WHY BECOME SELF-EMPLOYED?

A Microeconomic Analysis of Self-employment in the Australian Labour Market

by

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ABSTRACT

In Australia, almost 20% of the workforce is usually self-employed in one form or another. To put this into context, this is more than the number of workers usually unemployed or in the public-sector. However, there exists very little in the way of a theoretical understanding about why people choose to be self-employed rather than work (or search for work) as an employee, or an empirical consensus around the determinants or factors that motivate workers to become self-employed. Self-employment is routinely dismissed or ignored in labour economics research, especially Australian research, and, instead, is most often considered in the economics literature more broadly as a quantitative measure of entrepreneurship. This Thesis attempts to inform the broader purpose of self-employment in the functioning of the labour market and economy in two ways. First, it challenges the prevailing notion of self-employment as a form of entrepreneurship by testing the validity of the explanations derived from the entrepreneurial literature for the appeal of self-employment. Second, it recasts self-employment as a normal part of the labour market equilibrating process, and investigates whether the choice of self-employment is instead better explained by the same economic forces that are thought to cause voluntary job-change more broadly. Central to analysing these contrasting theoretical perspectives is the use of longitudinal data, together with econometric dynamic panel modelling corrected for sources of bias, to capture the causal impact of a worker's past employment outcomes on the future prospect of them being self-employed. The key finding to emerge is the lack of empirical support for the entrepreneurial explanation of self-employment when compared against the strength of the evidence in support of the alternative labour economics rationale. That is, learning on-the-job and the accumulation of firm-specific human-capital play an important role in determining the choice of self-employment. This is in contrast to much of the prevailing economic understanding of self-employment, and suggests that employees learn and acquire skills and knowhow through their experience on-the-job, which they later transfer to self-employment — a very satisfying genesis or root cause explanation for how people become self-employed.

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed,

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Darcy Daniel Fitzpatrick

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This Thesis uses unit record data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Australian Government Department of Social Services (DSS), and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views reported in this paper, however, are those of the author and should not be attributed to either DSS or the Melbourne Institute.

Substantive parts of this Thesis and the research herein have already been published either as part of a conference proceeding or as a journal article. Much of the work in Chapter Five was presented as a conference paper at the 45th Australian Conference of Economists (ACE) held at Flinders University – South Australia, 11th-13th July 2016. A modified version of this chapter has been since published by the Economic Record:

> Fitzpatrick D. (2017) Self-employment Dynamics in Australia and the
> Importance of State Dependence. *Economic Record* 93: 144-170.

Much of the research in Chapter Six was also presented as a conference paper at the 27th Australian Labour Market Research Workshop (ALMR) held at the Australian National University (ANU) Canberra, 1st-2nd December 2016.

ACKNOWLEDGMENTS

LIST OF ABBREVIATIONS

ABS	Australian Bureau of Statistics
ANZSCO	Australian & New Zealand Standard Classification of Occupations
ANZSIC	Australian & New Zealand Standard Industrial Classification
APE	Average Partial Effects
ASCO	Australian Standard Classification of Occupations
ASGC	Australian Standard Geograpical Classification
ASIC	Australian Standard Industrial Classification
ABN	Australian Business Number
CPI	Consumer Price Index
CURF	Confidentialised Unit Record File
D-IDA	Danish Integrated Database for Labour Market Research
DSS	Australian Government Department of Social Services
E.U.	European Union
EAD	Equity Adjusted Draw
ECHP	European Community Household Panel
GDP	Gross Domestic Product
G-SOEP	Socio-Economic Panel for Germany
GST	Goods & Services Tax
HILDA	Household Income & Labour Dynamics in Australia survey
ICSE-93	1993 International Classification of Status in Employment
ITW	Income Tax Withholding
ILO	International Labour Organisation
IQ	Intelligence Quotient
IRS	United States Internal Revenue Service
ISSP	International Social Survey Programme
LFS	Labour Mobility Survey
LFS-EEBTUM	Labour Force Survey – Employee Earnings, Benefits & Trade Union Membership supplementary
LFS-FoE	Labour Force Survey – Forms of Employment supplementary
LFS-LM	Labour Force Survey – Labour Mobility supplementary
LGA	Local Government Area
LSAY	Longitudinal Survey of Australian Youth
MESC	Main English speaking country
NESC	Non-English speaking country
OECD	Organisation for Economic Cooperation & Development
OMIE	Owner-manager of an incorporated enterprise
OMUE	Owner-manager of an unincorporated enterprise
RADL	Remote Access Data Laboratory
RBA	Reserve Bank of Australia
SALM	Small Area Labour Market
SCQ	Self-completion questionnaire
SNA	System of National Accounts
U.K.	United Kingdom
U.S.	Unites States of America
UK-BHPS	British Houseold Panel Study for the United Kingdom

UK-FES	Family Expenditure Survey for the United Kingdom
UK-LFS	Labour Force Survey for the United Kingdom
UK-NCDS	National Child Development Study for the United Kingdom
UK-NSEM	National Survey of Ethnic Minorities for the United Kingdom
UK-QLFS	Quarterly Labour Force Survey for the United Kingdom
US-CBO	Characteristics of Business Owners survey for the United States
US-CPS	Current Population Survey for the United States
US-NLSY	National Longitudinal Survey of Youth for the United States
US-NLSY79	National Longitudinal Survey of Youth (1979 cohort) for the United States
US-NLSYM	National Longitudinal Survey of Young Men for the United States
US-PSID	Panel Survey of Income Dynamics for the United States
US-SIPP	Survey of Income & Program Participation for the United States
VET	Vocational Education & Training

CHAPTER ONE
THESIS INTRODUCTION

Self-employment is commonplace in the labour markets of most developed economies, often accounting for large minority shares of employment. Self-employment has also remained a constant fixture of labour markets over time, persisting through business-cycle fluctuations and adapting to evolutions in the occupational and industrial compositions of economies — such as, the shift toward skilled and white-collar work in non-agricultural sectors. In Australia, as in other developed economies such as the U.S.A. and in the U.K., self-employment and self-employed workers remain an integral part of the labour market and economy despite dramatic shifts in the global economic landscape during the past 20-30 years.

In the labour market, self-employed workers sit at the intersection of both labour supply and labour demand. On the supply-side, the numbers of workers directly engaged in self-employment (depending on how it is classified and measured) are typically larger than or commensurate with other labour market segments — such as unemployed workers, public-sector workers, minimum or low-pay employees, and 'casually' employed workers. In recent history, for example, self-employment has regularly accounted for almost one-fifth of Australia's total employment.[1] Self-employed workers also make a disproportionately large contribution to the aggregate supply of hours worked per week by working longer hours on average than do employees (e.g. in 2010, Australian self-employed workers worked an average of 35.6 hours per week relative to 32.0 hours for employees).[2] On the demand-side, self-employed workers also act (or have the potential to act) as an important engine of employment growth by creating jobs. While most self-employed workers work alone (or on their 'own account'), a small share of self-employed workers are also 'employers' who disproportionately generate a very large amount of additional employment. In Australia, for example, 57% of the total employment in 2008 was attributable to self-employed 'employers', who accounted

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[1] Estimates are based on ABS data and are presented later in Figure 4.6, Chapter Four.
[2] Estimates are based on ABS data and are discussed later in Table 4.4, Chapter Four.

for only 7% of total employment.[3]

Self-employment is also highly pervasive. Rather than be associated with certain types of jobs and concentrated in particular occupations or industries, the composition of the self-employed workforce is almost as diverse as the work undertaken in the rest of the economy. The types of work undertaken by self-employed workers extend throughout the entire economy. Similarly, self-employment is widespread across the population when considered from a lifetime context. In contrast to the minority share of self-employed workers at a given point in time, a much larger share of workers experience self-employment at some point during their working life. Rather than be confined to a few, self-employment is 'shared-out' amongst individuals when considered across the life-course as workers transition to and from self-employment.

1.1 MOTIVATION FOR THE RESEARCH

Despite its importance, the understanding about self-employment, its role in the economy, and the motives of self-employed workers is poor and inchoate. In part, this is because microeconomic models largely ignore self-employment, which, in turn, has meant that self-employment is conspicuously absent from most economic texts. Labour economists, in particular, have tended to systematically disregard self-employment, focussing instead on the decisions and behaviours of individuals in the labour market as employees in relation to employers. This is especially true for the Australian literature. Instead, most of the existing research relevant to the economics of self-employment must be gleaned from the literature related to entrepreneurship; an area of research shared by multiple disciplines (e.g. business studies and management, finance, sociology, and psychology). Although entrepreneurship is also a relatively obscure topic in economics (Audretsch et al., 2016; Baumol, 1968; 2011), it has a long and rich history of scholarly thought and debate. While much of this debate is esoteric and devoted to making sense of the many and varied conceptual interpretations of entrepreneurship[4], there are aspects that overlap and resemble self-employment — such as, Knight's (1921) interpretation of entrepreneurship. As a result, self-employment is assumed to

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[3] Estimates are based on ABS data and are presented later in Table 4.7, Chapter Four.
[4] See, *inter alia*, Baumol (1993), Gartner & Shane (1995), Rosen (1997), Shane & Venkataraman (2000), Parker (2009a: 32-36), and Audretsch et al.(2015).

capture entrepreneurial behaviour and measures of self-employment are regularly used as quantitative proxies for entrepreneurship.

The entrepreneurial-centric research, therefore, is one of the few bodies of literature to provide empirical insights related to self-employment. However, the findings from this research and what it implies about self-employment lack clarity because of inconsistencies in the treatment of self-employment and in the quality of the empirical research. For instance, it is commonplace for measures of self-employment to be tailored to better suit the entrepreneurial focus of the research by reclassifying self-employment to include/exclude certain employment arrangements or occupations/industry categories; or, by restricting the sample to a certain gender, or race and ethnicity groups. Another significant drawback of entrepreneurial-centric research is the rigour of the empirical analysis, and the significant lag in the utilisation of more advanced methodological techniques, such as panel data econometrics, which have become standard in other fields of applied microeconomics. Consequently, the empirical findings from the entrepreneurial research are often difficult to translate back into a coherent understanding about self-employment and its role in the labour market.

Further, just as labour economists ignore self-employment; scholars of entrepreneurship similarly tend to ignore the extensive labour economics literature on the mobility and job-turnover of employees, and its commonalities with the movement of workers to and from self-employment (Sørensen & Sharkey, 2014). Labour economists have long sought to understand the mechanisms that generate labour market mobility, but, with few exceptions, this interest has not been extended to include labour mobility involving self-employment. Yet, the voluntary movement of employees between firms is similar to the path of mobility that workers follow to arrive in self-employment. Rather than attract unemployed or inexperienced labour market entrants, many workers who enter self-employment do so voluntarily after working for a period as an employee; just like job-to-job transitions amongst employees. In Australia, for example, 1% of all workers in 2012 had moved between self-employment and salaried-employed from the previous year (of which 77% was voluntary), while an additional 9% of employees changed

employers (of which 72% was voluntary)[5].

In contrast to the entrepreneurial-centric literature, the labour economics literature offers a fresh perspective for thinking about self-employment. Rather than assume that self-employment (or some variant of self-employment) is a manifestation of entrepreneurial behaviour, the labour economics approach recasts self-employment as a normal part of the labour market equilibrating process. That is, it treats the individual's decision to become self-employed like any other job-change event. Therefore, it is possible that the same mechanisms that underlie labour mobility and generate turnover between workers and firms also have a role in determining workers' choice of self-employment. This Thesis advances the existing economic understanding about self-employment by bridging this research gap between the entrepreneurial-centric literature, on the one side, and the labour economics literature, on the other. In doing so, it applies contemporary dynamic panel data econometric techniques.

1.2 PURPOSE OF THE THESIS

To better understand the purpose of self-employment both in the lives of workers and in the functioning of the labour market, this Thesis asks the question 'why do people choose to be self-employed' rather than work as (or search for work as) an employee? Obviously, from an economist's perspective, the choice of self-employment is reflective of individuals' utility maximising behaviour (Taylor, 1996; Parker, 2006). That is, for self-employed workers, the utility flows associated with work in self-employment are expected to be greater than from any other prevailing labour market opportunity (both employed and unemployed). What is not so obvious, however, are the underlying mechanisms that cause the utility flow from self-employment to exceed the other labour market opportunities for certain individuals and not others. The problem is that observing a self-employment outcome reveals nothing about an individual's preferences for self-employment because it is not known what alternative options were discarded or the context in which the choice of self-employment was made.

Self-employment is a bit like a Rorschach 'ink-blot' test in that competing

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[5] Estimates are based on ABS data and are presented in Table 5.4, Chapter Five, and in Table 7.1, Chapter Seven.

explanations about the cause of its increased utility flow can be conjured from the same picture. This is because, unlike other labour market states, the role of self-employment has no obvious rank-order in the labour market (e.g. employment being better than unemployment, or higher paying jobs being better than lower paid ones). On the one hand, it is possible for self-employment to be perceived as a form of entrepreneurship. In this instance, reasons for the increased utility flow from self-employment centre around both the entrepreneurial features of self-employment that distinguish it from salaried-employment — such as, the potential earnings premium, the greater autonomy and independence it offers —, as well as the distinctive attributes and traits of individuals to whom these features are thought to be most appealing — such as, those with an acumen for business, a tolerance of risk, or the financial wherewithal. On the other hand, self-employment could also be perceived as either a form of 'disguised unemployment' where redundant employees take shelter temporarily during poor economic conditions; or, as an occupation of 'last-resort' for poor-quality and unproductive workers. In this instance, the utility flows from self-employment are better than the disutility from unemployment and its potentially harmful effects on future employment prospects. Therefore, the share of observed self-employment at a point in time connotes both positive and negative explanations for individuals' behaviour and about the purpose of self-employment in the labour market.

Understanding individuals' choice of self-employment is further complicated by the fact that many non-self-employed workers, both employees and unemployed, also express an unfulfilled desire to be self-employed. For example, data from the 2005 International Social Survey Programme (ISSP), sampling the populations of 32 mainly developed countries, show that approximately 43% of employees and 51% of unemployed workers would have instead preferred to be self-employed.[6] *Prima facie*, this 'latent' self-employment, as it is referred to in the existing research (Blanchflower et al., 2001), is somewhat puzzling, particularly for unemployed workers. This is because, unlike entry into salaried-employed jobs, there are ostensibly few labour market barriers to entering self-employment (e.g. there is no employer 'screening' process). Yet, despite the pervasive 'latent' desire for self-employment amongst non-self-employed, very few act on their desire at any given

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[6] Estimates are presented in Table 4.3, Chapter Four.

time. Instead, the 'revealed preference' of most workers is to stay working as an employee or to continue searching for a job as an employee from unemployment. Thus, despite seeming like a ready labour market state into which workers may enter freely, self-employment is neither feasible nor available as an external employment opportunity for many workers at a given point in time.

1.3 AIMS & SCOPE

To clarify the purpose of self-employment in the labour market, it is necessary to identify what factors motivate workers to voluntarily choose self-employment and under what circumstances in a dynamic context. That is, rather than examine only the correlates at a single point in time, it is necessary to also consider intertemporal relationships using the sequence of individuals' behavioural outcomes over time. It is then possible to find out whether workers are inclined to either transition into and out of self-employment or instead remain in self-employment year after year. While the first implies that self-employment is a 'random-walk' phenomenon where everyone has an equal chance of experiencing self-employment each year, the second instead suggests that self-employment is highly persistent and concentrated amongst certain groups of individuals in a lifetime context. This Thesis examines the causes of any observed persistence in self-employment, and whether and to what extent workers differ in their propensity to be self-employed because of certain observed/unobserved individual characteristics that persist over time (i.e. a case of *pure heterogeneity*), or because their past experience affected their future behaviour in favour of self-employment (i.e. the result of *'genuine' state-dependence*).

A key finding of this Thesis is that genuine state-dependence is an important determinant of the persistence in self-employment. This indicates that there is a causal link between individuals' past and future self-employment outcomes, after controlling for differences in their personal characteristics (both observed and unobserved). That is, individuals' who experience self-employment are more likely to be self-employed in the future in comparison to an otherwise identical person who is not currently working in self-employment. Yet, the obverse of this is that non-self-employed workers, such as employees, are also less likely to become self-employed due to the difference in their experience. Distinguishing the importance of genuine state-dependence from individual heterogeneity is important, but in

itself does not explain why workers choose self-employment over working as an employee in the first place.

Just as the purpose of self-employment in the labour market is not obvious, the behavioural interpretations for genuine state-dependence in self-employment are also opaque *prima facie*. It is difficult to say whether genuine state-dependence implies a 'scarring' effect (i.e. where the experience of self-employment itself generates conditions that increase the probability of being self-employed later) or a 'virtuous' effect (i.e. where not having been self-employed in the past reduces the chance of self-employment in the future). The implication of a 'scarring' effect is that self-employed workers are 'locked-in' or trapped in a second-best outcome because their past experience in self-employment somehow prevents their gaining work as an employee. Whereas, a 'virtuous' effect implies that self-employment is a desired or preferred outcome because non-self-employed workers are 'locked-out' from entering self-employment due to the quality of their current employment outcome or circumstance. Therefore, to place a behavioural interpretation on the effect of genuine state-dependence in self-employment, it is necessary to further identify the underlying mechanism causing the effect.

To explore the rationale for genuine state-dependence in self-employment, this Thesis considers conditions and circumstances under which non-self-employed workers, namely employees, are more likely to transition into self-employment voluntarily from one year to the next, as compared to the likelihood of self-employed workers remaining in self-employment. That is, what past experiences or employment outcomes affect the future prospect of employees becoming self-employed, relative to the likelihood of past experience in self-employment, and, thus, diminish the effect of genuine state-dependence in self-employment. These are derived from the *a priori* assumptions about self-employment from the entrepreneurial literature, on the one hand, and the *a priori* reasoning for labour mobility and job-change from the labour economics literature, on the other.

This Thesis makes a substantive contribution to the economic research related to entrepreneurship by testing whether and to what extent employees select disproportionately into self-employment because of its supposed intrinsic appeal to individuals with entrepreneurial attributes and to whom the entrepreneurial features of self-employment would be most attractive. It also investigates whether

the appeal of self-employment is better understood as a normal labour mobility or job-turnover event; like other voluntary job-change events among employees. This Thesis, therefore, makes a subsequent original contribution to the labour economics literature by examining how the length of duration on a job with the same employer affects the probability of an employee becoming self-employed. Of particular interest is why self-employment opportunities become more appealing to employees with prolonged job-tenure. Is it because employees with longer tenure reveal that they are 'well-matched' on their current job and are likely to receive fewer attractive job offers from external firms? Or, is it because employees develop skills and knowhow with tenure on their current job that also augments their productivity value in outside self-employment opportunities, but does not similarly affect the value of alternative job-offers from outside firms? This Thesis examines both of these possibilities.

1.4 STRUCTURE OF THE THESIS

The remainder of this Thesis is set out as follows. Apart from the introduction and conclusion chapters, the thesis is organised into two parts. The first part, containing Chapters Two, Three and Four, lays the groundwork with regard to methodological considerations and contextual information on self-employment. Chapter Two discusses the many grey areas that exist when defining and measuring self-employment, as well as the many methodological inconsistencies that exist throughout the existing research. It summarises how self-employment is defined and classified, and the difficulties involved in capturing a complete and precise representation of this definition from data. Specifically, this chapter discusses how identifying and enumerating self-employed workers from data without detailed measures of employment arrangements is fraught, and the implications of this when comparing estimates of self-employment between surveys and across countries. Also, how there is considerable variation in the specification of self-employment throughout the existing economic literature, and the implications of this for making generalizable inferences about self-employment from the empirical research.

Chapter Three outlines the role of data in influencing the shape of the research and the complexity and power of the analysis that is possible. It discusses the limitations of cross-sectional data in comparison to the usefulness of longitudinal data in

setting the boundaries of research; and, how longitudinal data provides an opportunity to improve the rigour of analysis and the quality of results. This chapter also summarises the sources of data available (both cross-sectional and longitudinal), which both accurately identify and provide reliable information on self-employed workers in Australia.

Chapter Four provides contextual information about the importance of self-employment as a labour market segment and its contribution to the broader economy, both internationally, in Australia, and over time. Aggregate statistics from cross-sectional data are used to describe the rates of self-employment across developed economies, and highlight key trends in self-employment observed consistently across countries. This chapter also details the role of self-employment in Australia, and discusses the broader importance of self-employment to the Australian labour market and economy, in terms of its contribution to the quantity of labour supply and labour demand, as well as its contribution to the value of economic activity. Australian population and workforce survey data is then used to build a descriptive profile of self-employed workers in Australia: who they are, what they do, how they differ relative to employees and the unemployed, and how their profile has changed over time.

The second part of the Thesis, Chapters Five, Six and Seven, provides the detailed empirical analysis and findings to shed light on the question of why people choose to be self-employed rather than work as an employee. Testing different aspects of theory, these three chapters each conduct a separate econometric investigation using the same dynamic panel data method and data source of the Australian workforce, for the period 2001 to 2011, to disentangle the rationale for individuals' behaviour leading to the choice of self-employment. Because each chapter attempts to answer the same underlying question, the dependent variable of interest in each chapter also remains the same.

The salient distinction between each of the chapters is as follows:

- Chapter Five establishes the use of dynamic panel data methods of analysis when examining the probability of self-employment, and the importance of accounting for 'genuine' state-dependence, unobserved individual heterogeneity, and initial conditions.
- Chapter Six examines the notion of self-employment as a form of

entrepreneurship, and tests several predictions derived from economic theory on entrepreneurship.

Chapter Seven investigates an alternative labour economics rationale for self-employment, and tests whether the choice of self-employment is determined by additional work experience and the same learning and information accumulation theories that are thought to generate voluntary job-turnover and labour mobility more broadly.

Chapter Five explores the determinants of persistence in self-employment. It establishes the importance of using dynamic panel data econometric methods, rather than using pooled-panel (or cross-sectional) data methods, when estimating probability models of self-employment, and demonstrates how such improvements begin to change the 'story' about self-employment. It estimates dynamic panel data models of self-employment to disentangle the effects of 'genuine' state-dependence from unobserved individual heterogeneity, after accounting for observed individual characteristics. The key result of this chapter is that it is extremely important to take account of dynamics and that genuine state-dependence is an important determinant of self-employment. This finding implies that self-employment is highly persistent and concentrated amongst the same group of individuals year after year, rather than being tied to cyclical fluctuations or everyone having an equal chance of experiencing self-employment each year. However, difficultly in interpreting genuine state-dependence in self-employment means that this effect provides limited understanding about the rationale for individuals' behaviour and about whether a self-employment outcome is desired or detrimental.

Chapter Six builds on the findings from Chapter Five and examines the validity of 'entrepreneurial-pull' explanations for the choice of self-employment derived from the economics literature related to entrepreneurship. Using the same dynamic panel data econometric methods and data utilised in the previous chapter, this chapter estimates several probability models of self-employment. Based on *a priori* assumptions of entrepreneurship and entrepreneurs, these models separately test whether: self-employment attracts employees in higher paying jobs because of a potential entrepreneurial-earnings premium in self-employment; the choice of self-employment appeals to employees who feel increasingly disenfranchised with their current work or employer because of the potential for non-pecuniary benefits in

self-employment; employees with entrepreneurially advantageous characteristics are more likely to bring forward their decision to become self-employed. The results of these models find little evidence in support of the 'entrepreneurial-pull' explanations for why employees become self-employed, and have little economic significance when compared against the likelihood of past experience in self-employment. These findings cast into doubt on the entrepreneurial explanation for self-employment.

Chapter Seven offers an alternative explanation for the attractiveness of self-employment and investigates whether the choice of self-employment is better understood when based upon the economic rationale used to explain the voluntary movement of workers between firms. Again, utilising the same dynamic panel data econometric framework and data used in Chapter Five and Chapter Six, this chapter estimates several models analysing the extent to which the length of prior duration on a particular job affects the probability of workers being self-employed. These models test the hypotheses that the effect of genuine state-dependence in self-employment diminishes for workers with prolonged job-tenure due to the accumulation of *informational-capital* specific to their experience in that particular job (i.e. the effect of genuine duration-dependence). Of particular interest is whether duration-dependence influences the probability of employees becoming self-employed because the relative appeal of outside self-employment opportunities increase as 'better' employee job-offers from external firms diminish (as implied by the accumulation of 'match-specific' capital), or because the prospective opportunities in self-employment become increasingly valuable (as implied by the acquisition of 'firm-specific' human-capital). The results of the analyses in this chapter find evidence to support the 'mobility-push' explanations, specifically the prior acquisition of firm-specific human-capital as an employee, and provide the strongest indication yet for the genesis or root-cause of self-employment.

The last three chapters provide the substantive original contribution of the Thesis. In order to obtain reliable estimates and eliminate sources of bias, the econometric dynamic panel data methodology used throughout also tackles the additional 'initial conditions' problem, which must be addressed when disentangling the effect of genuine state-dependence from unobserved heterogeneity. These chapters advance the economic understanding around self-employment by attempting to

shift the paradigm away from the assumption of self-employment as a form of entrepreneurship to, instead, recast the choice of self-employment as being driven by the same economic forces that determine labour mobility and job-turnover more generally. In doing so, this paradigm shift shows how the current understanding of self-employment is not robust and offers an alternative that gets closer to the proper causal explanations for individuals' behaviour and for the purpose of self-employment. Knowing why workers choose self-employment rather than working as an employee also provides a more comprehensive understanding of the labour market and how it operates.

A summary and conclusion of the thesis is presented in Chapter Eight. This chapter summarises the major findings from throughout the Thesis as well their limitations. The chapter and thesis concludes by identifying policy implications and providing directions for future research.

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CHAPTER TWO
METHODOLOGICAL CONSTRAINTS TO CONSIDER WHEN ANALYSING SELF-EMPLOYMENT

2.1 DEFINING & CLASSIFYING SELF-EMPLOYMENT

In the analysis of the labour force, self-employment is generally considered as a form of employment or labour market activity distinct from jobs where people work as employees for a wage or salary. The identification of self-employed jobs in most current labour force statistics follows a well-established and internationally accepted convention to provide information on self-employment that is consistent both between countries and over time. Developed by the International Labour Organisation (ILO), self-employment is formally defined as part of the International Classification of Status in Employment (ICSE-93).[7] The ICSE-93 classifies employment arrangements according to:

- the degree of *economic risk*, which is the strength of the attachment between the worker and their job; and,

- the degree of *authority*, which is the responsibility for the operation and welfare of other workers or an enterprise, that a worker has in their job.

Fundamental to the organisation of the ICSE-93 is the distinction between salaried-employed jobs and self-employment. The ICSE-93 formally defines self-employment as jobs where 'remuneration is directly dependent upon profits and the incumbents make operational decisions, or delegate such decisions, while retaining responsibility for the welfare of the enterprise'. This contrasts with the definition of salaried-employed jobs where 'remuneration (typically wages and salaries) is not dependent upon the revenue of the unit for which the incumbent works, equipment and capital inputs are owned and supplied by the employer, and the incumbents work is directed and supervised by the employer (or their delegate)'. The ICSE-93 further refines the definition of self-employment into four sub-categories:

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[7] Adopted by the Fifteenth International Conference of Labour Statisticians, January 1993, the ICSE-93 is used internationally as the standard guide for the consistent collection and production of labour force statistics, and describes the various types of employment relationships and contractual situations of economically active workers.

- *Employers*: a person working in their own business who hires one or more employees;

- *Own-account workers*: a person working in their own business without any employees;

- *Contributing family workers*: a person working unpaid in a business operated by a related person living in the same household;

- *Members of producers' cooperatives*: a person working in a business of which they own an equal share, along with the other worker-owners, and operate as a partnership.

In most developed countries, the treatment of self-employment in the national labour force statistics is mostly consistent with these sub-categories. The 'employer' and 'own-account' sub-categories are commonly separately identified, as these are considered to be the most conventional forms of self-employment because they often account for the largest shares of self-employment. The 'contributing family' worker sub-category is also a group that is commonly separately identified. However, classifying 'contributing family' workers as self-employed is somewhat of a contentious issue. This is because, from a labour economics viewpoint, unpaid 'contributing family' workers face very different incentives and are more constrained in their set of choices in comparison to the 'employer' and 'own-account' sub-categories. It is debatable whether 'contributing family' workers should instead be classified as employees. The small size of this sub-category, however, means that their classification has a negligible impact when analysing self-employment.[8] Furthermore, the 'producers cooperative' sub-category is often not identified because it is such an uncommon arrangement in most developed economies (with the exception of some European countries – such as France, Spain and Italy (see Parker (2009b: 14)).

In general, these sub-categories capture most self-employment activity. However, there are complex contractual arrangements that can cut across two or more of these sub-categories and are difficult to distinguish with reference to either salaried-employment or self-employment. In recognition of these grey areas, the ICSE-93 additionally specifies a separate set of classifications to use in tandem with the main set of sub-categories. The additional classification most relevant to distinguishing

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[8] In Australia, for example, 'contributing family' workers typically account for less than 1% of the employed workforce.

self-employment is the legal status concept. This classifies owner-managers of unincorporated enterprises (OMUE) as distinct from owner-managers of incorporated enterprises (OMIE):

- *Owner-manager of an unincorporated enterprise (OMUE)*: a person working in a business (with or without employees) in which the person holds a controlling interest and is responsible for its operation, but where there is no legal distinction between the personal liabilities of the person and the assets of their business.

- *Owner-manager of an incorporated enterprise (OMIE)*: a person working in a business (with or without employees) in which the person holds a controlling interest and is responsible for its operation, but where the person and their business are separate legal entities and the person is employed under the account of the business (a limited liability company).

Both OMUEs and OMIEs resemble the same high degree of authority in, and responsibility for, an enterprise that characterises self-employment. In fact, in labour force statistics, OMUEs typically coincide with the employer and own-account sub-categories of self-employment. By contrast, the classification of OMIEs as either self-employment or salaried-employment is more complicated and depends on the context in which it is being considered. On the one hand, OMIEs may be classified as employees because these workers receive part of their remuneration in the same way as employees (i.e. as a wage or salary). For taxation purposes and in Systems of National Accounts data, OMIEs are often considered to be salaried-employed workers. On the other hand, OMIEs resemble self-employed workers (i.e. employers and own-account workers) because of the autonomy these workers have in making decisions over their own employment arrangements, such as the setting of hours and determination of pay.

Combining the various sub-categories to precisely identify self-employment is difficult. This is because each sub-category, to some extent, represents a different stage of success in self-employment. For instance, 'contributing family workers' represent those who provide unpaid help or assistance to the more senior business operator, 'own-account' workers are those who work alone and are more likely to be those operating a small business (by turnover or capitalisation) in its infancy, while 'employers' are more likely to be those operating an established business that

has grown to the extent that it is able to hire additional workers. A similar pattern of growth could also be said about the division between OMUEs and OMIEs. That is, the necessity to incorporate a business is most likely to occur because of an increase in the size of a business's turnover, profits, debt structure, and employment.

In the literature, a number of studies analyse the distinction between the sub-categories of self-employment. Earle & Sakova (2000), for example, use cross-sectional labour force data from several Eastern European countries following the fall of the Soviet Union (1994-1995) to show that 'employers' and 'own-account' self-employed differ significantly by their earnings and certain characteristics (e.g. gender, education, family background, and attitudes toward independence and risk).[9] Similarly, Levine & Rubinstein (2013) use a combination of data from the Current Population Survey (US-CPS) and the National Longitudinal Survey of Youth (US-NLSY79) in the U.S. to show that OMIEs engage in different types of work activities and have significantly higher hourly earnings in comparison to their unincorporated counterparts. Despite the variation within self-employment, however, Earle & Sakova (2000) and Levine & Rubinstein (2013) show that self-employed workers also have little in common with either employees or the unemployed.

In Australia, the classification of employment relationships in the national labour force statistics, administered by the Australian Bureau of Statistics (ABS), and other important population surveys, such as the Household & Labour Dynamics in Australia (HILDA) survey, closely follow the ICSE-93 framework and are usually very detailed. Table 2.1 provides a summary of the classification structure of employment relationships most common in Australian data. In most labour force surveys and household statistical collections, self-employment refers to the aggregation of OMUEs and OMIEs, which also includes 'own-account' workers and 'employers'. 'Contributing family' workers are also often classified as self-employed, in part, because it is not always separately identified from the OMUE or 'own-account' sub-categories. As discussed earlier, however, classifying 'contributing family' workers as self-employed potentially captures a different form of self-employment in comparison to the other sub-categories.

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[9] Earle & Sakova (2000) did not separately identify OMIE workers from OMUE workers.

Table 2.1: Classification of employment relationships for labour market analysis

Status in employment		Additional classification of employment arrangements
Broad	**Detailed**	
• Salaried-employment	• Employees	• Employees with paid-leave entitlements • Employees without paid-leave entitlements
• Self-employment	• Employers • Own-account workers • Contributing family workers*	• Owner-managers of incorporated enterprises (OMIE) • Owner-managers of unincorporated enterprises (OMUE) • Contributing family workers**

Notes: * On occasion the 'contributing family worker' category is combined with the 'own-account worker' sub-category. ** On occasion the 'contributing family worker' category is combined with the 'owner-manager of an unincorporated enterprise' category.

Source: ABS, cat. no. 6102.0.55.001, 'Labour Statistics: Concepts, Sources and Methods, 2013', Chapter. 4.1: Employment Relationship Classifications.

2.2 IDENTIFYING & MEASURING SELF-EMPLOYMENT IN DATA

Despite the detailed classification of employment relationships provided by the ICSE-93, the treatment and measurement of self-employment in the labour force statistics of many developed countries are inconsistent. Capturing a complete and precise representation of self-employment in labour force statistics that corresponds to its definition can be difficult. Variation in the measurement of self-employment also affects the comparability of estimates between surveys and across countries.

In some labour force surveys, such as the British Household Panel Survey (UK-BHPS) in the U.K., for example, respondents are simply asked to classify themselves as either a self-employed worker or as an employee without any further interrogation. In these instances, however, the enumeration of self-employment is likely to be incomplete and inaccurate because not enough detail on the various types of employment arrangements is collected (e.g. the ability to separately identify OMIEs as self-employed rather than employees).

In other instances, labour force surveys collect detailed information on employment arrangements on a regular basis, but only publish the aggregate statistics on self-employment. Where detailed statistics on the employment arrangements are collected but not published — such as, the monthly release of the U.S. national labour force statistics —, these statistics may provide accurate, but incomplete, enumerations of self-employment depending on the exclusion/inclusion of certain sub-categories (e.g. the exclusion of OMIEs from self-employment).[10]

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[10] U.S. Census Bureau, 'Current Population Survey Design and Methodology. Technical Paper 63, October 2006'

Moreover, in many developed countries, the additional classification of OMIEs in national labour force statistics is either not made available publicly or not collected on a regular basis. This is despite OMIEs representing a substantial and increasing share of self-employment in some developed economies. In the U.S., for example, where information on the number of OMIEs is not regularly released, the OECD (2000) estimates that in 1998 OMIEs accounted for 31.4% when reclassified as a part of self-employment[11]. Likewise, in Australia, where detailed information on employment arrangements are (by contrast) regularly collected and published, the number of OMIEs as a share of total self-employment increased from 24.3% in 1992 to 39.2% in 2011.[12]

2.3 SPECIFICATION & TREATMENT OF SELF-EMPLOYMENT IN THE LITERATURE

In addition to the complexities involved in classifying and identifying self-employment in data, there is also considerable variation in how self-employment has been specified or represented in the labour studies analysis and research. In the analysis of self-employment, it is commonplace for measures of self-employment to be tailored to better suit the focus of the research by either reclassifying self-employment to include/exclude certain employment arrangements or particular industries and professional occupations. Another common practice is for samples of self-employed workers to be restricted by gender, or race and ethnicity groups. Placing these types of restrictions when specifying self-employment, however, affects the findings and makes it difficult to gain a clear and consistent understanding of self-employment that is generalizable to the labour market more broadly.

There appear to be several reasons for why restrictions are imposed on measures of self-employment. In most instances, the information available in data and the sample sizes of particular cohorts determine how self-employment is specified. As already discussed, the measures of self-employment in many data sources are pre-determined without scope for adjustment or refinement. Another reason is that certain data sources have a specific focus on a particular population, such as the

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[11] (OECD, 2000: 156)

[12] ABS, cat. no. 6105.0., Australian Labour Market Statistics, July 2012, Data Cube, Employment type 1992-2011, 'Table 1. Employment Type: Employed persons by Sex, Full-time/part-time and Age, August 1992-August 2007 and November 2008-November 2011'.

National Longitudinal Survey of Young Men (US-NLSYM) (1966-1981) in the U.S. (as in Evans & Leighton (1989)) or the National Survey of Ethnic Minorities (UK-NSEM) (1993-1994) in the U.K. (as in Clark and Drinkwater (2000)). Similarly, it is sometimes necessary to exclude certain cohorts from the analysis of self-employment because these cohorts account for a minority of the population and a small sample size in data. These types of restrictions are particularly evident in past research on self-employment, which exclude certain workers — such as, those working part-time or on precarious employment arrangements, or those with 'non-white' or migrant backgrounds — who would now be considered a part of the mainstream and a diverse workforce.[13]

Another common restriction is to exclude females from the analysis of self-employment. In general, the exclusion of females from samples of workers is commonplace in applied microeconomic research because of the complex nature of female labour force participation (a field of study in its own right). As explored later in Chapter Four, women are still more likely than men to engage in part-time and flexible work arrangements while balancing the traditional roles of child rearing and family caring responsibilities. Furthermore, in most developed countries, the shares of female participation in self-employment are disproportionately small and tend to lag the engagement of females in the broader labour market. The economic research related to self-employment commonly cites the complexity of female labour force participation combined with issues related to small sample size as the reasons for excluding females from the sample altogether.[14]

It is also common for certain workers in particular industries — such as, agriculture — or certain occupations and profession — such as, medical practitioners or lawyers — either to be re-classified as employees or excluded from the sample altogether. One reason for this that is often cited is due to the variation and discrepancies that arise in the earnings information of particular workers. For example, agricultural and farm workers are often excluded on the grounds that their earnings information is inaccurately reported, or because their earnings may include

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[13] See Rees & Shah (1986), Evans & Jovanovic (1989) and Evans & Leighton (1989), *inter alia*, for examples where certain minority groups are excluded/restricted from the sample of analysis.
[14] See Rees & Shah (1986), Evans & Leighton (1989), Taylor (1996), Dunn & Holtz-Eakin (2000), Hamilton (2000), and Taylor (2011), *inter alia*, for a variety of examples where females are excluded/restricted from the sample of analysis.

government subsidies.[15] Highly paid professionals are also often excluded because of the top-coding of their earnings information in data.[16]

A second reason for the exclusion of certain workers is because the nature of their work is perceived to be distinct from the work undertaken in either self-employment or salaried-employment more generally. For example, agricultural workers and farmers, again, are often excluded because of the specific nature of agricultural land tenure law and inheritance.[17] Professionals, such as doctors and lawyers, are also often excluded because these occupations traditionally require a person to enter into a partnership, as part of the hierarchy of advancement in those occupations, which automatically classifies these workers as self-employed.[18]

Finally, it is common practice in the entrepreneurial literature to exclude or restrict certain workers from the measures of self-employment to quantitatively capture and emphasise a particular interpretation or aspect of entrepreneurial behaviour. In this instance, self-employment is often altered in a subjective fashion because, as outlined by Baumol (1993), entrepreneurship is a varied set of interpretations and definitions rather than a definitive concept. For example, the analysis of entrepreneurs generally excludes the self-employment classification of unpaid or contributing family workers because they are considered apprentice or assistants of entrepreneurs (OECD, 2000: 156). In more extreme cases, such as in Guiso et al. (2004: 948), the specification of self-employment is further narrowed to include only "bona fide" entrepreneurs, which excludes all professionals (e.g. doctors, lawyers, etc.), artisans, and trades occupations (e.g. plumbers, electricians, etc.).

A summary of the different approaches taken in specifying self-employment, from a selection of well-cited studies with relevance to self-employment, is outlined in Table 2.2. Also included in the table are the data sources utilised, the method by which the data sources identified self-employment, and sample sizes and share of self-employment.

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[15] See Rees & Shah (1986), Henley (2004) and Dawson & Henley (2012), *inter alia*, for discussions on the exclusion of agricultural and farm workers for reasons relating to their earnings.
[16] See Hamilton (2000), *inter alia*.
[17] See Henley (2004), *inter alia*.
[18] See Hamilton (2000), *inter alia*.

2.4 CONCLUDING REMARKS

For the remainder of this Thesis, self-employment is classified and enumerated as close as practicable to the definition provided by the ICSE-93. As discussed, this is reliant on how self-employment is collected and identified in the Australian labour statistics and data, which, by international standards, is exceptionally accurate. Where possible self-employment is specified as workers who are identified as either OMUE or OMIE workers, which includes 'employers' and 'own-account' workers. 'Contributing family' workers are also included as being self-employed only in the instances where data does not allow for these workers to be separately distinguished from another self-employed sub-classification. Estimates of the size of the self-employed workforce in Australia and its share of the labour market are provided in Chapter Four. Further restrictions made to the data samples under analysis are outlined further in Chapter Five, Chapter Six and Chapter Seven, but do not change the specification of self-employment.

Table 2.2: Summary of sample restrictions and the representation of self-employment in selected studies

Citation	Data source	Identification	Sample restrictions & specification of self-employment	Sample size & share (%) of self-employment
Dawson & Henley (2012)	Labour Force Survey (quarterly) (U.K.) (1999-2001)	Self-employed (self-identified)	Economically active, aged 18-65	≈ 103,715 (~10.7% self-employed)
Taylor (2011)	European Community Household Panel (1994-2001)	Self-employed (self-identified)	Males, aged 22-59, residents of Britain, France, Germany, Greece, Ireland, Italy, Spain or Portugal. Excluding unpaid family workers, and/or agricultural or fishery occupation workers.	≈ 34,123 (~15.6% self-employed)
Henley (2004)	British Household Panel Survey (1991-1999)	Self-employed (self-identified)	Economically active, excluding agricultural sector workers.	≈ 5,031 (~12.1% self-employed)
Clark & Drinkwater (2000)	National Survey of Ethnic Minorities (U.K.) (1993-1994)	Self-employed (self-identified)	Economically active, aged 16-64 for males or 16-59 for females, and of Indian, African Asian, Pakistani, Bangladeshi, Caribbean or Chinese ethnicity.	≈ 1,576 (~13.1% self-employed)
Hamilton (2000)	Survey of Income & Program Participation (1984) (U.S.)	Own and operate an unincorporated or incorporated enterprise	Males, aged 18-65, and had left school. Excludes agricultural sector workers, and the 'doctor' and 'lawyer' professional occupations.	≈ 8,771 (~12.6% self-employed)
Blanchflower & Oswald (1998)	National Child Development Study (U.K.) (1958)	Own and operate an unincorporated or incorporated enterprise	Economically active in 1981 (aged 23) and, again, 1991 (aged 33)	≈ 12,537 in 1981 (~4.2% self-employed) ≈ 11,407 in 1991 (~11.2% self-employed)
Taylor (1996)	British Household Panel Survey (1991)	Self-employed (self-identified)	Males, working full-time (≥30 hours p/w).	≈ 2,768 (~16.8% self-employed)
Evans & Leighton (1989)	National Longitudinal Survey of Young Men (U.S.) (1966-1981) Current Population Survey (U.S.) (1968-1987)	Own and operate an unincorporated or incorporated enterprise	White males, aged 14-24 (in 1966)	≈ 4,000 in 1966 (~3.9% self-employed) ≈ 2,731 in 1981 (~17.7% self-employed)
Rees & Shah (1986)	General Household Survey (U.K.) (1978)	Self-employed (self-identified)	Male, head-of-household, aged 16-65, working full-time (≥30 hours p/w). Excludes agricultural sector workers.	≈ 4,762 (~6.2% self-employed)

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CHAPTER THREE
THE IMPORTANCE OF DATA WHEN ANALYSING SELF-EMPLOYMENT

The role of quantitative data when analysing self-employment extends beyond the ability to accurately distinguish and quantify self-employment. The role of data is also important because of its influence in shaping and setting the boundaries of research. The design and availability of data determines the rigour of analysis that may be undertaken, as well as the quality of results that may be obtained. Different data sources allow for certain types of analysis to be undertaken, which may be more useful for obtaining answers to certain questions.

In most developed countries there are a range of data sources available that provide different layers of information on self-employment and the broader labour force. In most instances, the information is derived from representative sample surveys of the population or labour force, collected at the household or individual level. In some rare instances, information on businesses and their employees may also be derived from administrative databases or linked employer-employee surveys.

3.1 CROSS-SECTIONAL VERSUS LONGITUDINAL DATA

For the most part, the usefulness of particular source of data depends on its underlying design. For example, how it is collected, its sample size, representativeness and accuracy, the scope and coverage of its target population, and the detail of the information it collects. However, to undertake 'best practice' applied economics, one of the most important design features of data is the distinction between cross-sectional and longitudinal structures. Ultimately, the difference between these two data structures determine the complexity and power of the analysis that may be undertaken.

Cross-sectional data are a snapshot of the population at a point in time. By drawing from the current population a random sample of households and their occupants, cross-sectional surveys are able to provide an accurate representation of the population. For labour force analysis, cross-sectional data describe the 'stock' of workers in self-employment and allow for comparisons to be made between

individuals, such as the differences between self-employed and salaried-employed workers. Most developed countries collect their labour force statistics as representative cross-sectional surveys of households and their occupants – such as the Current Population Survey (US-CPS) in the U.S., the Labour Force Survey (UK-LFS) in the U.K. or the Labour Force Survey (LFS) in Australia. This process is then repeated on a regular basis, either at monthly or quarterly intervals, to capture the sequence of changes in their respective populations over time. From this time-series data, it becomes possible to measure the change in the aggregate stock or the 'net-entry' (i.e. the outcome after the inflow and outflow) of workers in a particular labour market state, such as self-employment, from one period to the next. Over long periods of time, time-series data is useful for examining the association or correlation between the change in the aggregate stock of two or more particular groups of workers — such as, the relationship between the share of self-employment and unemployment — or in relation to other macroeconomic events — such as, the change in the share of self-employment with growth in GDP. In general, the types of analysis possible using cross-sectional data are limited to examining descriptive statistics and identifying correlations, but are unable to distinguish the underlying causal relations with any certainty.

By contrast, longitudinal sources of data allow for more complex and powerful methods of analysis. This is because longitudinal data captures the temporal-order of events for each individual in the sample. In comparison to cross-sectional surveys, longitudinal surveys track or repeatedly collect information from the same households and individuals at regular intervals, usually on an annual basis, over an extended period of time. The design of longitudinal surveys typically takes one of two forms: (i) a 'cohort study', which follows the same individuals from a particular cohort through time — such as year of birth and/or gender —; or, (ii) a 'panel study'.

For labour market analysis purposes, longitudinal data is useful because it describes both the 'stock' of workers in a particular labour market state, as well as isolating the 'gross-entry' or 'flow' of workers between labour market states from one period to the next. More importantly, however, is that this allows for the comparison of differences both *between* individuals at a point in time as well as *within* the same individual over time. By observing the temporal order of events at an individual

level, longitudinal data allows for the dynamics of the labour market to be considered, which offers the ability to detect causal relationships. Further, the temporal nature of longitudinal data also allows for more sophisticated types of econometric methods that control for time-invariant individual characteristics, which may not be observed or even measurable in data (i.e. unobserved heterogeneity), from spuriously generating correlations between the observed outcomes. This further improves the accuracy of the results in unearthing the underlying causal relations.

Increasingly, nationally representative longitudinal surveys are available in many developed countries. Some examples of panel studies include: the Panel Study of Income Dynamics (US-PSID) in the U.S.; the European Community Household Panel (ECHP) in the E.U.; the British Household Panel Study (UK-BHPS) in the U.K.; the Socio-Economic Panel (G-SOEP) in Germany; or the Household, Income and Labour Dynamics in Australia (HILDA) survey in Australia. This increased availability has also seen the utilisation of longitudinal data become increasingly prevalent across many disciplines of research.

3.2 HOW DATA SHAPES THE ANALYSIS OF SELF-EMPLOYMENT

In the existing economic literature, the empirical analysis of individuals' decision to participate in self-employment is heavily reliant on cross-sectional rather than longitudinal data. This is particularly true for Australia. This reliance is, in part, due to an historical absence of longitudinal surveys and panel data spanning adequate lengths of time in many developed countries. With the exception of the U.S., the advent of longitudinal surveys in most other developed countries is comparatively recent.[19] In Australia, for example, the HILDA survey only commenced in 2001. As a consequence, this has had a profound impact on the breadth and shape of both the analysis undertaken, which, in turn, has affected the questions that have been asked, as well as the quality of results and the certainty of answers provided. By international standards, the pool of economic research on self-employment in Australia is particularly shallow, with limited studies and based mostly on cross-

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[19] For example, in the U.S. the US-PSID commenced in 1968; whereas, the G-SOEP in Germany and the UK-BHPS in the U.K. commenced in 1984 and 1991, respectively.

sectional data or taking panel data as cross-sectional.[20]

There are numerous examples in the literature of studies that utilise cross-sectional data to analyse self-employment.[21] However, as discussed earlier, analyses based on cross-sectional data are only able to ask how self-employed workers differ from other workers (employees or the unemployed), at a snapshot in time, and identify the observed individual characteristics that are correlated with being self-employed. The empirical insights about individuals' behaviour from cross-sectional data analysis are primarily descriptive, and are difficult to infer causal interpretations about why workers choose self-employment. This is because, as Evans & Leighton (1989) note, this approach confounds the determinants of entry and survival. That is, the factors associated with self-employment at a point in time are a product of workers having previously switched into self-employment and then surviving up until that point in time.

By contrast, longitudinal surveys and panel data allow for the analysis of dynamics (i.e. the movement of individuals between labour market states over time), which have allowed researchers to begin to answer questions about how workers who enter self-employment differ from those who remain in salaried-employment or unemployment, or how self-employed workers who exit differ from those who survive. These types of analyses identify the factors associated with workers' decisions either to become self-employed or to exit self-employment, in an attempt to disentangle entry and survival effects, respectively. While the use of panel data to analyse self-employment has become increasingly prevalent in the literature, very few studies go on to fully exploit the longitudinal nature of panel data. For instance, many of the studies analysing the dynamics of self-employment limit their analysis to either the entry or exit transitions, comparing those who switch from one year to the next against non-switchers.[22] Several Australian studies fall into this category.[23] This approach, however, only captures part of the dynamic process, that is, either entries to or exits from self-employment. The approach also excludes certain groups

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[20] Australian specific studies include: Blanchflower & Meyer (1994), Vandenheuvel & Wooden (1995), Bradbury (1997), Covick (1998), Le (1999), Eastough & Miller (2004), Evans & Sikora (2004), and Atalay et al. (2014), *inter alia*.

[21] See, *inter alia*, Rees & Shah (1986), Borjas & Bronars (1989), Evans & Leighton (1989), Dolton & Makepeace (1990), Clark & Drinkwater (2000), Earle & Sakova (2000), Wagner (2003; 2006), Brown et al.(2006), Åstebro & Thompson (2011), and Lechmann & Schnabel (2014).

[22] See, *inter alia*, Evans & Jovanovic (1989), Evans & Leighton (1989), Dunn & Holtz-Eakin (2000), Kuhn & Schuetze (2001), Hyytinen & Rouvinen (2008), Meager (2008), and Taylor (2011).

[23] Australian specific studies include: Blanchflower & Meyer (1994), Evans & Sikora (2004), and Atalay et al. (2014), *inter alia.*

of non-switchers from the comparative group who may be of interest — such as, the exclusion of successful self-employed workers, when comparing employees who switch into self-employment against those who remain in salaried-employment. In more extreme instances, the longitudinal nature of panel data is neglected altogether, and panel data is treated like cross-sectional data either by 'pooling' all observations as if they were collected independently at the same point in time, or by selecting a single wave or snapshot of data.[24]

Unlike other labour related areas of applied microeconomic research, it is rare for analyses of self-employment to use longitudinal and panel data methods to account for things such as the impact of unobserved heterogeneity (discussed earlier).[25] It is rarer still to find panel data studies of self-employment that also capture a complete picture of the labour market dynamics. That is, analyse in the same model both inflow and outflow transitions between self-employment and other labour market states, as well as capture the non-switchers in each state.[26] In Australia, for example, to the author's knowledge, no existing research on self-employment has undertaken this level of analysis. This Thesis, therefore, undertakes this more complete analysis, using Australian panel data. The implications of using panel data rather than cross-sectional (or pooled panel) data to analyse self-employment, and how these different types of analyses affect the results and shape the understanding of self-employment, are investigated further in Chapter Five.

3.3 AUSTRALIAN SOURCES OF DATA ON SELF-EMPLOYMENT

In Australia, there are several data sources that provide detailed information on workers and their employment arrangements. The ability to accurately identify self-employment in Australian data has also improved and become increasingly available over the last decade. A selection of the most useful Australian datasets available for the analysis of self-employment are summarised in Table 3.1.

For the most part, the main provider of data on the Australian population and labour force is the Australian government's statistical agency, the Australian Bureau

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[24] See, *inter alia*, Taylor (1996), Blanchflower & Oswald (1998), Hamilton (2000), Arabsheibani et al.(2000), Praag & Cramer (2001), Bruce & Schuetze (2004), Meager (2008), and Fairlie (2011).
[25] See, *inter alia*, Silva (2007) and Brown et al.(2011).
[26] See, *inter alia*, Henley (2004), Caliendo & Uhlendorff (2008), and Taylor (2011).

of Statistics (ABS). The ABS conducts a suite of nationally representative (principally) cross-sectional surveys on a regular basis, which serve as a baseline for statistics on the Australian population and labour force over time. The largest and most representative of the ABS data sources is the Census of Population & Housing, which is a census of the entire Australian population and conducted on 5-yearly basis. The Census collects broad-level demographic, labour force and employment information, but is enough to provide a complete account of self-employment. The other important sources of ABS data are the Labour Force Survey (LFS) and its supplementary surveys. These are smaller cross-sectional sample surveys of the Australian population, which are collected at regular intervals over time. These surveys have a specific focus on the Australian labour force over time, and collect very detailed information on the various aspects of employment (including self-employment arrangements), unemployment and underemployment. A detailed discussion of the ABS Census and Labour Force Surveys are presented in Appendix 3.A.

In addition to ABS data, another rich source of nationally representative data is the Household, Income and Labour Dynamics in Australia (HILDA) survey. Introduced in 2001, the HILDA survey is a longitudinal panel study that is collected on an annual basis, and provides extremely detailed information at the household and individual levels. HILDA data is particularly important because of its longitudinal properties and its usefulness for applying more powerful forms of analysis. A detailed discussion of the HILDA survey is presented in Appendix 3.B.

These data sources are used predominately throughout the remainder of the thesis. In particular, information from the ABS data sources are used in Chapter Four to perform descriptive analyses of the self-employed workforce in Australia; while data from the HILDA survey forms the basis for more sophisticated multivariate analyses that is undertaken in Chapter Five, Chapter Six, and Chapter Seven.

Table 3.1: Summary of Australian datasets useful for analysing self-employment

Title	Admin.	Survey design	Collection frequency	Reference period	Identification of self-employment	Sample size, reference year, & share (%) of self-employment
Household surveys						
Labour Force Survey (LFS)	ABS	Cross-sectional time-series	Monthly	-	OMUE only*	-
Labour Mobility (LFS-LM) supplementary	ABS	Cross-section	Biennial	Feb	OMIE & OMUE	≈ 32,062 in 2010 (~ 19% self-employed)
Employee Earnings, Benefits & Trade Union Membership (LFS-EEBTUM) supplementary	ABS	Cross-section	Annual	Aug	OMIE only	≈ 25,777 in 2010 (~ 9% self-employed)
Forms of Employment (LFS-FoE) supplementary	ABS	Cross-section	Annual	Nov	OMIE & OMUE	≈ 22,037 in 2008 (~ 21% self-employed)
Census of Population & Housing	ABS	Cross-section	5-yearly	Aug	OMIE & OMUE	≈ 1,002,793 in 2006 (~ 17% self-employed)
Household Income and Labour Dynamics in Australia (HILDA) survey	University of Melbourne	Panel	Annual	Aug-Mar	OMIE & OMUE	≈ 34,940 between 2001-2011 (~ 22% self-employed)
Employer surveys						
Employee Earnings & Hours	ABS	Cross-section	Biennial	May	OMIE only	≈ 60,271 in 2010 (~ 3% self-employed)
Business Longitudinal Database^	ABS	Panel	Annual	Financial year	-	≈ 2,263

APPENDIX 3.A — AUSTRALIAN BUREAU OF STATISTICS (ABS) SURVEYS

The monthly Labour Force Survey (LFS) and supplementary surveys

The Labour Force Survey (LFS) has been conducted by the ABS on a monthly basis since 1978. The LFS provides accurate cross-sectional time-series data on the labour market activity of the usual resident civilian population of Australia aged 15 years and over. The principle focus of the monthly LFS is to provide aggregate-level baseline statistics on labour force participation, unemployment and, more recently, under-employment over time. The monthly LFS also provides the spine for a suite of more detailed supplementary surveys collected on alternating months at either annual or biennial intervals.

While the information on employment arrangements provided by the monthly LFS statistics are limited and do not provide a complete account of self-employment, more detailed information on employment arrangement is available from a select number of the LFS supplementary surveys. The supplementary surveys most useful for identifying self-employment include:

- the Labour Mobility (LFS-LM) survey;
- the Forms of Employment (LFS-FoE) survey; and,
- the Employee Earnings, Benefits and Trade Union Membership (LFS-EEBTUM) survey.

More broadly, the LFS supplementary surveys are useful for providing addition information on: household and individual socio-demographics; household and family compositions; education participation and attainment; labour market activity; and, other social attitudes on crime and safety or the environment. The focus of each of the supplementary surveys is indicated by their titles.

The survey methodology is similar for both the monthly LFS and its annual and biennial supplementary surveys. The LFS randomly samples approximately 27,000 dwellings and 52,000 occupants (about 0.32% of the population aged 15 years and over) each month (ABS, 2013). The occupants of dwellings are interviewed either face-to-face or over the telephone. Once sampled, the selected households and

individuals are then surveyed for eight consecutive months. In each month, 1/8th of the sample is rotated and refreshed with a new sub-sample of dwellings. The rotation of the sample each month ensures that both the measures of monthly change in labour force statistics remain relatively stable over time, while also maintaining the representativeness of the sample to reflect changes in the dwelling population over time. For each supplementary survey, the sample usually is comprised of 7/8th of the LFS sample in the month of collection.

Technically, the sample for the LFS is comprised of eight separate cross-sectional sub-samples, each of which is a very short eight-month longitudinal panel. However, because of the short time-frame over which the LFS follows individuals and the limited amount of information that is consistently collected in each month (i.e. time-variant information), the usefulness of the LFS as a longitudinal data source is limited.

Furthermore, the usefulness of the LFS and its supplementary surveys are also limited by a shortcoming that is common to ABS statistical products more broadly. Despite collecting detailed individual-level information from the LFS and its supplementary surveys, the statistics published by the ABS on a regular basis are aggregated and homogenised. Individual-level data, particularly unit-record data, is provided less frequently and is also highly controlled by the ABS. For example, despite regularly publishing aggregate-level statistics from the LFS on a monthly and quarterly basis, the ABS only released individual-level unit-record data (for the period 2008-2010) in 2012. Similarly, individual-level unit record data for the LFS-EEBTUM supplementary survey has only been made available on a biennial basis since 2004, despite being collected on an annual basis since 1999. While individual-level unit-record data for the LFS-FoE supplementary survey has only been released once, in 2008, despite being collected annually since 2006. Moreover, even where detailed individual-level data is made available, the information is routinely homogenised by the ABS for privacy reasons. For instance, information on continuous measures — such as, weekly earnings or hours worked — are either categorised or top- or bottom-coded to ensure the anonymity of survey respondents in the data. One of the main reasons for this is because the ABS is obliged, under Australian Government legislation, to respect and protect the individual privacy of its survey participants to ensure the ongoing confidence and cooperation of the

Australian population. For researchers, however, the homogenisation of information is particularly problematic because it has the potential to aggregate out important and interesting variance in the data, limiting the depth of analysis that may be undertaken.

Labour mobility supplementary

The LFS-LM survey collects information on the mobility or transition of labour between labour market states (e.g. salaried-employment, self-employment, unemployment or not-in-the labour force) over a 12 month period. The information collected by the LFS-LM includes details of the current and previous employment arrangements of workers, the timing and duration of transition events, and the workers' reasons for transitioning. For analysis, the LFS-LM is useful for examining the dynamic nature of the labour force. However, because of the cross-sectional nature of LFS-LM data, the information collected on past events may suffer from recall bias, and the dynamics observed may not be a true representation of the events that transpired.

Forms of Employment supplementary

The LFS-FoE survey is intended to capture the nature of working arrangements that were not being effectively measured by existing classifications and definitions in other ABS surveys. The LFS-FoE collects information on the nature of employment relationships between workers and their employers or with the businesses in which they work. As well as accurately identifying the employment arrangements related to self-employment, the LFS-FoE also identifies workers engaged in a range of other unconventional employment arrangements — such as, casual employees, employees of labour hire firms, and independent contractors.

Employee Earnings, Benefits & Trade Union Membership supplementary

In contrast to the other supplementary surveys, the focus of the LFS-EEBTUM is only on workers that receive at least part of their remuneration as a wage or salary. For analysing self-employment, the LFS-EEBTUM identifies workers that are owner-mangers of incorporated enterprises (OMIEs) only. More broadly, however, the information collected by the LFS-EEBTUM is extremely valuable for identifying subsets of workers within salaried-employment. For instance, the LFS-EEBTUM is

only one of a handful of ABS surveys to provide reliable information on weekly earnings and employment benefits, and also identify trade-union members and public-sector employees.

Census of Population & Housing

The Census of Population and Housing is the largest and one of the longest running surveys conducted in Australia. The first national Census was conducted in 1901, and since 1961 it has been conducted regularly by the ABS on a 5-yearly basis. The most recent Census for which the data is publicly available occurred in 2011 and involved a complete enumeration of the usual resident Australian population.[27] The Census does not suffer the sampling problems experienced in other surveys and allows for the analysis of small or specific groups of individuals. The nature of the Census ensures that the underlying characteristic distributions are a true reflection of the population. For example, in 2011, the Census captured or 98.3% (21,504,721 people) of the estimated usual resident population, which was slightly better than the previous Census in 2006.[28]

Rather than have a specific focus, the information collected in the Census is more general and broad. For analysing self-employment, both the 2006 and 2011 Census' collected enough information on employment arrangements (particularly the distinction between OMIEs and salaried-employees) to provide a complete account of self-employment. Because of its size, the Census is also able to provide highly detailed information on occupational and industry classifications and geographical localities, for example. However, in comparison to the LFS and its supplementary surveys, the information collected by the Census on other labour force and employment characteristics is limited.

The accuracy of the information collected in the Census can also be less precise than other specialised ABS surveys. The survey design and methodology of the Census is considerably different in comparison to, for example, the LFS and supplementary surveys. For instance, rather than collect information using more accurate face-to-face or telephone interview techniques, the Census is self-enumerated: that is, respondents complete the questionnaire themselves. Self-enumeration increases the likelihood of respondents providing information that is incorrect or untrue through

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[27] The most recent Census was conducted in August 2016, but data is not yet publicly available.
[28] ABS, cat. no. 2940.0, Census of Population and Housing - Details of Undercount, 2011

misunderstanding questions, incorrectly classifying themselves, or, worse, not responding at all. Although the methodological differences between the Census and other ABS surveys, such as the LFS, can lead to large enumeration discrepancies, the proportional estimates are usually very similar – as shown in Table 3.2.

Finally, unlike some other ABS products, detailed aggregate-level statistics and individual-level unit-record data are usually readily and publicly available. Although privacy is still a concern for the ABS when releasing Census data, because the initial information collected is of a broad and general nature very little homogenisation of the information is undertaken. The ABS usually releases individual-level 1% and 5% sample unit-record datasets.

Table 3.2: Comparison of the 2011 Census and Labour Force Survey, August 2011, data

Labour force status (broad)	Census 2011	LFS (Aug, 2011)[a]
Employed	*61.4%*	*61.6%*
Unemployed	*3.7%*	*3.3%*
Not-in-the labour force	*35.0%*	*35.0%*
Total	*100.0%*	*100.0%*
N[b]	16,387,766	18,402,600

Notes: (a) LFS Aug 2011 are original data, source Labour Force, Australia (cat. no. 6202.0)
          (b) The number of not stated to LFS06P in the Census (975,929) have been removed to enable better comparison with the LFS.
Source: Reproduction of statistics provided in ABS 2011 Census Fact Sheet 'Differences between the LFS and the Census', abs.gov.au, accessed 08/05/2014

APPENDIX 3.B — HOUSEHOLD, INCOME AND LABOUR DYNAMICS IN AUSTRALIA (HILDA) SURVEY

The Household, Income and Labour Dynamics in Australia (HILDA) survey is a longitudinal panel study that traces the labour market, income and family dynamics of the usual resident Australian population. Since 2001, the HILDA survey has been conducted on an annual basis. Commissioned by the Australian Government, and designed and managed by the Melbourne Institute of Applied Economic and Social Research at the University of Melbourne, the impetus for the survey was to trace the income, labour market, and family dynamics of the Australian population, over an extended period of time (Watson & Wooden, 2002).

The inception of the HILDA survey marked a significant milestone for the research community in Australia across many disciplines, and, as already discussed, brought Australia in to line with many other developed countries. Prior to the introduction of the HILDA survey, a persistent weakness of Australian research had been the

reliance upon cross-sectional data and the subsequent descriptive or static analytical techniques. Appropriate longitudinal data, important for charting dynamics over time and allowing for more complex and powerful forms of analysis, was either inadequate or unavailable. The introduction of the HILDA survey opened up the research to examine and rethink relationships that had not been previously testable, and challenge the understanding of many established notions. The range and diversity of the research to which the HILDA data has contributed has now gone well beyond the purpose for which the study was initially conceived.

For many researchers, the depth and breadth of longitudinal information collected by the HILDA survey provides a one-stop-shop. In addition to the value of its temporal nature, the HILDA survey is also an incredibly rich source of information. HILDA data is particularly suitable for identifying and analysing self-employment because of the detailed information it collects on employment arrangements, as well as other labour force and employment characteristics. In addition, HILDA data also provides detailed information on range of other topics, including:

- household composition and family formation (e.g. partnering, relationships and family support);
- personal demographic information (e.g. age, sex, indigenous status);
- geographic localities;
- family background and ancestral information (e.g. country of birth and parents employment and education);
- education participation and attainment;
- labour force experience and history (employment and unemployment experience);
- current employment and work characteristics (e.g. employment arrangement, occupation and industry, public/private sector, hours worked, job-tenure);
- income and earnings information;
- household expenditure information;
- household wealth (assets and debts) and financial information;
- health and disability information;
- time use and calendar information;
- future intentions (e.g. retirement);

- youth related issues;

- social, employment and lifestyle attitudes and satisfaction.

Information may also be matched to individuals within a household and between spousal partners. Furthermore, because the HILDA survey is not constrained by the same privacy considerations that limit the ABS' surveys and statistics, most information is readily available, to most researchers with appropriate confidential facilities, in its original detail as individual-level unit-record data.

The delay in the establishment of the HILDA survey was not without its advantages. The methodology and design of the HILDA was able to take advantage of the lessons learnt in the development of similar international longitudinal panel studies, such as the G-SOEP established in 1984 or the UK-BHPS established in 1991. To ensure that HILDA is random and representative, the initial sample was selected by using a stratified approach applied to States and Territories and to metropolitan and non-metropolitan regions. The information collected on households and individuals is through a combination of face-to-face and telephone interviews and self-completion questionnaires. However, unlike ABS surveys where people are lawfully obliged to cooperate, participation in the HILDA is voluntary which generally makes it more difficult to draw a representative sample. Despite this, in its first wave, in 2001, the HILDA sample collected information on 13,969 Australian residents from 7,682 households. The household response rate for the first wave was an enviable 66%, followed by wave-on-wave rates of attrition over the subsequent five waves of 13.2% cent, 9.6%, 8.4%, 5.6% and 5.2%, respectively. The initial response rate and attrition rates compare favourably with the UK-BHPS (Watson and Wooden 2006).

Remarkably, despite the natural rate of attrition (i.e. household and individuals dropping out of the sample because of change in location, non-response or death), the HILDA survey sample grew over time due to the sampling methodology used – see Table 3.3. The drawback of the increasing sample size, however, also meant that over time the representativeness of the sample diverged from the reference population. For example, the sample begun to substantially under-represent certain segments of the population, such as new immigrants and returning Australians that had arrived in Australia since 2001, those living in rural and remote areas, and young Australians (Watson & Wooden, 2013). To improve the representativeness of

the sample, in 2011 a general top-up of 2,154 responding households and 4,009 individuals were added to the sample.

Table 3.3: Summary of HILDA survey sample size in each wave, 2001-2011

Wave	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of individuals sampled in all waves, in each wave	13,969	11,993	10,777	9,855	9,311	8,864	8,409	8,034	7,721	7,460	7,229
Number of individuals sampled in Wave 1, in each wave	13,969	11,993	11,190	10,565	10,392	10,085	9,628	9,354	9,245	9,002	8,780
Individual-level wave-on-wave rate of attrition* (%), in each wave	-	13.2%	9.6%	8.4%	5.6%	5.1%	5.3%	4.8%	3.7%	3.7%	3.5%
Number of existing individuals sampled, in each wave	-	11,993	11,895	11,702	11,940	12,060	12,103	12,098	12,448	12,702	12,854
Number of new individuals sampled, in each wave	13,969	1,048	833	706	819	845	686	687	853	824	749
Number of individuals in top-up sample, in Wave 11	-	-	-	-	-	-	-	-	-	-	4,009
Total number of individuals sampled, in each wave	13,969	13,041	12,728	12,408	12,759	12,905	12,789	12,785	13,301	13,526	17,612
Total number of households sampled, in each wave	7,682	7,245	7,096	6987	7,125	7,139	7,063	7,066	7,234	7,317	9,543

Notes: * Wave-on-wave rate of attrition is the percentage of individuals in the previous wave that did not provide an interview in the current wave, excluding those that were out-of-scope (i.e. those that had died or moved overseas).

Source: HILDA survey data, 2001-2011

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CHAPTER FOUR
DESCRIPTIVE ANALYSIS OF SELF-EMPLOYMENT: INTERNATIONALLY, IN AUSTRALIA, & OVER TIME

This chapter outlines contextual information about the size of self-employment within the labour market and its contribution to the broader economy. Self-employment is an often neglected area of research in economics, particularly labour economics, and particularly so for Australia. Yet, as William Baumol (2011) reckoned, the omission of entrepreneurship (or, for the purposes of this Thesis, self-employment) is intolerable and to the detriment of economics, specifically microeconomics, in its understanding of the labour market.

As this chapter makes clear, in most developed economies, self-employment is an important segment of the labour market in terms of its size and economic contribution (more so than unemployment, for example). At the microeconomic-level, self-employment touches on the lives of many both directly through participation over the life-course, as well as indirectly through familial and professional relationships. Self-employment is also a role to which many more workers aspire to attain. At the macroeconomic-level, self-employment sits at the intersection between labour-supply and labour-demand, as it not only attracts many workers but also generates a substantial amount of the additional employment in the labour market.

This chapter explores the importance of the contribution of self-employment in five parts. First, it presents the rates of self-employment across developed economies, discussing both the cross-country variation in these rates and the changes in these rates over time. Also discussed are certain trends in self-employment that are observed consistently across countries — such as, the high incidence of participation in self-employment over the life-course, as well as the unfulfilled or latent desire amongst many more non-self-employed. Second, the discussion turns to the role of self-employment in Australia, and contrasts this against recent structural changes in the Australian economy and the accompanying trends in the broader labour market. Third, this chapter highlights the broader importance of self-employment to the Australian labour market and economy, in terms of its

contribution to the quantity of labour supply and labour demand, as well as its contribution to the value of economic activity. Finally, the fourth and fifth sections provide a descriptive picture of self-employed workers in Australia: who they are, what they do, how they differ relative to employees and the unemployed, and how their profile has changed over time.

4.1 INTERNATIONAL TRENDS & RATES OF SELF-EMPLOYMENT

During the post-war period, many of the world's now developed countries (e.g. U.S., U.K., E.U., Japan, Canada, Australia and New Zealand) underwent significant economic reform and structural change, which had a dramatic effect upon the occupational and industrial composition of their economies. Further, it is more than mere coincidence that during this same period these countries also experienced numerous economic and social changes marked by rapid technological change, greater interconnectedness, the decline of heavy industry and 'blue-collar' jobs, rise in female labour force participation, and greater labour market flexibility. Against this backdrop, however, self-employment continued to remain a relevant form of employment.

The continued relevance of self-employment in the labour markets of developed economies over time

As Table 4.1 shows, self-employment consistently accounted for a substantial minority share of employment in the labour markets of several selected developed economies at select points during the post-war period. The continued relevance of self-employment over time highlights the adaptive role that self-employment has played in the labour markets of developed economies. The rates of self-employment in Table 4.1, however, tend to vary considerably both across countries at each point time and over time for each country.

There are several patterns that are worth noting. First, while the rates of self-employment inclusive of agriculture tend to decline over time (with the exception of New Zealand and the U.K.), there is a reversal of this trend in many more countries once agriculture is excluded. Increasing rates of non-agricultural self-employment indicate that much of the growth in self-employment has been driven by non-agricultural industries and occupations. This macro-level shift in the occupational

composition of self-employment over time also indicates that self-employment is not necessarily associated with a set of particular occupations or characterised by certain types of work.

Second, in Europe, there is a considerable difference in the rates of self-employment between the Mediterranean countries (i.e. Greece, Italy, Spain) in comparison to the Northern and Scandinavian ones (i.e. France, Germany, Sweden, Norway). For example, in Greece and Italy, the rates of self-employment in 2005 were 30% and 25%, respectively; whereas, the rates for France and Norway were 9% and 7%, respectively. This contrast between European countries is unusual given their close proximity to one another, as well as their now close economic ties through the E.U. (e.g. low to non-existent barriers to trade, capital and migration flows). It is possible that such differences are indicative not only of economic structural and compositional differences, but also of deep-seated institutional and cultural differences.

Third, the rates of self-employment in the U.S. over time are relatively low in comparison to other similar Anglo-countries (e.g. the U.K., Canada, Australia and New Zealand), but also against some very different European countries. This is unusual given that the U.S. has historically considered itself as the standard-bearer of 'democratic capitalism', and typically is the one country that is most associated with free-enterprise and entrepreneurship. Even more unusual is that the rates of self-employment in the U.S. tend to be lower than those in European countries that are typically associated with strong 'social-democratic' values and benevolent, yet high taxing, systems of government (e.g. Germany, Sweden and Norway).

While much of the research in the literature relating to cross-country variation over time has focussed on institutional and cultural differences between countries, the evidence is limited and the findings inconclusive.[29] Another possible source of inconsistency, which may account for some of the variation, is the differences in the treatment and measurement of self-employment between countries and over time (as discussed previously in Chapter Two). For example, in Table 4.1, the OECD estimates of the rates of self-employment across countries are gathered from the respective national labour force statistics, some of which are more accurate than others. An obvious omission from the estimates of self-employment in Table 4.1 is

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[29] See, *inter alia*, Staber & Bögenhold (1993), Blanchflower (2000), Parker & Robson (2004), and Taylor (2011).

the exclusion of owner-managers of incorporated enterprises (OMIEs), which, as previously discussed, have accounted for an increased share of self-employment (approx. 30%-40%) in the U.S. and Australia in recent years. As a result, the estimates in Table 4.1 are also likely to underestimate the true level of self-employment activity because of the exclusion of OMIEs from the measures of self-employment.

Table 4.1: International comparison of self-employment as a proportion (%) of employment for selected developed countries, over time.

	Rate of self-employment (%), excluding OMIEs					Rate of non-agricultural self-employment (%), excluding OMIEs				
	1966	1976	1986	1996	2005	1966	1976	1986	1996	2005
Australian & New Zealand										
Australia	15.9	15.2	16.8	15.1	12.7	9.8	10.1	11.8	11.3	11.4
New Zealand	14.0	14.1	17.9	20.4	17.9	na	na	12.1	14.5	15.6
Europe										
Austria	27.8 [c]	19.2	14.8	13.7 [e]	11.9	11.5 [c]	8.7	7.4 [e]	7.4	8.8
France	25.1	17.8	15.8	11.6 [f]	9.0	12.5	9.8	9.5	7.8	7.1
Germany	19.1	13.6	11.5	10.6	11.3	10.0	8.1	7.7	8.3	10.7
Greece	na	52.4 [d]	50.7	46.1 [f]	30.1	na	23.6 [d]	24.6	25.1 [f]	24.8
Italy	37.4	24.1	29.9	28.9	25.1	20.8	14.1	20.5	20.8	24.2
Norway	22.5	14.8	12.7	8.7	7.2	8.7	7.6	7.1	5.4	5.6
Spain	36.8 [b]	31.5	30.0	25.0	16.6	18.2	16.8	18.4	17.4	15.2
Sweden	13.1 [b]	8.2	6.5	11.0	9.6	7.0 [a]	4.4	4.1	8.5	8.8
UK	6.7	8.0	11.5	13.6	12.8	5.3	6.6	9.6	11.3	12.2
Asia										
Japan	38.0	29.4	24.9	17.7	10.2	18.3	17.1	15.8	12.0	8.5
North America										
Canada	14.8	9.7	9.7	11.3	9.2	8.3	6.2	6.9	8.9	8.4
USA	12.7	9.3	8.9	8.4	7.4	8.6	6.8	7.1	6.8	6.8

Notes: a = 1967 ; b = 1968 ; c = 1969 ; d = 1977 ; e = 1994 ; f = 1995

Sources: Combination of statistics from Blanchflower (2000: 480-481)and Blanchflower (2007: 53-54) using OECD Labour Force Statistics

The prevalence of self-employment over the life-course

Although the self-employed are a minority in the workforces of most developed countries, a much larger share of workers experience self-employment at some point during their working lives. Müller & Arum (2004), for example, using 1980-1992 US-PSID data, approximate that 40% of U.S. men experienced at least one stint in self-employment before their mid-50's. Similarly, both Ferber & Waldfogel (1998) and Williams (2000), using US-NLSY data, estimate that for young Americans 25% of men and 17% of women experienced self-employment prior to their mid-30's.

For Australia, comparable estimates of the prevalence of self-employment over the work-life cycle can be obtained using the HILDA survey over an 11 year period (2001-2011). As Table 4.2 shows, approximately 15% of young Australian males (15-24 years of age in 2001) experienced self-employment prior to their mid-30's in 2011, which further increased to 31% for males aged 35-44 years in 2001 prior to their mid-50's in 2011. While these estimates are slightly lower than those for the U.S., in part, because the HILDA survey's short timeframe in comparison to its U.S. equivalents, the share of Australian workers who experience self-employment during their working lives is still larger than the minority share of those self-employed at a given point in time.

Table 4.2: Self-employment rates of *any* self-employment experience between 2001-2011 by age and gender, in Australia

Age cohort in 2001	Sample size	Proportion of self-employment (%)		
		Male	Female	Persons
15-24	1,052	14.9	11.6	13.3
25-34	1,282	32.6	23.4	28.0
35-44	1,377	31.4	22.5	26.9
45-54	1,250	32.4	21.4	26.7
55-64	839	32.3	15.1	23.7
65-74	540	13.1	6.0	9.2
75+	220	6.1	0.6	2.1
Total*	**7,229**	**27.5**	**17.2**	**22.2**

Notes: Weighted estimates for a balanced panel, 2001-2011. *Due to missing age information in some cases, sample size estimates do not sum to the reported Total.
Source: HILDA survey, balanced panel, 2001-2011

The prevalence of self-employment in the lives of people also occurs indirectly. For instance, another way in which people experience self-employment is through a close friend or family member, especially parents. For example, extrapolating the estimates found by Dunn & Holtz-Eakin (2000) using US-PSID data, approximately 31% of young American males prior to their mid-30's had a parent who had been

self-employed for at least one year during the parent's working life.[30] Unfortunately, similar data on the incidence of parental self-employment is not available for Australia.

The influence of intergenerational transfers through wealth and experience, particularly from parents to children, on self-employment is a subject that has attracted much attention in the entrepreneurial literature.[31] However, the evidence that intergenerational factors determine self-employment is not strong. For example, Dunn & Holtz-Eakin (2000) show that while 18% of young American men experience a stint in self-employment, less than half had a parent who also had experienced self-employment. Fairlie & Robb (2007) obtain a similar result and estimate that approximately 50% of Americans with a business, in 1992, never had a self-employed family member prior to starting their business.[32] Evidence in the literature of the importance of intergenerational wealth transfers on self-employment is also not strong, and is discussed later in Chapter Six.

The 'latent' desire for self-employment among the non-self-employed

Another consistent trend across developed economies is the desire, or latent preference, for self-employment that is reported by non-self-employed workers. In contrast to the minority share of self-employed workers at a given point in time, many more workers (both employed and unemployed) express a latent desire to run their own business (Blanchflower et al., 2001). The level of latent self-employment reported by non-self-employed workers is both large and relatively consistent across countries. Table 4.3 presents estimates of latent self-employment, as captured by the 2005 International Social Survey Programme (ISSP) for 32 countries. As Table 4.3 shows, the proportion of latent self-employment is similar for both employees and unemployed workers, and is particularly pronounced amongst males. For example, in Australia, approximately 46% of employees (and 54% of male employees) report they would have preferred working as self-employed, increasing to 63% for unemployed workers.

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[30] Dunn & Holtz-Eakin (2000: 292) in Table 3 provide estimates from the US-PSID that allow the number of young males with a self-employed parent to be extrapolated (≈ 712 (or 31.3%) of 2,276 young males).
[31] See, *inter alia*, Holtz-Eakin et al. (1994), Blanchflower & Oswald (1998), Dunn & Holtz-Eakin (2000), and Fairlie & Robb (2007).
[32] Fairlie & Robb (2007) use U.S. 1992 Characteristics of Business Owners (US-CBO) survey data.

Furthermore, just like the cross-country differences in the rates of self-employment, there is considerable variation in the rates of latent self-employment between countries. For example, the country with the highest proportion of workers with a stated desire to become self-employed is the Philippines, at 79% for employees and 81% for the unemployed; while the country with the lowest is Finland, at 20% for employees and 13% for the unemployed. By comparison, the sample average for all 32 countries is 43% for employees and 51% for the unemployed.

Table 4.3: International league table of the latent preference for self-employment amongst employees & unemployed, 2005

	Economically active respondents			% of latent self-employment among:			
	N	% Self-emp.	% Emp.	% Unemp.	Employees			Unemp.
					Male	Female	Persons	Persons
Oceania								
Australia	1,252	13.2	84.3	2.6	54.6	38.8	46.1	63.3
New Zealand	965	14.4	77.7	7.9	56.8	40.9	48.4	35.9
Africa								
South Africa	2,106	5.9	31.9	62.2	52.5	55.6	53.7	50.0
Asia								
Israel	710	10.8	77.3	11.8	49.1	37.1	43.2	48.1
Japan	513	15.8	81.9	2.3	32.5	18.6	26.2	50.0
Philippines	801	49.3	31.3	19.4	83.1	71.0	79.2	80.8
Russia	961	3.6	91.4	5.0	51.7	42.2	47.0	57.8
South Korea	959	31.8	60.3	7.9	68.3	50.4	61.1	76.5
Taiwan	1,466	19.7	68.9	11.4	53.9	37.7	46.5	43.8
Europe								
Bulgaria	698	6.3	73.6	20.2	64.4	54.2	59.7	39.8
Cyprus	646	22.9	72.3	4.8	45.5	30.7	38.1	42.9
Czech Republic	751	12.6	75.2	12.2	26.7	20.4	23.8	21.8
Denmark	1,175	8.4	88.5	3.1	29.1	15.5	22.2	30.6
Finland	814	9.7	81.7	8.6	22.8	16.5	19.6	12.5
Flanders	821	11.6	80.4	8.0	23.4	14.8	19.5	27.8
France	1,019	7.8	82.9	9.3	46.1	28.9	36.5	36.4
Germany (East)	355	12.1	67.3	20.6	45.9	33.3	39.5	31.3
Germany (West)	600	9.7	79.8	10.5	40.2	36.2	38.5	44.6
Great Britain	535	12.5	82.7	4.8	54.6	31.0	41.6	47.6
Hungary	549	7.9	80.0	12.1	37.7	30.6	34.5	39.7
Ireland	628	13.0	81.4	5.6	57.5	33.7	46.7	29.1
Latvia	662	5.6	89.9	4.5	46.7	44.3	45.3	30.8
Norway	903	11.2	85.0	3.8	32.5	11.1	21.0	30.3
Portugal	1,227	14.0	78.2	7.8	48.1	47.3	47.7	50.0
Slovenia	580	5.7	82.4	11.9	54.9	41.6	48.5	52.5
Spain	670	12.0	72.8	15.2	28.7	28.4	28.6	38.1
Sweden	947	10.1	83.8	6.0	34.4	19.0	26.2	27.5
Switzerland	716	10.9	86.6	2.6	48.1	34.8	42.1	59.2
North America								
Canada	647	9.5	88.5	2.0	62.8	42.4	51.9	78.9
Dominican Republic	1,471	27.1	38.2	34.7	76.4	74.2	75.4	64.9
Mexico	926	24.5	50.5	24.9	78.6	74.0	76.7	77.6
USA	1,061	13.4	82.2	4.4	66.7	52.7	59.8	69.1
Total	28,134	14.1	71.8	14.1	48.9	36.2	42.8	51.1

Notes: In response to the question: 'Suppose you were working and you could choose between different kinds of jobs. Which of the following would you personally choose? I would choose: being an employee; being self-employed; can't choose?'
The proportions of latent self-employment by gender for unemployed workers are not reported due to small sample sizes.
Self-emp.= Self-employed; Emp.= Employee; Unemp.= Unemployed
Weighted estimates.
Source: International Social Survey Programme (ISSP) – Work Orientation module, 2005

The strong stated desire for self-employment amongst workers also appears to be relatively impervious to major lifetime events and shifts in personal circumstance that typically occur over the life-course — such as, marriage, the purchase of a house, or childbearing and child-rearing —, and that are also associated with a shift in perceptions towards work and its role in life. As illustrated in Figure 4.1, the latent desire for self-employment remains consistently strong for both employees and unemployed workers across all age-cohorts, with the exception of a noticeable dip amongst employees during the period prior to retirement (i.e. 50 to 64 years of age).

Given that a much smaller share of workers actually translate their preference for self-employment into action, the strength of the latent desire for self-employment both across countries and over the life-cycle has proved to be somewhat of a puzzle for economists. Particularly vexing is the high rate of latent self-employment amongst unemployed workers (compared with employees) because, unlike entry into salaried-employed jobs, there are fewer labour market barriers to entry into self-employment (i.e. there is no employer 'screening' process). In the existing literature, the latent desire expressed by employees and unemployed workers alike is often interpreted as evidence of the attractive features that are thought to distinguish self-employment — such as autonomy and independence — and the promise of non-pecuniary rewards that these features offer workers, as well as the inability of workers to access the 'seed' or financial capital necessary to establish their own business.[33] These hypotheses are the subject of further investigation later in Chapter Six. However, as is shown later, the empirical evidence does not support either of the notions that workers are drawn to self-employment because of its non-pecuniary benefits, or that workers are barred from entering self-employment because of financial constraints. Hence, it remains unclear what the pervasiveness of this unfulfilled desire for self-employment amongst the non-self-employed is indicative of.

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[33] See, *inter alia*, Blanchflower et al. (2001), Frey et al. (2004), Blanchflower & Shadforth (2007), Henley (2007), and Benz & Frey (2008a).

Figure 4.1: Latent preference for self-employment among employees and unemployed workers distributed by age (in 5-year cohorts), 2005

Employees
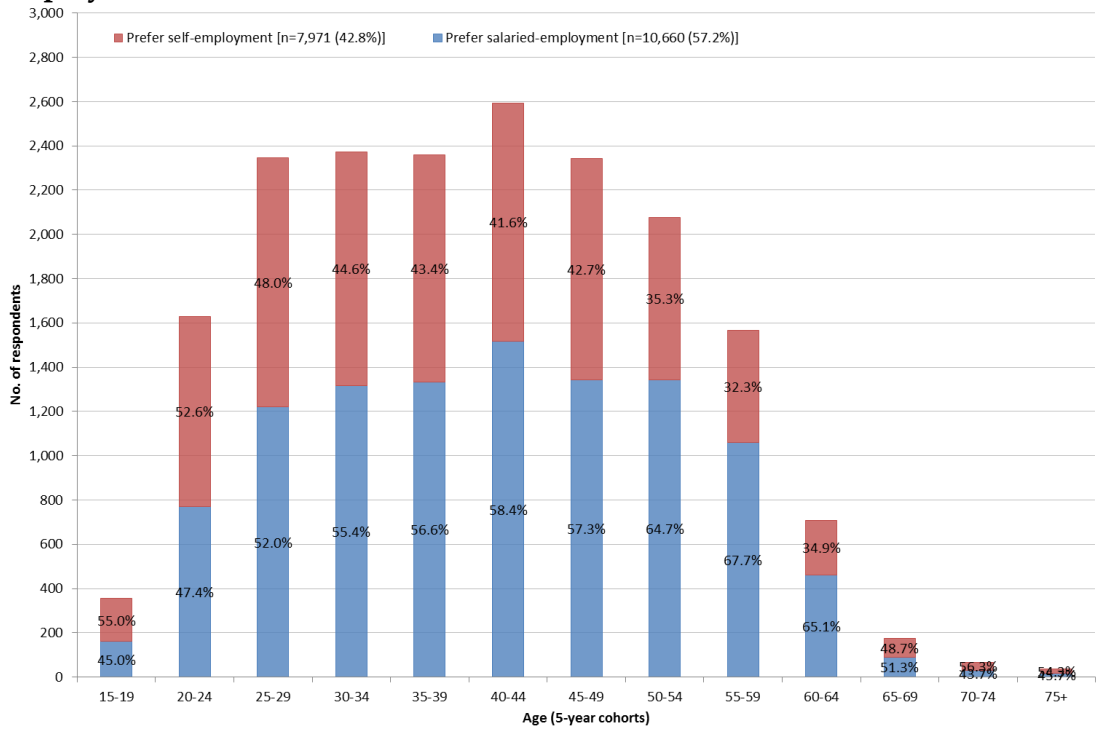
Unemployed
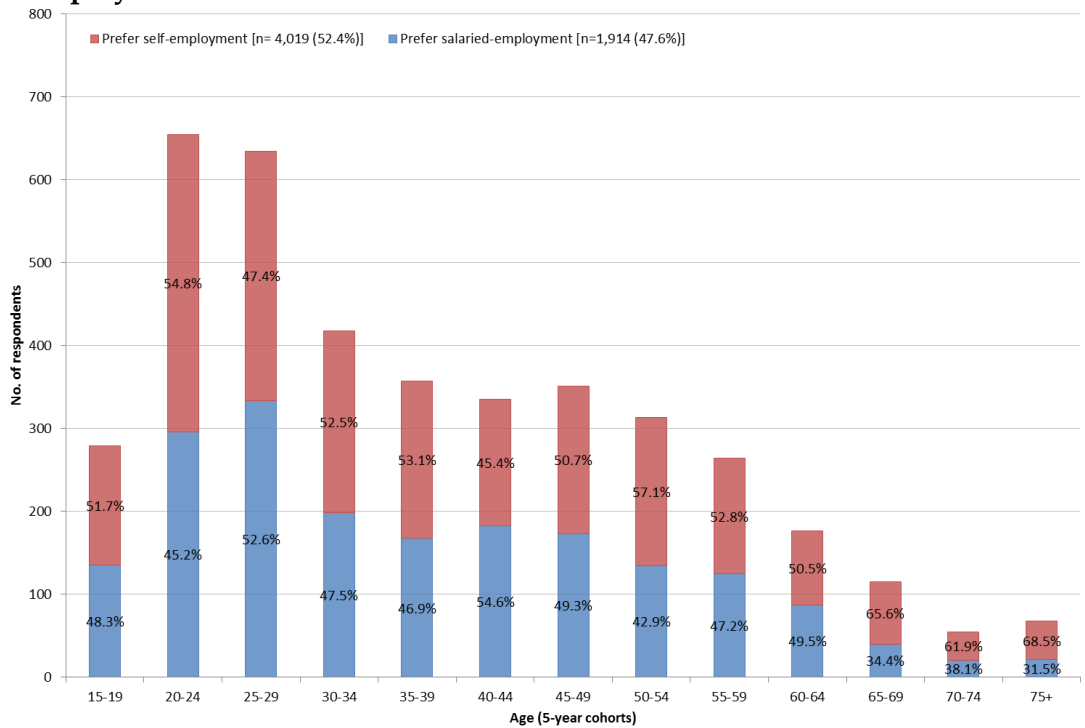
Notes: Estimates are from pooled data across 32 countries; see Table 4.3 (above) for the complete list. Weighted estimates.
Source: International Social Survey Programme (ISSP) – Work Orientation module, 2005

4.2 LABOUR MARKET TRENDS & SELF-EMPLOYMENT IN AUSTRALIA, 1990—

Economic reforms & structural changes

Like other developed countries during the post-war period, the Australian economy underwent many of the reforms and structural changes that were discussed earlier (particularly from the mid-1970's onwards). Many of the most significant social, financial, and economic reforms were undertaken between 1983 and 1996 by the successive Hawke- and Keating-led Labor governments, at a national level. Many of the reforms undertaken during this period were aimed at improving the competitiveness of Australian businesses and industries, as well as increasing the flexibility of the financial and labour markets, to ensure that resources were allocated more efficiently throughout the economy. On the one hand, the changes meant that firms, industries and employees were increasingly exposed to fluctuations in price and demand for their goods and services. On the other hand, deregulation and reducing the rigidities of the labour market provided firms with increased flexibility to adjust their internal labour costs in response to demand fluctuations. They also reduced the security of employment for many employees. While these reforms proved to be politically and socially uncomfortable at the time, the changes were successful in laying the foundation for a prolonged period of positive economic and employment growth from the mid-1990's onwards.

In recent years, particularly since 2008 with the onset of a global financial and subsequent economic crisis, the Australian experience has been dissimilar to many other developed economies. Buoyed by the economic rise of China and its insatiable appetite for Australian mineral resources, and the stability of Australian banks and broader financial system, the Australian economy and labour market has fared better than most economies in Europe, the U.K. and U.S. Figure 4.2 illustrates the annual growth in real Gross Domestic Product (GDP) since 1980 for Australia and selected economies.

Figure 4.2: Real GDP growth for Australia and selected developed economies, 1980-2015 per annum
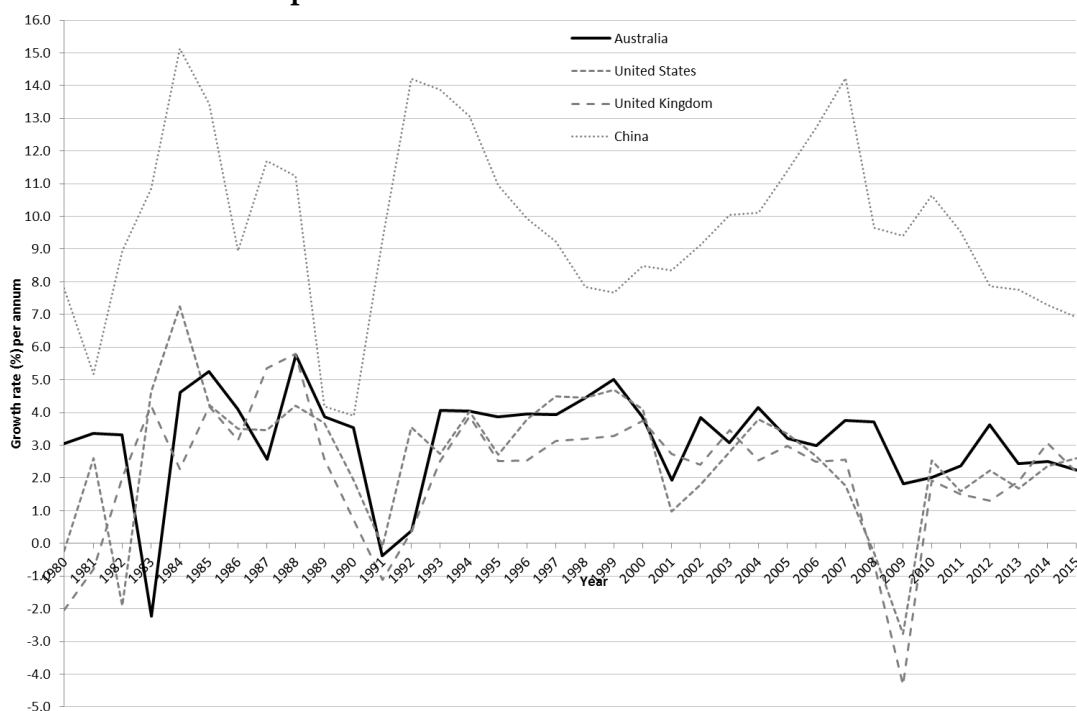
Source: World Bank national accounts data (http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG). Accessed 03/05/2017

Growth of the labour force

From the viewpoint of the labour market, the period of structural change accompanied a period of prolonged growth in labour participation and employment, as well as a significant shift in the employment relationship and the composition of the labour force. For example, between 1992 and 2013, the Australian labour force grew by approximately 42%, from 8.5 million participants in 1992 to 12.01 million in 2013 — illustrated in Figure 4.3.[34] During this period, the number of employment opportunities for both existing and new job-seekers also increased, as the share of participants seeking but unable to find suitable employment (i.e. the unemployed) steadily decreased from 10.4% (0.89 million) of the labour force in 1992 to 5.4% (0.66 million) in 2013. However, the substantial decline in the number of job-seekers cycling through the labour market during the two-decade period is not enough to account for the prolonged and sustained growth in labour force participation and employment.

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[34] The 1992 to 2013 time period has been determined by the availability of ABS LFS data. From 2014 onwards, the comparability of this particular time-series data is not recommended due to a restructuring of ABS LFS and supplementary survey collections.

Figure 4.3: Labour force participation in Australia disaggregated by labour force status (%), 1992-2013 per annum
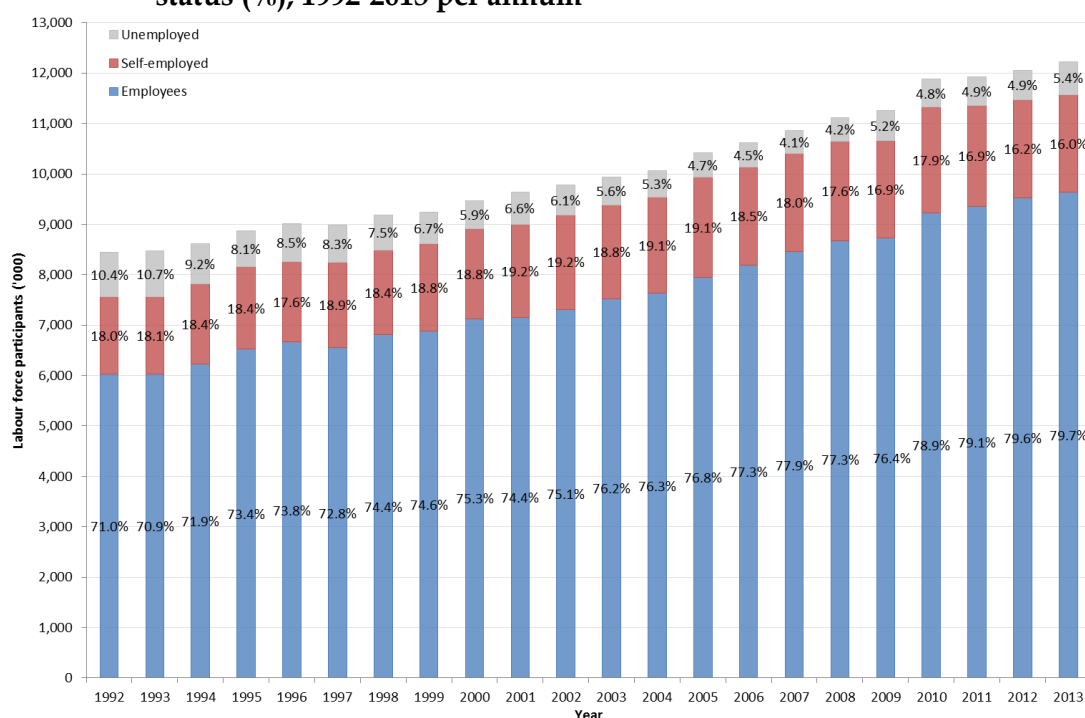
Notes: Due to data limitations, the month of enumeration was August for years 1992 to 2007 and then
          November from 2008 onwards, and are calculated using Original stock estimates.
          'Employees' exclude owner-managers of incorporated enterprises, and refers only to workers' main
          job. 'Self-employed' includes 'owner-mangers of incorporated enterprises' and 'owner-managers of
          unincorporated enterprises', but excludes 'contributing family workers'; and, only refers to workers'
          main job.
Source: ABS, cat. no. 6105.0 – Australian Labour Market Statistics, Jul 2014, Table 1
          ABS, cat. no. 6202.0 – Labour Force, Australia, Feb 2017, Table 1

Instead, the growth in participation is attributable to the entry of first-time and inexperienced workers, particularly females, from outside the labour market, as well as rapid growth in the working-age population (15-64 years) due to migration. As Figure 4.4 illustrates, the rates of labour market participation amongst working-age people in Australia increased from 72% in 1992 to 76% in 2013, driven by the rapid rise in female participation from 61% in 1992 to 70% in 2013. This trend, however, did not occur evenly throughout the labour market and masks some interesting patterns. One such pattern is the partial withdrawal of males from the labour market and the decline of male participation rates over time, which fell from 83% in 1992 to 82% in 2013 — illustrated in Figure 4.4. Another pattern is the asymmetric concentration of workers in salaried-employed jobs rather than self-employment over time. Shown in Figure 4.3 (above), for example, the size of salaried-employment increased by approximately 60%, from 6 million workers in 1992 to 9.6 million in 2013, while size of self-employment (including OMIEs, but excluding 'contributing family workers') only increased by 27%, from 1.5 million to 1.9 million

workers.

Figure 4.4: Labour force participation rates for working-age people (15-64 years) (%) by gender, 1992-2013 per annum

Despite its sluggish growth during the past two decades, self-employment remained an important part of the Australian labour market. As shown in Figure 4.3 (above), the share of self-employed workers typically accounted for one-sixth of labour market participants (including unemployment), and one-fifth of total employment (i.e. the self-employment rate). The shares of self-employment have also remained within a narrow band over time, approximately ranging from a minimum of 16.9% of total employment or 16.0% of the labour force (1.94 million workers) in 2013 to a maximum of 20.6% of total employment or 19.2% of the labour force (1.85 million workers) in 2002. During the period, the size of the self-employed workforce in the Australian labour market consistently outnumbered the number of unemployed job-seekers by between 1.7 times (in 1992) and 4.4 times (in 2007).

Labour market flexibility, 'casualisation' & changing employment arrangements

Another distinctive trend in the labour market, which coincides with the recent

growth in participation and employment, is the increased prevalence of part-time employment and the proliferation of flexible employment arrangements in salaried-employment. A consequence of the aforementioned industrial relations reforms to reduce labour market rigidities and stimulate employment growth, an increasing number of the jobs created were on a part-time basis: that is, less than 35 hours per week. As Figure 4.5 illustrates, the share of workers (both employees and self-employed) working part-time hours (in all jobs) went from being 24% (1.84 million workers) of total employment in 1992 to 30% (3.46 million workers) in 2013. Although not presented, this trend was driven by rapid growth in part-time employee jobs rather than in self-employment.

Associated with the increase in part-time employment was a shift away from the traditional employer-employee relationship — such as, permanent-ongoing employment contracts and jobs with paid-leave entitlements (e.g. annual-leave and sick-leave) — and toward contemporary employment arrangements with greater flexibility for employers and less job security for employees — such as, contingent fixed-term contracts and casual contracts (i.e. jobs that provide higher rates of hourly pay in lieu of paid-leave entitlements).[35] As illustrated in Figure 4.6 (below), the number of employees in casual jobs (i.e. those without any paid-leave entitlements) grew by 78% from 1.29 million workers (or 17% of the workforce) in 1992 to 2.3 million (or 20% of the workforce) in 2013. The trend toward 'casualisation' in the Australian labour market during this period saw the size of the self-employed workforce shrink from 1.2 times the number of casual employees in 1992 to 0.8 times the number in 2013.

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[35] Traditionally, it has been assumed that workers receiving paid-leave entitlements were engaged under permanent-ongoing or fixed-term contracts of service, and those without to be engaged on a casual contract. As their names suggest, the different types of employment vary by degree of flexibility in the commitment to hours of work and employment tenure – where permanent employment represents the strongest employment relationship between the employer and employee, and casual employment the weakest. Since 2000, however, greater efforts have been made to identify the contracts of employment of workers with more specificity, which relies less on the assumption of the receipt of paid-leave entitlements (See ABS, cat. no. 6102.0.55.001, Labour Statistics: Concepts, Sources and Methods, Apr 2007). For our purposes, we continue to use those with and without paid-leave entitlements as a proxy for permanent/fixed-term and casual contracts, respectively, due to the availability and consistency of the measure over time. Unlike other developed countries, Australia is unusual in that casual contracts are required to be paid at a higher hourly-rate than permanent/fixed-term contracts on equivalent jobs (approximately 25% more) in lieu of receiving paid-leave entitlements.

Figure 4.5: Size of total employment disaggregated by part-time/full-time hours worked per week (in main job) (%), 1992-2013 per annum
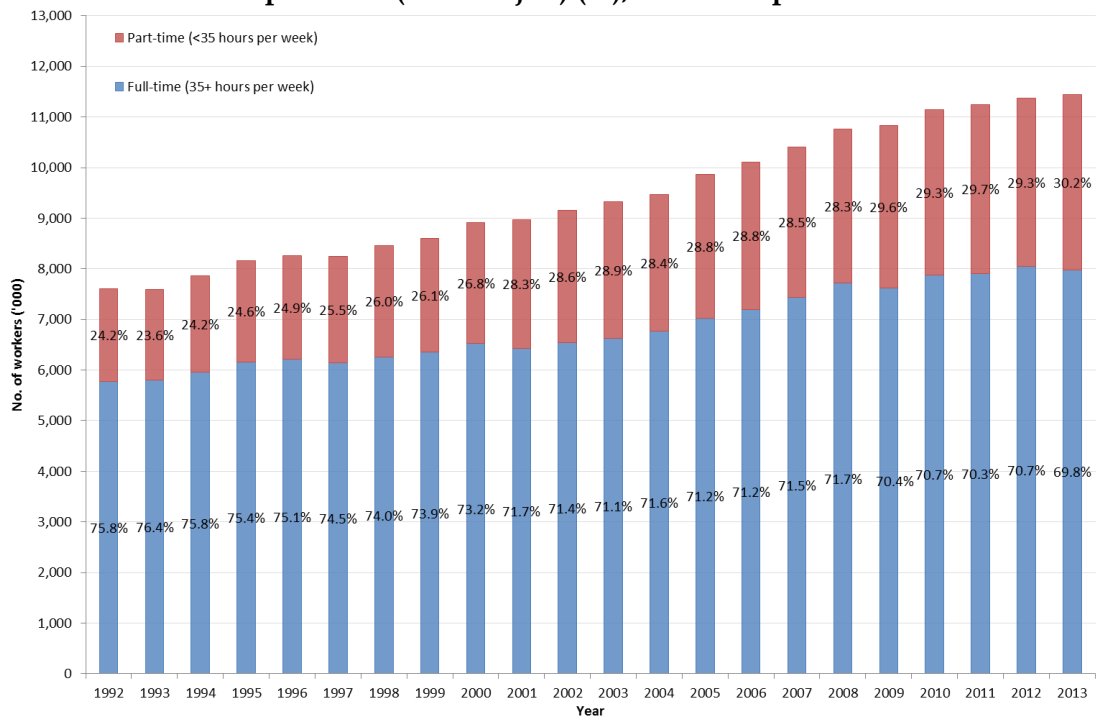
Notes: See Figure 4.3 (above)
Source: ABS, cat. no. 6105.0 – Australian Labour Market Statistics, Jul 2014, Table 1

The trend toward labour market flexibility over the past two decades also accompanied a shift in the type of legal structure utilised by self-employed workers to operate their businesses. As can be seen in Figure 4.6, there is rapid rise in the number of OMIEs and a decline in the share of OMUEs. For example, between 1992 and 2013, the number of OMIEs approximately doubled in size (110%) increasing from one-quarter of total self-employment in 1992 (24% or 0.37 million workers) to two-fifths (40% or 0.78 million workers) by 2013. By comparison, the number of OMUEs, traditionally the largest segment of self-employed workers, stagnated and the declined as a share of total self-employment from 76% (1.16 million workers) in 1992 to 60% (1.16 million workers) in 2013.

It is not clear whether or to what extent the increase in part-time jobs and casual contracts are associated with the shift in the legal structure of self-employment away from unincorporated enterprises toward incorporated ones, or are all symptoms of a deeper structural change (or completely unrelated). However, the increased prevalence of OMIEs in self-employment further highlights the importance of the classification of employment arrangements in accurately identifying and capturing self-employment (as discussed previously in Chapter

Two).

Figure 4.6: Size of total employment disaggregated by employment type (in main job) (%), 1992-2013 per annum
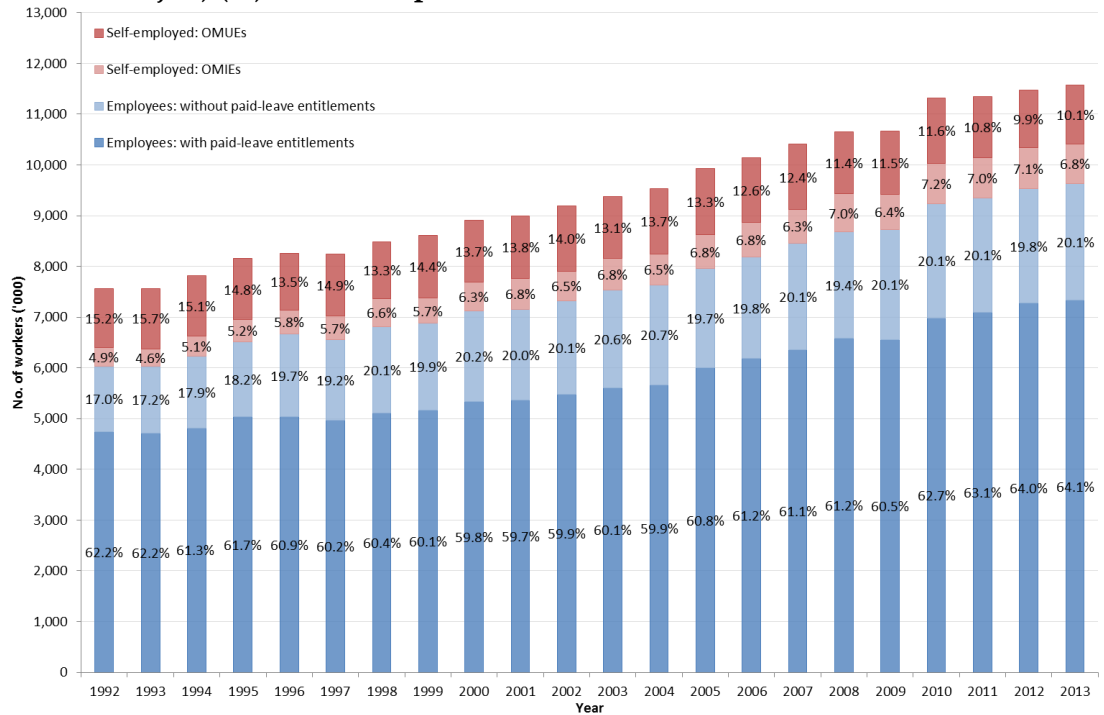
Notes: See Figure 4.3 (above)
Source: ABS, cat. no. 6105.0 – Australian Labour Market Statistics, Jul 2014, Table 1

Increasing female participation & diminishing gender inequality

As mentioned earlier, much of the growth in the size of Australia's labour force over the period is attributable to the increased share of women entering and remaining in the labour market — illustrated in Figure 4.4 (above). An important achievement of the reform process, increasing labour market flexibility (in terms of part-time hours and casualisation) also provided females with greater access to job opportunities across the labour market, helping to normalise their presence in more secure jobs previously dominated by men (i.e. permanent full-time jobs). As Figure 4.7 illustrates, a substantial shift in the gender composition of the workforce over the last two decades resulted in greater gender equality. For example, the share of females participating in both the labour force and the workforce increases from approximately 42% in 1992 to 46% in 2013 — illustrated in Figure 4.7.

Figure 4.7: Gender equality in the labour force: proportion (%) of workers that are female by labour force status, 1992-2013 per annum
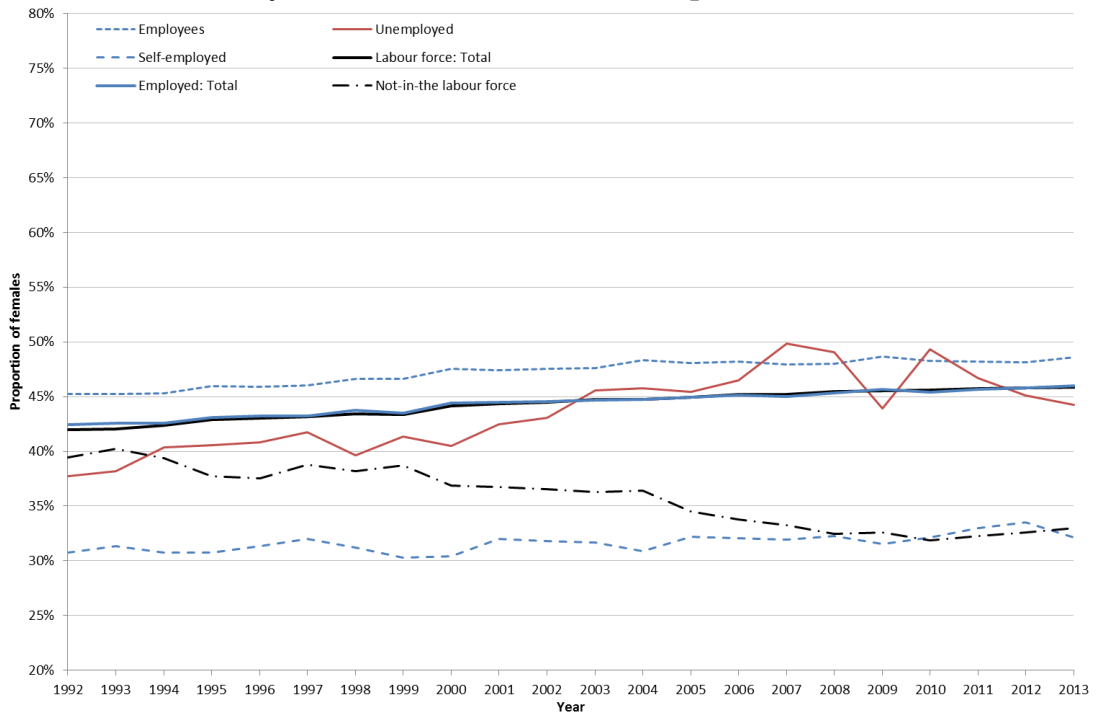
Notes: See Figure 4.3 (above)
Source: ABS, cat. no. 6105.0 – Australian Labour Market Statistics, Jul 2014, Table 1

However, as Figure 4.8 shows, the increase in female participation has been more conspicuous in certain types of employment than others. While the increase in casual employment (i.e. employees without paid-entitlements) coincided with the increase in female participation over time, the female share of casual employment actually decreased from 64% in 1992 to 54% in 2013 — illustrated in Figure 4.8. Rather, the improvement in gender equality in the Australian workforce is, for the most part, because females made significant inroads into employee jobs on permanent and fixed-term contracts (i.e. those with paid-entitlements), a segment previously dominated by men. That is, despite the high concentration of females in causal jobs in the early 1990's, the growth in female participation over time translated into females finding attractive opportunities in permanent and fixed-term jobs.

A similar trend is also observed in the share of females participating in full-time and part-time jobs. While women have traditionally engaged in part-time employment more so than men to balance child-bearing and family caring responsibilities, this picture has steadily changed over time. As Figure 4.9 (below) illustrates, just as female participation increased, the share of females in part-time employment had

declined from 75% in 1992 to 70% by 2013, while the female share of full-time employment increased from 32% in 1992 to 36% in 2013. Despite the increase in the prevalence of part-time employment and casual employee jobs in the labour market, the growth in female participation has instead coincided with increasing shares of women in full-time, as well as permanent, employment.

Figure 4.8: Gender equality in the workforce: proportion (%) of workers that are female by employment status, 1992-2013
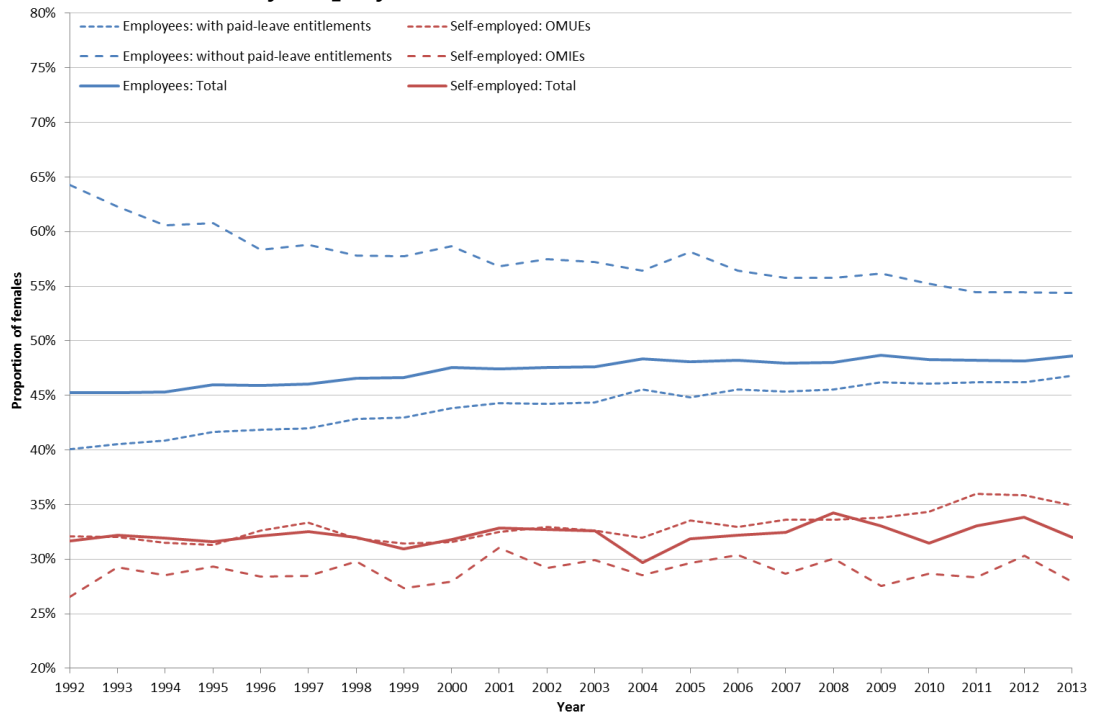
Notes: See Figure 4.3 (above)
Source: See Figure 4.3 (above)

Figure 4.9: Gender equality in the workforce: proportion (%) of workers that are female by full-time/part-time hours worked per week (in main job), 1992-2013 per annum
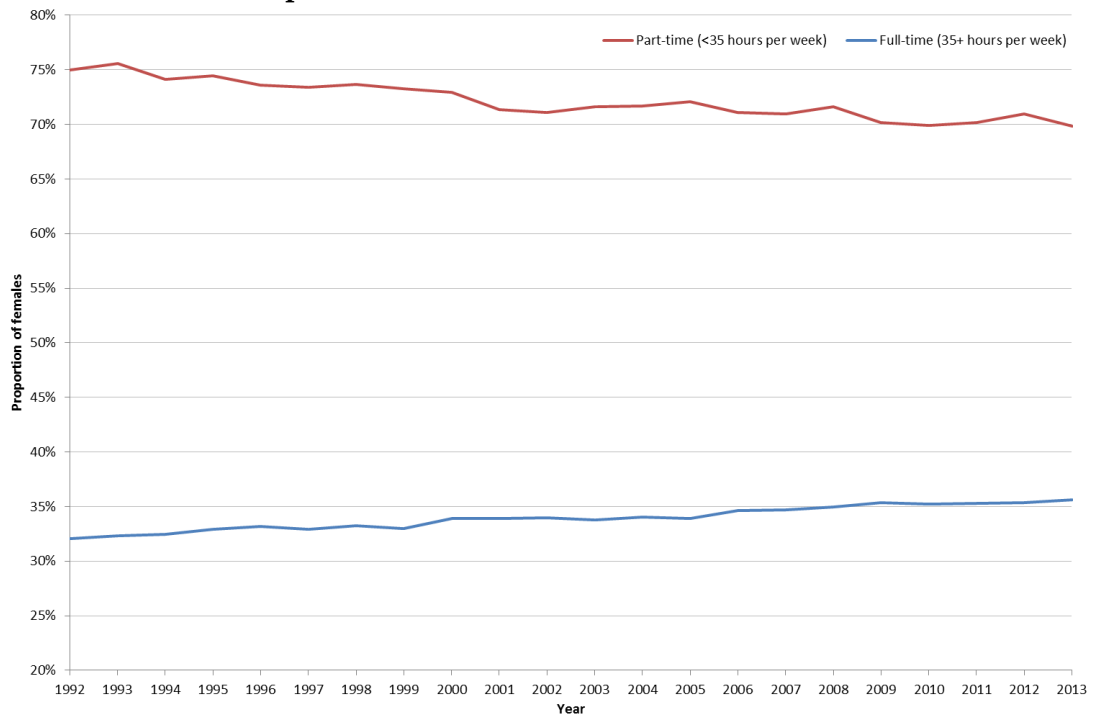
Notes: See Figure 4.3 (above)
Source: See Figure 4.3 (above)

The downside to this is otherwise positive outcome is the extent to which the growth of female participation has come at the expense of male participation and employment, particularly in permanent and fixed-term jobs. As shown in Figure 4.7 (above), the displacement of males coincided with a much larger decline in the female share of labour market non-participants relative to the rise in total participants. For example, while the female share of total labour market participation increased by 3.9 percentage points (from 42% in 1992 to 46% in 2013), the inverse decline in the female share of those not-in-the labour force was a much greater 6.5 percentage points (from 39% in 1992 to 33% in 2013).

Further, unlike the remainder of the labour force, the self-employed workforce did not experience the broader trend toward gender equality. As shown in Figure 4.8 (above), the share of female participation in self-employment sits well below the female share of participation in salaried-employed jobs. For example, over the past two decades, the female share of self-employment remained stubbornly low at about one-third (i.e. self-employed workers are predominately male). The only aspect of self-employment that showed some kind of improvement in gender equality was the OMUE segment. However, as discussed earlier, this same segment

experienced a decline as a share of total self-employment over time, while the share of OMIE workers increased. By contrast, the OMIE shares of self-employment remained predominately male over time.

4.3 HOW SELF-EMPLOYMENT CONTRIBUTES TO THE AUSTRALIAN ECONOMY

In addition to having persistently represented a large minority share of the Australian workforce (approx. one-fifth), self-employment also makes a broader contribution to the labour market and economy through both labour supply and demand. On the supply-side, self-employed workers (particularly male workers) contribute to a proportionately larger share of the total hours worked (per week) in Australia relative to their share of total employment. On the demand side, the self-employed further contribute to the creation of additional employment opportunities and the generation of economic activity, predominately by employing a large fraction of the remaining Australian workforce. Furthermore, self-employed workers also make a substantial contribution to the value of economic activity in Australia. However, gauging the importance of the productive value of self-employed workers, relative to employees, is not straightforward.

Hours worked & the quantity of labour supplied by self-employed workers

Self-employed workers in Australia dedicate more time to their businesses and work longer hours, particularly full-time hours, than those employed in salaried-employed jobs. As a result, self-employed workers supply a greater share of hours worked (per week) to the Australian labour market than their share of total employment.

As illustrated in Figure 4.10, detailed hours worked information from the 2010 ABS LFS-FoE supplementary survey shows that a larger share of self-employed workers, particularly males, worked longer than 35 hours per week (i.e. full-time hours) than the share of employees. This, however, is not necessarily because self-employed workers were less likely to work part-time hours in comparison to employees. Rather, it is because self-employed workers are more likely to work exceptionally long full-time hours. For example, approximately 38% ($= 100\% - 62\%$) of self-employed workers committed very-long full-time hours (i.e. 45 hours or more per

week) relative to 19% (= 100% − 81%) of employees. Further evidence of long working hours in self-employment is also reflected in the higher number of average and median hours supplied by those in self-employed relative to employees. As shown in Table 4.4, the average and median number of hours supplied per week by self-employed workers, approximately 35.6 and 39.2 hours respectively, were both greater than the average and median number of hours worked by those in employed jobs, approximately 32.0 and 37.5 hours respectively. Moreover, longer working hours also means that self-employed workers contributed a larger share to 'aggregate labour supply' (i.e. the total number of weekly hours worked by all workers) than their share of total employment. As estimated in Table 4.4, while the number of self-employed accounted for approximately 19% (2.1 million workers) of employment in 2010, they contributed approximately 21% (76.31 million hours per week) of the hours worked in Australia. The self-employed make a substantial contribution of labour to the Australian economy.

Figure 4.10: Cumulative distribution (%) of hours worked (per week) in the Australian workforce, disaggregated by employment type (broad) & gender, November 2010
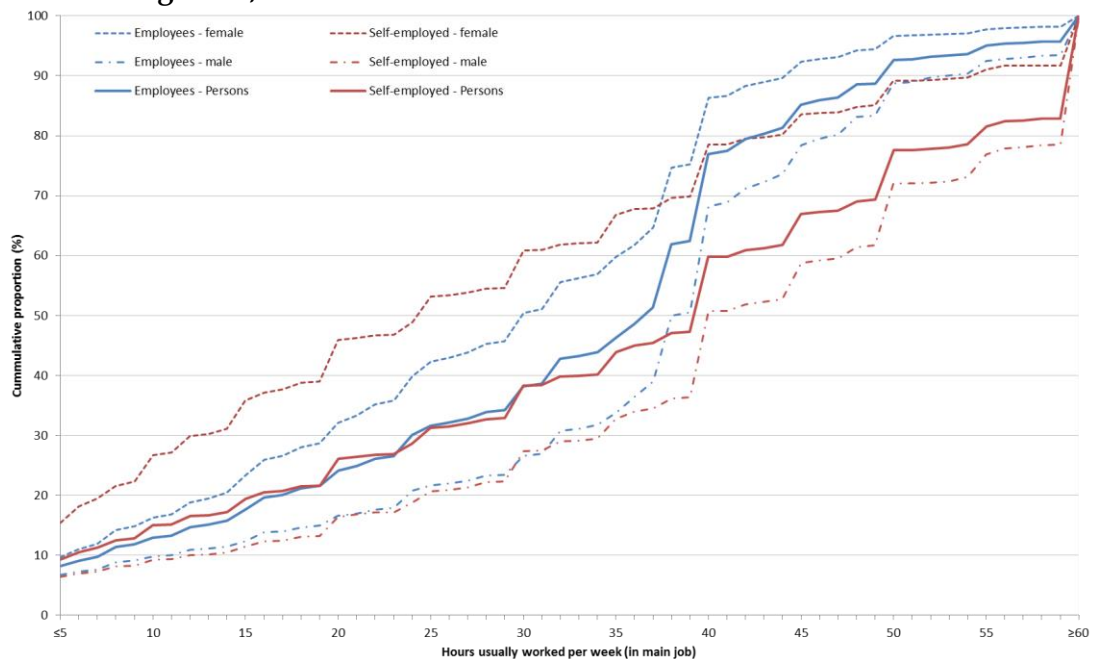
Notes: Weighted estimates.
          Self-employment includes 'OMUEs' and 'OMIEs', which are inclusive of 'employers' and 'own-account workers', and also 'contributing family workers'.
          The hours of labour supplied information is for the 'hours worked last week in main job' calculated in single hour increments between 6 and 59 hours; between 1-5 hours the mid-point of 3 hours was used; and, information was bottom-coded at 1 hour and top-coded at 60 hours.
Source: ABS, cat. no. 6602.0, Microdata: Longitudinal Labour Force, Expanded CURF, Australia, 2008-10

Table 4.4: Summary of aggregate hours of labour supplied (per week) by the Australian workforce, disaggregated by employment type (broad) & gender, November 2010

PERSONS						
Employment Type			**Hours Usually Worked**			
	Freq.	%	Freq.	%	Mean	Median
Employees	9,177,518	81.1	293,862,645	79.4	32.0	37.5
Self-employed	2,141,112	18.9	76,309,377	20.6	35.6	39.2
Total	11,318,629	100.0	370,172,02	100.0	32.7	37.9
MALE						
Employment Type			**Hours Usually Worked**			
	Freq.	%	Freq.	%	Mean	Median
Employees	4,738,745	76.7	169,719,595	74.6	35.8	37.0
Self-employed	1,440,604	23.3	57,736,298	25.4	40.1	39.9
Total	6,179,349	100.0	227,455,893	100.0	36.8	37.2
FEMALE						
Employment Type			**Hours Usually Worked**			
	Freq.	%	Freq.	%	Mean	Median
Employees	4,438,772	86.4	124,143,049	87.0	28.0	37.9
Self-employed	700,508	13.6	18,573,079	13.0	26.5	39.3
Total	5,139,280	100.0	142,716,128	100.0	27.8	37.6

Notes: See Figure 4.10 (above)
Source: See Figure 4.10 (above)

Curiously, the observation that those in self-employment experience relatively long working hours is at odds with the earlier observation about the unfulfilled or latent desire for self-employment prevalent amongst non-self-employed. Self-employment appears to provide fewer opportunities for workers to harmonise their work-life balance and work shorter hours. While it is possible that self-employment may allow those working full-time hours the flexibility to set and structure their hours, the proportion of self-employed workers who limited themselves to part-time hours was consistent with the share of part-time employees. As shown in Figure 4.10 (above), approximately 21% of self-employed workers and 20% of employees worked up to the approximate national weekly average hours for part-time workers, 17 hours.

Moreover, self-employment appears to do little for those workers who are most likely to need to engage in part-time and flexible work arrangements — such as, females, to balance the traditional roles of child rearing and family caring responsibilities. In addition to the pronounced gender inequality in self-employment relative to salaried-employment (already discussed), there is little evidence from the cumulative distributions of hours worked that females concentrate in part-time self-employment more so than in salaried-employment. As shown in Figure 4.10 (above), the proportions of self-employed females working at

either extreme of the hours distribution are greater than the shares for female employees. For example, while 38% of self-employed females and 27% of female employees worked part-time hours (i.e. ≤17 hours per week); comparable figures for those working ≥45 hours per week (i.e. very-long full-time) were 20% and 10%. Thus, for the most part, both male and female self-employed workers choose to commit longer than usual full-time hours.

Labour demand & the quantity of additional employment created by self-employment

Another important economic contribution of self-employment is to labour demand through the jobs that the businesses of self-employed workers create. As well as representing a substantial share of the workforce, self-employed workers also create jobs and employ a substantial amount of additional labour, which generates further economic activity.

As Table 4.5 shows, only one-third of self-employed workers operate businesses that employ additional labour. These businesses are also predominately incorporated with a company structure (i.e. OMIE workers). The remaining two-thirds of self-employed workers tend to work alone and mostly operate unincorporated enterprises. While the share of the self-employed that employs additional labour is small, the size of the additional employment generated is substantial. Using detailed employment information from the 2008 ABS LFS-FoE supplementary survey, Table 4.6 and Table 4.7 show that 0.76 million self-employed workers (representing 7% of total employment) claimed to employ an estimated 6.23 million additional workers (representing 57% of total employment). As Table 4.7 shows, the estimated number of employees working for self-employed workers also account for a substantial share of the total number of employees in the labour market. For example, in 2008, self-employed workers employed approximately 70% of all employees, or 88% of all private-sector employees. Combined, the total number of self-employed workers (2.02 million) plus the number of employees working for a self-employed employer (6.23 million) account for 76% of total employment (10.9 million). This combined share of employment goes to 91% once public-sector employment is removed (i.e. total private-sector employment: 9.1 million workers). That is, only 9% (or 0.85 million workers) of the remaining private-sector employment is generated by Australian publicly-listed corporations,

multinational companies, and privately-held companies with board structures and appointed management (such as, family-owned or partnership companies, or not-for-profit organisations).

Table 4.5: Summary of Australian workers in employed jobs by sector (public/private) or in self-employment by employer status, November 2008

Employment Type by Sector or Employer Status	Freq. ‡	% of total employment	% of total self-employment	% of total employees
Employees				
Public sector*	1,802,926	16.5	-	20.3
Private sector^	7,079,373	64.9	-	79.7
Total	8,882,299	81.5	-	100.0
Self-employed: *without employees†*				
OMUE††	965,292	8.9	47.8	-
OMIE	300,982	2.8	14.9	-
Total	1,266,274	11.6	62.6	-
Self-employed: *with employees†*				
OMUE	296,826	2.7	14.7	-
OMIE	458,213	4.2	22.7	-
Total	755,039	6.9	37.4	-
Self-employment: *total*	2,021,313	18.5	100.0	-
Employment: *total*	**10,903,612**	**100.0**	-	-

Notes: ‡ Estimated frequencies are weighted estimates from the Longitudinal Labour Force unit record data file, which brings together the ABS monthly Labour Force Survey and all the associated supplementary surveys, between January 2008 to December 2010.
* Estimated proportion of public-sector employment was extrapolated from LFS-EEBTUM supplementary survey data, August 2008.
^ The private-sector category also includes employees whose sector of employment could not be determined.
† Estimated proportion of self-employed workers with and without employees was derived from LFS-FoE supplementary survey, November 2008.
†† OMUE category includes contributing family workers.

Source: ABS, cat. no. 6602.0, Microdata: Longitudinal Labour Force, Expanded CURF, Australia, 2008-10
ABS, cat. no. 6202.0.30.001, Microdata: Labour Force Survey and Employee Earnings, Benefits and Trade Union Membership Survey, Aug 2008, CURF (Basic)
ABS, cat. no. 6202.0.30.007, Labour Force Survey and Forms of Employment Survey, Nov 2008, CURF (Expanded)

Table 4.6: Summary of Australian workers employed by a self-employed worker, distributed by business size (no. of employees) & disaggregated by self-employment type, November 2008

No. of employees^	OMIE Freq.‡	OMUE Freq.‡	Total Freq.‡	OMIE %	OMUE %	Total %
1	37,520	89,663	127,184	0.8	6.1	2.0
2	135,250	113,647	248,897	2.8	7.8	4.0
3	169,328	145,374	314,701	3.6	9.9	5.0
4	171,226	94,671	265,897	3.6	6.5	4.3
5	276,613	81,681	358,294	5.8	5.6	5.7
6	199,848	58,440	258,288	4.2	4.0	4.1
7	174,204	47,990	222,194	3.7	3.3	3.6
8	117,813	46,254	164,067	2.5	3.2	2.6
9	102,527	27,259	129,785	2.1	1.9	2.1
10	206,835	122,156	328,991	4.3	8.4	5.3
13*	399,515	141,788	541,303	8.4	9.7	8.7
18*	271,438	88,485	359,923	5.7	6.1	5.8
23*	192,955	47,835	240,789	4.0	3.3	3.9
28*	191,618	56,327	247,944	4.0	3.9	4.0
33*	202,521	13,214	215,735	4.2	0.9	3.5
38*	176,958	8,145	185,104	3.7	0.6	3.0
70*	986,731	217,708	1,204,440	20.7	14.9	19.3
100**	756,549	61,677	818,227	15.9	4.2	13.1
Total	**4,769,448**	**1,462,313**	**6,231,761**	**100.0**	**100.0**	**100.0**
%	*76.5*	*23.5*	*100.0*	*-*	*-*	*-*

Notes: ‡ Estimated frequencies are weighted estimates from the Longitudinal Labour Force unit record data file, which brings together the ABS monthly Labour Force Survey and all the associated supplementary surveys, between January 2008 to December 2010.
* Mid-point value of categorised information. ** Top-coded value.
^ Estimated number of workers employed by self-employed workers was derived from LFS-FoE supplementary survey, November 2008.
Source: ABS, cat. no. 6602.0, Microdata: Longitudinal Labour Force, Expanded CURF, Australia, 2008-10
ABS, cat. no. 6202.0.30.007, Labour Force Survey and Forms of Employment Survey, Nov 2008, CURF (Expanded)

Table 4.7: Summary of total jobs-created by self-employment in the Australian labour market, November 2008

	OMIE	OMUE	Total
No. of employees working for self-employed workers:	**4,769,448**	**1,462,313**	**6,231,761**
as a % share of private-sector employees only	*67.4*	*20.7*	*88.0*
as a % share of total employees (incl. public-sector employees)	*53.7*	*16.5*	*70.2*
as a % share of the total employment	*43.7*	*13.4*	*57.2*
No. of self-employed workers & their employees combined:	**5,528,643**	**2,724,431**	**8,253,074**
as a % share of private-sector employment	*60.7*	*29.9*	*90.7*
as a % share of total employment	*50.7*	*25.0*	*75.7*

Notes: Combination of estimates from Table 4.5 and Table 4.6 (above)
Source: See Table 4.5 & Table 4.6 (above)

The apparent magnitude of additional employment generated by self-employment is very high and a reason for scepticism about the accuracy of the estimates. However, the size and distribution of this result is consistent with comparable information from ABS Counts of Australian Business data for the approximately similar period of time. Figure 4.11 compares the workforce size distributions of the

enterprises operated by self-employed workers (as captured in the 2008 LFS-FoE Survey) against the total number of registered businesses that were currently active in Australia as at the start of the 2008 financial year (i.e. 1st July). As Figure 4.11 illustrates, the distribution of employment generated by the self-employed broadly mirrors the employment distribution of the total number of active businesses. Within self-employment, however, the difference between the size of business operated by OMUEs and OMIEs is distinct and reflects the differing complexity of these business structures, with OMUEs predominantly running small businesses with no employees and OMIEs running medium to larger sized firms.

In general, self-employment is an important engine of employment growth and labour demand in the Australian economy; more so than the public-sector and more so than publicly listed or multinational corporations. The substantial contribution to the labour supply and job creation in the economy that is generated by self-employment, particularly the OMIE self-employed, further highlights the large number of people who are directly and indirectly affected by self-employment and the pervasiveness of self-employment throughout the economy. This supports the earlier observation that, in addition to the larger numbers of people who participate in self-employment over the work life-cycle, many more workers are employed by and work in close proximity to people that find success in self-employment.

Figure 4.11: Distributions of business size by employment, comparing enterprises operated by self-employed workers (disaggregated by OMUE & OMIE) against the total number of 'active' businesses in Australia, 2008
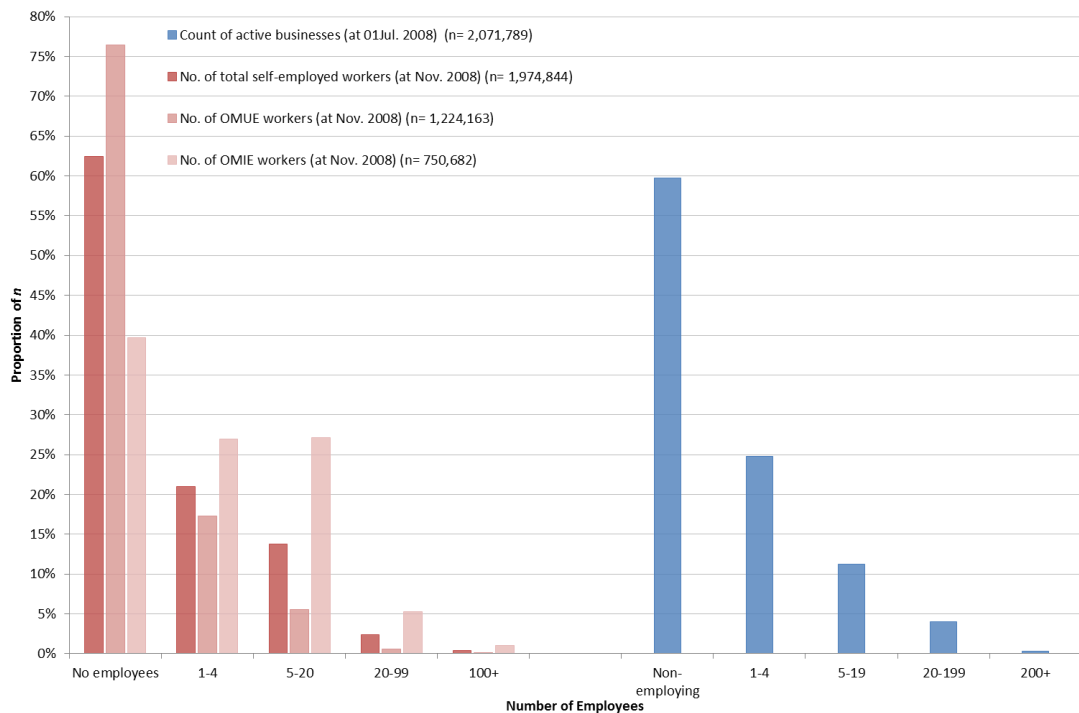
Notes: The 'number of self-employed' frequencies are weighted estimates from LFS-FoE Survey data. Self-employment includes OMUE and OMIE workers, 'employers', 'own account' workers, and 'contributing family workers'.

Information from the Counts of Australian Business data include registered businesses (i.e. with an Australia Business Number (ABN)), with an annual turnover above the Goods & Services Tax (GST) minimum threshold, have actively remitted GST in the past five-quarters above zero dollar amounts, and are classified as operating with the 'market sector' (see (ABS, 2010) for further explanation). Non-employing' businesses are classified as those without an active Income Tax Withholding (ITW) role or which has not remitted ITW for five consecutive quarters.

Source: ABS, cat. no. 6202.0.30.007, Labour Force Survey and Forms of Employment Survey, Nov 2008, CURF (Expanded) - accessed via RADL 20120309

ABS, cat. no. 8165.0, Counts of Australian Business, Including Entries and Exits - June 2007 to June 2009, Australia, Oct 2010, Table 13

Quality of the labour supplied & the employment created by self-employment

The importance of self-employment is also determined by the quality of its contribution the broader economy. Quantifying the value contributed by self-employed workers is useful because it gauges the efficiency of the allocation of labour resources within the economy relative to value contributed by the remainder of the workforce. The drawbacks of this process, however, are that it is difficult to capture quantitatively, and that the contribution may be evaluated in multiple ways. In most instances, detailed and onerous data sources are often necessary, but rarely available — such as, linked employer-employee surveys and administrative data sources. In other instances, the contribution of the value attributable to self-

employment may be measured in terms of the direct contribution of workers to aggregate labour earnings, to GDP, or to total factor productivity; as well as, the indirect contribution of self-employment to the quality and type of additional employment it creates.

In certain developed countries where appropriate data has been available to researchers — such as in the U.S., the U.K. and certain European countries —, the economic contribution of self-employment has been found to be associated with a corrosive effect on the quality of employment and a destabilising effect on the labour market. For example, in a comprehensive summary of the available evidence, Praag & Versloot (2007) find that although self-employment creates new jobs, the quality of the employment generated is low-skill, low-pay and unstable; and, that this additional employment is also created at the expense of higher-skilled, higher-paid and stable jobs. Praag & Versloot (2007: 377) conclude that while self-employment engenders substantial quantities of additional employment, productivity growth, and the commercialisation of high-quality innovations, the scale of the economic contribution of the self-employed is less important when compared against the value of the contribution made by the remaining workforce. A moot comparison, however, when considered alongside the fact that 90% of Australian employees in the private-sector were employed by a self-employed worker (discussed earlier).

In Australia, evaluating the economic value of self-employment is fraught with difficulty because of an absence of adequate data. An alternative, yet crude, approach is to use the aggregate measures of labour and capital (gross) input costs that go into aggregate production (a.k.a. Gross Domestic Product (GDP)), as collated by the ABS in the Systems of National Accounts (SNA) information.[36] As Figure 4.12 illustrates, the aggregate value added by labour and capital in the process of production is referred to as Total Factor Income (TFI), which is made up of three parts: Compensation of Employees (COE), Gross Operating Surplus (GOS), and Gross Mixed Income (GMI) of unincorporated enterprises.[37] Unfortunately,

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[36] Gross Domestic Product (GDP) is the total market value of goods and services produced within a national economy in a given period after deducting the cost of goods and services used up in the process of production but before deducting allowances for the consumption of fixed capital (ABS, 2015).

[37] Compensation of Employees (COE) is the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the employee during the accounting period; is not payable in respect of unpaid work undertaken voluntarily, including the work done by members of a household within an unincorporated enterprise owned by the same household; and, excludes any taxes payable by the employer on the

distinguishing the contribution to production attributable to total self-employment activity, including both OMUE and OMIE workers, is not possible from SNA data. Unlike labour force data, SNA information does not distinguish OMIE workers from employees. Instead, the value of the contribution of OMIEs is spread between the COE and GOS measures. Thus, only a partial value for self-employment accruing from production by unincorporated enterprises is distinguishable in TFI from the GMI component measure. A further issue with value of GMI (and also GOS), but unlike the value COE, is that it includes the returns to both labour and capital. Hence, the value of the Consumption of Fixed Capital (CFC) also needs to be removed to better distinguish the labour only component and obtain the Net Mixed Income (NMI) of unincorporated enterprises (but may still include a profit component from any capital investment).[38]

Figure 4.12 shows that while GMI (the value of labour and capital inputs for unincorporated enterprises of self-employed workers, as distinct from the compensation to any employees) grew by 228% from $80.7 billion in 1992 to $317.9 billion in 2013, the relative value of GMI has accounted for a declining share of TFI (going from 21% in 1992 to 19% in 2013). These shares become even smaller once capital input costs (i.e. estimated CFC) are removed and the returns on labour inputs are better isolated. For example, the relative income from worker compensation in unincorporated enterprises (i.e. NMI) in 1992 and 2013 is closer to 15% and 14%, respectively. While this is still a substantial minority share of the economic income from labour, the relative value of the *quality* of labour contributed by OMUE workers is not much greater than their relative contribution to the *quantity* of labour supplied. For example, in 2008, the 14% NMI share is not much larger than the employment share of OMUEs, 11%, or their share of 'aggregate

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wage and salary bill (e.g. payroll tax) (ABS, 2015).

Gross Operating Surplus (GOS) is the operating surplus accruing to all enterprises, except unincorporated enterprises, from their operations within the domestic economy; it is calculated before deduction of consumption of fixed capital, dividends, interest, royalties and land rent, and direct taxes payable, but after deducting the inventory valuation adjustment; and, is also calculated for general government and it equals general government's consumption of fixed capital (ABS, 2015).

Gross Mixed Income (GMI) of unincorporated enterprises is the surplus or deficit accruing from production by unincorporated enterprises; and, includes elements of both compensation of employees (returns on labour inputs) and operating surplus (returns on capital inputs) (ABS, 2015).

[38] The Consumption of Fixed Capital (CFC) is the value of the reproducible fixed assets used up during the period of production as a result of: normal wear and tear, foreseen obsolescence and the normal rate of accidental damage; but not the result of: unforeseen obsolescence, major catastrophes and the depletion of natural resources (ABS, 2015).

labour supply' (i.e. the total number of weekly hours worked by all workers), 12%.[39] That is, on a 'per head' or 'hours worked' basis, the importance of the economic contribution of OMUEs is relatively similar to the employee workforce, and further supports the conclusions that were made by Praag & Versloot (2007).

Figure 4.12: Wages, corporate profits & unincorporated incomes shares of Total Factor Income, 1992-2013

Total Factor Income ($ millions)
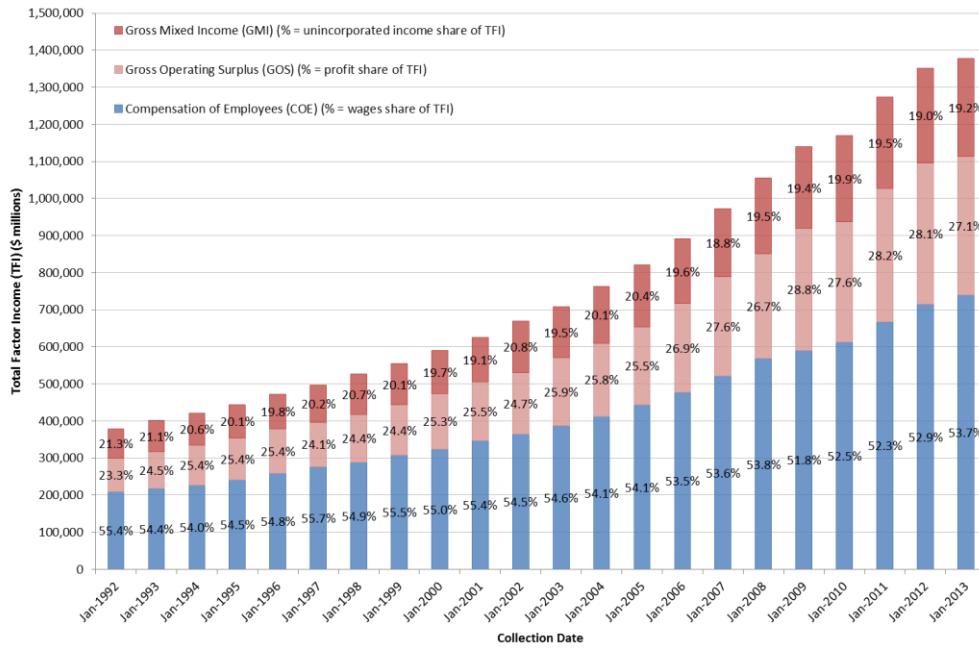
Total Factor Income ($ millions) excluding Consumption of Fixed Capital

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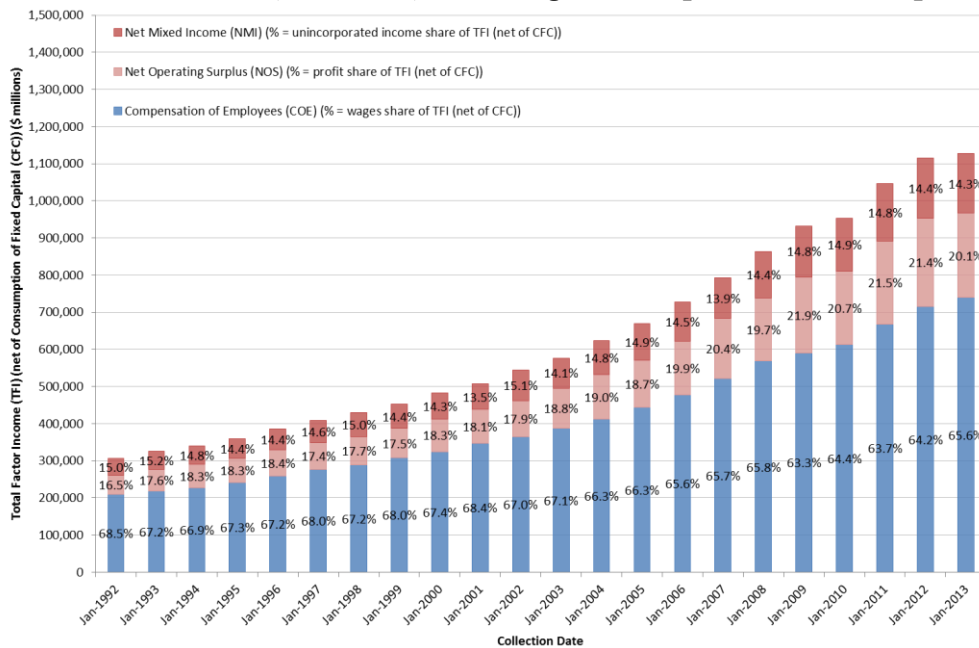
[39] The estimate for the employment share of OMUEs is shown in Figure 4.6. The estimate for the OMUE share of 'aggregate labour supply' is not reported earlier, but is estimated using the same data and method to calculate the estimates reported in Table 4.4.

Notes: Net Operating Surplus (NOS) and Net Mixed Income (NMI) were calculated by subtracting the
               Consumption of Fixed Capital (CFC) from the combined total of Gross Operating Surplus (GOS) and
               Gross Mixed Income (GMI) for the same period, and then by multiplying this 'net total' by the
               proportions of GOS and GMI as a share of their combined 'gross total', respectively.
Sources: ABS, cat. no. 5204.0, Australian System of National Accounts, 2015-16, Table 16, 46 & 47.

Based on the limited evidence presented already, the value of the economic contribution of self-employment to labour supply and labour demand, and its importance relative to the contribution of the remainder of the workforce, is mixed. On the one hand, self-employment makes a sizeable contribution to labour supply both directly, through its share of employment and the aggregate hours supply, and indirectly, through the considerable amount of additional employment it generates. On the other hand, the approximate economic value-add of OMUE workers, relative to the remainder of the workforce, is underwhelming. The economic contribution of self-employment could diminish further if, for instance, self-employment attracts high-skill workers — such as, those with higher levels of education and more labour market experience — who may otherwise generate greater value-added working as an employee. Similarly, the additional employment generated by self-employment may adversely affect economic growth if the job opportunities created are less-stable and lower-quality employment — such as, 'casual' jobs (discussed earlier) —; and, worse still, if the creation of these jobs come at the expense of existing stable and higher quality employment, rather than increase the number of job vacancies and labour demand (i.e. have a zero net contribution to the number of jobs). Although these hypotheses are not further pursued in this Thesis, they will remain important questions for future research to address until such time when more adequate sources of data become available.

4.4 CHANGES TO THE DEMOGRAPHIC PROFILE OF AUSTRALIAN SELF-EMPLOYED WORKERS FROM SNAPSHOTS OVER TIME, 1986—2011

As discussed earlier in this Chapter, self-employment lagged many of the salient labour market trends that occurred in Australia over the past two-decades; most notably, the growth in female labour market participation and the trend toward improved gender equality. Despite this, self-employment persists and remains an integral part of the Australian labour market and economy. This begins to raise some interesting questions about the purpose of self-employment, not only to the

functioning of the economy, but also to individuals and its role in bettering their lives. What then are the individual characteristics that distinguish self-employed workers; how do these differ from workers in other segments of the labour market; and, have the characteristics of the self-employed shifted over time?

The types of workers engaging in contemporary self-employment

Table 4.8 presents the most recent snapshot of demographic information for the Australian population from the 2011 ABS Census data. There are several distinct features that characterise the self-employed workforce:

- self-employed workers are predominately male (66%);
- older, with 49% between 45-64 years of age;
- in a married/de facto relationship (77%);
- Australian born (70%); and,
- well-educated, with 59% having attained a post-school qualification from either the 'Vocational Education & Training' (VET) (36%) or 'University' (22%) sectors.[40]

These features distinguish the self-employed when compared to the remainder of the Australian labour force, particularly from those in unemployment.

The distinctive features of the self-employed workforce begin to add some colour to the picture about the purpose of self-employment. In particular, the older age profile and the distinct gender inequality in self-employment are both associated with these workers having more labour market experience. Firstly, the older age distribution of the self-employed workforce is in contrast to the younger age distribution of the remaining workforce, especially in comparison to the unemployed who are those most likely to be inexperienced labour market entrants. Secondly, (and as discussed earlier in this chapter) the gender inequality in self-employment, relative to the remainder of the workforce, indicates that far fewer of the inexperienced, particularly female, workers who entered from outside the labour market over the past two decades pass through self-employment.

A further indication that self-employment is comprised of workers who are more

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[40] VET qualifications include: Certificate, Diploma and Advanced Diploma levels. University qualifications include: undergraduate Bachelor level, and post-graduate Graduate Diploma, Masters, and Doctorate levels.

likely to have had the opportunity to gain local labour market knowledge and experience is by the predominance in self-employment of workers who were either born in Australia or are long-term resident migrants. For example, in addition to 70% of the self-employed workforce who were born in Australia, approximately 62% of the migrant self-employed were Australian residents for 20 years or more. The share of participation in self-employment amongst long-term resident migrants is also much larger than in either of the employee or unemployed segments of the workforce. That is, recent migrant arrivals prefer to job search and enter the Australian labour market as employees.

Similarly, self-employment is predominately comprised of skilled-labour, particularly by workers with VET qualifications. The higher levels of education amongst the self-employed are more similar to the employee workforce than to the lower education profile of the unemployed.

Table 4.8: Demographics profile of Australian workers, disaggregated by labour force & employment status, 2011

	Self-employed			Employees	Unemployed
	OMIE	OMUE	Total*		
N	665,292	848,979	1,676,970	8,381,352	600,134
Share of self-employment (*row %*)	39.7	50.6	100.0	-	-
Share of total employment (*row %*)	6.6	8.4	16.7	83.3	-
Share of labour force (*row %*)	-	-	15.7	78.6	5.6
	col. %	*col. %*	*col. %*	*col. %*	*col. %*
Gender					
Male	70.7	66.1	66.2	50.8	53.3
Female	29.3	33.9	33.8	49.2	46.7
Non-resp.	-	-	-	-	-
Age					
15-24years	1.4	3.4	2.8	17.6	35.6
25-44 years	39.0	39.1	38.3	45.7	38.5
45-64 years	52.6	49.0	50.1	33.6	24.7
≥65 years	7.0	8.4	8.8	2.0	1.2
Non-resp.	-	-	-	1.1	-
Marital Status					
Married/De facto	81.5	73.7	77.3	56.5	33.6
Single	13.6	22.0	18.2	37.1	59.4
Non-resp.	4.9	4.3	4.5	6.4	7.0
Country of Birth					
Australian	69.1	70.4	69.9	70.6	66.5
NESC	11.6	11.4	11.2	10.8	22.9
MESC	18.0	16.7	17.4	16.3	9.1
Non-resp.	1.2	1.5	1.4	2.2	1.5
Years of Residence (*migrants only*)					
0-5 years	5.4	7.4	6.8	19.9	31.4
6-10 years	9.0	9.7	9.5	14.9	14.5
10-20 years	18.6	18.0	18.3	18.6	18.9
≥20 years	63.9	61.7	62.2	43.6	31.0
Non-resp.	3.0	3.2	3.2	3.1	4.2
Education (*highest level of attainment*)					
University	26.9	20.1	22.4	26.4	14.9
VET	35.3	39.0	36.3	28.3	22.4
Yr. 12	14.9	13.4	14.4	19.0	23.4
≥Yr. 11	18.2	22.6	21.9	20.8	33.7
Non-resp.	4.6	4.9	5.0	5.4	5.5

Notes: 'Non-resp.' indicates the share of persons who either chose not to provide information, or provided information that was inadequate or inconsistent.
               *Total self-employment includes 'contributing family workers'.
Source: ABS, cat. no. 2073.0 – 2011 Census of Population & Housing, 2011 TableBuilder Pro, 2011 Third Release

Changes to the demographic profile of the self-employed workforce over time

Many of the characteristics that distinguish the current self-employed workforce also remain consistent over time. Table 4.9 details snapshots of the demographic profile of the self-employed workforce from historical ABS Census data taken at selected intervals between 1986 and 2011. As shown, many of the same characteristics that epitomise the current self-employed workforce (in 2011) have persisted over time (i.e. pronounced gender inequality; older age-profile; high

proportions of marital and de facto relationships; and low proportions of recent migrants engaged in self-employment).

One notable exception is the general improvement in the education of self-employed workers that has occurred over time. For example, the shares of self-employed workers with post-school qualifications went from 43% in 1986 to 64% in 2011. Where much of this growth was driven by an increase in the share of self-employed workers having attained a University level qualifications, increasing from 6% in 1986 to 22% in 2011. The share of workers with post-school VET qualifications continued to remain an important, but relatively consistent, component of the skills in self-employment (approx. 31% in 1986 and 37% in 2011). Another notable difference in the self-employed workforce over time has been in the age distribution. While the proportion of self-employed workers in the 45-64 age range has always been large, the share of workers in the age bracket has gradually increased from 35% in 1984 to 50% in 2011. That is, the self-employed workforce has aged over time, but is consistent with an ageing population.[41]

Overall, the persistence of self-employment appears to have responded indirectly to the economic and demographic changes that have occurred in the broader labour market and population. Again, many of the characteristics that distinguish the self-employed workforce share little in common with the types of workers who drove the growth in employment and labour force participation during the past two decades, that is, those entering from outside the labour market (particularly females and migrants) or from unemployment. Instead, the characteristics of the self-employed workforce over time bear a closer resemblance to employees already actively engaged within the labour market and with skills and experience. That is, the growth in the number of opportunities in self-employment appears to have attracted workers who had already achieved a successful attachment to the labour market.

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[41] A comparison of age distributions between the self-employed and employee workforces is further examined in Chapter Five.

Table 4.9: Demographics profile of Australian self-employed workers at selected time intervals, 1986-2011

	1986	1991	2001	2006	2011
No. of self-employed	1,134,700	1,308,200	1,453,100	1,647,921	1,676,970
Share *(%)* **of total employment**	*17.4*	*18.4*	*17.6*	*18.3*	*16.7*
	col. %	*col. %*	*col. %*	*col. %*	*col. %*
Gender					
Male	*67.3*	*66.0*	*67.3*	*66.6*	*66.2*
Female	*32.7*	*34.0*	*32.7*	*33.4*	*33.8*
Non-resp.	-	-	-	-	-
Age					
15-24years	*5.5*	*4.7*	*3.4*	*2.9*	*2.8*
25-44 years	*54.7*	*53.4*	*43.2*	*41.0*	*38.3*
45-64 years	*35.3*	*37.2*	*47.1*	*49.3*	*50.1*
≥65 years	*4.5*	*4.7*	*6.2*	*6.8*	*8.8*
Non-resp.	-	-	-	-	-
Marital Status					
Married/De facto	*81.4*	*79.1*	*77.8*	*78.2*	*77.3*
Single	*18.6*	*20.9*	*17.9*	*17.3*	*18.2*
Non-resp.	-	-	*4.2*	*4.6*	*4.5*
Country of Birth					
Australian	*73.4*	*73.2*	*71.9*	*70.2*	*69.9*
NESC	*12.2*	*15.3*	*10.6*	*18.6*	*11.2*
MESC	*13.8*	*11.3*	*16.0*	*11.1*	*17.4*
Non-resp.	*0.6*	*0.3*	*1.5*	-	*1.4*
Years of Residence *(migrants only)*					
0-5 years	*5.2*	*2.0*	*7.5*	*5.4*	*6.8*
6-10 years	*10.0*	*4.0*	*6.8*	*8.5*	*9.5*
≥10 years	*84.8*	*92.0*	*81.0*	*82.3*	*80.5*
Non-resp.	-	*2.0*	*4.7*	*3.8*	*3.2*
Education *(highest level of attainment)*					
University	*6.2*	*9.5*	*15.7*	*18.7*	*22.4*
VET	*30.5*	*28.5*	*34.2*	*34.3*	*36.3*
Yr. 12	-	-	*14.4*	*14.2*	*14.4*
≥Yr. 11	-	-	*33.5*	*26.4*	*21.9*
No post-school	*57.4*	*60.9*	-	-	-
Non-resp.	*6.0*	*1.1*	*2.1*	*6.4*	*5.0*

Notes: 'Non-resp.' indicates the share of persons who either chose not to provide information, or provided information that was inadequate or inconsistent.

Classification of self-employment varies between data sources. In the 1986 and 1991 Census data, self-employment was self-identified without further classification. In the 2001 Census data, self-employment was inclusive of 'employers', 'own-account workers' and 'contributing family workers', but without any further distinction between 'OMIEs' and 'employees'. In the 2006 and 2011 Census data, self-employment was inclusive of 'OMUEs' and 'OMIEs', which accounted for 'employers' and 'own-account workers', and also 'contributing family workers'.

Source: ABS, cat. no. 2073.0 – 2011 Census of Population & Housing, 2011 TableBuilder Pro, 2011 Third Release

ABS, cat. no. 2073.0 – 2006 Census of Population & Housing, 2006 TableBuilder Pro, 2011 Third Release

ABS, cat. no. 2037.0.30.001 – 2001 Census of Population & Housing: Household Sample File (Basic data) - CURF, 2001

ABS, cat. no. 2037.0.30.001 – 1991 Census of Population & Housing: Household Sample File, Basic, 1991

ABS, cat. no. 2037.0.30.001 - 1986 Census of Population and Housing: Household Sample File, Basic, 1986

4.5 Shifts in the Occupational & Industrial Composition of Self-employment in Australia Over Time, 1986 — 2011

In contrast to the relatively consistent profile of characteristics that distinguish the self-employed workforce, self-employment is not ascribable to any one particular occupation or industry. With the exception of the industries and occupations dominated by public sector and public utilities employment (e.g. the 'Public Administration and Safety' or 'Electricity, Gas, Water and Waste Services' industries), the occupational and industrial composition of self-employment is similarly heterogeneous to the work undertaken by employees. Self-employment is prevalent across many different types of work and encompasses a wide array of otherwise unrelated occupations and industries.

The types of work undertaken in contemporary self-employment

Again, using 2011 ABS Census data, Table 4.10 presents the most recent snapshot of labour market information for the Australian population. As shown, the occupational and industrial composition of the self-employed workforce is almost as diverse as the work undertaken in the rest of the economy. For example, at the broadest level of industry categorisation, self-employed workers were most prevalent in:

- 'Construction' (19%);
- 'Professional, Scientific and Technical Services' (12%);
- 'Agriculture, Forestry and Fishing' (9%);
- 'Retail Trade' (9%); and,
- the 'Other Services' (9%) industry categories.

Similarly, at the broadest level of occupation categorisation, the most prevalent occupations for most self-employed workers were:

- 'Managers' (27%);
- 'Technicians & Trades' (21%); and,
- the 'Professionals' (19%) occupation categories.

Even at the most detailed level of occupation classification available in the 2011

Census, the types of work undertaken by both male and female self-employed workers remain diverse. As Table 4.10 details, the variety of specific occupations of self-employed workers range from:

- management and executive occupations — such as, chief executives, retail managers, or construction managers —;
- to agricultural occupations — such as, livestock or mixed-crop famers —;
- to trades occupations — such as, carpenters, plumbers, electricians or hairdressers.

Within self-employment, there are also differences in the occupational and industrial distributions when OMUE workers are distinguished from OMIE workers. As shown in Table 4.10, OMIE workers are concentrated in 'white-collar' or managerial occupations (approx. 33%), while OMUEs are prevalent in 'blue-collar' or technical and trades occupations (approx. 27%). The difference in the types of work undertaken by OMIE and OMUE workers is also reflected in their involvement in different industry sectors. For example, OMIE workers are more involved in the 'Manufacturing', 'Retail Trade' and 'Professional, Scientific and Technical Services' industries, while OMUE workers were more involved in the 'Agriculture, Forestry and Fishing' and 'Construction' industries.

Furthermore, as with the employee workforce, the occupational structure of self-employment is divided along gender lines. As shown in Table 4.11, it is more common for male self-employed workers to work as construction managers, plumbers, carpenters and joiners, truck drivers, or electricians, for example. Whereas, female self-employed workers are more likely to work as bookkeepers, clerks, secretaries, hairdressers, child carers, or café and restaurant managers. There are, however, certain occupations within self-employment where traditional gender biases lessen and improve. For example, one of the largest occupations in self-employment common amongst both male and female workers was 'livestock farming', of which females account for approximately 35%.

Despite the occupational and industrial compositions of both the self-employed and employee workforces being heterogeneous, there is very little overlap between their distributions of work. For example, in contrast with self-employment, Table 4.10 also shows that a majority of employees were concentrated in:

- 'Health Care and Social Assistance' (13%);

- 'Retail Trade' (11%);

- 'Manufacturing' (9%);

- 'Education and Training' (9%); and,

- the 'Public Administration and Safety' (8%) industry categories.

The only industry where a substantial share of workers in both self-employment and employed jobs coincide is the 'Retail Trade' category.

Furthermore, the concentration of self-employed workers in skilled occupations is greater than in the employee workforce. For example, only 45% of employees, in comparison to 66% of self-employed workers, are in occupations requiring a combination of post-school education and three to five years of relevant experience (i.e. managerial, professional, or the technical and trades occupations). This coincides with the earlier observation about the higher levels of education amongst self-employed workers, and is in keeping with the profile of self-employed workers as mature and experienced labour market participants.

While the composition of work in self-employment tends to be skilled relative to employees, this is not reflected in the rewards from work. In comparison to the income and earnings distribution of employees, which is centred around the median category (i.e. approx. 41% of employees earn $600-$1249 per week before tax); the earnings distribution for the self-employed workforce is more dispersed, with larger shares of workers at either ends of the distribution. For example, 33% of self-employed and 27% of employees earn at the bottom-end of the distribution ($\leq$$0 to $599 per week before tax), while 13% of self-employed and 10% of employees earn at the top ($\geq$$2000 per week before tax). The poor returns of self-employed workers relative to employees, particularly given the difference in their education and occupation profiles, raise some interesting questions about the motivations of workers to choose self-employment. However, it should be noted that weekly or annual income measures are a poor indication of the rewards from work because these are also the product of hours worked, which for self-employed workers is more widely distributed at either ends of the hours distribution relative to employees. Further, weekly or annual income measures are particularly fraught for self-employed workers because these workers are notorious for mis-reporting and under-reporting their income in comparison to employees. These issues and the

relationship between income and self-employment are further discussed and explored in Chapter Six.

Table 4.10: Occupational, industrial, income & hours composition of Australian workers, disaggregated by labour force & employment status, 2011

	Self-employed			Employees	Unemployed
	OMIE	OMUE	Total*		
N	665,292	848,979	1,676,970	8,381,352	600,134
	col. %	col. %	col. %	col. %	col. %
Occupation *(ANZSCO 2006, 1-digit) (in main job)*					
Managers	32.5	19.0	26.6	10.0	
Professionals	20.3	19.6	18.6	21.8	
Technicians and Trades Workers	15.8	26.6	20.6	12.8	
Community and Personal Service Workers	2.2	6.3	4.4	10.6	
Clerical and Administrative Workers	12.3	6.2	9.7	15.7	
Sales Workers	6.3	4.2	5.3	10.1	
Machinery Operators And Drivers	4.3	5.4	4.7	6.8	
Labourers	4.3	10.7	7.8	9.6	
Non-resp.	2.0	1.9	2.3	2.6	
Industry *(ANZSIC 2006, 1-digit) (in main job)*					
Agriculture, Forestry and Fishing	3.9	8.9	8.8	1.2	
Mining	0.6	0.2	0.4	2.0	
Manufacturing	8.4	5.2	6.5	9.4	
Electricity, Gas, Water and Waste Services	0.5	0.3	0.4	1.3	
Construction	17.2	20.6	18.1	6.2	
Wholesale Trade	5.6	2.0	3.6	4.1	
Retail Trade	9.7	7.3	8.7	10.8	
Accommodation and Food Services	5.3	4.5	5.3	6.6	
Transport, Postal and Warehousing	5.6	5.3	5.2	4.6	
Information Media and Telecommunications	1.5	0.9	1.1	1.9	
Financial and Insurance Services	3.8	1.2	2.3	4.0	
Rental, Hiring and Real Estate Services	3.6	1.1	2.2	1.4	
Professional, Scientific and Technical Services	14.6	10.5	11.6	6.4	
Administrative and Support Services	3.5	6.5	5.0	2.8	
Public Administration and Safety	0.7	0.5	0.5	8.1	
Education and Training	1.7	3.8	2.7	9.0	
Health Care and Social Assistance	5.6	7.3	6.1	12.6	
Arts and Recreation Services	1.1	2.3	1.7	1.4	
Other Services	5.1	8.7	6.8	3.1	
Non-resp.	2.1	2.8	3.0	3.0	
Income per week *(gross, all sources)*					
≤ $0	1.1	1.7	3.3	0.6	30.6
$1-$599	17.5	35.6	29.6	26.1	56.1
$600-$1249	36.2	37.3	35.0	41.0	7.6
$1250-$1999	22.6	13.9	16.5	20.2	2.0
≥ $2000	20.6	8.8	13.0	9.5	1.3
Non-resp.	1.9	2.6	2.5	2.5	2.6
Hours worked per week *(all jobs, in the week prior)*					
Part-time hours (1-34 hours)	22.2	36.6	31.6	29.9	
Full-time hours (≥35 hours)	73.5	57.6	62.6	63.0	
Non-resp.	4.3	5.8	5.8	7.1	

Notes: See Table 4.8 (above).
           ANZSCO = Australian & New Zealand Standard Classification of Occupations; ANZSIC = Australian
           & New Zealand Standard Industrial Classification.
Source: See Table 4.8 (above).

Table 4.11: Top-10 largest occupations (detailed) of Australian self-employed workers, by gender and self-employment type, 2011

ANZSCO (4-digit)	Title	Freq.	%	Cum. %	OMIE (%)	Male (%)
	MALE					
1421	Retail Managers	44,433	4.1	4.1	54.9	-
1213	Livestock Farmers	41,081	3.8	7.9	13.0	-
1331	Construction Managers	38,991	3.6	11.5	55.8	-
3312	Carpenters & Joiners	38,155	3.5	15.0	22.7	-
7331	Truck Drivers	24,834	2.3	17.3	49.9	-
3341	Plumbers	24,143	2.2	19.5	39.8	-
3411	Electricians	23,982	2.2	21.7	46.0	-
1111	Chief Executives & Managing Directors	23,822	2.2	23.9	91.6	-
1214	Mixed Crop & Livestock Farmers	22,663	2.1	26.0	18.6	-
1212	Crop Farmers	22,511	2.1	28.1	23.7	-
	FEMALE					
5512	Bookkeepers	36,586	6.6	6.6	35.0	-
1421	Retail Managers	35,431	6.4	13.0	39.6	-
5311	General Clerks	24,352	4.4	17.5	49.1	-
1213	Livestock Farmers	21,733	3.9	21.4	10.5	-
5212	Secretaries	20,382	3.7	25.1	62.8	-
5121	Office Managers	19,425	3.5	28.6	66.2	-
3911	Hairdressers	16,393	3.0	31.6	11.6	-
6211	Sales Assistants (General)	16,197	2.9	34.5	30.8	-
4211	Child Carers	12,538	2.3	36.8	8.5	-
1411	Cafe & Restaurant Managers	11,503	2.1	38.9	39.7	-
	PERSONS					
1421	Retail Managers	79,864	4.9	4.9	48.1	55.6
1213	Livestock Farmers	62,814	3.8	8.7	12.2	65.4
1331	Construction Managers	40,992	2.5	11.2	55.9	95.1
5512	Bookkeepers	39,104	2.4	13.6	34.9	6.4
3312	Carpenters & Joiners	38,406	2.3	15.9	22.6	99.3
1212	Crop Farmers	31,268	1.9	17.9	22.0	72.0
1214	Mixed Crop & Livestock Farmers	31,064	1.9	19.8	17.3	73.0
6211	Sales Assistants (General)	29,832	1.8	21.6	36.2	45.7
1111	Chief Executives & Managing Directors	28,340	1.7	23.3	90.6	84.1
5311	General Clerks	26,476	1.6	24.9	49.1	8.0

Notes: Self-employment is inclusive of 'OMUEs' and 'OMIEs', which account for 'employers' and 'own-account workers', and also 'contributing family workers'.
ANZSCO = Australian & New Zealand Standard Classification of Occupations.
Source: ABS, cat. no. 2073.0 – 2011 Census of Population & Housing, 2011 TableBuilder Pro, 2011 Third Release

Changes to the occupational & industrial composition of the self-employed workforce over time

While the demographics profile of the self-employed workforce remained relatively static over time (discussed earlier), the types of work undertaken in self-employment have adapted over time to the evolution in the broader economy. As before, historical ABS Census data is used to provide snapshots of the self-employed workforce in Australia taken at selected intervals between 1986 and 2011. Shown in Table 4.12 and Table 4.13 respectively, the occupational and industrial composition of the contemporary self-employed workforce bears little resemblance to the composition of past self-employment. Many of the 'blue-collar' jobs

traditionally associated with self-employment have declined over time as the self-employed workforce has 'professionalised' along with the broader shift in the Australian economy toward 'white-collar' jobs. For example, while a majority of the self-employed workforce have always been concentrated in skilled occupations, particularly the technical and trades occupations, there has also been a rapid rise in the share of self-employed workers engaging in professional occupations from 9% in 1986 to 19% in 2011. This rise in 'white-collar' self-employment also coincides with the growth in the share of OMIEs over the same period (discussed earlier).

The shift in the occupational composition of the self-employed workforce over time has also been accompanied by a shift in its industrial composition. Although it is difficult to make comparisons about the industrial composition over time due to changes in the classification, there has been a shift in self-employment away from industries in agriculture and in wholesale and retail trade, and toward industries in construction, the professions, and in business and financial services. In 1986, for example, 22% of the self-employed workforce was concentrated in the 'Agriculture, Forestry, Fishing & Hunting' industries, while only 10% were in the 'Finance, Property & Business Services' industries. By 2011, however, this pattern had inverted with 21% of self-employment now concentrated in the professional service industries (i.e. 'Financial & Insurance Services', 'Rental, Hiring & Real Estate Services', 'Professional, Scientific & Technical Services' and 'Administrative & Support Services'), while only 9% remained in the 'Agriculture, Forestry & Fishing' industries — shown in Table 4.13.

The shift over time in the composition of work in self-employment, toward skilled and white-collar work in non-agricultural sectors, is also reflected in the increasing rewards from work. Again, while difficult to make strict comparisons over time due to changes in the classification of data, there was an approximate increase in the real (i.e. adjusted for inflation) pre-tax earnings and income of self-employed workers, relative to employees, between 1986 and 2011 — as shown in Table 4.14. As noted earlier, however, this relative increase is due to the top-end of the self-employed earnings distribution, rather than the bottom-end. For example, the share of self-employed workers in the top-end of the pre-tax earnings distribution in both 1986 (10% earning $1,426 or more per week) and 2011 (13% earning $2,000 or more per week) was always greater than the share of employees (7% in 1986 and 10% in 2011).

However, while fewer self-employed workers were at the bottom-end of the pre-tax earnings distribution in 2011 (33% earning up to $600 per week) in comparison to 1986 (52% earning up to $666 per week), the shares of self-employed workers at the bottom-end of the earnings distribution remained greater than the 40% of employees in 1986 and the 27% of employees in 2011. As noted earlier, self-employment continually provided relatively poor returns for many workers and better returns for very few. However, as before, the problems around the veracity of self-employed workers' reported incomes still remain, making it difficult to observe the exact nature of the relationship between income and self-employment over time.

In general, self-employment is not bound to any one particular type of occupation or industry, but rather is a form of employment where workers from across the spectrum can package and deliver their skills.

Table 4.12: Occupational composition (in main job) for self-employed workers in Australian at selected time intervals, 1986-2011

	1986	1991	2001	2006	2011
No. of self-employed workers	1,134,700	1,308,200	1,453,100	1,647,921	1,676,970
Share *(%)* **of total employment**	*17.4*	*18.4*	*17.6*	*18.3*	*16.7*
	col. %	*col. %*	*col. %*	*col. %*	*col. %*
(ANZSCO 2006, 1-digit)					
Managers	-	-	-	*28.7*	*26.6*
Professionals	-	-	-	*17.2*	*18.6*
Technicians & Trades Workers	-	-	-	*20.1*	*20.6*
Community & Personal Service Workers	-	-	-	*3.7*	*4.4*
Clerical & Administrative Workers	-	-	-	*10.0*	*9.7*
Sales Workers	-	-	-	*5.5*	*5.3*
Machinery Operators & Drivers	-	-	-	*4.9*	*4.7*
Labourers	-	-	-	*7.6*	*7.8*
Non-resp.	-	-	-	*2.4*	*2.3*
(ASCO 1996, 1-digit)					
Managers & Administrators	-	-	*20.7*	-	-
Professionals	-	-	*15.4*	-	-
Associate Professionals	-	-	*15.9*	-	-
Tradespersons & Related Workers	-	-	*17.9*	-	-
Advanced Clerical & Service Workers	-	-	*4.1*	-	-
Intermediate Clerical, Sales & Service Workers	-	-	*6.3*	-	-
Intermediate Production & Transport Workers	-	-	*6.2*	-	-
Elementary Clerical, Sales & Service Workers	-	-	*3.7*	-	-
Labourers & Related Workers	-	-	*6.2*	-	-
Non-resp.	-	-	*3.5*	-	-
(ASCO 1986, 1-digit)					
Managers & Administrators	*34.6*	*29.9*	-	-	-
Professionals	*9.2*	*10.8*	-	-	-
Para-professionals	*1.5*	*1.7*	-	-	-
Tradespersons	*18.4*	*17.4*	-	-	-
Clerks	*6.4*	*7.0*	-	-	-
Salespersons & Personal Service Workers	*9.8*	*10.8*	-	-	-
Plant, Machine Operators & Drivers	*6.2*	*5.5*	-	-	-
Labourers & Related Workers	*6.1*	*6.1*	-	-	-
Non-resp.	*7.8*	*10.7*	-	-	-

Notes: See Table 4.9 (above).
           ASCO = Australian Standard Classification of Occupations; ANZSCO = Australian & New Zealand Standard Classification of Occupations.
Source: See Table 4.9 (above).

Table 4.13: Industrial composition (in main job) for self-employed workers in Australia at selected time intervals, 1986-2011

	1986	1991	2001	2006	2011
No. of self-employed workers	1,134,700	1,308,200	1,453,100	1,647,921	1,676,970
Share *(%)* of total employment	*17.4*	*18.4*	*17.6*	*18.3*	*16.7*
	col. %	col. %	col. %	col. %	col. %
(ANZSIC 2006, 1-digit) (main job)					
Agriculture, Forestry & Fishing	-	-	-	*11.6*	*8.8*
Mining	-	-	-	*0.4*	*0.4*
Manufacturing	-	-	-	*8.3*	*6.5*
Electricity, Gas, Water & Waste Services	-	-	-	*0.4*	*0.4*
Construction	-	-	-	*20.1*	*18.1*
Wholesale Trade	-	-	-	*4.6*	*3.6*
Retail Trade	-	-	-	*10.9*	*8.7*
Accommodation & Food Services	-	-	-	*5.7*	*5.3*
Transport, Postal & Warehousing	-	-	-	*6.3*	*5.2*
Information Media & Telecommunications	-	-	-	*1.3*	*1.1*
Financial & Insurance Services	-	-	-	*2.9*	*2.3*
Rental, Hiring & Real Estate Services	-	-	-	*2.6*	*2.2*
Professional, Scientific & Technical Services	-	-	-	*11.2*	*11.6*
Administrative & Support Services	-	-	-	*4.9*	*5.0*
Public Administration & Safety	-	-	-	*0.6*	*0.5*
Education & Training	-	-	-	*2.5*	*2.7*
Health Care & Social Assistance	-	-	-	*6.1*	*6.1*
Arts & Recreation Services	-	-	-	*1.7*	*1.7*
Other Services	-	-	-	*7.1*	*6.8*
Non-resp.	-	-	-	*3.7*	*3.0*
(ANZSIC 1993, 1-digit) (main job)					
Agriculture, Forestry & Fishing	-	-	*12.8*	-	-
Mining	-	-	*0.3*	-	-
Manufacturing	-	-	*8.4*	-	-
Electricity, Gas & Water Supply	-	-	*0.1*	-	-
Construction	-	-	*15.6*	-	-
Wholesale Trade	-	-	*4.5*	-	-
Retail Trade	-	-	*14.1*	-	-
Accommodation, Cafes & Restaurants	-	-	*3.4*	-	-
Transport & Storage	-	-	*4.6*	-	-
Communication Services	-	-	*1.2*	-	-
Finance & Insurance	-	-	*2.1*	-	-
Property & Business Services	-	-	*15.4*	-	-
Government Administration & Defence	-	-	*0.1*	-	-
Education	-	-	*1.8*	-	-
Health & Community Services	-	-	*4.9*	-	-
Cultural & Recreational Services	-	-	*2.6*	-	-
Personal & Other Services	-	-	*4.5*	-	-
Non-resp.	-	-	*3.5*	-	-
(ASIC 1983, 1-digit) (main job)					
Agriculture, Forestry, Fishing & Hunting	*22.1*	*14.8*	-	-	-
Mining	*0.2*	*0.3*	-	-	-
Manufacturing	*7.1*	*7.8*	-	-	-
Electricity, Gas & Water	*0.0*	*0.1*	-	-	-
Construction	*14.6*	*13.2*	-	-	-
Wholesale & Retail Trade	*23.4*	*22.4*	-	-	-
Transport & Storage	*5.3*	*4.7*	-	-	-
Communication	*0.0*	*0.1*	-	-	-
Finance, Property & Business Services	*10.3*	*12.3*	-	-	-
Public Administration & Defence	*0.0*	*0.3*	-	-	-
Community Services	*4.1*	*5.1*	-	-	-
Recreation, Personal & Other Services	*7.8*	*8.4*	-	-	-
Non-resp.	*5.0*	*10.5*	-	-	-

Notes: See Table 4.9 (above).
         ASIC = Australian Standard Industrial Classification; ANZSIC = Australian & New Zealand Standard Industrial Classification.
Source: See Table 4.9 (above).

Table 4.14: Income & hours distributions for self-employed & employees in Australia at selected time intervals, 1986-2011

	Self-employed					Employees				
	1986	1991	2001	2006	2011	1986	1991	2001	2006	2011
No. of workers	1,134,700	1,308,200	1,453,100	1,647,921	1,676,970	5,398,700	5,803,100	6,820,000	7,369,550	8,381,352
Share *(%)* of workforce	*17.4*	*18.4*	*17.6*	*18.3*	*16.7*	*82.6*	*81.6*	*82.4*	*81.7*	*83.3*
	col. %	*col. %*	*col. %*	*col. %*	*col. %*	*col. %*	*col. %*	*col. %*	*col. %*	*col. %*
Income per week *(gross, all sources)(inflated to 2011 $ values)*										
≤ $0	-	-	-	-	*3.3*	-	-	-	-	*0.6*
$1-$599	-	-	-	-	*29.6*	-	-	-	-	*26.1*
$600-$1249	-	-	-	-	*35.0*	-	-	-	-	*41.0*
$1250-$1999	-	-	-	-	*16.5*	-	-	-	-	*20.2*
≥ $2000	-	-	-	-	*13.0*	-	-	-	-	*9.5*
Non-resp.	-	-	-	-	*2.5*	-	-	-	-	*2.5*
≤ $0	-	-	-	*3.6*	-	-	-	-	*0.5*	-
$1-$692	-	-	-	*43.4*	-	-	-	-	*38.0*	-
$693-$1,500	-	-	-	*41.2*	-	-	-	-	*43.5*	-
$1,501-$2,309	-	-	-	*11.6*	-	-	-	-	*11.5*	-
≥ 2,310	-	-	-	*10.5*	-	-	-	-	*4.8*	-
Non-resp.	-	-	-	*2.8*	-	-	-	-	*1.6*	-
≤ $0	-	-	*3.7*	-	-	-	-	*0.3*	-	-
$1-$531	-	-	*28.0*	-	-	-	-	*25.3*	-	-
$532-$1,329	-	-	*45.1*	-	-	-	-	*54.4*	-	-
$1,330-$1,994	-	-	*9.7*	-	-	-	-	*12.1*	-	-
≥ $1,995	-	-	*9.9*	-	-	-	-	*5.8*	-	-
Non-resp.	-	-	*3.6*	-	-	-	-	*2.1*	-	-
≤ $0	-	*6.3*	-	-	-	-	*2.8*	-	-	-
$1-$643	-	*42.5*	-	-	-	-	*37.2*	-	-	-
$645-$1,286	-	*32.5*	-	-	-	-	*46.5*	-	-	-
$1,287-$1,931	-	*7.2*	-	-	-	-	*8.3*	-	-	-
≥ $1,933	-	*4.1*	-	-	-	-	*3.6*	-	-	-
Non-resp.	-	*7.4*	-	-	-	-	*1.6*	-	-	-
$0-$666	*51.7*	-	-	-	-	*39.7*	-	-	-	-
$667-$1,425	*33.4*	-	-	-	-	*51.0*	-	-	-	-
≥ $1,426	*9.5*	-	-	-	-	*7.1*	-	-	-	-
Non-resp.	*5.3*	-	-	-	-	*2.3*	-	-	-	-
Hours worked per week *(all jobs in the week prior)*										
Part-time (1-34 hours)	*19.7*	*21.8*	*26.6*	*28.7*	*31.6*	*18.6*	*23.3*	*28.9*	*29.7*	*29.9*
Full-time (≥35 hours)	*73.6*	*69.0*	*65.7*	*65.1*	*62.6*	*74.8*	*68.7*	*64.4*	*64.1*	*63.0*
Non-resp.	*6.7*	*9.2*	*7.7*	*6.2*	*5.8*	*6.6*	*8.0*	*6.8*	*6.2*	*7.1*

Notes: See Table 4.9 (above). Income values were inflated to 2011 $ values calculated using the Consumer Price Index (CPI), see http://www.rba.gov.au/calculator/ .Source: See Table 4.9 (above).

4.6 CONCLUDING REMARKS

The descriptive observations outlined in this Chapter reveal several interesting points about self-employment and highlight its significance as an area for further economic research.

First, the contribution of self-employment to the labour market and to the broader economy, both internationally and in Australia, is disproportionately large relative to its size. In most developed economies, self-employment usually only accounts for a modest share of the workforce. In Australia, for example, the share of self-employment (including OMIEs) is about one-fifth of total employment. Despite this, the share of self-employed workers is greater than other labour market segments that regularly attract more economic research interest — such as, unemployed or public-sector workers. Self-employed workers also make a disproportionately large contribution to the aggregate supply of hours worked (per week) by working longer hours on average than do employees.

Second, self-employment is pervasive on both macro and microeconomic levels. At the macro-level, self-employment is commonplace in the labour markets and economies of most developed countries, and has remained so over time despite structural economic changes and business-cycle fluctuations transforming the global economic landscape. In Australia, as in other developed countries, self-employment has adapted as the composition of economies have shifted toward skilled and white-collar work in non-agricultural sectors. This macro-level shift in the occupational composition of self-employment over time also indicates that self-employment is not necessarily associated with a set of particular occupations or characterised by certain types of work. In Australia, self-employment is found in many parts of the economy, and the occupational and industrial composition of the work undertaken by self-employed workers is just as heterogeneous as the work undertaken by employees. Moreover, at the micro-level, self-employment touches on the lives of many more people than the minority of workers who choose to be self-employed at any given time. Across the life course, a large portion of the population will at some point have participated in self-employment. Similarly, many non-self-employed workers have indirect ties to self-employment either through close familial relationships, particularly parental relationships, or through working for and in

close proximity to established self-employed workers.

Third, self-employment sits at the intersection of labour supply and labour demand. In addition to contributing to labour supply, self-employment also contributes to a substantial share of labour demand and is an important engine of employment growth. While most self-employed workers work alone, a minority of self-employed workers (approx. one-third in Australia) create jobs and employ a large fraction of the remaining workforce. In Australia, for example, it is estimated that 57% of total employment was attributable to employer self-employed workers, particularly OMIEs, who accounted for only 7% of total employment. The size of additional employment generated by self-employment is even more impressive when compared against the remaining sources of employment — such as, the share of employees in the public-sector (17% of total employment) or those employed by private-sector companies *not* owned and operated by self-employed workers (8% of total employment). While it is difficult to gauge the economic benefits of self-employment and the additional jobs it creates in dollar terms, this finding further supports the earlier conclusions: that the contribution of self-employment is disproportionate; and, that self-employment is pervasive and many employees work for and in close proximity to people who have found success in self-employment.

The final inference to be drawn from the descriptive statistics is about the role of self-employment in the labour market and to individuals. That is, self-employment appears to attract workers who are already actively engaged in the labour market and have had an opportunity to gain experience and local labour market knowledge. In Australia, at least, many of the factors that drove the growth in broader labour market participation over the past two decades — such as, the entry of first-time and inexperienced workers (particularly among females, the young, and migrants) from outside the labour market or from unemployment — did not translate into self-employment. Most notably, self-employment lagged the broader labour market trend toward greater gender equality and the growth in female participation. Instead, many of the characteristics that consistently distinguish the self-employed workforce over time — such as, pronounced gender inequality, an older age-profile, higher incidences of married/de facto relationships, lower proportions of recent migrants, and higher levels of education — bear a closer

resemblance to segments of the employee workforce than the unemployed. Moreover, there is also the compelling evidence that many more non-self-employed workers (both employees and unemployed) harbour an unfulfilled or latent desire for self-employment; a pattern consistent across developed economies and across the life course. That is, while self-employment is attained by very few at any given time, it is a position coveted by many. This further indicates that, for most workers, the opportunity to become self-employed only arrives later or in the final-stage of a career progression because workers face constraints that bar most from entering self-employment earlier in the work-life cycle — such as, the inability to readily access 'seed' capital and the insufficient accumulation of financial wealth, or a lack of the skills, networks and knowhow necessary for self-employment acquired through prior work experience.

Clearly, self-employment and self-employed workers form an integral part of the labour market and economy, both in Australia and abroad. However, it is not apparent from the statistics presented what factors determine self-employment. The shortcoming of descriptive observations is that they are limited to identifying patterns associated with being self-employed and interesting correlations between self-employment and other segments of the workforce. These relationships cannot distinguish the causes of self-employment from its effects. Further, many of these relationships may also have been spuriously generated by confounding factors that, in certain instances, may even remain unobserved. The underlying mechanisms causing certain individuals to choose self-employment over their other prevailing labour market opportunities remain opaque.

Therefore, the purpose of the remainder of this Thesis is to disentangle the fundamental factors that determine self-employment, and attempt to better understand what motivates workers to become self-employed and under what circumstances. In doing so, this will help understand the broader purpose of self-employment in both the lives of workers and in the functioning of the economy.

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CHAPTER FIVE
SELF-EMPLOYMENT DYNAMICS IN AUSTRALIA & THE IMPORTANCE OF STATE-DEPENDENCE

The role of self-employment in the labour market and the factors that influence workers to choose self-employment has been extensively studied in the economic literature. However, much of the empirical evidence on this topic remains incoherent and inconclusive. On the one hand, self-employment is often considered as a form of entrepreneurship.[42] This interpretation regards self-employment as a preferred or desired outcome because of the increased pecuniary and non-pecuniary rewards the opportunity offers to individuals, as well as being encouraged by governments and policy-makers as a means of promoting economic growth and employment generation.[43] On the other hand, self-employment is considered from a more pessimistic viewpoint as either: a form of 'disguised unemployment', which attracts displaced and redundant workers due to business-cycle fluctuations or structural changes in the economy[44]; or, as an occupation of 'last-resort', which attracts workers of 'poor' quality — such as, those with histories of weak attachment to the labour market, poor skills or low ability, or those suffering from racial, gender, or age discrimination by employers.[45] These differing perceptions of self-employment are also sometimes referred to in the literature using terminology such as "pull" versus "push" entrepreneurship or "opportunity-based" versus "necessity" entrepreneurship.[46] Another possibility is that self-employment encompasses both positive and negative viewpoints depending on the types of worker and the prevailing economic circumstance (Dawson & Henley, 2012).

It is no coincidence, therefore, that the findings in much of the existing research are predominately based on cross-sectional (or pooled panel) data methods of analysis.

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[42] See Shane & Venkataraman (2000), *inter alia*.

[43] See Reynolds et al. (2004), Rotefoss & Kolvereid (2005), Parker & Belghitar (2006), Henley (2007), van Praag & Versloot (2007) and Stam et al. (2008), *inter alia*, for a discussion of the entrepreneurial reasons for self-employment participation.

[44] See Covick (1998), Earle & Sakova (2000), Andersson & Wadensjö (2007), Hyytinen & Rouvinen (2008) and von Greiff (2009), *inter alia*, for a discussion of self-employment as a form of disguised unemployment or because of displacement from salaried-employment.

[45] See Evans & Leighton (1989), Clark & Drinkwater (2000) and Parker & Rougier (2007), *inter alia*, for a discussion of self-employment as an occupation of last resort for certain workers.

[46] See Gilad & Levine (1986), Amit & Muller (1995), Praag & Ophem (1995), Clark & Drinkwater (2000), Hessels et al. (2008), and Dawson & Henley (2012), *inter alia*.

Across the literature, the prevalence of these models have led to the inaccurate identification of a vast number of statistically significant relationships that are often contradictory to one another, which contribute to a 'scattershot' or obscured understanding of self-employment. Instead, a clearer understanding of self-employment and why it is chosen by certain individuals can be gained by utilising longitudinal data and econometrically advanced panel data techniques.

Panel data models observe the changes in the behaviour and responses of individuals over an extended period of time, and estimate with an improved robustness sources of observed and unobserved heterogeneity that are otherwise neglected in cross-sectional models. A further advantage of panel models is the ability to include dynamic extensions and control for the possible influence of 'genuine' state-dependence: that is, the extent to which individuals' past experience or 'lagged' self-employment status in a previous period *in and of itself* affects the current self-employment status.

In other areas of labour economics, the use of dynamic panel techniques to account for the possibility of unobserved heterogeneity and state-dependence has proved insightful for isolating the causal relationships that determine, for example, unemployment and low-pay employment states.[47] By contrast, only a few studies (predominately European) analyse the importance dynamics in determining self-employment outcomes.[48] These studies find strong and consistent evidence that self-employment is a persistent state and that this is largely a product of state-dependence. What is not clear from these studies, however, is the extent to which controlling for unobserved heterogeneity and state-dependence change the story about self-employment and help elucidate the contrapuntal themes identified in the cross-sectional research. This is the purpose of this chapter.

Using the first eleven waves of the HILDA survey for the period 2001 to 2011, this chapter models the self-employment status of Australian workers using both static cross-sectional and dynamic panel data techniques to analyse the sensitivity of the results to changes in the method of estimation. This approach is most similar to Henley's (2004) analysis of self-employment dynamics and the influence of state-

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[47] See Heckman (1981a), Stewart & Swaffield (1999), Uhlendorff (2006), Stewart (2007), Cappellari & Jenkins (2008), Buddelmeyer et al. (2010), Cai (2014), *inter alia*.
[48] See Henley (2004) for the U.K., Caliendo & Uhlendorff (2008) for Germany, and Taylor (2011) for selected E.U. countries.

dependence on self-employment in the U.K. In contrast to Henley's study, however, this chapter utilises the Wooldridge (2005) method, rather than Orme's (2001) method, to estimate the dynamic model, as well as data with greater numbers of waves, respondents and observations (all of which have been shown to improve the empirical performance of the estimators).[49] While there appear to be no other comparable Australian studies, this analysis improves upon recent research undertaken by Atalay et al. (2014) on self-employment dynamics also using HILDA data but ignoring the impacts of state-dependence and unobserved heterogeneity.

This chapter confirms the findings from the previous dynamic panel studies that genuine state-dependence is an important influence on individuals' self-employment status, and also finds the change in the results obtained between the cross-sectional and the dynamic panel models to be considerable. For example, the impact of being self-employed in the previous year, controlling for observed and unobserved characteristics, is found to increases the current probability of self-employment by 27 percentage points, compared with those workers who were employees. The results also demonstrate the importance of addressing the potential for endogeneity in the initial condition. Unlike the results in Henley's study, however, this chapter finds the change in the results between the cross-sectional and the dynamic panel models to be far more acute. Most of the observed characteristics are rendered either statistically or economically insignificant once dynamics are adequately accounted for. This is also in stark contrast to the importance placed on the observed characteristics in much of the, predominately cross-sectional, evidence on self-employment and casts doubt on the validity of the findings in the existing research.

Therefore, while certain individual characteristics and traits, particularly those that are persistent and unobservable (e.g. cognitive and non-cognitive abilities), exacerbate the likelihood of self-employment, it is the influence of past experience *itself* that leaves workers prone to continued participation in self-employment. However, despite establishing the importance of genuine state-dependence of self-employment, the possible causes underlying the state-dependence remain unresolved.

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[49] See Arulampalam & Stewart (2009) and Akay (2012) for a discussion on the performance and robustness of the Wooldridge (2005) method for estimating non-linear dynamic random-effects panel data models in comparison to other methods, in particular Heckman's (1981a; 1981b) estimator.

5.1 PREVIOUS RESEARCH

The determinants of self-employment and the reasons why people become self-employed is well-documented in the existing economic literature (see Le (1999), Sørensen & Chang (2006) Praag & Versloot (2007), Sluis et al. (2008), and Parker (2009a: 106-157) for overviews of this literature). The salient determinants of self-employment that emerge in the existing research include: a wage differential between self-employment and salaried-employment, the intergenerational transfer of self-employment, wealth accumulation and access to finance, spousal support, education attainment and the acquisition of skills through experience, regional differences or 'thin' labour markets, structural economic changes and business-cycle fluctuations, risk aversion and tolerance of uncertainty, and other personality traits thought to favour entrepreneurial behaviour. However, the usefulness of the findings from much of this research is questionable. A large number of individual characteristics are identified throughout the research as having a statistically significant relationship with self-employment status, but with very little consistency. As summarised by Parker (2009a), the estimates from some 153 scholarly articles generate an exhaustive list of significant determinants, as well as a considerable amount of contradiction in the direction of the estimated effects (positive/zero/negative) – reproduced in Table 5.1.

Table 5.1: Summary of significant determinants of self-employment (Parker, 2009a)

Explanatory variable	No. +	No. −	No. 0
Income differential	8	2	4
Age	83	6	14
Experience	24	1	2
Education	69	21	27
Risk aversion	0	11	3
Married / working spouse	52	9	8
Number of children	16	2	3
Ill health / disability	5	4	6
Entrepreneur parent	40	2	2
Technological progress	4	4	2
Unemployment			
Cross-section	22	14	18
Time series	33	5	2
Urban location	7	7	4
Immigration	5	1	0
Interest rates	1	9	3
Personal wealth	40	2	4
Personal income tax rates	12	5	1

Notes: +, − and 0 denote positive (significant at a 5% level), negative (significant at a 5% level), and zero (insignificant at 5% level) coefficients, respectively. Only multivariate studies (i.e. those including controls for other explanatory variables) are included; descriptive studies are excluded. For row 11, panel studies with large N and small T are classified as cross-section; those with large T and small N are

classified as time-series.
Source: Reproduced from Parker (2009a: 108)

A potential explanation for the lack of consensus in the existing empirical research is its heavy reliance upon cross-sectional (or pooled panel) data to estimate static models of self-employment.[50] Such models estimate the dependence of workers' probability of being self-employed purely on differences in the observed characteristics between those in self-employment and salaried-employment, at a point in time. However, the effectiveness of these models at capturing the self-employment choice is most unsatisfactory. Because static cross-sectional models neglect to control for the potential influence of unobserved heterogeneity, the estimates are likely to overstate the importance of the observed characteristics and suffer from omitted variable bias. A further limitation of the static cross-sectional approach is its assumption that workers face both the self-employment and salaried-employment opportunities concurrently. Because the current self-employment choice is determined independent of the self-employment status in the past, the estimates confound both the determinants of transition to self-employment with those of survival in self-employment (Evans & Leighton, 1989).

Historically, the prevalence of studies using static cross-sectional models has been due to the absence for many decades of longitudinal surveys in many developed countries, limiting the availability of more adequate panel data estimation techniques to researchers. However, even as the availability of panel data and associated econometric techniques has increased, the number of studies that fully exploit panel data to analyse the dynamics of self-employment is far less developed than in other areas of labour economics research. This is particularly true for Australia, where the body of economic research relating to self-employment is both small and largely descriptive due to the use of cross-sectional (or pooled-panel) data methods of analysis.[51] In the self-employment literature more broadly, only a handful of studies analyse the individual self-employment participation decision in a dynamic panel framework (see, for example, Henley, 2004; Caliendo & Uhlendorff, 2008; Taylor, 2011). These studies model the dynamics of transitions between self-employment and salaried employment over time, and identify the

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[50] See Rees & Shah (1986), Evans & Leighton (1989), Taylor (1996), Blanchflower & Oswald (1998), Dunn & Holtz-Eakin (2000), Hamilton (2000) and Clark & Drinkwater (2000), *inter alia*.

[51] See Blanchflower & Meyer (1994), Vandenheuvel & Wooden (1995), Bradbury (1997), Covick (1998), Eastough & Miller (2004), Evans & Sikora (2004), and Atalay et al. (2014), *inter alia*.

extent to which the persistence of self-employment is caused by genuine state-dependence and observed/unobserved individual heterogeneity. Unlike the inconsistent findings of the earlier studies, the dynamic panel studies find strong and consistent evidence that state-dependence is an important determinant of self-employment, both statistically and economically, even once observed and unobserved heterogeneity is accounted for.

Using the first 9 waves of the British Household Panel Survey (BHPS), Henley (2004) finds that relative to those working in wage-jobs, the workers who were self-employed in the previous year increased their probability of being self-employed in the current year by approximately 30 percentage points, and that the unobserved individual heterogeneity accounts for approximately 60% of the unexplained variance of the composite error. Consistent with these findings, Taylor (2011) obtains similarly large estimates, between 20 to 89 percentage points, for male workers from selected European countries (using the European Community Household Panel (ECHP), 1994-2011), as does Caliendo & Uhlendorff (2008), 22 percentage points, for German workers (using the Socio-Economic Panel (SOEP), 1984-2005). These studies also find substantial correlation between the unobserved heterogeneity and the initial condition, highlighting the importance of treating the initial conditions as endogenous.

While the existing dynamic panel studies distinguish the importance of genuine state-dependence from the influence of heterogeneity on self-employment status, no meaningful attempt is made to distinguish the possible mechanisms causing the state-dependence. Unlike unemployment, for example, where the reasons for state-dependence are obvious because of its undesirable nature and the negative consequences it has on individual's wellbeing, such conclusions are difficult to draw when considering self-employment against salaried-employment. Past experience in self-employment may be interpreted as having either a 'scarring' or 'virtuous' effect on the current self-employment outcome depending on how self-employment and its outcomes are perceived.

There is contradictory descriptive evidence that perceive self-employment as having both positive and negative outcomes. On the one hand, self-employment is often optimistically perceived and interpreted as a form of entrepreneurship. For example, as reported by Blanchflower et al. (2001), in most developed economies a

large minority share of employees hold a latent or unfilled desire to instead work in self-employment. Similarly, most workers who make the transition into self-employment are employees, rather than unemployed (Evans & Leighton, 1989; Henley, 2004), and who appear to make the transition voluntarily (Farber, 1999a). Self-employment is also associated with providing workers with greater non-pecuniary rewards, expressed as higher levels of work satisfaction by those in self-employment (Blanchflower & Oswald, 1998; Blanchflower, 2000; Hundley, 2001; Benz & Frey, 2008b; Benz & Frey, 2008a). Based on this evidence, state-dependence of self-employment might be interpreted as having a 'virtuous' effect where self-employment is less accessible than ostensibly thought and employees are 'locked-out' from transitioning to self-employment.

On the other hand, there is a substantial amount of descriptive evidence that contrasts with the optimistic perception of self-employment. In Australia, a large portion of the work undertaken in self-employment includes many mundane trades and professional occupations — such as, livestock and crop farming, truck driving, plumbing, electrician, hairdressing, and bookkeeping — which are not the types of activities that typically come to mind when considering entrepreneurship.[52] Furthermore, much of this self-employment activity does not create employment growth or generate additional labour demand, as most self-employed are own-account workers, that is, they work alone.[53] Also, for many workers, self-employment has worse employment outcomes than they could otherwise expect working as an employee. For example, self-employed workers are observed to experience both longer-working hours (Hyytinen & Ruuskanen, 2007) as well as suffering a wage-penalty (Hamilton, 2000). There is also evidence that self-employed workers experience higher levels of stress and anxiety, which has a negative effect on the health and familial situations of workers (Blanchflower, 2004; Taris et al., 2008; Stephan & Roesler, 2010). Based on this evidence, the effect of past experience in self-employment may be interpreted as having a 'scarring' effect that generates conditions that trap self-employed workers and reduce their chance of escaping to salaried-employment in the future

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[52] Based on detailed occupation statistics from the ABS 2011 Census of Population & Housing
[53] Own-account workers accounted for approximately 63% of total self-employment in Australia based on statistics from the ABS 2008 LFS-FoE

5.2 DATA SOURCES & DEFINING SELF-EMPLOYMENT

Throughout this chapter, two data sources are used to analyse the dynamics of self-employment. The principal source of data, used for the multivariate analysis segment of this chapter, is the first eleven waves of the HILDA longitudinal survey for the period 2001 to 2011. The HILDA survey and its use in this chapter are very similar to the sources of longitudinal data used to perform similar multivariate analysis in the existing dynamic panel studies of self-employment.

Detailed descriptions of HILDA, its history and its uses are well documented.[54] The HILDA survey is a representative sample survey of the Australian population that, since 2001, has attempted to follow the same individuals on an annual basis. The HILDA also collects a breadth of detailed information on a range of topics, including: household and familial relationships and background, demographic characteristics, education and training issues, labour market experience and employment arrangements, income and expenditure, time-use, social and lifestyle issues, and health and well-being. For the period 2001 to 2011, the HILDA survey had an unbalanced sample of 26,028 Australian residents, aged 15 years and over, from across 7,682 households. During this period, the characteristics of the responding sample remained a relatively good-match to the Australian population at a broad level (Watson & Wooden, 2013).

To complement HILDA, additional data from the 2006 and 2012 ABS LFS-LM cross-sectional surveys are also utilised as auxiliary sources of information for comparative and descriptive purposes. The LFS-LM surveys are representative sample surveys of the Australian population and labour force that provide a biennial snapshot of the employment arrangements of workers and the timing and duration of transitions events for the preceding 12 months. In comparison to HILDA, the LFS-LM surveys are much larger and typically collect information on approximately 32,000 respondents from 28,000 households. However, unlike HILDA, the LFS-LM surveys are narrower in breadth with respect to the information collected. The cross-sectional nature of the LFS-LM surveys also mean that the statistics potentially suffer from 'recall bias' through respondents intentionally misrepresenting or unintentionally mis-recollecting events that

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[54] See Wooden et al.(2002), Watson & Wooden (2002), Wooden & Watson (2007), Watson & Wooden (2012) and Richardson (2013), *inter alia*.

transpired during the preceding 12 months.

In keeping with the conventional approach to defining self-employment in labour economics, self-employment is broadly defined as: those whose 'remuneration is directly dependent upon profits and the incumbents make operational decisions, or delegate such decisions, while retaining responsibility for the welfare of the enterprise'.[55] While there is considerable variation in the definition and enumeration of self-employment in the existing research, this chapter considers self-employment to be a mutually exclusive labour market state that is distinct from salaried-employment, unemployment, and not-in-the labour force. That is, workers for whom self-employment is their primary labour market activity (e.g. their main job). This is a limit imposed by the data, as the HILDA only asks about the employment type of respondents' main job (their main source of income).

Treating self-employment as a mutually exclusive state simplifies the analysis by sidestepping the thorny issues of self-employment as a secondary activity or 'nascent entrepreneurship' — both topics that receive little attention in the broader economics literature. Further, in Australia at least, it is not a common phenomenon for employees to also be self-employed. Based on 2007 ABS data (the most recent publically available estimates of multiple job holders in Australia), for example, only 6% of all employed people held a second job.[56] Of these, less than one-third (or 1.8% of total employment) were employees with a second job in self-employment, while approximately one-half were employees with a second employee-job. By contrast, the share of workers in self-employment as their main job, in 2007, accounted for approximately 19% of total employment – see Chapter Four, Table 4.6.

Fortunately, both the HILDA and LFS-LM surveys are similar in their classification of labour force status and employment arrangements of workers, which allow for the comparable identification of self-employed workers. From the data, the classification of self-employment refers to the aggregation of *owner-managers of an unincorporated enterprise* (OMUE)[57] and *owner-managers of an incorporated enterprise*

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[55] International Classification of Status in Employment (ICSE-93) (ILO, 1993)

[56] see ABS Cat. No. 4102.0 - Australian Social Trends, Sep 2009
< http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4102.0Main+Features40Sep+2009>

[57] This is where the worker is remunerated directly from the profits of their business, but there is also no legal distinction between the personal liabilities of the worker and the assets of their business.

(OMIE)[58]. This classification also includes *own-account workers* (i.e. those who work alone) and *employers* (i.e. those who employ additional labour). In contrast to previous studies of self-employment, the data allows for the inclusion of OMIEs as self-employed, rather than as employees, to be explicitly made.[59] This is significant because OMIEs account for approximately 35% of the sample of self-employed workers in the HILDA data, and 35% and 38% of self-employment in the 2006 and 2012 samples of the LFS-LM survey, respectively. Furthermore, *contributing family workers*[60] are also classified as self-employed workers in the LFS-LM data because they were already combined with OMUE workers and not separately identifiable, but have been classified as employees in the HILDA sample. While it is debatable whether 'contributing family workers' should be classified as self-employed workers or employees, the small size of this group means that their classification makes a negligible impact on the analysis of self-employment (e.g. in the HILDA sample, 'contributing family workers' account for approximately 0.6% of the workforce).

5.3 AGGREGATE LABOUR MOBILITY OF SELF-EMPLOYMENT IN AUSTRALIA

Self-employment in Australia is a highly persistent labour market state for most workers. Table 5.2 summarises the aggregate year-on-year transitions between each of the labour market states for the years 2006 and 2012 using the LFS-LM data and for the pooled 2002-2011 period using the HILDA data. In 2012, the share of self-employed workers who had previously been self-employed in 2011 $(t-1)$ account for 91.7% of the self-employed workforce. The high incidence of persistence in self-employment is also comparable to the share of employees who remained in salaried-employed jobs year-on-year (89.2%, in 2012), while dissimilar to those who remained unemployed or not-in-the labour force (26.5% and 23.4%, respectively, in

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[58] This is where the worker and their business are separate legal entities and the worker is employed under the account of the business (a limited liability company), but the worker retains a controlling interest and remains responsible for its operation and is entitled to a distribution of the profits.

[59] Despite the ILO (1993) ICSE-93 recommendation that OMIE workers be classified as self-employed for labour market analysis, many studies related to self-employment fail to explicitly distinguish OMIE workers as self-employed (see, *inter alia*, Rees & Shah (1986), Taylor (1996), Clark & Drinkwater (2000), Henley (2004), Taylor (2011), and Dawson & Henley (2012)). Often, this is because of the limitations that the underlying data source impose (e.g. respondents are allowed to simply self-identify as self-employed, rather than being interrogated further about their form of employment). This can lead to self-employment being under-reported, as self-employed OMIE workers instead misreport themselves to be wage-earners or employees.

[60] This is where the worker works in a family owned and operated business and without explicitly being paid, but may benefit implicitly from the proceeds of the business.

2012). The patterns of persistence and mobility, particularly in self-employment, also remain relatively consistent over time between 2006 and 2012.

As discussed earlier, differences in the collection methodologies between the LFS-LM and HILDA surveys also produce some striking statistical differences. As evident from the statistics in Table 5.2, in comparison to the LFS-LM data, the HILDA data captures a similar pattern of year-on-year transitions for salaried-employment, while capturing a much higher incidence of mobility for self-employment. For example, in the HILDA data, only 80.8% of workers persist in self-employment year-on-year in comparison to 91.7% in the 2012 LFS-LM data. The discrepancies in the estimates between the HILDA and the LFS-LM surveys cannot be fully explained. However, in the context of this chapter, the over-enumeration of the transitions involving self-employment in the HILDA data is seen as beneficial.

Table 5.2: Mobility of labour & the transitions between labour market states, $t-1$ **to** t

Labour market transitions		ABS LFS-LM survey				HILDA survey	
		2006		2012		2002-2011	
t-1	*t*	N	%	N	%	Obs.	%
Employee	Employee	23,377	*88.6*	21,684	*89.2*	53,388	*90.5*
Self-employed	Employee	176	*0.7*	116	*0.5*	1,471	*2.5*
Unemployed	Employee	-	-	-	-	1,476	*2.5*
NILF	Employee	-	-	-	-	2,638	*4.5*
Unemp./NILF	Employee	2,832	*10.7*	2,496	*10.3*	-	-
	Total	26,385	*100.0*	24,296	*100.0*	58,973	*100.0*
Employee	Self-employed	323	*5.0*	188	*3.5*	1,692	*13.6*
Self-employed	Self-employed	5,779	*89.7*	4,899	*91.7*	10,060	*80.8*
Unemployed	Self-employed	-	-	-	-	96	*0.8*
NILF	Self-employed	-	-	-	-	609	*4.9*
Unemp./NILF	Self-employed	337	*5.2*	257	*4.8*	-	-
	Total	6,439	*100.0*	5,344	*100.0*	12,457	*100.0*
Employee	Unemployed	637	*66.8*	553	*67.1*	1,084	*38.2*
Self-employed	Unemployed	44	*4.6*	53	*6.4*	105	*3.7*
Unemployed	Unemployed	-	-	-	-	824	*29.0*
NILF	Unemployed	-	-	-	-	824	*29.0*
Unemp./NILF	Unemployed	273	*28.6*	218	*26.5*	-	-
	Total	954	*100.0*	824	*100.0*	2,837	*100.0*
Employee	NILF	1,184	*63.7*	1,095	*65.7*	3,199	*8.9*
Self-employed	NILF	189	*10.2*	182	*10.9*	778	*2.2*
Unemployed	NILF	-	-	-	-	807	*2.2*
NILF	NILF	-	-	-	-	31,354	*86.8*
Unemp./NILF	NILF	486	*26.1*	390	*23.4*	-	-
	Total	1,859	*100.0*	1,667	*100.0*	36,138	*100.0*
	Total (N)	35,637	-	32,131	-	110,405	-

Notes: Unweighted estimates. HILDA survey data is pooled and unbalanced. 'Contributing family workers' are classified as self-employed in the LFS-LM survey data, but have been designated as employees in the HILDA data. Unemp. = unemployed; NILF = not-in-the labour force

Source: ABS, cat. no. 6202.0.30.004, Labour Force Survey and Labour Mobility, Australia, Feb 2012, CURF (Expanded) – accessed via RADL 20140223
ABS, cat. no. 6202.0.30.004, Labour Force Survey and Labour Mobility, Australia, Feb 2006, CURF (Basic)
HILDA Survey, 2001-2012

The high incidence of persistence in self-employment provides no insight about the labour market pathways where self-employed workers arrive from or depart to. To better gauge the direction and relevance of the inflow and outflow transitions between self-employment and the other labour market states, Table 5.3 describes the aggregate inflow and outflow transitions involving self-employment relative to those who remained in self-employment. Much of the labour mobility involving self-employment occurs from within the labour market, predominately by employees already actively engaged in salaried-employed jobs. The incidence of transitions between self-employment and salaried-employment, in comparison to the unemployed and not-in-the labour market states, is particularly acute in the pooled 2002-2011 HILDA data more so than in the 2006 and 2012 ABS LFS-LM data. For example, relative to those who remain in self-employed, the HILDA data estimates the year-on-year inflow and outflow transitions between self-employment and salaried-employment to be 16.8% and 14.6%, respectively; whereas, the 2012 LFS-LM data estimates the same relative inflow and outflow transitions to be 3.8% and 2.4%, respectively. By comparison, very few of the transition pathways to and from self-employment involve unemployment. For example, in the HILDA data, the total number of year-on-year transitions between self-employment and unemployment only accounted for 2.0% of the persistent self-employed workforce.

Moreover, the direction of the transitions to and from self-employment is slightly unbalanced, as the relative shares of workers entering self-employment are slightly greater than the amount exiting from self-employment. This imbalance in the flows is also further pronounced when the transition pathways for each state are considered separately. It appears that, in aggregate, employees who enter self-employment from salaried-employment are more likely to exit self-employment to non-employment (most likely exiting the labour market completely), while workers entering from non-employment are less likely to exit from self-employment to salaried-employment. However, this provides no indication about the permanency of self-employment over the life-cycle of workers.

Table 5.3: Relative inflow & outflow transitions between self-employment & other labour market states, $t-1$ to t

| | | ABS LFS-LM survey | | | | HILDA survey | |
| | | 2006 | | 2012 | | 2002-2011 | |
		N	Transition / Stayers (%)	N	Transition / Stayers (%)	Obs.	Transition / Stayers (%)
Stayers:							
t-1	t						
Self-employed	Self-employed	5,779	100.0	4,899	100.0	10,060	100.0
Inflow transitions:							
t-1	T						
Employee	Self-employed	323	5.6	188	3.8	1,692	16.8
Unemployed	Self-employed	-	-	-	-	96	1.0
NILF	Self-employed	-	-	-	-	609	6.1
Unemp./NILF	Self-employed	337	5.8	257	5.2	705	7.0
Outflow transitions:							
t-1	T						
Self-employed	Employee	176	3.0	116	2.4	1,471	14.6
Self-employed	Unemployed	-	-	-	-	105	1.0
Self-employed	NILF	-	-	-	-	778	7.7
Self-employed	Unemp./NILF	233	4.0	235	4.8	883	8.8

Notes: see Table 5.2 (above)
Source: see Table 5.2 (above)

A clearer picture about the sequence or order in which workers engage in self-employment is gained by describing the timing of the inflow and outflow transitions over the life-cycle. Comparing the age-distributions of the inflow transitions to self-employment and salaried-employment, illustrated in Figure 5.1 and Figure 5.2 respectively, the opportunities in self-employment appear to be relatively more attractive to older workers who were already actively engaged within the labour market with skills and experience. As shown in Figure 5.1, workers enter self-employment from both the salaried-employment and non-employment states at a similarly older age, at a mid-point in the work-life cycle (approx. 30-34 years). By contrast, the inflow transitions to salaried-employment (Figure 5.2) are predominately young and inexperienced workers who enter from outside the labour market or from unemployment at the initial or early stages of the work-life cycle (approx. 15-29 years). Furthermore, once engaged, the evidence suggests that self-employment is permanent form of employment for most self-employed over the work-life cycle. The age distribution of the workers entering self-employment is predominately younger than those who exit. While the self-employed who do not survive predominately exit to salaried-employment sooner rather than later (approx. 35-39 years, as shown in Figure 5.2), the majority of the outflow transitions from self-employment to non-employment occur over an older, more elongated age range (approx. 45-66 years, as shown in Figure 5.3). Self-

employed workers are also more likely continue to work past the conventional age of retirement for employees (approx. 55-65 years), remaining in self-employment until their 70's (as shown in Figure 5.3).

Figure 5.1: Age distributions of inflow transitions to self-employment by previous labour market state, $t - 1$ to t, in 2012
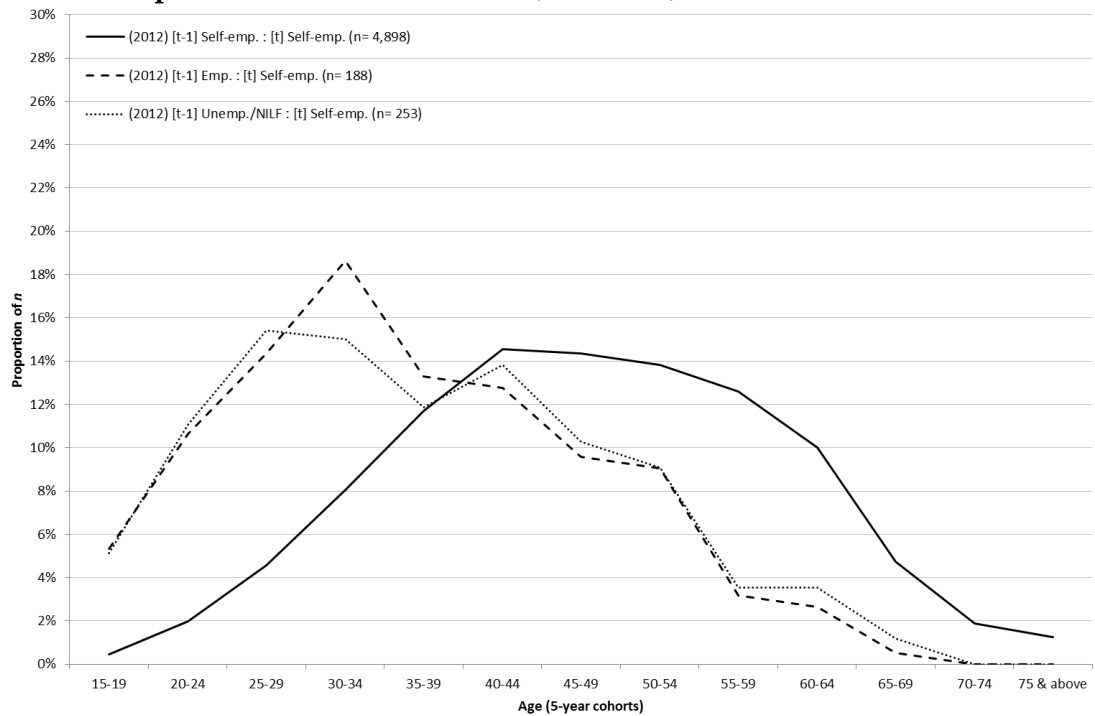
Notes: Unweighted estimates. Emp. = Employee; Self-emp. = Self-employed; Unemp. = unemployed; NILF = not-in-the labour force

Source: ABS, cat. no. 6202.0.30.004, Labour Force Survey and Labour Mobility, Australia, Feb 2012, CURF (Expanded) – accessed via RADL 23/02/2014

Figure 5.2: Age distributions of inflow transitions to salaried-employment by previous labour market state, $t-1$ to t, in 2012
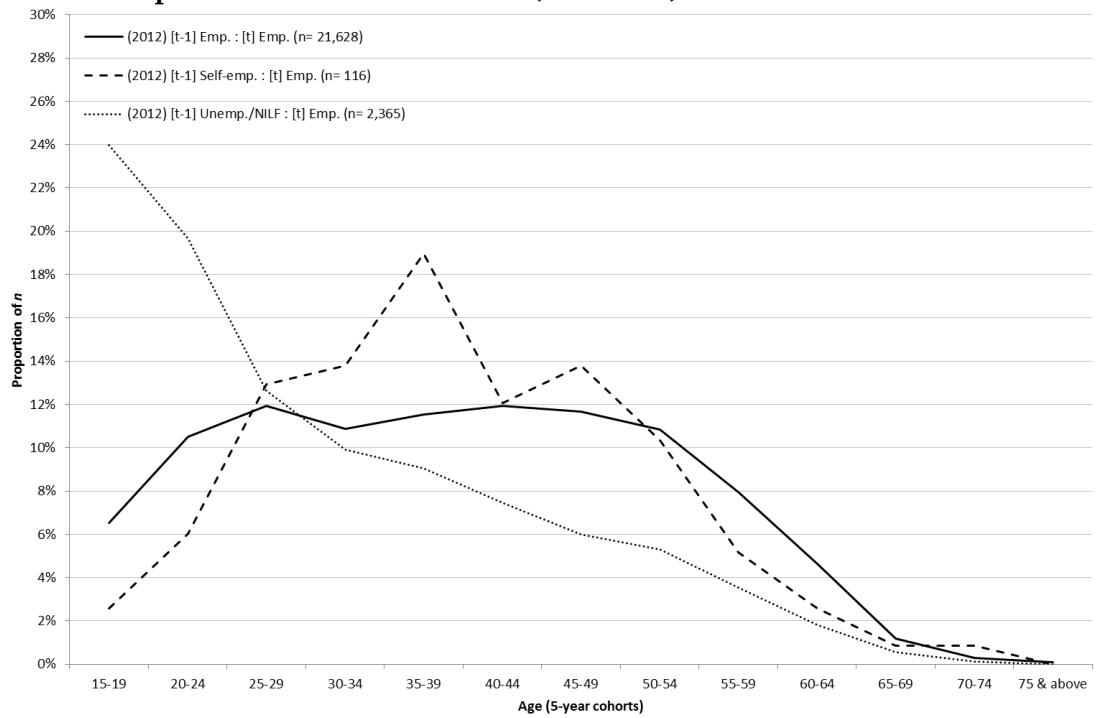
Notes: see Figure 5.1 (above).
Source: see Figure 5.1 (above).

Figure 5.3: Age distributions of outflow transitions from employment to non-employment, $t-1$ to t, by previous self-employment and salaried-employment status, in 2012
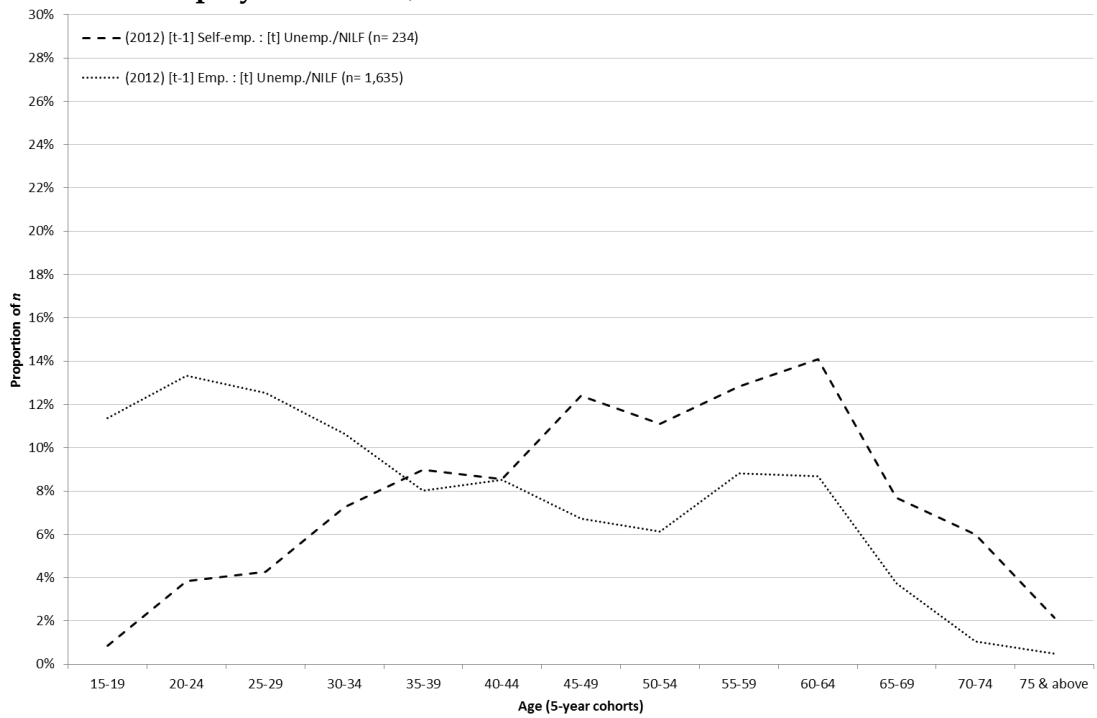
Notes: see Figure 5.1 (above).
Source: see Figure 5.1 (above).

There is also evidence to suggest that the participation in self-employment occurs as part of a career choice or progression, rather than behaviour that is forced by circumstance or necessity. Table 5.4 presents the proportion of transitions that were reported as voluntarily or involuntarily for those who ceased working in either a salaried-employed job or self-employment in year $t-1$. In 2012, for example, 76.6% of employees who transitioned to self-employment cited a voluntary reason for the transition — such as, unsatisfactory work conditions, better job opportunity, to start a new business, or family reasons. The share of employees voluntarily transitioning to self-employment is also greater than the share of employees who changed salaried-employed jobs (72.3%, in 2012).

On the whole, the descriptive analysis appears to indicate that self-employment is a destination *in itself*, which for many workers is a desired outcome but only ever achieved by a few. However, drawing inferences from the transition probabilities and persistence of self-employment in aggregate is difficult. The propensity for certain workers to transition and persist in self-employment does not necessarily imply that the state-dependence observed in aggregate is true for individuals, because there is more than one possible explanation for persistence (Heckman, 1981a). At the individual level, the probability of participating in self-employment could also be the result of persistent but unobserved individual characteristics. Therefore, additional controls for both observed past behaviour and unobserved characteristics are necessary for more accurate inferences about self-employment.

Table 5.4: Reason for ceasing job (involuntary/voluntary) and transitioning between labour market states, $t-1$ to t

Labour market transitions		ABS LFS-LM survey		
		2012		
			Invol.	Vol.	Non-resp.
t-1	*t*	N	*% (row)*	*% (row)*	*% (row)*
Employee	Emp. (new job)	2,655	*21.7*	*72.3*	*6.0*
Self-employed	Employee	116	*14.7*	*77.6*	*7.8*
Employee	Self-employed	188	*20.2*	*76.6*	*3.2*
Employee	Unemp./NILF	1,648	*42.5*	*57.5*	*0.0*
Self-employed	Unemp./NILF	235	*40.0*	*60.0*	*0.0*

Notes: Unweighted estimates. Emp. = Employee; Unemp. = Unemployed; NILF = not-in-the labour force; Invol. = involuntary; Vol. = voluntary; Non-resp. = missing information. Aggregation of 'reasons for transition' between labour market states are defined in ABS (2013).

Source: see Table 5.2 (above).

5.4 MULTIVARIATE ANALYSIS OF SELF-EMPLOYMENT DYNAMICS

Econometric model

The salient point of this chapter considers whether individuals' choice of self-employment is a product of their past observed and unobserved behaviours, and to what extent controlling for the dynamics of self-employment alters how self-employment is understood. In doing so, this chapter models the self-employment status of Australian workers using cross-sectional and panel data techniques.

In keeping with much of the existing research, the sequence begins by modelling the probability of self-employment in a static cross-sectional (or pooled-panel) probit framework, where the current outcome is determined by differences in the distribution of observed individual heterogeneity of the workers in self-employment relative to employees in salaried-employed jobs, at a particular point in time. The probability of individual i being observed in self-employment ($SE_i = 1$), relative to being in salaried-employment ($SE_i = 0$) can be written as:

$$\Pr[SE_i = 1] = \Pr[SE_i^* > 0] = \Phi(\boldsymbol{x_i}\boldsymbol{\beta} + u_i) \tag{1}$$

where $\boldsymbol{x_i}$ is a vector of strictly exogenous observed characteristics of the individuals, such as age, gender and education level etc.; $\boldsymbol{\beta}$ is the vector of coefficients associated with $\boldsymbol{x_i}$ to be estimated; u_i is the error term; and, Φ is the non-linear probit function.

The static cross-sectional model in Equation 1, however, neglects the possible impacts of unobserved heterogeneity and state-dependence. In order to control for these impacts it is necessary to instead utilise a dynamic random-effects panel probit framework. In this framework the probability of individual i being self-employed ($SE_{i,t} = 1$), at time t, is assumed to be determined by the individual's previous self-employment status, as well as other observed and unobserved individual characteristics:

$$\Pr[SE_{i,t} = 1] = \Pr[SE_{i,t}^* > 0] = \Phi(\gamma SE_{i,t-1} + \boldsymbol{x_{i,t}}\boldsymbol{\beta} + \varepsilon_i + v_{i,t}) \tag{2}$$

The dynamic model in Equation 2 differs from the static model in Equation 1 in two important respects. First, a one-period lag of the observed status in self-employment at year $t-1$ is included as an explanatory variable, $SE_{i,t-1}$. The estimated coefficient of the lagged dependent variable, γ, measures the extent of the effect of state-

dependence of self-employment (i.e. the propensity of individuals' participation in self-employment that is determined by their previous experience in self-employment). Second, the dynamic model controls for the unobserved individual heterogeneity component (ε_i) of the error term ($u_{i,t} = \varepsilon_i + v_{i,t}$), which includes any individual-specific characteristics that are unobserved in the data but persist over time (e.g. inherent cognitive or non-cognitive abilities).[61] The presence of unobserved heterogeneity is problematic, however, because of its possible correlation with the observed individual heterogeneity in the current time period as well as all previous time periods, which, in turn, has the potential to bias the coefficient estimates on the explanatory variables (β), particularly the lagged dependent variable (γ).

The inclusion of unobserved individual heterogeneity in a dynamic framework may generate a spurious correlation between individuals' past experience in self-employment on their current propensity to participate in self-employment (Heckman, 1981a). In the model, the assumption of independence between ε_i and the lagged dependent variable ($SE_{i,t-1}$) no longer holds, and the effect of ε_i cannot be eliminated through the simple application of a fixed-effects or random-effects estimator. It is possible, therefore, for the relationship between unobserved individual heterogeneity and state-dependence in a dynamic framework to be endogenous, which may bias the estimated effect of genuine state-dependence on the persistence of self-employment. This endogenous relationship is commonly referred to as the 'initial conditions problem' (Heckman, 1981b).

In practice, the initial conditions problem arises typically when using longitudinal data, such as HILDA, because the initial self-employment status ($SE_{i,0}$) observed in the data is already the product of a long established but unobserved sequence of behaviours and decisions, determined by unobserved individual heterogeneity (ε_i) and the histories of individuals' characteristics ($x_{i,t}$) and random luck ($v_{i,t}$). To deal with the initial conditions problem, Heckman (1981b) suggested approximating the unmeasured history of outcomes conditional on unobserved individual heterogeneity by separately specifying a reduced-form model of the initial self-employment status, using 'pre-sample' information as explanatory variables (e.g. family background or labour market history), and then estimating the reduced-form

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[61] Assume that $v_{i,t} \sim N(0, \sigma_v^2)$, and is independent of the observed characteristics.

model jointly with the dynamic model.[62] The Heckman method, however, is rarely implemented in applied research due to its econometric and computational complexity.

This chapter instead adopts the Wooldridge (2005) method, which suggests approximating the distribution of unobserved individual heterogeneity (ε_i) conditional on the initial self-employment status ($SE_{i,0}$) and the other exogenous observed characteristics. To approximate the initial conditions history, the Wooldridge method suggests the individual-specific means of the time-varying exogenous observed characteristics, $\overline{x_i}$ (also referred to as Mundlak (1978) corrections), and the initial value of the individuals' status in self-employment, $SE_{i,0}$, as explanatory variables, denoted as:

$$\varepsilon_i = \mu_0 + \overline{x_i}\delta + \gamma_0 SE_{i,0} + \eta_i \qquad [3]$$

where $\eta_i \sim N(0, \sigma_\eta^2)$ and is independent of x and v for all i and t. The observed explanatory variables (i.e. $SE_{i,0}$ and $\overline{x_i}$) are now allowed to correlate with unobserved individual heterogeneity (ε_i), while remaining uncorrelated with the individual-specific error term (η_i). Substituting Equation 3 into the dynamic model in Equation 2, the probability of individual i being observed in self-employment ($SE_{i,t} = 1$) at time t, relative to being an employee ($SE_{i,t} = 0$) becomes:

$$\Pr[SE_{i,t} = 1] = \Pr[SE_{i,t}^* > 0] = \Phi(\gamma SE_{i,t-1} + x_{i,t}\beta + \gamma_0 SE_{i,0} + \overline{x_i}\delta + \eta_i + v_{i,t}) \quad [4]$$

As before, the estimated coefficient of the lagged dependent variable, γ, measures the extent of the effect of state-dependence of self-employment. Whereas, the estimated coefficient on the initial observed status in self-employment, γ_0, indicates the importance of the correlation between unobserved heterogeneity and the initial condition. Wooldridge (2005) also recommends that interactions between $SE_{i,0}$ and $\overline{x_i}$ are necessary if interactions between $SE_{i,t-1}$ and $x_{i,t}$ are included. The Wooldridge method is then easily implemented using a typical random-effects panel probit estimator under common assumptions, which provides a novel and simple solution to the initial conditions problem in the dynamic model.[63]

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[62] Similar to the Heckman (1981b) method, Orme (2001) suggests a less complex two-step procedure. Orme's (2001) method is used by Henley (2004) to estimate a dynamic probability model of self-employment for the U.K.

[63] Assuming $v_{i,t} \sim N(0, \sigma_v^2)$, and is independent of the observed characteristics.

Model specification

From the HILDA data, the sample is restricted to an unbalanced panel of Australian workers in either salaried-employed or self-employed jobs (as their primary labour market activity), aged 15 years or over, and not studying full-time. In contrast to the conventional approach in labour economics research, the age range is not restricted to the conventional range of working ages, typically 25-64 years, because (as discussed earlier) the age profile of the transitions into self-employment occur much later in the work-life cycle and self-employed workers continue to work well past the conventional age of retirement (approximately 65 years). The sample for the dynamic model is further restricted by the inclusion of the lagged and initial dependent variables, which excludes the wave at which individuals are first observed in HILDA, as well as any subsequent waves for individuals without two or more consecutive observations. Overall, the sample size for the static cross-sectional (or pooled-panel) model is 86,946 observations, representing 17,502 individuals; whereas, the sample size for the dynamic panel model is 64,960 observations, representing, 11,702 individuals.

The dependent and explanatory variables used in the multivariate analysis are, for the most part, determined by the information provided in the HILDA data. As discussed earlier, the dependent variable indicates the workers in the sample who engaged in an employment arrangement classifiable as self-employment (previously defined) as a binary (or dummy) variable. Furthermore, the lagged dependent variable and the initial value of the dependent variable, included as explanatory variables in the dynamic model (as prescribed by the Wooldridge method), indicate self-employment status in a similar way.

In addition to the lagged and initial sets of expanded dependent dummy variables, a number of explanatory variables are included. The selection of the explanatory variables in this chapter are based on the variables used previously in similar studies that examine individuals' participation in self-employment (e.g. Evans & Leighton, 1989; Taylor, 1996; Blanchflower & Oswald, 1998; Hamilton, 2000; Henley, 2004; Uhlendorff, 2006; Taylor, 2011). These variables are intended to capture the effects of age[64], the number of resident dependent children, marital/de facto status,

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[64] Age and age-squared are included as continuous variables that capture the non-linear relationship between ageing and labour market interaction.

gender (female), education[65], long-term health condition or disability, geographic location of residence[66], home-ownership status[67], ethnic origin[68], unemployment rate in local area of residence[69], rates of self-employment in the industry and occupation of work[70], intergenerational occupational match[71], and labour market experience[72]. Furthermore, to address the initial conditions problem (discussed earlier), individual-specific means (i.e. the Mundlak corrections) for each of the time-varying explanatory variables are also included as explanatory variables in the dynamic model.

In contrast to previous studies, the use of the aggregate time-series measures in this chapter (i.e. unemployment and self-employment rates), which are matched to the HILDA data from the national labour statistics, are also more detailed than usual. These measures capture with greater precision the prevailing macroeconomic conditions that are closer to the demand-side factors that individuals' face when making their participation decisions. Also, because information on paternal self-employment status is not available in the HILDA data, the possible effect of intergeneration heritability of self-employment on the individuals' participation decision are instead proxied by the paternal occupation match explanatory variable.

Summary statistics of the dependent and explanatory variables for the samples used in both the static and dynamic model estimations are presented in Table 5.5. There is

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[65] Education is included as a dummy set indicating the highest level of education attainment, broadly classified into university, vocational education, Year 12, and Year 11 or below levels of qualification.

[66] Geographic location is included as a dummy set representing urban and rural/remote areas.

[67] Home-ownership status is included as a dummy set indicating whether a person owns their property of residence outright, holds a mortgage, holds a rent-buy agreement, pays rent or board, or holds a life-tenure agreement.

[68] Ethnic origin is included as a dummy set indicating whether a person was born an Australian native, or a foreign migrant born in either a main-English speaking country or a non-English speaking country.

[69] The unemployment rate is included as a continuous variable indicating the proportion of unemployment that exists in a respondent's local area, using Small Area Labour Market (SALM) information collated and published on a quarterly basis by the Australian Government's Department of Employment (https://employment.gov.au/small-area-labour-markets-publication). This information is matched to the HILDA data using the respondents' reported Local Government Area (LGA) geographic level (as defined by the Australian Standard Geographical Classification (ASGC), see ABS (1996; 2001; 2006)) of residence and for the quarterly time period closest to the respondents' date of interview.

[70] The self-employment rates are included as two continuous variables indicating the proportion of self-employed workers in a respondents industry and occupation of work. The information on the rates of self-employment is estimated from Australian Bureau of Statistics (ABS) national labour force statistics, and then matched to the HILDA survey data using the respondents' reported industry or occupation of work (at the 1-digit level of the Australian & New Zealand Standard Industrial Classification (ANZSIC) or the Australian & New Zealand Standard Occupation Classification (ANZSCO)).

[71] Intergenerational occupation match is included as one dummy indicating whether a person's current occupation was the same as their father's occupation when the person was aged 14. Paternal occupation information is reported by the respondent and matched to their current occupation of work (at the 2-digit level ANZSCO).

[72] Labour market experience is included as two continuous variables measuring the time a person spent in either unemployment or not-in-the labour force as a proportion of the total number of years since completing full-time education, but prior to entering the HILDA survey.

very little change in the summary statistics of the sample as it becomes smaller due to the restrictions imposed by the dynamic model estimation.

Table 5.5: Summary statistics of modelling samples

Dependent & explanatory variables	Static pooled-panel sample						Dynamic panel sample					
	Employee	Self-employed	All				Employee	Self-employed	All			
	Mean	Mean	Mean	S.D.	Min.	Max.	Mean	Mean	Mean	S.D.	Min.	Max.
Lagged dependent (base= Employee [t-1]):												
~ Self-employed *[t-1]*							0.03	0.86	0.18	0.38	0	1
Initial dependent (base= Employee [t=1]):												
~ Self-employed *[t=1]*							0.05	0.70	0.16	0.37	0	1
Demographic characteristics												
Age (in years)	39.0	46.9	40.4	12.9	15	89	40.3	47.4	41.6	12.4	16	89
Age^2	1684.0	2342.3	1797.4	1087.8	225	7921	1777.6	2377.7	1884.8	1068.1	256	7921
No. of resident dependent children	0.83	1.09	0.88	1.14	0	12	0.87	1.10	0.91	1.15	0	12
Marital status (base= single):												
~ Married/de facto	0.66	0.83	0.69	0.46	0	1	0.69	0.83	0.71	0.45	0	1
Long-term health condition (base= none):												
~ Disability/impairment	0.13	0.17	0.14	0.34	0	1	0.13	0.17	0.14	0.34	0	1
Geographic location (base= city/urban):												
~ Regional/remote	0.13	0.29	0.16	0.37	0	1	0.14	0.29	0.16	0.37	0	1
Home Ownership (base= mortgage/rent-buy):												
~ Own	0.22	0.37	0.24	0.43	0	1	0.22	0.37	0.25	0.43	0	1
~ Rent/board	0.29	0.16	0.26	0.44	0	1	0.26	0.15	0.24	0.43	0	1
~ Life-tenure (no-equity)	0.02	0.02	0.02	0.15	0	1	0.02	0.02	0.02	0.15	0	1
Education (base= school non-completer):												
~ University	0.28	0.24	0.27	0.44	0	1	0.29	0.24	0.28	0.45	0	1
~ VET	0.33	0.40	0.34	0.47	0	1	0.34	0.40	0.35	0.48	0	1
~ Yr. 12	0.18	0.12	0.17	0.37	0	1	0.16	0.11	0.15	0.36	0	1
Gender [t=1] (base= male):												
~ Female	0.50	0.34	0.47	0.50	0	1	0.49	0.33	0.46	0.50	0	1
Country of birth [t=1] (base= Australia):												
~ Main English speaking	0.09	0.12	0.10	0.30	0	1	0.09	0.12	0.10	0.30	0	1
~ Non-English speaking	0.10	0.12	0.10	0.31	0	1	0.10	0.11	0.10	0.30	0	1

Table 5.5 (continued)

Dependent & explanatory variables	Static model sample						Dynamic model sample					
	Employee	Self-employed	All				Employee	Self-employed	All			
	Mean	Mean	Mean	S.D.	Min.	Max.	Mean	Mean	Mean	S.D.	Min.	Max.
Employment/labour market characteristics												
SALM unemployment rate *(%)*	5.5	5.3	5.4	2.7	0.0	27.4	5.3	5.1	5.3	2.6	0.0	27.4
Self-employment rate in industry *(%)*	16.5	29.9	18.8	14.5	0.3	65.0	16.0	29.8	18.5	14.5	0.3	65.0
Self-employment rate in occupation *(%)*	18.4	25.7	19.7	11.0	4.9	49.2	18.7	25.6	20.0	10.9	4.9	48.3
Paternal occupation match (base= no match):												
~ Match	0.05	0.14	0.07	0.25	0	1	0.05	0.14	0.07	0.25	0	1
Share of working-life in unemployment *(%) [t=1]*	4.0	2.0	3.6	10.3	0.0	100.0	3.6	1.9	3.3	9.5	0.0	100.0
Share working-life not-in-the labour market *(%) [t=1]*	12.9	10.4	12.5	20.2	0.0	100.0	12.7	10.0	12.2	19.8	0.0	100.0
Observations	71,970	14,976	86,946				53,357	11,603	64,960			
	82.8%	17.2%	100.0%				82.1%	17.9%	100.0%			

Notes: The samples include individuals aged 15 years or over, and not currently studying full-time.
            The individual-specific means of the time-varying explanatory variables are not included in this table
            ~ indicates a dummy variable set.
            [t-1] indicates variables with a one-period lag.
            [t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

5.5 RESULTS

The coefficient estimates for the simple pooled static probit model and the more advanced dynamic random-effects panel probit model are presented in Table 5.6. Because of the use of non-linear probit estimators in this chapter, the coefficient estimates of the explanatory variables reported in Table 5.6 cannot be interpreted directly as marginal effects. To make sense of the coefficient estimates and infer an effect, this chapter adopts the Average Partial Effects (APE) approach and estimates the difference between counterfactual outcome probabilities, holding the explanatory variable of interest fixed at two different values (e.g. values 0 and 1 for a categorical dummy variable). The difference in the counterfactual predicted probabilities is estimated for each individual in the sample, and the marginal effect is then sample average of the individual differences. The APE estimation for the static cross-sectional (or pooled-panel) probit model can be written as:

$$\Pr\left[SE_{i,t} = 1\right] = N^{-1} \sum_{i=1}^{N} \Phi\left[(\hat{\alpha} + \boldsymbol{x_{i,t}}\boldsymbol{\hat{\beta}})\right] \qquad [5]$$

For the dynamic random-effects panel probit model, however, the estimation of the marginal effects is more complex.[73] To provide comparability with the pooled-panel probit model estimates, the coefficient estimates for a random-effects probit model are re-scaled by an estimate of $\sigma_v/\sigma_u = \sqrt{1 - \rho}$ prior to calculating the partial effects.[74] Therefore, the APE estimation for the dynamic random-effects panel probit model becomes:

$$\Pr\left[SE_{i,t} = 1\right] = N^{-1} \sum_{i=1}^{N} \Phi\left[(\hat{\alpha} + \hat{\gamma}SE_{i,t-1} + \boldsymbol{x_{i,t}}\boldsymbol{\hat{\beta}} + \hat{\gamma}_0 SE_{i,0} + \boldsymbol{\overline{x}_i}\boldsymbol{\hat{\delta}})/(1 + \rho)^{1/2}\right] \quad [6]$$

In short, rather than compare the difference of a change for a hypothetical person (e.g. set at sample mean values), the APE method compares the difference of a hypothetical change for a sample of individuals. The corresponding average partial, or marginal, effects (APEs) of the coefficient estimates for each model are presented in Table 5.7.

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[73] The coefficient estimates from a random-effects non-linear probit estimator involve different normalisations in comparison a pooled probit estimator (Arulampalam, 1999). The coefficient estimates from a random-effects probit model are normalised on $(\sigma_v^2 = 1)$, while for pooled probit models the coefficient estimates are normalised on $(\sigma_u^2 = 1)$. Thus, the coefficient estimates of the explanatory variables for a random-effects probit model are β/σ_v, while for a pooled probit model the estimates are β/σ_u.

[74] where $\rho = corr\left(u_{i,t}, u_{i,s}\right) = \sigma_\varepsilon^2/(\sigma_\varepsilon^2 + \sigma_v^2)$ for $t, s = 2, \dots, T; t \neq s$

Table 5.6: Coefficient estimates of models for self-employment probability

Dependent variable: Pr[Self-employed = 1]	Static pooled-panel probit (1)		Dynamic RE panel probit (2)	
	Coef.	S.E.	Coef.	S.E.
Lagged dependent (base= Employee [t-1]):				
~ Self-employed *[t-1]*			1.763***	(0.05)
Initial dependent (base= Employee [t=1]):				
~ Self-employed *[t=1]*			1.808***	(0.09)
Demographic characteristics				
Age (in years)	0.058***	(0.01)	0.121***	(0.02)
Age^2	-0.000***	(0.00)	-0.001***	(0.00)
No. of resident dependent children	0.058***	(0.01)	0.065**	(0.03)
Marital status (base= single):				
~ Married/de facto	0.217***	(0.03)	0.116*	(0.07)
Long-term health condition (base= none):				
~ Disability/impairment	0.083***	(0.03)	0.115***	(0.04)
Geographic location (base= city/urban):				
~ Regional/remote	0.146***	(0.03)	0.074	(0.09)
Home Ownership (base= mortgage/rent-buy):				
~ Own	0.127***	(0.03)	0.038	(0.05)
~ Rent/board	0.001	(0.03)	-0.027	(0.06)
~ Life-tenure (no-equity)	-0.087	(0.08)	0.095	(0.13)
Education (base= school non-completer):				
~ University	0.083**	(0.04)	-0.434*	(0.23)
~ VET	0.094***	(0.04)	-0.244	(0.17)
~ Yr. 12	0.096**	(0.05)	-0.246	(0.25)
Gender [t=1] (base= male):				
~ Female	-0.120***	(0.03)	-0.045	(0.03)
Country of birth [t=1] (base= Australia):				
~ Main English speaking	0.093**	(0.04)	0.148**	(0.06)
~ Non-English speaking	0.118***	(0.04)	0.211***	(0.06)
Employment/labour market characteristics				
SALM unemployment rate *(%)*	-0.005	(0.00)	0.009	(0.01)
Self-employment rate in industry *(%)*	0.029***	(0.00)	0.022***	(0.00)
Self-employment rate in occupation *(%)*	0.019***	(0.00)	0.013***	(0.00)
Paternal occupation match (base= no match):				
~ Match	0.064	(0.04)	0.121	(0.10)
Share of working-life in unemployment *(%) [t=1]*	-0.004***	(0.00)	-0.002	(0.00)
Share working-life not-in-the labour market *(%) [t=1]*	0.001*	(0.00)	0.000	(0.00)
Constant	-4.017***	(0.14)	-4.718***	(0.23)
$\hat{\rho}$ (rho)			0.477***	(0.02)
Log-likelihood	-31265.75		-10218.32	
No. of observations	86,946		64,960	
No. of respondents			11,702	
Average no. of obs. per respondent			5.6	

Notes: Standard errors are in parenthesis
* denotes coefficients significant at = 10%, ** at = 5% and *** at = 1%
Column (2) includes individual-specific means of the time-varying explanatory variables.
The samples include individuals aged 15 years or over, and not currently studying full-time.
~ indicates a dummy variable set.
[t-1] indicates variables with a one-period lag.
[t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

Table 5.7: Average partial effects on probability of self-employment (Pr[$SE = 1$])

Explanatory variables	Static pooled-panel probit (1)	Dynamic RE panel probit (2)
Lagged dependent (base= Employee [t-1]):		
~ Self-employed *[t-1]*		0.265***
Initial dependent (base= Employee [t=1]):		
~ Self-employed *[t=1]*		0.276***
Demographic characteristics		
Age (in years)	0.005***	0.002***
No. of resident dependent children	0.012***	0.005
Marital status (base= single):		
~ Married/de facto	0.041***	0.009
Long-term health condition (base= none):		
~ Disability/impairment	0.017***	0.009*
Geographic location (base= city/urban):		
~ Regional/remote	0.030***	0.006
Home Ownership (base= mortgage/rent-buy):		
~ Own	0.026***	0.003
~ Rent/board	0.000	-0.002
~ Life-tenure (no-equity)	-0.017	0.008
Education (base= school non-completer):		
~ University	0.017**	-0.034
~ VET	0.019***	-0.019
~ Yr. 12	0.020**	-0.019
Gender [t=1] (base= male):		
~ Female	-0.024***	-0.004
Country of birth [t=1] (base= Australia):		
~ Main English speaking	0.019**	0.012*
~ Non-English speaking	0.024***	0.018***
Employment/labour market characteristics		
SALM unemployment rate *(%)*	-0.001	0.001
Self-employment rate in industry *(%)*	0.006***	0.002***
Self-employment rate in occupation *(%)*	0.004***	0.001***
Paternal occupation match (base= no match):		
~ Match	0.013	0.010
Share of working-life in unemployment *(%) [t=1]*	-0.001***	-0.000
Share working-life not-in-the labour market *(%) [t=1]*	0.000*	0.000

Notes: For dummy variables the effect is that of a discrete change (0 to 1)
* denotes the APEs significant at = 10%, ** at = 5% and *** at = 1%
The APEs for the random-effect probit models are estimated using the correction described by Arulampalam (1999).
Column (2) includes individual-specific means of the time-varying explanatory variables.
The samples include individuals aged 15 years or over, and not currently studying full-time.
~ indicates a dummy variable set.
[t-1] indicates variables with a one-period lag.
[t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

Sensitivity of the results to the econometrics

Changes in the econometric methodology make a significant difference to the estimates obtained, and tell a different story about the contribution of the influences on self-employment choice. Comparing the estimates from the static pooled-panel probit model (Column (1)) to the estimates from dynamic panel probit model (Column (2)), there are several striking differences when state-dependence and unobserved individual heterogeneity are adequately accounted for.

First, the importance of the observed individual characteristics in determining self-employment is greatly diminished both statistically and economically. As shown in Table 5.6, the strength of the statistical significance of the estimated coefficients on most of the observed characteristics in Column (1) either weaken or disappear completely in Column (2). Many of the statistically significant characteristics in the static pooled-panel model cease to be strongly significant — such as, marital status, geographic location, home ownership, education level, and gender —; while only a handful of the characteristics remain statistically significant in both models — such as, age and age-squared, number of resident children, disability or impairment status, country of birth status, and the rates of self-employment by occupation and industry of work. Moreover, in economic terms, the significant observed characteristics in the dynamic model exert little influence on the probability of being self-employment. As shown in Column (2) of Table 5.7, the estimated marginal effects of the remaining statistically significant characteristics become increasingly economically irrelevant, with most tending toward zero. As a result, there is no reason to further investigate the importance of these variables on the choice of self-employment by splitting the sample further. Moreover, the absence of significant observable characteristics in the dynamic model is in stark contrast to the breadth and diversity of determinants found to be significant in the existing, predominately cross-sectional, research.

Second, as shown in Column (2) of Table 5.6, the unobserved effect (denoted as rho ($\hat{\rho}$)) is strongly significant and accounts for approximately 48% of the unexplained variance of the composite error. Controlling for unobserved heterogeneity in the dynamic panel model highlights just how much remains unexplained by the observed characteristics in the static pooled-panel model. This indicates that the choice of self-employment is determined, in part, by inherent individual characteristics that persist over time — such as, cognitive abilities and non-cognitive traits — but these are difficult to capture in the data and are possibly unmeasurable.

Finally, the inclusion of the lagged-dependent and initial-dependent variables (i.e. self-employment status in years $t-1$ and $t=1$) as an explanatory variables in the dynamic model, Column (2) of Table 5.6, confirm the findings of the previous research on the state-dependence of self-employment, as well as emphasise the need to adequately account for the initial conditions problem. The coefficient estimates on

the lagged-dependent ($\hat{\gamma}$) and initial-dependent ($\hat{\gamma}_0$) variables are both positive and highly statistically significant, and have considerably larger magnitudes than any of the other observed individual characteristics. The statistical significance of estimated coefficient on the initial-dependent variable, as well as the comparability of its magnitude to the lagged-dependent variable, is also indicative of the correlation that exists between the unobserved individual heterogeneity and the initial condition, which is accounted for by the Wooldridge method. The assumption that the initial value of self-employment status observed in the data is determined exogenously does not hold, and ignoring the initial conditions problem likely distorts the estimated coefficients, particularly the effect of state-dependence, at the expense of the unobserved effect.[75] It is important that the initial conditions problem is addressed in dynamic modelling and the Wooldridge method appears to be an effective treatment.[76]

Importance of state-dependence

The extent to which the probability of workers' participation in self-employment is attributable to genuine or structural state-dependence is substantial. To interpret the effect of the coefficient estimate on the lagged-dependent variable in the dynamic model, Table 5.8 presents the predicted counterfactual or transition probabilities, as well as the APE for the state-dependent effect. Relative to being an employee, experience in self-employment *in itself* increases the probability of being self-employed in the following year by 27 percentage points (= 0.37 – 0.10). The size of the marginal effect of state-dependence is also considerably larger than marginal effects of any of the remaining significant observed characteristics – presented in Table 5.7 (above). Furthermore, the size and significance of the influence of state-dependence corresponds with the findings in the international research discussed earlier. The result also confirms the earlier descriptive findings that indicated self-employment as a permanent state rather than a cyclical one; where workers, once

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[75] In addition, a Hausman test comparing the difference in results between an exogenously assumed dynamic model (estimates not reported) and the endogenously assumed dynamic model rejected the null-hypothesis and revealed the results to be systematically different from one another ($\chi^2 = 1460.43$, 1 d.f., p-value<0.000).

[76] An additional test of the stability of the Wooldridge method at approximating the distribution of the unobserved heterogeneity at the initial state was undertaken by re-estimating the dynamic model on a restricted-sample (using only the first 10 waves of the HILDA data rather than first 11 waves), and using a Hausman test to compare the results to estimates from the unrestricted-sample. The Hausman test rejected the null-hypothesis. The coefficient estimates for the dynamic model using the unrestricted-sample were found to be systematically different from the estimates for the restricted-sample model ($\chi^2 = 86.48$, 1 d.f., p-value<0.000) at a statistically significant level. However, the difference is particularly small and almost negligible.

engaged in self-employment, remain for a significant proportion of their working lives.

Table 5.8: Estimated transition probabilities & the APE of state-dependence for self-employment & salaried-employment at t, conditional on status at $t-1$

	Self-employed (t)	Employee (t)
Self-employed ($t-1$)	0.367***	0.633***
	(0.02)	(0.02)
Employee ($t-1$)	0.102***	0.898***
	(0.00)	(0.06)
(APE) State-dependence	0.265***	0.265***

Notes: Standard errors are in parenthesis
          * denotes the predicted probabilities and APEs significant at = 10%, ** at = 5% and *** at = 1%
Source: HILDA Survey, 2001-2011

The transition probabilities also highlight the importance of state-dependence in determining the self-employment choice in comparison to the obverse choice, the probability of salaried-employment. Independent of the state-dependent effect, the influence of the observed and unobserved characteristics shifts the majority of workers in the sample into salaried-employment rather than self-employment. As shown in Table 5.8 (above), the combined influence of the observed and unobserved characteristics, independent of employment status in the previous year, only explains 10% of the probability of self-employment in comparison to 63% of the probability of salaried-employment. Therefore, relative to the influence of the observed and unobserved characteristics, the influence of genuine persistence (27 percentage points) accounts for a considerably greater share of the probability of self-employment (73% = 0.27/(0.27 + 0.10)) than it does for the obverse outcome, the probability of salaried-employment (30% = 0.27/(0.27 + 0.63)). The converse implication of this being that the combined influence of workers' observed and unobserved characteristics (independent of the influence genuine persistence) favour salaried-employment rather than self-employed outcomes. Thus, the relative importance of genuine persistence on self-employment is such that, in comparison to the outside salaried-employment opportunities available to self-employed workers (based solely on their observed and unobserved characteristics), the choice of future self-employment for employees is relatively less visible or feasible.

Separating the effects on transition & survival

Despite the size and the significance of state-dependence on self-employment, it is

difficult to discern the economic relevance of its influence. For the reasons discussed earlier, it cannot be said why self-employed workers become locked-in to self-employment (or why employees are locked-out) from the state-dependent effect itself. This is a problem that is only further exacerbated by the absence in the dynamic model of salient differences in worker quality — such as, labour market inexperience or low-levels of education — which could have been used to infer the possible reasons for state-dependence. However, a shortcoming of the estimated effect of the observed characteristics in the dynamic model is that they confound the probability of self-employed workers *surviving* in self-employment (rather than exiting to salaried-employment) with the probability of employees *transitioning* into self-employment (rather than remaining in salaried-employment). If the transition and survival processes are determined by opposing effects, it is possible that the absence of significant observed characteristics in the dynamic model arises because the net effect of the determinants of transition and survival negate one another.

To disentangle the determinants of transition from those of survival in self-employment, this chapter extends the dynamic model by interacting the lagged-dependent variable with the observed characteristic variables. Table 5.9 presents the results of the coefficient estimates for a dynamic random-effects binary model using the Wooldridge method, and including interaction effects, to estimate the probability of being self-employed in year t.[77] In contrast to the previous results, the estimates of the dynamic model with interaction terms separately identify the determinants of the probability transition into self-employment for those who were an employee in year $t-1$, shown in Column (1), from the additional determinants of the probability of survival in self-employment for those who were self-employed in year $t-1$, shown in Column (2). Column (3) reports the tests of joint-significance of the coefficient estimates on each of the characteristic variables and their corresponding interaction terms together. As before, the average partial effects are estimated to interpret the coefficient estimates and are presented in Table 5.10: Columns (1) and (2) report the effects of the observed characteristics on the probability of self-employment in year t for workers who were either salaried-employed (i.e. transitioned) or self-employed (i.e. survived) in year $t-1$,

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[77] When interaction effects between the lagged-dependent variable and other observable characteristic explanatory variables are included in a dynamic model using the Wooldridge method, corresponding interaction effects between the explanatory variable for the initial value of the dependent variable and the individual-specific means of the observable characteristic explanatory variables must also be included (Wooldridge, 2005).

respectively; while, Column (3) reports the effects of the observed characteristics on the probability of self-employment in year t independent of the workers previous experience.

Table 5.9: Coefficient estimates for interaction model

Dependent variable: Pr[Self-employed = 1]	Dynamic binary random-effects probit					
	(1)		(2) Interaction terms: *Self-employed [t-1]* X		(3) Tests of joint-significance	
	Coef.	S.E.	Coef.	S.E.	χ^2 Coef.	
Lagged dependent (base= Employee [t-1]):						
~ Self-employed *[t-1]*	2.461***	(0.55)	-	-	-	-
Initial dependent (base= Employee [t=1]):						
~ Self-employed *[t=1]*	1.187*	(0.70)	-	-	-	-
Demographic characteristics						
Age (in years)	0.106***	(0.02)	0.013	(0.02)	33.69	***
Age^2	-0.001***	(0.00)	-0.000	(0.00)	20.25	***
No. of resident dependent children	0.080***	(0.03)	-0.037	(0.03)	8.02	**
Marital status (base= single):						
~ Married/de facto	0.132**	(0.06)	-0.055	(0.08)	4.28	
Long-term health condition (base= none):						
~ Disability/impairment	0.101**	(0.05)	0.040	(0.08)	7.96	**
Geographic location (base= city/urban):						
~ Regional/remote	0.182***	(0.07)	-0.266***	(0.09)	14.45	***
Home Ownership (base= mortgage/rent-buy):						
~ Own	0.097*	(0.05)	-0.148	(0.10)	3.56	
~ Rent/board	0.026	(0.07)	-0.166*	(0.09)	4.14	
~ Life-tenure (no-equity)	0.027	(0.14)	0.106	(0.19)	0.57	
Education (base= school non-completer):						
~ University	-0.397	(0.25)	-0.170	(0.11)	5.43	*
~ VET	-0.238	(0.16)	-0.171**	(0.08)	9.05	**
~ Yr. 12	-0.236	(0.26)	-0.304**	(0.13)	6.39	**
Gender [t=1] (base= male):						
~ Female	0.033	(0.04)	-0.157**	(0.07)	5.14	*
Country of birth [t=1] (base= Australia):						
~ Main English speaking	0.150***	(0.05)	-0.016	(0.07)	8.42	**
~ Non-English speaking	0.195***	(0.07)	0.034	(0.10)	13.16	*
Employment/labour market characteristics						
SALM unemployment rate *(%)*	0.010	(0.01)	-0.001	(0.01)	1.10	
Self-employment rate in industry *(%)*	0.027***	(0.00)	-0.015***	(0.00)	227.59	***
Self-employment rate in occupation *(%)*	0.011***	(0.00)	0.003	(0.00)	58.75	***
Paternal occupation match (base= no match):						
~ Match	0.105	(0.09)	0.016	(0.10)	1.57	
Share of working-life in unemployment *(%) [t=1]*	-0.001	(0.00)	-0.011***	(0.00)	8.73	**
Share working-life not-in-the labour market *(%) [t=1]*	0.001	(0.00)	-0.002	(0.00)	0.80	
Constant	-5.084***	(0.30)				
$\hat{\rho}$ (rho)	0.46***	(0.00)				
Log-likelihood	-10070.73					
No. of observations	64,960					
No. of respondents	11,702					
Average no. of obs. per respondent	5.6					

Notes: Standard errors are in parenthesis
          * denotes coefficients significant at = 10%, ** at = 5% and *** at = 1%
          Estimation include individual-specific means of the time-varying explanatory variables, and subsequent
          interactions with the initial self-employment status variable.

The samples include individuals aged 15 years or over, and not currently studying full-time.
~ indicates a dummy variable set.
[t-1] indicates variables with a one-period lag.
[t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

In comparison to the previous results, the inclusion of interaction terms to the dynamic model reveals a number of additional observed characteristics that have statistically significant effects on the probability of self-employment (as indicated by the chi-square (χ^2) tests of joint-significance, in Column (3) of Table 5.9 (above)). These additional variables include: rural/regional geographic location, level of education, gender, and the share of time spent in unemployment. Of the jointly-significant variables in Table 5.9 (above), the estimates also reveal some distinct differences in the observed characteristics that determine the probability of transition to self-employment (Column (1)) from those that additionally determine the probability of survival in self-employment (Column (2)).

Focussing on the significant observed characteristics that determine the probability of employees in year $t-1$ transitioning to self-employment in year t, the results appear to indicate that self-employment attracts employees to whom more beneficial opportunities in salaried-employment may have 'narrowed' or become less available. The types of employees who are more likely to select into self-employment are those who work in thin' labour markets, such as those living in rural/remote areas or those working in an industry or occupation with a high incidence of self-employment, as well as those with plateauing career trajectories, such as older workers. Further evidence that employees' transition to self-employment because of narrowing employment opportunities is also indicated by the types of employees increasingly attracted to self-employment with characteristics that fall outside of what is typically desired by employers, such as those with long-term disabilities or impairments and migrants (i.e. born in a main-English or non-English speaking country).

Moreover, there is no evidence to support the notion of self-employment as a form of 'disguised unemployment' into which unproductive or poor-quality employees are displaced — such as, those with low-skills or a history of weak attachment to the labour market. None of the variables that capture the skill quality of workers — such as, highest level of education attainment or the acquisition of skills through labour market experience (or lack thereof) — have a statistically significant effect on

the probability of employees transitioning to self-employment. That is, the results indicate that the skill and labour quality of employees transitioning to self-employment do not differ significantly from those who remain in salaried-employed jobs.

Rather than indicate self-employment as an occupation of 'last-resort' for unproductive employees, the results instead imply that self-employment is a labour market avenue taken by capable and productive employees. Combined with the earlier evidence that self-employment attracts employees characterised by narrowing opportunities for advancement, these results further imply that entry into self-employment may arise because capable employees face hierarchical organisational structures and narrow (possibly discriminatory) hiring practices.

There are also distinct differences between the significant observed characteristics of the employees who enter self-employment and the self-employed workers who stay (or don't exit to salaried-employment), with very little overlap between the same determinants. In contrast to the types of employees entering self-employment, the self-employed workers who accumulate or pool in self-employment appear to be male, poorly educated (i.e. school non-completers), live in a city/urban area, work in an industry with a lower incidence of self-employment, and have spent less time unemployed. However, unlike the entry into self-employment, the results do not provide a consistent story about survival in self-employment, and indicate that the reasons for survival in self-employment may be more complex. A possible explanation is that self-employment is a far more competitive and unforgiving environment than many latent self-employed workers may realise prior to entry.

Despite the statistical significance of the observed characteristics and their corresponding interaction terms, for the most part the economic importance of these variables is trivial. As shown in Table 5.10, conditional on workers being in either a salaried-employed job (Column (1)) or in self-employment (Column (2)) in the previous year, the marginal effects of the observed characteristics on the current self-employment status are negligibly small. For example, living in a rural/remote area (relative to living in a city/urban area) increases the probability of an employee transitioning to self-employment by 1.7 percentage points, while decreasing the probability of a self-employed worker surviving in self-employment by 1.9 percentage points. The largest marginal effect on the observed characteristics is the

effect that an increase in the level of education attainment has on the probability of self-employed workers remaining in self-employment. Relative to having never completed Year 12, self-employed workers with Year 12 or post-school level qualification have a decreased probability of remaining in self-employment by 9 to 12.5 percentage points.

Table 5.10: Average partial effects for the (interaction) dynamic binary random-effects probit model

Explanatory variables	(1) Conditional on: *Employed [t-1]*	(2) Conditional on: *Self-employed [t-1]*	(3) Unconditional
Lagged dependent (base= Employee [t-1]):			
~ Self-employed *[t-1]*	-	-	0.291***
Initial dependent (base= Employee [t=1]):			
~ Self-employed *[t=1]*	0.248***	0.443***	0.261***
Demographic characteristics			
Age (in years)	0.003***	0.007***	0.002***
No. of resident dependent children	0.007**	0.010	0.005**
Marital status (base= single):			
~ Married/de facto	0.011	0.018	0.009
Long-term health condition (base= none):			
~ Disability/impairment	0.009	0.033	0.009**
Geographic location (base= city/urban):			
~ Regional/remote	0.017*	-0.019	0.007
Home Ownership (base= mortgage/rent-buy):			
~ Own	0.009	-0.012	0.003
~ Rent/board	0.002	-0.032	-0.003
~ Life-tenure (no-equity)	0.002	0.031	0.005
Education (base= school non-completer):			
~ University	-0.033	-0.125*	-0.037
~ VET	-0.020	-0.091*	-0.024
~ Yr. 12	-0.019	-0.119	-0.029
Gender [t=1] (base= male):			
~ Female	0.003	-0.029	-0.002
Country of birth [t=1] (base= Australia):			
~ Main English speaking	0.014**	0.031	0.012*
~ Non-English speaking	0.018**	0.054**	0.017***
Employment/labour market characteristics			
SALM unemployment rate *(%)*	0.001	0.002	0.001
Self-employment rate in industry *(%)*	0.002***	0.003***	0.002***
Self-employment rate in occupation *(%)*	0.001***	0.003***	0.001***
Paternal occupation match (base= no match):			
~ Match	0.009	0.028	0.009
Share of working-life in unemployment *(%) [t=1]*	-0.000	-0.003**	-0.000
Share working-life not-in-the labour market *(%) [t=1]*	0.000	-0.000	0.000

Notes: For dummy variables the effect is that of a discrete change (0 to 1)
    * denotes the APEs significant at = 10%, ** at = 5% and *** at = 1%
    The APEs for the random-effect probit models are estimated using the correction described by Arulampalam (1999).
    Estimation includes individual-specific means of the time-varying explanatory variables, and subsequent interactions with the initial self-employment status variable.
    The samples include individuals aged 15 years or over, and not currently studying full-time.
    ~ indicates a dummy variable set.
    [t-1] indicates variables with a one-period lag.
    [t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

Instead of providing a greater insight into the possible causes underlying the state-dependence of self-employment, the inclusion of the interaction terms in the dynamic model have very little impact on the size of the influence of state-dependence and unobserved heterogeneity. As before, controlling for the impact of state-dependence, unobserved heterogeneity and the initial conditions problem accounts for most of the influence on the self-employment choice. As evident in Column (1) of Table 5.9 (above), the coefficient estimates on the lagged-dependent variable ($\hat{\gamma}$), the initial-dependent variable ($\hat{\gamma}_0$) and the unobserved effect ($\hat{\rho}$) all remain strongly significant both statistically and economically. Rather than account for more of the observed heterogeneity, the inclusion of the interaction terms instead slightly increase the size of the influence of state-dependence, while adding very little to the predictive power of the model. In comparison to the dynamic model without interaction terms, there is very little overall change in the mean predicted transition probabilities. As shown in Table 5.11, the estimated state-dependence for the dynamic model with interactions is 29 percentage points, which is slightly larger than the previous estimate of state-dependence from the dynamic model without interactions (27 percentage points – see Table 5.8 (above)).

Table 5.11: Estimated state-dependence & the mean predicted transition probabilities for self-employment & salaried-employment at t, conditional on status at $t-1$ (for interaction model)

	Self-employed (t)	Employee (t)
Self-employed ($t-1$)	0.395***	0.605***
	(0.02)	(0.04)
Employee ($t-1$)	0.104***	0.896***
	(0.00)	(0.03)
(APE) State-dependence	0.291***	0.291***
	(0.02)	(0.02)

Notes: Standard errors are in parenthesis
          * denotes the predicted probabilities and APEs significant at = 10%, ** at = 5% and *** at = 1%
Source: HILDA Survey, 2001-2011

5.6 CONCLUDING REMARKS

This chapter shows that modelling the probability of self-employment is extremely sensitive to changes in the econometric method of analysis from a static cross-sectional model to a dynamic panel model. In comparison to the estimates from the static cross-sectional model of self-employment, the results from the dynamic panel estimation greatly diminish the importance of observed heterogeneity in determining self-employment, while revealing the importance of controlling for

state-dependence and unobserved heterogeneity, as well as the necessity for dealing with endogenous selection into the initial self-employment state. Consistent with findings from the handful of existing dynamic studies on self-employment for the U.K. and Europe, the results of the dynamic panel model show that self-employment in Australia is also a genuinely persistent state. That is, *ceteris paribus*, the impact of past experience of self-employment itself increases the current probability of self-employment by 27 percentage points, compared with those who were employees. The influence of genuine state-dependence is also considerably more important in determining the probability of self-employment than it is in determining the obverse outcome, the probability of salaried-employment. The results of this chapter are in stark contrast to the importance placed on the observed individual characteristics in much of the, predominately cross-sectional, evidence on self-employment, and casts doubt on the validity of the findings in the existing research.

However, having identified the importance of the influence of genuine persistence on self-employment, the possible causes underlying this state-dependence remain unresolved. Unlike like other labour market states, the obscure nature of self-employment and its outcomes make it difficult to interpret or assign meaning to the state-dependence effect of self-employment. That is, it cannot be readily determined from the nature or outcomes of self-employment whether the state-dependent effect indicates a 'scarring' effect (i.e. self-employed workers become 'locked-in' and trapped in a second-best outcome) or whether it indicates a 'virtuous' effect (i.e. employees are 'locked-out' of a desired or preferred state and must find a way to enter).

An extension of the dynamic model with interaction terms to disentangle the determinants of transition to self-employment from those of survival provides little further insight. Statistically, the observed characteristics that determine the transition of employees into self-employment are found to be quite different to those that determine the survival of self-employed workers in self-employment. However, for the most part, these differences are economically negligible. Overall, the inclusion of interaction terms in the dynamic model adds very little to the predictive power of the model and does very little to help understand the influence of state-dependence. The possible reasons underlying the influence of state-

dependence on self-employment and the transition probabilities continue to remain a mystery.

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CHAPTER SIX
ENTREPRENEURIAL DETERMINANTS FOR EMPLOYEE TRANSITIONS INTO SELF-EMPLOYMENT

Much of the existing research relevant to self-employment in the economics literature is predominately related to entrepreneurship. Despite being somewhat supposititious, there exists a long history of economic thought and debate devoted to understanding the nature of entrepreneurship and its role in the economy. The conceptual interpretations of entrepreneurship that arise out of this debate are also many and varied. However, the economic research related to entrepreneurship is one of the few areas of literature that is directly relevant to self-employment. In this literature, self-employment is used to quantitatively capture entrepreneurship in its simplest form.

Empirically, the existing research loosely follows the implications of the economic theories on entrepreneurship, particularly the theories that formalise Knight's (1921) interpretation of entrepreneurship. These theories examine how workers choose between becoming an entrepreneur or an employee by distinguishing features of the entrepreneurial role — such as, the potential for earnings premium and greater autonomy — and then identifying the distinctive attributes and traits of individuals to whom the intrinsic features of the entrepreneurial role might be more appealing — such as, particular innate cognitive or non-cognitive characteristics and financial wherewithal. From this perspective, self-employment is viewed as a 'positive' employment outcome that is desired and preferred by workers. The entrepreneurial explanations for why workers voluntarily choose to become self-employed instead of working as an employee emphasise the distinctive features of the role, and of the individual, that likely shift the utility reward in favour of entrepreneurship (Sørensen & Sharkey, 2010).

Most of the empirical studies that operationalise and test the entrepreneurial theories, however, rely upon cross-sectional (or pooled-panel) data to estimate static models of self-employment. This has limited the usefulness of the empirical findings and has tended to obfuscate the feedback to the theoretical understanding. Static cross-sectional models provide biased and inconsistent estimates that likely

overstate the importance of observed individual characteristics in determining self-employment. These models neglect to control for both the influence of persistent unobserved individual heterogeneity and, more importantly, the influence of underlying labour market dynamics, specifically the impact of 'genuine' state-dependence (i.e. the causal impact of individuals' past employment status *itself* on the current self-employment outcome).

Recent evidence from a growing number of dynamic panel-data studies on self-employment demonstrate just how sensitive the findings are to improvements in the econometric method of analysis. Taking account for the possibility of genuine state-dependence has consistently shown to be the most important determinant of self-employment (see, *inter alia*, Henley, 2004; Caliendo & Uhlendorff, 2008; Taylor, 2011). That is, after controlling for unobserved heterogeneity and initial conditions, prior experience in self-employment *per se* causes future self-employment to be more likely. The evidence also indicates that once dynamics are adequately controlled for the improved robustness of the estimates greatly diminishes the importance of observed individual characteristics in determining self-employment.

Despite its importance, however, very little is known about the possible reasons for the genuine state-dependence of self-employment. Unlike other labour market states, such as unemployment or low-pay and high-pay employment, the role of self-employment has no natural rank-order in the labour market. The large and positive influence of state-dependence itself provides no indication as to why workers initially choose self-employment in the first place. Depending on how self-employment is perceived, the effect of genuine state-dependence may be interpreted as either: a 'scarring' effect, where the experience in self-employment generates conditions that trap self-employed workers and reduce their likelihood of escape to a salaried-employed job in the future; or, a 'virtuous' effect, where self-employment is less accessible than ostensibly thought and employees are 'locked-out' from entering self-employment.

Therefore, to gain a more complete picture of the dynamics of self-employment, this chapter analyses whether and to what extent the distinctive features of the entrepreneurial role, or of entrepreneurs, explain the intrinsic appeal of self-employment. In contrast to earlier dynamic studies, which tend to focus on the extent to which self-employment is genuinely persistent, this chapter instead

examines whether the state-dependence of self-employment is interrelated with the quality of employees' past outcomes in determining the probability of current self-employment. That is, to what extent distinguishing employee outcomes, based on the hypotheses derived from the entrepreneurial literature, affect the relative attractiveness of self-employment and influence the future prospect of self-employment for employees relative to self-employed workers because of the intrinsic differences in their experiences.

This chapter uses the first eleven waves of the longitudinal Household, Income and Labour Dynamics in Australia (HILDA) survey for the period 2001 to 2011, to estimate several models of the likelihood of current self-employment for Australian workers who remain self-employed, as well as employees with different outcomes who transition. Specifically, the past experiences and outcomes of employees are differentiated by: the pecuniary returns from work, in the form of the quintile distribution of hourly-wage; the non-pecuniary returns from work, captured using several measures of job-satisfaction and work-autonomy; the managerial or supervisory experience of employees in their current job; and, the recent receipt of a financial windfall gain. These models are also estimated using a dynamic random-effects panel probit framework to control for the impact of persistent unobserved individual heterogeneity and initial conditions.

In contrast to much of the existing entrepreneurial research, this chapter finds the entrepreneurial explanations for the choice of self-employment are not borne out by the empirical evidence. Rather than find that employees select disproportionately into self-employment from the types jobs and circumstances that would *a priori* favour the intrinsic features of entrepreneurship, the results instead indicate that self-employment is just as heterogeneous as salaried-employment and attracts employees from a wide variety of jobs and backgrounds. There is little evidence that employees' transition to self-employment because of the appeal of intrinsic entrepreneurial features and, in some instances, the evidence is counterintuitive to the theoretical implications.

Once the dynamics of self-employment and unobserved heterogeneity are adequately accounted for, the most remarkable finding is just how unremarkable the entrepreneurial determinants are at influencing the choice of self-employment. While this does not necessarily imply that the economic theories on

entrepreneurship are erroneous or incomplete, it does indicate that entrepreneurship is not the whole reason for why workers become self-employed. The genuine cause of state-dependence of self-employment and the reason for its importance are questions that remain to be answered.

6.1 ENTREPRENEURIAL THEORY

Occupation-choice & firm-formation under uncertainty

This chapter draws upon Knight's (1921) classic interpretation of entrepreneurship and the labour market, and the subsequent contemporary economic models that formalise Knight's sentiments on occupational-choice involving firm-formation under uncertain conditions. Although not explicitly the focus of this chapter, Knight's thesis on entrepreneurship, the presence of uncertainty and the specialisation of the entrepreneurial function in the labour market is an exemplar of classical economic thinking that touched on some now well-established neoclassical economic principles such as general equilibrium theory and Nash equilibrium game theory. A summary of Knight's work, in particular Chapter 9 (1921: 264-290), is included in Appendix 6.A for reference purposes.

Several theoretical studies are seminal in the development and evolution of the contemporary economic literature on entrepreneurship: Sheshinski & Drèze (1976); Lucas (1978); Kanbur (1979); Kihlstrom & Laffont (1979); Calvo & Wellisz (1980); Jovanovic (1982); Evans & Jovanovic (1989).[78] These models consider entrepreneurship as the formation of a firm analogous to self-employment and as an occupational choice for workers in the labour market that is distinct from the worker-form employment relationship. The basis of these models differentiate the role of entrepreneurship from the salaried-employment by the inclusion of uncertainty (i.e. a random parameter) in the entrepreneurial production function, the level of which is unknown to workers *ex ante*, but drawn from the same known distribution, and equivalent for all entrepreneurs *ex post*. Workers face an occupational choice between working as an entrepreneur for a risky-profit and

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[78] The theoretical model proposed by Lucas (1978) is based on an earlier (unpublished) version of the model proposed by Kihlstrom & Laffont (1979). Also, both Kanbur (1979) and Kihlstrom & Laffont (1979) developed models using the same theoretical framework concurrently. However, only Kihlstrom & Laffont (1979) provide a model that solves assuming both workforce heterogeneity and *ex ante* flexibility (i.e. the stochastic uncertainty in entrepreneurial production is not known to prospective entrepreneurs prior to their production output decision). Kanbur (1979) assumes either a heterogeneous workforce and *ex post* flexibility (Kanbur, 1979: 782-787) or a homogenous workforce and *ex ante* flexibility (Kanbur, 1979: 793-796).

working for an entrepreneur as an employee for a riskless-wage. The presence of uncertainty in entrepreneurial production affects the profit expectations for all prospective entrepreneurs equally. This induces a movement of labour between entrepreneurship and salaried-employment until the allocation is such that, in equilibrium, the expected profits in entrepreneurship and the 'guaranteed' wage-price in salaried-employment are at parity with one another.

To identify who becomes an entrepreneur, the inclusion of a utility maximisation criterion is used to further differentiate the values of risky entrepreneurial profits across the labour force. Workers are differentiated from one another by some characteristic that influences the utility value of uncertainty. The sources of heterogeneity that are proposed to increase the likelihood of entrepreneurship include: lower *risk aversion* (Kanbur, 1979; Kihlstrom & Laffont, 1979), greater endowment of *managerial or entrepreneurial talent* (Lucas, 1978; Jovanovic, 1982) or *capacity for learning* (Calvo & Wellisz, 1980), or ready access to *financial or 'seed' capital* necessary for starting a business (Evans & Jovanovic, 1989). Rather than maximising entrepreneurial profits, prospective entrepreneurs now sort themselves based on the expected utility value of entrepreneurial profits which depends on the underlying source of worker heterogeneity (i.e. underlying differences in the preference for or the ability/resources to deal with uncertainty).

The impact of the heterogeneity of workers on the allocation of workers between entrepreneurship and salaried-employment becomes more substantive when considered in a competitive general equilibrium framework (Kihlstrom & Laffont, 1979). In this framework, the equilibrium share of entrepreneurs is endogenously determined. The supply of workers attracted to the risky returns in entrepreneurship affects the demand for labour, which, in turn, puts upward pressure on the 'guaranteed' wage-price of salaried-employees and downward pressure on entrepreneurial profits as labour costs increase. This completes Knight's interpretation of entrepreneurship and of the labour market by introducing changes in the return to salaried-employment and an 'opportunity cost' to entrepreneurship.

6.2 PREVIOUS EMPIRICAL RESEARCH

Features inherent to self-employment

Pecuniary returns: wage premium or penalty

Examination of the pecuniary returns to self-employment and the earnings distribution of self-employed workers in the U.K. and the U.S. has received a great deal of empirical attention in the entrepreneurial-centric research (see, for example, Rees & Shah (1986), Dolton & Makepeace (1990), Taylor (1996) and Clark & Drinkwater (2000) for the U.K., and Hamilton (2000) for the U.S.). Based on the theoretical presumption that individuals respond to a potential earnings-premium in self-employment, these studies examine the extent to which the risk-adjusted, or relative, earnings differential between self-employment and salaried-employment affect the self-employment choice. Rather than confirm this suggestion, however, the empirical research instead finds that self-employed workers are more likely to suffer an earnings-penalty.

In most developed economies, the descriptive statistics of the earnings distribution for the self-employed, relative to employees, are characterised by a higher degree of dispersion and inequality. Using 1984 U.S. Survey of Income and Program Participation (US-SIPP) data to accurately capture the earnings of male self-employed workers, Hamilton (2000) shows that the distribution is skewed to the left of the hourly wage distribution for employees, but with a longer upper-tail. As Figure 6.1 illustrates (reproduced from Hamilton (2000: 613)), the majority of workers in self-employment earn less than the majority in salaried-employment, while a larger minority of self-employed earned considerably more.

Figure 6.1: Distributions of hourly earnings for male, self-employed and salaried-employed workforces, in the U.S., 1984
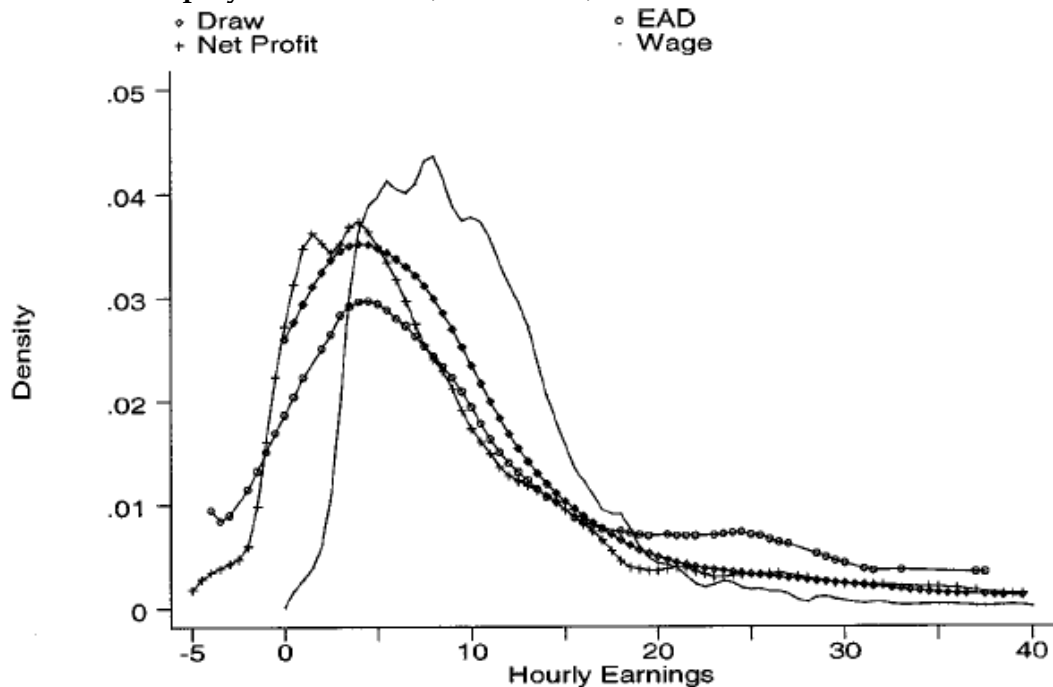
Notes: U.S. Survey of Income and Program Participation (US-SIPP), 1984.
          Sample is of U.S. male workers, aged 18-64 years. Sample size is 8,771, of which 1,101 (12.6%) are self-employed.
          Hamilton uses three alternative measures of hourly earnings for self-employment: 'Net profit' is defined as revenues minus costs and is usually considered as an accounting profit or net-income (this may understate the 'true' profit due to the overstatement of expense deductions for tax purposes); 'Draw' is defined as the amount of value generated by the business for consumption by the owner; 'Equity-adjusted draw' (EAD) is defined as the sum of the draw in period and the change in the business equity between period and (i.e. EAD accounts for the opportunity cost of business equity) (Hamilton, 2000: 611).
Source: reproduced from Hamilton (2000: 613)

Results from descriptive statistics can be misleading, however, because only one side of the earnings picture for an individual is ever observed, at a point in time, conditional on their choice between self-employment and salaried-employment. It is possible for the earnings difference between self-employed and employees to be systematically correlated with other observed and unobserved characteristics that cause workers to select non-randomly between self-employment and salaried-employment and endogenously affect the earnings distributions. Therefore, to infer the pecuniary effect of self-employment on participation more accurately, the research utilises two-step multivariate analysis methods to calculate the relative earnings differential by predicting the average earnings for each individual in both self-employment and salaried-employment.[79]

The more robust evidence from the research, however, find the proposition that

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[79] For further explanation of two-step multivariate analysis methods see Heckman (1979) and Maddala (1986).

workers are more likely to be self-employed because of an entrepreneurial earnings premium to be both weak and inconclusive. Most of the U.K. studies, for example, find the effect of the relative earnings advantage of self-employment on participation to be either statistically insignificant (Rees & Shah, 1986; Dolton & Makepeace, 1990) or significant but economically small (Taylor, 1996; Clark & Drinkwater, 2000).[80] Instead, the more important finding to emerge is the significance of the negative selection coefficient that is incidentally generated by the two-step estimation process. This implies that the mean wages of employees are less than the predicted wages of the self-employed had they instead been employees (Hamilton, 2000). Or, in other words, those in self-employment incur a wage-penalty and would potentially fare better as employees than their employee counterparts. Therefore, rather than support the notion of an entrepreneurial earnings-premium in self-employment, the existing evidence instead indicates that self-employment disproportionately attracts employees with a capacity for higher earnings and makes them worse off.

Of course, a criticism of this empirical work and its findings is that it does not adequately account for difference in the taxation of earnings between self-employment and salaried-employment. The opportunity for tax arbitrage has the potential to further affect the choice of self-employment that would appear similar to the entrepreneurial earnings premium.[81] However, this is a complicated issue, and one that is not yet adequately dealt with in the literature.[82] There are numerous empirical issues due, in part, to the endogenous relationship between choice of tax

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[80] Rees & Shah (1986) use the 1978 U.K. General Household Survey; Dolton & Makepeace (1990) use the U.K. Survey of 1980 Graduates and Diplomates; Taylor (1996) uses the first wave of the U.K. 1991 British Household Panel Survey (UK-BHPS); Clark & Drinkwater (2000) use the Fourth National Survey of Ethnic Minority for the U.K. (1993-1994).

[81] It is easily conceivable that certain employees, particularly highly paid ones, might be self-employed simply to minimise their income tax obligations, rather than for any entrepreneurial reasons. Likewise, workers who would otherwise face an effective income tax rate above the corporate tax rate as employees might select into self-employment — highlighting the potential endogeneity of the relationship.

[82] There exists little consensus in the literature as to the relevance of the effect of a tax differential on earnings and the choice of self-employment. Schuetze (2008) summarises this lack of consensus in a recent survey of the existing empirical research, and highlights poor quality data and the inability of the existing research to adequately deal with the potential endogenous relationship between marginal tax rates and the choice of self-employment as key shortcomings. Schuetze also raised the issue of tax non-compliance prevalent among self-employed workers as a further empirical limitation — that is, data limitations imposed on researchers due to self-employed workers, particularly those operating unincorporated businesses, lowering their taxable income (and tax liability) by under-reporting business revenue or by confounding personal consumption with their business expenses — this is further explored later in the chapter.
Schuetze's (2008) summarises the findings from several key studies in the literature using data from the US, UK, OECD, and Canada, as well as different methodological techniques. These studies include: time-series (Long (1982b); Blau (1987); (Parker, 1996); Robson (1998); Robson & Wren (1999); Briscoe et al.(2000); Bruce & Mohsin (2006)), cross-sectional (Long (1982b; 1982a); Moore (1983); Parker (2003)), and panel data (Schuetze (2000); Bruce (2000); Gentry & Hubbard (2000); Cullen & Gordon (2002)).

status and choice of self-employment, but also the fact that capturing the before and after tax components of self-employed workers incomes in data is often limited and fraught.

Non-pecuniary returns: compensating differential

Given the absence of an entrepreneurial earnings-premium, another aspect of the research instead focusses on the possible non-pecuniary benefits of entrepreneurship as an explanation for participation.[83] Again, this follows from Knight's view of entrepreneurship and includes the fact that self-employment allows individuals' to exercise 'responsible control' and 'knowledge and judgement' when at the helm of their own entrepreneurial production function. In this case, the earnings in self-employment no longer fully reflect the utility value that individuals may derive from self-employment. Benz & Frey (2008a: 363) describe this as 'procedural utility', which refers to "the value that individuals place not only on outcomes… but also on the processes and conditions leading to outcomes."[84] The notion that workers are more likely to be self-employed because of its non-pecuniary benefits also dovetails nicely with the entrepreneurial earnings-penalty finding. Hamilton (2000) views the earnings-penalty for self-employment as implicit evidence of a non-pecuniary 'compensating differential', such as the utility value from "being your own boss".[85]

Higher rates of job satisfaction amongst self-employed workers, relative to employees, are a common feature of labour markets in most developed economies. An international comparison of 10 developed countries by Blanchflower (2000) found the incidence of job satisfaction amongst the self-employed to be substantially greater than for employees in all but one of the 10 countries.[86] In the U.K. and the U.S., for example, the shares of self-employed workers who were 'completely satisfied' (the highest category) in their job was 27% and 31%, respectively, while the shares for employees was 10% and 13%, respectively. Moreover, the descriptive evidence also suggests the non-pecuniary benefits for self-employment are a greater motivation of participation than pecuniary reasons. Using data from the U.K.

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[83] For further discussion of the non-pecuniary benefits of self-employment see Blanchflower & Oswald (1998), Blanchflower (2000), Hundley (2001), Benz & Frey (2008a), Benz & Frey (2008b), and Praag & Versloot (2007), *inter alia*.
[84] For further explanation of 'procedural utility' see Frey et al. (2004) and Benz (2007)
[85] For further explanation of 'compensating differentials' see Rosen (1974; 1987).
[86] Blanchflower & Oswald (1998) use data from the 1989 International Social Survey Programme (ISSP).

Labour Force Survey, Dawson & Henley (2012) report that self-employed workers, when asked retrospectively 'why did you become self-employed', mostly cited 'to be independent/a change' (30%) as their reason rather than 'wanted more money' (13%).[87]

The cause and effect relationship between the apparent non-pecuniary benefits of self-employment and participation, however, is more complex than indicated by the descriptive evidence. On the one hand, it may be that self-employed workers are more satisfied in their jobs, relative to those working as employees, because the potential benefit from 'being one's own boss' in self-employment is a determinant of job satisfaction. That is, the choice of self-employment may improve the job satisfaction of workers because of its non-pecuniary benefit. On the other hand, it is possible that the choice of self-employment is instead determined by the workers' level of job satisfaction. This is because the value of the non-pecuniary benefit of 'being your own boss' in self-employment may be relative to the workers' level of job satisfaction (or dissatisfaction). The non-pecuniary benefit of self-employment may determine its choice because of the workers' level of job satisfaction. Just as the choice of self-employment may improve the job satisfaction of an employee dissatisfied in their job or with their employer, it is also possible that the non-pecuniary gains from self-employment are most appealing to the dissatisfied employee and affects their choice of self-employment. Therefore, the relationship is endogenous because of two-way or reverse causation, and is empirically difficult to disentangle using cross-sectional data methods of multivariate analysis.

Only one study in the existing research begins to untangle the endogenous relationship between individuals' job satisfaction and self-employment choice. Using German data collected during the 'reunification period' (1990-2000) following the collapse of the socialist German Democratic Republic, Benz & Frey (2008a) design a clever natural experiment that uses the exogenous and mostly unexpected shift in the social and economic structure, away from a system that actively discouraged self-employment because of its social and political philosophy against entrepreneurship and free markets, to examine the extent to which the non-pecuniary benefits of self-employment affect individuals' job satisfaction.[88] Benz & Frey (2008a) find that for the East Germans, in the decade following the fall of the

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[87] Dawson & Henley (2012) use 1999 U.K. Quarterly Labour Force Survey (UK-QLFS) data.
[88] Benz & Frey (2008a) use German Socio-Economic Panel (G-SOEP) survey data.

Berlin Wall, becoming self-employed had a positive and significant effect on job satisfaction, even after controlling for observed and unobserved heterogeneity. This robust evidence indicates that the non-pecuniary benefits of entrepreneurship, such as independence and autonomy at work, cause workers to be more satisfied in their job, and provides support for the compensating differentials notion of self-employment. Despite this, however, the opposite question "are workers more likely to become self-employed because of its non-pecuniary benefits" remains unanswered.

Innate Characteristics of the Self-employed

Another aspect of the entrepreneurial-centric research that receives a great deal of empirical attention is identifying the distinct individual characteristics and traits that are thought to explain entrepreneurial behaviour. This research loosely follows the economic theories on entrepreneurship that assert self-employed workers are more likely to be those who are: *risk tolerant* (Kanbur, 1979; Kihlstrom & Laffont, 1979), have a greater endowment of *managerial or entrepreneurial talent* (Lucas, 1978; Jovanovic, 1982) or *capacity for learning* (Calvo & Wellisz, 1980), or have *initial access to financial or 'seed' capital* necessary for establishing a new business (Evans & Jovanovic, 1989). That is, self-employment is more attractive to individuals' with a certain *je ne sais quoi* or perspicacity for entrepreneurship, which makes them more adept in dealing with uncertainty or in 'securing the confidence of others'.

Non-cognitive traits, cognitive abilities, & unobserved heterogeneity

A substantial fraction of research in this area is devoted to examining the impact of non-cognitive or psychological dispositions of individuals on the probability of self-employment, with a particular focus on the effect of individuals' *risk-tolerance* or *risk-aversion* (see, for example, Ekelund et al., 2005; Brown et al., 2006; Ahn, 2010; Brown et al., 2011). Numerous other types of traits, closely related to risk tolerance, are also examined, such as: degree of *optimism* (i.e. a person's expectation of the success and returns from a ventures) (Arabsheibani et al., 2000); *confidence* (i.e. a person's estimate of the degree of variation of outcomes) (Simon & Houghton, 2003); *internal 'locus of control'* (i.e. the belief that 'reinforcements' are controlled by one's own behaviour) (Evans & Leighton, 1989); *'self-efficacy'* (i.e. a person's perception of their effectiveness) (Chen et al., 1998); *need for achievement*

(McClelland, 1965); or, *tolerance of anxiety* (Blanchflower & Oswald, 1998). Another strand of this research attempts to capture the impact of individuals' innate cognitive abilities on the choice of self-employment by using Intelligence Quotient (IQ) scores as a proxy measure for individuals' intrinsic learning ability (de Wit & van Winden, 1990; Praag & Cramer, 2001).

Empirically, however, the importance of individuals' innate non-cognitive traits and cognitive abilities in determining self-employment status are likely to be overstated in the existing research because of its reliance upon static cross-sectional (or pooled-panel) data methods of analysis. These models neglect to control for the potential influence of other individual characteristics that persist over time but that remain unobserved in the data (i.e. unobserved individual heterogeneity). When unobserved heterogeneity exists, but is not controlled for, it biases the estimation results on the observed individual characteristics with which the unobserved heterogeneity is correlated, such as innate non-cognitive traits or cognitive abilities that are also persistent over time or evolve only gradually over the life-course.

In the more recent empirical research, a growing number of studies disentangle the extent to which a propensity for entrepreneurship is inherent or is the result of some nurturing process, and control for the impact of unobserved heterogeneity on self-employment status. These studies find that the impact of unobserved heterogeneity is both important and poorly captured by static cross-sectional methods of analysis. Several studies that use panel-data methods of analysis to control for unobserved heterogeneity, for example, consistently find that unobserved heterogeneity accounts for approximately 50%-60% of the unexplained variance of the composite error (Henley, 2004; Caliendo & Uhlendorff, 2008; Taylor, 2011). In corresponding research, innovative studies using twin-data find that genotype, rather than environment factors, account for approximately 40%-50% of the probability of self-employment (i.e. the 'heritability' of self-employment) (Nicolaou et al., 2008; Nicolaou & Shane, 2010).

Despite the importance of unobserved heterogeneity, however, it is rarely controlled for in the studies that also examine the effect of individuals' non-cognitive traits or cognitive abilities on self-employment status. In the few studies that do, the impact of the observed characteristics and traits is minor and substantially diminished in comparison to similar estimates from static cross-sectional models. Brown et al.

(2011), for example, using a panel-data model to examine if the likelihood of self-employment increases with individuals' proclivity to gamble, finds that unobserved heterogeneity accounts for a whopping 75% of the unexplained variance, while the effect of risk-taking is statistically significant but economically small.[89]

In general, the importance of non-cognitive traits and cognitive abilities as explanations for entrepreneurial behaviour is empirically tenuous and weaker than suggested by the theory. Rather than show that self-employed workers are distinguishable based on an 'essential' set of entrepreneurial characteristics, the research instead indicates that the self-employed are just as diverse a group of workers as employees. This also brings into question the entrepreneurial notion of self-employment as inherently uncertain, and that the occupational choice faced by workers is between operating a business for a risky-profit or working as an employee for a riskless-wage.

Financial constraints & intergenerational wealth transfers

As discussed earlier, those with ready access to financial wealth are thought more likely to become entrepreneurs (Evans & Jovanovic, 1989) because, as Knight (1921) suggests, prospective entrepreneurs require collateral to secure the confidence of potential employees and to provide satisfactory guarantees to capital markets against the risk of failure. Differences in familial or intergenerational wealth, therefore, are considered as an additional source of innate individual heterogeneity that is thought to differentiate entrepreneurs. However, the relationship between individuals' financial wealth and their self-employment status, at a point in time, is complex and potentially endogenous. For instance, access to financial wealth for prospective entrepreneurs may differ because of information imperfections or asymmetries in the credit market, which cause credit-rationing or prohibitive borrowing costs. In response to the liquidity constraints imposed by financial markets, prospective entrepreneurs may, in turn, adjust their consumption and savings behaviour to deliberately accumulate enough financial wealth in anticipation of entry into self-employment in the future.

In order to avoid the complexities of endogeneity, the empirical research focusses

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[89] Brown et al. (2011) uses 1996-2005 U.S. Panel Survey of Income Dynamics (US-PSID) data. An understanding of individuals' willingness to take financial risks was based on a series of hypothetical questions asked by survey about the conditions under which a respondent would consider gambling their income.

on plausibly exogenous sources of wealth received from previous generations to examine the impact of wealth accumulation on the self-employment outcomes of the current generation. In the research, there are two broad approaches. One approach, taken by Dunn & Holtz-Eakin (2000), for example, is to examine the extent to which parents' financial wealth is associated with the self-employment outcome of their adult children. This approach, however, relies on extremely long longitudinal data collections to capture detailed and accurate information on the value of parent's wealth, which is often rare. An alternative, more innovative approach has been to examine the impact of an *inheritance windfall* on individuals' self-employment status (see, for example, Holtz-Eakin et al., 1994; Blanchflower & Oswald, 1998). This approach is a type of 'natural experiment' because the receipt of an inheritance provides an unexpected relaxation of individuals' liquidity constraints that is exogenous to other sources of wealth accumulation.[90]Ostensibly, these studies find significant evidence that intergenerational transfers of wealth, particularly unexpected inheritance windfalls, bring forward the self-employment participation decision of prospective entrepreneurs, and appear support the notion that individuals are financially constrained from entering self-employment. For example, for U.S. salaried-employees, Holtz-Eakin et al. (1994) predict that the receipt of a $100,000 inheritance between 1982 and 1983 would increase the probability of transition to self-employment by 17 per cent (from 19.3% to 22.6%).[91] Similarly, for young (23-years old) male U.K. workers in 1981, Blanchflower & Oswald (1998) predict that receipt of an inheritance of £5,000 (in 1981 prices) more than doubled the probability of self-employment in comparison to those who received nothing (from 16% to 37%).[92]

However, these studies somewhat embellish the importance of intergenerational wealth transfers on self-employment outcomes, and the economic relevance of the results are less impressive when the magnitude and prevalence of the values are considered in context. In Holtz-Eakin et al. (1994), for example, the receipt of an inheritance of $100,000 was approximately four-times greater than the average salary or earnings income reported in the data, while Blanchflower & Oswald (1998) reported effect based on inheritances worth £5,000 was only applicable to the top

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[90] A similar approach has also been to use the lottery windfalls of individuals to generate a similar effect (see, for example, Lindh & Ohlsson, 1996).
[91] Holtz-Eakin et al. (1994) use U.S. Internal Revenue Service (IRS) data
[92] Blanchflower & Oswald (1998) use U.K. 1958 National Child Development Survey (UK-NCDS) data

15.2% of the distribution of those who received an inheritance. For the most part, the involvement of intergenerational transfers of financial wealth in business formations is minor. As shown by Fairlie & Robb (2007), the intergenerational transfer of wealth plays a minor role in the establishment of most business. For example, only 1.6%, 6.6% and 6.4% of businesses in the U.S., in 1992, were initiated with the financial support of either an inheritance, a direct transfer of business ownership, or a within-family loan, respectively.[93]

Moreover, the studies by Holtz-Eakin et al. (1994), Blanchflower & Oswald (1998) and Dunn & Holtz-Eakin (2000) all fail to account for impact of unobserved heterogeneity, which, as discussed earlier, will bias and overstate the importance of the estimates on the observed characteristics. The biasing impact of unobserved heterogeneity is likely to be particularly acute for estimates of the parental or familial wealth effect more so than the inheritance effect. This is because the influence of parent's wealth is more likely to have a persistent and cascading effect on the socio-economic outcomes of children over their lifetimes; whereas, the influence of an inheritance, in terms of its size and timing, is largely unanticipated and is likely not received until much later in a child's life.

6.3 ESTIMATION METHOD & ECONOMETRIC MODEL

Estimation method

In light of the mixed evidence from the existing empirical research, this chapter seeks to better elucidate the importance of entrepreneurial features in determining the choice of self-employment by Australian workers. In contrast to the existing research, rather than compare self-employed workers against employee counterparts for salient differences in their observed characteristics, this chapter examines whether the relative appeal of self-employment to employees differs depending on the intrinsic quality of the employment outcomes and extant circumstances of the employees. That is, to what extent employees are more likely to become self-employed in the future, relative to those who remain self-employed, because of their increased attractiveness to the distinctive entrepreneurial features of self-employment. This approach, while unconventional to the existing economic literature on entrepreneurship and self-employment, has been adopted from a well-

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[93] Fairlie & Robb (2007) use U.S. 1992 Characteristics of Business Owners (US-CBO) survey data

established body of empirical research in the labour economics literature on the interrelated dynamics between unemployment and low-quality employment (e.g. low-paying jobs and the under-utilisation and under-augmentation of skills).[94]

Based on the entrepreneurial hypotheses derived from literature, which suggest the distinctive features of entrepreneurship, and of entrepreneurs, explain the choice of self-employment, this chapter estimates several models of the likelihood of current self-employment depending on the past experience in self-employment and also separately distinguishing the past employment outcomes or extant circumstances of employees. The first set of models examine the importance of the potentially beneficial pecuniary and non-pecuniary features of entrepreneurship in determining self-employment by estimating the influence of past employee outcomes, distinguishing the hourly-wage distribution, as well as several measures of job-satisfaction and work-autonomy, respectively. *A priori*, it is expected that an entrepreneurial earnings-premium would increase the likelihood of higher paid employees entering self-employment because, in relative terms, it becomes the increasingly attractive option as the set of better paying alternatives diminish. Higher-paid employees could also transition to self-employment to minimise their income tax. As discussed earlier, however, this latter explanation is fraught by issues of endogeneity and data limitations summarised in Schuetze (2008). No further attempt is made in this research to disentangle this explanation from the entrepreneurial-earnings premium explanation. Conversely, the *a priori* expectation for the influence of the non-pecuniary benefits of entrepreneurship is that employees who feel increasingly disenfranchised with their work or employer would be more likely to become self-employed.

The second set of models examine the role that potentially advantageous individual characteristics of entrepreneurs play in determining self-employment by estimating the appeal of future self-employment to employees. These models distinguish the past outcomes and circumstances of employees separately by managerial status and the receipt of a windfall gain. *A priori*, it is expected that employees in managerial positions are more likely to become self-employed because of the positive influence that having their employer recognise their business acumen or provide training on how to coordinate production may have on their valuation of entrepreneurial

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[94] See Stewart & Swaffield (1999), Stewart (2007), Cappellari & Jenkins (2008), Buddelmeyer et al. (2010), Cai (2014), Mavromaras et al. (2015), *inter alia*.

uncertainty. Similarly, the receipt of an unexpected windfall gain is more likely to bring about a transition of employees into self-employment because the positive influence that relaxing financial constraints and improved access to 'seed' capital may have in shifting the cost-benefit calculus in favour of riskier behaviour and to secure the confidence of others and provide satisfactory guarantees in entrepreneurship. While it would have been ideal to also examine some of the more specialised measures used in the existing research of cognitive[95] and non-cognitive[96] traits that are thought to favour entrepreneurial behaviour, these were either: (i) not collected in the HILDA; (ii) collected but not on a consistent basis; or (iii), not captured using a measure validated in the existing literature.[97]

Another major innovation of this chapter is its treatment of econometric issues. Using the longitudinal Household, Income and Labour Dynamics in Australia (HILDA) survey for the period 2001 to 2011, the models of self-employment are estimated using a dynamic random-effects panel probit framework. This controls for the biasing influences of unobserved individual heterogeneity and the initial conditions problems, as well as account for the influence of observed labour market dynamics of individuals over time, specifically the impact of 'genuine' state-dependence (i.e. the effect of individuals' past experience *itself* on current self-employment status). Unlike static cross-sectional models, which only provide *ceteris paribus* correlations or associations between self-employment status and the observed individual characteristics, the estimates of state-dependence in dynamic panel models (holding observed and unobserved heterogeneity constant) isolate the extent to which differences in individuals' past employment history have a *causal* effect on the probability of current self-employment. This is also particularly useful for analysing the impact of determinants that, at a point in time, might otherwise be endogenously related with the outcome because of two-way causation, such as the relationship between self-employment and non-pecuniary outcomes. It also permits

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[95] Objective measures of risk-tolerance used in the existing research include: the consumption of financial security products such as life and home contents insurance (Brown et al., 2006); and, tests of gambling proclivity (Brown et al., 2011).

[96] Specialised measures of individuals' learning capacity utilised in the existing research include Intelligence Quotient (IQ) test scores (de Wit & van Winden, 1990; van Praag & Cramer, 2001).

[97] For completeness, the HILDA does ask a self-assessed question to gauge respondents' appetite for financial risk: '*Which of the following statements comes closest to describing the amount of financial risk that you are willing to take with your spare cash? That is, cash used for savings or investment.*' This question is asked periodically in waves 1, 2, 3, 4, .., 6, .., 8, .., 10, and 11. The use of this measure reduces the number of employee and self-employed respondents in the HILDA from 64,960 useable observations (11,702 individuals) to 26,366 useable observations (10,970 individuals).

the analysis of determinants that are only observed for some individuals or are poorly observed for others, such as the influence of pecuniary returns on self-employment and the high incidence of non-response or under-statement of earnings amongst self-employed workers. The dynamic panel models begin to disentangle the causal nature of the relationships that determine self-employment.

Econometric dynamic random-effects panel model

In this chapter, the self-employment status of Australian workers is modelled using a dynamic random-effects panel probit model. In this framework, the probability of individual i being self-employed ($SE_{i,t} = 1$), at time t, relative to being salaried-employed ($SE_{i,t} = 0$), is modelled as a product of the individual's previous state of employment, as well as other observed and unobserved characteristics:

$$\Pr[SE_{i,t} = 1] = \Pr[SE_{i,t}^* > 0] = \Phi(\boldsymbol{SE_{i,t-1}\gamma} + \boldsymbol{x_{i,t}\beta} + \varepsilon_i + \nu_{i,t}) \qquad [7]$$

where $\boldsymbol{x_{i,t}}$ is a vector of exogenous observed characteristics of the individuals, (e.g. highest level of education attainment, marital status, gender, age, etc.); $\boldsymbol{\beta}$ is the vector of coefficients associated with $\boldsymbol{x_{i,t}}$ to be estimated; ε_i is the time-invariant unobserved individual heterogeneity component of the error term (e.g. inherent non-cognitive and cognitive traits); $\nu_{i,t}$ is the random-error or 'luck' component of the error term; and, Φ is the non-linear probit function.

Departing from convention, this analysis co-opts a recent methodological innovation developed in the applied labour economics research (discussed earlier) and instead modifies the lagged-dependent variable in Equation 1 from a single explanatory variable into a set of dummy variables ($\boldsymbol{SE_{i,t-1}}$). That is, the base-category of the binary lagged-dependent variable (i.e. salaried-employment) is expanded to become a set of dummy variables that specify multiple states in salaried-employment at year $t-1$. This assumes that it is possible for transitions to occur between any of the states specified, that is, the states are independent of one another. Therefore, the coefficient estimates on the expanded lagged-dependent set of dummy variables ($\boldsymbol{\hat{\gamma}}$) imply the state-dependence effect of self-employment, as well as the entry-specific cross-dependence effects for specific states within salaried-employment.

The model also controls for unobserved individual heterogeneity. If unobserved heterogeneity exists, but is not controlled for, it will bias the coefficient estimates on

the explanatory variables, particularly the expanded set of lagged-dependent variables, with which it is correlated. However, controlling for unobserved heterogeneity in a dynamic panel framework is problematic. In practice, the temporal persistence of unobserved heterogeneity has the potential to generate a spurious correlation between individuals' past experience and the current outcome because the initial state observed in the data is likely to be endogenous and determined by the same persistent unobserved heterogeneity. This endogenous relationship is commonly referred to as the 'initial conditions problem' (Heckman, 1981b).

To overcome the initial conditions problem, this analysis adopts Wooldridge's (2005) method, which suggests approximating the initial conditions history by further incorporating the individual-specific means of the time-varying exogenous observed characteristics, $\overline{x}_i$ (also referred to as Mundlak (1978) corrections), and the initial values of the individuals' status in each of the expanded lagged dependent dummy set, $SE_{i,0}$, denoted as:

$$\varepsilon_i = \mu_0 + \overline{x}_i\delta + SE_{i,0}\gamma_0 + \eta_i \qquad\qquad [8]$$

where $\eta_i \sim N(0, \sigma_\eta^2)$ and is independent of x and v for all i and t. The observed explanatory variables (i.e. $SE_{i,0}$ and $\overline{x}_i$) are now allowed to correlate with unobserved individual heterogeneity (ε_i), while remaining uncorrelated with the individual-specific error term (η_i). Substituting Equation 2 into the dynamic model in Equation 1, the probability of individual i being observed in self-employment ($SE_{i,t} = 1$) at time t, relative to being an employee ($SE_{i,t} = 0$) becomes:

$$\Pr[SE_{i,t} = 1] = \Pr[SE_{i,t}^* > 0] = \Phi(SE_{i,t-1}\gamma + x_{i,t}\beta + SE_{i,0}\gamma_0 + \overline{x}_i\delta + \eta_i + v_{i,t}) \;\; [9]$$

The dynamic model of the probability of self-employment in Equation 3 is then possible to estimate using a conventional random-effects non-linear binary probit estimator based on standard assumptions.[98] The importance of the correlation between unobserved heterogeneity and the initial condition is inferred from the estimated coefficients on the initial observed status in the expanded lagged-dependent set of dummy variables, $\widehat{\gamma}_0$.

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[98] Assuming $v_{i,t} \sim N(0, \sigma_v^2)$, and is independent of the observed characteristics.

6.4 DATA SOURCE & DEFINING SELF-EMPLOYMENT

The HILDA survey

This chapter uses the first eleven waves of the HILDA longitudinal survey for the period 2001 to 2011. The HILDA survey is a representative sample survey of the Australian population that is collected on an annual basis and has attempted to follow the same individuals and households over time. Detailed descriptions of HILDA, its history and its uses are well documented.[99] The HILDA data collects a breadth of detailed information on a range of topics, including: household and familial relationships and background, demographic characteristics, education and training issues, labour market experience and employment arrangements, income and expenditure, time-use, social and lifestyle issues, and health and well-being. For the period 2001 to 2011, the HILDA survey had an unbalanced sample of 26,028 Australian residents, aged 15 years and over, from across 7,682 households. During this period, the characteristics of the responding sample remained a relatively good-match to the Australian population at a broad level (Watson & Wooden, 2013).

In addition to the information collected by the HILDA through its main interview process, supplementary information pertaining to issues of a more personal or sensitive nature are collected through voluntary a self-completion questionnaire (SCQ). The SCQ collects non-traditional survey information that is more subjective or based on the personal opinion of the respondents, such as: attitudes and values, health and well-being, lifestyle choices, financial security, and job and workplace issues. Several of the key explanatory variables used in this chapter are drawn from information collected in the SCQ. Because of its voluntary and more sensitive nature, however, the response rate to the information in the SCQ is slightly lower than the information collected through the face-to-face and telephone interviews (e.g. 94% of the 2001-2011 unbalanced sample responded).

Defining self-employment

In the entrepreneurial-centric research, there is very little consistency in the treatment of the classification of self-employment in either the collection of data or in the subsequent analysis of entrepreneurship. To avoid the complexities associated

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[99] See Wooden et al.(2002), Watson & Wooden (2002), Wooden & Watson (2007), Watson & Wooden (2012) and Richardson (2013), *inter alia*.

with the concepts of entrepreneurship, this chapter, as in Chapter Five, instead considers self-employment as a distinct labour market activity that is mutually exclusive from salaried-employment.[100]. In keeping with the conventional approach to defining self-employment in labour economics, self-employment status refers to the aggregation of several detailed labour force and employment arrangement classifications that are identified in the HILDA data: *owner-managers of an unincorporated enterprise* (OMUE)[101], *owner-managers of an incorporated enterprise* (OMIE)[102], and *contributing family workers*[103]. This classification of self-employment is also inclusive of *own-account workers* (i.e. those who work alone) and *employers* (i.e. those who employ additional labour).

6.5 DESCRIPTIVE STATISTICS & MODEL SPECIFICATION

Distinguishing features of self-employment

Pecuniary benefits

In this chapter, the pecuniary returns are defined as hourly earnings and calculated using '*gross weekly earnings from main job*' (deflated to 2001 dollar values) divided by the '*hours per week usually worked in main job*'. Earnings are measured in hours, as opposed to annual/monthly/weekly increments, so as to not confound differences in earnings with differences in hours worked. As Figure 6.2 illustrates, in Australia, the distribution of hours worked by self-employed workers is much more dispersed in comparison to employees. For example, a larger proportion of self-employed workers (approx. 45%) work long full-time hours (i.e. 45 hours or more) than employees (approx. 26%).

Based on descriptive evidence, most self-employed workers in Australia suffer a wage-penalty rather than a wage-premium relative to the majority of employees. As Figure 6.3 illustrates, the hourly earnings distribution for self-employed workers in Australia is skewed to left of the earnings distribution for salaried-employment, but

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[100] As in Chapter Five, self-employment refers to workers who reported self-employment as their primary labour market activity (i.e. their main job).

[101] This is where the worker is remunerated directly from the profits of their business, but there is also no legal distinction between the personal liabilities of the worker and the assets of their business.

[102] This is where the worker and their business are separate legal entities and the worker is employed under the account of the business (a limited liability company), but the worker retains a controlling interest and remains responsible for its operation and is entitled to a distribution of the profits.

[103] This is where the worker works in a family owned and operated business and without explicitly being paid, but may benefit implicitly from the proceeds of the business.

with a longer upper-tail. As discussed earlier, this is consistent with the findings described in Hamilton (2000) for the U.S. That is, the *median* hourly earnings indicate that most self-employed workers earn less than the majority of employees (e.g. $16.94 per hour in comparison to $18.12 per hour), while the *means* of hourly earnings indicate that a larger minority of self-employed workers at the upper-end of the distribution earn considerably more than employees (e.g. $25.56 per hour in comparison to $21.15 per hour).

Figure 6.2: Distribution of *hours usually worked (per week) in main job* for employees, self-employed workers, & the latent self-employed employees, at year *t*
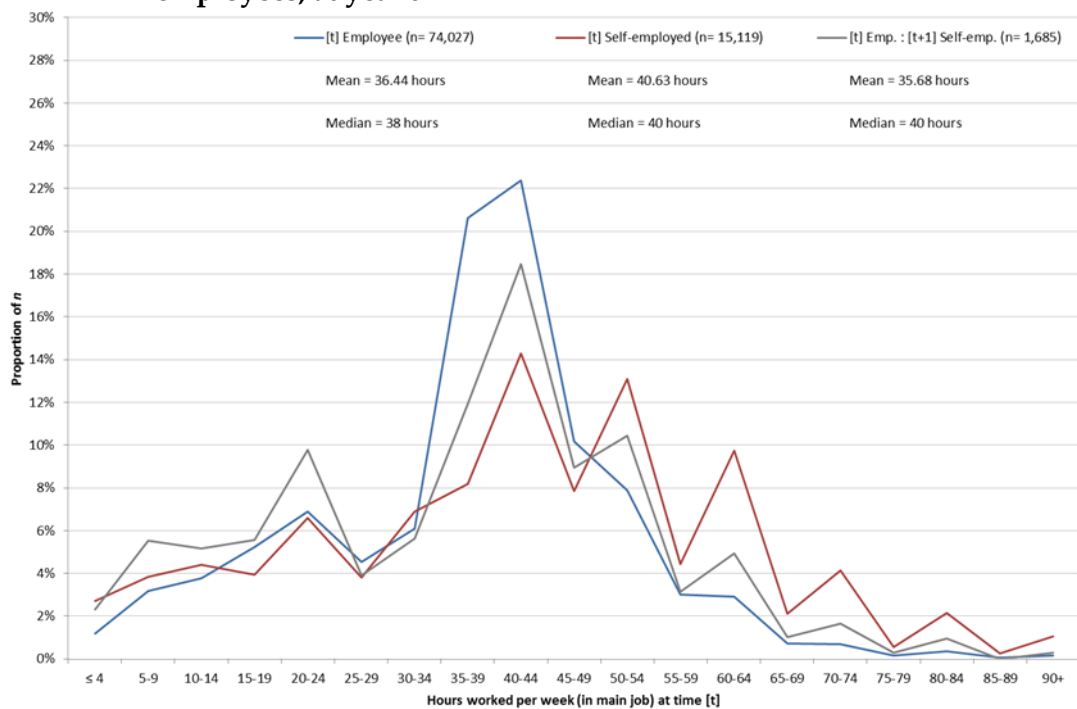
Notes: Unweighted estimates. Emp. = Employee; Self-emp. = Self-employed
Source: HILDA survey, 2001-2011

Figure 6.3: Distribution of *hourly (gross) earnings in main job* (in 2001 $ values) for employees, self-employed, & the latent self-employed employees, at year *t*
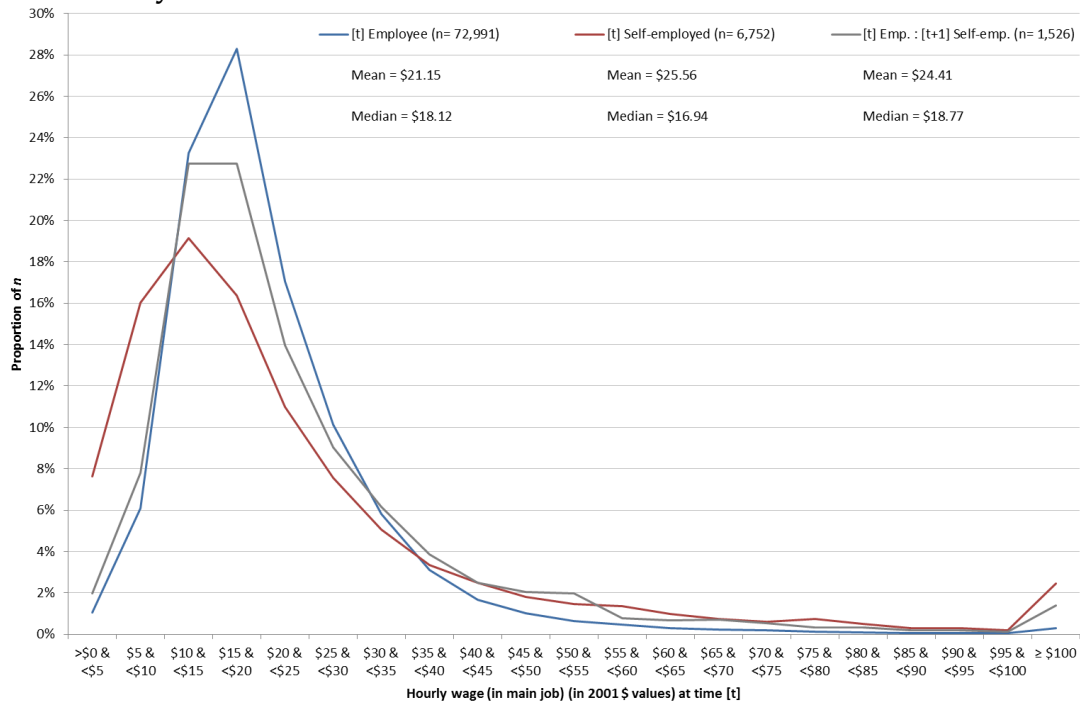
Notes: See Figure 6.2 (above).
Source: See Figure 6.2 (above).

Comparing the distributions of earnings between self-employment and salaried-employment is fraught with difficulty, however, because the quality and precision of the earnings information collected from self-employed workers is generally worse than for employees. As shown in Figure 6.2 and Figure 6.3 (above), while 99% of employees in the HILDA data with hours worked information also provide earnings information, this is true for only 45% for self-employed workers. Even when self-employed workers report their income there is reason to be sceptical as self-employed workers are notorious for under-reporting their income. Both Pissarides & Weber (1989) and Lyssiotou et al.(2004), for example, find that self-employed workers in the U.K. concealed their incomes by approximately 51%-64% for those in blue-collar occupations and 28%-54% for those in white-collar occupations.[104]

Therefore, rather than compare the pecuniary returns of self-employed workers against employees to test the notion of an entrepreneurial earnings-premium, this chapter instead analyses whether the hourly earnings of employees in the previous

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[104] Pissarides & Weber (1989) use 1982 U.K. Family Expenditure Survey (UK-FES) data. Lyssiotou et al. (2004) use 1993 U.K. Family Expenditure Survey (UK-FES) data.

year $(t-1)$ impact on their prospects of becoming self-employed in the following year (t). Counterintuitively, the potential for pecuniary gains in self-employment should be most attractive to the highest paid employees and least attractive to the lowest paid employees. This is because, in comparison to employees in lower paid jobs, employees in higher paying jobs have a diminishing set of better paid alternatives, of which, the option of self-employment becomes relatively more attractive. As Figure 6.3 (above) illustrates, however, this does not appear to be the case as self-employment attracts employees from both ends of the earnings distribution. Rather than make an obvious shift to the right of the employee wage distribution, the wage distribution for the group of employees who transitioned to self-employment from one year to the next (i.e. the *latent* self-employed) draw disproportionately from both the lower- and upper-ends of the employee wage-distribution.

A shortcoming of using *gross* earnings is that it ignores the confounding effect that a tax differential between salaried-employment and self-employment may have on the choice of employees to become self-employment (discussed earlier in the chapter). Distinguishing an employee's tax liability as a share of their gross hourly wage is especially complex because income tax, in Australia at least, is both progressive in nature, calculated on income earnt over an entire financial year, and occasionally subject to change from year to year as subsequent Australian Government's adjust fiscal policy settings. At a given point in time, for example, it is possible that two employees earning the same gross hourly wage could have very different tax liabilities depending on the difference in their hours worked over the financial year. It is similarly possible for two employees with very different gross hourly wages to have the same average tax liability as a share of their respective hourly wages. As a result, differences in shares of income tax paid by employees at the same gross hourly wage has the potential to confound the impact of the entrepreneurial wage-premium on the choice of self-employment. This additional layer of complexity is not further considered, however, and the extent of its impact on the findings remains unclear.

To better infer the impact of the entrepreneurial wage-premium on the choice of self-employment, the hourly earnings distribution of employees at year $t-1$ are specified as a quintile distribution, and then included in the multivariate dynamic

model as part of the expanded lagged-dependent dummy set (discussed earlier). From the HILDA data, Table 6.1 shows the estimated thresholds of the quintile distribution of hourly earnings for employees in year $t - 1$.

Table 6.1: Estimated quintile distribution thresholds of gross hourly earnings (in 2001 $ values) for employees at year $t - 1$

Percentile	Obs.	Lower bound ($)	Upper bound ($)
0-20 (lowest)	12,555	0.02	14.21
20-40	12,771	12.36	17.43
40-60 (median)	12,976	15.13	21.71
60-80	12,651	18.65	29.07
80-100 (highest)	13,210	24.11	1500.00
Total	64,163	-	-

Notes: Unweighted estimates
Source: HILDA survey, 2001-2011

Non-pecuniary returns

As discussed earlier, in the absence of conclusive evidence of an entrepreneurial wage-premium, another strand of the existing research instead turns its attention to the non-pecuniary benefits of entrepreneurship as a possible explanation for self-employment. To analyse the impact of the non-pecuniary features of self-employment, three measures of job satisfaction are initially selected from the HILDA data: satisfaction with *the job overall*, *the work itself*, and *total pay*. These measures are scored on a ten point Likert scale, with a response of 0 corresponding to 'dissatisfied', up to 10 corresponding to 'satisfied'. Figure 6.4 illustrates the distribution of responses for the three measures of job satisfaction, for the self-employed, salaried-employed and latent self-employed workforces separately.

Figure 6.4: Measures of *satisfaction* in current job for the salaried-employed, self-employed, & latent self-employed workforces, at year *t*
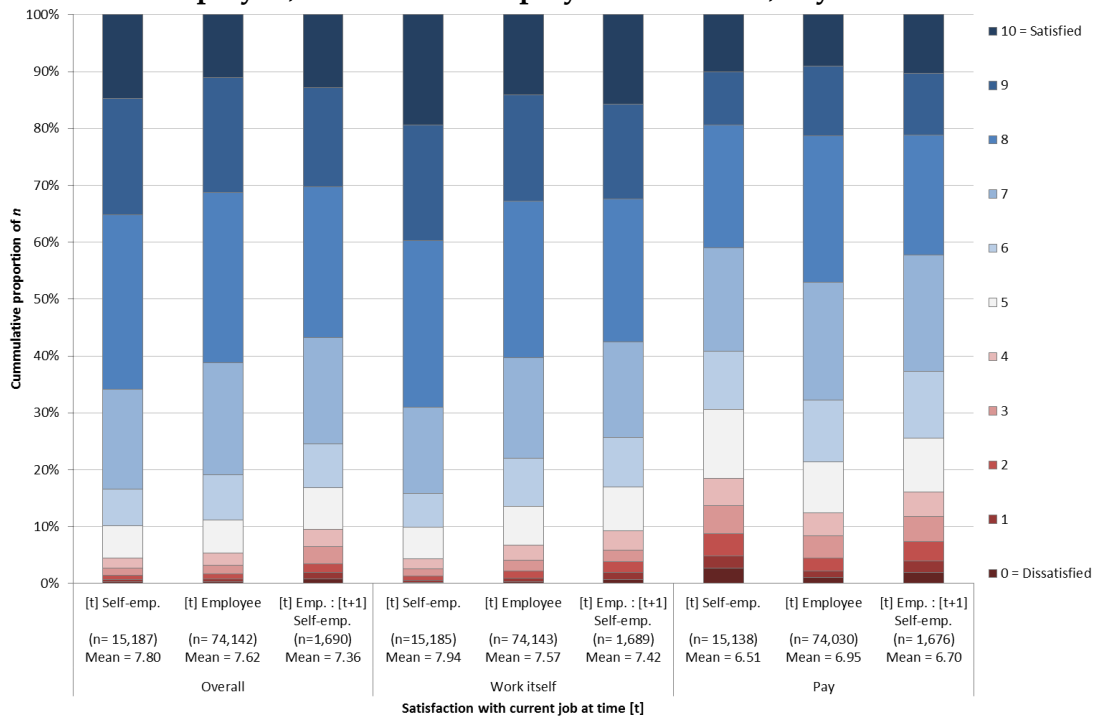
Notes: Unweighted estimates. Emp. = Employee; Self-emp. = Self-employed
Source: HILDA survey, 2001-2011

Consistent with the descriptive evidence from other countries, Australian workers in self-employment report being more satisfied with their job overall than those in salaried-employed jobs. The source of overall job satisfaction also appears to derive more from satisfaction with the work itself rather than from satisfaction with pay. For self-employed workers in particular, the pattern of overall job satisfaction is very similar to the pattern of satisfaction with the 'work itself', while most dissimilar to the patterns of satisfaction with 'total pay'. However, the extent to which employees' transition to self-employment because of its non-pecuniary benefits remains unclear. As Figure 6.4 (above) illustrates, while the latent self-employed employees are more dissatisfied (i.e. scales 0-4) with all aspects of their current job (at year *t*) in comparison to employees as a whole, and are also more dissatisfied with every aspect of their job except pay in comparison to self-employed workers; a large share of the latent self-employed employees are also highly satisfied (i.e. scales 9-10) with most aspects of their current job, and in proportions similar to the broader employee sample and self-employed workers.

To consider the non-pecuniary benefits of self-employment more closely, three additional measures are selected from the HILDA data to proxy for the utility value

that may be derived in self-employment from making entrepreneurial production decisions, such as independence and autonomy. The three statements selected are from the SCQ component of the HILDA survey (discussed earlier), and capture individuals' sentiment related to the structure and timing of work: '*I have a lot of freedom to decide how I do my own work*', '*I have a lot of say about what happens on my job*', and '*I have a lot of freedom to decide when I do my work*'. These measures are scored on a seven point Likert scale, with a response of 1 corresponding to 'strongly disagree', up to 7 corresponding to 'strongly agree'. Figure 6.5 illustrates the distribution of responses for the three measures of work autonomy, for the self-employed, salaried-employed and latent self-employed workforces separately.

Figure 6.5: Measures of *work autonomy* in current job for the salaried-employed, self-employed & latent self-employed workforces, at *t*
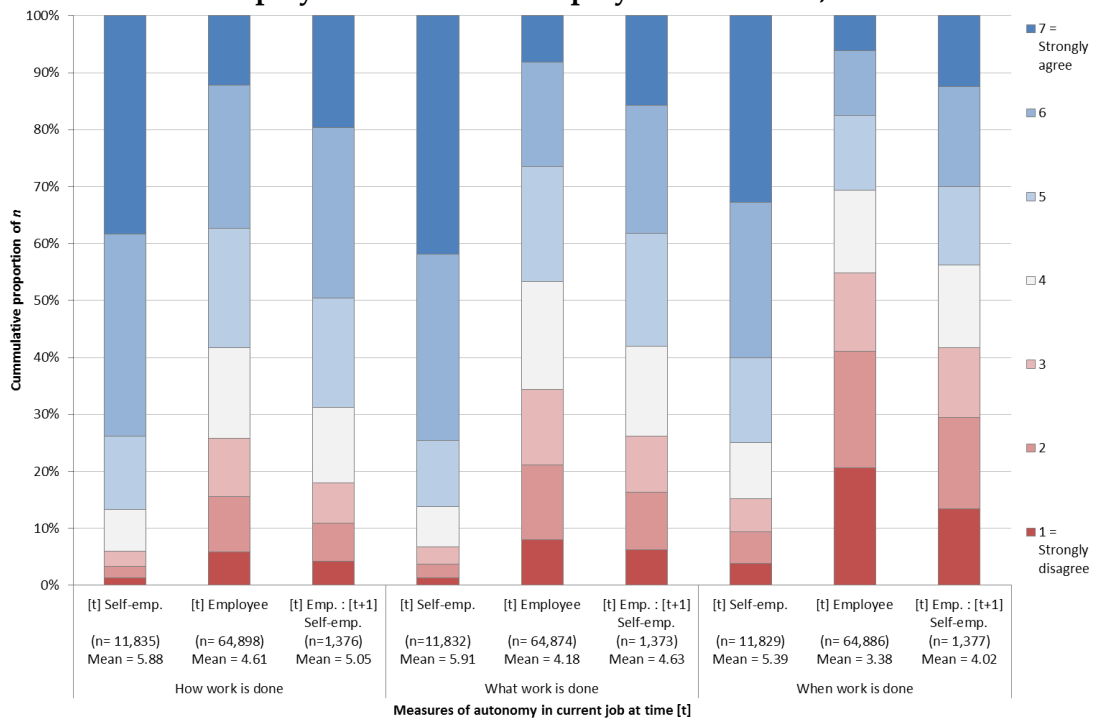
Again, comparing the self-employed and salaried-employed workforces, a larger share of Australian self-employed workers report a high degree of autonomy in the structure of their work (i.e. *what* and *how*), as well as a high degree of flexibility in timing *when* work is done. Ostensibly, this acute difference in the autonomy of work in self-employment provides qualified support for the notion that non-pecuniary gains in entrepreneurship may be compensating workers for a possible earnings-penalty. However, as illustrated in Figure 6.5 (above), the levels of autonomy

experienced by latent self-employed employees in their current job (at year t) is greater than that experienced by employees more generally. Rather than attract the employees whose jobs are most stifling in terms of autonomy, self-employment instead appears to disproportionately attract the employees who already experience higher degrees of autonomy in their existing job. The difference in the patterns of work autonomy between the latent self-employed and employees are in stark contrast to the previous results for the overall job satisfaction and work itself satisfaction non-pecuniary measures. This casts doubt on the extent to which the notional non-pecuniary benefits of entrepreneurship explain individuals' self-employment status. Instead, the strong preference for autonomy amongst latent self-employed employees may be reflecting the confounding influence of unobserved individual heterogeneity: that is, the persistent, yet unobserved, 'taste' for autonomy.

To better examine the impact of satisfaction and autonomy on the probability of salaried-employed workers transitioning to self-employment (between years $t - 1$ and t), each of the selected measures are collapsed into three broad categories, and then specified in separate multivariate dynamic models as part of the expanded lagged dependent variable. The Likert scales are collapsed into three broad categories by classifying the upper- and lower-ends of the distribution that are greater than one standard-deviation from the mean as 'satisfied/agree' and 'dissatisfied/disagree', respectively; and treating the third middle category as a residual (i.e. the majority clustered around one standard-deviation from the mean). Table 6.2 and Figure 6.6 detail the reclassification and distribution, respectively, of the Likert scales for each of the selected measures of job satisfaction and work autonomy.

Table 6.2: Reclassification of Likert scales for selected measures of *satisfaction* and *work autonomy* for employees at year $t-1$

Satisfaction (Likert scale 0-10)	Obs.	Mean	S.D.	Categories		
				Dissatisfied/ Disagree	Residual	Satisfied/ Agree
Job overall	72,350	7.62	1.74	0-5	6-9	10
Work itself	72,353	7.58	1.88	0-5	6-9	10
Total pay	72,242	6.95	2.12	0-4	5-9	10
Autonomy (Likert scale 1-7)						
How work is done	63,432	4.61	1.72	1-2	3-6	7
What work is done	63,408	4.18	1.74	1-2	3-5	6-7
When work is done	63,423	3.38	1.89	1	2-5	6-7

Notes: Unweighted estimates. Obs. = Observations; S.D. = Standard deviation.
Source: HILDA survey, 2001-2011

Figure 6.6: Distributions of the reclassified measures of *satisfaction* & *work autonomy* for employees at year $t-1$
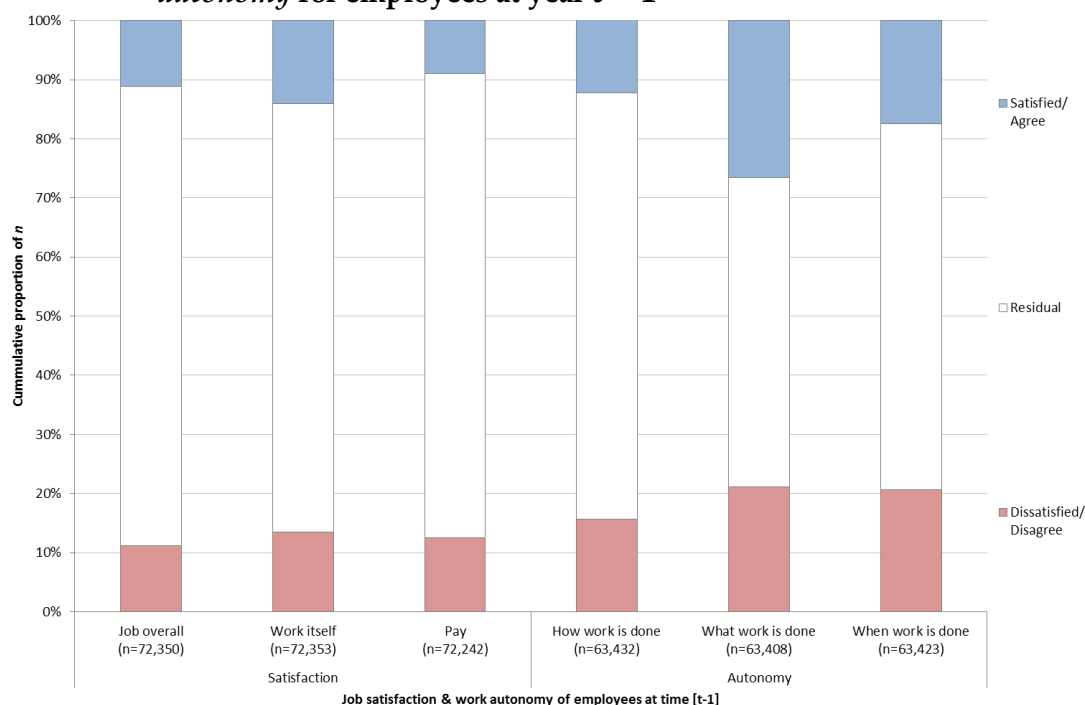
Notes: See Table 6.2 (above).
Source: See Table 6.2 (above).

Distinguishing characteristics of the self-employed

Managerial status

From the HILDA data, the *managerial/supervisory status* of employees in their current job is selected as a proxy for the combination of cognitive and non-cognitive abilities that shift the utility value of entrepreneurial uncertainty in favour of self-employment. As discussed earlier, in comparison to the other non-managerial employees in a firm, employees in managerial jobs have secured the confidence of their employer and have been recognised as being most adept at coordinating

production. Table 6.3 details the share of Australian employees in managerial/supervisory jobs.

The *prima facie* evidence, however, indicates that the proportions of employees transitioning to self-employment from managerial and non-managerial positions are similar. As shown in Table 6.3, the share of employees in managerial positions is approximately equivalent for both the latent self-employed workforce (48%) and the salaried-employed workforces (50%). There is very little descriptive evidence to indicate that employees in managerial positions are more likely transition to self-employment disproportionately to those in non-managerial employees.

It is possible that this descriptive evidence, however, may be correlated with some individual characteristic(s) that are unobserved, yet persist over time. That is, the same unobserved characteristics that determine the managerial status of employees may also determine the utility value of the self-employment. Therefore, to better infer the influence of managerial status on the probability of employees transitioning to self-employment (between years $t - 1$ and t), the employee managerial status is included as part of the expanded lagged dependent variable in a separate multivariate dynamic models, controlling for observed and unobserved heterogeneity.

Table 6.3: *Managerial/supervisory status* **for employees and latent self-employed workers at year** $t - 1$

	Obs.	Manager/supervisor status
[t-1] Employee	53,804	*49.6%*
[t-1] Self-employed	-	-
[t-1] Emp. : [t] Self-employed	1,657	*47.5%*

Notes: Unweighted estimates.
Source: HILDA survey, 2001-2011

Windfall financial gain

As discussed earlier, the existing research identifies individuals' access to financial wealth as another possible source of heterogeneity that is thought to determine the entrepreneurial choice. That is, individuals with ready access to financial wealth are more likely to be entrepreneurs because of the initial collateral or 'seed' capital necessary in establishing a new business. In keeping with the studies by Holtz-Eakin et al. (1994) and Blanchflower & Oswald (1998), this chapter uses information on *windfall gain to the gross household income in the last financial year* to proxy for an

unexpected relaxation of individuals' financial constraints.[105] Table 6.4 details the statistics from the HILDA data on windfall income for those in the salaried-employed, self-employed and latent self-employed workforces.

Consistent with the existing descriptive evidence on the incidence of inheritance windfalls, Table 6.4 shows that only a small fraction of the Australian workforce experienced a windfall gain (from any irregular income source). Furthermore, the incidence of windfall gain amongst employees is not associated with a higher incidence of transition to self-employment. The share of employees who received a windfall gain and the later transitioned into self-employment (7.4%) is roughly equivalent to the salaried-employed workforce more broadly (7.5%). There is very little descriptive evidence to support the entrepreneurial notion than an unexpected relaxation in liquidity constraints brings forward the timing of the decision by employees to become self-employed because of their improved initial access to 'seed' capital.

By contrast, there is a noticeable difference in the size of the windfall amounts received by employees who later transition into self-employment in comparison to the employee workforce more broadly. The median windfall amount received by a majority of latent self-employed employees ($5,325) is approximately twice the size of the median amount received by employees in general ($2,427). That is, self-employment appears to attract employees who experience larger windfall gains. Unlike the incidence of windfall gain, however, it is possible that the notable difference in the size of the windfall amounts arise because of persistent, yet unobserved, circumstances — such as the size of familial or parental wealth.

Therefore, to better infer the impact of the receipt of a windfall gain on the probability of employees becoming self-employed (between years $t - 1$ and t), a binary indicator for windfall gain is included as part of the expanded lagged dependent variable in a separate multivariate dynamic models, controlling for observed and unobserved heterogeneity. Unfortunately, small sample size issues prevent the further separation of windfall gain by amounts, and, as it transpires, are unnecessary once unobserved heterogeneity is controlled for.

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[105] The HILDA data defines 'windfall income' as any irregular sources of income, such as: inheritances, redundancies, payments from parents, lump sum superannuation payouts, lump sum workers compensation payouts (Summerfield et al., 2012: 64).

Table 6.4: Statistics of windfall gain (to gross household income in the previous financial year), for the salaried-employed, self-employed and latent self-employed workforces

	Obs.	% of workforce	Mean	S.D.	Min.	Median	Max.
[t-1] Employee	5,546	7.5%	$19,662	$75,069	$9	$2,427	$2,325,582
[t-1] Self-emp.	887	5.8%	$40,313	$115,189	$47	$5,440	$1,351,351
[t-1] Emp. : [t] Self-emp.	126	7.4%	$30,137	$62,878	$71	$5,325	$509,434

Notes: Unweighted estimates. Emp. = Employee; Self-emp. = Self-employed
Source: HILDA survey, 2001-2011

Model specification

From the HILDA data, the sample is restricted to an unbalanced panel of Australian workers in salaried-jobs or self-employment, aged 15 years or over and not studying full-time. In contrast to the conventional approach in labour economics research, the age range is not restricted to the conventional upper range of working age, typically 64 years, because the age profile of the transitions into self-employment occur much later in the work-life cycle and self-employed workers continue to work well past the conventional retirement age (i.e. 65 years). Observations with missing information on the dependent and the selected independent variables are further excluded from the sample. Also, the use of dynamic modelling and the inclusion of the lagged and initial sets of expanded dependent dummy variables in the multivariate estimations further excludes from the sample the wave of HILDA data at which individuals are first observed, as well as any subsequent waves for individuals without two or more consecutive observations. Furthermore, because there are several multivariate estimations each focused on a different key independent variable, there is some variation in the sample size across estimations depending on the use of the information from the HILDA survey's SCQ (discussed earlier). Overall, the sample size of the multivariate estimations vary between a maximum of 64,960 observations, representing 11,702 individuals, and a minimum of 56,923, representing 10,581 individuals, when using information from the SCQ.

The dependent and explanatory variables used in the multivariate analysis are, for the most part, determined by the information provided in the HILDA data. As discussed earlier, the dependent variable indicates the workers in the sample who engaged in an employment arrangement classifiable as self-employment (previously defined) as a binary (or dummy) variable. Furthermore, the lagged and initial sets of expanded dependent dummy variables in the multivariate estimations are included as explanatory variables in the dynamic models, as prescribed by the Woodridge

method (discussed earlier), to capture the transition probabilities for salaried-employed workers under different conditions and circumstances into self-employment, while accounting for unobserved individual heterogeneity and the initial conditions problem.

In addition to the lagged and initial sets of expanded dependent dummy variables, a number of explanatory variables are included, and selected based on the variables that have been used frequently in the existing research. These variables are intended to capture the effects of age[106], the number of resident dependent children, marital/de facto status, gender (female), education[107], long-term health condition or disability, geographic location of residence[108], home-ownership status[109], ethnic origin[110], unemployment rate in local area of residence[111], rates of se clf-employment in the industry and occupation of work[112], intergenerational occupational match[113], and labour market experience[114]. Furthermore, to address the initial conditions problem (discussed earlier), individual-specific means (i.e. the Mundlak corrections) for each of the time-varying explanatory variables are also included as additional explanatory variables.

Summary statistics of the explanatory variables for the largest and smallest samples

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[106] Age and age-squared are included as continuous variables that capture the non-linear relationship between ageing and labour market interaction.

[107] Education is included as a dummy set indicating the highest level of education attainment, broadly classified into university, vocational education, Year 12, and Year 11 or below levels of qualification.

[108] Geographic location is included as a dummy set representing urban, and rural/remote areas.

[109] Home-ownership status is included as a dummy set indicating whether a person owns their property of residence outright, holds a mortgage, holds a rent-buy agreement, pays rent or board, or holds a life-tenure agreement.

[110] Ethnic origin is included as a dummy set indicating whether a person was born an Australian native, or a foreign migrant born in either a main-English speaking country or a non-English speaking country.

[111] The unemployment rate is included as a continuous variable indicating the proportion of unemployment that exists in a respondent's local area, using Small Area Labour Market (SALM) information collated and published on a quarterly basis by the Australian Government's Department of Employment (https://employment.gov.au/small-area-labour-markets-publication). This information is matched to the HILDA data using the respondents' reported Local Government Area (LGA) geographic level (as defined by the Australian Standard Geographical Classification (ASGC), see ABS (1996; 2001; 2006)) of residence and for the quarterly time period closest to the respondents' date of interview.

[112] The self-employment rates are included as two continuous variables indicating the proportion of self-employed workers in a respondents industry and occupation of work. The information on the rates of self-employment is estimated from Australian Bureau of Statistics (ABS) national labour force statistics, and then matched to the HILDA survey data using the respondents' reported industry or occupation of work (at the 1-digit level of the Australian & New Zealand Standard Industrial Classification (ANZSIC) or the Australian & New Zealand Standard Occupation Classification (ANZSCO)).

[113] Intergenerational occupation match is included as one dummy indicating whether a person's current occupation was the same as their father's occupation when the person was aged 14. Paternal occupation information is reported by the respondent and matched to their current occupation of work (at the 2-digit level ANZSCO).

[114] Labour market experience is included as two continuous variables measuring the time a person spent in either unemployment or not-in-the labour force as a proportion of the total number of years since completing full-time education, but prior to entering the HILDA survey.

only are presented in Appendix 6.B, Table 6.10. There is very little change in the summary statistics between the largest and smallest samples. The summary statistics are also consistent with the statistics presented in earlier studies from the U.K. and U.S. (e.g. Evans & Leighton, 1989; Taylor, 1996; Blanchflower & Oswald, 1998; Hamilton, 2000; Henley, 2004; Uhlendorff, 2006; Taylor, 2011).

6.6 ESTIMATION RESULTS & DISCUSSION

The coefficient estimates for each of the dynamic random-effects panel probit models of self-employment are reported in Appendix 6.B, Table 6.11. The primary interest of this chapter is the importance of the coefficient estimates on the lagged employment states. As discussed earlier, the first set of models focus on the influence of the potential pecuniary and non-pecuniary benefits of entrepreneurship in determining self-employment, and separately distinguish employee outcomes at year $t-1$ by the hourly-wage distribution (Column (1), as well as by several measures of job-satisfaction (Column (2) through Column (3)) and work-autonomy (Column (4) through Column (7)), respectively. The second set of models focus on the impact that advantageous individual characteristics of entrepreneurs may have determining self-employment, and distinguish the employee circumstances at year $t-1$ separately by managerial status (Column (8)) and the receipt of a windfall gain (Column (9)).

In general, the results highlight the need to account for the dynamics of self-employment and for the impact of unobserved heterogeneity. The strong significance of coefficient estimates on the lagged-dependent and initial-dependent self-employment variables (i.e. self-employment status in years $t-1$ and $t=1$), both statistically and economically, are consistent with the findings from previous dynamic studies, as well as confirm the need to adequately account for the initial conditions problem. The statistical significance of initial-dependent variables in each of the models indicate that correlation between the unobserved individual heterogeneity and the initial condition exists, and the assumption that the initial value of self-employment status observed in the data is determined exogenously does not hold. Controlling for the presence of unobserved individual heterogeneity also reveals just how much remains unexplained by the observed characteristics. Across each of the models, the unobserved effect (denoted as rho ($\hat{\rho}$)) is strongly

significant and accounts for 46% to 48% of the unexplained variance. By comparison, the size and significance of the coefficient estimates on the remaining explanatory variables (i.e. age, gender, marital status, education etc.) are either statistically insignificant or economically small.

Because of the use of non-linear probit estimators in this analysis, the coefficient estimates reported in Table 6.11, Appendix 6.B, cannot be interpreted directly as marginal effects. To meaningfully interpret the magnitude of the coefficient estimates on the lagged employment states, the sample average of the predicted probabilities of self-employment at year t are estimated for each individual in the sample, holding fixed the employment state at year $t-1$.[115] These predicted transition probabilities are then used to estimate the marginal effects, or Average Partial Effects (APEs), for the genuine state-dependence of self-employment and the cross-dependencies of specific states within salaried-employment. That is, estimate the marginal effects as the counterfactual differences between the probability of a worker remaining in self-employment and the probability of transitioning into self-employment from another state in salaried-employment (i.e. the state-dependent effect), as well as the difference in the probabilities between transitioning into self-employment from one particular salaried-employment state relative to another salaried-employment state (i.e. the cross-dependence effects).

The remainder of the discussion focusses on the predicted probabilities of self-employment and the marginal effects of the coefficient estimates on the lagged-dependent variables in each of the estimated models.

Does self-employment appeal to employees in higher paying jobs or to those who feel disenfranchised with their work?

Employee pay

As discussed earlier, it was conjectured that the impact of the entrepreneurial earnings-premium on the choice of self-employment would more likely attract employees in higher paying jobs into becoming self-employed because, relative to low-pay employees, higher paid employees face a diminishing set of increasingly

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[115] Following Arulampalam (1999), the the coefficient estimates from each of the dynamic random-effects probit models are re-scaled by an estimate of $\sigma_v/\sigma_u = \sqrt{1-\rho}$ prior to calculating the sample mean predicted probabilities and partial effects (where $\rho = corr(u_{i,t}, u_{i,s}) = \sigma_\varepsilon^2/(\sigma_\varepsilon^2 + \sigma_v^2)$ for $t, s = 2, \dots, T; t \neq s$). This provides comparability with predicted probabilities and marginal effects from pooled-panel probit model estimates.

attractive alternatives in salaried-employment. The results, however, do not support this conjecture. Instead, the results indicate that employees at both the lowest and highest wage quintiles are more likely to transition to self-employment, while those in 'middle-pay' jobs are least likely to become self-employed. As identified earlier, a limitation of this finding is the potential confounding effect of employees' income tax liability, which is not accounted for.

Table 6.5 shows the mean predicted probabilities of self-employment status at year t for employees transitioning from wage quintile states at year $t - 1$; as well as the marginal effects for state-dependence in self-employment and for cross-dependencies in the employee wage quintile states, relative to the median employee wage quintile.[116] Relative to employees in the median wage quintile, the cross-dependent effects for those in the lowest paying jobs and for those in the highest paying jobs increase the probability of self-employment by a similar amount: 2.7 and 1.8 percentage points, respectively. This pattern of transitions reveals that the relationship between employee earnings and the likelihood of becoming self-employed is U-shaped. Self-employment attracts employees from both extremes of the earnings distribution by roughly similar proportions. This unexpected finding is in stark contrast to much of the existing, predominately static cross-sectional, research and casts doubt on the notion of entrepreneurial pecuniary benefits as a general explanation for the choice of self-employment.

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[116] The mean predicted probabilities are based on the coefficient estimates from Column (1) of Table 6.11, Appendix 6.B.

Table 6.5: Employee *wage quintile* states: (average predicted) transition probabilities of self-employment status, & the marginal state-dependence & cross-dependence effects

	Self-employed$_t$	Employee$_t$
Transition probabilities		
Self-employed$_{t-1}$	0.387***	0.613
	(0.018)	
Employee$_{t-1}$		
Lowest quintile	0.110***	0.890
	(0.006)	
2nd quintile	0.086***	0.914
	(0.005)	
Median quintile	0.083***	0.917
	(0.005)	
4th quintile	0.085***	0.915
	(0.005)	
Highest quintile	0.101***	0.899
	(0.005)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (Median quin.)$_{t-1}$	0.304***	
	(0.022)	
Cross-dependence		
Emp. (Lowest quin.)$_{t-1}$ — Emp. (Median quin.)$_{t-1}$	0.027***	
	(0.006)	
Emp. (2nd quin.)$_{t-1}$ — Emp. (Median quin.)$_{t-1}$	0.003	
	(0.006)	
Emp. (3rd quin.)$_{t-1}$ — Emp. (Median quin.)$_{t-1}$	0.002	
	(0.006)	
Emp. (Highest quin.)$_{t-1}$ — Emp. (Median quin.)$_{t-1}$	0.018***	
	(0.006)	

Notes: Standard errors are in parenthesis
        * denotes the predicted probabilities and APEs significant at = 10%, ** at = 5% and *** at = 1%
Source: HILDA Survey, 2001-2011

Employee job satisfaction & work autonomy

There is also mixed evidence for the conjecture that the intrinsic appeal of the entrepreneurial non-pecuniary benefits, derived from the 'procedural utility' value of 'being your own boss', influences individuals' choice of self-employment. Table 6.6 and Table 6.7 show the averaged predicted probabilities of self-employment status at year t for employees at year $t-1$ by level of satisfaction for the selected measures of job satisfaction and work autonomy, respectively.[117] These tables also include the estimated state-dependence effect of self-employment, as well as the cross-dependence effects of employee satisfaction/dissatisfaction, relative to the residual employee state of satisfaction (i.e. neither satisfied nor dissatisfied within ±1 standard deviation of the employee sample means). While these results are unable to determine if self-employment improves the satisfaction of employees who

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[117] The mean predicted probabilities are based on the coefficient estimates from Column (2) through Column (7) of Table 6.11, Appendix 6.B.

become self-employed, the results do indicate the extent to which employee satisfaction (or dissatisfaction) with various aspects of their current job cause transitions into self-employment in the future.

As shown in Table 6.6, the results indicate that employees who are either the least or the most satisfied in their existing job, relative to those who are neither, are both more likely to become self-employed. For example, the cross-dependent effects of employee satisfaction and dissatisfaction with their job overall both increase the probability of becoming self-employed by 1.5 and 3.2 percentage points, respectively. This U-shaped pattern of employee transitions to self-employment is also similar for the other measures of job satisfaction. For the measure of total pay satisfaction, the cross-dependent effects for employees who were either the most or least satisfied increase the probability of self-employment by almost equal amounts: 1.0 and 1.6 percentage points, respectively. For the work itself measure of satisfaction the U-shape pattern is less pronounced, with the cross-dependent effect of employee satisfaction increasing the probability of self-employment by a much smaller amount than the cross-dependent effect of employee dissatisfaction: 0.9 and 2.2 percentage points, respectively.

These results are inconsistent with the implications of the entrepreneurial notion of non-pecuniary benefits as a general explanation for self-employment. Rather than only find that employees are increasingly attracted to self-employment as dissatisfaction with their existing job increases, these patterns of transition instead reveal that employees at both extremes of the job satisfaction distribution are attracted to self-employment.

Table 6.6: Employee *job satisfaction* states: Probability of self-employment (average predicted), & the marginal state-dependence & cross-dependence effects

Job Overall	Self-employed$_t$	Employee$_t$
Transition probabilities		
Self-employed$_{t-1}$	0.369***	0.631
	(0.017)	
Employee$_{t-1}$		
Satisfied	0.110***	0.890
	(0.006)	
Residual	0.095***	0.905
	(0.003)	
Dissatisfied	0.128***	0.872
	(0.006)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (residual)$_{t-1}$	0.274***	
	(0.018)	
Cross-dependence		
Emp. (Satisfied)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.015**	
	(0.006)	
Emp. (Dissatisfied)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.032***	
	(0.006)	
Work Itself	**Self-employed (t)**	**Employee (t)**
Transition probabilities		
Self-employed$_{t-1}$	0.369***	0.631
	(0.017)	
Employee$_{t-1}$		
Satisfied	0.106***	0.894
	(0.006)	
Residual	0.097***	0.903
	(0.003)	
Dissatisfied	0.119***	0.881
	(0.006)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (residual)$_{t-1}$	0.272***	
	(0.018)	
Cross-dependence		
Emp. (Satisfied)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.009	
	(0.005)	
Emp. (Dissatisfied)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.022***	
	(0.005)	
Total Pay	**Self-employed (t)**	**Employee (t)**
Transition probabilities		
Self-employed$_{t-1}$	0.370***	0.630
	(0.017)	
Employee$_{t-1}$		
Satisfied	0.108***	0.892
	(0.007)	
Residual	0.098***	0.902
	(0.003)	
Dissatisfied	0.113***	0.887
	(0.006)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (residual)$_{t-1}$	0.272***	
	(0.018)	
Cross-dependence		
Emp. (Satisfied)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.010	
	(0.006)	
Emp. (Dissatisfied)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.016***	
	(0.005)	

Notes: see Table 6.5 (above).
Source: see Table 6.5 (above).

Further analysis of the importance of the entrepreneurial non-pecuniary benefits in determining self-employment using selected measures of autonomy in work also reveals that self-employment appeals most to employees who already have a high level of discretion over *how*, *what* and *when* work is completed in their existing job. As shown in Table 6.7, employees who felt they had greater autonomy and independence in their existing job are more likely to transition into self-employment, while those who felt increasingly disenfranchised in their job are less likely to become self-employed. This pattern of employee transitions is also similar for each of the three measures of autonomy, with the most pronounced difference being around the flexibility in timing *when* work is done. For example, relative to employees who express an indifference to their freedoms in deciding when to complete work, the cross-dependent effects for those with a high degree of freedom increases the probability of their becoming self-employed by 3.0 percentage points, while those with a low degree of freedom decreased the probability of self-employment by 0.6 percentage points.

Rather than support the corollary of the entrepreneurial notion that its intrinsic non-pecuniary benefits of 'being your own boss' would be most appealing to disenfranchised employees, these results instead find the opposite and show that self-employment is, in fact, increasingly attractive to employees who have already attained higher levels of autonomy in their existing jobs and increasingly less attractive to those without autonomy. This evidence runs contrary to the prevailing entrepreneurial understanding about the possible influence of its non-pecuniary features, and is also inconsistent with the evidence presented on the selected measures of job satisfaction discussed earlier. The evidence instead indicates that self-employment is valued more highly by employees who have already achieved autonomy in their work.

Table 6.7: Employee *work autonomy* states: Probability of self-employment (average predicted), & the marginal state-dependence & cross-dependence effects

How Work is Done	Self-employed$_t$	Employee$_t$
Transition probabilities		
Self-employed$_{t-1}$	0.399***	0.601
	(0.018)	
Employee$_{t-1}$		
Agree	0.115***	0.885
	(0.006)	
Residual	0.097***	0.903
	(0.003)	
Disagree	0.088***	0.912
	(0.006)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (residual)$_{t-1}$	0.302***	
	(0.019)	
Cross-dependence		
Emp. (Agree)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.018***	
	(0.006)	
Emp. (Disagree)$_{t-1}$ — Emp. (residual)$_{t-1}$	-0.009	
	(0.006)	
What Work is Done	**Self-employed$_t$**	**Employee$_t$**
Transition probabilities		
Self-employed$_{t-1}$	0.400***	0.600
	(0.018)	
Employee$_{t-1}$		
Agree	0.108***	0.892
	(0.005)	
Residual	0.094**	0.906
	(0.004)	
Disagree	0.093***	0.907
	(0.006)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (residual)$_{t-1}$	0.307***	
	(0.020)	
Cross-dependence		
Emp. (Agree)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.014***	
	(0.004)	
Emp. (Disagree)$_{t-1}$ — Emp. (residual)$_{t-1}$	-0.000	
	(0.005)	
When Work is Done	**Self-employed$_t$**	**Employee$_t$**
Transition probabilities		
Self-employed$_{t-1}$	0.401***	0.599
	(0.018)	
Employee$_{t-1}$		
Agree	0.123***	0.877
	(0.006)	
Residual	0.093***	0.907
	(0.004)	
Disagree	0.086***	0.914
	(0.006)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (residual)$_{t-1}$	0.309***	
	(0.019)	
Cross-dependence		
Emp. (Agree)$_{t-1}$ — Emp. (residual)$_{t-1}$	0.030***	
	(0.005)	
Emp. (Disagree)$_{t-1}$ — Emp. (residual)$_{t-1}$	-0.006	
	(0.006)	

Notes: see Table 6.5 (above).
Source: see Table 6.5 (above).

Is the value of self-employment greater to employees in managerial positions or to those who experience a windfall gain?

The estimates from the second set of models also find that entrepreneurially advantageous characteristics of employees, once unobserved heterogeneity is controlled for, play a trivial role in precipitating the choice of self-employment in the future. Table 6.8 and Table 6.9 show the averaged predicted probabilities of self-employment status at year t for employees at year $t-1$ by their managerial/supervisory status in their existing job and the receipt of any windfall (or irregular) income, respectively; as well as the marginal effects for state-dependence in self-employment and cross-dependencies between the different employee states at year $t-1$.[118] In both instances, there is very little in difference between the probability estimates of employees transitioning to self-employment as their circumstances change. For example, experiencing an irregular financial windfall during the preceding financial year, relative to no windfall, increases the probability of future self-employment for an employee by only 0.8 percentage points. Furthermore, the effect of managerial status is not only small but also in the opposite direction to the finding that was expected. For example, employees who have been recognised, selected and possibly nurtured to work in managerial/supervisory jobs by their employers, relative to being in a non-managerial job, are actually 0.9 percentage points less likely to become self-employed in the future.

The results indicate that once unobserved individual heterogeneity is controlled for the distinctive individual characteristics that are thought to influence the appeal of entrepreneurship exert very little additional influence on bringing about the transition of employees into self-employment. These findings are in contrast to the previous research (discussed earlier), and also casts doubt on the entrepreneurial explanations that certain employees are more likely to select into self-employment because of their non-cognitive and cognitive talents, or their access to 'seed' capital.

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[118] The mean predicted probabilities are based on the coefficient estimates from Column (8) through Column (9) of Table 6.11, Appendix 6.B.

Table 6.8: Employee *managerial/supervisory* state: Probability of self-employment (average predicted), & the marginal state-dependence & cross-dependence effects

	Self-employed$_t$	Employee$_t$
Transition probabilities		
Self-employed$_{t-1}$	0.368***	0.632
	(0.017)	
Employee$_{t-1}$		
Manager/supervisor	0.097***	0.903
	(0.004)	
Non-managerial position	0.106***	0.894
	(0.004)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (Non-manager)$_{t-1}$	0.262***	
	(0.017)	
Cross-dependence		
Emp. (Manager)$_{t-1}$ — Emp. (Non-manager)$_{t-1}$	-0.009**	
	(0.004)	

Notes: see Table 6.5 (above).
Source: see Table 6.5 (above).

Table 6.9: Employee *windfall gain* state: Probability of self-employment (average predicted), & the marginal state-dependence & cross-dependence effects

	Self-employed$_t$	Employee$_t$
Transition probabilities		
Self-employed$_{t-1}$	0.367***	0.633
	(0.017)	
Employee$_{t-1}$		
Windfall gain	0.110***	0.890
	(0.008)	
No gain	0.101***	0.899
	(0.003)	
Average Partial Effects		
State-dependence		
Self-emp.$_{t-1}$ — Emp. (No gain)$_{t-1}$	0.266***	
	(0.017)	
Cross-dependence		
Emp. (Windfall)$_{t-1}$ — Emp. (No gain)$_{t-1}$	0.008	
	(0.007)	

Notes: see Table 6.5 (above).
Source: see Table 6.5 (above).

The importance of state-dependence of self-employment

The coefficient estimates on the lagged-dependent variable in each of the models also find the interdependence between the quality of employee outcomes and self-employment is inconsequential when compared against the impact of state-dependence on self-employment. Across each of the models, the coefficient estimates on the lagged-dependent self-employment variables are positive, highly statistically significant, and have considerably larger magnitudes than any of the other lagged-dependent employee outcome variables. That is, the experience in self-

employment *itself* has a much larger impact on future self-employment prospects than any of the other outcomes or circumstances experienced as an employee. For example, using the marginal effects of the predicted probability estimates reported in Table 6.5 (above), while the probability of low-pay and high-pay employees becoming self-employed is 2.7 and 1.8 percentage points, relative to the median paid employees; the increase in probability for self-employed workers is a massive 30.4 percentage points. The story is similar for the results across each of the models.

In terms of future self-employment prospects, none of the employee outcomes or circumstances distinguished have as much of an impact as the experience in self-employment. That is, the quality of the experience in self-employment itself is not similar to any of the particular employee outcomes in determining the future probability of self-employment. Instead of providing a greater insight into the possible cause underlying the state-dependence of self-employment, the results provide no strong indication as to why workers initially choose self-employment in the first place.

6.7 CONCLUDING REMARKS

Treating self-employment as a form of entrepreneurship is commonplace in the economic literature. Predicated on economic theories of entrepreneurship, particularly those that formalise Knight's (1921) interpretation of entrepreneurship, the research has emphasised the distinctive features of the entrepreneurial role, and of entrepreneurs, as the determinants that shift cost-benefit calculus of workers in favour of self-employment. In particular, the research focusses on the importance of the appeal of entrepreneurial benefits — such as, the potential earnings-premium that comes with operating a business for a risky-profit, or the potential 'procedural' utility derived from 'being your own boss' —; as well as the importance of advantageous attributes and traits of entrepreneurs — such as, innate cognitive and non-cognitive characteristics of individuals that makes individuals more adept at dealing with or valuing uncertainty, or access to intergenerational financial wealth to gain the necessary collateral to secure the confidence of others and the 'seed' capital to create a business. In stark contrast to much of the existing literature, however, the evidence in support of the entrepreneurial predictions for why employees freely transition into self-employment is found to be much weaker than

previously thought.

Using the longitudinal HILDA data for Australia, this chapter presents estimates from several dynamic models that examine the extent of genuine state-dependence in determining the probability of current self-employment and the role played in this by the intrinsic quality of the employment outcomes and extant circumstances of employees. Each model separately distinguishes the past employment outcomes or extant circumstances of employees based on the entrepreneurial hypotheses derived from the literature. These models were then estimated using a dynamic random-effects panel probit framework to control for the impact of persistent unobserved individual heterogeneity and the deal with the initial conditions problem. The results reveal several key findings.

First, rather than show that employees become self-employed in a pattern consistent with an entrepreneurial earnings-premium in self-employment, the results instead show the relationship between employee earnings and the likelihood of self-employment is U-shaped. That is, relative to employees in 'middle-pay' jobs, employees at both the lowest and highest wage-quintiles are more likely to transition into self-employment. This finding is only partially consistent with the entrepreneurial notion of self-employment and suggests that this understanding is incomplete. As identified earlier, one confounding possibility is the potential impact of differences in employees' income tax liabilities, which would similarly attract high earning employees into self-employment. For reasons identified earlier, this additional layer of complexity was not dealt with in this analysis, and the extent of its impact on the findings remains unclear. However, if tax-arbitrage were found to explain the transition of high-paid employees into self-employment, this would further diminish the entrepreneurial notion of self-employment. This is a question for future research.

Second, the evidence that self-employment increasingly appeals to employees disenfranchised with their current job or employer because of perceived non-pecuniary benefits in self-employment is also found to be weak. Instead, the patterns of transition reveal that employees at both extremes of the job satisfaction distribution are just as likely to become self-employment. Further analysis of the importance entrepreneurial non-pecuniary benefits reveals that self-employment is most appealing to employees who already have a high level of discretion over how,

what and when work is completed in their existing job.

Third, entrepreneurially advantageous characteristics play a trivial role in bringing forward the choice of self-employment. Once the important impact unobserved individual heterogeneity is controlled for, the difference in the probability of employees becoming self-employed because of a change in their managerial status or because of the receipt of a windfall gain is negligible. These findings cast doubt on the entrepreneurial explanations that workers select into self-employment because of their cognitive and non-cognitive abilities, or their access to 'seed' capital.

Finally, the most important finding is just how inconsequential the influence of the quality of employees past outcomes on the future self-employment prospects are when compared alongside the impact of state-dependence of self-employment. Consistent throughout the results, the past experience in self-employment itself has a much larger impact on the current self-employment status than any of the other outcomes or circumstances as an employee.

Overall, the most remarkable finding is just how unremarkable the entrepreneurial determinants derived from the existing literature are at influencing the choice of self-employment. Once dynamics and unobserved heterogeneity are adequately accounted for, there is little evidence that employees are attracted disproportionately into self-employment because of the appeal of the distinctive features of entrepreneurship. Instead, in some instances, the evidence is even counterintuitive to the theoretical implications. The reasons for why workers choose to become self-employed and the genuine cause of state-dependence are questions that remain to be answered.

APPENDIX 6.A — A SUMMARY OF KNIGHTIAN ENTREPRENEURSHIP: THE PRESENCE OF UNCERTAINTY & THE SPECIALISATION OF THE ENTREPRENEURIAL FUNCTION IN THE LABOUR MARKET.

As proposed in Knight (1921) the presence of uncertainty transforms the 'doing of things' from a mechanical task or the simple execution of an activity to being a task

of *deciding what to do* and *how to do it*.[119] The presence of uncertainty makes it necessary for individuals' to exercise knowledge and judgement, which exerts a tendency for individuals to specialise the functions of production in the labour market and to organise themselves between working as an entrepreneur and working as the employee of an entrepreneur.

In Knight's view, the entrepreneur is delegated control of and responsibility for the production function of a (homogenous) good or service by the non-entrepreneurs (i.e. the remaining workers). The entrepreneur organises the labour services of the remaining workers (and capital inputs) and directs their activities. In return for placing their labour services under the direction of the entrepreneur, the non-entrepreneurs receive satisfactory guarantees against uncertainty and fluctuations in their wage-price from the entrepreneur. This is what Knight refers to as the "double contract".[120] Therefore, the entrepreneur's contribution to the production process is their ability to accurately forecast the product demand (i.e. deciding how much to produce and how much additional labour to employ), while also having the requisite qualities to secure the labour services of the remaining workers.

In return for their contribution, the entrepreneur receives the residual profit from the production process, which is the remaining amount from the income received for the output of goods or services supplied to the product market minus the cost of production, namely the cost of employing the remaining non-entrepreneurs at a fixed or guaranteed wage-price. However, the residual profit received by the entrepreneur is subject to the degree of their effective judgement or decision-making in dealing with the uncertainties of estimating both the "technical or physically measured product (specific contribution) of the labour *and* the price to be expected for that product when it comes upon the market."[121] Rather than be determined directly by demands for entrepreneurial or managerial ability, the entrepreneur's income is, for the most part, determined indirectly by the competing demands for the labour services of the non-entrepreneurs, which adjusts the wage-price cost that the entrepreneur guarantees to pay the non-entrepreneur before receiving anything themselves. That is, the entrepreneur's income is not "determined" *per se*, but is

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[119] Knight (1921: 268)
[120] Knight (1921: 270)
[121] Knight (1921: 275)

"what is left" after the others are "determined."[122]

The individuals' decision to participate as either an entrepreneur or as a non-entrepreneur is then determined through a competitive bidding process of "offers and counter-offers", which adjusts the wage-price of the labour services of the non-entrepreneurs, based on the judgement of actual and potential entrepreneurs.

> *"The laborer asks what he thinks the entrepreneur will be able to pay, and in any case will not accept less than he can get from some other entrepreneur, or by turning entrepreneur himself. In the same way the entrepreneur offers to any laborer what he thinks he must in order to secure his services, and in any case not more than he thinks the laborer will actually be worth to him, keeping in mind what he can get by turning labourer himself. … Since in a free market there can be but one price on any commodity, a general wage rate must result from this competitive bidding. … The mechanism of price adjustment is the same as in any other market. There is always an established uniform rate, which is kept constantly at the point which equates the supply and demand." (Knight, 1921: 273-274)*

The residual profits received by entrepreneurs are determined by the entrepreneurs' demand for labour services of the remaining workers, which, in turn, is determined by the "self-confidence of entrepreneurs as a class…."[123] Correspondingly, the supply of entrepreneurs is determined by the factors that affect self-confidence, which Knight identifies as endowments of: *ability* (i.e. knowledge and judgement, foresight and a capacity for managing others); a *willingness* to take responsibility and bear risks (i.e. confidence of judgement); the *power to give satisfactory guarantees* (i.e. a disposition to 'back it up' in action); and, the *coincidence of these factors*.[124] Therefore, the decision by an individual to participate as an entrepreneur depends upon the conviction of their beliefs that they can bring together the labour services of the non-entrepreneurs and generate an anticipated residual income that is greater than or equal to the prevailing wage-price foregone, which is similarly fixed upon them by the conviction of the beliefs of the other entrepreneurs (both actual and potential). In doing so, Knight emphasises the "importance of indirect knowledge of fact through the knowledge of others' knowledge"[125], the uncertainty of which distinguishes both the desirable features of the entrepreneurial function as well as

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[122] Knight (1921: 280)
[123] Knight (1921: 283)
[124] Knight (1921: 282)
[125] Knight (1921: 288)

the competitive environment for determining entrepreneurial positions.

APPENDIX 6.B

Table 6.10: Summary statistics for explanatory variables

Dependent variable: Pr[Self-employed = 1]	(1)		(2)	
	Mean	S.D.	Mean	S.D.
Demographic characteristics				
Age (in years)	42.1	12.3	41.6	12.5
Age^2	1925.8	1063.4	1884.8	1068.1
No. of resident dependent children	0.9	1.2	0.9	1.2
Marital status (base= single):				
~ Married/defacto	0.72	0.45	0.71	0.45
Long-term health condition (base= none):				
~ Disability/impairment	0.14	0.35	0.14	0.34
Geographic location (base= city/urban):				
~ Regional/remote	0.17	0.37	0.16	0.37
Home Ownership (base= mortgage/rent-buy):				
~ Own	0.26	0.44	0.25	0.43
~ Rent/board	0.23	0.42	0.24	0.43
~ Life-tenure (no-equity)	0.02	0.14	0.02	0.15
Education (base= school non-completer):				
~ University	0.29	0.45	0.28	0.45
~ VET	0.35	0.48	0.35	0.48
~ Yr. 12	0.15	0.36	0.15	0.36
Gender [t=1] (base= male):				
~ Female	0.46	0.50	0.46	0.50
Country of birth [t=1] (base= Australia):				
~ Main English speaking	0.10	0.30	0.10	0.30
~ Non-English speaking	0.09	0.29	0.10	0.30
Employment/labour market characteristics				
SALM unemployment rate *(%)*	5.3	2.56	5.3	2.6
Self-employment rate in industry *(%)*	18.4	14.5	18.5	14.5
Self-employment rate in occupation *(%)*	20.1	11.0	20.0	11.0
Paternal occupation match (base= no match):				
~ Match	0.07	0.26	0.07	0.25
Share of working-life in unemployment *(%) [t=1]*	3.1	9.0	3.3	9.5
Share working-life not-in-the labour market *(%) [t=1]*	12.0	19.4	12.2	19.8
No. of observations	56,923		64,960	
No. of respondents	10,581		11,702	
Average no. of obs. per respondent	5.4		5.6	

Notes: The samples include individuals aged 15 years or over, and not currently studying full-time.
          The individual-specific means of the time-varying explanatory variables are not included in this table
          ~ indicates a dummy variable set.
          [t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

Table 6.11: Coefficient estimates

Dependent variable: Pr[Self-employed = 1]	(1) Coef.	S.E.	(2) Coef.	S.E.	(3) Coef.	S.E.	(4) Coef.	S.E.	(5) Coef.	S.E.	(6) Coef.	S.E.	(7) Coef.	S.E.	(8) Coef.	S.E.	(9) Coef.	S.E.
Employee wage distribution																		
Lagged dependent (base= Employee: 3rd quintile [t-1])																		
~ Self-employed *[t-1]*	1.998***	(0.05)																
~ Employee: Lowest quintile [t-1]	0.303***	(0.05)																
~ Employee: 2nd quintile [t-1]	0.038	(0.05)																
~ Employee: 4th quintile [t-1]	0.029	(0.05)																
~ Employee: Highest quintile [t-1]	0.209***	(0.05)																
Initial dependent (base= Employee: 3rd quintile [t=1])																		
~ Self-employed *[t=1]*	1.765***	(0.08)																
~ Employee: Lowest quintile [t=1]	0.113*	(0.07)																
~ Employee: 2nd quintile [t=1]	0.008	(0.07)																
~ Employee: 4th quintile [t=1]	-0.018	(0.07)																
~ Employee: Highest quintile [t=1]	0.068	(0.07)																
Overall job satisfaction																		
Lagged dependent (base= Employee: residual [t-1])																		
~ Self-employed *[t-1]*			1.839***	(0.04)														
~ Employee: satisfied [t-1]			0.167***	(0.05)														
~ Employee: dissatisfied [t-1]			0.241***	(0.04)														
Initial dependent (base= Employee: residual [t=1])																		
~ Self-employed *[t=1]*			1.796***	(0.07)														
~ Employee: satisfied [t=1]			-0.072	(0.06)														
~ Employee: dissatisfied [t=1]			0.067	(0.05)														
Pay satisfaction																		
Lagged dependent (base= Employee: residual [t-1])																		
~ Self-employed *[t-1]*					1.810***	(0.04)												
~ Employee: satisfied [t-1]					0.112**	(0.05)												
~ Employee: dissatisfied [t-1]					0.172***	(0.05)												
Initial dependent (base= Employee: residual [t=1])																		
~ Self-employed *[t=1]*					1.801***	(0.07)												
~ Employee: satisfied [t=1]					-0.071	(0.07)												
~ Employee: dissatisfied [t=1]					0.097*	(0.05)												

Table 6.11 (cont.)

Dependent variable: Pr[Self-employed = 1]	(1) Coef.	S.E.	(2) Coef.	S.E.	(3) Coef.	S.E.	(4) Coef.	S.E.	(5) Coef.	S.E.	(6) Coef.	S.E.	(7) Coef.	S.E.	(8) Coef.	S.E.	(9) Coef.	S.E.
Satisfaction with the work itself																		
Lagged dependent (base= Employee: residual [t-1])																		
~ Self-employed *[t-1]*							1.818***	(0.04)										
~ Employee: satisfied [t-1]							0.101**	(0.05)										
~ Employee: dissatisfied [t-1]							0.242***	(0.04)										
Initial dependent (base= Employee: residual [t=1])																		
~ Self-employed *[t=1]*							1.807***	(0.07)										
~ Employee: satisfied [t=1]							-0.003	(0.05)										
~ Employee: dissatisfied [t=1]							0.104*	(0.06)										
Have the freedom to decide how to do own work																		
Lagged dependent (base= Employee: residual [t-1])																		
~ Self-employed *[t-1]*									1.911***	(0.04)								
~ Employee: agree [t-1]									0.191***	(0.05)								
~ Employee: disagree [t-1]									-0.103*	(0.06)								
Initial dependent (base= Employee: residual [t=1]																		
~ Self-employed *[t=1]*									1.739***	(0.08)								
~ Employee: agree [t=1]									0.071	(0.06)								
~ Employee: disagree [t=1]									0.136**	(0.06)								
Have a lot of say about what happens on the job																		
Lagged dependent (base= Employee: residual [t-1])																		
~ Self-employed *[t-1]*											1.949***	(0.04)						
~ Employee: agree [t-1]											0.154***	(0.04)						
~ Employee: disagree [t-1]											-0.006	(0.05)						
Initial dependent (base= Employee: residual [t=1])																		
~ Self-employed *[t=1]*											1.743***	(0.08)						
~ Employee: agree [t=1]											0.088*	(0.05)						
~ Employee: disagree [t=1]											0.059	(0.06)						
Have the freedom to decide when do to work																		
Lagged dependent (base= Employee: residual [t-1])																		
~ Self-employed *[t-1]*													1.964***	(0.04)				
~ Employee: agree [t-1]													0.315***	(0.04)				
~ Employee: disagree [t-1]													-0.076	(0.05)				
Initial dependent (base= Employee: residual [t=1)]																		
~ Self-employed *[t=1]*													1.710***	(0.08)				
~ Employee: agree [t=1]													0.057	(0.06)				
~ Employee: disagree [t=1]													-0.015	(0.06)				

Table 6.11 (cont.)

Dependent variable: Pr[Self-employed = 1]	(1) Coef.	S.E.	(2) Coef.	S.E.	(3) Coef.	S.E.	(4) Coef.	S.E.	(5) Coef.	S.E.	(6) Coef.	S.E.	(7) Coef.	S.E.	(8) Coef.	S.E.	(9) Coef.	S.E.
Employed in a managerial or supervisory role																		
Lagged dependent (base= Employee: non-man. [t-1])																		
~ Self-employed *[t-1]*															1.714***	(0.04)		
~ Employee: manager/supervisor *[t-1]*															-0.106***	(0.03)		
Initial dependent (base= Employee: non-man. [t=1])																		
~ Self-employed *[t=1]*															1.772***	(0.07)		
~ Employee: manager/supervisor *[t=1]*															-0.048	(0.04)		
Experienced a 'windfall gain' to gross FY income																		
Lagged dependent (base= Employee: no gain [t-1])																		
~ Self-employed *[t-1]*																	1.769***	(0.04)
~ Employee: windfall gain *[t-1]*																	0.092	(0.06)
Initial dependent (base= Employee: no gain [t=1])																		
~ Self-employed *[t=1]*																	1.806***	(0.07)
~ Employee: windfall gain *[t=1]*																	-0.003	(0.09)
Demographic characteristics																		
Age (in years)	0.129***	(0.02)	0.122***	(0.02)	0.125***	(0.02)	0.122***	(0.02)	0.120***	(0.02)	0.117***	(0.02)	0.116***	(0.02)	0.123***	(0.02)	0.122***	(0.02)
Age^2	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)	-0.001***	(0.00)
No. of resident dependent children	0.064**	(0.03)	0.065**	(0.03)	0.067**	(0.03)	0.064**	(0.03)	0.057**	(0.03)	0.057**	(0.03)	0.054*	(0.03)	0.064**	(0.03)	0.065**	(0.03)
Marital status (base= single):																		
~ Married/defacto	0.106*	(0.06)	0.116**	(0.06)	0.118**	(0.06)	0.116**	(0.06)	0.103*	(0.06)	0.100	(0.06)	0.100	(0.06)	0.118**	(0.06)	0.116**	(0.06)
Long-term health condition (base= none):																		
~ Disability/impairment	0.105**	(0.04)	0.114***	(0.04)	0.112***	(0.04)	0.115***	(0.04)	0.100**	(0.05)	0.103**	(0.05)	0.101**	(0.05)	0.114***	(0.04)	0.115***	(0.04)
Geographic location (base= city/urban):																		
~ Regional/remote	0.048	(0.07)	0.070	(0.07)	0.070	(0.07)	0.070	(0.07)	0.017	(0.08)	0.016	(0.08)	0.009	(0.08)	0.072	(0.07)	0.073	(0.07)
Home Ownership (base= mortgage/rent-buy):																		
~ Own	0.022	(0.05)	0.039	(0.04)	0.039	(0.04)	0.038	(0.04)	0.023	(0.05)	0.022	(0.05)	0.023	(0.05)	0.038	(0.04)	0.038	(0.04)
~ Rent/board	-0.010	(0.05)	-0.028	(0.05)	-0.029	(0.05)	-0.025	(0.05)	-0.044	(0.06)	-0.042	(0.06)	-0.049	(0.06)	-0.028	(0.05)	-0.026	(0.05)
~ Life-tenure (no-equity)	0.146	(0.11)	0.098	(0.11)	0.117	(0.11)	0.104	(0.11)	0.028	(0.12)	0.029	(0.12)	0.018	(0.12)	0.099	(0.11)	0.096	(0.11)
Education (base= school non-completer):																		
~ University	-0.289	(0.24)	-0.454*	(0.24)	-0.394*	(0.24)	-0.450*	(0.23)	-0.523**	(0.26)	-0.503*	(0.26)	-0.508*	(0.26)	-0.427*	(0.23)	-0.431*	(0.23)
~ VET	-0.081	(0.15)	-0.253*	(0.15)	-0.185	(0.15)	-0.249*	(0.15)	-0.289*	(0.17)	-0.267	(0.17)	-0.282*	(0.17)	-0.234	(0.15)	-0.245	(0.15)
~ Yr. 12	-0.143	(0.22)	-0.274	(0.22)	-0.198	(0.22)	-0.261	(0.22)	-0.353	(0.24)	-0.345	(0.24)	-0.353	(0.24)	-0.246	(0.22)	-0.247	(0.22)
Gender [t=1] (base= male):																		
~ Female	-0.067*	(0.04)	-0.043	(0.04)	-0.057	(0.04)	-0.048	(0.04)	-0.044	(0.04)	-0.036	(0.04)	-0.048	(0.04)	-0.050	(0.04)	-0.045	(0.04)
Country of birth [t=1] (base= Australia):																		
~ Main English speaking	0.143***	(0.06)	0.142***	(0.06)	0.145***	(0.06)	0.144***	(0.06)	0.138**	(0.06)	0.137**	(0.06)	0.144**	(0.06)	0.148***	(0.06)	0.147***	(0.06)
~ Non-English speaking	0.197***	(0.06)	0.199***	(0.06)	0.207***	(0.06)	0.204***	(0.06)	0.160***	(0.06)	0.165***	(0.06)	0.155***	(0.06)	0.202***	(0.06)	0.213***	(0.06)

Table 6.11 (cont.)

Dependent variable: Pr[Self-employed = 1]	(1) Coef.	S.E.	(2) Coef.	S.E.	(3) Coef.	S.E.	(4) Coef.	S.E.	(5) Coef.	S.E.	(6) Coef.	S.E.	(7) Coef.	S.E.	(8) Coef.	S.E.	(9) Coef.	S.E.
Employment/labour market characteristics																		
SALM unemployment rate *(%)*	0.011	(0.01)	0.009	(0.01)	0.010	(0.01)	0.009	(0.01)	0.003	(0.01)	0.005	(0.01)	0.004	(0.01)	0.009	(0.01)	0.009	(0.01)
Self-employment rate in industry *(%)*	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)	0.022***	(0.00)
Self-employment rate in occupation *(%)*	0.012***	(0.00)	0.013***	(0.00)	0.012***	(0.00)	0.013***	(0.00)	0.012***	(0.00)	0.012***	(0.00)	0.012***	(0.00)	0.013***	(0.00)	0.013***	(0.00)
Paternal occupation match (base= no match):																		
~ Match	0.112	(0.07)	0.129*	(0.07)	0.120*	(0.07)	0.124*	(0.07)	0.124	(0.08)	0.134*	(0.08)	0.132*	(0.08)	0.121*	(0.07)	0.121*	(0.07)
Share of working-life in unemployment *(%) [t=1]*	-0.002	(0.00)	-0.002	(0.00)	-0.002	(0.00)	-0.002	(0.00)	-0.001	(0.00)	-0.001	(0.00)	-0.001	(0.00)	-0.002	(0.00)	-0.002	(0.00)
Share working-life not-in-the labour market *(%) [t=1]*	-0.001	(0.00)	0.000	(0.00)	0.000	(0.00)	0.000	(0.00)	-0.000	(0.00)	-0.000	(0.00)	-0.000	(0.00)	0.000	(0.00)	0.000	(0.00)
Constant	-4.973***	(0.25)	-4.774***	(0.23)	-4.728***	(0.23)	-4.801***	(0.23)	-4.629***	(0.24)	-4.601***	(0.24)	-4.536***	(0.24)	-4.705***	(0.23)	-4.739***	(0.23)
$\hat{\rho}$ (rho)	0.46		0.47		0.47		0.47		0.46		0.45		0.46		0.47		0.48	
Log-likelihood	-9705.34		-10185.39		-10142.13		-10188.81		-8819.11		-8820.36		-8803.79		-10211.18		-10217.07	
No. of observations	63,789		64,919		64,807		64,921		56,938		56,923		56,932		64,960		64,960	
No. of respondents	11,530		11,695		11,675		11,694		10,582		10,581		10,578		11,702		11,702	
Average no. of obs. per respondent	5.5		5.6		5.6		5.6		5.4		5.4		5.4		5.6		5.6	

Notes: Standard errors are in parenthesis

* denotes coefficients significant at = 10%, ** at = 5% and *** at = 1%

The samples include individuals aged 15 years or over, and not currently studying full-time.

~ indicates a dummy variable set.

[t-1] indicates variables with a one-period lag.

[t=1] indicates time-invariant variables, where the initial value is taken at wave of entry

Source: HILDA Survey, 2001-2011

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CHAPTER SEVEN
Job-tenure, Job-change, & Self-employment:
THE ROLE OF SPECIFIC-CAPITAL & THE IMPORTANCE OF DURATION-DEPENDENCE IN DETERMINING SELF-EMPLOYMENT

Research interest on the nature and role of self-employment in the labour market has seen a marked increase among economists in recent decades. Yet, a fundamental shortcoming of this research has been its tendency to overlook the commonalities that labour dynamics involving self-employment have with other instances of mobility in the broader labour market (Sørensen & Sharkey, 2014). The existing research has predominately centred around understanding self-employment as a form of entrepreneurship, pointing to the distinctive features of entrepreneurship and the distinguishing affinities of those who gravitate toward it as explanations for why workers might voluntarily choose self-employment. The quantitative importance of these 'entrepreneurial-pull' explanations, however, pale in significance once labour market dynamics, specifically state-dependence, and unobserved heterogeneity are adequately accounted for. There is now strong and consistent evidence that self-employment, like unemployment and other employment states, is highly persistent and that this is largely the product of 'genuine' state-dependence (i.e. the experience of self-employment *itself* makes future self-employment more likely).[126] Yet the importance of this state-dependence as a genuine cause of self-employment provides no inherent understanding about the underlying mechanism that generates self-employment in the first place: that is, the *genesis* for self-employment. If both salaried-employment and self-employment are persistent labour market states, and there are no obvious individual characteristics that determine self-employment, how is it that employees choose to become self-employed?

An alternative approach that has yet to be fully considered is to treat the choice of self-employment as a normal part of the labour market equilibrating process and like any other job change event. Job-change and the mobility of workers between

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[126] See Chapter Five, as well as Henley (2004), Caliendo & Uhlendorff (2008), and Taylor (2011) *inter alia.*

firms are common features of labour markets in most developed economies — that is, a high frequency of job turnover among new, particularly younger, hires; a decline in the probability of job separation as tenure increases; and, an ensuing high incidence of long-term employment relationships, particularly among older workers.[127]. Moreover, the movement of workers between firms (involving both voluntary quits and involuntary layoffs) is far more prevalent than the transition of employees into self-employment. In Australia, for example, the share of employees who experienced a job change year-on-year accounted for 9.9% of the workforce in 2012, while only 1.3% were involved in a transition to or from self-employment — shown in Table 7.1.

Table 7.1: Summary of job change $t - 1$ to t for employed Australian workers, 2012

Labour market transitions		ABS LFS-LM survey 2012		
t-1	*t*	N	%	%
Employee	Employee (same job)	19,029	87.3	64.4
Employee	Employee (changed jobs)	2,655	12.2	9.0
Self-employed	Employee	116	0.5	0.4
	Total	21,800	100.0	73.5
Employee	Self-employed	188	3.7	0.6
Self-employed	Self-employed	4,899	96.3	16.5
	Total	5,087	100.0	17.2
	Total employment	29,640	-	100.0

Notes: Unweighted estimates. Emp. = Employee.
Source: ABS, cat. no. 6202.0.30.004, Labour Force Survey and Labour Mobility, Australia, Feb 2012, CURF (Expanded) – accessed via RADL 23/02/2014

Employee job-turnover has also long attracted the attention of labour economists, and there is a relatively well-established body of literature devoted to understanding the 'mobility-push' forces that strengthen and erode the employment relationships between workers and firms.[128] Central to the models of job-turnover and labour mobility in the labour economics literature is the hypothesis that "individuals learn from their working experience" (Rosen, 1972: 327).[129] The arrival of new information and knowledge (to both workers and firms) that comes with additional work experience on a particular job, in turn, generates both job-turnover as well as long-term employment relationships between workers and firms. These models imply that the length of work experience or tenure on a particular job

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[127] For descriptive evidence from the U.S., see Farber (1994; 1999b) *inter alia*. For descriptive evidence from the U.K., see Burgess & Rees (1996) and Booth et al. (1999) *inter alia*.

[128] See Farber (1999b) for a detailed survey of this literature.

[129] Although not considered further in this chapter, it is also possible that work experience also informs firms about their workers; and, that the learning or flow of information between firms and workers about one another is not necessarily symmetric (see, *inter alia*, Spence (1973) and Salop & Salop (1976)).

influences the probability of changing jobs, even after other observed and unobserved individual characteristics that possibly affect the propensity for job-change are controlled for (i.e. 'genuine' duration-dependence). The accumulation over time of *informational-capital* specific to a particular worker-firm match strengthens the employment relationship by lowering the probability of job separation, while simultaneously increasing the length of job-tenure. Is it possible that the same mechanisms that underlie labour mobility and generate turnover in the broader labour market also play a similar role in determining the choice of self-employment?

Exactly how accumulating specific-capital on a particular job over time leads employees into self-employment is not immediately obvious. The existing models of specific-capital accumulation and job-turnover in the labour economics literature are silent on the relationship between tenure and job-change involving self-employment. *Prima facie*, the patterns of mobility involving self-employment as job-tenure increases appear to be very similar to the job-turnover of employees between firms. As Figure 7.1 illustrates, Australian employees transitioning to and from self-employment also declines at longer job tenures, just like the pattern of job-separations between workers and firms. Ostensibly, these negative relationships between tenure and turnover indicate a tendency by workers to increasingly persist in the same job as their tenure increases, rather than change jobs or employment state. However, what is less obvious is that most job-separations between workers and firms occur sooner than those involving self-employment; and, in relative terms, employees with longer job-tenures are increasingly likely to transition to and from self-employment. This subtle, yet important, observation indicates that even though job-separations involving self-employment decline with increasing job-tenure, there also appears to be a relative increase in the share of mobility involving self-employment. That is, while the incidence of employees changing jobs diminishes with tenure, those employees with longer tenures who do change jobs increasingly enter into self-employment rather move to another firm.

Figure 7.1: Distribution of job-tenure of Australian employees and self-employed workers prior to changing jobs, $t - 1$ to t, in 2012
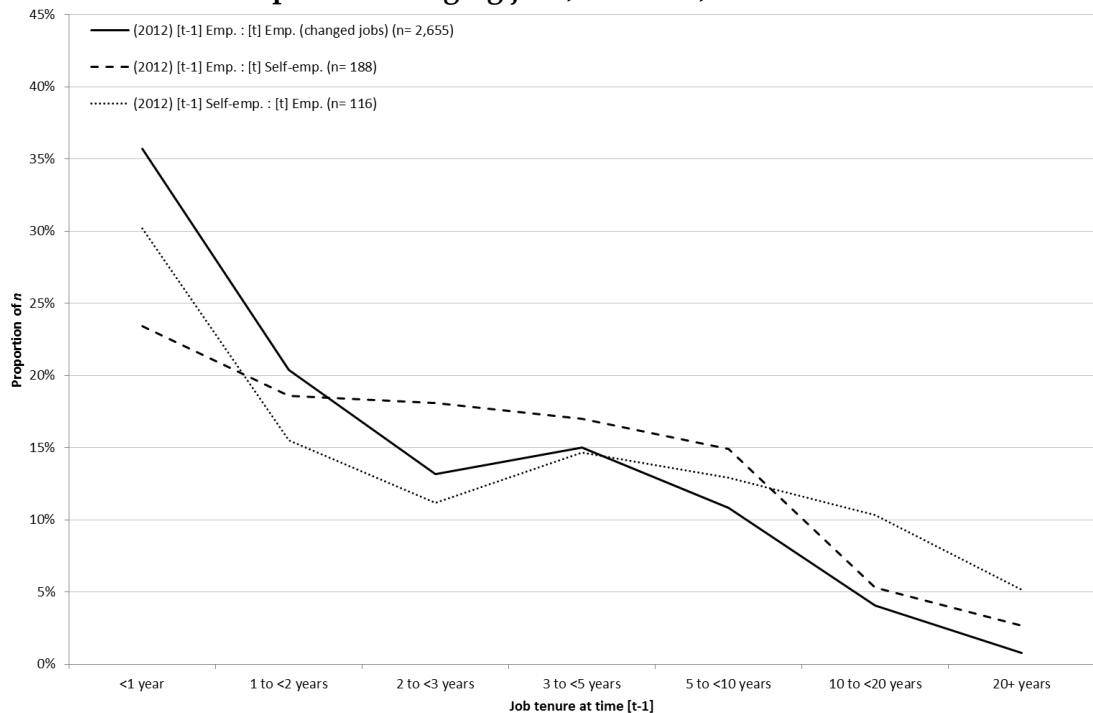
Notes: Unweighted estimates. Emp. = Employee; Self-emp. = Self-employed
Source: ABS, cat. no. 6202.0.30.004, Labour Force Survey and Labour Mobility, Australia, Feb 2012, CURF
          (Expanded) – accessed via RADL 23/02/2014

There is also relatively little research explicitly examining the link between duration-dependence implied by the models of specific-capital and the choice of employees to become self-employed. A notable exception in the literature is Sørensen & Sharkey's (2014) study of the impact of job-tenure on the likelihood of employees who change jobs entering self-employment relative to moving to another employers instead. Using Danish workforce panel data to estimate 'competing risks' models of relative survival, their study reports evidence that employees are relatively more likely to become self-employed, as opposed to switching employers, as their tenure increases because the decline in the rate of job-separations into self-employment is slower than it is for transitions to another employer.[130] These findings, however, do not take into consideration the potential impact of persistent unobserved individual heterogeneity on the duration-dependence of the separation probabilities, or address the potential for endogeneity caused by the 'initial conditions' problem, both of which have the potential to bias the estimates.

This chapter, therefore, examines whether the same underlying process that

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[130] Sørensen & Sharkey (2014) use the Danish Integrated Database for Labour Market Research (IDA), 1980-1997, which is a matched employer-employee annual census of the Danish labour force.

strengthens the worker-firm job-match over time simultaneously acts to weaken their attachment when self-employment as an outside alternative is considered. Elaborating on existing dynamic panel studies of self-employment, this chapter explores the extent to which the probability of current self-employment depends on the self-employment outcome in the previous year (relative to working as an employee), and whether this state-dependence is also affected by the length of prior experience on a particular job (i.e. duration-dependence). To analyse the importance of the duration-dependence and state-dependence effects on the choice of self-employment, the longitudinal Household, Income & Labour Dynamics in Australia (HILDA) survey for the period 2001 to 2011 is used to estimate a dynamic random-effects panel probit model of the probability of self-employment for Australian workers. The dynamic model introduces duration-dependence, in addition to state-dependence, by allowing the probability of self-employment to also depend on the length of prior experience on a particular job. To make duration-dependence state-specific, job-tenure in the previous year is interacted with 'lagged' self-employment status. To the extent that this dynamic model adequately controls for persistent unobserved individual heterogeneity and the 'initial conditions' problem, the estimates provide the *causal* impact of past experience in self-employment, relative to working as an employee, on the probability of current self-employment (i.e. 'genuine' state-dependence). The degree to which this state-dependence then varies as prior job-tenure increases provides the causal impact attributable the accumulation of specific-capital on the probability of workers transitioning to and from self-employment (i.e. 'genuine' duration-dependence). Of particular interest is how increasingly prolonged lengths of job-tenure affect the probability of employees transitioning into self-employment in the future.

This chapter advances the existing research by providing credible evidence of the important role that prior on-the-job learning and accumulation of specific-capital, particularly firm-specific human-capital, play in determining the choice of self-employment. This also provides an explanation for why employees initially choose self-employment in the first place (i.e. a 'root cause' or genesis for self-employment) and a better understanding of the role of self-employment in the labour market and the economy more broadly.

7.1 THEORETICAL INSIGHTS

Labour mobility, job-matching, & the role of specific-capital

Job 'shopping' & imperfect information

To better understand why workers transition into self-employment, it is necessary to first understand the motivation for why workers change jobs more generally. Labour economists have long recognised that "matching the right firms to the right workers creates economic value of a magnitude that few other economic processes can" (Lazear & Oyer, 2007: 18). In this research, labour markets are viewed as 'arenas' where workers of different abilities and tastes trade their labour, in terms of time and skill, to firms seeking employees with certain capabilities, who in return offer different remuneration, employment conditions and work environments. This contrasts with the portrayal of self-employment in the entrepreneurial-centric literature as an occupational choice that is distinct from all other jobs. This alternative perspective instead considers the labour market as being composed of seemingly infinite numbers of possible combinations between workers and firms: "the value of a given worker is likely to vary dramatically across potential employers and the disutility of effort associated with work will vary for a typical worker across the firms she might work for" (Lazear & Oyer, 2007: 18). The problem for both workers and firms is that they do not know the value of their optimum combination or where it is located. Workers and firms must 'shop' around to improve the rewards from work and increase the profits from production, respectively.

Prior to the formation of a new job match, both workers and firms are ill-informed about the productive value of one another. On the one hand, workers lack information about the value of opportunities that are available in other firms, while, on the other hand, firms lack information about the 'true' productivity of new hires. Imperfect information between workers and firms means that both parties must acquire *informational capital* specific to the employment relationship in order to learn about the productive value of their pairing. In consummating their employment relationship, both parties share in an incurred investment cost that is non-recoverable (i.e. has no value to either the worker or the firm) outside of their employment relationship. The cost of specific capital could be the result of either

workers searching for better jobs and firms screening for the best candidate, or the productivity cost to both workers and firms of learning and training on-the-job, or a combination of both. Over time, job-turnover can arise when both the worker and the firm realise the true productive value of their employment relationship is worse than anticipated or of a 'poor' match-quality.[131] Other explanations for job-turnover — such as, either the worker or the firm learning about a better external match, or adverse changes to a firm's product market demand leading to redundancies — are also possible but are not further considered.

Learning mechanisms: revealing latent match-specific capital versus developing firm-specific human-capital

In the labour economics literature, two categories of microeconomic theories propose competing learning mechanisms whereby new information arrives about the existing employment relationship as it is experienced by workers and firms to generate job-turnover and explain labour mobility.[132] Although not explicitly related to self-employment or entrepreneurship, the empirical implications of these theories may prove insightful for understanding the job changes involving self-employment.

In one category, job-match theory (Jovanovic, 1979b) proposes that new informational capital about the productive value of the match quality between a worker and a firm on a particular job is *revealed* to both parties through experiencing one another. In this model, match-specific capital inheres to both parties and determines the productive value of their employment relationship: "… there are no 'good' workers and 'good' employers, but only good matches" (Jovanovic, 1979a: 1248). This model predicts that the probability of separation between a worker and firm is a decreasing function of their job tenure as "… workers remain on in jobs in which their productivity is revealed to be relatively high and that they select themselves out of jobs in which their productivity is revealed to be low" (Jovanovic, 1979b: 974). A mismatch between an employee and their employer is evident by an early separation and shorter job tenure.

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[131] It is possible that this process of realisation occurs 'asymmetrically', which may determine the voluntary 'quits' by workers or the involuntary 'layoffs' of workers by firms.

[132] Alternative theoretical approaches, not considered in this chapter, are models of 'job-search' (see, for example, Burdett, 1978; Mortensen, 1978; Jovanovic, 1979a). This is where new informational arrives about alternative prospective employment opportunities through increased efforts of job-search, which, in turn, acts to dissolve the existing employment relationship. As noted by Farber (1999b: 2460), these models are often vague about the process that determines the search intensity and the rate at which more attractive job offers arrive. See Mortensen (1986) for detailed survey of this literature.

In the second category, human-capital theory (Oi, 1962; Becker, 1962; 1964) proposes a more complex learning mechanism where skills and knowhow of the worker are, instead, *developed* on-the-job through an investment by the firm in learning and training, which subsequently augments the productivity value of the worker to the firm where the human-capital is acquired (i.e. firm-specific human-capital). Unlike match-specific capital, however, firm-specific capital inheres in the worker entirely. In this model, the employment relationship between a worker and a firm on a particular job requires a shared investment in the costs and returns to firm-specific capital, which forms an implicit contract (Hashimoto, 1981). This is achieved by the firm paying the worker below their marginal product value, but above the amount that a prospective alternative firm would pay for their 'general' human-capital *sans* the firm-specific human-capital (i.e. their alternative wage). The strength of the employment relationship on a particular job is determined by the level of shared investment. Similar to job-match theory, human-capital theory also predicts that the probability of separation declines as the workers' stock of specific human-capital increases with tenure, unrelated to persistent observed and unobserved individual heterogeneity (implying 'genuine' duration-dependence).

Firm-specific human-capital & the 'returns' to tenure

Although both theoretical mechanisms predict that turnover rates decrease in job-tenure because of specific-capital, in comparison to job-match theory, human-capital theory implies that job-tenure alone is no longer a suitable proxy for evaluating the importance of specific-capital in determining the probability of job change (Farber, 1999b: 2470). In contrast to Jovanovic's job-match model of turnover, which posits that the productive value of a particular work-employer match, at a given point in time, is reflected entirely in the worker's wage[133]; Becker's human-capital model instead posits that, because of the shared investment in developing firm-specific skill and knowhow, the observed wage is only ever a partial reflection of a worker's marginal product value to their employer. The human-capital model implies that wage, like tenure, is also the product of optimisation by firms and workers, and both outcomes are endogenously related with respect to the influence of firm-specific capital on the probability of separation. It is possible that the quality and

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[133] This is because match-quality on a particular job is assumed to be constant and revealed over time to both parties symmetrically (Jovanovic, 1979b: 973-974).

quantity of specific-capital operates through a combination of job-tenure and wage-growth to jointly influence the probability of changing jobs. Employees on a particular job are less likely to separate from firms who (for whatever reason) invest increasing amounts of specific human-capital, and where the worker also realises a 'fair share' of their now augmented marginal product value received by the firm. Therefore, in contrast to the job-match model, the human-capital model implies that the accumulation of firm-specific capital by the worker on a particular job manifests empirically as both longer tenures and steeper rates of wage-growth. That is, for a given amount of firm-specific human-capital with respect to tenure, the probability of job-separation declines at a faster rate for workers who experience relatively 'better' wage outcomes (i.e. steeper wage-growth).

Mobility & self-employment as an outside alternative

Self-employment as an alternative job opportunity & the impact of specific-capital

Just as scholars of entrepreneurship have tended to neglect the extensive labour economics literature on the determinants of inter-firm worker mobility and labour market dynamics more broadly, labour economists have similarly tended to systematically disregard self-employment. Despite providing explanations for why certain employee-employer relationships dissolve and generate turnover, while others flourish and have long tenures; the theories of job-turnover provide no explicit reason for why the accumulation of specific-capital generates mobility to self-employment rather than to another salaried-employed job. As discussed earlier, specific-capital is meant to have no value outside of the employment relationship in which it was accumulated. That is, the values of a worker's prospective job opportunities in alternative firms are independent of the specific-capital accumulated on their current job.

In comparison to the employee-employer relationship, however, self-employment is a unique employment relationship. In self-employment, there are no longer the information imperfections between workers and firms about their productive value together and the need for both parties to form an implicit contract through mutual assurance. Moreover, in most developed economies, the option of self-employment as an alternative job opportunity for most workers is omnipresent. Unlike in the employer-employee relationship, where workers must first satisfy the prerequisites

of the prospective employer to secure a job, there are no ostensible barriers to workers becoming self-employed.[134] It therefore stands to reason that workers can transfer specific-capital, particularly firm-specific human-capital, more readily to self-employment than would otherwise be possible when changing jobs between firms.

Match-specific capital & the perceived attractiveness of self-employment opportunities

It is possible that the same mechanisms that underlie labour mobility and generate job-turnover of the sort implied by the specific-capital models also play a role in determining the choice of self-employment. One explanation, based on Jovanovic's (1979b) notion of the inherent value of the latent match-quality between a worker and a firm on a particular job (discussed earlier), is that self-employment as an outside employment option becomes *relatively* more attractive to employees who reveal a 'better' quality job-match. As Sørensen & Sharkey (2014: 346) hypothesise, the choice of self-employment becomes increasingly apparent to employees who reveal that they are 'well-matched' to their current employer as their tenure increases because having a 'better' job-match leads to "…a decline in the arrival rate of attractive employment offers, but does not similarly affect the arrival of entrepreneurial offers." That is, the decline in probability of job-separations with tenure is accompanied by an increase in the share of transitions involving self-employment.

The flaw of this explanation, however, is the assumption that the arrival of outside entrepreneurial opportunities is independent of the accumulation of match-specific capital, and that the same entrepreneurial opportunities are visible and feasible for all workers regardless of the specific-capital possessed. In this case, learning about the job-match quality of their current job affects the probability of employees becoming self-employed by shifting their perception of the entrepreneurial opportunities, rather than expanding or 'unlocking' the number of prospective opportunities in self-employment.

While this is a neat explanation for why self-employment might be the more attractive alternative to 'better' matched employees than a job with another firm, it

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[134] There are, of course, other possible constraints to entry into self-employment, such as limited access to financial or 'seed' capital. See Evans & Jovanovic (1989), Holtz-Eakin et al. (1994) and Blanchflower & Oswald (1998), *inter alia.*

does not account for the sequence of mobility or the 'path' that workers generally follow to arrive at self-employment: that is, most workers enter self-employment voluntary at a later point in the work-life cycle after working for a period as an employee. If, as Sørensen & Sharkey (2014) assume, specific-capital does not affect the entrepreneurial opportunities, why aren't more workers observed heading straight for self-employment on entering the labour market and first 'try their hand' as an entrepreneur before considering a transition into salaried-employment?

Firm-specific human-capital & the value of prospective self-employment

A competing explanation for how specific-capital might increase the future prospects of employees becoming self-employed is also possible based on the Beckerian notion of firm-specific human-capital. As discussed earlier, a firm may choose to strengthen the employment relationship with a worker on a particular job by augmenting the worker's marginal product through a shared investment in specific human-capital to develop the worker's skills and knowhow on-the-job. However, because firm-specific capabilities inhere in the worker, specific human-capital may also be more readily transferable or 'generalizable' to self-employment than would be possible (or valued) by another firm.[135] It is possible, therefore, that the accumulation of specific human-capital on a particular job simultaneously increases the relative attractiveness of outside employment opportunities where the marginal product value of their acquired knowhow might be better realised, namely self-employment. Similar to Sørensen & Sharkey's (2014) hypothesis, the choice of self-employment may also become increasingly apparent to employees as their job-tenure increases because the accumulation of specific human-capital in their current job also affects the attractiveness of their outside self-employment opportunities, but does not similarly affect the value of alternative job-offers from outside firms.

However, as discussed earlier, in contrast to match-specific capital, the impact of specific human-capital on the probability of job-separation no longer operates through job-tenure alone, but is also manifest empirically through wage-growth. Therefore, for a given length of tenure on a particular job (i.e. the 'sunk cost' in time that might have otherwise been spent accumulating specific-capital elsewhere), the share of employee transitions to self-employment are also likely to increase at a

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[135] As discussed earlier, this is because it is difficult for an outside firm to observe or recognise *ex ante* the marginal product value of the firm-specific human-capital accumulated by a worker in another firm as general human-capital.

faster rate for those who experience relatively 'poor' returns on their time. In other words, as the tenure of employees on a particular job increases, those with relatively worse wage outcomes (i.e. flatter wage-growth *ceteris paribus*) are more likely to become self-employed at a faster rate than those in 'better' paid jobs (i.e. with steeper experience-earnings profiles).

Distinguishing specific-capital from individual heterogeneity & the choice of self-employment

There are, of course, numerous alternative reasons that might also explain the relationship between job-tenure and mobility, as well as account for the share of transitions to self-employment, which, in aggregate, would also resemble the impact of the 'genuine' duration-dependence implied by the accumulation of specific-capital. One, very simple, alternative explanation for the observed dependence between job-tenure and job-change may arise because of their possible correlation with persistent individual characteristics, which may or may not be observable, and are independent of the length of previous experience on a particular job. This relationship is best illustrated by Blumen's (1955) theoretical model of pure-heterogeneity where workers are either movers (i.e. footloose and have a high propensity for turnover) or a stayers (i.e. have a low propensity for turnover). In this model, the probability of change is strictly a function of the worker's innate type and persistent over time, so that 'movers' are more likely to change jobs and have shorter tenures while 'stayers' remain and have longer tenures. The mover/stayer heterogeneity, therefore, causes job-tenure and the probability of separation to be spuriously negatively correlated, which, when not accounted for, could be incorrectly attributed to the importance of specific-capital.

It also possible for persistent individual heterogeneity to affect the wage outcomes of workers, which similarly gives rise to a spurious correlation between tenure and job-change, unrelated to the development of firm-specific human-capital with job-tenure. One reason, for example, is that workers with innate 'high ability' tend to have higher reservation wages and are more likely to reject low pay job offers and gravitate toward higher paid jobs. This, in turn, leads 'high ability' employees to stay on in higher paid jobs longer because they receive fewer attractive external

offers as tenure increases.[136] Another, more complex, reason for how individual heterogeneity affects the wage outcomes of workers is through the design of the compensation structures of firms. Recognising that individual heterogeneity affects the marginal productivity value of workers, employers may deliberately alter their method of compensation to encourage certain workers to self-select. One example is the use of 'efficiency wages' by firms, which involves paying workers an above competitive market rate, to attract 'high ability' workers and to discourage job-separation, as well as prevent 'shirking' (Shapiro & Stiglitz, 1984).[137] Another example is the use of a delayed or 'back-ended' compensation structure by firms to encourage longer and mutually beneficial employment relationships with their employees, and to sort 'movers' from the 'stayers' (Salop & Salop, 1976; Lazear, 1979; Lazear & Moore, 1984). In each of these models, the relationship between wage-growth and job-tenure is again caused by persistent individual heterogeneity, rather than the accumulation of specific-capital with job-tenure.

The importance of individual heterogeneity in determining the tenure-turnover relationship also has particular relevance when considering the choice of self-employment. One possibility, based on Lazear's (2004; 2005) increasingly popular view that entrepreneurs "must be *jack-of-all-trades* who need not excel in any one skill but are competent in many" (Lazear, 2005: 649)[138], is that employees with an innate propensity for job-change (i.e. 'movers') are increasingly likely to favour self-employment as an alternative employment opportunity. This is because workers with a history of 'job-hopping' and, hence, shorter job-tenures, are also more likely to have a kaleidoscopic range of experiences across different jobs, firms, and industries. This, in turn, equips 'movers' with a balance of skills, the combination of which is most valuable when performing a variety of tasks, namely self-employment. Another possibility is that the prospect of future self-employment

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[136] This is based on a similar premise to Burdett's (1978) model of 'job-search', which provides a simple alternative explanation to specific capital accumulation for why the probability of separation declines with tenure, where job-tenure and wages are independent of one another. In Burdett's study, workers receive outside wage offers from a fixed distribution, known to all, and that are ex ante observable and constant with job-tenure.

[137] For a concise summary of 'efficiency wages' and related literature, see Gibbons & Waldman (1999: 2388-2391).

[138] Underpinning the jack-of-all-trades hypothesis is Lazear's (2009) reinterpretation of Beckerian human-capital theory, which instead asserts that all 'specific' skills are generalizable to some degree and useful in a variety of other endeavours but with different weights attached. Although the publication of Lazear's work on entrepreneurship (Lazear, 2004; 2005) precedes his reinterpretation of human-capital theory using the 'skill-weights' approach (Lazear, 2009), the thinking outlined in the latter is apparent in the former. Lazear's (2009) reinterpretation of human-capital theory is also similar to an earlier theoretical study by Jovanovic & Nyarko (1997) which considers the generalisability of 'specific' human-capital and the transfer of skills between jobs.

becomes relatively more attractive to employees in higher paying jobs due to their superior innate ability. As discussed earlier, firms tend to reward high ability workers with higher paying jobs to sort and retain these workers for longer because higher paid workers receive fewer attractive job-offers from external firms. This, in turn, may cause higher paid employees to perceive self-employment more favourably as a share of their outside employment opportunity.

In short, the observed dependence of job-change involving self-employment on the length of job-tenure may also arise because of individual heterogeneity, particularly unobserved characteristics that persist or evolve gradually over the life-course. If unaccounted for, the spurious correlation caused by individual heterogeneity has the potential to confound, in part or in full, the impact of the structural dependence implied by specific-capital.

7.2 PREVIOUS EMPIRICAL RESEARCH

Much of the existing economic research related to self-employment centres around notions of entrepreneurship. Rather than examine the impact of 'genuine' duration-dependence implied by specific-capital on employee transitions into self-employment, much of the entrepreneurial-centric research has instead focussed on the features intrinsic to the employment history of those who become self-employed. The strength of the evidence from these studies, however, is tenuous.

Prior job-tenure & history of job-turnover

There is limited research explicitly examining the relationship between tenure on a particular job and the choice of self-employment (see, for example, Evans & Leighton, 1989; Sørensen & Sharkey, 2014). Instead, more recent research has focussed on comparing the labour market mobility histories of self-employed workers against those in salaried-employment. Inspired by Lazear's *jack-of-all-trades* hypothesis (discussed earlier), numerous studies examine the extent to which the rate of job-change (i.e. the inverse of job-tenure) and the number of roles held in different firms, occupations and industries affect the workers' decision to participate in self-employment (see, for example, Wagner, 2003; Wagner, 2006; Silva, 2007; Åstebro et al., 2011; Åstebro & Thompson, 2011; Lechmann & Schnabel, 2014).

In general, the results from these studies tell a consistent story and show that

employees are less likely to become self-employed the longer they remain with their current employer and, inversely, the less frequently they change jobs. However, caution needs to be exercised when interpreting the importance of these findings. For the most part, these studies do not use panel data methods of analysis and, hence, neglect to adequately account for the impact of labour market dynamics and persistent unobserved heterogeneity. Omitting these sources of heterogeneity has the potential to spuriously negatively correlate the future choice of self-employment with tenure (or, inversely, positively correlate with job-change). Silva (2007), for example, show that once unobserved heterogeneity is accounted for, the effect of 'job-hopping' history on the choice of self-employment becomes statistically insignificant. Further, a number of the studies examining the impact of varied work experiences on becoming self-employed also run a risk of generating spurious correlations by failing to acknowledge that, in most instances, becoming self-employed is itself a job-change, which shortens tenure and, possibly, involves a change of occupational/professional roles.[139]

Proximity to self-employment & contagious entrepreneurship

Another strand of research has examined the extent to which skill and knowledge specific to entrepreneurship is transmitted from those already in self-employment to other workers as a by-product of working within close proximity to entrepreneurial activity. For example, the *intergenerational transmission* of capital through work experience as an employee or (unpaid) contributing family worker in a parent's or familial business (Dunn & Holtz-Eakin, 2000; Fairlie & Robb, 2007; Sørensen, 2007b); working as an employee in a *small business* and closely observing an established entrepreneur (Acs & Audretsch, 1993; Sørensen, 2007a; Parker, 2009b); or, working closely alongside a latent entrepreneur or *work colleague* who later 'strikes out' and establishes their own business (Stuart & Ding, 2006). These studies report that employees of self-employed workers are themselves likely to become self-employed sooner because the transmission of entrepreneurial-specific capital through on-the-job experience is more likely to spread to those with increased exposure to extant self-employment. Sørensen (2007a) and Parker (2009b) also find the relationship between distinctive prior work experiences and self-employment outcomes to be

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[139] One way or another, several of the studies including Wagner (2003), Silva (2007), Åstebro & Thompson (2011), and Lechmann & Schnabel (2014) all risk falling into this trap.

robustly and positively correlated, even after controlling for observed and unobserved individual heterogeneity.

However, the notion that self-employment exists because entrepreneurial-specific human-capital is transmitted, like a contagion, to latent entrepreneurs through exposure to those already engaged in self-employment is a fundamentally flawed explanation. Firstly, treating self-employment as the cause of further self-employment, like a pathogen, neglects the process that generated the initial self-employment of the employer (i.e. the genesis for self-employment). Secondly, it is possible that the positive correlation between the proximity to entrepreneurship in prior work experience and future self-employment spuriously arises because of the structural relationship between job-tenure and mobility implied by specific-capital. Finally, this explanation fails to correspond with the irrefutable descriptive evidence that most self-employed workers do not have a history of working for, or in close proximity to, an established self-employed worker.[140]

7.3 ECONOMETRIC MODEL & ESTIMATION METHOD

The key question of this chapter is whether individuals' choice of self-employment is determined by the length of prior work experience on a particular job and, more specifically, to what extent the transition of employees into self-employment over time is attributable to genuine duration-dependence implied by the accumulation of specific capital. To answer this question, a dynamic random-effects panel probit model is used to estimate the annual rates of transition of Australian workers between self-employment and salaried-employment states depending on their lengths of elapsed job-tenure. In contrast to the existing dynamic panel models of self-employment in the literature, this analysis interacts the employment dynamics with the length of job-tenure in the previous year to further specify the effect of state-specific duration-dependence. Specifically, the probability of individual i being self-employed ($SE_{i,t} = 1$), at time t, relative to being in salaried-employment ($SE_{i,t} = 0$), is assumed to be determined by the product of the individual's duration on a particular job ($DUR_{i,t-1}$) and their self-employment status ($SE_{i,t-1}$) at year $t-1$,

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[140] Fairlie & Robb (2007) show that, for the U.S. in 1992, of those in self-employment only 23% had previously worked in a family member's business prior to starting their own enterprise. Similarly, both Sørensen (2007a) and Parker (2009b), using Danish and U.K. longitudinal data respectively, show that employees enter self-employment from both very small and very large firms in approximately equal proportions.

as well as other observed and unobserved individual characteristics:

$$\Pr[SE_{i,t} = 1] = \Pr[SE_{i,t}^* > 0]$$

$$= \Phi\big(\boldsymbol{\gamma_0}\boldsymbol{SE_{i,t-1}} + \delta_1 DUR_{i,t-1} + \boldsymbol{\delta_2}DUR_{i,t-1} \cdot \boldsymbol{SE_{i,t-1}} + x_{i,t}\boldsymbol{\beta} + \varepsilon_i + v_{i,t}\big)[10]$$

where $x_{i,t}$ is a vector of exogenous observed characteristics of the individuals, (e.g. highest level of education attainment, marital status, gender, age); $\boldsymbol{\beta}$ is the vector of coefficients associated with $x_{i,t}$ to be estimated; ε_i is the time-invariant unobserved individual heterogeneity component of the error term (e.g. inherent non-cognitive and cognitive traits); $v_{i,t}$ is the random-error or 'luck' component of the error term; and, Φ is the non-linear probit function.

The model in Equation 1 differs from existing dynamic panel models of self-employment in three importance respects. First, the lagged-dependent variable in Equation 1 is modified from being a single explanatory variable into a set of dummy variables ($\boldsymbol{SE_{i,t-1}}$), where the base-category of the binary lagged-dependent variable (i.e. salaried-employment) is expanded to indicate the quintile distribution of employee hourly-wage outcomes. This modification is made to better capture the quality of the stock of specific human-capital accumulated, as discussed earlier, and to evaluate the importance of specific human-capital in determining employee transitions into self-employment. Second, the coefficient estimates on the lagged job-tenure variable (δ_1) and the interaction terms ($\boldsymbol{\delta_2}$) disentangle the extent of the duration-dependence effect (attributable to the quantity of specific-capital accumulated) from the effect of state-dependence, inferred from the coefficient estimates on the lagged dependent-variables ($\boldsymbol{\gamma_0}$).[141] This duration-dependence effect is also independent from other sources of human-capital captured by the control variables — such as, education, history of labour market experience, and age. Third, the model controls for the unobserved individual heterogeneity component (ε_i) of the error term ($u_{i,t} = \varepsilon_i + v_{i,t}$), which includes any individual-specific characteristics that are unobserved in the data but persist over time (e.g. an innate propensity to change jobs or to remain in jobs).

The inclusion of unobserved individual heterogeneity in a dynamic panel framework, however, introduces another set of problems. In practice, the temporal

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[141] The effect of duration-dependence is denoted as: $\frac{\partial SE_{i,t}}{\partial DUR_{i,t}} = \delta_1 + \boldsymbol{\delta_2}SE_{i,t-1}$. The effect of state-dependence is denoted as: $\frac{\partial SE_{i,t}}{\partial SE_{i,t-1}} = \boldsymbol{\gamma_0} + \boldsymbol{\delta_2}DUR_{i,t-1}$.

persistence of unobserved heterogeneity has the potential to generate a spurious correlation between individuals' past experience and the current outcome because the initial state observed in the data is likely to be endogenous and determined by the same persistent unobserved heterogeneity. This endogenous relationship is commonly referred to as the 'initial conditions problem' (Heckman, 1981b).

To overcome the initial conditions problem, this analysis adopts Wooldridge's (2005) method. This suggests approximating the distribution of unobserved individual heterogeneity (ε_i) conditional on the individual-specific means of the time-varying exogenous observed characteristics, $\overline{x}_i$ (also referred to as Mundlak (1978) corrections), and the initial value of the individuals' status in self-employment, $SE_{i,0}$, as explanatory variables. Wooldridge (2005) also recommends that interactions between $SE_{i,0}$ and $\overline{x}_i$ are necessary when interactions between $SE_{i,t-1}$ and observed explanatory variables are included, such as $DUR_{i,t-1}$ (the individual-specific mean of which is denoted as $\overline{DUR}_i$). Substituting these variables into the dynamic model in Equation 1, the probability of individual i being observed in self-employment ($SE_{i,t} = 1$) at time t, relative to being an employee ($SE_{i,t} = 0$) becomes:

$$\Pr[SE_{i,t} = 1] = \Pr[SE_{i,t}^* > 0]$$

$$= \Phi\big(\gamma_0 SE_{i,t-1} + \delta_1 DUR_{i,t-1} + \delta_2 DUR_{i,t-1} \cdot SE_{i,t-1} + \gamma_2 SE_{i,0} +$$
$$\vartheta_1 \overline{DUR}_i + \vartheta_2 \overline{DUR}_i \cdot SE_{i,0} + \beta x_{i,t} + \theta \overline{x}_i + \eta_i + \nu_{i,t}\big) \qquad [11]$$

Equation 2 is then possible to estimate using a conventional random-effects non-linear binary probit estimator based on standard assumptions.[142] The importance of the correlation between unobserved heterogeneity and the initial condition is inferred from the joint-significance of the estimated coefficients on the initial observed status in the expanded lagged-dependent set of dummy variables, $\widehat{\gamma}_2$ & $\widehat{\vartheta}_3$.

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[142] Assuming $\nu_{i,t} \sim N(0, \sigma_\nu^2)$, and is independent of the observed characteristics.

7.4 DATA, DEFINITIONS & DESCRIPTIVE STATISTICS

The HILDA survey

This analysis uses the first eleven waves of the longitudinal HILDA survey for the period 2001 to 2011. From the HILDA data, the sample is restricted to an unbalanced panel of Australian workers in salaried and self-employed jobs, aged 15 years or over, and not studying full-time. The sample is further restricted by the use of dynamic modelling and the inclusion of the lagged and initial sets of expanded dependent dummy variables in the multivariate analysis, which excludes all other information from the wave at which individuals are first observed in HILDA, as well as any subsequent waves for individuals without two or more consecutive observations. Observations with missing information on the dependent and the selected independent variables are also further excluded from the sample. Overall, the sample size for the dynamic panel model is 64,161 observations, representing, 11,526 individuals.

Defining self-employment

The dependent and explanatory variables used in the multivariate analysis are, for the most part, determined by the information provided in the HILDA data. To avoid the complexities associated with defining self-employment in the entrepreneurial-centric literature, this analysis instead adopts the conventional definition in labour economics.[143] From the data, self-employment is defined as the aggregation of several detailed labour force and employment arrangement classifications: *owner-managers of an unincorporated enterprise* (OMUE)[144], *owner-managers of an incorporated enterprise* (OMIE)[145], and *contributing family workers*[146]. This measure of self-employment is also inclusive of *own-account workers* (i.e. those who work alone) and *employers* (i.e. those who employ additional labour). The dependent variable indicates the workers who are self-employed in their main job as a binary (or dummy) variable (=1) from employees (=0). The lagged-dependent variables and

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[143] As in Chapter Five and Chapter Six, self-employment is considered as a distinct labour market activity, mutually exclusive from salaried-employment, and as the primary labour market activity (i.e. their main job).

[144] This is where the worker is remunerated directly from the profits of their business, but there is also no legal distinction between the personal liabilities of the worker and the assets of their business.

[145] This is where the worker and their business are separate legal entities and the worker is employed under the account of the business (a limited liability company), but the worker retains a controlling interest and remains responsible for its operation and is entitled to a distribution of the profits.

[146] This is where the worker works in a family owned and operated business and without explicitly being paid, but may benefit implicitly from the proceeds of the business.

the initial value of the dependent variables (discussed earlier) also indicate self-employment status in a similar way. The share of self-employment as defined by these employment classifications accounts for approximately 18% of the sample – as shown in Table 7.2.

Table 7.2: Summary statistics for the t, $t-1$ lag, and initial t_0 values of self-employment status dependent & explanatory variables

	Mean	S.D.	Min.	Max.
Dependent variable				
Self-employed$_t$ (base= Employee$_t$)	0.18	0.38	0	1
Explanatory variables				
Self-employed$_{t-1}$ (base= Employee$_{t-1}$)	0.18	0.38	0	1
Self-employed$_0$ (base= Employee$_0$)	0.17	0.37	0	1
Total (N)	**64,214**			

Notes: Unweighted estimates. S.D. = Standard deviation.
Source: HILDA survey, 2001-2011

Defining job-tenure

The HILDA survey also contains detailed information on employment history and changes to individuals' employment activity over time. As discussed earlier, this analysis includes a one-year lag of job-tenure as a key explanatory variable. From the data, job-tenure is defined as the length of time individuals have worked for their current employer or in self-employment, measured in years.[147] The longitudinal nature of the HILDA allows for the lengths of work experience on a particular job to be accurately determined, when combined with the historical tenure information for those in jobs preceding the survey. However, because job-tenure information is asked of respondents at each interview and collected repeatedly over time (i.e. the value recorded is independent of past responses), it is possible that the values recorded for an individual over time are not consistent. To avoid possible longitudinal inconsistencies due to recall bias, this analysis uses the initial value of tenure reported and then adds on the uninterrupted duration spent working for the same employer or in the same business calculated using the time difference between interview dates.[148] Further adjustments to the derived tenure values were also made to ensure that the periods of time did not coincide with full-time study or with underage-employment (i.e. aged less than 15 years).

Job-tenure is included in the multivariate analysis as a continuous explanatory

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[147] This is obtained from the derived '_JBEMPT' variable in the HILDA.
[148] From the HILDA, an indicator of job/employer/business change between interviews was derived using a combination of the '_ESEMPST', '_ESBRD', '_PJO', '_PJOT', '_PJOTH' and '_PJOTR' variables. The time difference calculated between sequential interview dates was derived using the '_HHIDATE' variable.

variable. Shown in Figure 7.2 and Figure 7.3, the HILDA data describes a similar pattern of diminishing labour market mobility and increasing stability with job-tenure as was found in the Australian labour force statistics (discussed earlier). Those who change jobs do so sooner rather than later, and this also coincides with an increasing share of transitions involving self-employment as the movement of employees between firms diminish faster than the mobility of workers to and from self-employment. However, to what extent the positive correlation between job-tenure and the share of transitions to self-employment is because of the accumulation of firm-specific human-capital is not yet clear. As discussed earlier, it is possible that the relationship between job-tenure and the choice of self-employment may simply coincide because of persistent but unobserved individual heterogeneity (e.g. the innate propensity to change jobs), or because of other more complex reasons that determine wage-growth unrelated to specific capital.

Figure 7.2: Distribution of job-tenure (at year $t-1$) for workers who change jobs, $t-1$ to t
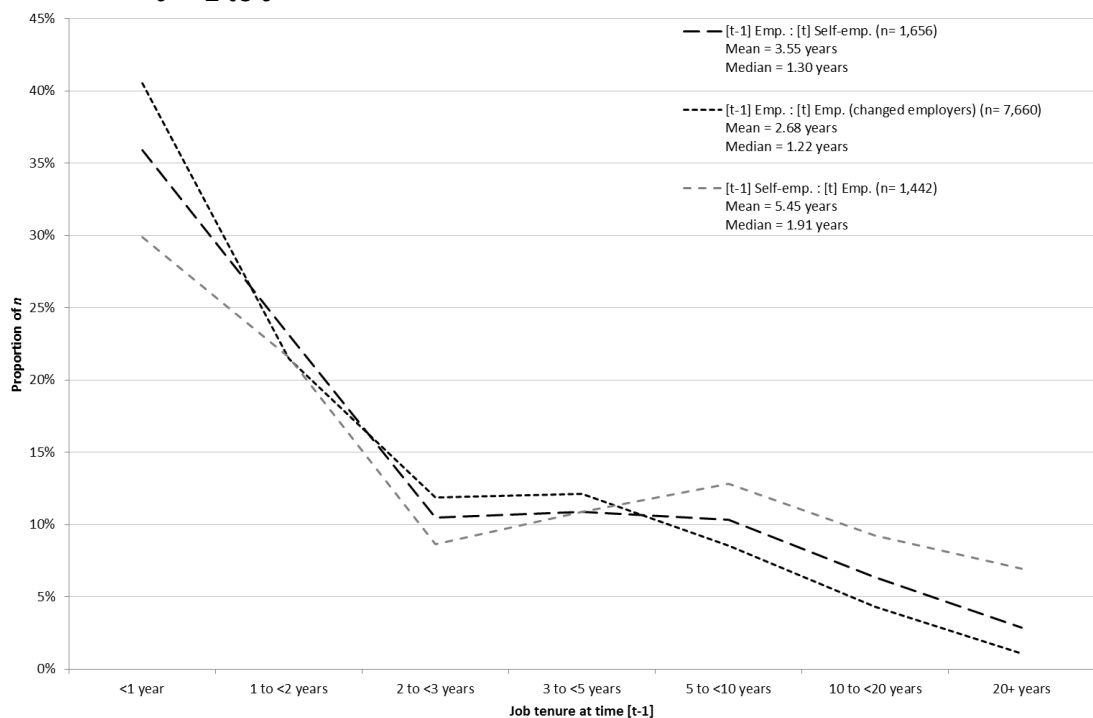
Notes: Unweighted estimates. Emp. = Employee; Self-emp. = Self-employed
Source: HILDA survey, 2001-2011

Figure 7.3: Distribution of job-tenure (at year $t-1$) for workers who remain in the same job, $t-1$ to t
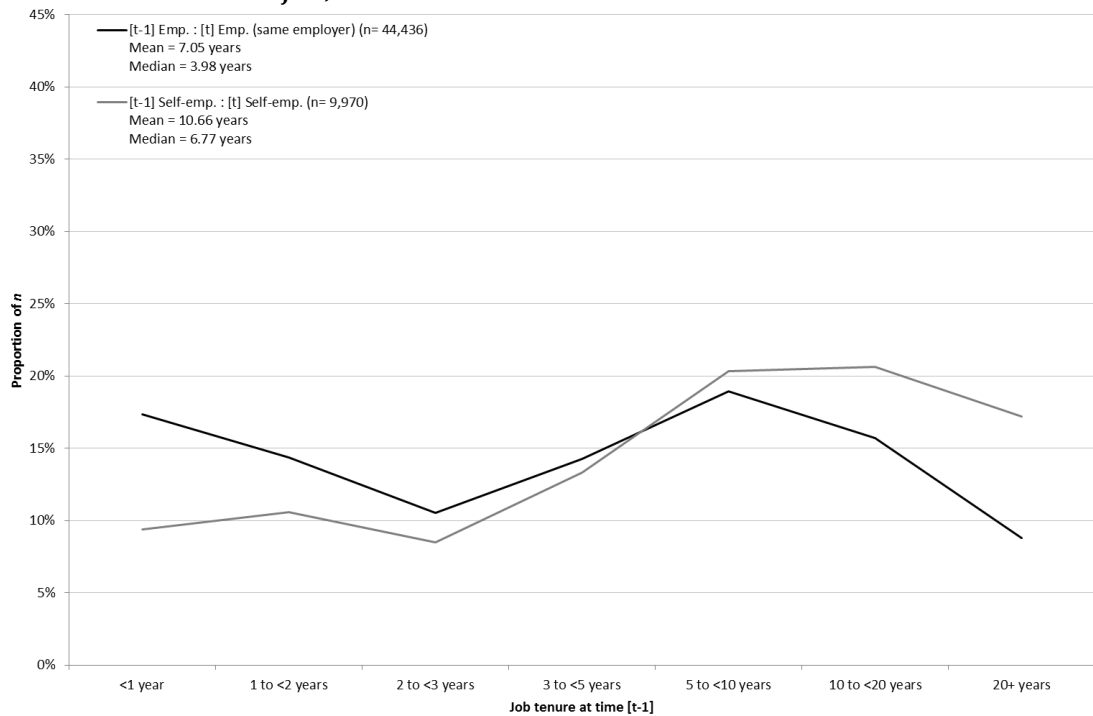
Notes: See Figure 7.2 (above).
Source: See Figure 7.2 (above).

Defining hourly-wage outcomes

As discussed earlier, additional explanatory information on employee hourly-wage outcomes is also included to better capture the quality of the stock of specific human-capital accumulated and to evaluate the importance of specific human-capital in determining employee transitions into self-employment. In contrast to the job-match model, the human-capital model implies that the impact of specific capital on job-turnover is only partially reflected by the length of job-tenure and, in the presence of firm-specific capital, is instead determined in conjunction with the quality of the wage outcome. Unlike job-tenure, however, including a one-year lag of earnings as a continuous explanatory variable is fraught with difficulty because the quality and precision of information on the earnings of self-employed workers is notoriously unreliable.[149] In the HILDA sample, for example, 99% of employees provided earnings information, while only 45% of self-employed workers did likewise. Including earnings as a continuous explanatory variable in the multivariate analysis would, therefore, shrink the sample and disproportionately exclude the self-employed.

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[149] For further discussion of the complexities and difficulties related to measuring the earnings of self-employed workers see Pissarides & Weber (1989), Lyssiotou et al.(2004) and Hamilton (2000), *inter alia.*

To overcome this problem, the binary lagged-dependent and initial-dependent explanatory variables are instead expanded to include additional earnings information for employees only as dummy sets of discrete outcomes. From the HILDA, the hourly-wage measure is calculated using '*gross weekly earnings from main job*' (deflated to 2001 dollar values) divided by the '*hours per week usually worked in main job*' information. Earnings are measured in hours, as opposed to annual/monthly/weekly increments, so as to not confound differences in earnings with differences in hours worked. This continuous measure of hourly-wage is then collapsed into discrete quintile outcomes and included in the analysis as a relative measure of employee earnings. Rather than speciously compare the wage outcomes of employees relative to the entire salaried-employed workforce, this analysis instead estimates the quintile wage distributions for employees separately by birth and sex cohort.[150] That is, the quality of an employee's wage outcome is relative to other employees in their age/sex peer-group, into which individuals are determined exogenously and fixed over the life-course. This makes for a fairer comparison of employees' wage outcomes given their labour market opportunities. In general, females have fewer labour market opportunities than males because of child-bearing and caring responsibilities, and also because of possible employer discrimination. Similarly, ageing implies more opportunities and longer periods of time for workers to adjust their behaviour and improve their labour market outcomes.

Figure 7.4 illustrates the relationship between the relative wage distribution for employees (in their age/sex peer-group) and the pattern of future employment mobility, and also implies the inverse relationship between wage and job-tenure. On the one hand, the descriptive observations indicate that employees increasingly stay on the same job and are less likely to change employers as their relative wages improve, which inversely implies that employee job-tenures grow with wages. However, as discussed earlier, this observation *per se* does not necessarily confirm the importance of specific capital accumulation and may simply arise because of individual heterogeneity. On the other hand, the descriptive evidence also reveals a stark difference in the patterns of employee wage outcomes between those who change employers and those who become self-employed. In comparison to those

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[150] The birth-cohort includes 12 categories, 11 of which are set at 5-year intervals ranging 1938 to 1997, and the oldest cohort including all respondents in the sample born in 1937 or before.

employees who change employers, the relative wage profile for employees who become self-employed exhibits a distinct non-linear U-shaped pattern. That is, employees in both relatively high-pay and low-pay jobs for their age/sex cohort are more likely to transition to self-employment in roughly equal proportions, while those in 'middle-pay' jobs for their age/sex cohort are least likely to become self-employed.

Although harder to intuit, the difference in the relative wage patterns provides a stronger indication of the importance of specific capital in determining employee job-turnover and the share of those transitions to self-employment. Unlike the negative relationship between employee wages and job-separations to a new employer, the distinctive U-shaped wage distribution for employees who become self-employed is no longer consistent with the hypotheses (discussed earlier) where the relationship between job-separations and wage-growth could be independent of tenure (e.g. the unobserved heterogeneity hypothesis where job-separations diminish at higher wages simply because 'high ability' workers receive fewer more attractive wage offers). Instead, the observed relationship between employee wage outcomes and the choice of future self-employment is indicative of the complex wage-tenure relationship implied by firm-specific human-capital. However, again, to what extent this is the case cannot be determined without also accounting for the impacts of persistent but unobserved individual heterogeneity (e.g. the innate propensity to change jobs).

Figure 7.4: Distribution of relative wage outcomes (at year $t − 1$) for employees by job-change, $t − 1$ to t
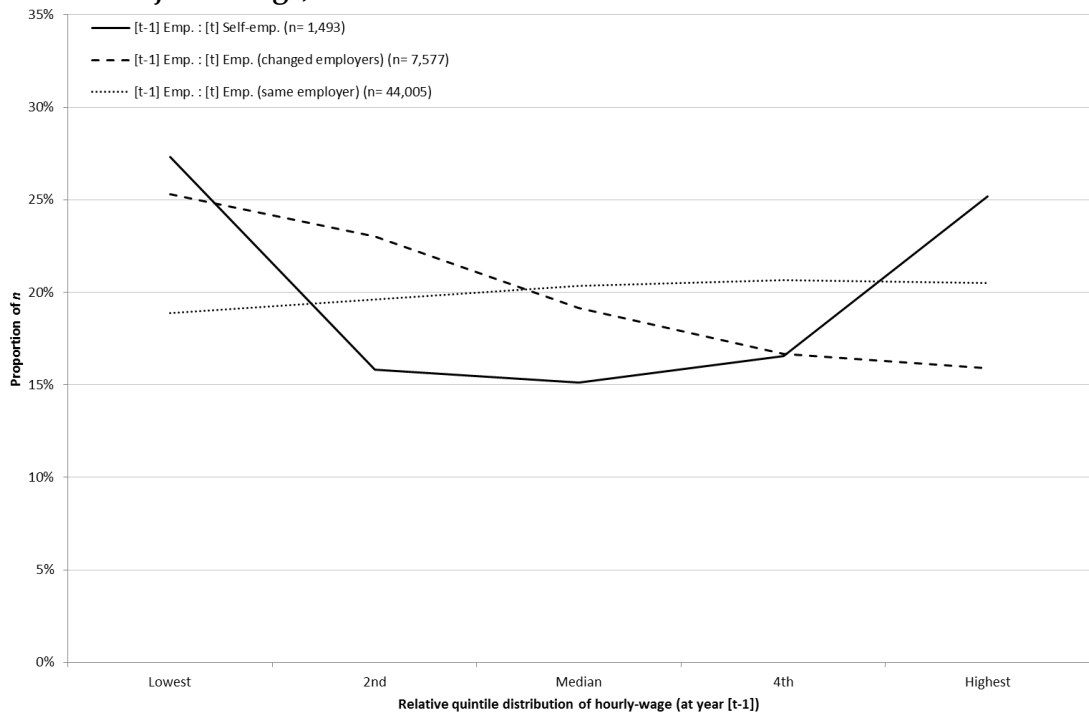
Notes: See Figure 7.2 (above).
Source: See Figure 7.2 (above).

Model specification

To better infer the importance of specific capital in determining employee job-change to self-employment, and to disentangle the confounding influences of observed and unobserved individual heterogeneity, the multivariate analysis also includes a number of control variables in addition to key variables already discussed. Table 7.3 lists the additional explanatory variables included, along with their summary statistics (i.e. means and standard deviations). Furthermore, the dynamic model includes individual-specific means (i.e. the Mundlak corrections) for each of the time-varying explanatory variables to address the initial conditions problem (discussed earlier).

Table 7.3: Summary statistics (means & standard deviations) of control variables

Control variables	Mean	S.D	Min.	Max.
Demographic characteristics				
Job-tenure (in years) *[t-1]*	7.0	8.4	0	71
Age (in years)	41.7	12.5	16	89
Age^2	1891.0	1069.0	256	7921
No. of resident dependent children	0.91	1.15	0	12
Marital status (base= single):				
~ *Married/defacto*	0.71	0.45	0	1
Long-term health condition (base= none):				
~ *Disability/impairment*	0.14	0.34	0	1
Geographic location (base= city/urban):				
~ *Regional/remote*	0.17	0.37	0	1
Home Ownership (base= mortgage/rent-buy):				
~ *Own*	0.25	0.43	0	1
~ *Rent/board*	0.24	0.43	0	1
~ *Life-tenure (no-equity)*	0.02	0.14	0	1
Education (base= school non-completer):				
~ *University*	0.28	0.45	0	1
~ *VET*	0.35	0.48	0	1
~ *Yr. 12*	0.15	0.36	0	1
Gender *[t=1]* (base= male):				
~ *Female*	0.46	0.50	0	1
Country of birth *[t=1]* (base= Australia):				
~ *Main English speaking*	0.10	0.30	0	1
~ *Non-English speaking*	0.10	0.30	0	1
Employment/labour market characteristics				
SALM unemployment rate *(%)*	5.3	2.6	0.0	27.4
Self-employment rate in industry *(%)*	18.5	14.5	0.3	65.0
Self-employment rate in occupation *(%)*	20.0	10.9	4.9	48.3
Paternal occupation match (base= no match):				
~ *Match*	0.07	0.26	0	1
Share of working-life in unemployment *(%) [t=1]*	3.3	9.5	0.0	100.0
Share working-life not-in-the labour market *(%) [t=1]*	12.2	19.7	0.0	100.0
Observations	64,161			

Notes: The samples include individuals aged 15 years or over, and not currently studying full-time.
The individual-specific means of the time-varying explanatory variables are not included in this table
~ indicates a dummy variable set.
[t-1] indicates variables with a one-period lag.
[t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
The unemployment rate is included as a continuous variable indicating the proportion of unemployment that exists in a respondent's local area, using Small Area Labour Market (SALM) information collated and published on a quarterly basis by the Australian Government's Department of Employment (https://employment.gov.au/small-area-labour-markets-publication). This information is matched to the HILDA data using the respondents' reported Local Government Area (LGA) geographic level (as defined by the Australian Standard Geographical Classification (ASGC), see ABS (1996; 2001; 2006)) of residence and for the quarterly time period closest to the respondents' date of interview.
The self-employment rates are included as two continuous variables indicating the proportion of self-employed workers in a respondents industry and occupation of work. The information on the rates of self-employment is estimated from Australian Bureau of Statistics (ABS) national labour force statistics, and then matched to the HILDA survey data using the respondents' reported industry or occupation of work (at the 1-digit level of the Australian & New Zealand Standard Industrial Classification (ANZSIC) or the Australian & New Zealand Standard Occupation Classification (ANZSCO)).
Intergenerational occupation match is included as one dummy indicating whether a person's current occupation was the same as their father's occupation when the person was aged 14. Paternal occupation information is reported by the respondent and matched to their current occupation of work (at the 2-digit level ANZSCO).
Labour market experience is included as two continuous variables measuring the time a person spent in either unemployment or not-in-the labour force as a proportion of the total number of years since completing full-time education, but prior to entering the HILDA survey.
Source: HILDA Survey, 2001-2011

7.5 RESULTS & DISCUSSION

Using the aforementioned Wooldridge method, the coefficients estimates for the dynamic random-effects panel probit models of self-employment are presented in Table 7.4 and Table 7.6. The results of primary interest are the importance of the coefficient estimates on the length of job-tenure at year $t - 1$ and how these estimates vary when the lag of job-tenure is subsequently interacted with the lagged employment state variables. The coefficient estimates of the remaining observed individual characteristics are also presented for completeness and to reassure the reader that they are sensible, but are not central to the discussion. The results show the coefficient estimates on elapsed job-tenure are consistently strongly statistically significant across each of the estimations, even after other observed and unobserved individual characteristics are controlled for.[151] However, because the coefficients were estimated using a non-linear probit estimator, the economic significance of their magnitudes cannot be directly interpreted from the coefficient estimates as reported. Instead, the Average Partial Effects (APEs) is further calculated to meaningfully infer the marginal (or partial) effect of the explanatory variables on the probability of self-employment. Using the estimated coefficients, this method calculates the predicted probability of self-employment at year t, for each individual in the sample, holding fixed the explanatory variable of interest at two different values (e.g. values 0 and 1 for a categorical dummy variable). The marginal effect is then the sample average of the individual differences between the estimated counterfactual predicted probabilities.[152] Table 7.8, in Appendix 7.A, reports the corresponding APEs of the estimated coefficients for each model.

Before further discussing the results of job-tenure and its interaction with the dynamic terms, it is worthwhile noting the importance of taking account of dynamics more generally, as well as the robustness of the estimation method at handling the econometric challenges posed by unobserved time-invariant individual heterogeneity and the initial conditions problem (discussed earlier). The magnitude and statistical significance of the coefficient estimates on the lagged-

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[151] For the results in Column (2) of Table 7.4 and Column (2) of Table 7.6, the joint-significance between the coefficient estimates on job-tenure at year $t - 1$ and its interaction with the lagged-dependent variable was tested and found to be statistically significant at the 1% level ($\chi^2 = 152.78$, p-value<0.000).

[152] The APE calculation is denoted as: $\Pr[SE_{i,t} = 1] = N^{-1} \sum_{i=1}^{N} \Phi[(\hat{\alpha} + \hat{\gamma}_0 SE_{i,t-1} + \hat{\delta}_1 DUR_{i,t-1} + \hat{\delta}_2 DUR_{i,t-1} \cdot SE_{i,t-1} + \hat{\gamma}_2 SE_{i,0} + \hat{\vartheta}_1 \overline{DUR}_i + \hat{\vartheta}_2 \overline{DUR}_i \cdot SE_{i,0} + \hat{\beta} x_{i,t} + \hat{\theta} \overline{x}_i)/(1 + \hat{\rho})^{1/2}]$. The inclusion of $(1 + \hat{\rho})^{1/2}$ re-scales random-effects panel probit coefficient estimates to make them comparable with estimates from pooled-panel probit estimators (see Arulampalam (1999) for further discussion).

dependent and initial-dependent self-employment variables (i.e. self-employment status in years $t-1$ and $t=1$) in each of the models confirm the importance of taking into account the state-dependence of employment, as well as the potential endogeneity of the initial state.[153] These are consistent with the findings from previous dynamic studies. The statistical significance of the initial-dependent variables also indicates that correlation exists between unobserved heterogeneity and the initial employment state observed in the data.

Further, in each of the models, there is strong evidence of the presence of time-invariant unobserved individual heterogeneity. The estimated impact of unobserved heterogeneity (denoted as rho ($\hat{\rho}$)) is highly statistically significant and, across all of the models, accounts for between 39% and 48% of the unexplained variance. This indicates that the choice of self-employment depends, in part, on individual characteristics that persist over time — such as propensity to change jobs, or ability — but that are difficult to capture or possibly unmeasurable in the data. Uncontrolled for, the impact of the unobserved heterogeneity and the initial conditions problem would have otherwise biased the estimation results on the lagged-dependent variable and overstated the importance of the remaining observed characteristics.

The impact of lagged job-tenure & the importance of duration-dependence

As shown in Table 7.4, the dynamic models of self-employment include the length of workers' prior experience on a particular job (i.e. job-tenure at year $t-1$), first, as an explanatory variable independent of the dynamic terms (Column (1)) and then, second, as an interaction with the lagged-dependent variable of self-employment status (Column (2)).

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[153] In Column (2) of Table 7.4 and Column (2) of Table 7.6, tests of joint-significance were used to test the statistical significance of the coefficient estimates on the lagged-dependent and initial-dependent variables and their respective interactions with the lag of job-tenure.

Table 7.4: Coefficient estimates of dynamic panel probit models for self-employment probability
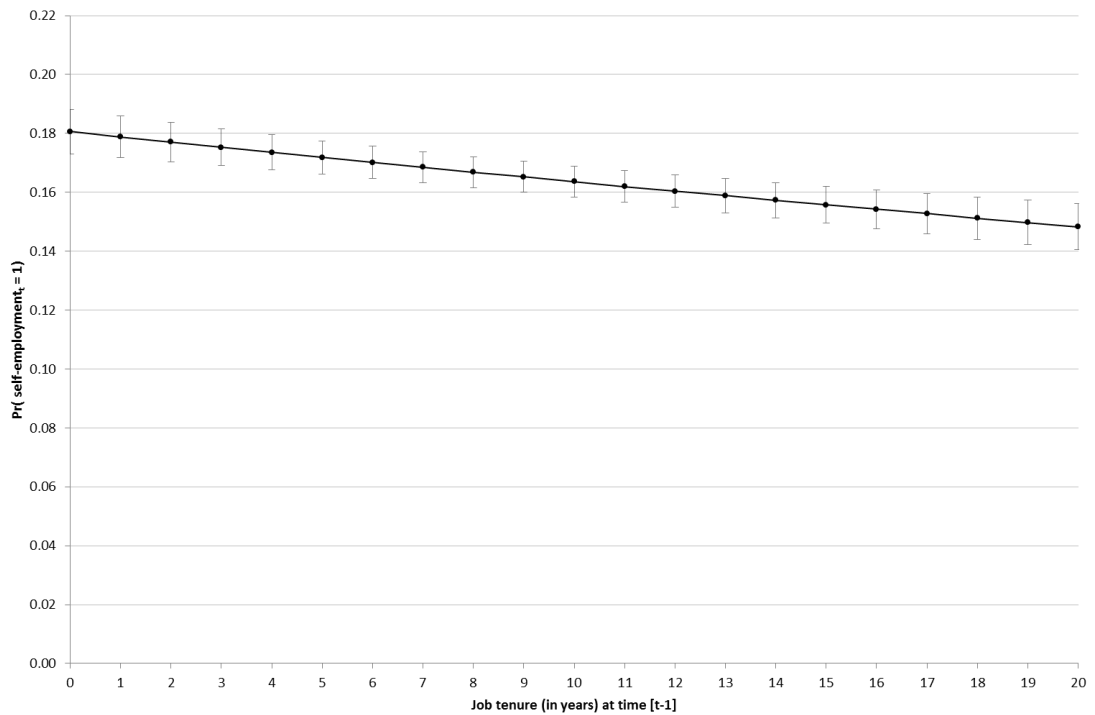
| Dependent variable: Pr[Self-employment$_t$ = 1] | Random-effects probit | | | |
| | (1) | | (2) | |
	Coef.	S.E.	Coef.	S.E.
Lagged dependent (base= Employee [t-1]):				
~ Self-employed *[t-1]*	1.762***	(0.04)	1.958***	(0.04)
Initial dependent (base= Employee [t=1]):				
~ Self-employed *[t=1]*	1.848***	(0.07)	0.771***	(0.07)
Interaction terms				
Self-employed *[t-1]* × Job-tenure (in years) *[t-1]*			-0.059***	(0.01)
Self-employed *[t=1]* × Job-tenure (in years) *[x̄]*			0.186***	(0.01)
Demographic characteristics				
Job-tenure (in years) *[t-1]*	-0.021***	(0.00)	0.013***	(0.00)
Age (in years)	0.139***	(0.02)	0.133***	(0.02)
Age^2	-0.001***	(0.00)	-0.001***	(0.00)
No. of resident dependent children	0.063**	(0.03)	0.064**	(0.03)
Marital status *(base= single):*				
~ Married/defacto	0.127**	(0.06)	0.119**	(0.06)
Long-term health condition *(base= none):*				
~ Disability/impairment	0.121***	(0.04)	0.123***	(0.04)
Geographic location *(base= city/urban):*				
~ Regional/remote	0.074	(0.07)	0.074	(0.07)
Home Ownership *(base= mortgage/rent-buy):*				
~ Own	0.032	(0.05)	0.043	(0.05)
~ Rent/board	-0.033	(0.05)	-0.025	(0.05)
~ Life-tenure (no-equity)	0.095	(0.11)	0.096	(0.11)
Education *(base= school non-completer):*				
~ University	-0.450*	(0.24)	-0.458**	(0.23)
~ VET	-0.255*	(0.15)	-0.269*	(0.15)
~ Yr. 12	-0.280	(0.22)	-0.260	(0.21)
Gender *[t=1] (base= male):*				
~ Female	-0.050	(0.04)	-0.072*	(0.04)
Country of birth *[t=1] (base= Australia):*				
~ Main English speaking	0.136**	(0.06)	0.106**	(0.05)
~ Non-English speaking	0.199***	(0.06)	0.138***	(0.05)
Employment/labour market characteristics				
SALM unemployment rate *(%)*	0.010	(0.01)	0.010	(0.01)
Self-employment rate in industry *(%)*	0.023***	(0.00)	0.023***	(0.00)
Self-employment rate in occupation *(%)*	0.013***	(0.00)	0.013***	(0.00)
Paternal occupation match *(base= no match):*				
~ Match	0.108	(0.07)	0.112	(0.07)
Share of working-life in unemployment *(%) [t=1]*	-0.002	(0.00)	-0.003*	(0.00)
Share working-life not-in-the labour market *(%) [t=1]*	0.000	(0.00)	-0.000	(0.00)
Constant	-4.718***	(0.23)	-4.774***	(0.22)
$\hat{\rho}$ (rho)	0.48		0.41	
Log-likelihood	-10004.47		-9699.05	
No. of observations	64,214		64,214	
No. of respondents	11,537		11,537	
Average no. of obs. per respondent	5.6		5.6	

Notes: Standard errors are in parenthesis
* denotes coefficients significant at = 10%, ** at = 5% and *** at = 1%
Columns (1) & (2) also include individual-specific means of the time-varying explanatory variables [$\bar{x}$] as prescribed by Wooldridge (2005).
The samples include individuals aged 15 years or over, and not currently studying full-time.
~ indicates a dummy variable set.
[t-1] indicates variables with a one-period lag.
[t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
[$\bar{x}$] indicates the (time-invariant) individual-specific mean of the time-varying covariate.
Source: HILDA Survey, 2001-2011

In Column (1), the estimated effect of elapsed job-tenure on the choice of self-employment is statistically significant, but negative. This indicates that longer lengths of elapsed tenure on a particular job (irrespective of self-employment or salaried-employment) lower the probability of a worker being self-employed. To better infer the magnitude of this effect on self-employment, Figure 7.5 presents the average predicted probability of self-employment at year *t* for increasing lengths of job-tenure in the previous year. This result reveals that the difference in the probability of self-employment declines at a gradual rate of approximately 0.2 percentage points for each additional year of elapsed tenure on a particular job. This finding is also consistent with the evidence in much of the entrepreneurial-centric research, and lends support to the notion that those workers who change jobs sooner rather than later are more likely to become self-employed. However, as discussed earlier, a potential flaw with this finding is that the estimated effect conflates the elapsed job-tenures of employees with those of self-employed workers because the effect of job-tenure is unconditional on the past employment state of workers. This, in turn, may spuriously generate a negative correlation between tenure and self-employment if the *ceteris paribus* job-tenures of those employees who become self-employed were cut-short because the process of becoming self-employed itself involves a job-change.

**Figure 7.5: Estimated (average predicted) probabilities of self-employment (at t)
for increasing lengths of job-tenure (at $t-1$)**

By contrast, the inclusion of the interaction term in the estimation in Column (2) disentangles the impact of elapsed job-tenure on the probability of self-employment into constituent parts conditional upon the past experience of workers in either self-employment or salaried-employment. The coefficient estimates on the elapsed job-tenure variable and on its dynamic interaction distinguish the impact of tenure for employees in salaried-employed jobs on the probability of future self-employment separately from the additional effect of tenure on future self-employment for self-employed workers. In comparison to the unconditional effect of elapsed job-tenure in Column (1), the estimates in Column (2) reveal the impact of job-tenure on the prospect of employees becoming self-employed as being radically different, both statistically and economically, from the impact of job-tenure on the future probability of self-employed workers remaining in self-employment. As Figure 6 illustrates, on the one hand, the averaged predicted probability of a self-employed worker remaining self-employed in the following year declines rapidly at longer lengths of job-tenure; while, on the other hand, a longer spell working for the same employer steadily increases the probability of an employee changing jobs and becoming self-employed. Table 7.5 presents the estimated marginal impacts of job-

tenure on the probability of future self-employment for self-employed workers, which decrease at a rate of approximately 0.9 percentage points, and for employees, which increase at a rate of approximately 0.1 percentage points.

Figure 7.6: Estimated (average predicted) probabilities of self-employment (at t) for increasing lengths of job-tenure (at $t - 1$), conditional on self-employment/salaried-employment state (at $t - 1$)
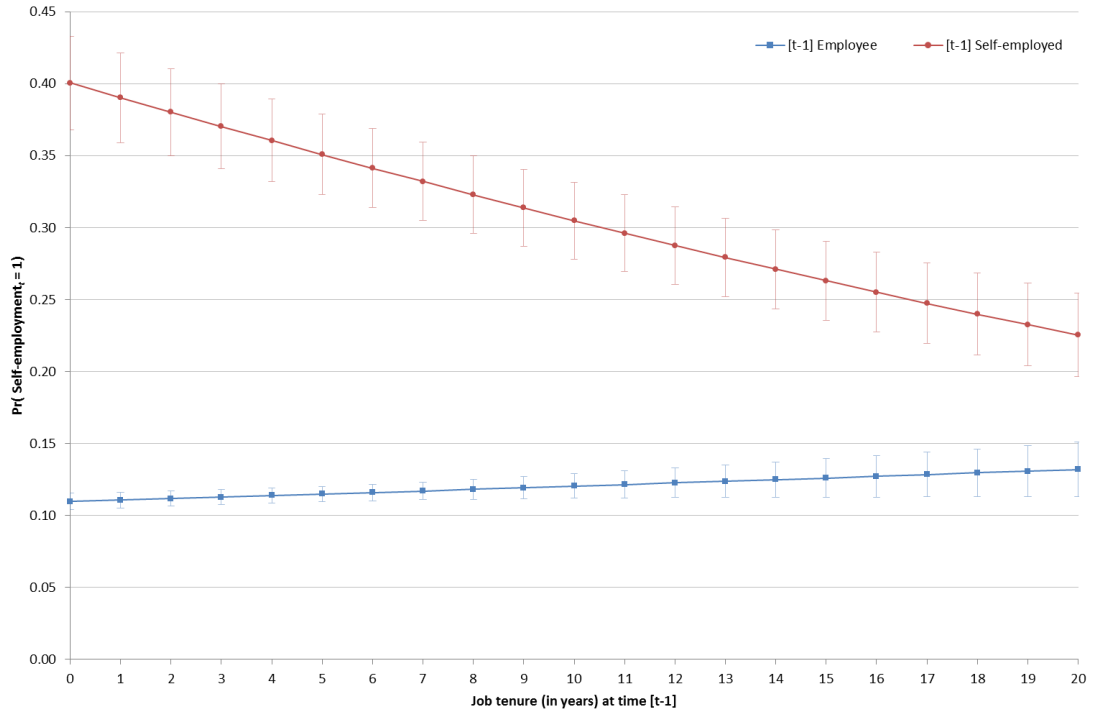
Notes: The estimated averaged predicted probabilities were calculated using STATA12 from the coefficient estimates reported in Column (2) of Table 7.4 (above).
         The ± error bars represent the 95% Confidence Intervals for the predicted probabilities.
Source: HILDA Survey, 2001-2011

Table 7.5: Marginal effect (APE) of job-tenure (at $t - 1$) on the probability of self-employment (at t) , conditional on previous employment status (at $t - 1$)

| Conditional on being:	Marginal effects (APEs)	S.E.
Self-employed$_{t-1}$	-0.010***	(0.00)
Employee$_{t-1}$	0.001**	(0.00)

Notes: Standard errors are in parenthesis
         * denotes the APEs significant at = 10%, ** at = 5% and *** at = 1%
         The estimated APEs were calculated using STATA12 from the coefficient estimates reported in Column (2) of Table 7.4 (above).
Source: HILDA Survey, 2001-2011

The predicted probabilities shown in Figure 7.6 (above) also reveal the extent to which the probability of current self-employment depends on genuine persistence (i.e. the causal impact of past experience in self-employment *per se*, relative to working as an employee); and, most importantly, whether and to what extent this state-dependence is subsequently affected by the length of this prior experience on a

particular job (i.e. the impact of genuine duration-dependence). Consistent with the findings from existing dynamic studies on self-employment, the results indicate that past experience in self-employment, relative to working as an employee in a salaried-employed job, *itself* has a large and significant influence on increasing the future probability of self-employment. This is particularly so for workers new to their job with little to no tenure. For example, the probability of future self-employment for a worker new to self-employment with zero years of tenure (= 0.40) is approximately 29 percentage points greater than their prospects of self-employment had they instead been a newly hired employee (= 0.11). However, as the previous length of job-tenure at year $t-1$ increases, the difference in predicted probabilities between self-employed workers remaining in self-employment and employees becoming self-employed converge, and the impact of state-dependence diminishes dramatically. Figure 7.7 illustrates the change in the marginal effect of state-dependence of self-employment with respect to job-tenure in the previous year. These estimates indicate that for each additional year of tenure the causal impact of state-dependence declines at a rate of approximately 1.0 percentage points. That is, the impact of duration-dependence erodes the importance of genuine persistence in determining the choice of self-employment from 29.0 percentage points at zero years of tenure to 9.0 percentage points at 20 years of tenure.

Figure 7.7: The state-dependent APE of self-employment with respect to job-tenure (at $t-1$) (i.e the affect of duration-dependence)
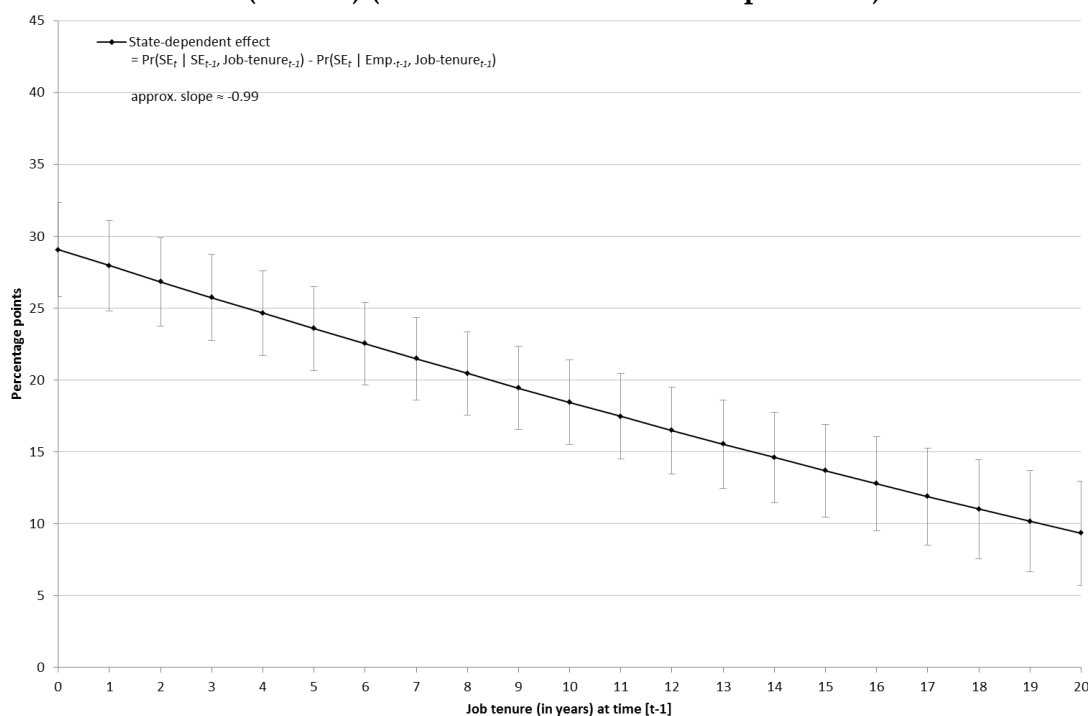
Notes: The APE of state-dependence is calculated as the difference between the averaged predicted probabilities shown in Figure 7.6 (above), and based on the coefficient estimates from Column (2) of Table 7.4 (above).
The $\pm$ error bars represent the 95% Confidence Intervals for the difference in predicted probabilities.
Source: HILDA Survey, 2001-2011

To the extent that both observed and unobserved individual characteristics are adequately controlled for, the relationship between longer job-tenure and the diminished persistence in self-employment and salaried-employment states (or, inversely, the increased mobility of workers between salaried-employment and self-employment) is also indicative of the structural dependence attributable to specific-capital accumulation postulated in both the job-matching and human-capital theories of job-turnover (discussed earlier). Interestingly, this result runs contrary to the theoretical prediction that specific-capital accumulation lowers the probability of changing jobs. Rather than find that the accumulation of specific-capital implied by increasingly prolonged lengths of tenure strengthens the employment relationship of workers on their current job. The result instead indicates that when labour mobility and job-change involving self-employment is considered, tenure acts to weaken the attachment of workers to their existing job and promote mobility both to and from self-employment.

By contrast, this finding is consistent with Sørensen & Sharkey's (2014) hypothesis that self-employment opportunities become increasingly attractive to employees as

their tenure on a job with a particular employer increases, relative to working as an employee in another firm, and that tenure is accompanied by an increase in the share of transitions involving self-employment. However, whether this is because employees with longer tenure reveal that they are 'well-matched' on their current job, which cause a shift in the appeal of outside self-employment opportunities relative to job-offers from external firms, or because employees develop skills and knowhow on-the-job that 'unlock' an increasing number of prospective opportunities in self-employment over time, cannot be inferred from the results. This is because, as discussed earlier, the effect of prior job-tenure may only partially capture the impact attributable to the accumulation of specific-capital and that *alone* it cannot distinguish between the competing job-match and human-capital learning mechanisms.

The accumulation of specific human-capital and its role in determining the choice of self-employment

Despite the structural-dependence of the probability of current self-employment on elapsed job-tenure in the previous year, it is difficult to discern what this implies about the nature of the underlying learning mechanism without also considering the complex relationship between specific-capital accumulation and wage outcomes. As discussed earlier, rather than assume that the match-specific productivity of a worker's capital on a particular job is a given, it may be more realistic to instead assume that the productive value of the worker to a particular firm can be augmented on-the-job through a shared investment in developing the worker's stock of human-capital. In contrast to job-match theory, human-capital theory implies that the influence of specific-capital accumulation on the probability of job-change now manifests itself as the joint product of workers prior tenure and wage outcomes.

To better infer the reason for the structural effect of prior job-tenure on the choice of self-employment and distinguish between the underlying job-match and human-capital learning mechanisms, this analysis extends the dynamic model to also include the quintile distribution of employee hourly-wage outcomes, relative to their birth/sex peer-group fixed over the life-cycle, as a part of the lagged-dependent variable (discussed earlier). Table 7.6 presents the estimated coefficient estimates for dynamic models of self-employment at year t, and separately

distinguishing employee wage outcomes at year $t-1$. As before, elapsed job-tenure at year $t-1$ is included, first, as an explanatory variable independent of the now expanded dynamic terms (Column (1)) and then, second, as a state-specific interaction with the lagged employment outcome at year $t-1$ (Column (2)).

Table 7.6: Coefficient estimates of dynamic panel probit model for self-employment probability

Dependent variable: Pr[Self-employment$_t$ = 1]	Random-effects probit			
	(1)		(2)	
	Coef.	S.E.	Coef.	S.E.
Lagged dependent (base= Employee: 3rd quintile [t-1]):				
~ Self-employed *[t-1]*	2.007***	(0.05)	2.260***	(0.06)
~ Employee: Lowest quintile *[t-1]*	0.287***	(0.05)	0.287***	(0.07)
~ Employee: 2nd quintile *[t-1]*	0.030	(0.05)	0.022	(0.07)
~ Employee: 4th quintile *[t-1]*	0.085	(0.05)	0.134*	(0.07)
~ Employee: Highest quintile *[t-1]*	0.268***	(0.06)	0.341***	(0.07)
Initial dependent (base= Employee: 3rd quintile [t=1]):				
~ Self-employed *[t=1]*	1.784***	(0.09)	0.583***	(0.09)
~ Employee: Lowest quintile *[t=1]*	0.041	(0.07)	-0.020	(0.09)
~ Employee: 2nd quintile *[t=1]*	-0.053	(0.07)	-0.095	(0.09)
~ Employee: 4th quintile *[t=1]*	-0.042	(0.07)	-0.111	(0.09)
~ Employee: Highest quintile *[t=1]*	0.054	(0.07)	-0.005	(0.09)
Interaction terms				
Self-employed *[t-1]* × Job-tenure (in years) *[t-1]*			-0.080***	(0.01)
Employee: Lowest quintile *[t-1]* × Job-tenure (in years) *[t-1]*			0.000	(0.01)
Employee: 2nd quintile *[t-1]* × Job-tenure (in years) *[t-1]*			0.004	(0.01)
Employee: 4th quintile *[t-1]* × Job-tenure (in years) *[t-1]*			-0.013	(0.01)
Employee: Highest quintile *[t-1]* × Job-tenure (in years) *[t-1]*			-0.024**	(0.01)
Self-employed *[t=1]* × Job-tenure (in years) *[x̄]*			0.220***	(0.01)
Employee: Lowest quintile *[t=1]* × Job-tenure (in years) *[x̄]*			-0.008	(0.02)
Employee: 2nd quintile *[t=1]* × Job-tenure (in years) *[x̄]*			-0.002	(0.02)
Employee: 4th quintile *[t=1]* × Job-tenure (in years) *[x̄]*			0.031**	(0.02)
Employee: Highest quintile *[t=1]* × Job-tenure (in years) *[x̄]*			0.024	(0.02)
Demographic characteristics				
Job-tenure (in years) *[t-1]*	-0.018***	(0.00)	0.032***	(0.01)
Age (in years)	0.140***	(0.02)	0.133***	(0.02)
Age^2	-0.001***	(0.00)	-0.001***	(0.00)
No. of resident dependent children	0.058**	(0.03)	0.059**	(0.03)
Marital status *(base= single):*				
~ Married/defacto	0.111*	(0.06)	0.104*	(0.06)
Long-term health condition *(base= none):*				
~ Disability/impairment	0.108**	(0.04)	0.107**	(0.04)
Geographic location *(base= city/urban):*				
~ Regional/remote	0.056	(0.07)	0.056	(0.07)
Home Ownership *(base= mortgage/rent-buy):*				
~ Own	0.015	(0.05)	0.021	(0.05)
~ Rent/board	-0.015	(0.05)	-0.007	(0.05)
~ Life-tenure (no-equity)	0.157	(0.11)	0.156	(0.11)
Education *(base= school non-completer):*				
~ University	-0.292	(0.24)	-0.291	(0.24)
~ VET	-0.080	(0.16)	-0.082	(0.15)
~ Yr. 12	-0.162	(0.23)	-0.119	(0.22)
Gender *[t=1] (base= male):*				
~ Female	-0.078*	(0.04)	-0.108***	(0.04)
Country of birth *[t=1] (base= Australia):*				
~ Main English speaking	0.138**	(0.06)	0.100*	(0.05)
~ Non-English speaking	0.184***	(0.06)	0.122**	(0.05)
Employment/labour market characteristics				
SALM unemployment rate *(%)*	0.011	(0.01)	0.010	(0.01)
Self-employment rate in industry *(%)*	0.023***	(0.00)	0.023***	(0.00)
Self-employment rate in occupation *(%)*	0.013***	(0.00)	0.012***	(0.00)
Paternal occupation match *(base= no match):*				
~ Match	0.103	(0.07)	0.106	(0.07)
Share of working-life in unemployment *(%) [t=1]*	-0.002	(0.00)	-0.003*	(0.00)
Share working-life not-in-the labour market *(%) [t=1]*	-0.001	(0.00)	-0.001	(0.00)

| Dependent variable: Pr[Self-employment$_t = 1$] | Random-effects probit | | | |
| | (1) | | (2) | |
	Coef.	S.E.	Coef.	S.E.
Constant	-4.737***	(0.24)	-4.796***	(0.23)
$\hat{\rho}$ (rho)	0.46		0.38	
Log-likelihood	-9524.44		-9183.41	
No. of observations	63,085		63,085	
No. of respondents	11,372		11,372	
Average no. of obs. per respondent	5.5		5.5	

Notes: Standard errors are in parenthesis
           * denotes coefficients significant at = 10%, ** at = 5% and *** at = 1%
           Columns (1) & (2) also include individual-specific means of the time-varying explanatory variables [$\bar{x}$]
           as prescribed by Wooldridge (2005).
           The samples include individuals aged 15 years or over, and not currently studying full-time.
           ~ indicates a dummy variable set.
           [t-1] indicates variables with a one-period lag.
           [t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
           [$\bar{x}$] indicates the (time-invariant) individual-specific mean of the time-varying covariate.
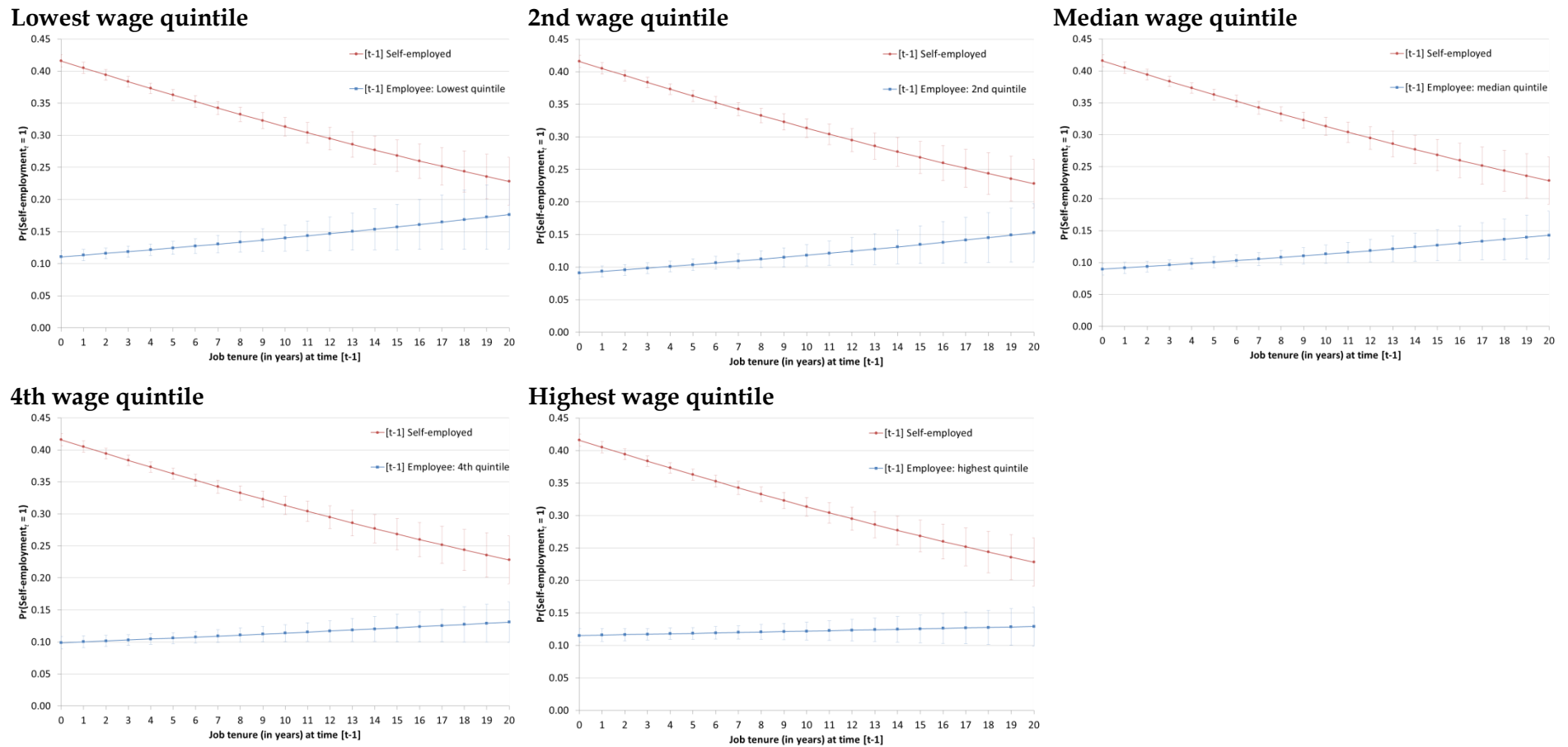Source: HILDA Survey, 2001-2011

Similar to the previous results, the estimated unconditional effect of elapsed job-tenure on the choice of self-employment in Column (1) has a negative effect, but is also highly statistically significant even when employees prior wage outcomes are accounted for. The results in Column (1) also indicate that employees at both the highest and lowest relative wage quintiles are statistically significant and more likely to transition to self-employment in the following year in roughly equal proportions, in comparison to those in the median quintile (the base category). Interestingly, this this pattern of transitions reveals that, even once elapsed job-tenure is controlled for, there is a structural relationship between the relative wage profile for employees and their probability of becoming self-employed that has a distinct non-linear U-shape. These finding are also contrary to the theoretical arguments that the choice of future self-employment is spuriously correlated with employees prior wage and tenure outcomes because of individual heterogeneity (particularly persistent unobserved characteristics); or, that self-employment opportunities become relatively attractive to employees in 'better' paying jobs, unrelated to their length of job-tenure, simply because they are less likely to receive fewer more attractive wage offers.

In Column (2), as with the earlier set of estimations, the inclusion of interaction terms reveal that the impact of elapsed job-tenure on the future probability of self-employment is dramatically different, both statistically and economically, between workers in self-employment and salaried-employment. Again, longer job-tenure has the effect of lowering the probability of self-employed workers remaining in self-

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employment, on the one hand, while increasing the probability of employees becoming self-employed, on the other. This also has the effect of diminishing the magnitude of the state-dependence of self-employment: that is, the difference in predicted probabilities between self-employed workers remaining in self-employment and employees becoming self-employed becomes smaller as the length of their experience on their current job increases (i.e. the impact of duration-dependence).

More importantly, however, the estimates in Column (2) reveal that the impact of elapsed tenure on the probability of employees changing jobs and becoming self-employed in the following year also depend on the relative wage outcome of their current salaried-employed job. Figure 7.8 shows the mean predicted probabilities of self-employment status at year t conditional on the employment status of workers at year $t-1$, distinguishing the employee outcomes at year $t-1$ into separate relative wage quintiles. In comparison to the unconditional effect of elapsed job-tenure in Column (1), the impact of longer job-tenure also shifts the relationship between employee earnings and the likelihood of becoming self-employed from the unusual non-linear U-shaped pattern into a linear pattern, so that employees with relatively worse wage outcomes are more likely to become self-employed. That is, in addition to the share of employee transitions to self-employment increasing with respect to tenure, this also occurs at a decreasing rate with respect to relative wage outcomes. As Table 7.7 reports, the rate at which the probability of employees becoming self-employed increases with respect to their prior job-tenure slows and becomes flatter as employees experience relatively higher wage outcomes, from approximately 0.3 percentage points at the lowest quintile to 0.1 percentage points at the highest wage quintile.

Figure 7.8: Estimated (average predicted) probabilities of self-employment (at t) for increasing lengths of job-tenure (at $t-1$), conditional on self-employment (at $t-1$) & the relative wage outcomes of employees by quintile (at $t-1$)

Lowest wage quintile

2nd wage quintile

Median wage quintile

4th wage quintile

Highest wage quintile

Notes: The estimated averaged predicted probabilities were calculated using STATA12 from the coefficient estimates reported in Column (2) of Table 7.6 (above).
The ± error bars represent the 95% Confidence Intervals for the predicted probabilities.
Source: HILDA Survey, 2001-2011

Table 7.7: Marginal effect (APE) of job-tenure (at $t-1$) on the probability of self-employment (at t) , conditional on previous employment status (at $t-1$)

Conditional on being:	Marginal effects (APEs)	S.E.
Self-employed$_{t-1}$	-0.010***	(0.00)
Employee$_{t-1}$		
Lowest relative wage quintile	0.003**	(0.00)
2nd relative wage quintile	0.003***	(0.00)
Median relative wage quintile	0.002***	(0.00)
4th relative wage quintile	0.001*	(0.00)
Highest relative wage quintile	0.001	(0.00)

Notes: Standard errors are in parenthesis
         * denotes the APEs significant at = 10%, ** at = 5% and *** at = 1%
         The estimated APEs were calculated using STATA12 from the coefficient estimates reported in
         Column (2) of Table 7.6 (above).
Source: HILDA Survey, 2001-2011

Consistent with the earlier estimations, the difference in mean predicted probabilities between self-employed workers remaining in self-employment and employees becoming self-employed converge with longer prior job-tenure and that the impact of genuine persistence (i.e. the state-dependence of self-employment) diminishes because of duration-dependence. Except that now, the results also show that the rate of this convergence slows as the relative wage outcomes of employees improve, given their elapsed job-tenure. Figure 7.7 (above) illustrates the change in the marginal effect of state-dependence of self-employment, relative to the quintile wage outcomes for employees, with respect to prior job-tenure. That is, employees with increasingly long job tenures are similarly likely to be self-employed in the following year as an equally tenured self-employed worker, and that this similarity tends to become more so as the relative wage outcome for employees gets worse. The rate at which the causal impact of state-dependence diminishes for each additional year of elapsed tenure, for example, goes from approximately 1.01 percentage points, for employees who find themselves in jobs at the highest relative wage quintile, and gets steeper for employees at the lowest relative wage quintile, approximately 1.27 percentage points. The impact of duration-dependence both erodes the importance of genuine persistence in determining the choice of self-employment and at an increasing rate as employees receive a 'poorer' return on their experience on a particular job.

The evidence that prior tenure and wage outcomes of employees jointly influence the future prospects of employees changing jobs and becoming self-employed is indicative of the type of specific-capital accumulation that is implied by human-

capital theory (discussed earlier). That is, the influence of specific-capital accumulation on the probability of job-change manifests as the joint product of workers prior tenure and wage outcomes, because the productivity value of a worker to a particular firm is augmented on-the-job through a shared investment to develop the firm-specific skills and knowhow of the worker. Rather than strengthen the employment relationship between the worker and their employer, however, the accumulation of specific human-capital appears to simultaneously increase the attractiveness of outside self-employment opportunities where the value of their augmented productivity can be better realised. The findings suggest that employees develop skills and knowhow on-the-job that 'unlock' an increasing number of prospective opportunities in self-employment over time.

Figure 7.9: The state-dependent APE of self-employment & the affect of duration-dependence on the probability of self-employment (at *t*)
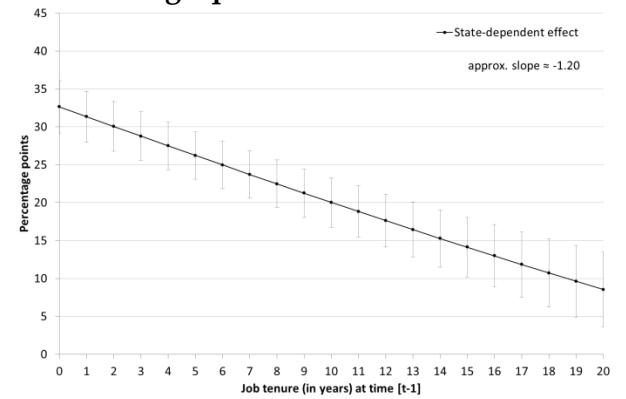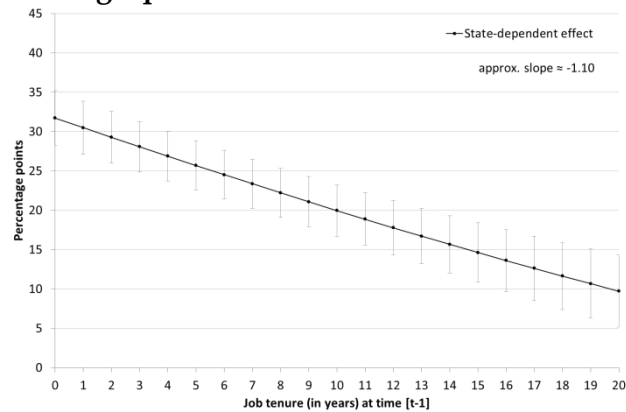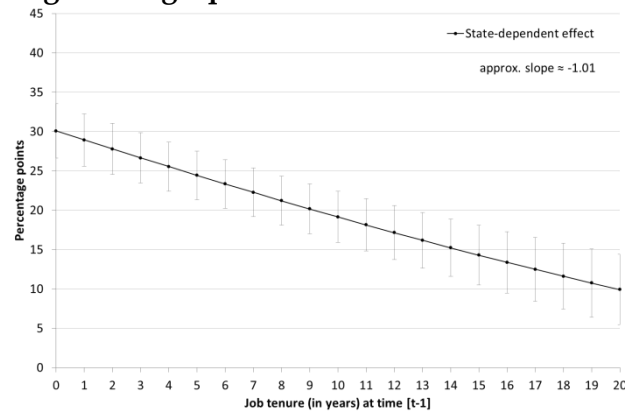
Lowest wage quintile
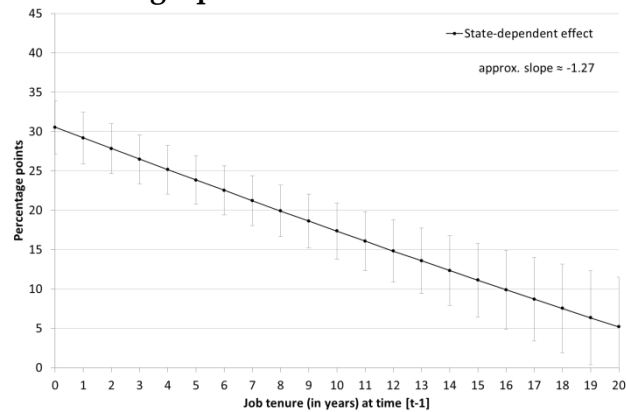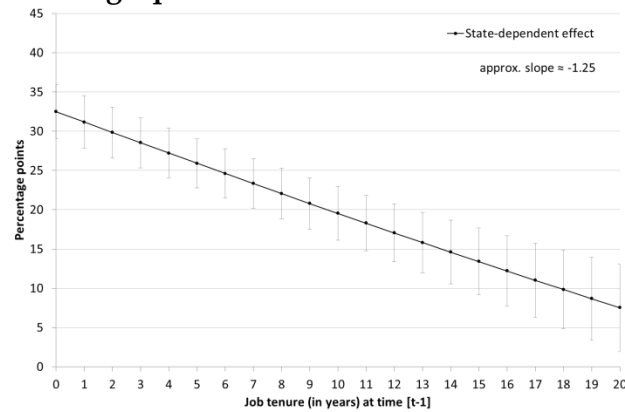
2nd wage quintile

Median wage quintile

4th wage quintile

Highest wage quintile

Notes: The APE of state-dependence is calculated as the difference between the averaged predicted probabilities shown in Figure 7.8 (above), and based on the coefficient estimates from Column (2) of Table 7.6 (above).
The ± error bars represent the 95% Confidence Intervals for the difference in predicted probabilities.

Source: HILDA Survey, 2001-2011

7.6 CONCLUDING REMARKS

Despite the extensive research in the labour economics literature on the 'mobility-push' forces that strengthen and erode the employment relationship between workers and firms, in particular the negative structural dependence of the probability of job change on tenure, job-turnover and labour mobility involving self-employment is mostly neglected. Similarly, much of the economic research related to self-employment centre around 'entrepreneurial-pull' explanations for why workers gravitate toward self-employment, rather than focus on the commonalties that the labour dynamics involving self-employment might have with labour mobility and job-change more broadly. In an attempt to bridge this gap in the research, this chapter, therefore, examines whether and to what extent the choice of self-employment is similarly determined in the same way that the theoretical models of employee job-turnover and inter-firm labour mobility in the labour economics literature suggest.

Using the longitudinal HILDA data to estimate a dynamic random-effects panel probit model of self-employment for Australian workers, this chapter examines to what extent the length of prior experience on a particular job determines the choice of self-employment, and, also, to what extent this effect is attributable to 'genuine' duration-dependence implied by the accumulation of specific-capital. In contrast to earlier dynamic studies, which tend to focus on the state-dependence of self-employment only, the employment dynamics are now interacted with the length of job-tenure in the previous year to further specify the effect of state-specific duration-dependence. Controlling for observed and unobserved heterogeneity and initial conditions, the estimates distinguish the causal impact of past experience in self-employment, relative to working as an employee, on the probability of current self-employment (i.e. 'genuine' state-dependence) from the causal impact of elapsed job-tenure on the probability of workers transitioning to and from self-employment in the future (i.e. 'genuine' duration-dependence attributable to the accumulation of specific-capital).

The results highlight the importance of duration-dependence, as well as state-dependence, in determining self-employment. The first part of the multivariate analysis shows that longer lengths of prior job-tenure greatly diminish the large and

significant influence of state-dependence, as the impact of past self-employment experience on the probability of remaining self-employed in the future declines with tenure, on the one hand, while the impact of employees becoming self-employed in the future increases with tenure. That is, the impact of duration-dependence adversely affects persistence and positively influences the probability of changing employment states. The results indicate that learning on-the-job and the accumulation of specific-capital play an important role in determining the choice of self-employment, and, contrary to the theoretical predictions, tenure acts to weaken the attachment of workers to their existing job and promote mobility both to and from self-employment. This finding is consistent with recent evidence reported by Sørensen & Sharkey's (2014) that employees are relatively more likely to become self-employed, as opposed to switching employers, as their tenure increases. Whereas, the finding casts doubt on Lazear's *jack-of-all-trades* hypothesis and the previous empirical evidence that self-employment is positively correlated with histories of job-turnover (or, inversely, shorter tenures).

The second part of the multivariate analysis, which extends the dynamic model to also include the quintile distribution of employee hourly-wage outcomes as a part of the lagged-dependent variable, further shows that the magnitude of the structural effect of prior job-tenure on the choice of self-employment becomes greater for employees who experience 'poorer' wage outcomes relative to their peer group (by age and sex). That is, the length of past experience in a particular job positively influences the probability of changing employment state, and the rate at which employees are more likely to become self-employed increases as the relative value of their return on tenure worsens. The evidence that prior tenure and wage outcomes of employees jointly influence the future prospects of employees changing jobs and becoming self-employed is indicative of the type of specific-capital accumulation that is implied by human-capital theory. In contrast Sørensen & Sharkey's (2014) study, which concluded that self-employment as an outside employment option becomes relatively more attractive to 'well-matched' employees with longer tenures because they receive fewer attractive wage-offers from external firms; this finding instead indicates that employees 'unlock' an increasing number of prospective opportunities in self-employment with tenure because of the skills and knowhow they develop on their current job. This now provides an explanation for self-employment that does not rely on extant self-employment: that is, it

provides a genesis cause for self-employment.

The key implication of these findings is that learning on-the-job and the accumulation of firm-specific human-capital appear to play an important role in determining the choice of self-employment. When self-employment as an outside alternative is considered, the same specific-capital accumulation process that strengthens the worker-firm job-match over time now acts as 'double-edged sword' by weakening the attachment of workers to their existing job and promoting mobility both to and from self-employment. The same human-capital that firms invest in their employees to augment their productivity and strengthen their employment relationship (i.e. lower the probability of separation to another firm) simultaneously increases the likelihood of those workers becoming self-employed. This is particularly acute for the employees who increasingly realise a 'poor' wage outcome on their tenure. Firms and employers who invest in a high-skill workforce, which take longer to develop but deliver productivity gains, potentially sow the seeds of their future competitors if they fail to adequately share in the gains with workers.

APPENDIX 7.A

Table 7.8: Average Partial Effects (APEs) on probability of self-employment (Pr[$SE_t = 1$])

Explanatory variables	(1)	(2)	(3)	(4)
Lagged dependent (base= Employee [t-1]):				
~ Self-employed *[t-1]*	0.261***	0.242***		
Lagged dependent (base= Employee: 3rd quintile [t-1]):				
~ Self-employed *[t-1]*			0.318***	0.287***
~ Employee: Lowest quintile *[t-1]*			0.023***	0.022***
~ Employee: 2nd quintile *[t-1]*			0.002	0.003
~ Employee: 4th quintile *[t-1]*			0.007	0.006
~ Employee: Highest quintile *[t-1]*			0.021***	0.018***
Initial dependent (base= Employee [t=1]):				
~ Self-employed *[t=1]*	0.281***	0.331***		
Initial dependent (base= Employee: 3rd quintile [t=1]):				
~ Self-employed *[t=1]*			0.265***	0.336***
~ Employee: Lowest quintile *[t=1]*			0.003	-0.004
~ Employee: 2nd quintile *[t=1]*			-0.004	-0.008
~ Employee: 4th quintile *[t=1]*			-0.003	0.002
~ Employee: Highest quintile *[t=1]*			0.004	0.008
Demographic characteristics				
Job-tenure (in years) [t-1]	-0.002***	-0.001***	-0.001***	-0.000
Age (in years)	0.002***	0.002***	0.002***	0.002***
No. of resident dependent children	0.005*	0.005*	0.005	0.004*
Marital status (base= single):				
~ Married/defacto	0.010	0.009	0.009	0.008
Long-term health condition (base= none):				
~ Disability/impairment	0.010**	0.010**	0.009*	0.008*
Geographic location (base= city/urban):				
~ Regional/remote	0.006	0.006	0.004	0.004

Table 7.8: (cont.)

Explanatory variables	(1)	(2)	(3)	(4)
Home Ownership (base= mortgage/rent-buy):				
~ Own	0.003	0.003	0.001	0.002
~ Rent/board	-0.003	-0.002	-0.001	-0.001
~ Life-tenure (no-equity)	0.008	0.008	0.013	0.012
Education (base= school non-completer):				
~ University	-0.035	-0.035	-0.022	-0.022
~ VET	-0.020	-0.021	-0.006	-0.006
~ Yr. 12	-0.021	-0.019	-0.012	-0.009
Gender [t=1] (base= male):				
~ Female	-0.004	-0.006	-0.006	-0.008**
Country of birth [t=1] (base= Australia):				
~ Main English speaking	0.011*	0.008	0.011*	0.008
~ Non-English speaking	0.016**	0.011**	0.015**	0.009*
Employment/labour market characteristics				
SALM unemployment rate *(%)*	0.001	0.001	0.001	0.001
Self-employment rate in industry *(%)*	0.002***	0.002***	0.002***	0.002***
Self-employment rate in occupation *(%)*	0.001***	0.001***	0.001***	0.001***
Paternal occupation match (base= no match):				
~ Match	0.009	0.009	0.008	0.008
Share of working-life in unemployment *(%) [t=1]*	-0.000	-0.000	-0.000	-0.000
Share working-life not-in-the labour market *(%) [t=1]*	0.000	-0.000	-0.000	-0.000

Notes: For dummy variables the effect is that of a discrete change (0 to 1)
  * denotes the APEs significant at = 10%, ** at = 5% and *** at = 1%
  The APEs for the random-effect probit models are estimated using the correction described by Arulampalam (1999).
  Column (2) includes individual-specific means of the time-varying explanatory variables.
  The samples include individuals aged 15 years or over, and not currently studying full-time.
  ~ indicates a dummy variable set.
  [t-1] indicates variables with a one-period lag.
  [t=1] indicates time-invariant variables, where the initial value is taken at wave of entry
Source: HILDA Survey, 2001-2011

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CHAPTER EIGHT
THESIS CONCLUSION

Why do people choose to be self-employed, rather than work as (or search for work as) an employee? What are the key factors that cause certain workers to expect a greater utility flow from self-employment in comparison to their other labour market opportunities? How does knowledge of this help inform the broader purpose of self-employment in the functioning of the labour market and economy? Most importantly, why does any of this matter; why is advancing the economic understanding about self-employment necessary at all? These are the central questions that this Thesis set out to illuminate and provide answers to.

8.1 BACKGROUND & JUSTIFICATION

Self-employment and self-employed workers form an integral part of the labour market that straddles the intersection of labour supply and labour demand. Self-employment is commonplace in the labour markets of most developed economies, and has remained so despite the dramatic shifts in the global economic landscape during the past 20-30 years. In Australia, the share of self-employment (including OMIEs) regularly accounts for a modest one-fifth of total employment; outnumbering other labour market segments, such as unemployment and public sector employment. Self-employed workers are also spread throughout the entire economy, with the occupational and industrial composition of self-employment almost as heterogeneous as the employee workforce.

Self-employment also touches on the lives of many more people than the minority who choose to be self-employed at any given point in time. Across the life-course, almost one-third of Australian males come to experience self-employment first-hand during their working lives. Furthermore, many other workers are indirectly tied to self-employment. One source of secondary contact is through close familial relationships, particularly parental relationships. Another, more important, source is through employees working for and in close proximity to self-employed 'employers'. This also makes self-employment an important engine of employment growth. While most self-employed workers work alone, a smaller share of self-

employed employers disproportionately generate a very large amount of additional employment. In Australia, 57% of total employment consists of employees working for a self-employed worker, who account for another 7% of total employment.

Despite the disproportionately large contribution of self-employment to the labour market and broader economy, the economic motives for choosing self-employment have remained poorly understood. Conspicuously absent from most economic texts, self-employment is, for the most part, ignored by economists. Even labour economists have tended to systematically disregard self-employment, instead focussing on the labour market behaviour of individuals working as employees or searching for an employee job (i.e. unemployed). This is particularly true for Australia, where the body of economic research on self-employment is small and largely descriptive. Instead, one of the few bodies of literature to consistently provide empirical insights relating to self-employment is the multi-disciplinary area of *entrepreneurship*. However, the veracity of the entrepreneurial interpretations about self-employment tends to be unsatisfactory.

In the entrepreneurial literature, explanations for why workers might voluntarily choose self-employment centre around both the supposed distinctive features of the entrepreneurial role — such as, the potential earnings premium, the greater autonomy and independence it offers —, as well as the distinguishing affinities of those who gravitate toward it — such as, those with an acumen for business, a tolerance of risk, or the financial wherewithal. These explanations presume that the labour dynamics involving self-employment are fundamentally different from the other instances of job choice, job-turnover and employee mobility that occurs in the labour market more broadly. That is, people choose self-employment, as opposed to being an employee, because of the distinct entrepreneurial features of the role, or of entrepreneurs; and, that workers always face a realistic choice between opportunities in self-employment and in salaried-employment concurrently, and this choice is independent of their past behaviour.

Then there are the quantitative shortcomings of the entrepreneurial-centric literature, which further obscure an understanding about self-employment. For instance, much of the entrepreneurial-centric research has tended to rely upon less rigorous cross-sectional (or pooled panel) data and outmoded methods of analysis, which only isolate correlates, but are unable to disentangle true causal relationships.

This research also tends to assume without question that measures of self-employment (or variants thereof) are suitable quantitative proxies for entrepreneurial behaviour.

Thus far, the previous economic research fails at pinpointing the root-causes of self-employment, how self-employment improves the utility outcome of workers, the context in which workers make the choice of self-employment, and, subsequently, the purpose of self-employment in the labour market.

8.2 A NEW BEGINNING

To shed some light on these questions, this thesis challenges the prevailing notion of self-employment as a form of entrepreneurship and, instead, recasts self-employment as a normal part of the labour market equilibrating process, treating the decision to become self-employed like any other job change event. In doing so, the contribution to the existing economic understanding about self-employment is twofold.

First, the Thesis tests the validity of the explanations derived from the entrepreneurial literature for the choice of self-employment. These hypotheses include: that self-employment attracts employees in higher paying jobs because of a potential entrepreneurial-earnings premium in self-employment; that employees who feel increasingly disenfranchised in their current job are drawn to self-employment because of the potential non-pecuniary benefits from autonomy; and, that employees with entrepreneurially advantageous characteristics, such as inherited wealth or business acumen, are more likely to bring forward their decision to become self-employed.

Second, the Thesis considers the choice of self-employment from a labour economics perspective as an alternate and, hitherto, unexplored rationale for worker behaviour. It investigates whether the choice of self-employment is instead better explained by the same economic forces that are thought to cause voluntary job-change more broadly. Specifically, the Thesis tests the hypothesis that self-employment opportunities become more appealing to employees with prolonged job-tenure. It distinguishes whether this is because such employees reveal a 'good match' to their current employer, which, in turn, diminishes their likelihood of receiving a 'better' offer from another firm, but leaves their prospective self-

employment opportunities unchanged[154]; or, is instead because employees develop skills and knowhow with experience on their current job, which, in turn, augments their productivity value in outside self-employment opportunities, but does not similarly affect the employment offers received from outside firms.[155]

Central to the empirical analysis of these contrasting theoretical perspectives of self-employment is the use of longitudinal HILDA data (for the period 2001 to 2011) to estimate dynamic panel data econometric models of self-employment. While the use of such techniques are now commonplace and have proved insightful in other areas of labour economics, dynamic panel data econometrics has rarely been used to examine self-employment, particularly in the entrepreneurial literature. In this Thesis, dynamic panel data models of self-employment capture the movement of workers between self-employment and salaried-employment from one year to the next, and disentangle the causal impact of *state-dependence*[156] from *individual heterogeneity*[157] on workers' self-employment outcomes. A major innovation of this Thesis, in comparison to previous work relating to self-employment, is its subsequent use of state-dependence to test the theoretical rationales for self-employment. This is done by further differentiating the employment experiences for employees, and, then, by analysing whether and to what extent certain employees are more likely than others to become self-employed because of an intrinsic difference in their employment experience. Econometric challenges concerning unobserved heterogeneity and initial conditions are also dealt with.

8.3 KEY FINDINGS

The most important finding to emerge from the Thesis is the lack of empirical support for the entrepreneurial explanations for self-employment when compared against the strength of the evidence in support of the alternative labour economics rationale: that the choice of self-employment is driven by the same economic forces that determine job-change and labour mobility more broadly. The basis for this conclusion, for Australia at least, is drawn from the detailed empirical work in

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[154] As Sørensen & Sharkey (2014) propose based on Jovanovic's (1979b) job-match theory of turnover.

[155] As implied by the acquisition of 'firm-specific' capital derived from Becker's (1964; 1962) theories on human-capital.

[156] The influence of past experience in self-employment *itself*, relative to experience as an employee.

[157] The influence of persistent individual characteristics which may or may not be observable or even measurable statistically.

Chapters Five, Six and Seven, and the main finding of each:

1. *Self-employment experience begets experiencing self-employment*: The key result of Chapter Five is that self-employment is a highly persistent state and that this is largely attributable to genuine state-dependence, after controlling for unobserved heterogeneity and initial conditions. The results suggest that an Australian worker who experienced self-employment was 27 percentage points more likely to be self-employed in the future in comparison to an otherwise identical person working as an employee. That is, an individual's previous self-employment experience has a causal impact on their future labour market behaviour. This finding highlights the importance of using dynamic panel econometric methods when estimating probability models of self-employment, and is consistent with evidence from a handful of similar studies in the U.K. and Europe. It also demonstrates how such improvements begin to change the story about self-employment when compared against cross-sectional (or pooled) data studies predominant in the entrepreneurial literature, which tend to over-emphasise the importance of observed personal characteristics in determining self-employment. Despite its importance, however, finding that strong state-dependence effects exist does not in itself help explain why an employee would voluntarily choose to be become self-employed in the first instance.

2. *Entrepreneurial fallacies about self-employment*: Building on the previous chapter, the key finding to emerge in Chapter Six is the lack of empirical support for the a priori assumptions about self-employment derived from the entrepreneurial literature. In stark contrast to the conclusions of much of the existing literature, the entrepreneurial explanations for why employees freely transition into self-employment are found to be weak, once dynamics and unobserved heterogeneity are adequately accounted for. There is little evidence to indicate that employees are drawn disproportionately to self-employment because of distinctive entrepreneurial features of the role or of those who become self-employed. In some instances, the evidence was even counterintuitive to the theoretical implications. For example, rather than find that higher-pay employees are increasingly attracted to self-employment because of

the potential entrepreneurial earnings-premium, the results instead found that employees at both the lowest and highest wage-quintiles are more likely to transition into self-employment (i.e. the relationship between employee earnings and the likelihood of self-employment is U-shaped). Similarly, rather than find that self-employment appeals to employees who feel increasingly disenfranchised with their current employer because of its compensating entrepreneurial non-pecuniary benefits, the results instead revealed that that self-employment is most appealing to employees who already have a high level of discretion over how, what and when work is completed in their existing job. Furthermore, when compared against the strength of the state-dependence effect of self-employment, the evidence in support of the 'entrepreneurial-pull' explanations were of almost no consequence. When viewed as a whole, the popular understanding of self-employment in the economics literature as a form of entrepreneurship does not appear to hold as a generalisation.

3. *Self-employment as a learnt outcome*: In contrast to the previous chapter, the key finding from Chapter Seven is how the strength of the persistence of self-employment attributable to genuine state-dependence begins to diminish with workers' length of experience on the same job (even after unobserved sources of dependence are controlled for). That is, prolonged tenure increases the probability of an employee becoming self-employed, on the one hand, while increasing the probability of a self-employed worker transitioning to a salaried-employed job, on the other. As a result, the initial large difference in the probabilities of future self-employment between a self-employed worker and an otherwise identical employee diminishes at longer lengths of job-tenure as the probabilities of future self-employment converge (i.e. state-dependence of self-employment effect diminishes with tenure). This result is indicative of genuine *duration-dependence*, attributable to specific-capital accumulation, of the sort postulated in the labour economics literature by both job-match and human-capital theories of job-turnover. It is also consistent with Sørensen & Sharkey's (2014) recent evidence, using Danish workforce data, that the share of employees who change jobs into self-employment,

compared with moving to another firm, increases with longer job-tenure. However, this does not confirm that this is because employees with longer tenures are more likely to have revealed a 'good' job-match with their current employer, which lowers the likelihood of them receiving a better wage-offer from an external firm but does not similarly affect the expected value of their outside self-employment option. The evidence instead supports the alternate hypothesis that employees develop skills and knowhow on-the-job with their current employer, which not only augments the productivity value of the worker to the firm, but also increases the worker's expected productivity in any other outside job opportunities where the value of their acquired knowhow might also be better realised, namely self-employment. This is because the rate at which employees are increasingly likely to become self-employed with job-tenure occurs faster for those who experience 'worse' wage outcomes (relative to their age and sex peer group). The joint influence of tenure and wage on the probability of employees changing jobs and becoming self-employed is indicative of the relationship attributable to the accumulation of firm-specific human-capital.

The finding that learning on-the-job and the accumulation of firm-specific human-capital play an important role in determining the choice of self-employment is significant for several reasons. First, to the author's knowledge, this is a completely original contribution of this thesis and has not been shown before in a way that adequately controls for the confounding effect of unobserved individual heterogeneity. Second, this finding runs contrary to the theoretical predictions for employee-employer relationships that specific-capital accumulation lowers the probability of changing jobs. When self-employment as an outside alternative is considered, the acquisition of firm-specific human-capital that is supposed to strengthen the worker-firm relationship over time now acts as 'double-edged sword' and acts to weaken the attachment of workers to their existing job, promoting mobility both to and from self-employment. Third, the finding that an employee with a longer, rather than shorter, tenure on a particular job is more likely to become self-employed casts doubt on Lazear's (2004; 2005) *jack-of-all-trades* hypothesis. That is, the notion that workers with a history of 'job-hopping' and, hence, shorter job-tenures, are also more likely to have a kaleidoscopic range of

experiences across different jobs, firms, and industries, which, in turn, equips these 'movers' with a balance of skills, the combination of which is most valuable when performing a variety of tasks, namely self-employment. Finally, and most importantly, it provides an explanation for self-employment that does not rely on the entrepreneurial features of the role, distinctive or innate attributes of individuals, the prior existence of self-employment or a transfer from parent to child, or the idiosyncratic feature of a particular job-match between an employee and their employer. Instead, it suggests that people learn and acquire skills and knowhow through their experience on-the-job. The fact that people then transfer their acquired skills and knowhow and apply them elsewhere, in different circumstances and possibly in new or innovative ways, is a very satisfying explanation for why people become self-employed — it provides a genesis or root cause for self-employment.

8.4 IMPLICATIONS OF FINDINGS & FUTURE RESEARCH

What the findings imply is profound, and, all of sudden, many strands of evidence that initially appeared to be disparate and contradictory now begin to coalesce. The fact that workers need skills and knowhow before becoming self-employed, which takes time and experience to accumulate, explains why self-employed workers are generally older than the remainder of the workforce and do not enter self-employment until midway into their working life. It also dovetails nicely with the high incidence of latent self-employment amongst both employees and unemployed workers observed in most developed economies. Despite being coveted by many, the choice of self-employment for most workers only arrives later or in the final-stage of a career progression because younger workers, even those with sufficient financial or 'seed' capital, lack the skills and knowhow necessary for self-employment that comes with experience — that is, while the option of self-employment is always apparent to workers, it only becomes a realistic possibility through the gaining of work experience (most likely as an employee) over time.

A corollary of is that government programmes that focus on incentivising and shifting the young, long-term unemployed and inexperienced welfare recipients into becoming self-employed, rather than focus on increasing their prospects of gaining work as an employee, may be misguided and destine these workers for

failure. Instead, it would be more appropriate for government policies aimed at incentivising self-employment to help employees most likely to become self-employed and bring forward the transition – namely, those in their mid-career with several years of experience with an employer. Ironically, these are not the types of people who would typically be candidates for government assistance. However, encouraging experienced employees into self-employment could subsequently create additional job opportunities for the unemployed, as well as young and inexperienced workers in an indirect manner. This could occur through two channels: first, as marginally less experienced employees shift-up into the jobs vacated by more experienced workers exiting to start their own businesses; and, second, as the newly self-employed grow their businesses and employ additional workers. Of course, this raises broader questions about the need for government intervention in the first place, and whether increasing the rate of self-employment is even necessary or a desired outcome. This is a question for future research.

The findings also provide a possible explanation for the persistent and pronounced gender inequality in self-employment, relative to the trend toward greater female labour force participation more broadly. While the growth of the Australian labour market over the past two decades was driven largely by increased female participation, it is possible women's self-employment lagged because this growth involved the entry of first-time and inexperienced workers from outside the labour market or from unemployment. It is also the case that, traditionally, female employees are more likely than males to break their tenure of employment, or exit the labour market all together, because of child-rearing or family caring responsibilities. In the future, it will be interesting to see whether the share of female participation in self-employment increases in response to the breakdown of traditional gender roles and social norms around child care, as initiatives by government and employers, to right this imbalance and encourage continued female labour market participation, begin to take effect.

Another implication of the findings is the potential future decline in the incidence of self-employment due to the casualisation of the Australian workforce during the past two decades. Although providing employers with the flexibility to adjust their internal labour costs more quickly, it is possible that the emergence of more precarious forms of salaried-employment may have also dissuaded firms from

investing in the human-capital of their casual and contract employees. If so, there may be fewer Australian workers equipped with the competencies necessary for self-employment in the future. It will also be interesting to see how self-employment in Australia evolves over time, and whether it will increasingly consist of sole traders or independent contractors who are dependent on the one client with a relationship similar to that of an employee. Such level of detail in the analysis of self-employment is more nuanced than what was considered in this Thesis.

While firm-specific human-capital is a useful construct for understanding the transition of employees into self-employment as a reflection of their acquired expertise with job-tenure, the progression as represented in this Thesis does not consider the potential role of the organisational hierarchy in the employee's decision to become self-employed. That is, to what extent does a ladder of progression in an organisation affect the accumulation of firm-specific human-capital, and does the progression of an employee up this ladder also affect their decision to become self-employed as positions nearer the top become increasingly scarce. The shape of an organisation hierarchy (i.e. flat versus hierarchical) would also affect both the tenure and wage-growth of an employee in a particular firm, as well as reflect the complexity of a firm's technology of production and the need for its employees to acquire firm-specific human-capital. To the author's knowledge there is no work in relation to self-employment that examines this, but future work would need to build from the theoretical concepts outlined by Rosen (1982), Jovanovic & Nyarko (1997), and Davis (1997).

A more basic extension of this work for future research could be to capture the dynamics of self-employment more fully by mapping the multinomial transitions to unemployment and not-in-the labour market, as well as to different states of employment. While this is currently econometrically and computationally challenging, greater interest in dynamic modelling as well as continued improvements to off-the-self statistical software and computing power will make doing such work increasingly accessible to the applied-economist in the future. To the author's knowledge there are only a few empirical studies that undertake multinomial analysis, and these do not focus much on self-employment despite its inclusion (e.g. Caliendo & Uhlendorff (2008), and Cai et al. (forthcoming)). The use of multinomial techniques would be beneficial for examining the impact of self-

employed workers' experience on their future labour market transitions, how this affects the value of their accumulated human-capital, whether these workers head back to salaried-employed jobs or leave the labour market, and the speed at which these transitions occur.

Other future extensions could include a more detailed analysis of the pathways workers take on entering and exiting self-employment. Specifically, to what extent employees' make a gradual transition to self-employment and work for themselves as a second job. Similarly, to what extent the dynamics of self-employment vary for different forms of self-employment, such as incorporated owner-managers, employers, independent contractors, franchisees, or dependent-self-employed. Of course, each of these extensions relies on the detailed and accurate capture of employment relationships in labour force statistics data – an improvement that would be of great benefit to labour economics more broadly.

Self-employment is a fascinating area of economic research and one that we are only just now beginning to scratch the surface. The fact of the matter is, we don't really have a good understanding of what self-employment is – i.e. who uses it, why are they using it, what is its function in the labour market and economy. Furthermore, just as the strength and nature of the employee-employer relationship has changed over time, it is unlikely that 'what self-employment is' remains constant.

If erstwhile employees are being forced into self-employment, then that is what self-employment is. If otherwise unemployed workers are taking up self-employment to avoid the tarnish of unemployment, then that is what self-employment is. If people with certain characteristics are drawn to the entrepreneurial features of the role of self-employment, then that is what self-employment is. If an employee realises they could attain a greater return on their learnt skills and knowhow by becoming self-employed, then that is what self-employment is.

It is necessary, therefore, to keep looking for the common motivating thread(s). And, to do this, data should be allowed to show support for a theory, not forced to speak in its favour.

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