low levels of skill utilisation for part time workers, supports increasing concerns regarding social return on the expansion of higher education and about the longer term consequences for graduates (Henseke & Green 2016; Holmes & Mayhew 2015, 2016; SkillsIQ 2017). This will be discussed further in Chapter Seven.

The level of skill utilisation among those employed full time falls for each age group from 25 to 29 years until the 45 to 49 years age group, in which it is higher for those aged 50 to 54 years, before declining again to 45.7 per cent for those aged 60 to 64 years. After peaking between ages 35 and 39, skill utilisation for those employed part time drops to 41.8 per cent for those aged 60 to 64 years. The least difference in skill utilisation between full time and part time employment was apparent among those aged 45 to 49 years – a 3.9 percentage point difference. Clearly evident is that part time employment, particularly at younger ages, has a substantial impact on the respective level of skill utilisation, potentially affecting individuals' potential to maximise successful life outcomes. What cannot be ascertained from this research, however, is whether the large gap between full time and part time employment for the younger cohorts will persist over the lifespan. Or whether under-utilised workers will actively seek employment which matches their accumulated human capital (as per the prediction of Human Capital Theory),– and the extent to which market forces will correct any mismatch in the long run to ensure increased skill utilisation.

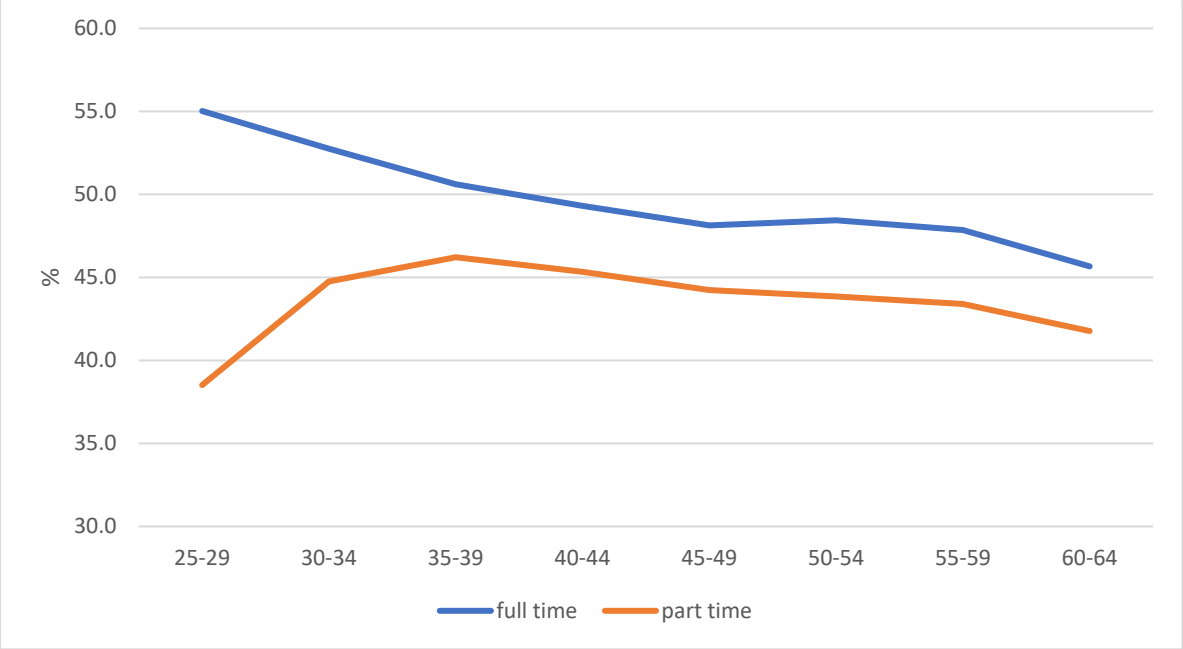

Figure 6.4. Skill utilisation by labour force status by age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by labour force status and age differs considerably again when further disaggregated by sex (Figure 6.5). Men employed full time had the highest rate of skill utilisation for the age group 25 to 29 years (57.0 per cent), as they did for each subsequent age group to 50 to 54 years (48.5 per cent), at which point women employed full time aged 55 to 64 years had higher rates of skill utilisation than men employed full time. This pattern of skill utilisation supports the presence of the tri-phasic life course model for men and women. For men, this reflects the typical 20th Century male biography, a 'lock step life course' centred on the world of work and the lifelong occupational ladder and hierarchy (Kohli 2007; Moen 2016; Moen & Sweet 2004). For women, though, the model focusses on normative patterns in relation to institutionalised, standardised pathways (Elder, Johnson & Crosnoe 2003). That is, the model of women's biography focusses on family in a normative sequence: education, employment, family, employment (Heinz 2001, 2003; Moen 2016). This pattern could also be evidence of the 'extended work-education sequences' life course model (O'Rand & Bostic 2016), consisting of various forms of discontinuous careers interspersed with periods of full time or part time work or non-work activities for women. However, the restrictive nature of cross-sectional data, and of the data itself (the collection of only one post-school qualification), does not allow for these inferences to be made.

Women employed part time had higher levels of skill utilisation than men employed part time for all age groups. Men employed part time and aged 25 to 29 years had the lowest level of skill utilisation

(33.8 per cent). This gradually increased by age group to 44.5 per cent at age 40 to 44 years, before declining to 41.1 per cent for 60 to 64 year olds. Skill utilisation among women employed part time increased from 41.0 per cent for those aged 25 to 29 years to 46.8 per cent for those aged 35 to 39 years, and then declined to 42.3 per cent for 60 to 64 year olds. These findings suggest that women are more likely than men to secure part time work that matches their complement of skills.

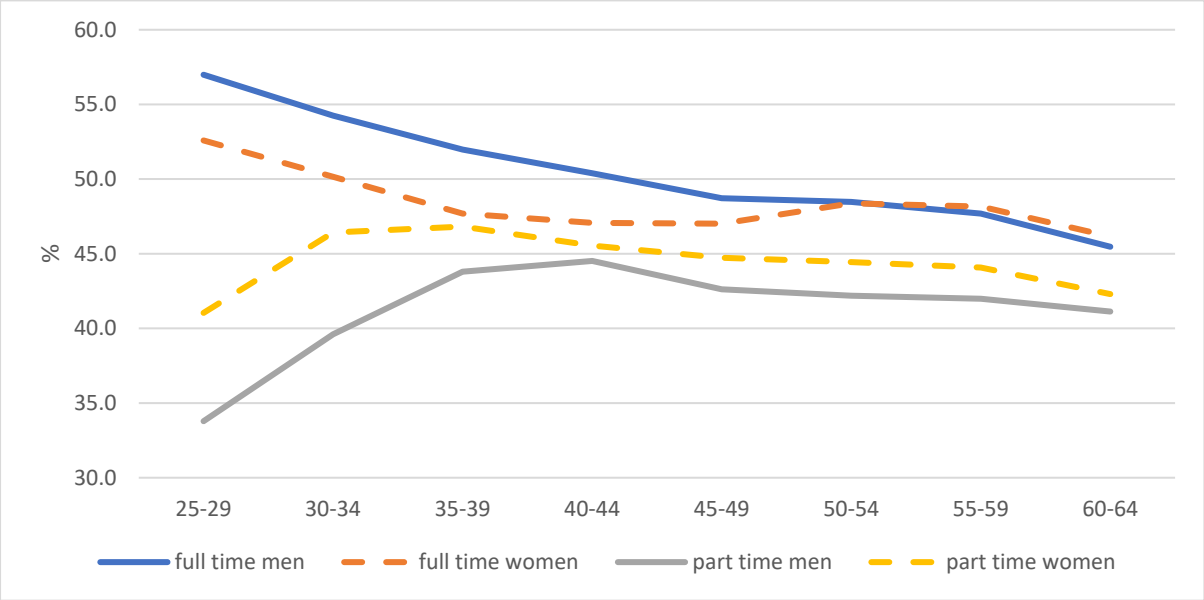

Figure 6.5. Skill utilisation by labour force status by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Clear patterns exist in the type of utilisation for men and women by labour force status and age. Figures 6a and 6b, below, show the stark similarities between the type of utilisation for men and women employed full time by age group.

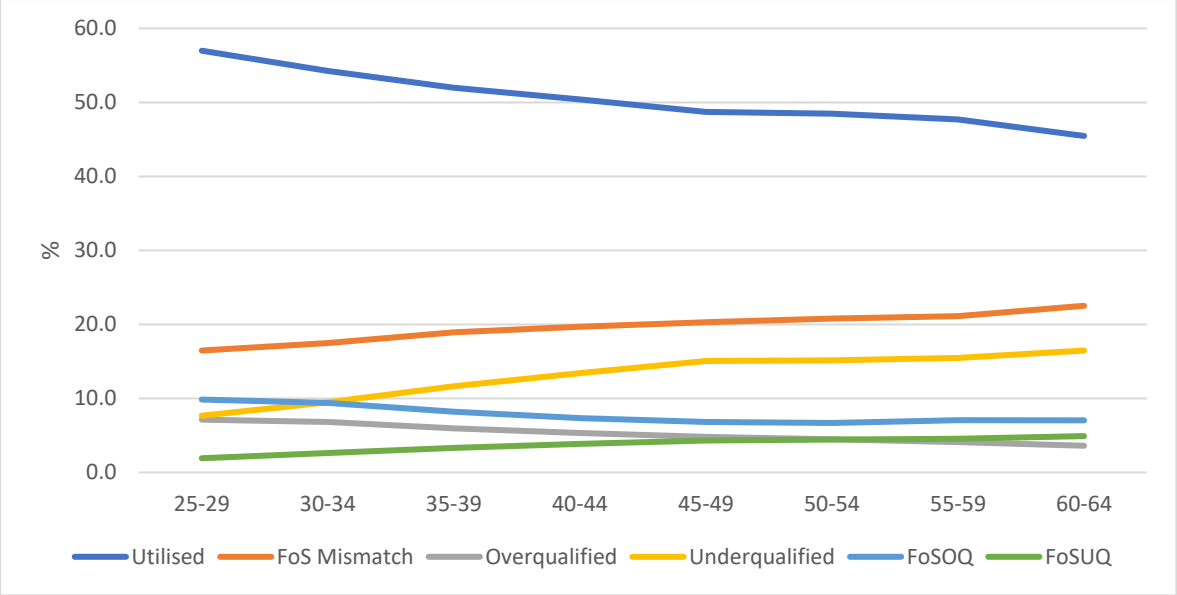

Figure 6.6a. Type of utilisation for men employed full time, by age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

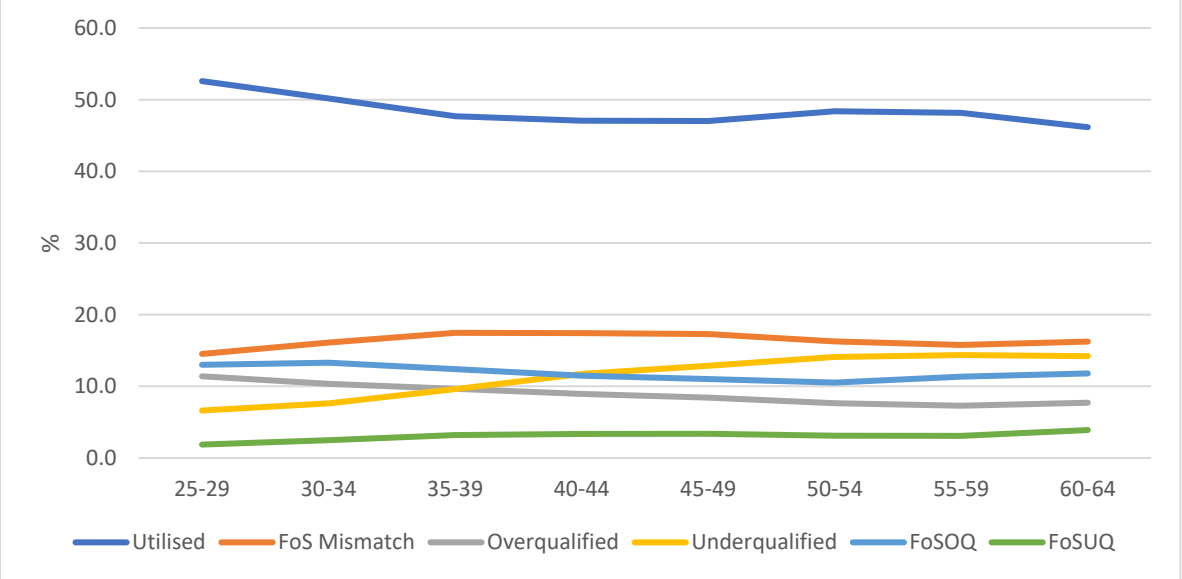

Figure 6.6b. Type of utilisation for women employed full time, by age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Field of study mismatch was the most prevalent type of under-utilisation for men and women employed full time, increasing for men in each successive age group while remaining relatively stable for women. The level of under-qualification increased from one age group to the next for both men and women, mirroring the trend for the level of over-qualification, with the difference being greater for men than women. For the older age groups, these findings can be explained by age and cohort effects; more specifically, by lower levels of tertiary educational attainment for older men and

women. Even so, women employed full time experienced more field of study mismatch combined with over-qualification than men for each successive age group.

Unlike those employed full time, men and women employed part time experienced very different types of skill under-utilisation over the lifespan. Figures 7a and 7b show the type of utilisation for men and women employed part time by age. For the younger age groups (24 to 39 years of age) men employed part time experienced a higher level of field of study mismatch combined with over-qualification than did women employed part time: a third (33.9 per cent) of men aged 24 to 29 years employed part time compared with a quarter (24.3 per cent) of women aged 24 to 29 years employed part time, decreasing to 18.8 per cent for 35 to 39 years old men, corresponding with improved skill utilisation, compared with 17.1 per cent for 35 to 39 year old women. Thereafter the level of field of study mismatch combined with over-qualification for men employed part time gradually declined to 12.6 per cent for 60 to 64 year olds, while for part time employed women, the level of field of study mismatch combined with over-qualification remained relatively stable. This indicates that it is more difficult for men to utilise their skills in a part time employment capacity than it is for women, particularly in the younger age groups. For men employed part time, the level of field of study mismatch, under-qualification and the combination of field of study mismatch and under-qualification increased for each successive age group, while the level of over-qualification decreased marginally. For women employed part time, the level of under-qualification increased for each successive age group, while the levels of field of study mismatch, over-qualification, and field of study mismatch combined with under-qualification remained relatively stable. Importantly, as previously mentioned, higher levels of under-qualification at older ages can be explained by the lower levels of educational attainment of older cohorts, supplemented by experience over time and informal learning.

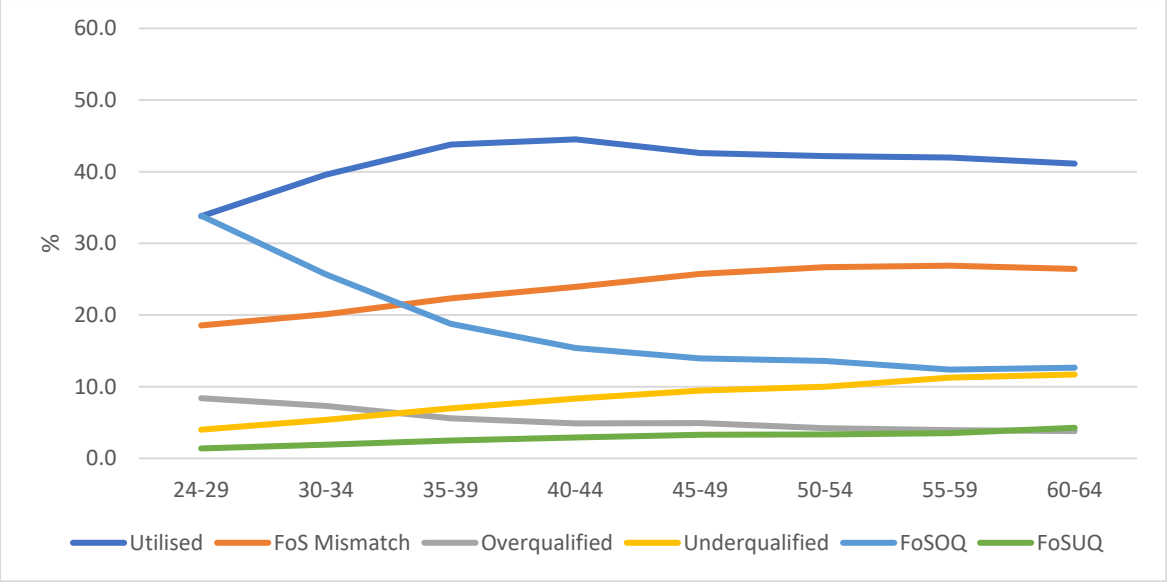

Figure 6.7a. Type of utilisation for men employed part time, by age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

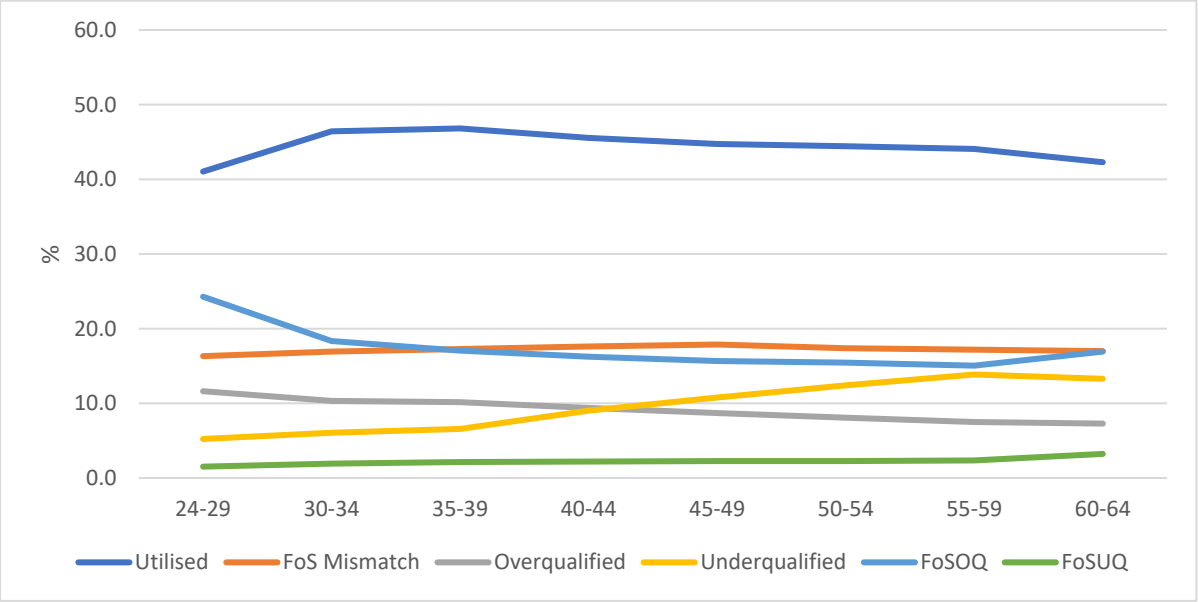

Figure 6.7b. Type of utilisation for women employed part time, by age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Overall, for women, the most widespread type of under-utilisation was field of study mismatch, as well as the combination of field of study mismatch and over-qualification. Those employed full time were more likely to experience under-qualification than those employed part time, increasing for all ages – from 7.7 per cent for those aged 25 to 29 years, to 16.5 per cent for 60 to 64 year olds. For all age groups, those employed part time were more likely to experience field of study mismatch or the combination of field of study mismatch with over-qualification than those employed full time.

For men, the most common types of under-utilisation were field of study mismatch and under-qualification. Like women, men employed full time were more likely to experience under-qualification than those employed part time, increasing for all ages from 6.6 per cent of those aged 25 to 29 years to 14.2 per cent of 60 to 64 year olds. Again like women, men employed part time were more likely to experience field of study mismatch or the combination of field of study mismatch with over-qualification than those employed full time, for all age groups.

Successful life outcomes over the lifespan are affected by an individual's ability to utilise skills in the workforce. This ability differs for men and women and according to how individuals engage with work, with clear trends for each sex. The following sections introduce the concept of linked lives into the analysis of skill utilisation to further outline the differences between men and women.

Skill utilisation and linked lives

In the life course framework, the principle of linked lives exists both horizontally (within cohorts or generations) and vertically (across generations), and intimately links life decisions, actions and meanings over the lifespan. For this analysis, the presence or absence of a partner will capture the association of horizontally linked lives on skill utilisation, and the presence or absence of a child will capture the association of vertically linked lives, including through analysis of how skill utilisation differs with the presence of a partner or child. How the combination of linked lives is associated with skill utilisation for men and women is also examined.

Skill utilisation and linked lives: the presence or absence of a partner

As detailed in Chapter Two, the life course framework provides a complementary lens through which to analyse skill utilisation. The capacity of individuals to make rational choices and compromises based on multiple and often competing options has important consequences for both future decision making and subsequent life trajectories, particularly in relation to linked lives, participation in the workforce and ultimate skill utilisation. When lives are linked (or not) by the presence or absence of a partner, skill utilisation differs for men and women, as shown in Table 6.1, below. Regardless of partner status, men had a higher level of skill utilisation than women. Partnered men had the highest level of skill utilisation (45.5 per cent), followed by non-partnered men (39.9 per cent). The converse was true for women; non-partnered women had a marginally higher level of skill utilisation than partnered women, the group with the lowest level of skill utilisation (36.9 per cent

compared with 36.8 per cent), providing initial evidence of the operation of the 'neo-traditional' arrangement in the home (Moen & Sweet 2004). In fact, while the presence of a partner made almost no difference in the level of skill utilisation for women (0.3 percentage points), for men, the presence of a partner made a substantial impact: a 5.6 percentage point greater level of skill utilisation for partnered men.

Table 6.1. Skill utilisation by presence, or not, of a partner, for men and women

	Men (%)	Women (%)
Partnered	45.5	36.8
Not Partnered	39.9	36.9

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

When disaggregated by labour force status, skill utilisation for partnered and non-partnered men and women differs further. Figure 6.8, below, shows skill utilisation by the proportion of the male and female population by labour force status and partner status. Over half of all men were partnered and employed full time (54.0 per cent), compared with a quarter of women (26.0 per cent). A fifth of all men (19.2 per cent) and 16.3 per cent of women were not partnered and were working full time. For the not utilised, not employed population (22.4 per cent of women and 12.1 per cent of men), over half of the women were partnered and not in the labour force (13.6 per cent of all women), compared with 5.1 per cent of all men.

Partnered men were more likely to be employed full time than partnered women, increasing the likelihood that their skills would be utilised effectively, given that those employed full time have higher levels of skill utilisation than those employed part time. The same is true for non-partnered men and women. In addition, partnered women were more likely to not be in the labour force than were partnered men, further widening the gap between men's and women's skill utilisation.

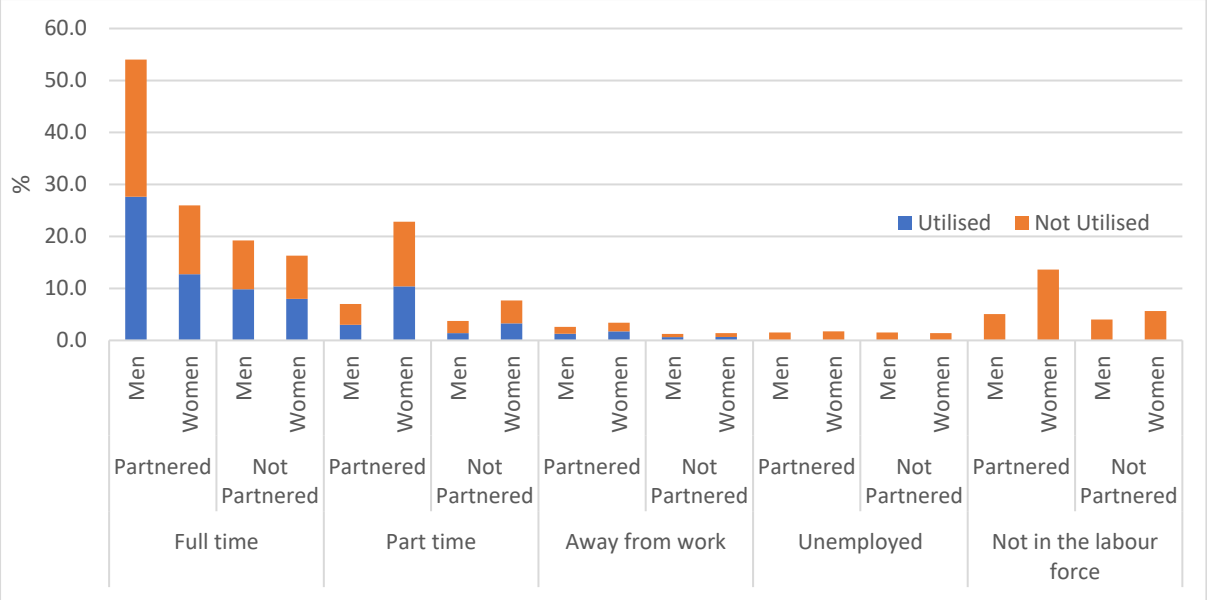

Figure 6.8. Skill utilisation, proportion of the male and female population by labour force status and presence of a partner

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The presence of a partner made no difference to the level of skill utilisation for men working full time, nor to that of women working full time (0.1 percentage point). Even so, the overall level of skill utilisation was higher for men than for women (around 2.0 percentage points). See Table 6.2.

Table 6.2. Skill utilisation by labour force status and presence of partner for men and women

		Men (%)	Women (%)
Full time	Partnered	51.2	49.0
	Not partnered	51.2	49.1
Part time	Partnered	42.6	45.5
	Not partnered	37.7	42.8

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Partnered and non-partnered men employed full time (accounting for 73.2 per cent of all men) had the highest rate of skill utilisation: both 51.2 per cent. Of the female population, women working full time had the highest level of skill utilisation: 49.1 per cent for non-partnered women and 49.0 per cent for partnered women. The presence of a partner had a much greater impact on skill utilisation for those men and women working part time, with partners having a positive effect on skill utilisation: 4.9 percentage points more for partnered men and 3.2 percentage points more for partnered women. Even so, among those working part time, women had higher rates of skill

utilisation than men regardless of partner status. Non-partnered men and women working part time had the lowest level of skill utilisation: 37.7 per cent and 42.8 per cent respectively.

The greatest impact on skill utilisation for men and women is the level of attachment to the labour market. For partnered men, the level of skill utilisation is 8.6 percentage points higher for those working full time than for those working part time. For non-partnered men, the level of skill utilisation is 13.5 percentage points higher for those working full time than for part time workers. The differences for women are smaller; 3.5 percentage points for partnered women and 6.3 percentage points for non-partnered women.

Skill utilisation by partner status over the lifespan

Over the whole lifespan, the highest level of skill utilisation was experienced by partnered men, as clearly shown below in Figure 6.9. Partnered men's skill utilisation peaked in the 25 to 29 years age group (52.4 per cent). Each subsequent age group's level of skill utilisation was lower, with 30.0 per cent for those aged 60 to 64 years the lowest. Non-partnered men followed a similar pattern to partnered men, albeit at a considerably lower rate – an average of 7.0 percentage points lower over the lifespan. Women, partnered or not, had the lowest level of skill utilisation from the age groups 24 to 29 years to 45 to 49 years (at which age partnered women's skill utilisation was higher than that of non-partnered men) and 50 to 54 years (when non-partnered women's skill utilisation was higher than for non-partnered men). Increases in skill utilisation in the 35 to 49 years age groups correspond to post-peak childbearing and rearing ages. These differences can be partly explained by changes in the proportion of each age group not participating in the workforce.

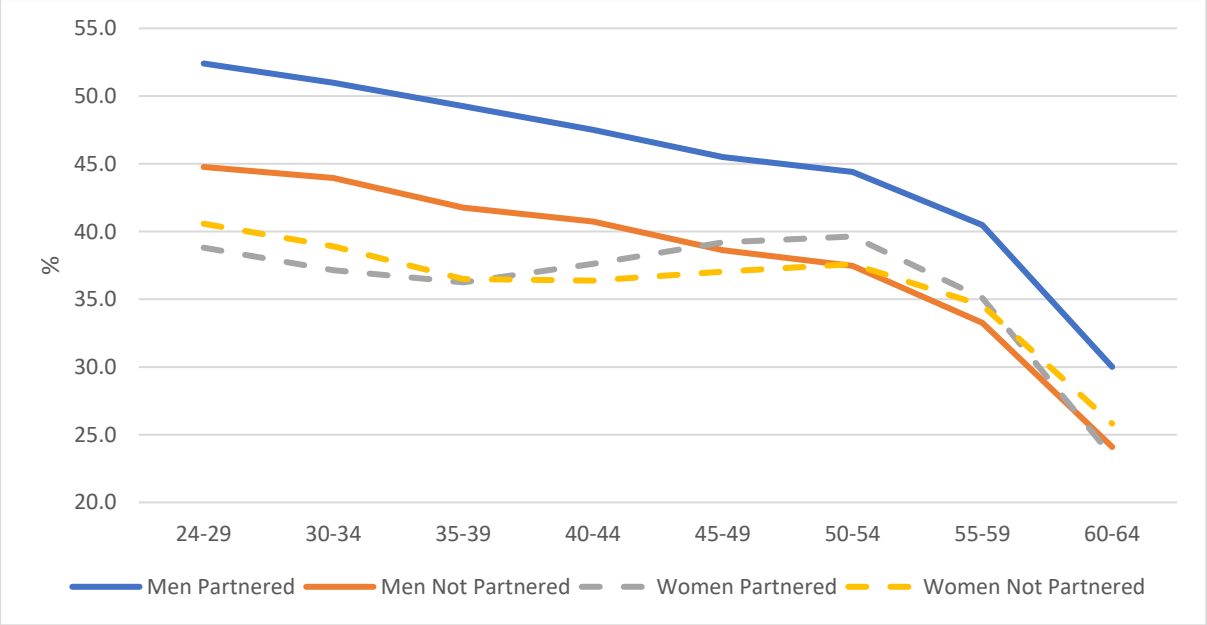

Figure 6.9. Skill utilisation by presence of a partner or not, and sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation in each age group for the employed population differs considerably from that of the whole population, as shown below in Figure 6.10, when compared with Figure 6.9, above – particularly for women.

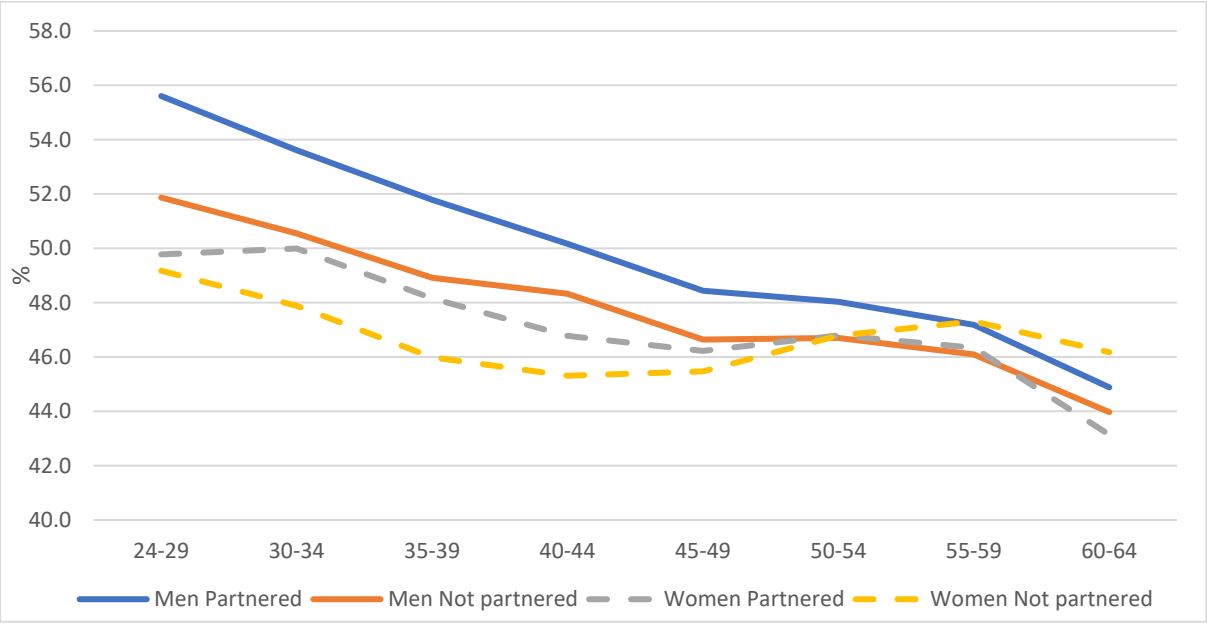

Figure 6.10. Skill utilisation of the employed population, by presence of a partner or not, and sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

While having the lowest level of skill utilisation of all age groups from the ages of 24 to 54 years, non-partnered women's level of skill utilisation was higher than that for partnered men from the 55 to 59 years age group, who had the highest level of skill utilisation in the preceding, younger age groups. All population groups' level of skill utilisation, except partnered men, was similar at the age of 50 to 54 years; around 46.7 per cent. While the level of skill utilisation for partnered women and non-partnered men was lower for all successively older age groups, it was higher for non-partnered women until the ages of 55 to 59. This indicates that for women at older ages, and post child-rearing – who do not have linked lives (horizontally at least) –, their opportunity to participate in employment to improve productivity and prospects of successful life outcomes is greater at older ages, potentially out of necessity, but certainly not over the whole lifespan, as is the experience for men.

When the employed population is disaggregated by labour force status, skill utilisation differs further by sex and age group, as shown in Figure 6.11, below. Men working full time, partnered and not partnered, had higher levels of skill utilisation than did all other combination of sex, partner status and labour force status variables until the 45 to 49 years age group. For age groups older than 45 to 49, the level of skill utilisation improved for women (except for partnered women working part time) up to the 55 to 59 years age group. For men, the level of skill utilisation deteriorated for each successive age group (except for those non-partnered men working full time, for whom the change was minimal). Men and women working full time, partnered or not, had higher levels of skill utilisation than those working part time for all age groups (with the exception of partnered women working part time at age 35 to 39 years). Non-partnered men employed part time had the lowest level of skill utilisation than all other population and age groups – despite increasing from 38.1 per cent for ages 24 to 29 years to 43.8 per cent for those aged 40 to 44 years –, before stabilising for subsequent age groups. Conversely, the level of skill utilisation for non-partnered women working part time increased gradually for each successive age group. Partnered women working part time had higher levels of skill utilisation than partnered men working part time for each age group, but both men and women experienced a similar trend; the level of skill utilisation improved for each age group until the 35 to 39 years age group for women and the 40 to 44 years age group for men, before deteriorating for successively older age groups. These findings confirm that horizontally linked lives have a different association wit skill utilisation for men and women when the level of labour force attachment is incorporated. Most notably, the absence of a partner for women older than 45, employed both part time and full time, resulted in higher levels of skill utilisation until the 55 to 59 years age group for those employed full time, and 60 to 64 years age group for those

employed part time. These findings indicate a change in life circumstances, providing an opportunity to optimise life outcomes, albeit at a later stage in life.

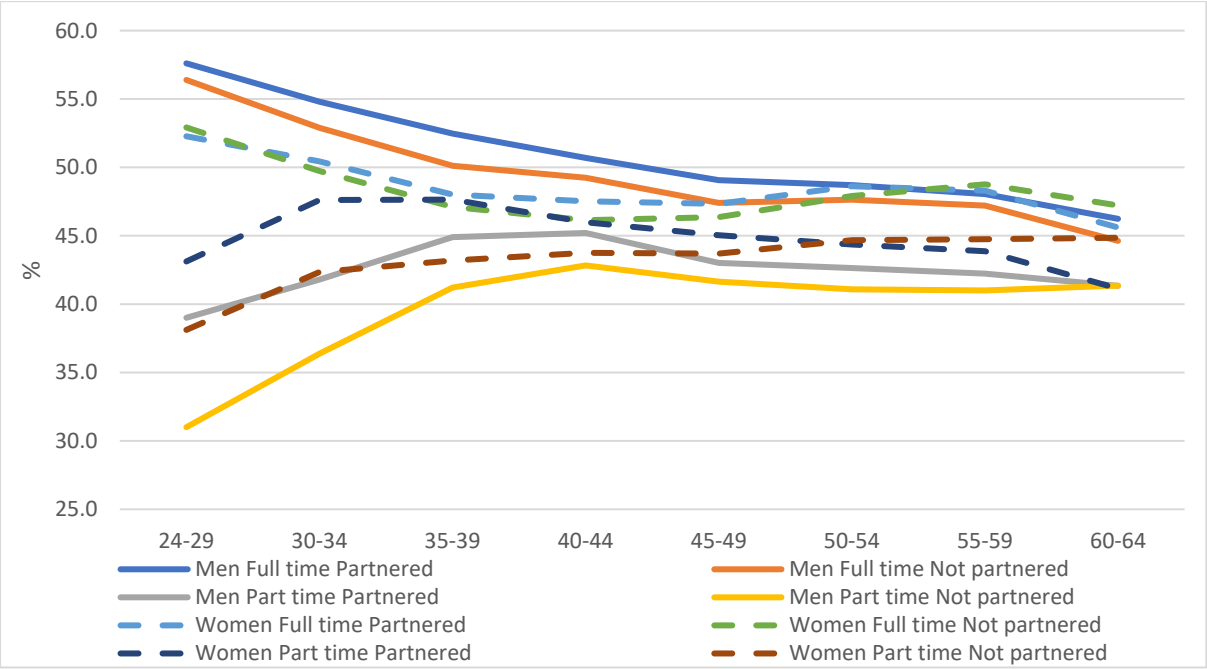

Figure 6.11. Skill utilisation by labour force status and presence of a partner or not, and sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

As each additional life course variable is added into the analysis of skill utilisation in Australia, it is increasingly evident that diverse life pathways exist within the population, and that patterns of skill utilisation exist for similar groups of people at similar ages over the lifespan. Linked lives, in this case the presence of a partner, and the decision-making process regarding the level of engagement with the workforce affect skill utilisation as well as potential successful life outcomes at the micro-level, and productivity performance at the macro-level.

Skill utilisation and linked lives: presence or absence of a child

Vertically linked lives in the form of the presence of a child in the household also have a different association with skill utilisation for men and women, as shown in Table 6.3, below. For all scenarios, men had a higher level of skill utilisation than women. Like the presence of a partner, the presence of a child has a considerable, positive impact on the level of skill utilisation for men. The level of skill utilisation for men with dependent children was 8.1 percentage points higher than for men with non-dependent children, and 7.1 percentage points higher than for men with no children. For

women, the presence of children (dependent or non-dependent) reduces the level of skill utilisation compared with women with no children by around 2.4 percentage points.

Table 6.3. Skill utilisation by the presence, or not, of a dependent child or non-dependent child, men and women

	Men (%)	Women (%)
Dependent children	48.0	35.7
Non-dependent children	39.9	35.8
No children	40.9	38.1

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

When disaggregated by labour force status, skill utilisation for men and women and the presence, or not, of a dependent or non-dependent child, differs further. Figure 6.12, below, shows skill utilisation by the proportion of the male and female population by labour force status and child status. Over two thirds of all men (73.3 per cent) were employed full time; nearly half had dependent children (33.9 per cent of all men) while 35.1 per cent worked full time and had no children living in the household. For women, the level of engagement with the labour force is negatively influenced by the presence of a child. While 42.3 per cent of all women worked full time, over half (a quarter of all women, 25.4 per cent) had no children, while 14.0 per cent had dependent children. Nearly a third of all women worked part time (30.5 per cent), over half of whom had dependent children (18.3 per cent of all women), and 10.2 per cent worked part time and had no children living in the household.

Over one in ten women (12.1 per cent) were not employed and had dependent children living in the household, compared with 2.7 per cent of men with dependent children. Nearly one in ten women (9.1 per cent of women) and 8.6 per cent of men had no children living in the household and were not working.

As with horizontally linked lives, men were more likely to work full time than women, more so when children were present. Women were more likely to work part time or not at all than were men, and this, too, was more the case with children present, clearly associated with the different levels of skill utilisation for both men and women.

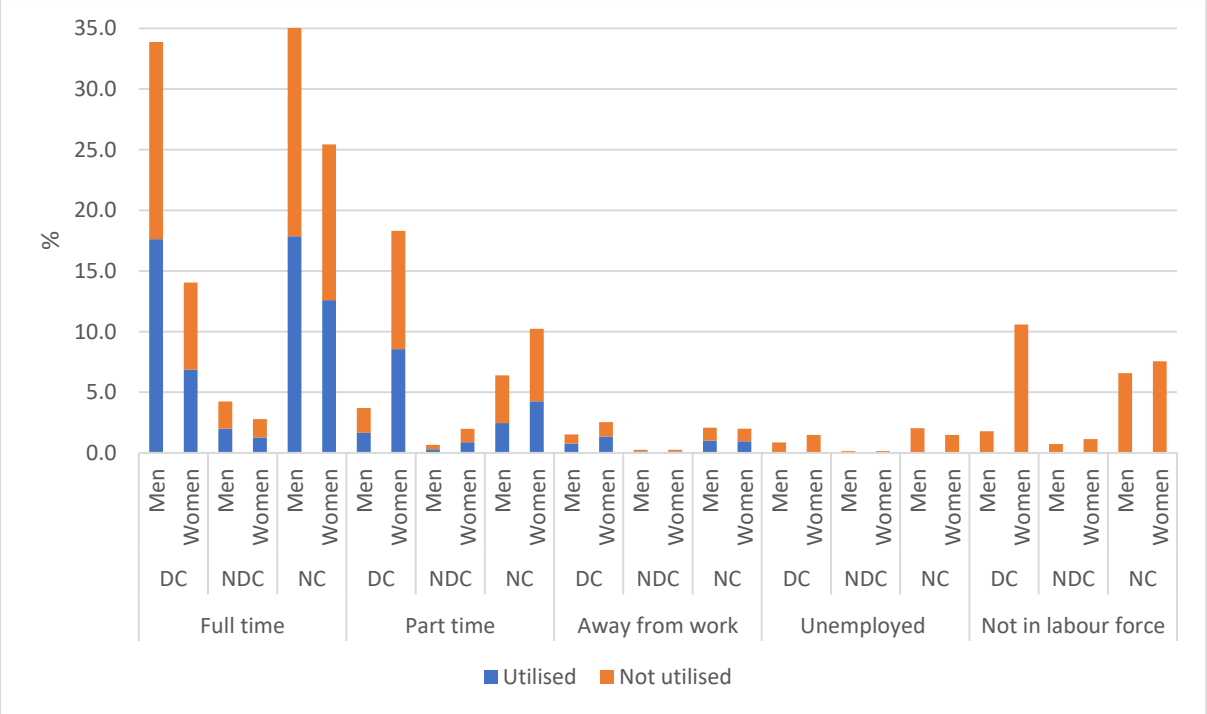

Figure 6.12. Skill utilisation, proportion of the male and female population by labour force status and presence, or not, of a dependent child or non-dependent child

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Linked lives in the form of the presence of a child living in the household reduce the level of engagement with the labour force for women. Men, on the other hand, increase their level of attachment to the labour force. Both situations result in corresponding association with the level of skill utilisation.

As with vertically linked lives, the presence of children has a similar effect on the level of skill utilisation for working men and women. Regardless of child status, for those working full time, men had higher levels of skill utilisation than women in all scenarios, while for those working part time, women had higher levels of skill utilisation than men (see Table 6.4, below). Even so, the presence of children and their level of dependency had a differing effect on skill utilisation for men and women. The level of skill utilisation was higher with dependent children compared than with non-dependent children for both men and women working full or part time. While the highest level of skill utilisation for men was evident for those working full time with dependent children (52.0 per cent), the highest level for women was for those working full time with no children (49.5 per cent). The greatest differences in the level of skill utilisation exist between those working full time and part time rather than between men and women. For both men and women, the greatest difference is apparent for those with no children: 12.3 percentage points and 8.0 percentage points respectively between

those working full time and part time. These findings suggest that linked lives in the form of the presence of, and responsibility for, dependent children, motivates parents to maximise their potential life outcomes, even when employed part time.

Given the association of the age of children with the age of parents, it is likely that some age effects are present in this analysis. Older age groups are more likely to have no children or non-dependent children living in the household, yet also have lower levels of educational attainment and/or non-participation in the workforce, potentially reducing their level of skill utilisation.

Table 6.4. Skill utilisation by the presence, or not, of a child and labour force status for men and women

		Men (%)	Women (%)
Full time	Dependent children	52.0	48.9
	Non-dependent children	47.1	45.3
	No children	50.8	49.5
Part time	Dependent children	44.6	46.7
	Non-dependent children	43.0	44.1
	No children	38.5	41.5

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation by presence or absence of a child over the lifespan

The presence of a child has the greatest association with the trajectory of skill utilisation over the lifespan for women, as is clearly evident in Figure 6.13, below, which reveals an inverse trajectory from that of the other population groups. For each age group, the highest level of skill utilisation was experienced by men with dependent children living in the household: 52.5 per cent for the 25 to 29 years age group and declining for each subsequent age group to 36.3 per cent for those aged 60 to 64 years. For women with dependent children living in the household, skill utilisation was the lowest for the 25 to 29 years age group (27.1 per cent) – partially explained by lower levels of labour force attachment –, and increased for each successive age group up to 50 to 54 years (40.8 per cent), with levels of skill utilisation higher than for men and women with no children.

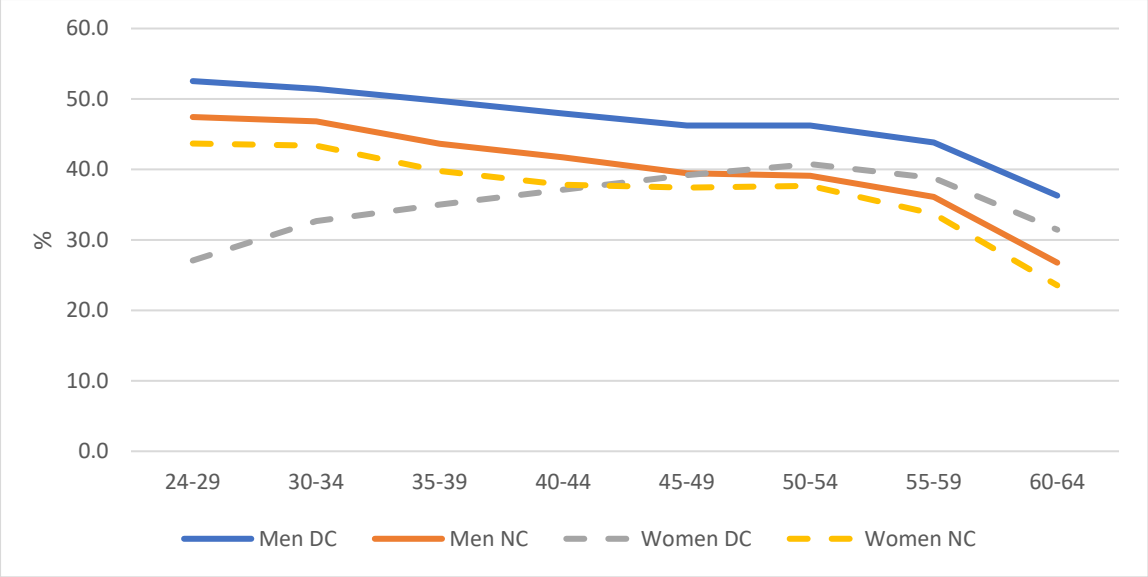

Figure 6.13. Skill utilisation by presence, or not, of a child, by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

When the employed only population is considered, the pattern of skill utilisation over the lifespan is similar for men regardless of the presence of a child, though the level of skill utilisation is considerably greater for men with dependent children. The pattern of skill utilisation for women with no children is also similar to the male trend, albeit at a lower level until the older age groups from 45 to 49 years. For these men and women, skill utilisation peaks at 25 to 29, and deteriorates for each successive age group up to the 45 to 49 years age group. For the successively older age groups, skill utilisation is higher for men with dependent children and for women with no children, and is stable for men with no children up to the 55 to 59 years age group. Higher and increasing levels of skill utilisation for women with no children for age groups older than 45 to 49 years could be explained by an age effect, with women experiencing a change in life circumstances (i.e. children no longer dependent or living in the household). While skill utilisation for employed women with dependent children living in the household is the lowest at age 25 to 29 years (47.7 per cent), it has the least variance over the age groups; increasing from the 25 to 29 years age group to be higher than women with no children for the 30 to 34 years age group (49.5 per cent), and men with no children for the 45 to 49 years age group (47.1 per cent), and men with dependent children living in the household for the 55 to 59 years age group(49.6 per cent). Women with dependent children living in the household aged 60 to 64 years had the highest level of skill utilisation for all scenarios, 49.7 per cent. The higher levels of skill utilisation for older women with dependent children could also be explained by an age effect, given that at these older ages dependent children are more likely

to be aged 15 to 24 years of age and attending full time education (and therefore relatively self-sufficient), enabling mothers to return to the workforce to a greater extent.

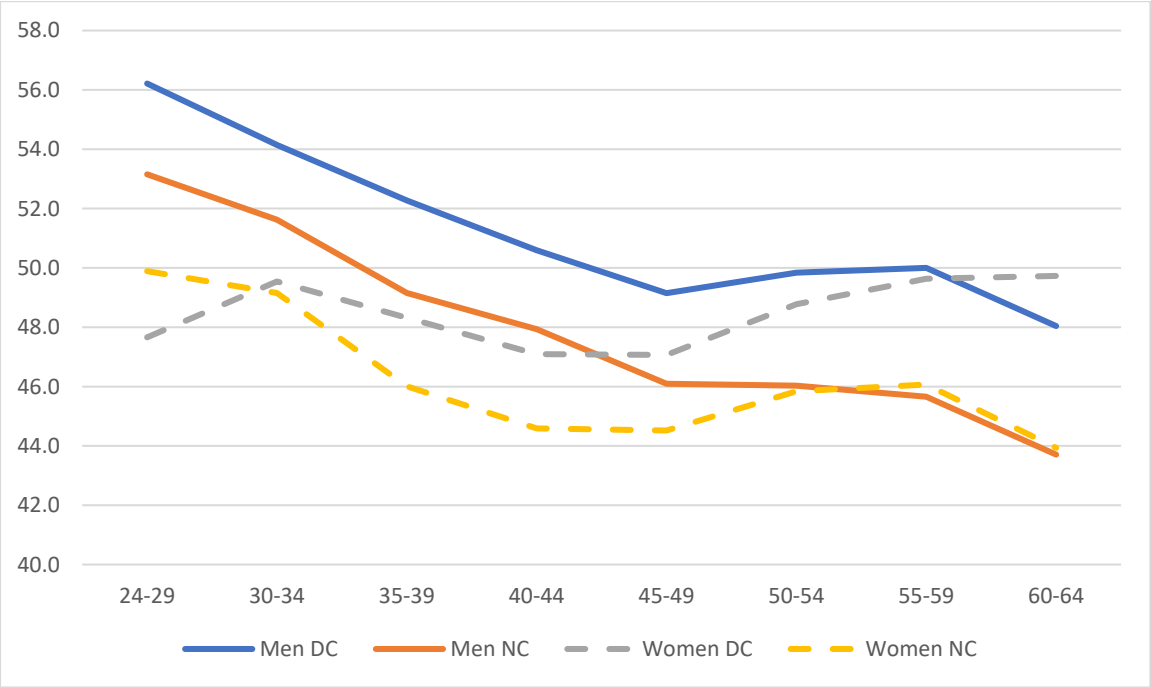

Figure 6.14. Skill utilisation of the employed population, by presence, or not, of a child, by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

When the employed population is disaggregated by full time or part time employment, skill utilisation differs further for each population group, as shown in Figure 6.15, below. Men working full time, regardless of the presence of a child living in the household, experienced a similar trajectory of skill utilisation over the lifespan. Men working full time with dependent children had higher levels of skill utilisation for each age group than men working full time with no children, peaking at 57.5 per cent for those aged 25 to 29 years, and declining to 49.4 per cent by ages 60 to 64 years. Similarly, for women working full time with no children living in the household, while at a lower level than men, the pattern of skill utilisation peaked for those aged 25 to 29 years (53.2 per cent), and declined gradually until ages 45 to 49 years, when it increased slightly until ages 55 to 59 years before resuming a decline to 45.8 per cent at age 60 to 64 years. Conversely, for women with dependent children living in the household, the level of skill utilisation for those working full time increased for all age groups from 45.0 per cent at 25 to 29 years to 53.6 per cent by age 60 to 64 years, exceeding all other population groups' level of skill utilisation from the ages of 50 to 54 years. For those women working part time with dependent children in the household, the level of skill utilisation remained relatively stable for all age groups, averaging 46.3 per cent, with a peak of 48.7

per cent at ages 30 to 34 years. Skill utilisation for men and women working part time with no children was the lowest for all scenarios and age groups (except for women aged 50 to 59 years). Even so, the level of skill utilisation increased for successively older age groups for both of these population groups. The fluctuating levels of skill utilisation for women could be explained by transitions in and out of the workforce depending on changing life circumstances, such as the age of a child. These life events do not seem to have the same effect on a man's level of skill utilisation. The pattern of skill utilisation provides evidence of both age effects and also of the existence of normative biological working life models for both men and women. First, lower educational attainment at older ages leads to increasing levels of under-qualification for job roles, particularly for men as they advance their career trajectory. These differences and cultural norms reinforce the proposed rise of the 'neo-traditional' male (Moen 2016; Moen & Sweet 2004) and the model of women's biography focusing on family in a normative sequence: education, employment, family, employment (Heinz 2001, 2003; Moen 2016). The low levels of skill utilisation for men and women working part time with no children living in the household suggests a lack of incentive to maximise successful life outcomes.

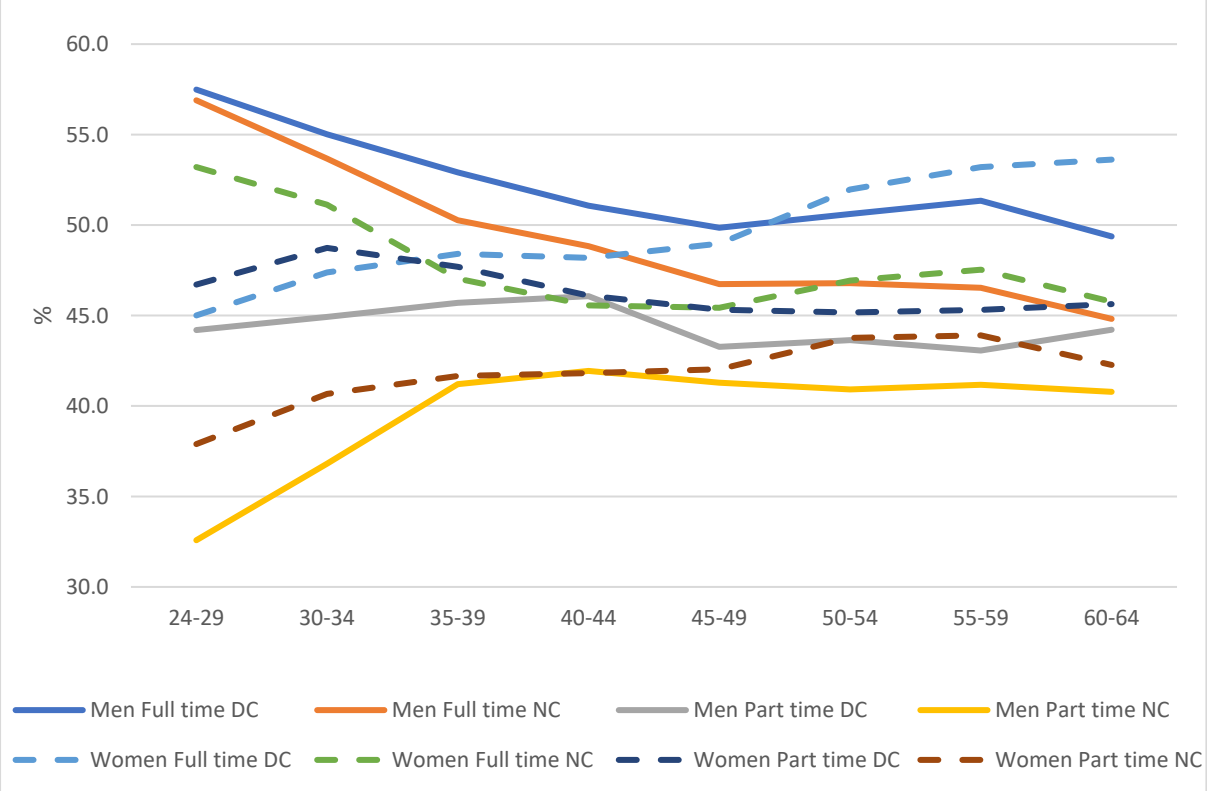

Figure 6.15. Skill utilisation by labour force status and presence, or not, of a child, by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Skill utilisation and linked lives: by partner and child status

When horizontally linked lives (partners) and vertically linked lives (children) are incorporated into the analysis of skill utilisation, greater understanding of potential productivity performance is forthcoming. For all combinations of partner and/or child status, men had a higher level of skill utilisation than women. See Table 6.5, below.

Table 6.5. Skill utilisation by the presence, or not, of a partner, and presence, or not, of a child, men and women

		Men (%)	Women (%)
Partnered	Dependent children	48.3	35.9
	Non-dependent children	40.0	35.7
	No children	42.0	38.2
Not Partnered	Dependent children	40.6	33.6
	Non-dependent children	39.1	36.0
	No children	39.8	38.0

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Partnered men with dependent children had the highest level of skill utilisation (48.3 per cent), while non-partnered women with dependent children had the lowest level of skill utilisation (33.6 per cent). For men, the presence of a partner and/or child increases skill utilisation, and more so if both a partner and a child are present. For women, the presence of a partner and/or child decreases skill utilisation, and more so if both are present, but the lowest level of skill utilisation is experienced by those non-partnered women with dependent children (33.6 per cent).

When disaggregated by labour force status, skill utilisation for men and women, and the presence or absence of a partner and/or child, differs further. Figure 6.16 shows skill utilisation by the proportion of the male and female population by labour force status, partner status and child status. Around one third of all men (33.0 per cent) were partnered with a dependent child and working full time, compared with 11.4 per cent of women. For partnered and non-partnered men and women with no children, the proportion working full time was similar: 17.2 per cent of men and 12.7 per cent of women were partnered with no children and working full time, while 17.9 per cent of men and 12.8 per cent of women were not partnered, had no children and were working full time. More women were employed part time than men for all combinations of partner and/or child status – significantly, 15.7 per cent of women were partnered, had a dependent child and were working part time, compared with 3.5 per cent of men, and almost one in ten women (9.0 per cent) were not working and were partnered with dependent children living in the household, compared with 1.6 per cent of men.

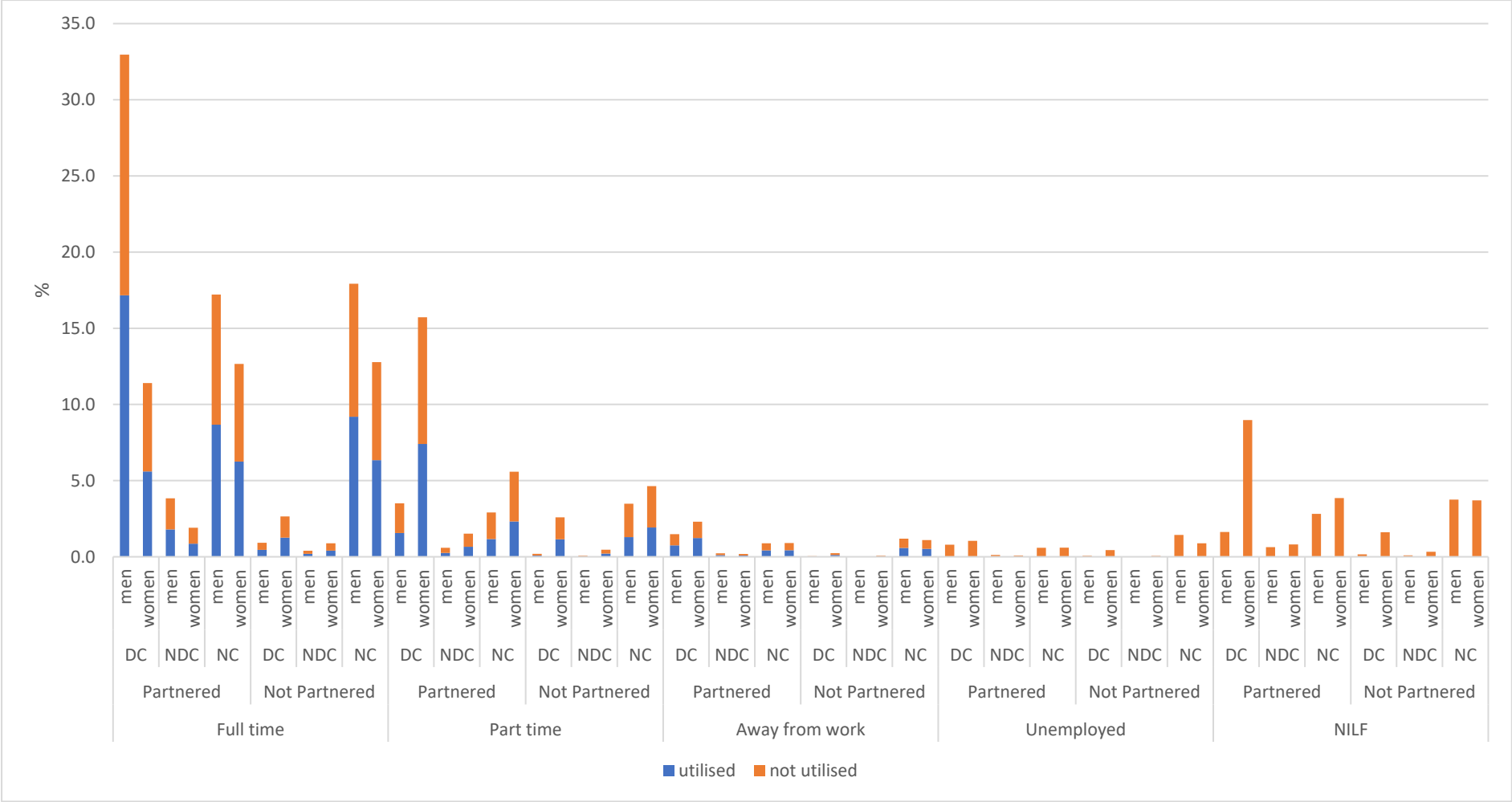

Figure 6.16. Skill utilisation, proportion of the male and female population by labour force status and presence, or not, or a partner and presence, or not, of a child

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

For those working full time, men had higher levels of skill utilisation than women for all scenarios, while for those working part time, women had higher levels of skill utilisation than men (excepting the very small proportion of non-partnered men with non-dependent children living in the household). See Table 6, below.

Table 6.6. Skill utilisation by the presence, or not, of a partner, and presence, or not, of a child, and labour force status for men and women

			Men (%)	Women (%)
Full time	Partnered	Dependent children	52.1	49.2
		Non-dependent children	46.9	45.0
		No children	50.4	49.4
	Not Partnered	Dependent children	49.7	47.6
		Non-dependent children	49.2	45.8
		No children	51.3	49.6
Part time	Partnered	Dependent children	44.6	47.1
		Non-dependent children	42.5	43.4
		No children	40.2	41.6
	Not Partnered	Dependent children	44.1	44.5
		Non-dependent children	46.8	46.1
		No children	37.1	41.5

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

For men, skill utilisation is maximised for those partnered, working full time with a dependent child (52.1 per cent), followed by non-partnered men working full time with no children (51.3 per cent). For women, skill utilisation is maximised for those who are not partnered, with no children and working full time (49.6 per cent). For men and women working part time, skill utilisation is higher for those with both a partner and a dependent child, albeit at a lower rate than those employed full time (7.5 percentage points and 2.1 percentage points respectively). The lowest level of skill utilisation for both men and women is for those working part time with no partner and no child (37.1 per cent and 41.5 per cent respectively). These findings suggest that for those working part time, linked lives, both vertically and horizontally, are motivating factors to maximise potential life outcomes. On the other hand, for those working full time, the existence of linked lives constrains the ability to maximise life outcomes – except for men with both a partner and a dependent child. As soon as a woman has a partner or child, and/or lowers her level of labour force attachment, her

level of skill utilisation declines, providing further evidence of the neo-traditional arrangement in the home.

Skill utilisation by partner and child status over the lifespan

Over the lifespan, skill utilisation differs for men and women for all combinations of partner and/or child status. For men, the pattern of skill utilisation over the lifespan is similar, regardless of the presence of a partner and/or child, except for those non-partnered men with a dependent child.

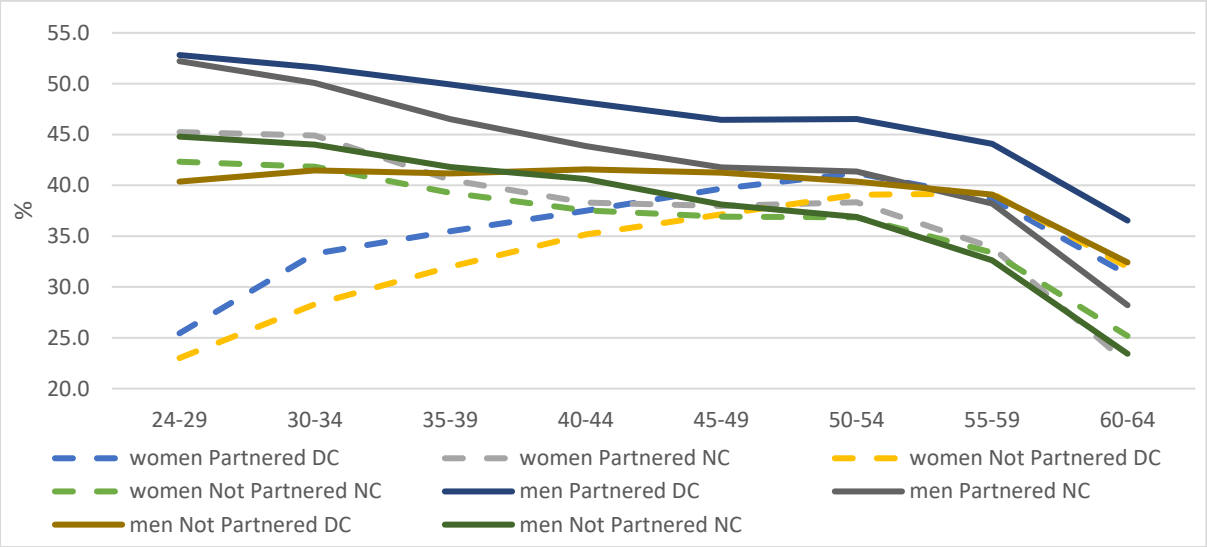

Figure 6.17. Skill utilisation by presence, or not, of a partner, and presence, or not, of a child, by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

For men with a partner and a child, skill utilisation is higher than that for partnered or non-partnered men with no children for each successive age group, peaking in the 25 to 29 years age group at 52.8 per cent, and gradually declining to 36.5 per cent for the 60 to 64 years age group, as shown in Figure 6.17, above. This skill utilisation trajectory is also similar for women with no children, regardless of partner status. Like men, partnered women with no children had higher levels of skill utilisation for each age group than non-partnered women with no children. Conversely, the skill utilisation trajectory for women with dependent children was inverse to that of men (excepting non-partnered men with children) and women with no children: skill utilisation was lowest for the 25 to 29 years age group – 23.0 per cent for non-partnered women with dependent children, and 25.4 per cent for partnered women with dependent children. For each successively older age group, skill utilisation progressively improved to 41.2 per cent for partnered women with dependent children aged 50 to 54 years, and to 39.2 per cent for non-partnered women aged 55 to 59 years with dependent children. These differences can be partly explained by the proportion of each group not

participating in the workforce and therefore not effectively utilised, particularly in the younger age groups. The opportunity cost for women aged 25 to 44 years of having dependent children is in the reduction of their chance to maximise skill utilisation and potential successful life outcomes, for those partnered or not. In each successively older age group women with dependent children (as the children get older and more self-reliant), women are essentially playing 'catch up'.

When the employed only population is considered, the pattern of skill utilisation over the lifespan for men is similar regardless of the presence of a partner and/or child, except for those non-partnered men with a dependent child. Even so, for men with a partner and a child, skill utilisation is higher than that for partnered or non-partnered men with no children for each age group, peaking at 56.3 per cent in the 25 to 29 years age group, and gradually declining to 48.0 per cent by the 60 to 64 years age group, as shown in Figure 6.18, below.

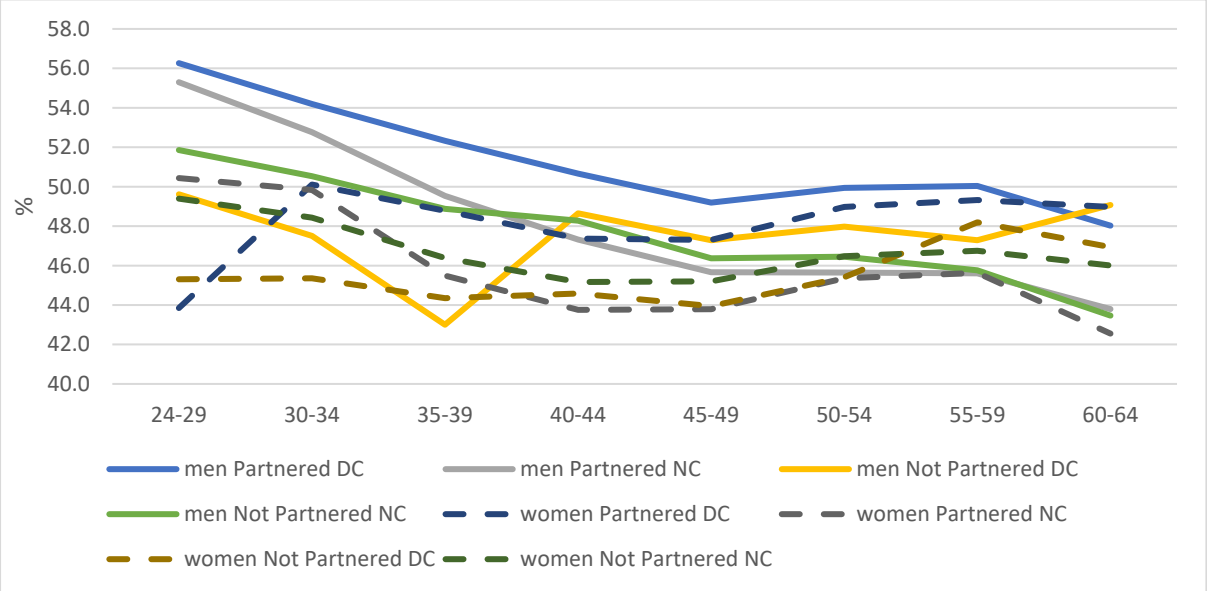

Figure 6.18. Skill utilisation of the employed population, by presence, or not, of a partner and presence, or not, of a child, by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The pattern of skill utilisation for women with no children is also similar to the male trend, regardless of partner status, albeit at a lower level until the 50 to 54 years age group. This increase in skill utilisation in later years for women could be explained by an age effect and change in life phases, with women moving from a household with children to one without, enabling women to pursue maximising life outcomes, as per the normative sequence of women's biography: education, employment, family, employment (Heinz 2001, 2003; Moen 2016).

For employed women with dependent children, regardless of partner status, skill utilisation was the lowest at ages 25 to 29 years, and improved for each successively older age group: from 43.8 per cent for partnered women with children, to 49.0 per cent for the 60 to 64 years age group, the second highest level of skill utilisation for all population groups, exceeded slightly (0.1 percentage point) by non-partnered men with dependent children. Skill utilisation for non-partnered women with no children living in the household had the least variance for all age groups: from 49.4 per cent for the 25 to 29 years age group, and 46.0 per cent for the 60 to 64 years age group. Partnered women with no children had the lowest level of skill utilisation in the older age groups, suggesting that the presence of a partner reduced the need to maximise successful life outcomes at an individual level, as per the theory of the neo-traditional household. Partnered men with no children experienced the greatest decline in the level of skill utilisation for each progressively older age group: from 55.3 per cent for the 25 to 29 years age group, to 43.5 per cent for the 60 to 64 years age group. This can be explained by both an age effect, in terms of lower levels of educational attainment at older ages, and by the typical 20th Century male biography – the lifelong occupational ladder and hierarchy (Kohli 2007; Moen 2016; Moen & Sweet 2004).

Skill utilisation differs considerably over the lifespan within the population when all life course variables are incorporated into the analysis – the presence or absence of a partner or child and labour force status for men and women. Figure 6.19, below, shows the extent of difference between the population groups over the lifespan, supporting the idea that the life course is no longer standardised or predictable. In the younger age groups (25 to 44 years), men and women had vastly different levels of skill utilisation depending on labour force status, and then on the presence or not of a partner and/or child. For each age group, skill utilisation was highest for men working full time, particularly those partnered with dependent children. For women working full time, skill utilisation was relatively higher for those with no children, although still lower than for all men working full time. This suggests cultural norms and institutional pathways continue to be established in younger age groups, instilling a male breadwinner and female caregiver role, or a neo-traditional arrangement in the home giving priority to the male partner's work-life course when family time requirements increase, reinforcing and exacerbating the existence of gendered work-life course models. Skill utilisation was lower for those men and women working part time with no children, regardless of partner status; this indicates a lack of motivation to maximise life outcomes.

For the older age groups (45 to 64 years), the level of skill utilisation appears to be more comparable, though this may be disguised by age, period and/or cohort effects, as well as by transitions in and out of life phases over time, given the cross-sectional nature of the dataset. Skill

utilisation improves the most for women working full time, particularly for those non-partnered with dependent children, indicating the need, ability and impetus to maximise life outcomes as dependent children get older and more self-reliant. Skill utilisation deteriorates the most for men working full time, but it deteriorates least for those partnered with dependent children. As previously discussed, this outcome can be explained by the effect of lower levels of formal qualifications for older age groups, as well as by the male 'lock step life course' centred on the world of work, progression and promotion associated with the lifelong occupational ladder and hierarchy. Those men and women employed part time with no children maintained the lowest level of skill utilisation for each age group, particularly men, regardless of partner status. For men and women working part time with dependent children, regardless of partner status, skill utilisation varied little, although it was consistently lower than for those working full time.

These findings support the view that part time work is perceived to be of lower status, particularly for men. Low skill utilisation among part time workers provides evidence of an inability to achieve employment in a job that matches their accumulated human capital. The suggestion that market forces will correct any mismatch in the long run to ensure that skills are fully utilised is not borne out for part time workers. Further, the need to balance work and life may prevent under-utilised workers from actively seeking employment that matches their accumulated human capital if appropriate work is not available in a part time capacity.

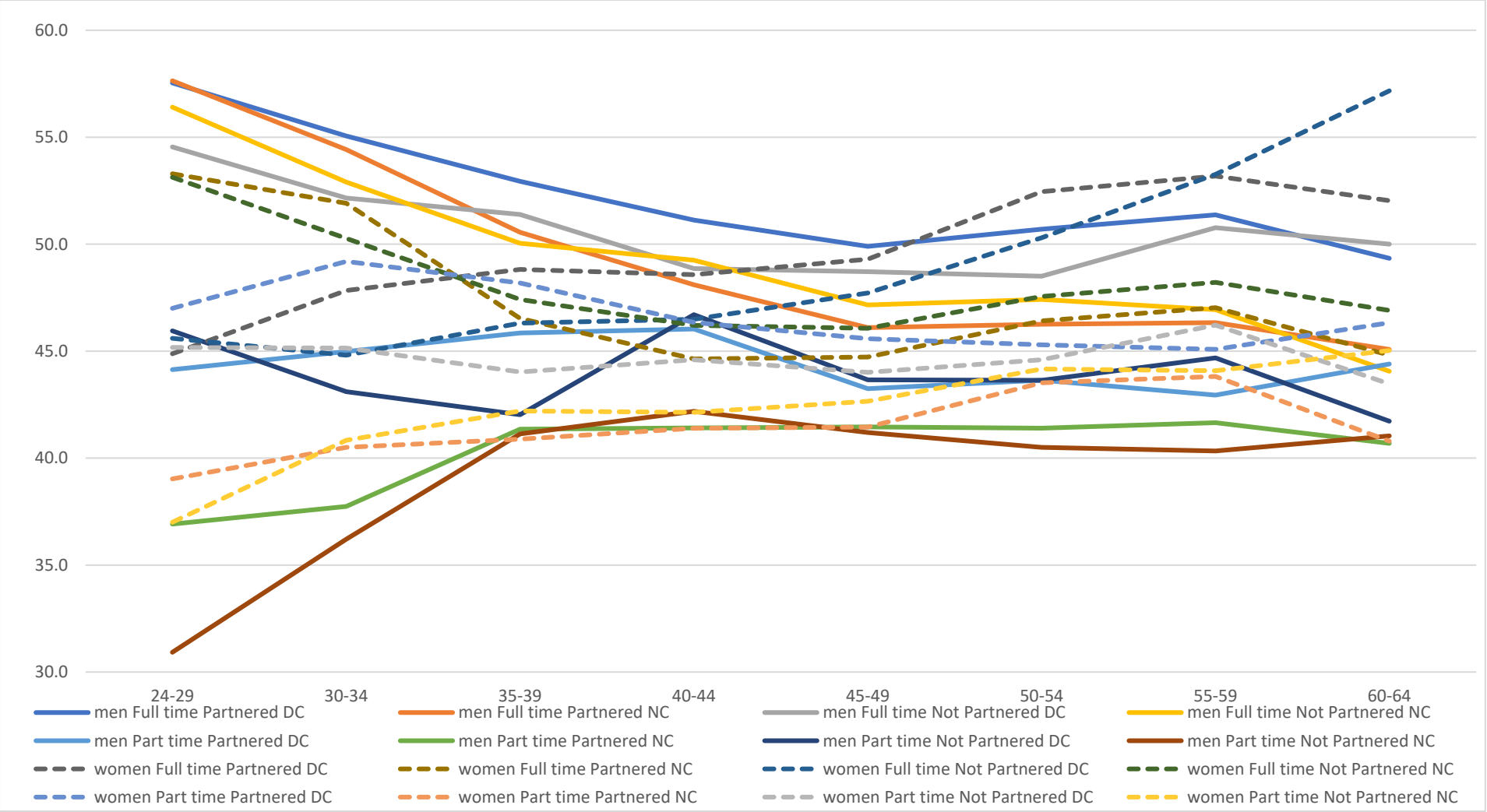

Figure 6.19. Skill utilisation by labour force status and presence, or not, of a partner, and presence or not, of a child, by sex and age

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Summary

Linked lives have a clear association with skill utilisation and the potential to maximise successful life outcomes for men and women over the life course. Regardless of human capital accumulation, it is the presence of a partner and/or the presence of a child which is associated with the different level of engagement with the workforce for men and women, and this is further associated with the level of skill utilisation experienced by each population group.

Clearly evident from this analysis is that horizontally and vertically linked lives have a different association with skill utilisation for men and women, often in opposing directions. Critically, the presence of a dependent child, and, to a lesser degree, the presence of a partner, is associated with a relatively higher level of skill utilisation for both men and women working full time (except for women with neither children nor a partner) and part time compared to those without children or a partner. Even so, the skill utilisation trajectory over the lifespan differs for men and women. While the majority of men, largely employed full time, experience declining skill utilisation as they age, the trajectory is more varied for women, fluctuating for each age group and influenced by the presence of a child or partner. These findings provide evidence of the continuation of the typical 20th Century male biography into the 21st Century – a 'lock step life course' centred on the world of work and the lifelong occupational ladder and hierarchy. This male biography is supported by the model of women's biography focusing on family in a normative sequence: education, employment, family, employment (Heinz 2001, 2003; Moen 2016). Together, these findings support the suggestion by Moen and Sweet (2004) that it is these differences in labour force participation and the work-family nexus that are creating a 'neo-traditional' arrangement in the home, giving priority to the male partner's work-life course when family time requirements increase, reinforcing and exacerbating the existence of gendered work-life course models. Further, the findings also provide potential evidence of the 'extended work-education sequences' life course model suggested by O'Rand and Bostic (2016), which consists of various forms of discontinuous careers interspersed with periods of full time or part time work or non-work activities for women.

For men and women working part time with dependent children, regardless of partner status, the level of skill utilisation varied little over the life course, although it was consistently lower than for those employed full time. Given the higher proportion of field of study mismatch and over-qualification for part time workers than full time, in addition to occupational downgrade and foregone productivity, this may be evidence of a lack of opportunity for career progression for part time workers; skill utilisation for men, with children and/or a partner, in part time employment is lower over the lifespan than for women, with children and/or a partner, employed part time. These

findings also suggest the presence of cultural barriers to part time employment for men that influence effective skill utilisation.

The level of skill utilisation is lowest across the lifespan for men and women working part time with no partner or child present in the household. These findings suggest that the presence of a child, and to a lesser degree, of a partner, is a motivating factor to maximise the potential for successful life outcomes of individuals by working in an occupation that matches their particular complement of skills. Even so, there remains clear evidence of gendered roles within the household, and of the emergence of the neo-traditional arrangement in the home in which partnered men with dependent children were more likely to be employed full time with comparatively higher levels of skill utilisation than partnered women with dependent children, who were more likely to be employed part time or not at all.

The implications of the ineffective utilisation of skills in the workforce for successful life outcomes and potential productivity performance at a macro-level will be discussed in the next chapter.

Chapter seven
Discussion

Introduction

Two in five Australians aged 25 to 64 years with post-school qualifications were effectively utilising their complement of skills in the workforce; that is, they were productive members of society and the economy. In other words, three in five Australians were not maximising their potential successful life outcomes, compromising productivity performance at the meso and macro levels. Improving skill utilisation is therefore a viable, complementary policy alternative to increasing productivity, and thus economic growth, in response to the challenges of an ageing population. This chapter further explores and discusses four key findings from this research:

1. The high level of under-utilisation of Australians' complement of skills being best explained by a mismatch between the supply of, and demand for, skills;
2. The difference in skill utilisation between those employed full time and part time, variation over the lifespan, and the clear gender disparity explained by 'linked lives';
3. The disparity in skill utilisation among young Australians, including their delayed and protracted entry into full time work; and
4. The high level of under-qualification in 'skill level one' occupations, and the impact on productivity of under-utilisation.

Mismatch in supply of, and demand for, skills

This research provides Australian-based evidence to support Livingstone's (2017) assertion that the under-utilisation of people's education and skills in the form of both over-qualification and under-employment is a persistent problem in the employed labour force of advanced market economies.

Nearly a third (32.7 per cent) of all Australians aged 25 to 64 years with post-school qualifications were either working in a job which they were over-qualified for or were not working at all. A further 15.3 per cent had a field of study mismatch only. While those not employed were not utilising, nor benefiting from, their investment in human capital accumulation, this may be a result of their own choice. Even so, the level of skill under-utilisation for the working population remains of serious concern, with less than half effectively utilising their combination of education and skills (48.7 per cent). In the workforce, 7.2 per cent were over-qualified, 11.5 per cent experienced a combination of field of study mismatch and over-qualification, and 18.4 per cent had a field of study mismatch only. See Figure 7.1, below.

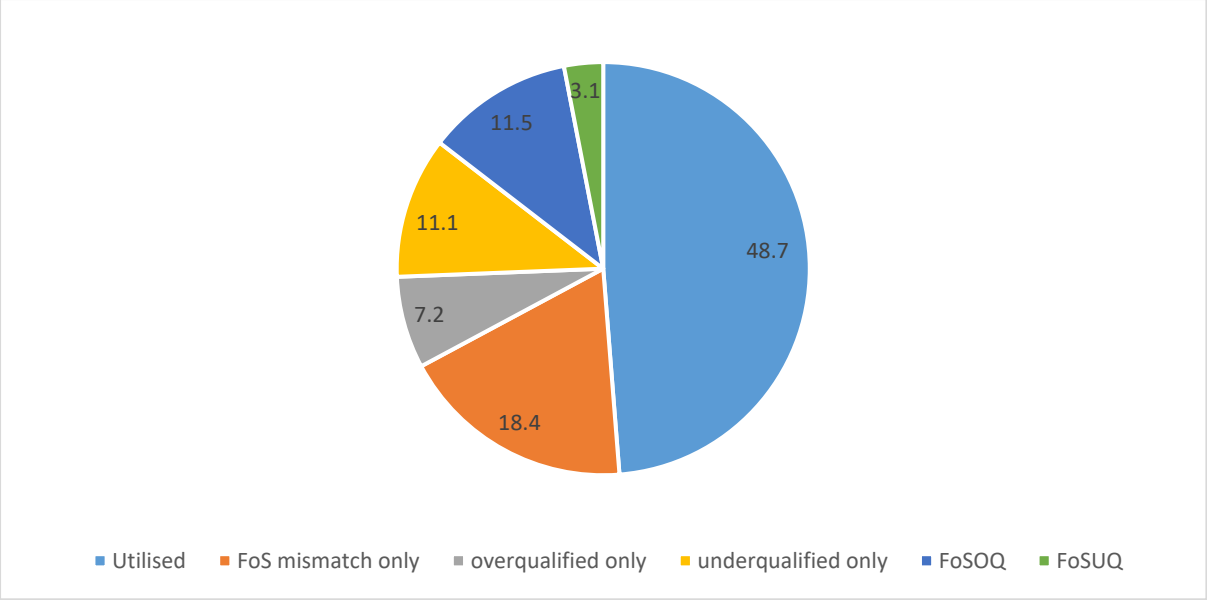

Figure 7.1. Skill utilisation of the workforce in Australia

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

As explained in Chapter Two, Human Capital Theory (HCT) assumes a scenario in which equilibrium between supply and demand of human capital is achieved, maximising productivity (Becker 1962). It postulates that the labour market distributes jobs on the basis of individuals' accumulated human capital, and that organisations respond to changes in the supply of labour by adjusting their internal processes to ensure that full utilisation of the skills of their workforce is achieved. This then results in optimal organisational level productivity. Some human capital theorists also predicts that, in the long run, market forces correct any mismatch between the supply of and demand for human capital to ensure that skills are fully utilised; thus productivity at an individual, organisational or aggregate state level is maximised. As the editors of the Oxford Handbook of Skills and Training point out in their introductory chapter (Buchanan et al. 2017b), nearly all the contributions in that book either explicitly or implicitly challenge the framing of Human Capital Theory, with its preoccupation with supply side issues deriving from the expansion of skill formation to improve economic and social outcomes. The findings of this research also contradict HCT, and provide evidence that there is a persistent mismatch between the supply of, and demand for, education and skills in the Australian labour market.

While skills are considered the global currency of the 21st Century (OECD 2012), there is increasing evidence that higher levels of education and skills do not automatically convert into jobs and growth. In their analysis of 19 OECD nations, Holmes and Mayhew (2015) found that for most countries, growth in the supply of highly qualified workers exceeded the growth in high skilled jobs,

providing further evidence that we may live in a knowledge society but we do not yet live in a knowledge economy (Livingstone 1999). Further, competition for jobs is growing as the supply of highly educated people increases at a greater rate than high skilled jobs (Keep 2017).

Desjardins and Rubenson (2011) suggest that the limited understanding of (and limited suggested solutions to) skill and education mismatch is the result of failure to consider both the supply and demand sides of the labour market. While Smith (2017) provides a comprehensive historic account of the shifting demand for skills as it relates to changes in the education system, Quintini (2011a), in her review of the extensive literature on the various forms of over-qualification, identified very few studies which specifically discussed policy initiatives to tackle the discrepancy between the demand for, and supply of, education and skills. Given that it is now more widely accepted among policy makers that the prevalence of under-utilisation of education and skills is a persistent problem affecting productivity, determining the actual and anticipated skill demands of employers and industries is becoming increasingly important (Smith 2017).

Like the conceptualisation and operationalisation of skill and skill utilisation, methods to project skill demand are highly contested and complex (Smith 2017). The greatest challenge to predicting demand is the changing level and type of labour and skill required for productive activity as the global economy continues to restructure (Buchanan et al. 2017b). Many advanced economies are now turning to forecasting employer demand for skills to assist in planning for future skill needs and improving education and training policy development. Most forecasting predicts growth in demand for higher skills, but it is not clear whether this growth will be sufficient to absorb the growth in skills supply. While projecting future demand for skills can inform policy development, projections tend to rely on past trends that are extrapolated into the future (Smith 2017). Knight and Mlotknowski (2009) suggest that longer term structural change in the occupational profile of the workforce is the best indicator of changing skill demand in the shorter term. However, changes that may affect the labour market, such as digital technologies and globalisation, can reduce the accuracy of forecasts (Smith 2017). The key challenge is trying to ensure that skills supply matches current and future skills demand; however, the mechanisms for matching supply and demand are many and varied (Smith 2017).

An analysis of the occupational composition of the workforce in Australia and how it has changed in the ten years since 2006 reveals that the greatest growth in jobs as a proportion of the total workforce has been in community and personal services occupations, none of which requires tertiary level qualifications. See Figure 7.2, below.

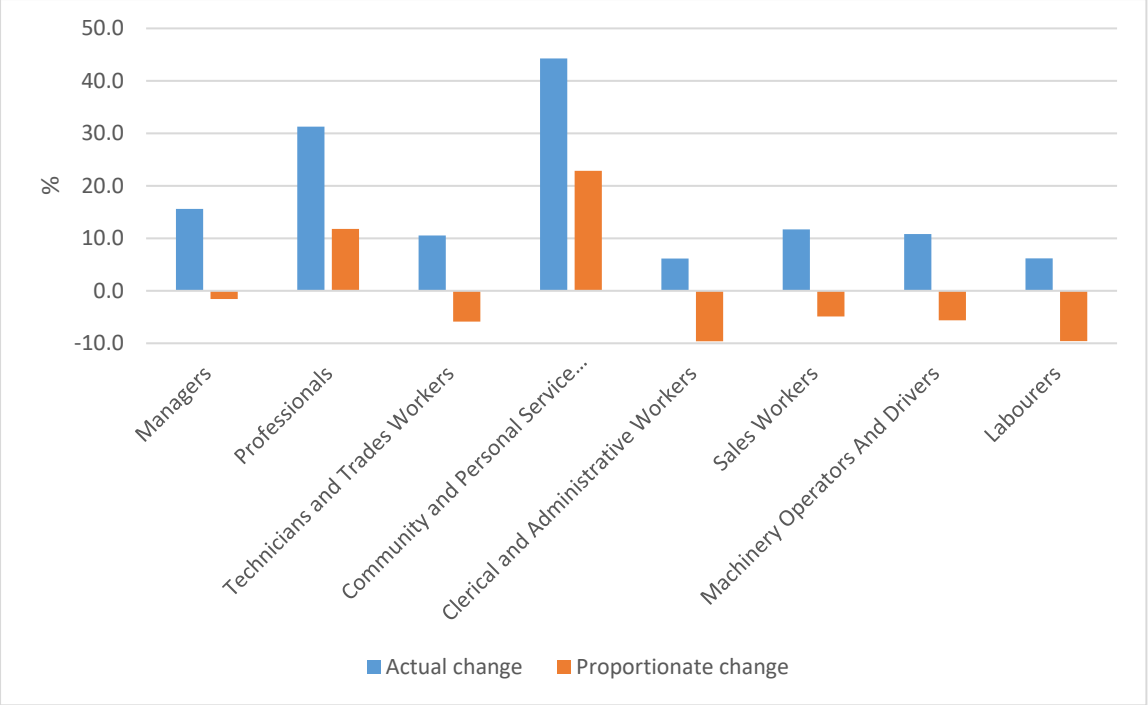

Figure 7.2. Change in composition of the workforce by occupation, actual and proportion, 2006 to 2016

Source: ABS Census of Population and Housing, 2006 and 2016

The total workforce grew by 17.4 per cent in the 10 year period to 2016 to 10,497,692. See Table 7.1, below. The number of community and personal services workers increased by 44.3 per cent to 7.0 per cent of the total workforce, a proportionate increase of 22.9 per cent in ten years. In contrast, the proportion of the workforce employed in managerial occupations declined by 1.6 per cent to 13.2 per cent, despite an overall increase of 15.6 per cent in the number of people working as managers. Professional occupations were the only other category to increase their proportion of the workforce. The number of professionals increased by 31.3 per cent to represent 22.6 per cent of the total workforce, a proportionate change of 11.8 per cent.

Table 7.1. Occupational structure of the Australian workforce, 2006 and 2016, number and proportion

	2006		2016	
	No.	%	No.	%
Managers	1,202,262	13.5	1,390,049	13.2
Professionals	1,806,017	20.2	2,370,967	22.6
Technicians and Trades Workers	1,309,256	14.6	1,447,415	13.8
Community and Personal Services Workers	801,909	9.0	1,157,004	11.0
Clerical and Administrative Workers	1,365,805	15.3	1,449,677	13.8
Sales Workers	896,208	10.0	1,000,953	9.5
Machinery Operators And Drivers	604,617	6.8	670,107	6.4
Labourers	952,523	10.7	1,011,520	9.6
Total	8,938,597		10,497,692	

Source: ABS Census of Population and Housing, 2006 and 2016

In terms of educational attainment over the same period, the proportion of the population aged 25 to 64 years with no post-school qualifications declined from 46.0 per cent of the population to 33.7 per cent (3,781,645) in 2016. See Table 7.2, below.

Table 7.2. Highest level of educational attainment, 2006 and 2016, number and proportion

	2006		2016	
	No.	%	No.	%
Postgraduate Degree Level	375,370	4.0	813,889	7.2
Graduate Diploma and Graduate Certificate Level	209,523	2.2	322,596	2.9
Bachelor's Degree Level	1,544,144	16.5	2,361,783	21.0
Advanced Diploma and Diploma Level	906,101	9.7	1,313,952	11.7
Certificate Level	2,031,029	21.6	2,632,444	23.4
No-post school qualification	4,317,336	46.0	3,781,645	33.7
	9,385,509	100	11,228,325	100

Source: ABS Census of Population and Housing, 2006 and 2016

Large increases in the number of people with tertiary qualifications were apparent; a 53.0 per cent increase for those with bachelor's degree qualifications to 21.0 per cent of the population, a 27.8 per cent proportionate increase. The greatest increase was for those with post-graduate degree

qualifications, which increased by 116.8 per cent to 7.2 per cent of the population, a proportionate change of 81.2 per cent in 10 years. See Figure 5.3, below.

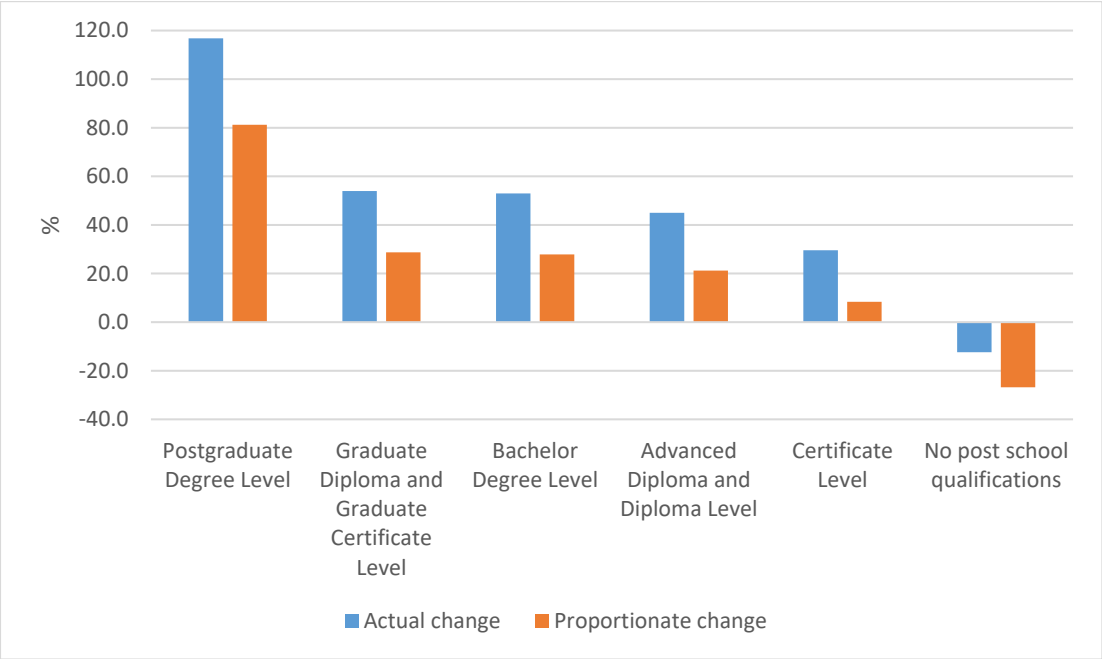

Figure 7.3. Change in level of educational attainment of the population aged 25 to 64 years, actual and proportion, 2006 to 2016

Source: ABS Census of Population and Housing, 2006 and 2016

Since 2006, the number of skill level one jobs which require tertiary level qualifications (most managerial and professional occupations), increased by 25.0 per cent, from 33.7 per cent of the workforce in 2006 to 35.8 per cent in 2016. Skill level one occupations experienced a proportionate increase in the workforce of 6.5 per cent between 2006 and 2016. Over the same period, the number of people aged 25 to 64 years with tertiary level qualifications increased by 64.3 per cent to 31.2 per cent of the population aged 25 to 64 years.

While a greater proportion of occupations requires tertiary level qualifications than the current supply of appropriately qualified people (explained by an age effect), if the rates of increase and change in occupation composition of the workforce and educational attainment continue, supply of highly qualified people will eventually exceed demand.

In Australia, there have been a number of efforts to model or project demand for and supply of skills (see, for example, Deloitte Access Economics (2009); Deloitte Access Economics (2012); Mavromaras, Healy, et al. (2013)). In their employment projections for the five year period to 2022, the Australian Department of Employment (DoE) (Australian Government 2017) predicts that employment will grow by 7.8 per cent (948,400 new jobs), largely driven by increases in professional

occupations (36.3 per cent of the projected growth) and community and personal services workers (25.6 per cent of the projected growth). See Table 7.3, below. In terms of skill levels, the DoE projects that 43.5 per cent of occupations will require a tertiary level qualification, and that 27.0 percent of jobs will required Certificate II or III qualifications, as shown in Table 7.4, below. Given that in 2016 there were 1.4 million students studying full time at an Australian university and over 160,000 full time students studying VET, as well as an additional half a million students enrolled part time in higher education institutions (Australian Bureau of Statistics 2016), even accounting for labour market retirements resulting from an ageing population, it is likely that supply of highly educated graduates will exceed demand for highly-skilled workers.

Table 7.3. Projected employment growth by occupation, five years to 2022, Australia

	Change ('000)	Change (%)	Proportion total change
Managers	120.0	7.8	12.7
Professionals	344.4	12.1	36.3
Community and personal services workers	242.9	19.2	25.6
Clerical and administrative workers	27.4	1.7	2.9
Sales workers	39.4	3.6	4.2
Machinery operators and drivers	27.9	3.6	2.9
Labourers	64.3	5.3	6.8
All occupations	948.4	7.8	100.0

Source: Department of Employment, 2017 Employment Projections

Table 7.4. Projected employment growth by skill level, five years to 2022, Australia

	Jobs growth projected ('000)	% of overall growth
Skill Level 1	412.7	43.5
Skill Level 2	129.0	13.6
Skill Level 3	57.8	6.1
Skill Level 4	256.4	27.0
Skill Level 5	92.4	9.7
	948.4	100.0

Source: Department of Employment, 2017 Employment Projections[1]

As is evident globally, the increasing proportion of the population with higher education qualifications is failing to deliver the economic and social improvements anticipated. As such, policy development needs to move beyond a focus on the supply side to consider both the demand for, and deployment of, skills, including the dynamics of skill gain and/or loss over the lifespan, and how this is affected by changing job content in the context of economic restructuring (Buchanan et al. 2017a; Desjardins & Rubenson 2011). Without a corresponding increase in the demand for skills and their subsequent effective utilisation in the labour market, continued investment in the formation of skills (which may not be required or utilised) will be wasted (Keep 2017).

Part time employment and gender disparity

Throughout this thesis, clear gendered work-life course patterns have been reaffirmed – occupational segregation and level of labour force attachment – and these have implications on skill utilisation and potential productivity. The disparity between men's and women's level and type of skill utilisation is appears likely to be associated with ingrained cultural attitudes to gender roles, parenthood and the division of labour. While the overall level of skill utilisation is low in Australia, as discussed above, it is highest for those employed full time, of whom half (50.4 per cent) were effectively utilised, predominately men. Skill utilisation is the lowest for those employed part time (and not employed at all) – predominantly women. Critically, those employed part time were twice

[1] Skill Level 1 is commensurate with a Bachelor's degree or higher qualification
Skill Level 2 is commensurate with an Advanced Diploma or Diploma
Skill Level 3 is commensurate with a Certificate IV or III (including at least 2 years on-the-job training)
Skill Level 4 is commensurate with a Certificate II or III
Skill Level 5 is commensurate with a Certificate I or secondary education

as likely to experience a combination of field of study mismatch and over-qualification as those employed full time (17.8 per cent compared with 9.3 per cent). The decision to work part time increases the likelihood of skill under-utilisation leading to detrimental impacts on both potential successful life outcomes at an individual level, and on productivity at a macro level.

This research found that the level of attachment to the labour force is influenced by life course events. It is the presence of a partner and/or child that differentiates the level of labour force attachment and subsequent skill utilisation over the life course between men and women. It is clearly evident that men increase their level of attachment to the labour force with the addition of a partner, and do so further with the addition of a child. The converse is true for women; women reduce their level of attachment to the labour force with the presence of a partner, and further reduce it with the addition of a child. Notably, these patterns are consistent for all five-year age groups for those aged 25 to 64 with post-school qualifications.

For all demographic combinations of presence of a partner and/or presence of a child, women have a lower level of attachment to the labour force than men, regardless of their demographic profile. In all 12 possible demographic combinations of sex, partner status and child status, men have higher levels of labour force attachment than women. Partnered men with dependent children have the highest level of attachment at 96.0 per cent, and partnered women with dependent children have the lowest at 77.3 per cent. See Figure 7.4, below.

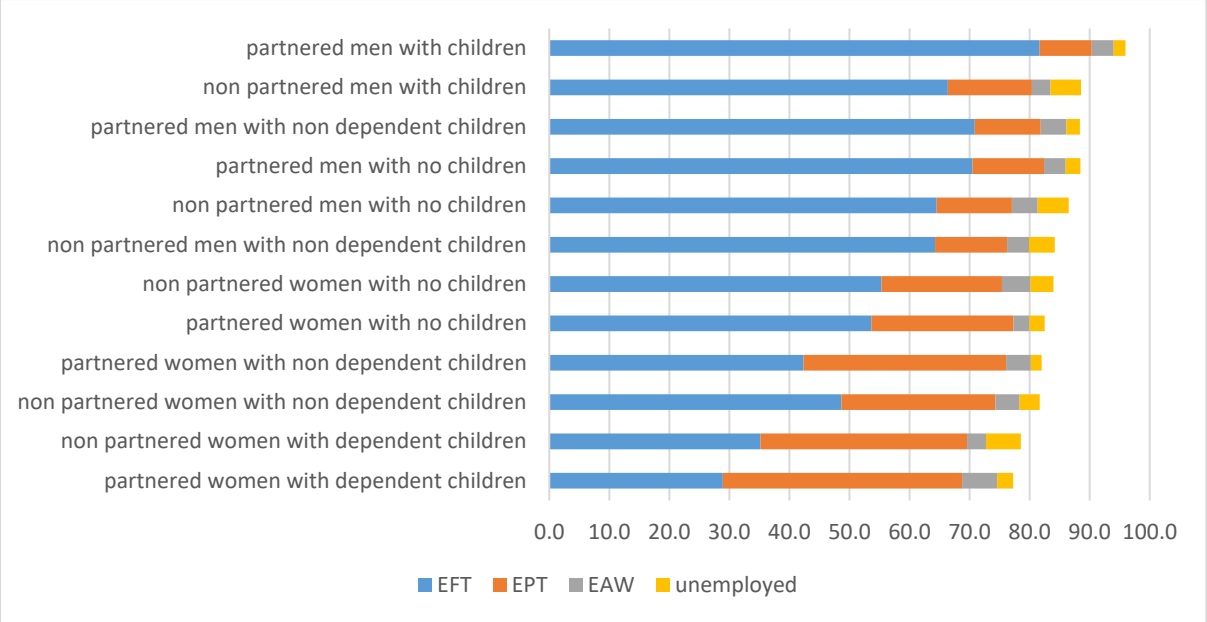

Figure 7.4. Level of labour force attachment in descending order by demographic profile

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations[2]

As is evident for men, the level of labour force attachment is less influenced by linked lives (the presence of a partner and/or child) than it is for women. Even so, a greater proportion of men with dependent children were employed full time (81.7 per cent compared with the next highest, 70.9 per cent for partnered men with non-dependent children), and have correspondingly higher levels of skill utilisation over the life course than those without dependent children. Men with dependent children were also less likely than women to not be in the workforce. The opposite is true for women, whose level of attachment to the labour force is substantially influenced by the presence of a child. Women with a dependent child or children were more likely to be employed part time (39.9 per cent for partnered women and 34.4 per cent for non-partnered women) compared with those with no children (23.7 per cent and 20.1 per cent respectively) or not in the labour force at all (22.7 per cent compared with 17.5 per cent for partnered women, and 21.5 per cent compared with 16.0 per cent for non-partnered women). This echoes findings by Argyrous, Craig and Rahman (2017) that childbearing has a major impact on mothers' paid work time and little for fathers'.

For women, the level and type of attachment to the labour force is affected by both the presence of a partner and/or the presence of a child. A greater proportion of non-partnered women with dependent and non-dependent children work full time than those who are partnered. Even when

[2] Employed, full time (EFT), employed, part time (EPT), employed, away from work (EAW).

women are not partnered and have no children in the household, they have a lower level of attachment to the labour force than men who are not partnered and have no dependent children (55.3 per cent full time compared with 64.5 per cent, and 20.1 per cent part time compared with 12.5 per cent respectively).

The level of skill utilisation for men and women and their respective partner and child status reflects their labour force status. According to Argyrous, Craig and Rahman (2017) the default position among Australian couples is that childbearing should not affect the father's work hours, and that it is the mother's place to make adjustments to her working life. However, this thesis finds that fathers, particularly partnered fathers, are more likely to be working full time than are all other men. Additionally, there is increasing evidence of a 'fatherhood bonus', in that men with children are more likely to earn a wage premium than men without children (Hodges & Budig 2010; Petersen, Penner & Høgsnes 2011), which is reflected in the relative levels of skill utilisation in this research. Importantly, while the proportion of men employed part time is small (with a correspondingly lower level of skill utilisation), this choice is likely to be the outcome of constraints in employment opportunities and instability in men's social situation, rather than driven by a concern for balancing work and family responsibilities (Blossfeld & Drobnic 2001) – the driver of part time employment for women. Even so, the presence of a partner and/or child for men employed part time does increase the level of skill utilisation in comparison to those men without a partner or child.

Overall, compared with men, women were more likely to be employed part time, or to be not in the workforce at all, to have a lower rate of skill utilisation, and to be over-qualified or experience a combination of field of study mismatch and over-qualification.

Greater understanding of the decision making process to work part time will enable more informed policy development aimed at improving productivity performance through skill utilisation.

A vast body of research exists exploring the work/family nexus, including issues such as attitudes to the gendered division of labour (Baxter et al. 2015; Cunningham 2008; Johnston, Schurer & Shields 2014; Moen 2016), parental leave (Baird 2011; Baird & Whitehouse 2012; Baird, Williamson & Heron 2012; Baxter 2009; Broomhill & Sharp 2012; Martin et al. 2012), wage penalties (Wilson 2010), time use (Argyrous, Craig & Rahman 2017; Baxter, Hewitt & Haynes 2008; Craig & Powell 2013), job satisfaction (Bridges & Owens 2017; Roeters & Craig 2014), and child care (Argyrous, Craig & Rahman 2017; Boyd 2012; Chevalier & Viitanen 2002; Craig 2007; Craig & Mullan 2011; Jenkins 2010). This research has focussed on highlighting and attempting to reconcile work/family conflict rather than macro-level issues such as productivity improvement. Williams, Berdahl and Vandello

(2016) argue that there has been very little progress in workplace practices, despite extensive evidence that current practices are not economically efficient. Williams, Berdahl and Vandello (2016) further argue that the large body of research has fundamentally focussed on the individual experience of work/family conflict, and not on the structural problem constructed by institutional and social forces which make career norms "extraordinarily resistant to change". Rather, they argue that paying sustained attention to the infrastructure that reinforces the mismatch between today's workplaces and workers is required in order to identify and enact policies to achieve improved bottom-line economic benefits.

According to Schuller (2011), Paula's Principle suggests that women tend to remain at a level below than their real competence because of personal, structural or social forces, relative to men (whose experience is influenced by Peter's Principle). Despite higher education participation and attainment, women make conscious decisions to use their skills at a level that best aligns with the competing needs in their lives, often subordinating career progression and aspirations to other goals or values.

The transition to parenthood is a key life course event that results in changes in attitudes to gender divisions of labour for mothers and fathers (Baxter et al. 2015). Delayed child-bearing by the children of the baby boomers – partially attributable to increased participation in education by women (McDonald 2000) – provided a false sense of security to the labour market in terms of the corresponding increase in the level of labour force attachment by women and ensuing economic performance. Since the mini baby boom of the early 2000s (Churchill, Denny & Jackson 2014), labour markets have not kept pace with the changing priorities and time requirements of new families, nor with how parenthood affects men and women differently (Baxter et al. 2015; Baxter, Hewitt & Haynes 2008). The subsequent changes in labour force attachment are reflected in a shift in attitudes by both men and women to more strongly support a traditional division of labour in which mothers provide the primary responsibility for care and home duties, while fathers become the primary breadwinners, with the strongest effect on women's employment behaviour (Baxter, Hewitt & Haynes 2008). This results in a 'neo-traditional' arrangement in the home giving priority to the male partner's work-life course when family time requirements increase, reinforcing and exacerbating gendered work-life course models (Moen 2016; Moen & Sweet 2004).

Johnston, Schurer and Shields (2014) suggest that these gendered attitudes to the division of labour are intergenerational, finding that mothers' and children's (male and female) gender role attitudes are strongly correlated. However, while maternal attitudes are only predictive of daughters' labour supply, they are also a positive predictor of daughters-in-law's labour supply (in contrast to the near zero effect on sons' full time employment status). Non-traditional attitudes of mothers increase the

probability of daughters being employed full time by almost 30 per cent. This intergenerational transfer of gender role attitudes is evident initially in the level of human capital investment in daughters, with non-traditional mothers likely to invest more in the education of daughters than traditional mothers. Even so, Johnston, Schurer and Shields (2014) find that the most significant determinant of daughters' labour supply decisions is their behavioural response to motherhood. Compared with daughters of traditional mothers, daughters of non-traditional mothers reduced their labour supply half as strongly after child-bearing, leading to the conclusion that it is the labour supply attitudes and decisions of mothers that predict their children's future labour supply decisions.

Despite the well-evidenced long term negative effects of the changed employment arrangements that women usually experience post-childbearing, Yerkes et al. (2017) find that mothers view these trade-offs in time-related flexible employment set-ups as 'fair' (using distributive, procedural and interactional justice frameworks), if not necessarily equal. Yerkes et al. (2017) made two significant findings for women based on educational levels, findings that reflect the level of labour force attachment by women, and, ultimately, skill utilisation. For women with tertiary level qualifications employed in occupations with less gender segregation (for example, management or professional occupations), mothers believed that reduced career prospects resulting from flexible work place arrangements represented a fair opportunity cost for their ability to reconcile work and family needs. Additionally, mothers stated that they were aware of the long-term consequences of their choices. Mothers without tertiary level qualifications, were generally employed in female-dominated occupations (administration, sales or caring, etc.) with limited career prospects and in which part time work following child-bearing was widely accepted. Yerkes et al. (2017) conclude that this pattern arises largely because the career and labour market penalties for motherhood are already built into the employment terms of these female-dominated occupations. Critically, it was comparison with other women rather than with male partners or men that was central to mothers' assessment of the fairness of the trade-off for flexibility. The value mothers perceived in flexibility was significantly increased by the lack of flexibility afforded to men, which mothers ultimately considered to be acceptable and fair, and not a value to which men should aspire (Yerkes et al. 2017).

The findings of Yerkes et al. (2017) highlight both the choices that women make in relation to their human capital investment and participation in the workforce, particularly when they partner and have children, as well as the rationale behind those choices. Moreover, the findings are poignant when considering improving productivity and skill utilisation. In terms of skill utilisation in this research, even though gendered occupations have pre-programmed career interruptions into

women's (mothers') occupational pathways that limit career progression, relatively lower levels of skill utilisation for these occupations indicate two issues. First, mothers are either accepting an occupational downgrade which presents as over-qualification (or a combined over-qualification field of study mismatch) for the job they were employed in, and/or second, there is a mismatch between supply and demand in the labour market. For more gender-neutral occupations which offer stronger career trajectories and income-generating capacity (that is, successful life outcomes), skill utilisation is higher than for those gender- (female-) specific occupations, regardless of the level of labour force participation.

Consistent with other research, this thesis finds that regardless of the level of attachment a mother has to the labour force, her productivity will be lower than it was prior to childbearing. Given the low status of part time work, and correspondingly lower levels of pay, the switch from full time work to part time work by women often results in a sizeable occupational downgrade, with detrimental economic outcomes (Bridges & Owens 2017). Hook and Pettit (2016) found in their international comparison of occupational segregation that there is strong sorting of mothers in the labour market; that is, mothers are under-represented in higher skill occupations and often over-represented in lower skill occupations, despite much lower levels of labour force participation, and mostly irrespective of educational attainment. This is because most mothers are required to downgrade their occupational status to combine the responsibilities associated with family and childrearing and income-generating employment.

Connolly and Gregory (2008) found that the switch between full time and part time work results in an average qualification level well below that of the individual's previous full time job, and Johnes (2006) found that occupational downgrade occurs most significantly for those employed in high skill occupations prior to childbearing and who then need to trade down in order to combine work and family commitments. Often former roles do not accommodate changing needs, including part time employment and child care availability. In this research, the high level of over-qualification and the combination of field of study mismatch and over-qualification for women employed part time over the lifespan provides evidence of occupational downgrade. For female clerical and administration workers employed part time, the skills of one in five (22.0 per cent) were effectively utilised. For those under-utilised female clerical and administration workers employed part time, almost half (46.0 per cent) experienced a combination of over-qualification and field of study mismatch, and another quarter were over-qualified (23.3 per cent). In contrast, for the more gender-neutral occupation of 'professional', over two thirds (69.6 per cent) of women employed part time were effectively utilised. For the under-utilised professional women employed part time, over half (56.6

per cent) were under-qualified. The rigidities associated with full time and part time employment result in over-qualified mothers under-utilising their past experience, skills, education and training (Daley, McGannon & Ginnivan 2012; Dex & Joshi 1999; Tomlinson, Olsen & Purdam 2009).

While Argyrous, Craig and Rahman (2017) suggest that there are two work decisions that parents have to make post child-bearing – whether to return to work, and if employed, how many hours to work –, an additional question should also be asked: what sort of work should be undertaken in order to maximise successful life outcomes? While a number of studies imply that the ability to work part time enabling a balance between work and family responsibilities is considered a successful life outcome (Yerkes et al. 2017), there is emerging evidence that job satisfaction levels are waning for mothers working part time; particularly in younger cohorts and those with higher levels of educational attainment (Bridges & Owens 2017). Bridges and Owens (2017) find that while the determinants of job satisfaction change when women have children (with occupational status and salary levels having smaller effects on job satisfaction than those without children), those with tertiary level qualifications report the lowest levels of satisfaction and that this satisfaction is further reduced for those who experience occupational downgrade with a shift from full time to part time work.

While attitudes to the gender division of labour that prioritise the importance of motherhood as a key role for women in a family are generally clear cut for men, Baxter et al. (2015) find it is more ambiguous for women. This is unsurprising given the greater changes for women associated with parenthood than for men. What is clear is that the decision to work part time is a willing and active one on the part of mothers (and their partners). However, this choice often results in occupational downgrade and the under-utilisation of mothers' skills, with more highly educated women becoming increasingly dissatisfied with this scenario. As Treas, van der Lippe and Tai (2011) explain, when part time work is not associated with occupational downgrade, it enables women (and mothers) to maximise their successful life outcomes, enabling them to meet the obligations of family and to achieve a fulfilling career – maximising skill utilisation.

Given the range of evidence suggesting it is unlikely that once a woman has a partner or a child she will increase her labour force attachment, policies to improve skill utilisation will need to focus on those working part time. Encouragingly, this research finds that for those working part time, linked lives, both vertically and horizontally, are factors that motivate individuals to maximise their potential life outcomes.

Disparity in skill utilisation for Australian youth

This research found that the greatest disparity in the level of skill utilisation within an age group is experience by those aged 25 to 29 years. Despite having the overall highest level of skill utilisation for all age groups (43.7 per cent), skill utilisation ranged from 57.6 per cent for partnered men working full time with dependent children to 30.9 per cent for non-partnered men working part time with no children. This warrants further investigation and discussion, because members of the youngest age group in the analysis are less likely to have experienced multiple life events or transitions that result in turning points in their work-life course than other, older age groups. The level of disparity and potential lifelong effects is of particular concern in terms of ensuring that individuals are able to maximise their successful life outcomes based on their investment in human capital accumulation.

Even at the ages of 25 to 29 years there are vast differences between men and women, their engagement with the workforce, the impact of linked lives, and between their later levels and types of skill under-utilisation.

At the age of 25 to 29 years, men had a higher level of skill utilisation than women, 48.2 per cent compared with 39.6 per cent (see Figure 7.5, below). The difference is largely explained by the difference in the proportion of the male and female population not in the labour force; 16.1 per cent of women were not employed compared with 6.1 per cent of men. This is also apparent from the disparity between men and women in the level of field of study mismatch combined with over-qualification; 32.9 per cent for women compared with 22.1 per cent for men. Even so, skill mismatch combined with education mismatch is the greatest type of under-utilisation for both men and women aged 25 to 29 years. These findings are consistent with both the 2017 Graduate Outcomes Survey (QILT 2018b) and the VET Student Outcomes 2017 report (NCVER 2017b), as well as with the Wibrow (2014) investigation of qualification utilisation of VET graduates. These reports found that there are considerable variations in employment outcomes for different fields of study. Those with vocationally oriented fields of study were more likely to gain employment (and full time employment) and to report higher levels of skill utilisation than those who completed education or training in more generalist fields of study. Wibrow (2014) also found that those completing qualifications with an intended occupation in the manager or professional occupation groups were employed at a lower skill level than their training was geared towards, with around half of graduates with diploma level qualifications not being effectively utilised. This provides further evidence of a mismatch between demand for and supply of skills, as well as of possible credentialism, with priority being given to those job applicants with higher level qualifications than those available in the

vocational sector. Together these reports indicate the inability of many young graduates to secure employment in a job that matches both their level of qualifications and their field of study. This is particularly problematic given the likely short time frame between completing their post-school qualifications and entering the workforce, and thus the reduced opportunity to maximise their productivity.

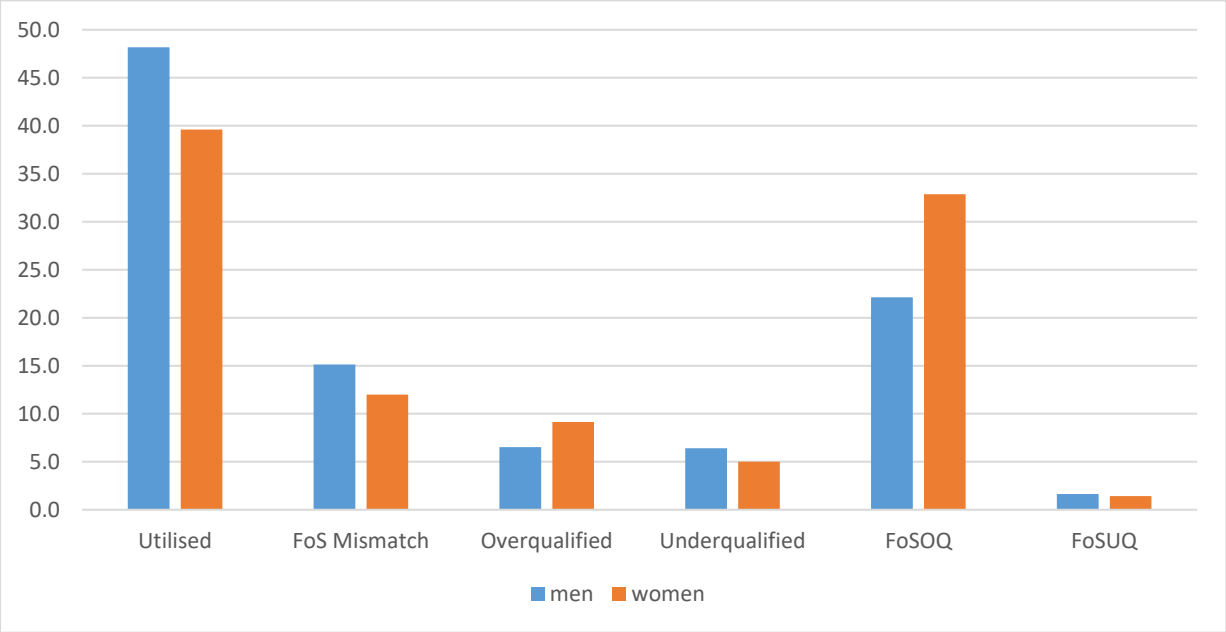

Figure 7.5. Skill utilisation and type of under-utilisation for the 25 to 29 year age group for men and women

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The existence of linked lives, both vertically and horizontally, explains the majority (74.3 per cent) of 25 to 29 year old women's non-participation in the workforce, but this was not the case for men aged 25 to 29 years, of whom three quarters (74.5 per cent) were not partnered and did not have a child (see Figure 7.6, below). This is also consistent with the Graduate Outcomes Survey, which found that recent male graduates had lower levels of labour force participation than female graduates (84.2 per cent compared with 87.7 per cent), and which is consistent with the emerging trend of the disappearing working man (Rozner 2017). Even so, recent graduates are also likely to be engaged in further full time study rather than being employed, particularly those in generalist fields (QILT 2018b).

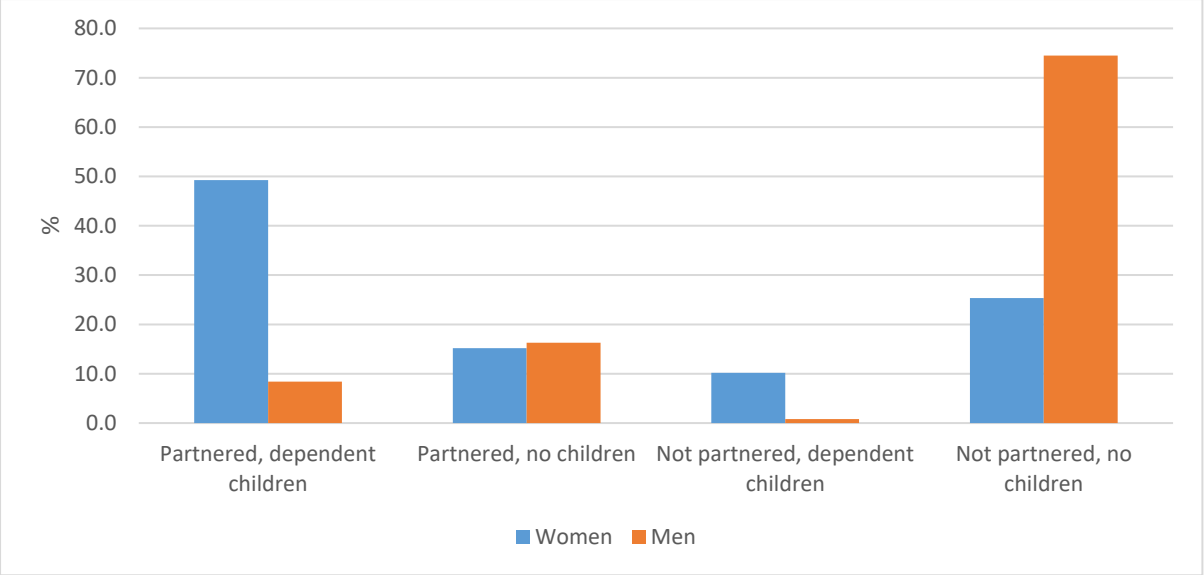

Figure 7.6. Proportion of those not in the labour force by presence or not of a partner and/or child, men and women aged 25 to 29 years

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

While similar proportions of employed men and women aged 25 to 29 years had no children (85.2 per cent of men and 84.6 per cent of women), their level of engagement with the workforce differs considerably. For the employed population aged 25 to 29 years, 85.5 per cent of men worked full time compared with 71.8 per cent of women. A greater proportion of women worked part time with the presence of a partner compared with men (8.0 per cent compared to 3.9 per cent). A slightly higher proportion of women (8.5 per cent) worked part time when both a partner and a child were present compared with 1.4 per cent of men. Conversely, 13.1 per cent of men worked full time with the presence of both a partner and a child, compared with 4.4 per cent of women. Even so, one in ten men and women aged 25 to 29 years who did not have a partner nor a child, worked part time and had the lowest level of skill utilisation within the age group: 30.9 per cent for men and 37.0 per cent for women. In their research, QILT (2018b) concluded that the increasing trend towards part time work cannot be entirely explained by changing personal preferences, but rather that the state of the labour market also plays a role. Further, recent tertiary graduates are more likely to be employed part time than are members of the workforce in general, again indicating a demand side issue.

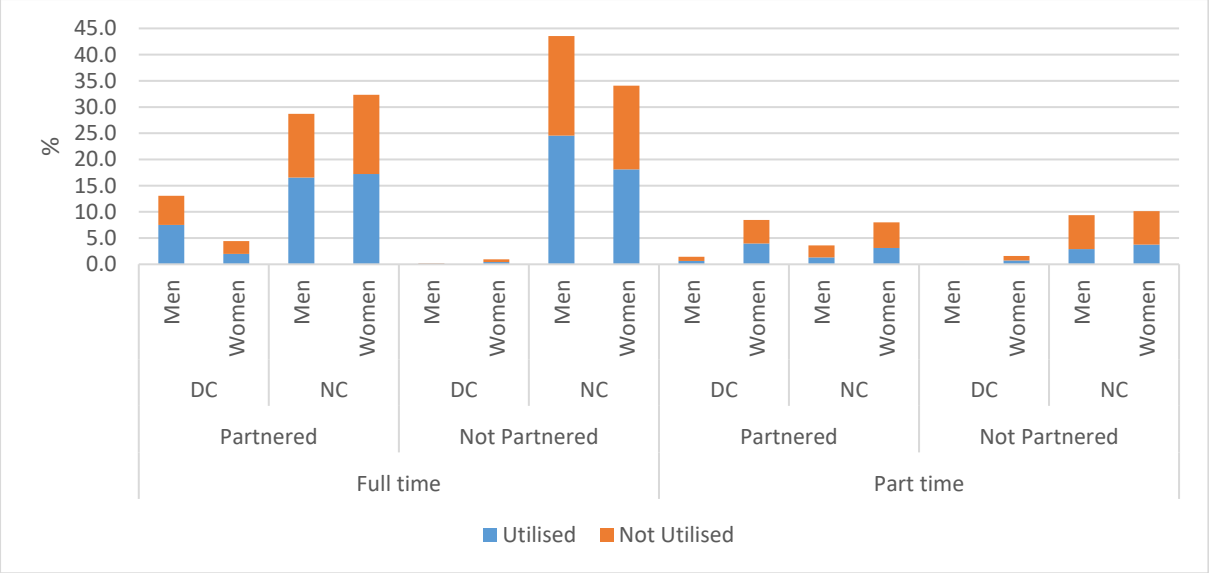

Figure 7.7. Skill utilisation by the proportion of the employed 25 to 29 years age group by presence of a partner and/or child by labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The type of skill utilisation and under-utilisation differs considerably for men and women by their labour force status. As is the case across all age groups, for the 25 to 29 years age group, men working full time had a higher level of skill utilisation than women working full time (57.2 per cent compared with 52.6 per cent), while women working part time had a higher level of skill utilisation than men working part time (41.0 per cent compared with 33.8 per cent). Critically, for those employed full time, 16.5 per cent of men and 14.5 per cent of women experienced a field of study mismatch, and 9.1 per cent of men and 13.3 per cent of women experienced over-qualification or the combination of skill and over-education mismatch. This shows that nearly half of those working full time soon after completing their post-school qualifications were not able to secure work in an occupation that matched their skills and/or their qualifications, indicating a serious discrepancy in the supply of and demand for skills in the labour market for new entrants. Significantly, over-qualification (either in itself or combined with field of study mismatch) dominated the under-utilised proportion of the population working part time, particularly among men. According to the Graduate Outcomes Survey (QILT 2018b), 72.2 per cent of recent graduates were employed in Skill Level 1 occupations requiring a tertiary qualification. However, only 59.7 per cent of graduates employed part time were working in equivalent occupations (QILT 2018b). While there is some evidence that

graduates combine part time work and further study (NCVER 2017b; QILT 2018b),[3] the inability of the part time worker to utilise existing skills and qualifications in the workforce is potentially detrimental to their lifelong prosperity.

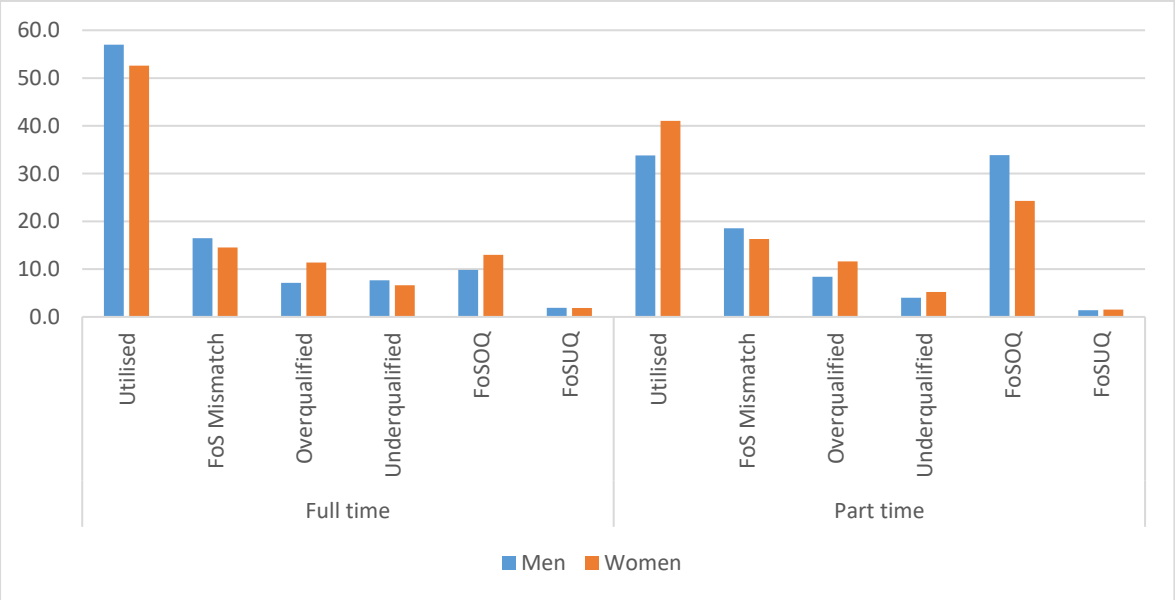

Figure 7.8. Skill utilisation and type of under-utilisation for 25 to 29 year old men and women by labour force status

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

As shown in Table 7.5, below, the presence of a partner or child has little influence on the level of skill utilisation for men aged 25 to 29 years employed full time. For women aged 25 to 29 years working full time, the presence of a partner makes little difference to the level of skill utilisation, though the presence of a dependent child does: 8.4 percentage points for partnered women and 7.5 percentage points for non-partnered women. Similarly, skill utilisation for women working part time with a dependent child is comparable with that of women working full time with dependent children, regardless of partner status. Those women working part time with no children experienced considerably lower levels of skill utilisation than women working full time with no children or with dependent children, regardless of labour force status. For men working part time it is a similar story, skill utilisation is considerably lower than for those working full time: 25.5 percentage points for non-partnered men with no children (9.4 per cent of the male population) and 20.7 percentage points for partnered men with no children (3.6 per cent of the male population). The level of skill

[3] Participation in education was not a variable used in this research, and therefore the proportion of young people combining part time work and further study cannot be ascertained.

utilisation for both men and women working part time is considerably higher for those with children than for those without, particularly for non-partnered men and women. This strongly indicates that the presence of vertically linked lives motivates mothers and fathers to maximise skill utilisation to achieve successful life outcomes – perhaps out of necessity, rather than by choice, given their responsibility for a child.

Table 7.5. Skill utilisation for 25 to 29 year old men and women by presence of a partner and/or child and labour force status

			Men (%)	Women (%)
Full time	Partnered	Dependent children	57.5	44.9
		No children	57.6	53.3
	Not Partnered	Dependent children	54.5	45.6
		No children	56.4	53.1
Part time	Partnered	Dependent children	44.1	47.0
		No children	36.9	39.0
	Not Partnered	Dependent children	45.9	45.2
		No children	30.9	37.0

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

While the proportion of the 25 to 29 year age group working part time (or not at all) is relatively small, particularly those without linked lives, their lower levels of skill utilisation raises the question as to what long term effects this will have on their ability to maximise their successful life outcomes. Further, will this be a trend for future cohorts and generations?

As discussed in the first section of this chapter, there is increasing evidence that the expansion of the higher education sector is producing more highly educated young people than there are jobs available for (Dockery & Miller 2012; Holmes & Mayhew 2015, 2016; McGuinness 2006; SkillsIQ 2017). Skill utilisation is highest for those who are able to secure full time employment following completion of their qualification, but for many graduates, jobs for new labour market entrants do not allow them to use their skills (Holmes & Mayhew 2016). In Australia, the 2017 Graduate Outcomes Survey (QILT 2018b) reports that while 86.5 per cent of graduates secured employment within 4 months of completing their degree, two in five (41.1 per cent) graduates do not use their skills or education in their job, primarily due to the lack of suitable jobs in their area of expertise. As Montt (2015) concluded, employment in a person's chosen field of study will not be automatic; it is dependent on the degree of saturation of a particular field of study in the labour market and the

level of generic skills which determine an appropriate match. While there is evidence that higher education is endowing graduates with skills relevant for the labour market (Holmes & Mayhew 2016; QILT 2018a, 2018b), the expansion of the sector and the subsequent increase in the supply of skills has not resulted in the anticipated corresponding increase in the number of high skill jobs for labour market entrants, as predicted by the theory of human capital. This undersupply of graduate level jobs has led to employers using qualifications as a filtering or screening device to identify the intrinsic qualities and attributes sought for the job. Moreover, while there is some evidence that the increase in supply of more highly educated labour market entrants has resulted in the upskilling or upgrading of jobs, it is more likely that graduates are working in a job that in previous generations would have been filled by non-graduates, and, as such, are no more or less productive (Holmes & Mayhew 2015, 2016). There is also an increasing trend in Australia towards recent graduates being employed part time, increasing by 17.1 percentage points to 37.9 per cent of graduates since 2008 (QILT 2018b). This is particularly so for male graduates, and provides further evidence of the disappearing working male (Rozner 2017), which is linked closely to field of study and industry sector.

Henseke and Green (2016) developed an indicator of graduate jobs to test whether the restructuring of the 21st Century economy to a technologically driven one had resulted in any adjustment to an upskilled labour market. They found that higher education qualifications are required for a considerable range of jobs beyond the traditional classification of most occupations in the Major Groups 1 and 2 of the ISCO. The proportion of graduate skill requirements increased from around 21.2 per cent of all jobs to 27.6 per cent of all jobs following the reclassification, because it added an additional 43 per cent to the Minor Group 3 occupations. In terms of utilisation, Henseke and Green (2016) found that 68.7 per cent of all graduates worked in a graduate job (using educational attainment as a proxy for utilisation and not accounting for field of study match) in the new classification, compared with 57.2 per cent under the traditional classification. Even so, they also found that relatively more non-graduates worked in graduate positions than had under the traditional classification (around 14.2 per cent), suggesting under-qualification. The expansion of the higher education sector has led to increasing competition for jobs, particularly given the relatively smaller proportion of graduate level jobs in the total job market, regardless of which classification system is used. This, in turn, leads to the crowding out of non-graduates into even lower level jobs. The employer response to this increase in the supply of graduates has been to raise their expectations of labour market entrants' qualifications and skills (Smith 2017), that is to increase the skill requirement to get a job, rather than do a job. This results in the exacerbation of economic and social inequality and does nothing to improve productivity (Holmes & Mayhew 2015, 2016). Finally,

the expansion of higher education may also lead to the deskilling of the bulk of graduate jobs (Henseke & Green 2016; Holmes & Mayhew 2015), given that advancements in technology and artificial intelligence are likely to cause 'knowledge work' to become more routine, reducing the demand for some previously high skilled occupations. This is effectively increasing the proportion of high skill and lower skill jobs in the labour market at the expense of middle level jobs, usually those labour market entrant jobs typically filled by recent graduates (Holmes & Mayhew 2015). These changes in the world economy mean that more highly educated workers are no longer guaranteed a high skill, high pay career (Smith 2017).

Not only is the extent of over-education and under-utilisation of skills evident in graduate level jobs, there is also increasing heterogeneity in the returns to education and skills (Henseke & Green 2016). It should be borne in mind, too, that, the combination of over-qualification and skill mismatch has the most severe negative labour market outcomes, and that these vary by gender (Mavromaras, McGuinness, et al. 2013).

Employers report being highly satisfied with both the higher education (83.6 per cent) (QILT 2018a) and VET sectors (74.5 per cent) (NCVER 2017a), and that there is a strong relationship between the skills and knowledge acquired and the requirements of specific jobs. Even so, as is evident in the research for this thesis, graduates are being significantly under-utilised due to a lack of supply of jobs appropriate to their complement of skills and qualifications. Importantly, employers report that it is domain-specific skills and knowledge that are the most important requirement of a qualification to best prepare young people for employment (52.8 per cent) (QILT 2018a). Further, 37.6 per cent of employers surveyed also suggested than any improvements to qualifications in preparing young people for employment should focus on domain-specific and technical skills. Even so, 42.1 per cent of employers reported recruitment difficulties, predominantly due to a shortage of appropriate skills (56.4 per cent) and limited applicants (41.6 per cent) (NCVER 2017a), further reinforcing a mismatch between the supply of and demand for skills.

The extent of under-utilisation of recent graduates raises the question of the role and size of the higher education sector in relation to the size of the labour market (Chartered Institute of Personnel and Development 2016). While employers focus on the immediate skills graduates require to become members of the workforce, Humburg and Van der Velden (2017) suggest that higher education also needs to equip students with skills that contribute positively to their employability over their lifespan and enable them to have a good career. In a rapidly changing global economy, higher education also needs to find a balance between enabling students to acquire broad

professional skills and narrower, domain-specific skills (Humburg & Van der Velden 2017), rather than just responding to immediate demand.

Employment outcomes and labour market considerations are becoming increasingly important as the cost of higher education is shifted from a sector which was largely publicly funded to one in which the student will bear the bulk of the financial risk (Holmes & Mayhew 2016). With the supply of highly skilled and educated young people exceeding the demand for their skills, there is a need to devise and construct alternative, more effective pathways from education to the labour market than those afforded solely by higher education, including greater demand side analysis and investigation of sectoral conduct (Holmes & Mayhew 2016). Holmes and Mayhew (2016, p. 490) go so far as to state that "society has created a strange form of entrapment as far as young people's decision making is concerned."

This transition to an alternative model may already be occurring, in Australia at least. The VET Student Outcomes Survey (NCVER 2017b) reports that a higher proportion of VET graduates from universities were employed after their training compared with recipients of other providers of VET (89.2 per cent). Further, almost half of the recent graduate respondents to the Graduate Student Outcomes Survey were employed in their job before they completed their qualification, with employers advising that the combination of work and study broadens and deepens the skills and knowledge base of their employees (QILT 2018b).

In terms of employment and skill utilisation of young people with linked lives, the oversupply of highly skilled and qualified people results in employers using a filtering system to identify the most able individuals to meet their needs to effectively do the job. This will mean that as soon as a person, regardless of age, reduces their availability, the opportunity to gain employment in an occupation appropriately matched to their complement of skills will be reduced.

Importantly, to improve macro-level productivity through improving skill utilisation of educated individuals over their lifespan (particularly those aged 25 to 29 years), increasing the appropriate supply of skills and outcomes will rely on the ability and willingness of employers to change the organisation and design of work to take advantage of these skills, as well as on a broader increase in demand (Holmes & Mayhew 2015).

The high level of under-qualification in 'skill level one' occupations

The high level of under-qualification in Australia's workforce warrants further exploration, particularly of those in skill level one occupations: managers and professionals. Over one in ten Australians with post-school qualification were under-qualified for their job; 9.2 per cent were under-qualified only, and 2.5 per cent had a combined under-qualified and field of study mismatch. Of these, two in five were employed in managerial occupations and almost half were employed as professionals (see Figure 7.9, below). Further, the proportion of the workforce that was under-qualified increased with age, as was shown in Chapter Six. As Allen and Van der Velden (2001) explained, working in a job above a person's education level raises the productivity ceiling, which is then further limited by the ability, knowledge and experience of the individual worker. Ensuring that workers' education and skill levels are adequate to perform in their jobs will be a critical factor in improving life outcomes and productivity performance at the meso and macro levels.

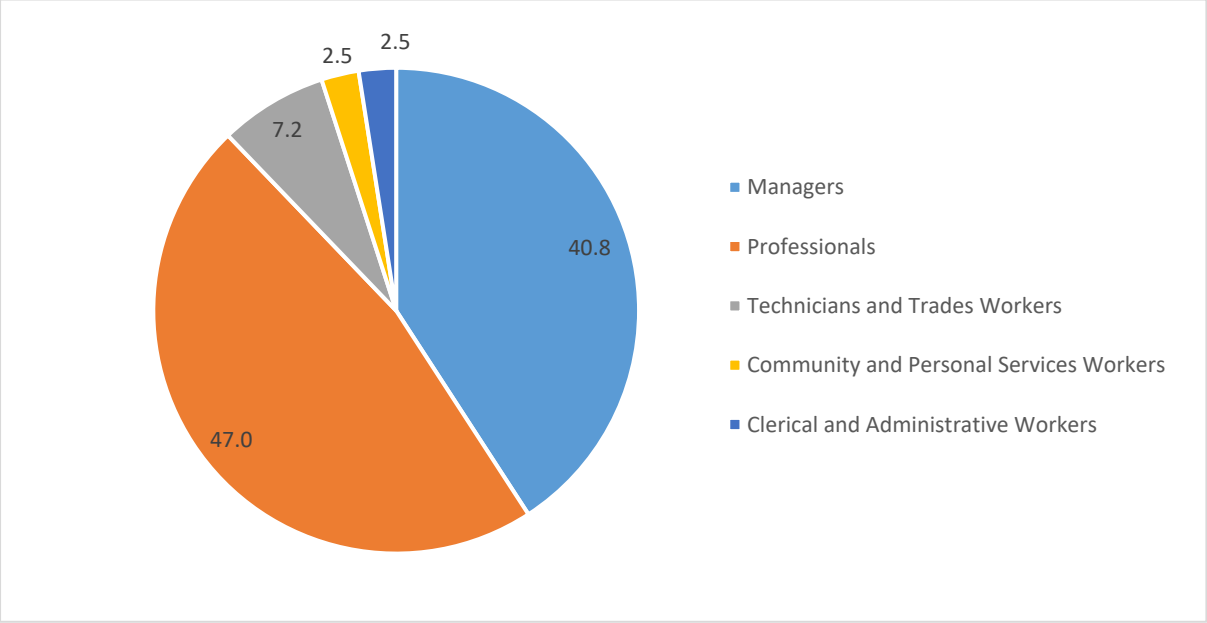

Figure 7.9. Proportion of under-qualified workforce by occupation

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

The literature on under-education and under-skilling is limited from both individual and economic perspectives (McGuinness, Pouliakas & Redmond 2017; Quintini 2011a). Of the two types of education mismatch, over-qualification has received the most attention, primarily due to concerns about the increase in the supply of university and vocational training graduates (Quintini 2011a), the lack of a corresponding increase in high skilled jobs (Holmes & Mayhew 2016), and the financing of excessive levels of education causing inefficiency (Mahy, Rycx & Vermeylen 2015).

In their review of the literature on skill mismatch, McGuinness, Pouliakas and Redmond (2017) identified that human capital deficits, such as under-education and under-skilling, receive very little attention in comparison with other skill and education mismatch types. They found 24 papers that addressed under-education as a sub-topic to a primary focus on over-education and only three that addressed under-skilling. Of all 27 papers, only three explored the relationship between under-education and productivity. Most papers explored the wage effect, well-being, job satisfaction, or retention of a mismatched worker. Even so, Pouliakas and Russo (2015) concluded that under-skilled workers are more likely to be concentrated in high skilled occupations. These variables are often used as a proxy for productivity, which can lead to inconsistent and misleading inferences (Grunau 2016). As Hartog (2000, p. 139) stated, "it would obviously be highly informative if we knew the effect of over or under-education on productivity rather than on wages."

An under-educated and/or under-skilled worker is one employed in a job for which their formal level of education is not sufficient, or with which their field of study does not match (Green, McIntosh & Vignoles 1999). The assumption attached to an under-educated or -skilled worker is that they would be less productive than an adequately educated and skilled worker. However, Quintini (2011b) also found that under-educated workers often do possess the competencies and skills required by the job as a result of their years of experience and informal learning. As such, under-education increases with labour market experience, and is particularly high among older workers. This research concurs, finding that the level of under-qualification increased from 7.2 per cent for those aged 25 to 29 years to 11.3 per cent for the 60 to 64 year age group. The highest proportion of under-qualification was experienced by the 50 to 54 year age group, 15.3 per cent, corresponding with higher labour force participation rates than the older age groups. Quintini (2011b) found, however, that nearly 90 per cent of under-qualified workers reported being well-matched to or over-skilled for their job. In other words, labour market experience and on-the-job training is often a substitute for the formal education required to do a job (Voon & Miller 2005). Even so, emerging evidence also suggests that under-education is negatively correlated with productivity (see for example; Adalet McGowan and Andrews (2015); Grunau (2016); Kampelmann and Rycx (2012); Mahy, Rycx and Vermeylen (2015)). As the global economy continues to restructure, and the complexity of job roles evolves to reflect this changing skill mix, under-education and under-skilling may be by-products of the adjustment mechanism in the workforce, characterised by technological change (Voon & Miller 2005; Warhurst, Tilly & Gatta 2017). More specifically, Mahy, Rycx and Vermeylen (2015) investigated the impact of education mismatch on productivity depending on the technological/knowledge intensity of the enterprise. They found that the level of education required had a positive, significant impact on enterprise productivity regardless; while under-education reduced productivity by 1.3 per cent in

low-tech enterprises, over-education increased productivity by 2.3 per cent. These findings suggest that under-education constrains technological advancement of enterprises, as well as productivity. Grunau (2016) found that under-educated workers directly impair an organisation's productivity performance. Grunau's finding also incorporated the indirect spill-over effect of mismatched workers on co-workers' productivity. Kampelmann and Rycx (2012) used panel data over a seven year period to measure the direct impact of education mismatch on enterprise productivity and how it varied by age for over and under-educated workers. Adjusting for cohort effects, they found that over-education is beneficial at an enterprise level, but that under-education is detrimental to an organisation's productivity, though only for young workers. Kampelmann and Rycx (2012) further suggest that over-educated workers are more productive over their lifespan, and that under-educated workers either attempt to compensate for their lack of productivity through additional work experience and/or training, or transition to lower skilled jobs as they age. In their study of the relationship between skill and education mismatch and labour productivity in 19 OECD countries, Adalet McGowan and Andrews (2015) found that higher skill and education mismatch is associated with lower labour productivity, with under-education and under-skilling accounting for most of the impact. More specifically, under-education is associated with lower productivity through lower efficiency in resource allocation and reduced within-enterprise productivity. This is driven primarily by the combination of under-education and under-skilling.

While the literature on under-education is limited, there is increasing evidence that under-education and/or skills is correlated with management performance, which has a flow on effect on productivity (Adalet McGowan & Andrews 2015; Australian Workforce and Productivity Agency 2013; Bloom et al. 2013; Green, R et al. 2009). Adalet McGowan and Andrews (2015) found that differences in managerial quality explain the negative relationship between under-education and under-skilling and enterprise productivity. Essentially, they found that higher managerial quality increases productivity through more efficient matching of qualifications and skills to jobs.

This research found that of the Australian workers employed in managerial occupations, the skills of a third (33.7 per cent) were effectively utilised in the labour market, while around another third were under-qualified (29.8 per cent), and one in ten (9.0 per cent) had a combined under-qualified and field of study mismatch. While professionals (69.9 per cent) had a higher level of skill utilisation than managers, one in five (19.4 per cent) experienced either under-qualification or a combined under-qualified and field of study mismatch. See Figure 7.10, below.

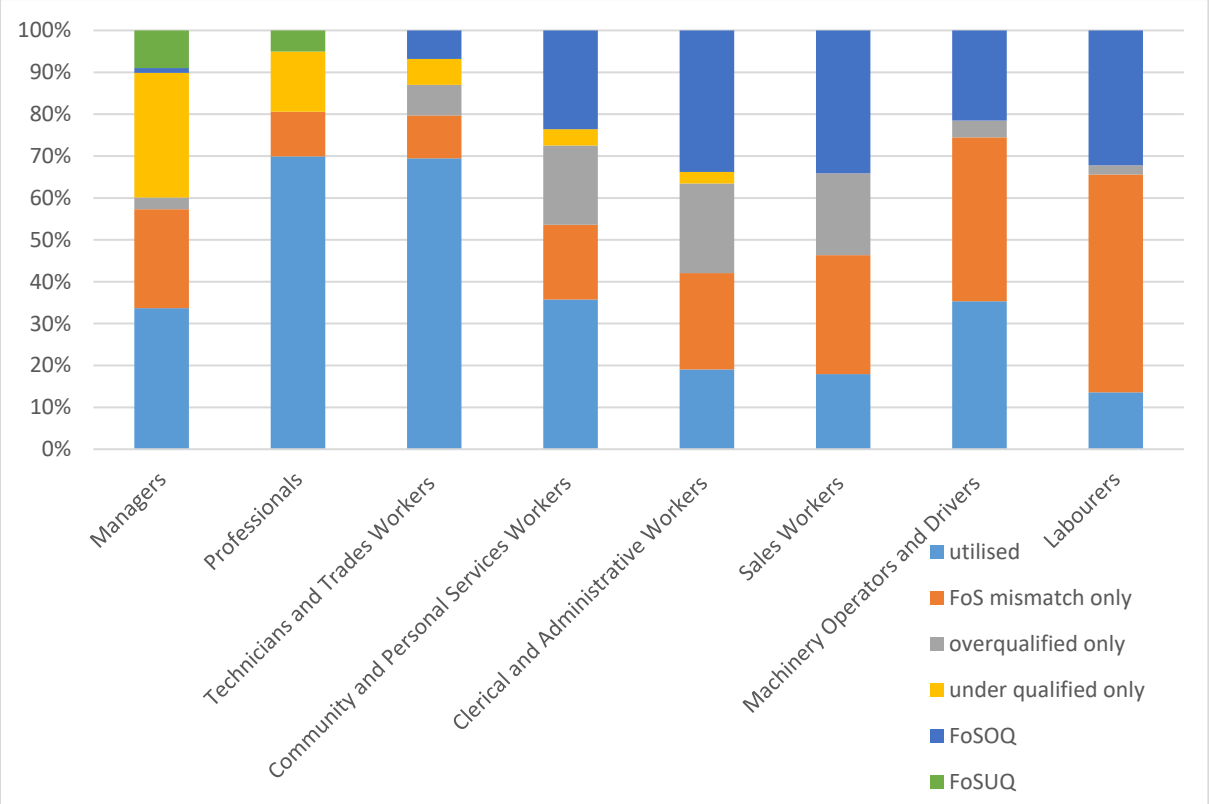

Figure 7.10. Skill utilisation and type of utilisation by occupation

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

Of those in managerial occupations, farmers and farm managers had the highest level of under-qualification. Three quarters of farmers and farm managers are under-qualified, including both those under-qualified only (35.4 per cent), and those with a combined under-qualified and field of study mismatch (39.5 per cent). Nearly two thirds of construction, distribution and production managers (63.3 per cent) were under-qualified or had a combination of under-qualification and field of study mismatch. Over half of all accommodation and hospitality managers (52.2 per cent), retail managers and hospitality (55.0 per cent), retail and service managers (52.5 per cent) experienced a field of study mismatch only. Even so, one in five was also under-qualified.

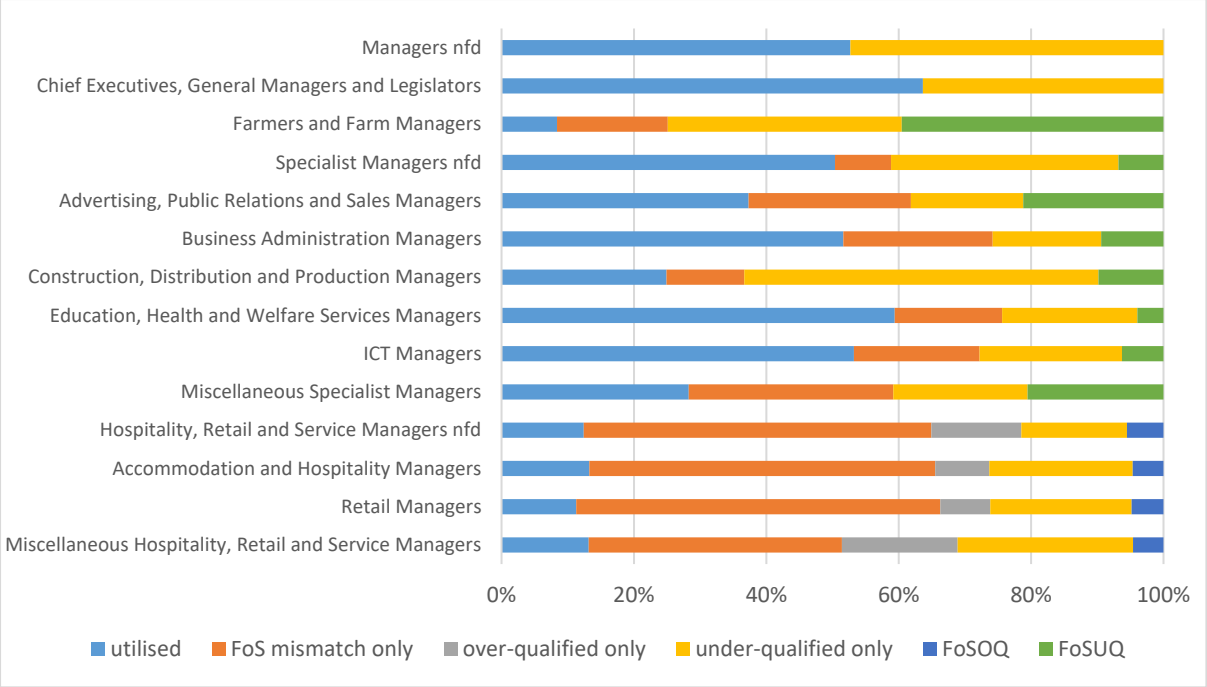

Figure 7.11. Skill utilisation and type of under-utilisation for managerial occupations

Source: ABS Census of Population and Housing (2011), customised dataset, author calculations

In their analysis of the productivity of managers in Australia, Green, R et al. (2009) found that the level of education and skills of managers (and also of non-managers) is positively correlated with management performance. Further, Skills Australia (2012) identified a strong link between effective management, skill utilisation and productivity, suggesting that in addition to improved productivity, innovation, staff retention and job satisfaction will also be improved through better management practices and skill utilisation. Scored against 18 dimensions of people, performance and operations, Green, R et al. (2009) found a clear relationship between the quality of management and enterprise productivity. They went on to suggest that engaging better educated managers, combined with continued investment in workforce development through the upgrading of skills, will contribute significantly to enhanced management performance and thus to productivity, particularly in the manufacturing sector.

Summary

The under-utilisation of skills is widespread in the Australian labour market and has a detrimental effect on individuals' potential prosperity over their lifespan, as well as on macro-level productivity. It particularly affects recent graduates and mothers, but also workplaces more broadly. The under-utilisation of skills is driven by an increasing supply of highly qualified labour exceeding the demand

for skills, as well as by a persistent culture of gendered roles over the life course. The next, concluding chapter will provide a discussion of potential policy solutions to the low level of skill utilisation, with a particular focus on improving productivity in response to the challenges of an ageing population. It will also identify areas for further data collation, research and analysis that could overcome some of the challenges of the methodology in this thesis, as well as offer a more granular insight into skill utilisation in Australia.

Chapter eight
Conclusion

Introduction

This research found evidence of the substantial under-utilisation of Australians' skills in the labour market. The fact that three in five Australians are operating at below their productive capacity should be a major concern for policy makers.

The solution of successive Australian governments to the challenges of an ageing population has been to foster economic growth through a policy framework that increases the Three Ps (3Ps): productivity, (labour force) participation and population. While few specific policy initiatives are suggested in the Intergenerational Reports, the 2015 report maintains that the ongoing improvement of Australian living standards will remain primarily contingent upon continuous improvement in productivity, and will also require every effort to increase labour force participation rates (Commonwealth of Australia 2015).

As governments worldwide respond to challenges such as global restructuring and population ageing driving changes in the occupational structure (which affect both the supply of, and demand for, labour and skills), policy development to improve productivity will need to shift focus from skill formation alone to a three-pronged approach: skill supply, skill demand and skill utilisation. This constitutes a major policy challenge as it requires an integrated approach to skill utilisation and productivity improvement, far removed from the individualist approach of the original Human Capital Theory model (Dalziel 2017).

As Quintini (2011) points out, policy initiatives relating to skills formation, demand and the matching process are undergoing long term changes, but these changes are occurring somewhat independently of each other – this is despite many of the policy problems being interrelated. These include issues such as the structure of the labour market, quality and quantity of employment, the nature of the relationship between employer and employee, economic performance, innovation, education and training, migration, labour mobility, family policy, social welfare, public finance and globalisation (Keep 2016; OECD 2012; Payne 2012; Quintini 2011a). Policy intervention needs to be cognisant of all these factors and must be integrated into a broader framework.

Despite the substantial and growing body of evidence of under-utilisation of skills and qualifications, and the associated costs to the individual and broader economy, evidence of policy development to tackle this issue is scant (Buchanan et al. 2017; Keep 2016, 2017). Keep (2016) suggests this is due to

the considerable lack of workplace research being explicitly focused on skill utilisation per se. As such, a dearth of direct evidence of what best practice may be means that policy development is under-informed.

McGuinness, Pouliakas and Redmond (2017) suspect that policy inertia is the result of political challenges. That is, of a fundamental reorganisation of skills policy questions and of long held policies and assumptions as to the benefits of the continued expansion of education. Alternatively, the three suggest, the under-utilisation of education and skills is not considered problematic over the longer term, given the expectation that market forces will correct short-term inefficiencies (despite evidence to the contrary). Policy interventions identified by McGuinness, Pouliakas and Redmond (2017) were either vague or were responsive to areas of mismatch for which the least evidence was available, such as skills gaps or shortages. These policy responses to short term issues in times of relative economic strength highlight the inexperience of policy makers in addressing the significant, and complex, challenges of skill under-utilisation. Given that there is a substantial body of scholarship indicating that it is over-qualification and under-utilisation of skills which are the greatest imposition on individuals and the economy, policy intervention should focus on the problem of surplus human capital. Moreover, there is now strong empirical evidence that substantial benefits would accrue to individuals, enterprises and the macro-economy should policy intervention be successful. However, policy makers need to be cognisant of the distinction between the types of mismatches and their interrelatedness (McGuinness, Pouliakas & Redmond 2017), as well as of the various forms of measurement needed to benchmark and evaluate policy implementation.

Contribution to the literature

This research provides an invaluable contribution to the scholarship on skill utilisation. The development of an indicator to measure skill utilisation using population-level data provides a systematic method to capture the different perspectives of skill. The method enables the exploration of the under-utilisation of skills which Findlay and Warhurst (2012) suggest is lacking in current scholarship. This method can be applied at different geographical levels and is applicable to multivariate analysis, as well as enabling comparison between countries and regions. Additionally, the method provides for the analysis of finely differentiated variables, such as occupation, industry sector, age, or, as in the case of this research, the presence of a partner and/or child. From the life course perspective, this method enables comparison with other age cohorts, which is particularly important given that evidence suggests that greater differences occur across cohorts rather than

within them, according to economic and social resources at the time (Heinz 2016). Even so, within-cohort differences are also identifiable, and considerable in the case of the present research. This method also negates the concerns associated with the subjective nature of the worker assessment method, and provides a behavioural framework within which to measure and analyse skill utilisation, rather than an attitudinal one. Given the statistical nature of the method and its application to population-level data collected at regular intervals, the measurement of skill utilisation provides the means to both benchmark and identify changes in skill utilisation over time. In particular, it can be used as a tool to evaluate policy interventions as well as to isolate variables to achieve a more granular analysis.

Given that the ABS now integrates Census data with other statistical products, this method can be applied more broadly. In particular, when applied to the Australian Census and Migrants Integrated Dataset (ACMID), the measure of skill utilisation would enable analysis of how well the skills of recent migrants to Australia are being used. The 2011 Census project relates to people who have migrated to Australia on a permanent Skilled, Family or Humanitarian stream visa and 'arrived' in Australia between 1 January 2000 and 9 August 2011. This would be particularly useful for analysing and evaluating some components of the Australian Government's skilled migration programme. In addition, the ABS produces the Australian Census Longitudinal Dataset (ACLD), which brings together a five per cent sample from Censuses since 2006 to create a research tool for exploring how Australian society is changing over time. The ABS envisages that the 2016 and subsequent Censuses will be added in the future, as well as other administrative data sets. The application of the skill utilisation method to the ABS longitudinal dataset using Census data will remove some of the concerns of using cross-sectional data to interpret skill utilisation over the lifespan. The longitudinal dataset also has the potential to reveal any transitions into and out of work and/or education, and the associated changes in skill utilisation. Such data would contribute to assessment of O'Rand and Bostic's (2016) hypothesis of the "extended work-education sequences" life course model, particularly for women. Finally, future research could use the method of measuring skill utilisation for multivariate analysis (e.g., using regression models), which would enable the net effect of each of the independent variables on skill utilisation to be estimated (de Vaus 2014) after controlling for the interrelationship between them.

Policy implications

Three-pronged approach

Skills formation has historically been relied upon in achieving a wide range of policy objectives, in addition to improving productivity. These include improving social mobility, reducing inequality, and driving innovation and growth (Holmes & Mayhew 2016). However, as Holmes and Mayhew (2016) point out, both the social and economic returns of education are now low, and it is increasingly difficult to establish firm links between higher education expansion and economic growth. In fact, the increasing heterogeneity in the returns of education is linked to over-qualification (Henseke & Green 2016). As such, there is a desperate need to find alternative solutions to improving social and economic prosperity at both the individual and macro levels.

The post war economic growth experienced globally and the subsequent transition to a more knowledge-based economy is largely attributed to the expansion of the higher education sector, as evidenced through the professionalisation of the global workforce, with little acknowledgement of the demographic input. The entrance of the post-war baby boomers into the workforce coincided with the gender revolution, and increased female participation in education and work resulted in a 'demographic dividend' (Eastwood & Lipton 2012; Lee & Mason 2006) to the economy. With this demographic input now reversing in the form of population ageing in most developed nations, and with productivity languishing, the issue of skill under-utilisation, previously largely a focus of academic scholarship, is now increasing in prominence in policy debates. Even so, a misalignment is evident between the academic literature and the direction of skill and labour market policy (McGuinness, Pouliakas & Redmond 2017).

As Keep and Mayhew (2010) and (Payne 2012) assert, a heavy burden of policy expectations rest on the shoulders of skill, yet there is increasing evidence that skill alone will not result in a "productivity miracle" (Keep, Mayhew & Payne 2006, p. 547). Attention needs to move beyond skills formation alone and onto demand for skills and skill utilisation. Given that skills are developed over an individual's working life, skill utilisation is affected by the manner in which skill formation evolves over the lifespan. This evolution is influenced by institutional and cultural structures, which either help or hinder individuals in navigating transitions between working and non-working spheres of life (Buchanan et al. 2017).

Critical in formulating policy to improve productivity will be arresting the mismatch between the supply of, and demand for, skills. As Desjardins and Rubenson (2011) clarify, this does not mean scaling back skill formation or investment in human capital but rather tackling the negative causes

and consequences of mismatch, and the under-utilisation of skills. Even so, how the government invests in education and training into the future should be reviewed. In addition, policy needs to recognise that the process of skill formation and utilisation extends over the lifespan as individuals negotiate their own life courses.

The OECD (2012) produced an overarching framework for developing skills policies, with the Scottish Government leading the way in implementation (Payne 2012; Warhurst & Findlay 2012). The OECD strategic approach recognised the integrated nature of skills, and recommended exploiting linkages across policy fields to ensure efficiency and to avoid duplication – it also recognised that some trade-offs would need to be made. The focus of the framework was on fully utilising available skills, developing the right skills to respond to the needs of the labour market, stimulating the creation of more high skilled and high value add jobs, while also ensuring that young people can gain a foothold in the labour market. Similarly, the Chartered Institute of Personnel and Development (2016), to improve pathways to the labour market, recommended increasing the availability of quality careers advice and guidance for young people, improving alternative pathways into the labour market by providing viable options other than the current default of university education, changing employer recruitment behaviour and investment in young people, and increasing the creation of high skilled jobs, among other things. In particular, the Institute suggested, enhancing leadership and people management capability by identifying progression routes and job design should improve job creation, and result in improved skill utilisation.

In Australia, there is no longer a central agency or body responsible for workforce skills and associated strategies following the transition of the functions of the Australian Workforce and Productivity Agency (AWPA) (formerly Skills Australia) to the Department of Industry in July 2014. Since then, the responsibility for workforce skills falls under the auspices of the Department of Education and Training as an aspect of the governance of the vocational education and training sector. As such, there is no overarching strategy for skills supply, demand and utilisation.

In its productivity review, the Productivity Commission (Productivity Commission 2017, p. 7) stated that “the wellbeing of Australians is substantially and inextricably dependent on persistent growth in productivity.” However, the focus for improving productivity remains on skill supply: “if we had to pick just one thing to improve… it must be skills formation” (Productivity Commission 2017, p. 85). Shifting the Dial: 5 Year Productivity Review (Productivity Commission 2017) identified five main themes in achieving greater productivity in Australia: healthier Australians, future skills and work, better functioning towns and cities, more efficient markets, and more effective governments. The Productivity Commission suggests that as health and education are both expanding sectors in

Australia and effectively under the control of the government, greater efficiency in their delivery focussed on users will produce greater benefits than traditional industry reform. Even so, the focus of the future skills and work theme is on skill formation, with little mention of demand side issues, apart from regulatory burdens and costs – and it contains only one reference to skill utilisation. This reference relates to the potential loss of skill utilisation resulting from the changing nature of occupations to support the recommendation for greater investment in skills development throughout working life. Despite the lack of attention paid to skill demand or utilisation, the Productivity Commission acknowledges deteriorating student outcomes, such as increasing attrition in higher education, the rise of underemployment of graduates from 9.0 per cent in 2008 to 20.5 per cent in 2016, starting salaries growing at a slower rather than the broader economy (around 75 per cent of average weekly earnings in 2015 compared with around 90 per cent in 1989), and that a quarter of graduates employed full time report being in a job unrelated to their studies. The Productivity Commission also recognises not just that these problems are related to the provision of education by various institutions, but also that the inherent capabilities and choice of students, as well as labour market conditions and "mere chance" also affect outcomes (Productivity Commission 2017, p. 104). While the intent of the future skills and work theme is to support a well-functioning labour market to support living standards, the priority policy settings are to 'create the right supply-side settings for the skills system' while ensuring that 'the demand side for the right skills is not frustrated' by the regulatory system in accessing education and training. The Productivity Commission also references other reports and recommendations relevant to policies aimed at improving the function of the labour market, implying that that function of the labour market was actually not a key focus for the Productivity Review. As such, the Commission's five future skills and work theme recommendations are:

1. To improve the educational outcomes of school students;
2. To develop proficiency based assessment for skills rather than competency based;
3. To develop a framework to facilitate independent accreditation of skills;
4. To enable Consumer Law to apply to the higher education sector; and
5. To increase accessibility to information about education and career options for people of all working ages.

The failure of the Productivity Commission to acknowledge the mismatch between the demand for, and supply of, skills, and the subsequent under-utilisation of skills and its impact on productivity are concerning. This is particularly so given the assertion of Buchanan et al. (2017, p. 10) that the greatest challenge to skill utilisation is "that affecting demand, especially the character (and not just

the level) of labour required for productive activity." While the Productivity Commission may argue that its review was broader than just skills, the OECD (2012) explicitly recommends exploiting linkages across policy fields, given the integrated nature of the policy problems related to skills.

Skill utilisation over the life course

In addition to the three-pronged approach to skills, policy intervention must also recognise that work is no longer a linear concept and that there is an increasing variety of employment relationships as people transition into and out of work, and as the labour market responds to economic restructuring and demographic change. The three-pronged approach needs to frame skills formation, demand and utilisation in terms of the life course.

While the life course is no longer the standardised tri-phasic model suggested by earlier theories of the life course, but is made up of increasingly diverse pathways, transitions within the life course are highly structured and profoundly linked between the institutions of the state, the market and the family (Schmid 2017), making them relatively predictable.

As Schmid (2017) points out, transitions into and out of the labour market in response to social obligations and labour market restructuring create risks not only to income generating capacity, and thus skill utilisation, but also to emotional relationships. Schmid (2017) suggests that these risks need to be redistributed between the state, the market and the family through policy intervention to achieve better outcomes for the economy and fairer outcomes for the broader society. In particular, policy needs to enable transitions over the life course, smoothing career breaks and maintaining strong connections to the labour market, particularly for women (mothers). The opportunity cost of transitions into and out of the labour market extend beyond maintaining a continuous career path and a competitive advantage in career promotion opportunities, and into compromised life outcomes and macro-level productivity.

This research has identified a substantial disparity in the level of labour force attachment and subsequent skill utilisation between men and women, associated with linked lives. More specifically, this research reaffirms the existence of the neo-traditional division of labour which prioritises the role of men as the primary breadwinners and women as the homemakers. Further, the level of attachment to the labour force is associated with life course events and by the decision to work part time – which can be a willing and active one on the part of mothers (and their partners). Despite these conscious choices, Schmid (2017) argues that the impact of time out of the workforce (or reduced time in it) is underestimated in terms of loss of income and the erosion of skills. As this

research shows, the decision to work part time increases the likelihood of skill under-utilisation, which has the potential to lead to detrimental effects on both potential life outcomes at an individual level, and on productivity at a macro level.

While increasing female labour force participation is an explicit policy goal of the Australian Government (Commonwealth of Australia 2015), there has not been the revolution in women's work that labour force participation rates suggest (Daley, McGannon & Ginnivan 2012; Guest & Parr 2012; Tapper 2010). Parr (2012) notes that where there are increases in female labour force participation rates these are in part time employment, and that this trend is increasing in Australia to a point where it is internationally distinctive. While there are more women engaged in paid work, Tapper (2010) argues that since 1966 there has been little change in the average hours spent in paid work by women. The upward trend for women (compared with a downward trend for men) is on a slow trajectory which Tapper (2010) estimates as amounting to one hour per week per decade. Research by Guest and Parr (2012) into the effect of the Child Care Rebate on couples' attachment to the workforce supports Tapper's findings, with couples only increasing their average hours by between 0.75 and 1 hour per couple per week, and only when the youngest child is less than five years old. Time use studies suggest that the distribution of paid work has been constant over time, with two thirds undertaken by men and one third by women, and that mothers' combined unpaid and paid work is equivalent to the average hours worked by all women (Tapper 2010).

Determining the influences on female labour force attachment is complex. Women are influenced by life events and by socio-demographic factors such as educational attainment, marital status, birth place, and the number and age of children. The average number of hours worked is further influenced by the age of the youngest child, and by the number of children under five years old (Euwals, Knoef & Van Vuuren 2011; Parr 2012). Other influences are the mother's partner's educational attainment, labour force status and income level (Dex & Joshi 1999; Dex et al. 2001). Female labour force participation rates are further compounded by access to affordable, quality child care (Boyd 2012; Chevalier & Viitanen 2002; Guest & Parr 2012). Limited access to child care effects both the timing of the return to work and the hours available to work (Boyd 2012). Consistent with the findings of this research, Parr (2012) identifies that the greater the educational attainment the more likely mothers are to be employed and to work longer hours, particularly married mothers. In addition, more highly educated mothers are also more likely to return to full time employment (Parr 2012; Tomlinson, Olsen & Purdam 2009). In their UK study, Macran, Joshi and Dex (1996) also found that the break in employment after childbearing is decreasing in length, particularly for older, more highly educated mothers, and that this is increasingly so from one

generation to the next (Dex et al. 2001). Guest and Parr (2012) identify that mothers' labour force attachment is also influenced by their husbands' educational attainment. Where the father has a higher educational attainment than the mother, the wife tends to work fewer hours (compared with other wives whose husbands are not as highly educated), suggesting role specialisation within the family and further supporting the notion of the 'neo-traditional household'. This is also supported by another UK study by Dex et al. (2001), who found that the educational level of the father or partner influences the amount of time spent out of employment by the mother.

Daley, McGannon and Ginnivan (2012) attribute Australia's low labour force participation rates and increasing part time work to the lack of financial incentive to participate – due to the restrictive tax system and favourable eligibility for welfare benefits which place a high value on parental care. Boyd (2012) implicitly agrees, suggesting that increasing workforce participation will rely on the intrinsic value attached to the work.

Through legislation and workplace reform, successive governments have attempted to construct a new social contract regarding work and family. However, current policy practices support the '1.5 earner model', a solution predicated on combining work and care in a couple where the father works full time and the mother part time (Boyd 2012). Boyd (2012) highlights that current policies are aimed at accommodating caring and work by providing rights to primary carers, but that these policies do little to equalise the distribution of unpaid work between men and women, further contributing to the ingrained cultural attitude to gender. Female labour force attachment will only increase out of choice (as opposed to necessity), with the greatest threat to female workforce participation being a lack of suitable jobs with the right working conditions, as well as a lack of access to appropriate child care (Heron & Charlesworth 2012). Evident throughout this thesis is that the choice to work part time results in occupational downgrade and the under-utilisation of mothers' skills. Part time employment also has other long term implications for women, for example, lower levels of superannuation accumulation over the lifespan, which compounds the inequalities of outcome between men and women. However, as Treas, van der Lippe and Tai (2011) explain, when part time work is not associated with occupational downgrade, it enables women (and mothers) to maximise their successful life outcomes, letting them meet the obligations of family and achieve a fulfilling career, maximising skill utilisation. Given the range of evidence suggesting that it is unlikely that once a woman has a partner or a child she will increase her level of labour force attachment, policies to improve skill utilisation will need to focus on those working part time. Encouragingly, this research has found that for those working part time, linked lives, both vertically and horizontally, are factors that motivate individuals to maximise their potential life outcomes.

Critically, the impact of part time employment on skill utilisation and potential life outcomes is not isolated to mothers alone, but also to the young, recently graduated cohort. As discussed, the youngest age group, those aged 25 to 29 years, had the greatest disparity in the level of skill utilisation within an age group. This is concerning because this age group is less likely to have experienced multiple life events or transitions that reduce their level of attachment to the labour force, as such events do for mothers. What is not clear, however, is whether the large gap between full time and part time employment for the younger cohort will persist over their lifespan and have a detrimental effect on their life outcomes, or, indeed, if the under-utilised workers will actively seek and secure employment that matches the human capital they have accumulated over time.

Regardless of age, sex or presence of a partner or child, in an environment in which the supply of highly educated individuals exceeds the demand for equivalent skills, employers will use a filtering system to identify the most able and available individuals to meet their needs to effectively do the job. This will mean that as soon as a person reduces their availability, the opportunity to gain employment in an occupation appropriately matched to their complement of skills will also be reduced.

Schmid (2017) argues for policy intervention for a comprehensive skills strategy framed by the principles of the life course on the basis of three key principles:

1. That people with insufficient earnings capacity at the beginning of (or during) their life course are not able to compensate for any deficiencies throughout their life course;
2. That the failure of the capital market to support those unable to invest in their own human capital accumulation results in foregone talent, cost to society, loss of opportunity for individuals and deepening inequality; and
3. That there is a lack of equity.

If Australian Government policy does not evolve to cater to the needs of young labour market entrants, and of both men and women and their roles within families, labour force attachment, and thus skill utilisation, will continue to be constrained, which in turn will limit future prospects for economic growth – the key objective of the Intergenerational Reports. Critically, skills policies should not be confined to a point in time at which to place individuals in a job. The three-pronged skills strategy needs to use a life course framework to enable sustainable career trajectories for all, ultimately maximising successful life outcomes.

Concluding remarks

Politicised documents such as the Intergenerational Reports aside, population ageing and demographic change provide very real challenges to the future fiscal sustainability of governments. Improving productivity provides the potential to also improve social and economic prosperity in response to population ageing. In what has previously been a hidden problem, or a naïve belief that demand for skills would adjust upward with an increase in supply (and thus so too would productivity, as per Human Capital Theory), the current workforce provides an untapped, latent potential to improve productivity and to maximise successful life outcomes. Evidence clearly suggests that improved skill utilisation has the potential to improve returns on current and future investment in human capital at both the individual and macro levels – vital in a period of population ageing. While it is acknowledged that a focus on a three-pronged approach to skills (supply, demand and utilisation), represents a fundamental, but necessary, realignment of what a traditional skills (education and training) policy encompasses, the design of appropriate policies to enable such a transition remains an ongoing challenge for governments in Australia, and internationally.

Appendices

Appendix A ANZSCO: Occupation at Minor Group (three-digit) level

Major Group				Predominant Skill Level
	Sub-Major Group			
		Minor Group		
1	MANAGERS			
	11	Chief Executives, General Managers and Legislators		
		111	Chief Executives, General Managers and Legislators	1
	12	Farmers and Farm Managers		
		121	Farmers and Farm Managers	1
	13	Specialist Managers		
		131	Advertising, Public Relations and Sales Managers	1
		132	Business Administration Managers	1
		133	Construction, Distribution and Production Managers	1
		134	Education, Health and Welfare Services Managers	1
		135	ICT Managers	1
		139	Miscellaneous Specialist Managers	1
	14	Hospitality, Retail and Service Managers		
		141	Accommodation and Hospitality Managers	2
		142	Retail Managers	2
		149	Miscellaneous Hospitality, Retail and Service Managers	2
2	PROFESSIONALS			
	21	Arts and Media Professionals		
		211	Arts Professionals	1
		212	Media Professionals	1
	22	Business, Human Resource and Marketing Professionals		
		221	Accountants, Auditors and Company Secretaries	1
		222	Financial Brokers and Dealers, and Investment Advisers	1, 2
		223	Human Resource and Training Professionals	1

		224	Information and Organisation Professionals	1
		225	Sales, Marketing and Public Relations Professionals	1
	23	Design, Engineering, Science and Transport Professionals		
		231	Air and Marine Transport Professionals	1
		232	Architects, Designers, Planners and Surveyors	1
		233	Engineering Professionals	1
		234	Natural and Physical Science Professionals	1
	24	Education Professionals		
		241	School Teachers	1
		242	Tertiary Education Teachers	1
		249	Miscellaneous Education Professionals	1
	25	Health Professionals		
		251	Health Diagnostic and Promotion Professionals	1
		252	Health Therapy Professionals	1
		253	Medical Practitioners	1
		254	Midwifery and Nursing Professionals	1
	26	ICT Professionals		
		261	Business and Systems Analysts, and Programmers	1
		262	Database and Systems Administrators, and ICT Security Specialists	1
		263	ICT Network and Support Professionals	1
	27	Legal, Social and Welfare Professionals		
		271	Legal Professionals	1
		272	Social and Welfare Professionals	1
3	TECHNICIANS AND TRADES WORKERS			
	31	Engineering, ICT and Science Technicians		
		311	Agricultural, Medical and Science Technicians	2
		312	Building and Engineering Technicians	2
		313	ICT and Telecommunications Technicians	2
	32	Automotive and Engineering Trades Workers		
		321	Automotive Electricians and Mechanics	3

		322	Fabrication Engineering Trades Workers	3
		323	Mechanical Engineering Trades Workers	3
		324	Panel beaters, and Vehicle Body Builders, Trimmers and Painters	3
	33	Construction Trades Workers		
		331	Bricklayers, and Carpenters and Joiners	3
		332	Floor Finishers and Painting Trades Workers	3
		333	Glaziers, Plasterers and Tilers	3
		334	Plumbers	3
	34	Electrotechnology and Telecommunications Trades Workers		
		341	Electricians	3
		342	Electronics and Telecommunications Trades Workers	3
	35	Food Trades Workers		
		351	Food Trades Workers	3
	36	Skilled Animal and Horticultural Workers		
		361	Animal Attendants and Trainers, and Shearers	3
		362	Horticultural Trades Workers	3
	39	Other Technicians and Trades Workers		
		391	Hairdressers	3
		392	Printing Trades Workers	3
		393	Textile, Clothing and Footwear Trades Workers	3
		394	Wood Trades Workers	3
		399	Miscellaneous Technicians and Trades Workers	3
4	COMMUNITY AND PERSONAL SERVICE WORKERS			
	41	Health and Welfare Support Workers		
		411	Health and Welfare Support Workers	2
	42	Carers and Aides		
		421	Child Carers	4
		422	Education Aides	4
		423	Personal Carers and Assistants	4
	43	Hospitality Workers		

		431	Hospitality Workers	4, 5
	44	Protective Service Workers		
		441	Defence Force Members, Fire Fighters and Police	2, 3
		442	Prison and Security Officers	4, 5
	45	Sports and Personal Service Workers		
		451	Personal Service and Travel Workers	3, 4
		452	Sports and Fitness Workers	3, 4
5	CLERICAL AND ADMINISTRATIVE WORKERS			
	51	Office Managers and Program Administrators		
		511	Contract, Program and Project Administrators	2
		512	Office and Practice Managers	2
	52	Personal Assistants and Secretaries		
		521	Personal Assistants and Secretaries	3
	53	General Clerical Workers		
		531	General Clerks	4
		532	Keyboard Operators	4
	54	Inquiry Clerks and Receptionists		
		541	Call or Contact Centre Information Clerks	4
		542	Receptionists	4
	55	Numerical Clerks		
		551	Accounting Clerks and Bookkeepers	4
		552	Financial and Insurance Clerks	4
	56	Clerical and Office Support Workers		
		561	Clerical and Office Support Workers	5
	59	Other Clerical and Administrative Workers		
		591	Logistics Clerks	4
		599	Miscellaneous Clerical and Administrative Workers	3, 4
6	SALES WORKERS			
	61	Sales Representatives and Agents		
		611	Insurance Agents and Sales Representatives	3, 4

		612	Real Estate Sales Agents	3
	62	Sales Assistants and Salespersons		
		621	Sales Assistants and Salespersons	5
	63	Sales Support Workers		
		631	Checkout Operators and Office Cashiers	5
		639	Miscellaneous Sales Support Workers	3, 4, 5
7	MACHINERY OPERATORS AND DRIVERS			
	71	Machine and Stationary Plant Operators		
		711	Machine Operators	4
		712	Stationary Plant Operators	4
	72	Mobile Plant Operators		
		721	Mobile Plant Operators	4
	73	Road and Rail Drivers		
		731	Automobile, Bus and Rail Drivers	4
		732	Delivery Drivers	4
		733	Truck Drivers	4
	74	Storepersons		
		741	Storepersons	4
8	LABOURERS			
	81	Cleaners and Laundry Workers		
		811	Cleaners and Laundry Workers	5
	82	Construction and Mining Labourers		
		821	Construction and Mining Labourers	4, 5
	83	Factory Process Workers		
		831	Food Process Workers	4, 5
		832	Packers and Product Assemblers	5
		839	Miscellaneous Factory Process Workers	4, 5
	84	Farm, Forestry and Garden Workers		
		841	Farm, Forestry and Garden Workers	5
	85	Food Preparation Assistants		

		851	Food Preparation Assistants	5
	89	Other Labourers		
		891	Freight Handlers and Shelf Fillers	5
		899	Miscellaneous Labourers	4, 5

Appendix B ASCED Narrow Field of Study at the Highest Non-School Qualification

	Narrow Field of Study at the Highest Non-School Qualification – 4 digit level
0101	Mathematical Sciences
0103	Physics and Astronomy
0105	Chemical Sciences
0107	Earth Sciences
0109	Biological Sciences
0199	Other Natural and Physical Sciences
0201	Computer Science
0203	Information Systems
0299	Other Information Technology
0301	Manufacturing Engineering and Technology
0303	Process and Resources Engineering
0305	Automotive Engineering and Technology
0307	Mechanical and Industrial Engineering and Technology
0309	Civil Engineering
0311	Geomatic Engineering
0313	Electrical and Electronic Engineering and Technology
0315	Aerospace Engineering and Technology
0317	Maritime Engineering and Technology
0399	Other Engineering and Related Technologies
0401	Architecture and Urban Environment
0403	Building
0501	Agriculture
0503	Horticulture and Viticulture
0505	Forestry Studies
0507	Fisheries Studies
0509	Environmental Studies
0599	Other Agriculture, Environmental and Related Studies
0601	Medical Studies
0603	Nursing

0605	Pharmacy
0607	Dental Studies
0609	Optical Science
0611	Veterinary Studies
0613	Public Health
0615	Radiography
0617	Rehabilitation Therapies
0619	Complementary Therapies
0699	Other Health
0701	Teacher Education
0703	Curriculum and Education Studies
0799	Other Education
0801	Accounting
0803	Business and Management
0805	Sales and Marketing
0807	Tourism
0809	Office Studies
0811	Banking, Finance and Related Fields
0899	Other Management and Commerce
0901	Political Science and Policy Studies
0903	Studies in Human Society
0905	Human Welfare Studies and Services
0907	Behavioural Science
0909	Law
0911	Justice and Law Enforcement
0913	Librarianship, Information Management and Curatorial Studies
0915	Language and Literature
0917	Philosophy and Religious Studies
0919	Economics and Econometrics
0921	Sport and Recreation
0999	Other Society and Culture

1001	Performing Arts
1003	Visual Arts and Crafts
1005	Graphic and Design Studies
1007	Communication and Media Studies
1099	Other Creative Arts
1101	Food and Hospitality
1103	Personal Services
1201	General Education Programmes
1203	Social Skills Programmes
1205	Employment Skills Programmes
1299	Other Mixed Field Programmes

Appendix C ASCED - Broad Level of Highest Non-School Qualification

Australian Standard Classification of Education (ASCED)			
Level of Education Classification (LOE) - Broad, Narrow and Detailed Fields			
1	POSTGRADUATE DEGREE LEVEL		
	11	Doctoral Degree Level	
		111	Higher Doctorate
		112	Doctorate by Research
		113	Doctorate by Coursework
		114	Professional Specialist Qualification at Doctoral Degree Level
		115	Statement of Attainment at Doctoral Degree Level
		116	Bridging and Enabling Course at Doctoral Degree Level
	12	Master Degree Level	
		121	Master Degree by Research
		122	Master Degree by Coursework
		123	Professional Specialist Qualification at Master Degree Level
		124	Statement of Attainment at Master Degree Level
		125	Bridging and Enabling Course at Master Degree Level
2	GRADUATE DIPLOMA AND GRADUATE CERTIFICATE LEVEL		
	21	Graduate Diploma Level	
		211	Graduate Diploma
		212	Graduate Qualifying or Preliminary
		213	Professional Specialist Qualification at Graduate Diploma Level
		214	Statement of Attainment at Graduate Diploma Level

		215	Bridging and Enabling Course at Graduate Diploma Level
	22	Graduate Certificate Level	
		221	Graduate Certificate
		222	Professional Specialist Qualification at Graduate Certificate Level
		223	Statement of Attainment at Graduate Certificate Level
		224	Bridging and Enabling Course at Graduate Certificate Level
3	BACHELOR DEGREE LEVEL		
	31	Bachelor Degree Level	
		311	Bachelor (Honours) Degree
		312	Bachelor (Pass) Degree
		313	Statement of Attainment at Bachelor Degree Level
		314	Bridging and Enabling Course at Bachelor Degree Level
4	ADVANCED DIPLOMA AND DIPLOMA LEVEL		
	41	Advanced Diploma and Associate Degree Level	
		411	Advanced Diploma
		412	Statement of Attainment at Advanced Diploma Level
		413	Associate Degree
		414	Statement of Attainment at Associate Degree Level
		415	Bridging and Enabling Course at Advanced Diploma and Associate Degree Level
	42	Diploma Level	
		421	Diploma
		422	Statement of Attainment at Diploma Level

		423	Bridging and Enabling Course at Diploma Level
5	CERTIFICATE LEVEL		
	51	Certificate III & IV Level	
		511	Certificate IV
		512	Statement of Attainment at Certificate IV Level
		513	Bridging and Enabling Course at Certificate IV Level
		514	Certificate III
		515	Statement of Attainment at Certificate III Level
		516	Bridging and Enabling Course at Certificate III Level
	52	Certificate I & II Level	
		521	Certificate II
		522	Statement of Attainment at Certificate II Level
		523	Bridging and Enabling Course at Certificate II Level
		524	Certificate I
		525	Statement of Attainment at Certificate I Level

Appendix D Matched Occupation and Field of Study codes

Occupation - ANZSIC 4 digit level	Field of Study at the Highest Non-School Qualification – 4 digit level
100 Managers nfd	any
111 Chief Executives, General Managers and Legislators	any
121 Farmers and Farm Managers	500, 501, 503, 507, 803
130 Specialist Managers nfd	100, 101, 200, 201, 203, 299, 300, 313, 301, 303, 305, 307, 309, 311, 400, 401, 403, 500, 505, 600, 603, 613, 700, 701, 703, 800, 801, 803, 805, 811, 899, 901, 903, 909, 919, 1007
131 Advertising, Public Relations and Sales Managers	803, 800, 805, 1007, 811, 899
132 Business Administration Managers	800, 801, 803, 811, 613, 703, 899, 901, 903, 909, 919
133 Construction, Distribution and Production Managers	107, 300, 301, 303, 305, 307, 309, 311, 313, 400, 401, 505, 403, 803, 899, 613
134 Education, Health and Welfare Services Managers	600, 603, 700, 701, 803, 905, 703, 799
135 ICT Managers	101, 803, 300, 200, 201, 203, 299, 313
139 Miscellaneous Specialist Managers	100, 105, 107, 199, 300, 307, 313, 803, 509, 911, 100
140 Hospitality, Retail and Service Managers nfd	801, 803, 1101, 1100
141 Accommodation and Hospitality Managers	803, 1101, 1100
142 Retail Managers	803, 805, 807, 1101, 1103, 605, 607, 609
149 Miscellaneous Hospitality, Retail and Service Managers	200, 300, 305, 307, 313, 800, 803, 811, 921, 403
200 Professionals nfd	any
210 Arts and Media Professionals nfd	1000, 1001, 1003, 1005, 1007, 915
211 Arts Professionals	1000, 1001, 1003, 1005, 1007
212 Media Professionals	915, 1007, 1000, 1001, 1005
220 Business, Human Resource and Marketing Professionals nfd	800, 801, 803, 805, 811, 909, 919, 700, 701, 703, 200, 101, 913, 899, 900, 901, 903, 907, 1007

221 Accountants, Auditors and Company Secretaries	800, 801, 803, 811, 919
222 Financial Brokers and Dealers, and Investment Advisers	800, 801, 803, 811, 919
223 Human Resource and Training Professionals	700, 701, 803, 703, 799, 200, 800
224 Information and Organisation Professionals	100, 811, 101, 200, 201, 800, 801, 803, 913, 919, 899, 900, 901, 903, 907, 909
225 Sales, Marketing and Public Relations Professionals	200, 300, 800, 803, 805, 1007, 1200, 1201, 1203, 1205, 1299
230 Design, Engineering, Science and Transport Professionals nfd	100, 107, 109, 199, 200, 201, 300, 303, 307, 309, 311, 313, 315, 317, 399, 400, 401, 403, 500, 503, 509, 507, 509, 601, 611, 505, 699, 599, 801, 1005, 1003, 1000, 1007
231 Air and Marine Transport Professionals	100, 300, 307, 315, 317, 399
232 Architects, Designers, Planners and Surveyors	311, 400, 401, 1005, 1003, 1007, 1000
233 Engineering Professionals	103, 107, 300, 303, 309, 307, 313, 315, 403
234 Natural and Physical Science Professionals	100, 103, 105, 107, 109, 199, 500, 501, 503, 509, 507, 601, 611, 505, 699, 599
240 Education Professionals nfd	700, 701, 799
241 School Teachers	1000, 1001, 1003, 100, 101, 103, 105, 107, 109, 199, 700, 701, 703, 799, 803, 903, 913, 915, 905
242 Tertiary Education Teachers	any
249 Miscellaneous Education Professionals	700, 701, 703, 901, 915, 1001, 799, 1000, 1003, 1005
250 Health Professionals nfd	100, 600, 601, 603, 607, 613, 617, 619, 699
251 Health Diagnostic and Promotion Professionals	100, 600, 603, 605, 609, 613, 615, 617, 699
252 Health Therapy Professionals	600, 607, 617, 619, 699
253 Medical Practitioners	600, 601, 603, 607, 613, 615, 617, 699
254 Midwifery and Nursing Professionals	600, 603, 613, 699
260 ICT Professionals nfd	100, 101, 103, 200, 201, 203, 299, 300, 313
261 Business and Systems Analysts, and Programmers	101, 103, 200, 201, 203, 300, 313, 101, 803

262 Database and Systems Administrators, and ICT Security Specialists	200, 201, 203, 299, 300, 313
263 ICT Network and Support Professionals	200, 201, 203, 300, 313
270 Legal, Social and Welfare Professionals nfd	613, 900, 901, 903, 905, 907, 909, 911
271 Legal Professionals	909, 911
272 Social and Welfare Professionals	900, 903, 905, 907, 917, 613, 700, 915
300 Technicians and Trades Workers nfd	100, 105, 109, 199, 103, 107, 109, 200, 201, 203, 299, 300, 301, 305, 307, 313, 399, 400, 401, 403, 500, 501, 503, 600, 603, 605, 613, 699, 507
310 Engineering, ICT and Science Technicians nfd	100, 101, 105, 109, 199, 300, 307, 313, 399
311 Agricultural, Medical and Science Technicians	100, 101, 105, 103, 107, 109, 199, 500, 501, 503, 509, 600, 603, 605, 613, 699, 507
312 Building and Engineering Technicians	300, 303, 307, 309, 313, 400, 401, 403
313 ICT and Telecommunications Technicians	200, 201, 203, 299, 300, 313, 1007
320 Automotive and Engineering Trades Workers nfd	300, 305, 307, 313, 399
321 Automotive Electricians and Mechanics	399, 300, 305, 307
322 Fabrication Engineering Trades Workers	300, 305, 307, 399
323 Mechanical Engineering Trades Workers	300, 305, 307, 313, 315, 399
324 Panelbeaters, and Vehicle Body Builders, Trimmers and Painters	300, 301, 305, 307, 399
330 Construction Trades Workers nfd	403
331 Bricklayers, and Carpenters and Joiners	403
332 Floor Finishers and Painting Trades Workers	403
333 Glaziers, Plasterers and Tilers	403
334 Plumbers	403
340 Electrotechnology and Telecommunications Trades Workers nfd	200, 307, 300, 313, 1007

341 Electricians	313
342 Electronics and Telecommunications Trades Workers	200, 300, 307, 313, 1007
351 Food Trades Workers	1101, 1100
360 Skilled Animal and Horticultural Workers nfd	500, 501, 503, 611, 1003
361 Animal Attendants and Trainers, and Shearers	501, 611
362 Horticultural Trades Workers	500, 503, 1003
390 Other Technicians and Trades Workers nfd	301, 307, 305, 403, 1005, 1103
391 Hairdressers	1103
392 Printing Trades Workers	301, 1005
393 Textile, Clothing and Footwear Trades Workers	301, 1005
394 Wood Trades Workers	301, 403
399 Miscellaneous Technicians and Trades Workers	300, 307, 313, 317, 403, 913, 1003, 1005, 1007, 609, 913, 1103
400 Community and Personal Service Workers nfd	600, 603, 607, 613, 615, 617, 699, 900, 905, 907, 1103
411 Health and Welfare Support Workers	600, 603, 607, 617, 699, 900, 905, 613, 615, 699, 907
420 Carers and Aides nfd	700, 701, 799, 600, 603, 607, 613, 617, 905,
421 Child Carers	700, 701, 905, 799
422 Education Aides	700, 701, 799, 905
423 Personal Carers and Assistants	600, 603, 607, 905, 617
431 Hospitality Workers	1100, 1101
440 Protective Service Workers nfd	905, 911, 999, 399, 505
441 Defence Force Members, Fire Fighters and Police	911, 399, 505, 999
442 Prison and Security Officers	911, 999
450 Sports and Personal Service Workers nfd	617, 619, 921
451 Personal Service and Travel Workers	807, 1103, 619
452 Sports and Fitness Workers	699, 921, 701, 100, 109

500 Clerical and Administrative Workers nfd	800, 803, 809, 899
510 Office Managers and Program Administrators nfd	800, 803, 899
511 Contract, Program and Project Administrators	800, 803, 899, 901
512 Office and Practice Managers	800, 803, 809, 899, 603, 605, 607, 609, 611
521 Personal Assistants and Secretaries	800, 803, 809, 899
530 General Clerical Workers nfd	800, 803, 809, 899
531 General Clerks	800, 803, 809, 899
532 Keyboard Operators	800, 803, 809, 899
540 Inquiry Clerks and Receptionists nfd	800, 803, 809, 899
541 Call or Contact Centre Information Clerks	200, 800, 803, 809, 905, 899
542 Receptionists	800, 803, 809, 1103, 899
550 Numerical Clerks nfd	800, 801, 803, 811, 899
551 Accounting Clerks and Bookkeepers	800, 801, 803, 809, 811, 899
552 Financial and Insurance Clerks	800, 801, 803, 811, 899
561 Clerical and Office Support Workers	800, 803, 809, 899
590 Other Clerical and Administrative Workers nfd	800, 803, 809, 899
591 Logistics Clerks	800, 803, 899
599 Miscellaneous Clerical and Administrative Workers	800, 801, 803, 809, 909, 911, 913, 899, 811, 911, 913
600 Sales Workers nfd	800, 803, 805, 811, 899
610 Sales Representatives and Agents nfd	800, 803, 805, 811, 899
611 Insurance Agents and Sales Representatives	800, 803, 805, 811, 899
612 Real Estate Sales Agents	800, 803, 805, 899
621 Sales Assistants and Salespersons	800, 803, 805, 1103, 899, 605
630 Sales Support Workers nfd	800, 803, 805, 1103, 899
631 Checkout Operators and Office Cashiers	800, 801, 803, 805, 809, 899
639 Miscellaneous Sales Support Workers	800, 803, 805, 807, 809, 1103, 899

700 Machinery Operators and Drivers nfd	300, 301, 305, 307, 399
710 Machine and Stationary Plant Operators nfd	300, 301, 305, 307, 399
711 Machine Operators	300, 301, 305, 307, 399
712 Stationary Plant Operators	300, 301, 303, 305, 307, 313, 399
721 Mobile Plant Operators	300, 305, 307, 399
730 Road and Rail Drivers nfd	300, 305, 307, 399
731 Automobile, Bus and Rail Drivers	300, 305, 307, 313, 399
732 Delivery Drivers	300, 305, 307, 399, 313
733 Truck Drivers	300, 305, 307, 313, 399
741 Storepersons	899, 803
800 Labourers nfd	403
811 Cleaners and Laundry Workers	899
821 Construction and Mining Labourers	403
830 Factory Process Workers nfd	303
831 Food Process Workers	303, 1100, 1101,
832 Packers and Product Assemblers	307, 313
839 Miscellaneous Factory Process Workers	307, 300, 301, 303
841 Farm, Forestry and Garden Workers	500, 501, 505
851 Food Preparation Assistants	1100, 1101
890 Other Labourers nfd	any
891 Freight Handlers and Shelf Fillers	any
899 Miscellaneous Labourers	any

Appendix E Skill utilisation formulas

	FoS Code (A)	EA code (B)	Occupation	Utilisation (D)	FoS MM	education mismatch
2	FoS Code	EA Code	100 Managers nfd	=IF(AND(A2>=1,B2<=3),"Y","N")	=IF(AND(D2="N", A2<100),"MISMATCH")	=IF(AND(D2="n",B2>3),"under-qualified")
3	FoS Code	EA Code	111 Chief Executives, General Managers and Legislators	=IF(AND(A3>=1,B3<=3),"Y","N")	=IF(AND(D3="N", A3<100),"MISMATCH")	=IF(AND(D3="n",B3>3),"under-qualified")
4	FoS Code	EA Code	121 Farmers and Farm Managers	=IF(OR(A4=500,A4=501,A4=503,A4=507,A4=803,A4=1200,A4=1205,A4=1201,A4=1203,A4=1299)*AND(B4<=3),"Y","N")	=IF(D4="n",AND(A4<>500, A4<>501,A4<>503,A4<>507,A4<>803,A4<>1200,A4<>1205,A4<>1201, A4<>1203,A4<>1299))	=IF(AND(D4="n",B4>3),"under-qualified")
5	FoS Code	EA Code	130 Specialist Managers nfd	=IF(OR(A5=100,A5=101,A5=200,A5=201,A5=203,A5=299,A5=300,A5=313,A5=301,A5=303,A5=305,A5=307,A5=309,A5=311,A5=400,A5=401,A5=403,A5=500,A5=505,A5=600,A5=603,A5=613,A5=700,A5=701,A	=IF(OR(A5=100,A5=101,A5=200,A5=201,A5=203,A5=299,A5=300,A5=313,A5=301,A5=30	=IF(AND(D5="n",B5>3),"under-qualified")

				5=703,A5=800,A5=801,A5=803,A5=805,A5=811,A5=899,A5=901,A5=903,A5=909,A5=919,A5=1007,A5=1200,A5=1205,A5=1201,A5=1203,A5=1299)*AND(B5<=3),"Y","N")	3,A5=305,A5=307,A5=309,A5=311,A5=400,A5=401,A5=403,A5=500,A5=505,A5=600,A5=603,A5=613,A5=700,A5=701,A5=703,A5=800,A5=801,A5=803,A5=805,A5=811,A5=899,A5=901,A5=903,A5=909,A5=919,A5=1007,A5=1200,A5=1205,A5=1201,A5=1203,A5=1299)*AND(B5<=3),"Y","N")	
6	FoS Code	EA Code	131 Advertising, Public Relations and Sales Managers	=IF(OR(A6=803,A6=800,A6=805,A6=1007,A6=811,A6=899,A6=1200,A6=1205,A6=1201,A6=1203,A6=1299)*AND(B6<=3),"Y","N")	=IF(D6="n",AND(A6<>803,A6<>800,A6<>805,A6<>1007,A6<>811,A6<>899,A6<>1200,A6<>1205,A6<>1201,A6<>1203,A6<>1299))	=IF(AND(D6="n",B6>3),"under-qualified")

7	FoS Code	EA Code	132 Business Administration Managers	=IF(OR(A7=800,A7=801,A7=803,A7=811,A7=613,A7=703,A7=899,A7=901,A7=903,A7=909,A7=919,A7=1200, A7=1201,A7=1203,A7=1205,A7=1299)*AND(B7<=3),"Y","N")	=IF(D7="n",AND(A7<>800,A7<>801,A7<>803,A7<>811,A7<>613,A7<>703,A7<>899,A7<>901,A7<>903,A7<>909,A7<>919,A7<>1200, A7<>1201,A7<>1203,A7<>1205,A7<>1299))	=IF(AND(D7="n",B7>3),"under-qualified")
8	FoS Code	EA Code	133 Construction, Distribution and Production Managers	=IF(OR(A8=107,A8=300,A8=301,A8=303,A8=305,A8=307,A8=309,A8=311,A9108=313,A8=400,A8=401,A8=505,A8=403,A8=8903,A8=899,A8=613,A8=1200,A8=1201,A8=1203,A8=1205,A8=1299)*AND(B8<=3),"Y","N")	=IF(D8="n",AND(A8<>107,A8<>300,A8<>301,A8<>303,A8<>305,A8<>307,A8<>309,A8<>311,A8<>313,A8<>400,A8<>401,A8<>505,A8<>403, A8<>803,A8<>899,A8<>613,A8<>1200,A8<>1201,A8<>1203,A8<>1205,A8<>1299))	=IF(AND(D8="n",B8>3),"under-qualified")
10	FoS Code	EA Code	134 Education, Health and Welfare	=IF(OR(A9=600,A9=603,A9=700,A9=701,A9=803,A9=905,A9=703,A9=799,A9=1200,	=IF(D9="n",AND(A9<>600,A9<>603,A9<>700,A9<>701,A9<>799,A9<>	=IF(AND(D9="n",B9>3),"under-qualified")

			Services Managers	A9=1201,A9=1203,A9=1205,A9=1299)*AND(B9<=3),"Y","N")	803,A9<>905,A9<>703,A9<>1200,A9<>1201,A9<>1203,A9<>1205,A9<>1299))	
11	FoS Code	EA Code	135 ICT Managers	=IF(OR(A10=101,A10=803,A10=300,A10=200,A10=201,A10=203,A10=299,A10=313,A10=1200,A10=1201,A10=1203,A10=1205,A10=1299)*AND(B10<=3),"Y","N")	=IF(D10="n",AND(A10<>101,A10<>803,A10<>300,A10<>200,A10<>201,A10<>203,A10<>299,A10<>313,A10<>1200,A10<>1201,A10<>1203,A10<>1205,A10<>1299))	=IF(AND(D10="n",B10>3),"under-qualified")
12	FoS Code	EA Code	139 Miscellaneous Specialist Managers	=IF(OR(A11=100,A11=105,A11=107,A11=199,A11=300,A11=307,A11=313,A11=803,A11=509,A11=911,A11=100,A11=1200,A11=1201,A11=1203,A11=1205,A11=1299)*AND(B11<=3),"Y","N")	=IF(D11="n",AND(A11<>100,A11<>105,A11<>107,A11<>199,A11<>300,A11<>307,A11<>313,A11<>803,A11<>509,A11<>911,A11<>1200,A11<>1201,A11<>1203,A11<>1205,A11<>1299))	=IF(AND(D11="n",B11>3),"under-qualified")

13	FoS Code	EA Code	140 Hospitality, Retail and Service Managers nfd	=IF(OR(A12=801,A12=803,A12=1101,A12=1100,A12=1200,A12=1201,A12=1203,A12=1205,A12=1299)*AND(B12=4),"Y","N")	=IF(D12="n",AND(A12<>801,A12<>803,A12<>1101,A12<>1100,A12<>1200,A12<>1201,A12<>1203,A12<>1205,A12<>1299))	=IF(AND(D12="n",B12<3),"over-qualified")
14	FoS Code	EA Code	141 Accommodation and Hospitality Managers	=IF(OR(A13=803,A13=1101,A13=1100,A13=1200,A13=1201,A13=1203,A13=1205,A13=1299)*AND(B13=4),"Y","N")	=IF(D13="n",AND(A13<>803,A13<>1101,A13<>1100,A13<>1200,A13<>1201,A13<>1203,A13<>1205,A13<>1299))	=IF(AND(D13="n",B13<3),"over-qualified")
15	FoS Code	EA Code	142 Retail Managers	=IF(OR(A14=803,A14=805,A14=807,A14=1101,A14=1103,A14=605,A14=607,A14=A600,A14=1200,A14=1201,A14=1203,A14=1205,A14=1299)*AND(B14=4),"Y","N")	=IF(D14="n",AND(A14<>803,A14<>805,A14<>807,A14<>1101,A14<>1103,A14<>605,A14<>607,A14<>609,A14<>1200,A14<>1201,A14<>1203,A14<>1205,A14<>1299))	=IF(AND(D14="n",B14<3),"over-qualified")
16	FoS Code	EA Code	149 Miscellaneous Hospitality,	=IF(OR(A15=200,A15=300,A15=305,A15=307,A15=313,A15=403,A15=800,A15=803,A15=811,A15=921,A15=1200,A15=1201,A	=IF(D15="n",AND(A15<>200,A15<>300,A15<>305,A1	=IF(AND(D15="n",B15<3),"over-qualified")

			Retail and Service Managers	15=1203,A15=1205,A15=1299)*AND(B15=4),"Y","N")	5<>307,A15<>313,A15<>403,A15<>800,A15<>803,A15<>811,A15<>921,A15<>1200,A15<>1201,A15<>1203,A15<>1205,A15<>1299))	
17	FoS Code	EA Code	200 Professionals nfd	=IF(AND(A16>=1,B16<=3),"Y","N")	=IF(AND(D16="N",A16<100),"MISMATCH")	=IF(AND(D16="n",B16>3),"under-qualified")
18	FoS Code	EA Code	210 Arts and Media Professionals nfd	=IF(OR(A17=915,A17=1000,A17=1001,A17=1003,A17=1005,A17=1007,A17=1200,A17=1201,A17=1203,A17=1205,A17=1299)*AND(B17<=3),"Y","N")	=IF(D17="n",AND(A17<>915,A17<>1000,A17<>1001,A17<>1003,A17<>1005,A17<>1007,A17<>1200,A17<>1201,A17<>1203,A17<>1205,A17<>1299))	=IF(AND(D17="n",B17>3),"under-qualified")
19	FoS Code	EA Code	211 Arts Professionals	=IF(OR(A18=1000,A18=1001,A18=1003,A18=1005,A18=1007,A18=1200,A18=1201,A18=1203,A18=1205,A18=1299)*AND(B18<=3),"Y","N")	=IF(D18="n",AND(A18<>1000,A18<>1001,A18<>1003,A18<>1005,A18<>1007,A18<>1200,A18<>1201,A18<	=IF(AND(D18="n",B18>3),"under-qualified")

					>1203,A18<>1205,A18<>1299))	
20	FoS Code	EA Code	212 Media Professionals	=IF(OR(A19=1000,A19=1001,A19=1005,A19=1007,A19=915,A19=1200,A19=1201,A19=1203,A19=1205,A19=1299)*AND(B19<=3),"Y","N")	=IF(D19="n",AND(A19<>1000,A19<>1001,A19<>1005,A19<>1007,A19<>915,A19<>1200,A19<>1201,A19<>1203,A19<>1205,A19<>1299))	=IF(AND(D19="n",B19>3),"under-qualified")
21	FoS Code	EA Code	220 Business, Human Resource and Marketing Professionals nfd	=IF(OR(A20=800,A20=801,A20=803,A20=805,A20=811,A20=909,A20=919,A20=700,A20=701,A20=703,A20=200,A20=101,A20=913,A20=899,A20=900,A20=901,A20=903,A20=907,A20=1200,A20=1201,A20=1203,A20=1205,A20=1299,A20=1007)*AND(B20<=3),"Y","N")	=IF(D20="n",AND(A20<>800,A20<>801,A20<>803,A20<>805,A20<>811,A20<>909,A20<>919,A20<>1007,A20<>700,A20<>701,A20<>703,A20<>200,A20<>101,A20<>913,A20<>899,A20<>900,A20<>901,A20<>903,A20<>907,A20<>1200,A20<>1201,A20<>1203,A20<>1205,A20<>1299))	=IF(AND(D20="n",B20>3),"under-qualified")

22	FoS Code	EA Code	221 Accountants, Auditors and Company Secretaries	=IF(OR(A21=800,A21=801,A21=803,A21=811,A21=919,A21=1200,A21=1201,A21=1203,A21=1205,A21=1299)*AND(B21<=3),"Y","N")	=IF(D21="n",AND(A21<>800,A21<>801,A21<>803,A21<>811,A21<>919,A21<>1200,A21<>1201,A21<>1203,A21<>1205,A21<>1299))	=IF(AND(D21="n",B21>3),"under-qualified")
23	FoS Code	EA Code	222 Financial Brokers and Dealers, and Investment Advisers	=IF(OR(A22=800,A22=801,A22=803,A22=811,A22=919,A22=1200,A22=1201,A22=1203,A22=1205,A22=1299)*AND(B22<=4),"Y","N")	=IF(D22="n",AND(A22<>800,A22<>801,A22<>803,A22<>811,A22<>919,A22<>1200,A22<>1201,A22<>1203,A22<>1205,A22<>1299))	=IF(AND(D22="n",B22>3),"under-qualified")
24	FoS Code	EA Code	223 Human Resource and Training Professionals	=IF(OR(A23=700,A23=701,A23=803,A23=703,A23=799,A23=200,A23=800,A23=1200,A23=1201,A23=1203,A23=1205,A23=1299)*AND(B23<=3),"Y","N")	=IF(D23="n",AND(A23<>700,A23<>701,A23<>803,A23<>703,A23<>799,A23<>200,A23<>800,A23<>1200,A23<>1201,A23<>1203,A23<>1205,A23<>1299))	=IF(AND(D23="n",B23>3),"under-qualified")
25	FoS Code	EA Code	224 Information	=IF(OR(A24=100,A24=201,A24=811,A24=101,A24=200,A24=800,A24=801,A24=803,	=IF(D24="n",AND(A24<>100,A24<>	=IF(AND(D24="n",B24>3),"under-qualified")

			and Organisation Professionals	A24=913,A24=919,A24=899,A24=900,A24=901,A24=903,A24=907,A24=909,A24=1200,A24=1201,A24=1203,A24=1205,A24=1299)*AND(B24<=3),"Y","N")	201,A24<>811,A24<>101,A24<>200,A24<>800,A24<>801,A24<>803,A24<>913,A24<>919,A24<>899,A24<>900,A24<>901,A24<>903,A24<>907,A24<>909,A24<>1200,A24<>1201,A24<>1203,A24<>1205,A24<>1299))	
26	FoS Code	EA Code	225 Sales, Marketing and Public Relations Professionals	=IF(OR(A25=200,A25=203,A25=300,A25=800,A25=803,A25=805,A25=1007,A25=1200,A25=1201,A25=1203,A25=1205,A25=1299)*AND(B25<=3), "Y","N")	=IF(D25="n",AND(A25<>200,A25<>203,A25<>300,A25<>800,A25<>803,A25<>805,A25<>1007,A25<>909,A25<>1200,A25<>1201,A25<>1203,A25<>1205,A25<>1299))	=IF(AND(D25="n",B25>3),"under-qualified")
27	FoS Code	EA Code	230 Design, Engineering, Science and Transport	=IF(OR(A26=100,A26=107,A26=109,A26=199,A26=200,A26=300,A26=303,A26=307,A26=309,A26=311,A26=313,A26=315,A26=317,A26=399,A26=400,A26=401,A26=403,A26=500,A26=503,A26=509,A26=507,A	=IF(D26="n",AND(A26<>100,A26<>107,A26<>109,A26<>199,A26<>200,A26<>300,A26<>	=IF(AND(D26="n",B26>3),"under-qualified")

			Professionals nfd	26=509,A26=601,A26=611,A26=505,A26=699,A26=599,A26=801,A26=1005,A26=1003,A26=1000,A26=1007,A26=1200,A26=1201,A26=1203,A26=1205,A26=1299)*AND(B26<=3),"Y","N")	303,A26<>307,A26<>309,A26<>311,A26<>313,A26<>315,A26<>317,A26<>399,A26<>400,A26<>401,A26<>403,A26<>500,A26<>503,A26<>509,A26<>507,A26<>509,A26<>601,A26<>611,A26<>505,A26<>699,A26<>599,A26<>801,A26<>1005,A26<>1003,A26<>1000,A26<>1007,A26<>1200,A26<>1201,A26<>1203,A26<>1205,A26<>1299))	
28	FoS Code	EA Code	231 Air and Marine Transport Professionals	=IF(OR(A27=100,A27=300,A27=307,A27=315,A27=317,A27=399,A27=1200,A27=1201,A27=1203,A27=1205,A27=1299)*AND(B27<=3),"Y","N")	=IF(D27="n",AND(A27<>100,A27<>300,A27<>307,A27<>315,A27<>317,A27<>399,A27<>1200,A27<>1201,A27<>1203,A27<>1205,A27<>1299))	=IF(AND(D27="n",B27>3),"under-qualified")

29	FoS Code	EA Code	232 Architects, Designers, Planners and Surveyors	=IF(OR(A28=311,A28=400,A28=401,A28=1005,A28=1003,A28=1007,A28=1000,A28=1200,A28=1201,A28=1203,A28=1205,A28=1299)*AND(B28<=3),"Y","N")	=IF(D28="n",AND(A28<>311,A28<>400,A28<>401,A28<>1005,A28<>1003,A28<>1007,A28<>1000,A28<>1200,A28<>1201,A28<>1203,A28<>1205,A28<>1299))	=IF(AND(D28="n",B28>3),"under-qualified")
30	FoS Code	EA Code	233 Engineering Professionals	=IF(OR(A29=103,A29=107,A29=300,A29=303,A29=309,A29=307,A29=313,A29=315,A29=403,A29=1200,A29=1201,A29=1203,A29=1205,A29=1299)*AND(B29<=3),"Y","N")	=IF(D29="n",AND(A29<>103,A29<>107,A29<>300,A29<>303,A29<>309,A29<>307,A29<>313,A29<>315,A29<>403,A29<>1200,A29<>1201,A29<>1203,A29<>1205,A29<>1299))	=IF(AND(D29="n",B29>3),"under-qualified")
31	FoS Code	EA Code	234 Natural and Physical Science Professionals	=IF(OR(A30=100,A30=103,A30=105,A30=107,A30=109,A30=199,A30=500,A30=501,A30=503,A30=509,A30=507,A30=601,A30=611,A30=505,A30=699,A30=599,A30=1200,A30=1201,A30=1203,A30=1205,A30=1299)*AND(B30<=3),"Y","N")	=IF(D30="n",AND(A30<>100,A30<>103,A30<>105,A30<>107,A30<>109,A30<>199,A30<>500,A30<>501,A30<>503,A30<>509,A30<>507,A30<>601,A30<>611,A3	=IF(AND(D30="n",B30>3),"under-qualified")

					0<>505,A30<>699,A30<>599,A30<>1200,A30<>1201,A30<>1203,A30<>1205,A30<>1299))	
32	FoS Code	EA Code	240 Education Professionals nfd	=IF(OR(A31=700,A31=701,A31=799,A31=1200,A31=1201,A31=1203,A31=1205,A31=1299)*AND(B31<=3),"Y","N")	=IF(D31="n",AND(A31<>700,A31<>701,A31<>799,A31<>1200,A31<>1201,A31<>1203,A31<>1205,A31<>1299))	=IF(AND(D31="n",B31>3),"under-qualified")
33	FoS Code	EA Code	241 School Teachers	=IF(OR(A32=1000,A32=1001,A32=1003,A32=100,A32=101,A32=103,A32=105,A32=107,A32=109,A32=199,A32=700,A32=701,A32=703,A32=799,A32=803,A32=903,A32=913,A32=915,A32=905,A32=1200,A32=1201,A32=1203,A32=1205,A32=1299)*AND(B32<=3),"Y","N")	=IF(D32="n",AND(A32<>1000,A32<>1001,A32<>1003,A32<>100,A32<>101,A32<>103,A32<>105,A32<>107,A32<>109,A32<>199,A32<>700,A32<>701,A32<>703,A32<>799,A32<>803,A32<>903,A32<>913,A32<>915,A32<>905,A32<>1200,A32<>1201,A32<>1203,A32<	=IF(AND(D32="n",B32>3),"under-qualified")

					>1205,A32<>1299))	
34	FoS Code	EA Code	242 Tertiary Education Teachers	=IF(AND(A33>=1,B33<=3),"Y","N")	=IF(AND(D33="N",A33<100),"MISMATCH")	=IF(AND(D33="n",B33>3),"under-qualified")
	FoS Code	EA Code	249 Miscellaneous Education Professionals	=IF(OR(A34=700,A34=701,A34=703,A34=901,A34=915,A34=1001,A34=799,A34=1000,A34=1003,A34=1005,A34=1200,A34=1201,A34=1203,A34=1205,A34=1299)*AND(B34<=3),"Y","N")	=IF(D34="n",AND(A34<>700,A34<>701,A34<>703,A34<>901,A34<>915,A34<>1001,A34<>799,A34<>1000,A34<>1003,A34<>1005,A34<>1200,A34<>1201,A34<>1203,A34<>1205,A34<>1299))	=IF(AND(D34="n",B34>3),"under-qualified")
35	FoS Code	EA Code	250 Health Professionals nfd	=IF(OR(A35=100,A35=600,A35=601,A35=603,A35=607,A35=613,A35=617,A35=619,A35=699,A35=1200,A35=1201,A35=1203,A35=1205,A35=1299)*AND(B35<=3),"Y","N")	=IF(D35="n",AND(A35<>100,A35<>600,A35<>601,A35<>603,A35<>607,A35<>613,A35<>617,A35<>619,A35<>699,A35<>1200,A35<>1201,A35<>1203,A35<>1205,A35<>1299))	=IF(AND(D35="n",B35>3),"under-qualified")

36	FoS Code	EA Code	251 Health Diagnostic and Promotion Professionals	=IF(OR(A36=100,A36=600,A36=603,A36=605,A36=609,A36=613,A36=615,A36=617,A36=699,A36=1200,A36=1201,A36=1203,A36=1205,A36=1299)*AND(B36<=3),"Y","N")	=IF(D36="n",AND(A36<>100,A36<>600,A36<>603,A36<>605,A36<>609,A36<>613,A36<>615,A36<>617,A36<>699,A36<>1200,A36<>1201,A36<>1203,A36<>1205,A36<>1299))	=IF(AND(D36="n",B36>3),"under-qualified")
37	FoS Code	EA Code	252 Health Therapy Professionals	=IF(OR(A37=600,A37=607,A37=617,A37=619,A37=699,A37=1200,A37=1201,A37=1203,A37=1205,A37=1299)*AND(B37<=3),"Y","N")	=IF(D37="n",AND(A37<>600,A37<>607,A37<>617,A37<>699,A37<>619,A37<>1200,A37<>1201,A37<>1203,A37<>1205,A37<>1299))	=IF(AND(D37="n",B37>3),"under-qualified")
38	FoS Code	EA Code	253 Medical Practitioners	=IF(OR(A38=600,A38=601,A38=603,A38=607,A38=613,A38=615,A38=617,A38=699,A38=1200,A38=1201,A38=1203,A38=1205,A38=1299)*AND(B38<=3),"Y","N")	=IF(D38="n",AND(A38<>600,A38<>601,A38<>603,A38<>607,A38<>613,A38<>615,A38<>617,A38<>699,A38<>1200,A38<>1201,A38<>1203,A3	=IF(AND(D38="n",B38>3),"under-qualified")

					8<>1205,A38<>1299))	
39	FoS Code	EA Code	254 Midwifery and Nursing Professionals	=IF(OR(A39=600,A39=603,A39=613,A39=699,A39=1200,A39=1201,A39=1203,A39=1205,A39=1299)*AND(B39<=3),"Y","N")	=IF(D39="n",AND(A39<>600,A39<>603,A39<>613,A39<>699,A39<>1200,A39<>1201,A39<>1203,A39<>1205,A39<>1299))	=IF(AND(D39="n",B39>3),"under-qualified")
40	FoS Code	EA Code	260 ICT Professionals nfd	=IF(OR(A40=100,A40=101,A40=103,A40=200,A40=201,A40=203,A40=299,A40=300,A40=313,A40=1200,A40=1201,A40=1203,A40=1205,A40=1299)*AND(B40<=3),"Y","N")	=IF(D40="n",AND(A40<>100,A40<>101,A40<>103,A40<>200,A40<>201,A40<>203,A40<>299,A40<>300,A40<>313,A40<>1200,A40<>1201,A40<>1203,A40<>1205,A40<>1299))	=IF(AND(D40="n",B40>3),"under-qualified")
41	FoS Code	EA Code	261 Business and Systems Analysts, and Programmers	=IF(OR(A41=101,A41=103,A41=200,A41=201,A41=203,A41=300,A41=313,A41=803,A41=1200,A41=1201,A41=1203,A41=1205,A41=1299)*AND(B41<=3),"Y","N")	=IF(D41="n",AND(A41<>101,A41<>103,A41<>200,A41<>201,A41<>203,A41<>300,A41<>313,A41<>803,A41<>1200,A41<>1201,A41<>1203,A4	=IF(AND(D41="n",B41>3),"under-qualified")

					1<>1205,A41<>1299))	
42	FoS Code	EA Code	262 Database and Systems Administrators, and ICT Security Specialists	=IF(OR(A42=200,A42=201,A42=203,A42=299,A42=300,A42=313,A42=1200,A42=1201,A42=1203,A42=1205,A42=1299)*AND(B42<=3),"Y","N")	=IF(D42="n",AND(A42<>200,A42<>201,A42<>203,A42<>299,A42<>300,A42<>313,A42<>1200,A42<>1201,A42<>1203,A42<>1205,A42<>1299))	=IF(AND(D42="n",B42>3),"under-qualified")
43	FoS Code	EA Code	263 ICT Network and Support Professionals	=IF(OR(A43=200,A43=201,A43=203,A43=300,A43=313,A43=1200,A43=1201,A43=1203,A43=1205,A43=1299)*AND(B43<=3),"Y","N")	=IF(D43="n",AND(A43<>200,A43<>201,A43<>203,A43<>300,A43<>313,A43<>1200,A43<>1201,A43<>1203,A43<>1205,A43<>1299))	=IF(AND(D43="n",B43>3),"under-qualified")
44	FoS Code	EA Code	270 Legal, Social and Welfare Professionals nfd	=IF(OR(A44=613,A44=900,A44=901,A44=903,A44=905,A44=907,A44=909,A44=911,A44=1200,A44=1201,A44=1203,A44=1205,A44=1299)*AND(B44<=3),"Y","N")	=IF(D44="n",AND(A44<>613,A44<>900,A44<>901,A44<>903,A44<>905,A44<>907,A44<>909,A44<>911,A44<>1200,A44<>1201,A44<>1203,A4	=IF(AND(D44="n",B44>3),"under-qualified")

					4<>1205,A44<>1299))	
45	FoS Code	EA Code	271 Legal Professionals	=IF(OR(A45=909,A45=911,A45=1200,A45=1201,A45=1203,A45=1205,A45=1299)*AND(B45<=3),"Y","N")	=IF(D45="n",AND(A45<>909,A45<>911,A45<>1200,A45<>1201,A45<>1203,A45<>1205,A45<>1299))	=IF(AND(D45="n",B45>3),"under-qualified")
46	FoS Code	EA Code	272 Social and Welfare Professionals	=IF(OR(A46=900,A46=903,A46=905,A46=907,A46=917,A46=613,A46=700,A46=915,A45=1200,A45=1201,A45=1203,A45=1205,A45=1299)*AND(B46<=3),"Y","N")	=IF(D46="n",AND(A46<>900,A46<>903,A46<>905,A46<>907,A46<>917,A46<>613,A46<>700,A46<>915,A45<>1200,A45<>1201,A45<>1203,A45<>1205,A45<>1299))	=IF(AND(D46="n",B46>3),"under-qualified")
47	FoS Code	EA Code	300 Technicians and Trades Workers nfd	=IF(OR(A47=100,A47=105,A47=109,A47=199,A47=103,A47=107,A47=109,A47=200,A47=201,A47=203,A47=299,A47=300,A47=301,A47=305,A47=307,A47=313,A47=399,A47=400,A47=401,A47=403,A47=500,A47=501,A47=503,A47=600,A47=603,A47=605,A47=613,A47=699,A47=507,A47=1200,A47=1201,A47=1203,A47=1205,A47=1299)*AND(B47=4),"Y","N")	=IF(D47="n",AND(A47<>100,A47<>105,A47<>109,A47<>199,A47<>103,A47<>107,A47<>109,A47<>200,A47<>201,A47<>203,A47<>299,A47<>300,A47<>301,A4	=IF(AND(D47="n",B47<4),"over-qualified")

					7<>305,A47<>307,A47<>313,A47<>399,A47<>400,A47<>401,A47<>403,A47<>500,A47<>501,A47<>503,A47<>600,A47<>603,A47<>605,A47<>613,A47<>699,A47<>507,A47<>1200,A47<>1201,A47<>1203,A47<>1205,A47<>1299))	
48	FoS Code	EA Code	310 Engineering, ICT and Science Technicians nfd	=IF(OR(A48=100,A48=101,A48=105,A48=109,A48=199,A48=300,A48=307,A48=313,A48=399,A48=1200,A48=1201,A48=1203,A48=1205,A48=1299)*AND(B48=4),"Y","N")	=IF(D48="n",AND(A48<>100,A48<>101,A48<>105,A48<>109,A48<>199,A48<>300,A48<>307,A48<>313,A48<>399,A48<>1200,A48<>1201,A48<>1203,A48<>1205,A48<>1299))	=IF(AND(D48="n",B48<4),"over-qualified")
49	FoS Code	EA Code	311 Agricultural, Medical and	=IF(OR(A49=100,A49=101,A49=105,A49=103,A49=107,A49=109,A49=199,A49=500,A49=501,A49=509,A49=503,A49=600,A49=603,A49=605,A49=613,A49=699,A49=50	=IF(D49="n",AND(A49<>100,A49<>105,A49<>101,A49<>103,A49<>107,A49<>109,A49<>	=IF(AND(D49="n",B49<4),"over-qualified")

			Science Technicians	7,A49=1200,A49=1201,A49=1203,A49=1205,A49=1299)*AND(B49=4),"Y","N")	199,A49<>509,A49<>500,A49<>501,A49<>503,A49<>600,A49<>603,A49<>605,A49<>613,A49<>699,A49<>507,A49<>1200,A49<>1201,A49<>1203,A49<>1205,A49<>1299))	
50	FoS Code	EA Code	312 Building and Engineering Technicians	=IF(OR(A50=300,A50=303,A50=307,A50=309,A50=313,A50=400,A50=401,A50=403,A50=1200,A50=1201,A50=1203,A50=1205,A50=1299)*AND(B50=4),"Y","N")	=IF(D50="n",AND(A50<>300,A50<>303,A50<>307,A50<>309,A50<>313,A50<>400,A50<>401,A50<>403,A50<>1200,A50<>1201,A50<>1203,A50<>1205,A50<>1299))	=IF(AND(D50="n",B50<4),"over-qualified")
51	FoS Code	EA Code	313 ICT and Telecommunications Technicians	=IF(OR(A51=200,A51=201,A51=203,A51=299,A51=300,A51=313,A51=1200,A51=1201,A51=1203,A51=1205,A51=1299,A51=1007)*AND(B51=4),"Y","N")	=IF(D51="n",AND(A51<>1007,A51<>200,A51<>201,A51<>203,A51<>299,A51<>300,A51<>313,A51<>1200,A51<>1201,A51<	=IF(AND(D51="n",B51<4),"over-qualified")

					>1203,A51<>1205,A51<>1299))	
52	FoS Code	EA Code	320 Automotive and Engineering Trades Workers nfd	=IF(OR(A52=300,A52=305,A52=307,A52=313,A52=399,A52=1200,A52=1201,A52=1203,A52=1205,A52=1299)*AND(B52=5),"Y","N")	=IF(D52="n",AND(A52<>300,A52<>305,A52<>307,A52<>313,A52<>399,A52<>1200,A52<>1201,A52<>1203,A52<>1205,A52<>1299))	=IF(AND(D52="n",B52<5),"over-qualified")
53	FoS Code	EA Code	321 Automotive Electricians and Mechanics	=IF(OR(A53=300,A53=305,A53=307,A53=313,A53=399,A53=1200,A53=1201,A53=1203,A53=1205,A53=1299)*AND(B53=5),"Y","N")	=IF(D53="n",AND(A53<>300,A53<>305,A53<>307,A53<>313,A53<>399,A53<>1200,A53<>1201,A53<>1203,A53<>1205,A53<>1299))	=IF(AND(D53="n",B53<5),"over-qualified")
54	FoS Code	EA Code	322 Fabrication Engineering Trades Workers	=IF(OR(A54=300,A54=305,A54=307,A54=399,A54=1200,A54=1201,A54=1203,A54=1205,A54=1299)*AND(B54=5),"Y","N")	=IF(D54="n",AND(A54<>300,A54<>305,A54<>307,A54<>399,A54<>1200,A54<>1201,A54<>1203,A54<>1205,A54<>1299))	=IF(AND(D54="n",B54<5),"over-qualified")
55	FoS Code	EA Code	323 Mechanical	=IF(OR(A55=300,A55=305,A55=307,A55=313,A55=315,A55=399,A55=1200,A55=120	=IF(D55="n",AND(A55<>300,A55<>	=IF(AND(D55="n",B55<5),"over-qualified")

			Engineering Trades Workers	1,A55=1203,A55=1205,A55=1299)*AND(B55=5),"Y","N")	305,A55<>307,A55<>313,A55<>315,A55<>399,A55<>1200,A55<>1201,A55<>1203,A55<>1205,A55<>1299))	
56	FoS Code	EA Code	324 Panelbeaters, and Vehicle Body Builders, Trimmers and Painters	=IF(OR(A56=300,A56=301,A56=305,A56=307,A56=399,A56=1200,A56=1201,A56=1203,A56=1205,A56=1299)*AND(B56=5),"Y","N")	=IF(D56="n",AND(A56<>300,A56<>301,A56<>305,A56<>307,A56<>399,A56<>1200,A56<>1201,A56<>1203,A56<>1205,A56<>1299))	=IF(AND(D56="n",B56<5),"over-qualified")
57	FoS Code	EA Code	330 Construction Trades Workers nfd	=IF(OR(A57=403,A57=1200,A57=1201,A57=1203,A57=1205,A57=1299)*AND(B57=5),"Y","N")	=IF(D57="n",AND(A57<>403,A57<>1200,A57<>1201,A57<>1203,A57<>1205,A57<>1299))	=IF(AND(D57="n",B57<5),"over-qualified")
58	FoS Code	EA Code	331 Bricklayers, and Carpenters and Joiners	=IF(OR(A58=403,A58=1200,A58=1201,A58=1203,A58=1205,A58=1299)*AND(B58=5),"Y","N")	=IF(D58="n",AND(A58<>403,A58<>1200,A58<>1201,A58<>1203,A58<>1205,A58<>1299))	=IF(AND(D58="n",B58<5),"over-qualified")

59	FoS Code	EA Code	332 Floor Finishers and Painting Trades Workers	=IF(OR(A59=403,A59=1200,A59=1201,A59=1203,A59=1205,A59=1299)*AND(B59=5),"Y","N")	=IF(D59="n",AND(A59<>403,A59<>1200,A59<>1201,A59<>1203,A59<>1205,A59<>1299))	=IF(AND(D59="n",B59<5),"over-qualified")
60	FoS Code	EA Code	333 Glaziers, Plasterers and Tilers	=IF(OR(A60=403,A60=1200,A60=1201,A60=1203,A60=1205,A60=1299)*AND(B60=5),"Y","N")	=IF(D60="n",AND(A60<>403,A60<>1200,A60<>1201,A60<>1203,A60<>1205,A60<>1299))	=IF(AND(D60="n",B60<5),"over-qualified")
61	FoS Code	EA Code	334 Plumbers	=IF(OR(A61=403,A61=1200,A61=1201,A61=1203,A61=1205,A61=1299)*AND(B61=5),"Y","N")	=IF(D61="n",AND(A61<>403,A61<>1200,A61<>1201,A61<>1203,A61<>1205,A61<>1299))	=IF(AND(D61="n",B61<5),"over-qualified")
62	FoS Code	EA Code	340 Electrotechnology and Telecommunications Trades Workers nfd	=IF(OR(A62=200,A62=307,A62=300,A62=313,A62=1007,A62=1200,A62=1201,A62=1203,A62=1205,A62=1299)*AND(B62=5),"Y","N")	=IF(D62="n",AND(A62<>200,A62<>307,A62<>300,A62<>313,A62<>1007,A62<>1200,A62<>1201,A62<>1203,A62<>1205,A62<>1299))	=IF(AND(D62="n",B62<5),"over-qualified")

63	FoS Code	EA Code	341 Electricians	=IF(OR(A63=313,A63=1200,A63=1201,A63=1203,A63=1205,A63=1299)*AND(B63=5),"Y","N")	=IF(D63="n",AND(A63<>313,A63<>1200,A63<>1201,A63<>1203,A63<>1205,A63<>1299))	=IF(AND(D63="n",B63<5),"over-qualified")
64	FoS Code	EA Code	342 Electronics and Telecommunications Trades Workers	=IF(OR(A64=1007,A64=200,A64=300,A64=307,A64=313,A64=1200,A64=1201,A64=1203,A64=1205,A64=1299)*AND(B64=5),"Y","N")	=IF(D64="n",AND(A62<>1007,A64<>200,A64<>300,A64<>307,A64<>313,A64<>1200,A64<>1201,A64<>1203,A64<>1205,A64<>1299))	=IF(AND(D64="n",B64<5),"over-qualified")
65	FoS Code	EA Code	351 Food Trades Workers	=IF(OR(A65=1101,A65=1000,A65=1200,A65=1201,A65=1203,A65=1205,A65=1299)*OR(B65=4,B65=5),"Y","N")	=IF(D65="n",AND(A65<>1101,A65<>1100,A65<>1200,A65<>1201,A65<>1203,A65<>1205,A65<>1299))	=IF(AND(D65="n",B65<4),"over-qualified")
66	FoS Code	EA Code	360 Skilled Animal and Horticultural Workers nfd	=IF(OR(A66=500,A66=501,A66=503,A66=611,A66=1003,A66=1200,A66=1201,A66=1203,A66=1205,A66=1299)*AND(B66=5),"Y","N")	=IF(D66="n",AND(A66<>500,A66<>501,A66<>503,A66<>611,A66<>1003,A66<>1200,A66<>1201,A66<>120	=IF(AND(D66="n",B66<5),"over-qualified")

					3,A66<>1205,A66<>1299))	
67	FoS Code	EA Code	361 Animal Attendants and Trainers, and Shearers	=IF(OR(A67=501,A67=611,A67=1200,A67=1201,A67=1203,A67=1205,A67=1299)*AND(B67=5),"Y","N")	=IF(D67="n",AND(A67<>501,A67<>611,A67<>1200,A67<>1201,A67<>1203,A67<>1205,A67<>1299))	=IF(AND(D67="n",B67<5),"over-qualified")
68	FoS Code	EA Code	362 Horticultural Trades Workers	=IF(OR(A68=500,A68=503,A68=1003,A68=1200,A68=1201,A68=1203,A68=1205,A68=1299)*AND(B68=5),"Y","N")	=IF(D68="n",AND(A68<>500,A68<>503,A68<>1003,A68<>1200,A68<>1201,A68<>1203,A68<>1205,A68<>1299))	=IF(AND(D68="n",B68<5),"over-qualified")
69	FoS Code	EA Code	390 Other Technicians and Trades Workers nfd	=IF(OR(A69=301,A69=307,A69=305,A69=403,A69=1005,A69=1103,A69=1200,A69=1201,A69=1203,A69=1205,A69=1299)*AND(B69=5),"Y","N")	=IF(D69="n",AND(A69<>301,A69<>307,A69<>305,A69<>403,A69<>1005,A69<>1103,A69<>1200,A69<>1201,A69<>1203,A69<>1205,A69<>1299))	=IF(AND(D69="n",B69<5),"over-qualified")
70	FoS Code	EA Code	391 Hairdressers	=IF(OR(A70=1103,A70=1200,A70=1201,A70=1203,A70=1205,A70=1299)*AND(B70=5),"Y","N")	=IF(D70="n",AND(A70<>1103,A70<>1200,A70<>1201	=IF(AND(D70="n",B70<5),"over-qualified")

					,A70<>1203,A70<>1205,A70<>1299))	
71	FoS Code	EA Code	392 Printing Trades Workers	=IF(OR(A71=301,A71=1005,A71=1200,A71=1201,A71=1203,A71=1205,A71=1299)*AND(B71=5),"Y","N")	=IF(D71="n",AND(A71<>301,A71<>1005,A71<>1200,A71<>1201,A71<>1203,A71<>1205,A71<>1299))	=IF(AND(D71="n",B71<5),"over-qualified")
72	FoS Code	EA Code	393 Textile, Clothing and Footwear Trades Workers	=IF(OR(A72=301,A72=1005,A72=1200,A72=1201,A72=1203,A72=1205,A72=1299)*AND(B72=5),"Y","N")	=IF(D72="n",AND(A72<>301,A72<>1005,A72<>301,A72<>1005,A72<>1200,A72<>1201,A72<>1203,A72<>1205,A72<>1299))	=IF(AND(D72="n",B72<5),"over-qualified")
73	FoS Code	EA Code	394 Wood Trades Workers	=IF(OR(A73=301,A73=403,A73=1200,A73=1201,A73=1203,A73=1205,A73=1299)*AND(B73=5),"Y","N")	=IF(D73="n",AND(A73<>301,A73<>403,A73<>1200,A73<>1201,A73<>1203,A73<>1205,A73<>1299))	=IF(AND(D73="n",B73<5),"over-qualified")
74	FoS Code	EA Code	399 Miscellaneous Technicians and Trades Workers	=IF(OR(A74=300,A74=307,A74=313,A74=317,A74=403,A74=913,A74=1003,A74=1005,A74=1007,A74=609,A74=913,A74=1103,A74=1200,A74=1201,A74=1203,A74=1205,A74=1299)*AND(B74=5),"Y","N")	=IF(D74="n",AND(A74<>300,A74<>307,A74<>313,A74<>317,A74<>403,A74<>913,A74<>	=IF(AND(D74="n",B74<4),"over-qualified")

					1003,A74<>1005,A74<>1007,A74<>609,A74<>913,A74<>1103,A74<>1200,A74<>1201,A74<>1203,A74<>1205,A74<>1299))	
75	FoS Code	EA Code	400 Community and Personal Service Workers nfd	=IF(OR(A75=600,A75=603,A75=607,A75=613,A75=615,A75=617,A75=699,A75=900,A75=905,A75=907,A75=1103,A75=1200,A75=1201,A75=1203,A75=1205,A75=1299)*AND(B75=4),"Y","N")	=IF(D75="n",AND(A75<>600,A75<>603,A75<>607,A75<>613,A75<>615,A75<>617,A75<>699,A75<>900,A75<>905,A75<>907,A75<>1103,A75<>1200,A75<>1201,A75<>1203,A75<>1205,A75<>1299))	=IF(AND(D75="n",B75<4),"over-qualified")
76	FoS Code	EA Code	411 Health and Welfare Support Workers	=IF(OR(A76=600,A76=603,A76=607,A76=617,A76=699,A76=900,A76=905,A76=613,A76=615,A76=699,A76=907,A76=1200,A76=1201,A76=1203,A76=1205,A76=1299)*AND(B76=4),"Y","N")	=IF(D76="n",AND(A76<>600,A76<>603,A76<>607,A76<>617,A76<>699,A76<>900,A76<>905,A76<>613,A76<>615,A76<>699,A76<>907,A76<>1200,A76<>1201,	=IF(AND(D76="n",B76<4),"over-qualified")

					A76<>1203,A76<>1205,A76<>1299))	
77	FoS Code	EA Code	420 Carers and Aides nfd	=IF(OR(A77=700,A77=701,A77=799,A77=600,A77=603,A77=607,A77=613,A77=617,A77=905,A77=1200,A77=1201,A77=1203,A77=1205,A77=1299)*AND(B77=5),"Y","N")	=IF(D77="n",AND(A77<>700,A77<>701,A77<>799,A77<>600,A77<>603,A77<>607,A77<>613,A77<>617,A77<>905,A77<>1200,A77<>1201,A77<>1203,A77<>1205,A77<>1299))	=IF(AND(D77="n",B77<5),"over-qualified")
78	FoS Code	EA Code	421 Child Carers	=IF(OR(A78=700,A78=701,A78=905,A78=799,A78=1200,A78=1201,A78=1203,A78=1205,A78=1299)*AND(B78=5),"Y","N")	=IF(D78="n",AND(A78<>700,A78<>701,A78<>905,A78<>799,A78<>1200,A78<>1201,A78<>1203,A78<>1205,A78<>1299))	=IF(AND(D78="n",B78<5),"over-qualified")
79	FoS Code	EA Code	422 Education Aides	=IF(OR(A79=700,A79=701,A79=799,A79=905,A79=1200,A79=1201,A79=1203,A79=1205,A79=1299)*AND(B79=5),"Y","N")	=IF(D79="n",AND(A79<>700,A79<>701,A79<>799,A79<>905,A79<>1200,A79<>1201,A79<>1203,A79<>1205,A79<>1299))	=IF(AND(D79="n",B79<5),"over-qualified")

80	FoS Code	EA Code	423 Personal Carers and Assistants	=IF(OR(A80=600,A80=603,A80=607,A80=905,A80=617,A80=1200,A80=1201,A80=1203,A80=1205,A80=1299)*AND(B80=5),"Y","N")	=IF(D80="n",AND(A80<>600,A80<>603,A80<>607,A80<>905,A80<>617,A80<>1200,A80<>1201,A80<>1203,A80<>1205,A80<>1299))	=IF(AND(D80="n",B80<5),"over-qualified")
81	FoS Code	EA Code	431 Hospitality Workers	=IF(OR(A81=1100,A81=1101,A81=1200,A81=1201,A81=1203,A81=1205,A81=1299)*AND(B81=5),"Y","N")	=IF(D81="n",AND(A81<>1100,A81<>1101,A81<>1200,A81<>1201,A81<>1203,A81<>1205,A81<>1299))	=IF(AND(D81="n",B81<5),"over-qualified")
82	FoS Code	EA Code	440 Protective Service Workers nfd	=IF(OR(A82=905,A82=911,A82=999,A82=399,A82=505,A82=1200,A82=1201,A82=1203,A82=1205,A82=1299)*OR(B82=4,B82=5),"Y","N")	=IF(D82="n",AND(A82<>905,A82<>911,A82<>999,A82<>399,A82<>505,A82<>1005,A82<>1200,A82<>1201,A82<>1203,A82<>1205,A82<>1299))	=IF(AND(D82="n",B82<5),"over-qualified")
83	FoS Code	EA Code	441 Defence Force Members,	=IF(OR(A83=911,A83=399,A83=505,A83=999,A83=1200,A83=1201,A83=1203,A83=1205,A83=1299)*OR(B83>=4),"Y","N")	=IF(D83="n",AND(A83<>911,A83<>399,A83<>505,A83<>999,A83<>120	=IF(AND(D83="n",B83<4),"over-qualified")

			Fire Fighters and Police		0,A83<>1201,A83<>1203,A83<>1205,A83<>1299))	
84	FoS Code	EA Code	442 Prison and Security Officers	=IF(OR(A84=911,A84=999,A84=1200,A84=1201,A84=1203,A84=1205,A84=1299)*AND(B84=5),"Y","N")	=IF(D84="n",AND(A84<>911,A84<>999,A84<>1200,A84<>1201,A84<>1203,A84<>1205,A84<>1299))	=IF(AND(D84="n",B84<5),"over-qualified")
85	FoS Code	EA Code	450 Sports and Personal Service Workers nfd	=IF(OR(A85=617,A85=619,A85=921,A85=1200,A85=1201,A85=1203,A85=1205,A85=1299)*AND(B85=5),"Y","N")	=IF(D85="n",AND(A85<>617,A85<>619,A85<>921,A85<>1200,A85<>1201,A85<>1203,A85<>1205,A85<>1299))	=IF(AND(D85="n",B85<5),"over-qualified")
86	FoS Code	EA Code	451 Personal Service and Travel Workers	=IF(OR(A86=807,A86=1103,A86=619,A86=1200,A86=1201,A86=1203,A86=1205,A86=1299)*AND(B86=5),"Y","N")	=IF(D86="n",AND(A86<>807,A86<>1103,A86<>619,A86<>1200,A86<>1201,A86<>1203,A86<>1205,A86<>1299))	=IF(AND(D86="n",B86<5),"over-qualified")
87	FoS Code	EA Code	452 Sports and Fitness Workers	=IF(OR(A87=699,A87=921,A87=701,A87=100,A87=109,A87=1200,A87=1201,A87=1203,A87=1205,A87=1299)*AND(B87=5),"Y","N")	=IF(D87="n",AND(A87<>699,A87<>921,A87<>701,A87<>100,A87<>109	=IF(AND(D87="n",B87<5),"over-qualified")

					,A87<>1200,A87<>1201,A87<>1203,A87<>1205,A87<>1299))	
88	FoS Code	EA Code	500 Clerical and Administrative Workers nfd	=IF(OR(A88=800,A88=803,A88=809,A88=899,A88=1200,A88=1201,A88=1203,A88=1205,A88=1299)*AND(B88>=4),"Y","N")	=IF(D88="n",AND(A88<>800,A88<>803,A88<>809,A88<>899,A88<>1200,A88<>1201,A88<>1203,A88<>1205,A88<>1299))	=IF(AND(D88="n")*OR(B88<4),"over-qualified")
89	FoS Code	EA Code	510 Office Managers and Program Administrators nfd	=IF(OR(A89=800,A89=803,A89=899,A89=1200,A89=1201,A89=1203,A89=1205,A89=1299)*AND(B89=4),"Y","N")	=IF(D89="n",AND(A89<>800,A89<>803,A89<>899,A89<>1200,A89<>1201,A89<>1203,A89<>1205,A89<>1299))	=IF(AND(D89="n",B89<4),"over-qualified")
90	FoS Code	EA Code	511 Contract, Program and Project Administrators	=IF(OR(A90=800,A90=803,A90=899,A90=901,A90=1200,A90=1201,A90=1203,A90=1205,A90=1299)*AND(B90=4),"Y","N")	=IF(D90="n",AND(A90<>800,A90<>803,A90<>899,A90<>901,A90<>1200,A90<>1201,A90<>1203,A90<>1205,A90<>1299))	=IF(AND(D90="n",B90<4),"over-qualified")

91	FoS Code	EA Code	512 Office and Practice Managers	=IF(OR(A91=800,A91=803,A91=809,A91=899,A91=603,A91=605,A91=607,A91=609,A91=611,A91=1200,A91=1201,A91=1203,A91=1205,A91=1299)*AND(B91=4),"Y","N")	=IF(D91="n",AND(A91<>800,A91<>803,A91<>809,A91<>899,A91<>603,A91<>605,A91<>607,A91<>609,A91<>611,A91<>1200,A91<>1201,A91<>1203,A91<>1205,A91<>1299))	=IF(AND(D91="n",B91<4),"over-qualified")
92	FoS Code	EA Code	521 Personal Assistants and Secretaries	=IF(OR(A92=800,A92=803,A92=809,A92=899,A92=1200,A92=1201,A92=1203,A92=1205,A92=1299)*AND(B92=5),"Y","N")	=IF(D92="n",AND(A92<>800,A92<>803,A92<>809,A92<>899,A92<>1200,A92<>1201,A92<>1203,A92<>1205,A92<>1299))	=IF(AND(D92="n",B92<5),"over-qualified")
93	FoS Code	EA Code	530 General Clerical Workers nfd	=IF(OR(A93=800,A93=803,A93=809,A93=899,A93=1200,A93=1201,A93=1203,A93=1205,A93=1299)*AND(B93=5),"Y","N")	=IF(D93="n",AND(A93<>800,A93<>803,A93<>809,A93<>899,A93<>1200,A93<>1201,A93<>1203,A93<>1205,A93<>1299))	=IF(AND(D93="n",B93<5),"over-qualified")
94	FoS Code	EA Code	531 General Clerks	=IF(OR(A94=800,A94=803,A94=809,A94=899,A94=1200,A94=1201,A94=1203,A94=1205,A94=1299)*AND(B94=5),"Y","N")	=IF(D94="n",AND(A94<>800,A94<>803,A94<>809,A9	=IF(AND(D94="n",B94<5),"over-qualified")

					4<>899,A94<>1200,A94<>1201,A94<>1203,A94<>1205,A94<>1299))	
95	FoS Code	EA Code	532 Keyboard Operators	=IF(OR(A95=800,A95=803,A95=809,A95=899,A95=1200,A95=1201,A95=1203,A95=1205,A95=1299)*AND(B95=5),"Y","N")	=IF(D95="n",AND(A95<>800,A95<>803,A95<>809,A95<>899,A95<>1200,A95<>1201,A95<>1203,A95<>1205,A95<>1299))	=IF(AND(D95="n",B95<5),"over-qualified")
96	FoS Code	EA Code	540 Inquiry Clerks and Receptionists nfd	=IF(OR(A96=800,A96=803,A96=809,A96=899,A96=1200,A96=1201,A96=1203,A96=1205,A96=1299)*AND(B96=5),"Y","N")	=IF(D96="n",AND(A96<>800,A96<>803,A96<>809,A96<>899,A96<>1200,A96<>1201,A96<>1203,A96<>1205,A96<>1299))	=IF(AND(D96="n",B96<5),"over-qualified")
97	FoS Code	EA Code	541 Call or Contact Centre Information Clerks	=IF(OR(A97=200,A97=800,A97=803,A97=809,A97=905,A97=899,A97=1200,A97=1201,A97=1203,A97=1205,A97=1299)*AND(B97=5),"Y","N")	=IF(D97="n",AND(A97<>200,A97<>800,A97<>803,A97<>809,A97<>905,A97<>899,A97<>1200,A97<>1201,A97<>1203,A97<>1205,A97<>1299))	=IF(AND(D97="n",B97<5),"over-qualified")

98	FoS Code	EA Code	542 Receptionists	=IF(OR(A98=800,A98=803,A98=809,A98=1103,A98=899,A98=1200,A98=1201,A98=1203,A98=1205,A98=1299)*AND(B98=5),"Y","N")	=IF(D98="n",AND(A98<>800,A98<>803,A98<>809,A98<>1103,A98<>899,A98<>1200,A98<>1201,A98<>1203,A98<>1205,A98<>1299))	=IF(AND(D98="n",B98<5),"over-qualified")
99	FoS Code	EA Code	550 Numerical Clerks nfd	=IF(OR(A99=800,A99=801,A99=803,A99=811,A99=899,A99=1200,A99=1201,A99=1203,A99=1205,A99=1299)*AND(B99=5),"Y","N")	=IF(D99="n",AND(A99<>800,A99<>801,A99<>803,A99<>811,A99<>899,A99<>1200,A99<>1201,A99<>1203,A99<>1205,A99<>1299))	=IF(AND(D99="n",B99<5),"over-qualified")
100	FoS Code	EA Code	551 Accounting Clerks and Bookkeepers	=IF(OR(A100=800,A100=801,A100=803,A100=809,A100=811,A100=899,A100=1200,A100=1201,A100=1203,A100=1205,A100=1299)*AND(B100=5),"Y","N")	=IF(D100="n",AND(A100<>800,A100<>801,A100<>803,A100<>809,A100<>811,A100<>899,A100<>1200,A100<>1201,A100<>1203,A100<>1205,A100<>1299))	=IF(AND(D100="n",B100<5),"over-qualified")
101	FoS Code	EA Code	552 Financial and	=IF(OR(A101=800,A101=801,A101=803,A101=811,A101=899,A101=1200,A101=120	=IF(D101="n",AND(A101<>800,A10	=IF(AND(D101="n",B101<5),"over-qualified")

			Insurance Clerks	1,A101=1203,A101=1205,A101=1299)*AND(B101=5),"Y","N")	1<>801,A101<>803,A101<>811,A101<>899,A101<>1200,A101<>1201,A101<>1203,A101<>1205,A101<>1299))	
102	FoS Code	EA Code	561 Clerical and Office Support Workers	=IF(OR(A102=800,A102=803,A102=809,A102=899,A102=1200,A102=1201,A102=1203,A102=1205,A102=1299)*AND(B102=5),"Y","N")	=IF(D102="n",AND(A102<>800,A102<>803,A102<>809,A102<>899,A102<>1200,A102<>1201,A102<>1203,A102<>1205,A102<>1299))	=IF(AND(D102="n",B102<5),"over-qualified")
103	FoS Code	EA Code	590 Other Clerical and Administrative Workers nfd	=IF(OR(A103=800,A103=803,A103=809,A103=899,A103=1200,A103=1201,A103=1203,A103=1205,A103=1299)*AND(B103=5),"Y","N")	=IF(D103="n",AND(A103<>800,A103<>803,A103<>809,A103<>899,A103<>1200,A103<>1201,A103<>1203,A103<>1205,A103<>1299))	=IF(AND(D103="n",B103<5),"over-qualified")
104	FoS Code	EA Code	591 Logistics Clerks	=IF(OR(A104=800,A104=803,A104=899,A104=1200,A104=1201,A104=1203,A104=1205,A104=1299)*AND(B104=5),"Y","N")	=IF(D104="n",AND(A104<>800,A104<>803,A104<>899,A104<>1200,A1	=IF(AND(D104="n",B104<5),"over-qualified")

					04<>1201,A104<>1203,A104<>1205,A104<>1299))	
105	FoS Code	EA Code	599 Miscellaneous Clerical and Administrative Workers	=IF(OR(A105=800,A105=801,A105=803,A105=809,A105=909,A105=911,A105=913,A105=899,A105=811,A105=911,A105=913,A105=1200,A105=1201,A105=1203,A105=1205,A105=1299)*OR(B105>=4),"Y","N")	=IF(D105="n",AND(A105<>800,A105<>801,A105<>803,A105<>809,A105<>909,A105<>911,A105<>913,A105<>899,A105<>811,A105<>911,A105<>913,A105<>1200,A105<>1201,A105<>1203,A105<>1205,A105<>1299))	=IF(AND(D105="n")*OR(B105<4),"over-qualified")
106	FoS Code	EA Code	600 Sales Workers nfd	=IF(OR(A106=800,A106=803,A106=805,A106=811,A106=899,A106=1200,A106=1201,A106=1203,A106=1205,A106=1299)*AND(B106=5),"Y","N")	=IF(D106="n",AND(A106<>800,A106<>803,A106<>805,A106<>811,A106<>899,A106<>1200,A106<>1201,A106<>1203,A106<>1205,A106<>1299))	=IF(AND(D106="n",B106<5),"over-qualified")
107	FoS Code	EA Code	610 Sales Representati	=IF(OR(A107=800,A107=803,A107=805,A107=811,A107=899,A107=1200,A107=120	=IF(D107="n",AND(A107<>800,A10	=IF(AND(D107="n",B107<5),"over-qualified")

			ves and Agents nfd	1,A107=1203,A107=1205,A107=1299)*AND(B107=5),"Y","N")	7<>803,A107<>805,A107<>811,A107<>899,A107<>1200,A107<>1201,A107<>1203,A107<>1205,A107<>1299))	
108	FoS Code	EA Code	611 Insurance Agents and Sales Representatives	=IF(OR(A108=800,A108=803,A108=805,A108=811,A108=899,A108=1200,A108=1201,A108=1203,A108=1205,A108=1299)*AND(B108=5),"Y","N")	=IF(D108="n",AND(A108<>800,A108<>803,A108<>805,A108<>811,A108<>899,A108<>1200,A108<>1201,A108<>1203,A108<>1205,A108<>1299))	=IF(AND(D108="n",B108<5),"over-qualified")
109	FoS Code	EA Code	612 Real Estate Sales Agents	=IF(OR(A109=800,A109=803,A109=805,A109=899,A109=1200,A109=1201,A109=1203,A109=1205,A109=1299)*AND(B109=5),"Y","N")	=IF(D109="n",AND(A109<>800,A109<>803,A109<>805,A109<>899,A109<>1200,A109<>1201,A109<>1203,A109<>1205,A109<>1299))	=IF(AND(D109="n",B109<5),"over-qualified")
110	FoS Code	EA Code	621 Sales Assistants	=IF(OR(A110=800,A110=803,A110=805,A110=1103,A110=899,A110=605,A110=120	=IF(D110="n",AND(A110<>800,A110<>803,A110<>80	=IF(AND(D110="n",B110<5),"over-qualified")

			and Salespersons	0,A110=1201,A110=1203,A110=1205,A110=1299)*AND(B110=5),"Y","N")	5,A110<>1103,A110<>899,A110<>605,A110<>1200,A110<>1201,A110<>1203,A110<>1205,A110<>1299))	
111	FoS Code	EA Code	630 Sales Support Workers nfd	=IF(OR(A111=800,A111=803,A111=805,A111=1103,A111=899,A111=1200,A111=1201,A111=1203,A111=1205,A111=1299)*AND(B111=5),"Y","N")	=IF(D111="n",AND(A111<>800,A111<>803,A111<>805,A111<>1103,A111<>899,A111<>1200,A111<>1201,A111<>1203,A111<>1205,A111<>1299))	=IF(AND(D111="n",B111<5),"over-qualified")
112	FoS Code	EA Code	631 Checkout Operators and Office Cashiers	=IF(OR(A112=800,A112=801,A112=803,A112=805,A112=809,A112=899,A112=1200,A112=1201,A112=1203,A112=1205,A112=1299)*AND(B112=5),"Y","N")	=IF(D112="n",AND(A112<>800,A112<>801,A112<>803,A112<>805,A112<>809,A112<>899,A112<>1200,A112<>1201,A112<>1203,A112<>1205,A112<>1299))	=IF(AND(D112="n",B112<5),"over-qualified")
113	FoS Code	EA Code	639 Miscellaneous Sales	=IF(OR(A113=800,A113=803,A113=805,A113=807,A113=809,A113=1103,A113=899,A113=1200,A113=1201,A113=1203,A113	=IF(D113="n",AND(A113<>800,A113<>803,A113<>80	=IF(AND(D113="n",B113<5),"over-qualified")

			Support Workers	=1205,A113=1299)*AND(B113=5),"Y","N")	5,A113<>807,A113<>809,A113<>1103,A113<>899,A113<>1200,A113<>1201,A113<>1203,A113<>1205,A113<>1299))	
114	FoS Code	EA Code	700 Machinery Operators and Drivers nfd	=IF(OR(A114=300,A114=301,A114=305,A114=307,A114=399,A114=1200,A114=1201,A114=1203,A114=1205,A114=1299)*AND(B114=5),"Y","N")	=IF(D114="n",AND(A114<>300,A114<>301,A114<>305,A114<>307,A114<>399,A114<>1200,A114<>1201,A114<>1203,A114<>1205,A114<>1299))	=IF(AND(D114="n",B114<5),"over-qualified")
115	FoS Code	EA Code	710 Machine and Stationary Plant Operators nfd	=IF(OR(A115=300,A115=301,A115=305,A115=307,A115=399,A115=1200,A115=1201,A115=1203,A115=1205,A115=1299)*AND(B115=5),"Y","N")	=IF(D115="n",AND(A115<>300,A115<>301,A115<>305,A115<>307,A115<>399,A115<>1200,A115<>1201,A115<>1203,A115<>1205,A115<>1299))	=IF(AND(D115="n",B115<5),"over-qualified")
116	FoS Code	EA Code	711 Machine Operators	=IF(OR(A116=300,A116=301,A116=305,A116=307,A116=399,A116=1200,A116=120	=IF(D116="n",AND(A116<>300,A11	=IF(AND(D116="n",B116<5),"over-qualified")

				1,A116=1203,A116=1205,A116=1299)*AND(B116=5),"Y","N")	6<>301,A116<>305,A116<>307,A116<>399,A116<>1200,A116<>1201,A116<>1203,A116<>1205,A116<>1299))	
117	FoS Code	EA Code	712 Stationary Plant Operators	=IF(OR(A117=300,A117=301,A117=303,A117=305,A117=307,A117=313,A117=399,A117=1200,A117=1201,A117=1203,A117=1205,A117=1299)*AND(B117=5),"Y","N")	=IF(D117="n",AND(A117<>300,A117<>301,A117<>303,A117<>305,A117<>307,A117<>313,A117<>399,A117<>1200,A117<>1201,A117<>1203,A117<>1205,A117<>1299))	=IF(AND(D117="n",B117<5),"over-qualified")
118	FoS Code	EA Code	721 Mobile Plant Operators	=IF(OR(A118=300,A118=305,A118=307,A118=399,A118=1200,A118=1201,A118=1203,A118=1205,A118=1299)*AND(B118=5),"Y","N")	=IF(D118="n",AND(A118<>300,A118<>305,A118<>307,A118<>399,A118<>1200,A118<>1201,A118<>1203,A118<>1205,A118<>1299))	=IF(AND(D118="n",B118<5),"over-qualified")

119	FoS Code	EA Code	730 Road and Rail Drivers nfd	=IF(OR(A119=300,A119=305,A119=307,A119=399,A119=1200,A119=1201,A119=1203,A119=1205,A119=1299)*AND(B119=5),"Y","N")	=IF(D119="n",AND(A119<>300,A119<>305,A119<>307,A119<>399,A119<>1200,A119<>1201,A119<>1203,A119<>1205,A119<>1299))	=IF(AND(D119="n",B119<5),"over-qualified")
120	FoS Code	EA Code	731 Automobile, Bus and Rail Drivers	=IF(OR(A120=300,A120=305,A120=307,A120=313,A120=399,A120=1200,A120=1201,A120=1203,A120=1205,A120=1299)*AND(B120=5),"Y","N")	=IF(D120="n",AND(A120<>300,A120<>305,A120<>307,A120<>313,A120<>399,A120<>1200,A120<>1201,A120<>1203,A120<>1205,A120<>1299))	=IF(AND(D120="n",B120<5),"over-qualified")
121	FoS Code	EA Code	732 Delivery Drivers	=IF(OR(A121=300,A121=305,A121=307,A121=313,A121=399,A121=1200,A121=1201,A121=1203,A121=1205,A121=1299)*AND(B121=5),"Y","N")	=IF(D121="n",AND(A121<>300,A121<>305,A121<>307,A121<>313,A121<>399,A121<>1200,A121<>1201,A121<>1203,A121<>1205,A121<>1299))	=IF(AND(D121="n",B121<5),"over-qualified")

122	FoS Code	EA Code	733 Truck Drivers	=IF(OR(A122=300,A122=305,A122=307,A122=313,A122=399,A122=1200,A122=1201,A122=1203,A122=1205,A122=1299)*AND(B122=5),"Y","N")	=IF(D122="n",AND(A122<>300,A122<>305,A122<>307,A122<>313,A122<>399,A122<>1200,A122<>1201,A122<>1203,A122<>1205,A122<>1299))	=IF(AND(D122="n",B122<5),"over-qualified")
123	FoS Code	EA Code	741 Storepersons	=IF(OR(A123=899,A123=803,A123=1200,A123=1201,A123=1203,A123=1205,A123=1299)*AND(B123=5),"Y","N")	=IF(D123="n",AND(A123<>899,A123<>803,A123<>1200,A123<>1201,A123<>1203,A123<>1205,A123<>1299))	=IF(AND(D123="n",B123<5),"over-qualified")
124	FoS Code	EA Code	800 Labourers nfd	=IF(OR(A124=403,A124=1200,A124=1201,A124=1203,A124=1205,A124=1299)*AND(B124=5),"Y","N")	=IF(D124="n",AND(A124<>403,A124<>1200,A124<>1201,A124<>1203,A124<>1205,A124<>1299))	=IF(AND(D124="n",B124<5),"over-qualified")
125	FoS Code	EA Code	811 Cleaners and Laundry Workers	=IF(OR(A125=899,A125=1200,A125=1201,A125=1203,A125=1205,A125=1299)*AND(B125=5),"Y","N")	=IF(D125="n",AND(A125<>899,A125<>1200,A125<>1201,A125<>1203,	=IF(AND(D125="n",B125<5),"over-qualified")

					A125<>1205,A125<>1299))	
126	FoS Code	EA Code	821 Construction and Mining Labourers	=IF(OR(A126=403,A126=1200,A126=1201,A126=1203,A126=1205,A126=1299)*AND(B126=5),"Y","N")	=IF(D126="n",AND(A126<>403,A126<>1200,A126<>1201,A126<>1203,A126<>1205,A126<>1299))	=IF(AND(D126="n",B126<5),"over-qualified")
127	FoS Code	EA Code	830 Factory Process Workers nfd	=IF(OR(A127=303,A127=1200,A127=1201,A127=1203,A127=1205,A127=1299)*AND(B127=5),"Y","N")	=IF(D127="n",AND(A127<>303,A127<>1200,A127<>1201,A127<>1203,A127<>1205,A127<>1299))	=IF(AND(D127="n",B127<5),"over-qualified")
128	FoS Code	EA Code	831 Food Process Workers	=IF(OR(A128=303,A128=1100,A128=1101,A128=1200,A128=1201,A128=1203,A128=1205,A128=1299)*AND(B128=5),"Y","N")	=IF(D128="n",AND(A128<>303,A128<>1100,A128<>1101,A128<>1200,A128<>1201,A128<>1203,A128<>1205,A128<>1299))	=IF(AND(D128="n",B128<5),"over-qualified")
129	FoS Code	EA Code	832 Packers and Product Assemblers	=IF(OR(A129=307,A129=313,A129=1200,A129=1201,A129=1203,A129=1205,A129=1299)*AND(B129=5),"Y","N")	=IF(D129="n",AND(A129<>307,A129<>313,A129<>1200,A129<>1201,A129<>1203,A129<	=IF(AND(D129="n",B129<5),"over-qualified")

					>1205,A129<>1299))	
130	FoS Code	EA Code	839 Miscellaneous Factory Process Workers	=IF(OR(A130=307,A130=300,A130=301,A130=303,A130=1200,A130=1201,A130=1203,A130=1205,A130=1299)*AND(B130=5),"Y","N")	=IF(D130="n",AND(A130<>307,A130<>300,A130<>301,A130<>303,A130<>1200,A130<>1201,A130<>1203,A130<>1205,A130<>1299))	=IF(AND(D130="n",B130<5),"over-qualified")
131	FoS Code	EA Code	841 Farm, Forestry and Garden Workers	=IF(OR(A131=500,A131=501,A131=505,A131=1200,A131=1201,A131=1203,A131=1205,A131=1299)*AND(B131=5),"Y","N")	=IF(D131="n",AND(A131<>500,A131<>501,A131<>505,A131<>1200,A131<>1201,A131<>1203,A131<>1205,A131<>1299))	=IF(AND(D131="n",B131<5),"over-qualified")
132	FoS Code	EA Code	851 Food Preparation Assistants	=IF(OR(A132=1100,A132=1101,A132=1200,A132=1201,A132=1203,A132=1205,A132=1299)*AND(B132=5),"Y","N")	=IF(D132="n",AND(A132<>1100,A132<>1101,A132<>1200,A132<>1201,A132<>1203,A132<>1205,A132<>1299))	=IF(AND(D132="n",B132<5),"over-qualified")
133	FoS Code	EA Code	890 Other Labourers nfd	=IF(OR(A133=403,A133=1200,A133=1201,A133=1203,A133=1205,A133=1299)*AND(B133=5),"Y","N")	=IF(D133="n",AND(A133<>403,A133<>1200,A133<>1	=IF(AND(D133="n",B133<5),"over-qualified")

					201,A133<>1203,A133<>1205,A133<>1299))	
134	FoS Code	EA Code	891 Freight Handlers and Shelf Fillers	=IF(OR(A134=500,A134=501,A134=503,A134=611,A134=1003,A134=1200,A134=1201,A134=1203,A134=1205,A134=1299)*AND(B134=5),"Y","N")	=IF(D134="n",AND(A134<>500,A134<>501,A134<>503,A134<>611,A134<>1003,A134<>1200,A134<>1201,A134<>1203,A134<>1205,A134<>1299))	=IF(AND(D134="n",B134<5),"over-qualified")
135	FoS Code	EA Code	899 Miscellaneous Labourers	=IF(OR(A135=500,A135=501,A135=503,A135=611,A135=1003,A135=1200,A135=1201,A135=1203,A135=1205,A135=1299)*AND(B135=5),"Y","N")	=IF(D135="n",AND(A135<>500,A135<>501,A135<>503,A135<>611,A135<>1003,A135<>1200,A135<>1201,A135<>1203,A135<>1205,A135<>1299))	=IF(AND(D135="n",B135<5),"over-qualified")
136	FoS Code	EA Code	Not employed	N	=IF(D136="n",AND(A136>1))	=IF(AND(D136="n",B136<=5),"over-qualified")

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