

**An examination of personality in occupational choice:
Antagonistic managers, careless workers and
extraverted salespeople**

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Abstract

This paper is an econometric investigation of the choice of individuals between a number of occupation groupings utilising an extensive array of conditioning variables measuring a variety of aspects of individual heterogeneity. Whilst the model contains the main theory of occupational choice, human capital theory, it also tests dynasty hysteresis through parental status variables. The focus is an examination of the relationship between choice and personality with the inclusion of psychometrically derived personality variables. The empirical model of occupational choice is a multinomial logit estimated using the Household Income and Labour Dynamics in Australia (HILDA) survey data. Human capital variables are found to exhibit strong credentialism effects. Parental status has a small and limited effect on occupation outcomes indicative of only some small dynasty hysteresis. On the other hand, personality effects are found to be significant, relatively large and persistent across all occupations. Further, the strength of these personality effects are such that they can in many instances rival that of various education credentials. These personality effects include but are not limited to: managers being less agreeable and more antagonistic; labourers being less conscientiousness; and sales people being more extraverted.

JEL Classification: J24; J62; C25

Keywords: Occupational choice; personality traits; credentialism; dynasty hysteresis

Introduction¹

This paper examines occupational choice to test if an extended array of variables, including personality traits, influence an individual's occupational choice. Typically the heterogeneity of labour markets is examined by looking for compensating wage differentials as first advocated by Adam Smith in "*an inquiry into the nature and cause of the wealth of nations*" (1776, 1993 reprint) and hedonic wage theory (Lucas 1977). These approaches rely on labour markets being in equilibrium and completely reflecting the value of the individual's characteristics. However, the commonly used earnings functional form has flaws, especially in terms of measures of human capital inputs such as education (Heckman *et al.* 2003). Further the use of equilibrium analysis in wages is questionable if wages are sticky, markets are imperfect and inhibited by various institutional and sociological factors (Akerlof & Yellen 1990; Ehrenberg & Smith 2006; Kaufman & Hotchkiss 2006). Wages may take a long time to adjust (Friedman 2007) and observed wages may contain a large component of disequilibrium rents (Bowles *et al.* 2001a). It can also be argued that models of wage determination do not directly lend themselves to application by policy makers in terms of ways to improve labour force supplies and the outcomes of particular individuals.

An alternative is the occupational choice approach which focuses on examining the individual's choice behaviour in the heterogeneous labour market. It does this by examining the probability an individual will attain a particular occupation on the basis of their characteristics using discrete choice models. This approach has the advantage that it provides clear prediction as to what influences choice and outcomes and it lends itself to

¹ This paper 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 Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either FaHCSIA or the MIAESR

The data used in this paper was extracted using the Add-On package PanelWhiz for Stata[®]. PanelWhiz (<http://www.PanelWhiz.eu>) written by Dr. John P. Haisken-DeNew (john@PanelWhiz.eu). See Haisken-DeNew and Hahn (2006) for details. The PanelWhiz generated DO file to retrieve the data used here is available from me the authors on request. Any data or computational errors in the paper due to the authors.

resolving possible shortages in various types of skilled labour and the formulation of policy particularly to minimizing “joblessness”.

The first empirical work in occupational choice using modern discrete choice econometrics is Boskin (1974) followed by Schmidt and Strauss (1975). There is limited econometric work in Australia (Vella 1993; Borooah & Mangan 2002). The central tenet of these models, formalized by (Heckman & Honore 1990; Gould 2002), is that individuals move to that occupation in which their particular characteristics are most productive and highest valued even if these characteristics are valued in all occupations.

There are various sources of heterogeneity in labour markets that can influence the productivity of an individual and, through wages and non-pecuniary factors, alter the utility of a specific occupation. The primary factor that has been examined as a source of heterogeneity between individuals is human capital. Becker (1993) argues that education, experience and various other skills can be seen as capital improvements like any of factor of production and therefore increase the productivity of an individual. The literature to date has usually measured education and experience in years. However, Heckman *et al.* (2003) posit that the effect of education may not be constant in years and that certain educational credentials may have non-linear effects. Shaw (1984) highlights that considering human capital to primarily consist of general education and job specific experience is limited. Leigh (2008) demonstrates that education credentials exhibit a non-linear effect in years of education on earning and labour force participation in Australia.

An extension to human capital and occupational choice is the argument that the achievement of an individual’s parents influences the behaviour, skills and abilities of an individual. That is the status of an individual’s parents is a potential source of heterogeneity. Due to this transference of characteristics between parents and offspring, individuals tend to have an increased probability of being in the same or similar occupations as their parents, *ceteris paribus*. This is known as dynasty hysteresis. The mechanism underlying dynasty hysteresis is subject to debate. Laband and Lentz (1983) argue that dynasty hysteresis is caused by human capital transfer which is more

predominant in some occupations than others. Fan (2008) argues that dynasty hysteresis may be transmitted by religion and its associated characteristics. Akerlof (1997) puts forward a theory of social distance in which individuals have both a desire to excel and a desire to conform to their social group. Other potential mechanisms include the intergenerational transfer of preferences (Doepke & Zilibotti 2005) and of non-cognitive factors (Bowles & Gintis 2002). Irrespective of the transfer mechanism, dynasty is an important phenomenon to be examined in occupational choice as it has a crucial effect on the ability of individuals to have freedom to pursue any occupation they desire and the extent to which the other determinants influence that choice (Bradley 1991; Mazumder 2005; Bjerk 2007). Previous analyses of occupational choice have included parental variables to attempt to control for dynasty hysteresis (Robertson & Symons 1990; Bradley 1991; Tsukahara 2007). By controlling for education and personality it may be possible to control and identify that dynasty hysteresis is just due to the correlation of these variables across generations.

Human capital theory has recently expanded the search for sources of productive capabilities, notably cognitive intelligence. However, it appears that the effects of cognitive intelligence on wages are modest at best (Cawley *et al.* 1997; Cawley *et al.* 2001). Bowles, Gintis and Osborne (2001a) highlight that the modest returns to cognitive intelligence are not due to its lack of influence on productivity, but reflects the lack of scarcity of this characteristic. Heckman and Rubinstein (2001) refer to the lack of the effect of intelligence factors and argue from common sense that various behavioural characteristics, or as they call them non-cognitive skills, are important influences on labour market outcomes. Heckman and Rubinstein (2001) state these behavioural characteristics are the ‘dark matter’ of economics, a potentially powerful explanatory and under examined area in economics.

It has been previously thought within economics that differences between individuals’ characteristics, such as preferences, are far too numerous, and are not a sensible area, for the scientific examination of economic behaviour (Caplan 2003). This is not the case in

psychology which has long sought to find and classify the differences between individuals' consistent and enduring behavioural characteristics; these are known as personality traits. The focus of this paper is an examination of the influence of personality traits on occupational choice by way of a standard multinomial logit model. The categorical variable, occupation category is measured as Australian and New Zealand standard classification of occupations (ANZSCO). The conditioning variables used not only include personality measures, but also include educational achievement by way of qualifications gained; demographic and personal variables; parents' characteristics, to capture dynasty hysteresis; as well as controls for industry and location.

Psychometrically Derived Personality Traits and Occupational Choice

McCrae and Costa (2003) provide a summary of the literature on personality psychology to date and argue, along with others (Digman 1990; Goldberg 1993; Caplan 2003; Terracciano *et al.* 2006; Cole 2007; Borghans *et al.* 2008a; Costa Jr & McCrae 2008; Terracciano *et al.* 2010), that the general consensus model for personality traits is that of the five factor model (FFM). The FFM states that personality traits are “dimensions of individual differences in tendencies to show consistent patterns of thoughts, feeling, and actions” (McCrae & Costa 2003, p. 25). These personality traits dimensions are typically viewed as broad level dispositions or propensities, that is they are not the sole determinant of behaviour but should be viewed as a contributing factor in a *ceteris paribus* context. Caplan (2003) emphasizes that, whilst personality traits are an important aspect of the examination of economic activity, the incentives of economics should not be neglected. Personality traits consist of broad dispositional traits that can influence behaviour, this does not mean that individuals with the same level of personality traits are identical as the traits can manifest themselves in different specific mannerisms, or characteristics adaptations, as stated by McCrae and Costa (2003).

These five traits consist of openness to experience, conscientiousness, extraversion, agreeableness and neuroticism². Each of these traits have a corresponding negative-

² This can be remembered with the mnemonic device OCEAN which corresponds to the order stated above.

closed to experience, carelessness, introversion, antagonism and emotional stability- which correspond to low scores of the corresponding dimensions. It should be noted that here emotional stability is used in the place of neuroticism to preserve the original arrangement of the data. Openness to experience can be defined as a trait associated with being accepting of new ideas and alternative points of view, appreciation of new concepts, imaginative and creative and generally inquisitive and curious. Conscientiousness is the trait that is associated with diligence, self discipline, punctuality, organised and general competence³. Extraversion is the trait associated with being talkative, friendly, energetic and outgoing. This trait has been previously examined in economics by Krueger and Schkade (2008) and found to influence occupational outcomes and wages. Agreeableness can be described as the tendency to be generous, warm, altruistic, tender, and complacent and tend to get along with others. Individuals with a lack of agreeableness can conversely be aggressive, tough and quite adversarial. Neuroticism is the last trait in the FFM, it is often commonly referred to by its negative of emotional stability. In this paper both terms are used interchangeably depending on contextual appropriateness. However, the estimated empirical model uses the positive counterpart, emotional stability, as the conditioning variable. Neuroticism can be described as the tendency of experiencing negative emotions more frequently and intensely. Neuroticism can be described as a trait associated with anxiety, worry, paranoia and stress. Traits associated with these dimensions of personality can be seen in Table 1 from McCrae and Costa (2003)

³ This trait in a precursor to the FFM is referred to as 'work' (Goldberg,1993)

Table 1: Characteristics of higher and lower scores in the personality traits of the five factor model.

Personality trait	Low Scorer	Higher scorer
Openness	Favours conservative values Judges in conventional terms Uncomfortable with complexities Moralistic	Values intellectual matters Rebellious, nonconforming Unusual thought processes Introspective
Conscientiousness	Eroticizes situations Unable to delay gratification Self-indulgent Engages in fantasy, daydreams	Behaves ethically Dependable, responsible Productive Has high aspiration levels
Extraversion	Emotionally bland Avoids close relationship Overcontrol of impulses Submissive	Talkative Gregarious Socially poised Behaves assertively
Agreeableness	Critical, sceptical Shows condescending behaviour Tries to push limits Expresses hostility directly	Sympathetic, considerate Warm, Compassionate Arouses liking Behaves in a giving away
Neuroticism	Calm, relaxed Satisfied with self Clear-cut personality Prides self on objectivity	Thin-skinned Basically anxious Irritable Guilt-Prone

Source: McCrae and Costa, 2003

In psychology, research suggests that personality traits influence the choice of occupation by an individual (Barrick & Mount 1991; Larson *et al.* 2002; Barrick *et al.* 2003; Ozer & Benet-Martinez 2006; Furnham & Fudge 2008). Barrick and Mount (1991) put forward a number of hypotheses in their meta-analysis of the effect of the FFM in regard to how personality variables influence an individual's productivity and consequently their occupational achievement. Conscientiousness is argued to carry a ubiquitous positive effect on labour market outcomes as individuals who possess this trait are often hardworking, productive, punctual, organised and accepting of responsibility. It can be argued that openness has an effect on the ability of individuals to be trained, being embracing of new ideas and consequently can be positively valued. Emotional stability is argued to influence an individual's occupational achievement via the individual being

less likely to experience negative emotions and they can take on more stressful, non-routine and risky tasks. Barrick and Mount (1991) posit that agreeableness may be valued in some occupations as friendliness is desirable for interpersonal interaction; however, it has been argued that antagonistic personality may be required for certain tasks by both the supplier of and demander for labour (McCrae & Costa 2003; Borghans *et al.* 2008b). In addition, it has been argued that Machiavellian tendencies, that is the ability and desire to manipulate people for benefit, is positively valued in some labour markets (Bowles *et al.* 2001a; Bowles *et al.* 2001b; Wakefield 2008). Extraversion may be valued in occupations that involve a large amount of interaction with others, as extraverted individuals would gain greater utility from these interactions (Barrick & Mount 1991; Krueger & Schkade 2008). The results of Barrick and Mount's (1991) meta-analysis show that conscientiousness and openness behave as predicted, extraversion is valued, in terms of job productivity, in both social jobs and training while agreeableness and neuroticism are observed to have no effect on labour market outcomes. They argue that the lack of an observed effect with regard to neuroticism may be due to a sample selection bias as you require a minimum amount of emotional stability -the negative of neuroticism- to achieve a position in the labour market.

One important issue is the stability of personality traits. McCrae and Costa (2003) present a comprehensive review of a large body of work which suggests that from the age of thirty personality, as defined above, is stable within the broad definition of the FFM from around the age of thirty and some stability can even be seen in younger individuals. This study includes a review of longitudinal studies (pp. 108-115) which provide strong evidence for stability citing a study reporting 3 year retest correlations for both men and women in two groups aged 25-56 and 57-84 ranging from 0.55 to 0.87. In addition, further research supports this claim (Terracciano *et al.* 2006; Terracciano *et al.* 2010). Further, even in young adults retest correlations are as high as 0.3. Finally, Viinikainen *et al.* (2010), using a Finnish data set, find correlations between childhood personality scores and adult labour market outcomes 35 years later. Whilst the personality scores pre-date the FFM the personality measures considerably overlap the FFM and these correlations are indicative of long run stability in broad personality factors.

With regard to specific aspects of personality traits, the five factors each comprise a number of smaller factors or facets which are specific aspects of that trait. In addition, these facets can also, depending on the test, consist of even finer aspects of personality traits. While the broad traits of the FFM are stable, their components are less stable; however, the changes in these finer order characteristics tend to average out leaving the broad factor stable. Thus, while a broad trait is stable, the way it manifests itself in specific behaviours may vary. Others argue that personality is endogenous and unstable and may be influenced by labour market factors (Mueller & Plug 2004; Groves 2005; Heckman *et al.* 2006; Cole 2007; Semykina & Linz 2007; Cunha & Heckman 2008). Importantly this is due to the fact that they are using different traits derived from different personality models. The adult stability of personality traits as measured by the FFM complements the argument put forward for early intervention in studies by Heckman and associates with productive personality traits and behavioural tendencies being influenced at a young age (Heckman 2000; Heckman 2006; Knudsen *et al.* 2006; Cunha & Heckman 2008; Heckman 2008). Further, this stability precludes endogeneity in models using the FFM measures. Based on the FFM, this analysis treats adult personality as stable over the relatively short length, (five years at most) of the data.

The Data

The data source is the Household Income and Labour Dynamics in Australia (HILDA) longitudinal data set. The HILDA survey is an approximately one in one thousand sample of the Australian population consisting of 19,914 individuals in 7,682 households in sample Wave one (Watson 2009). The HILDA dataset contains an extremely rich set of variables which capture details on a large number of individual characteristics including the focus of this study occupational and labour market outcomes, education, parental status, and standard demographic variables. Particularly, it contains a comprehensive set of personality measures which conform with the FFM. These were derived, following the well established procedures of the FFM, using a factor analysis of underlying variables.

Occupations in the HILDA data are coded into the ANZSCO system. The HILDA data in its general release provide the ANZSCO coding at both the one digit and two digit levels. This research uses the one digit ANZSCO coding which consists of eight mutually exclusive and exhaustive occupation outcomes. The eight one digit categories are managers, professionals, technicians and tradespersons, community and personal service workers, clerical and administrative workers, sales workers, machine operators and drivers, and labourers. Each of these categories describes a set of skill specialisations that are relatively homogenous when compared with other groups. These categories give a good representation of occupations based on the view that an occupation is a set of relatively homogenous tasks. A brief description of each of these eight occupational categories and examples of jobs that fall into these categories can be seen in Table 2.

Table 2: Definitions and examples of the ANZSCO coding of occupations

Occupation (abbreviations underlined)	Description of tasks	Examples
Managers	Plan, organize, coordinate and review various operations	General manager, legislators, farm manager, finance managers, retail manager, & customer service manager
Professionals	analytical, conceptual and creative tasks require the application of a body of knowledge	Actors, airline pilots, Engineers, Physical and social Scientists, Medical professionals, lawyers, IT professionals, and educators
<u>Technicians</u> and tradespersons	Skilled tasks requiring broad or specific knowledge.	Scientific Technicians, motor mechanics, construction workers, chefs, florists and hairdressers
Community and personal <u>service workers</u>	Provision of service to either individuals personally or the community as a whole that often requires interaction with others.	Paramedics, child carers, baristas, waiters, security officer, military personnel, driving instructors and sportspersons.
<u>Clerical</u> and administrative <u>workers</u>	Organize, store, manipulate and retrieve information	Office managers, data entry clerks, receptionists, payroll clerk, mail clerks and proofreader
Sales workers	Sell goods and services and provide sales support	Sales representative, insurance brokers, retail supervisors, checkout operator, models and telemarketers,
Machinery <u>operators</u> and drivers	Operate machinery, plant vehicles and other equipment	Industrial spraypainter, sewing machinist, motion picture projectionist, crane operator, forklift driver, and train driver
Labourers	Repetitive and routine tasks that may include the use of hand or power tools.	Cleaners, steel fixer, product assembler, packer, slaughter, farm worker, kitchen hand, freight handler and handypersons

While these groups are relatively homogeneous in terms of tasks, some occupations can be expected to have differing desired characteristics; for example, security workers are in the same category as baristas. Analysis of the two digit level of 43 categories would

capture some of the heterogeneity in the broader class. However, analysis at the two digit level leads to difficulties given: the necessary number of parameters; a low frequency of observation in particular states; and the possible violation of necessary conditions for the model's adequacy. For these reasons the current work is limited to occupational categories at the one digit level.

As well as personality trait measures, the HILDA data gives very detailed listings of variables that theory elects as important in conditioning occupational outcomes. Along with the standard demographic variables such as age, gender, location, marital status, etc., the HILDA survey dataset contains data on the educational attainment of an individual in terms of qualifications. In order to capture occupation specific human capital and to introduce non-linearity into the influence of education on labour market outcomes the analysis uses a series of binary variables based on educational achievement.

Two sets of variables are used to capture parental status. The first is the labour market success of an individual's parents. This is measured by a set of binary variables which reflect the occupation of an individual's mother and father. Of particular interest is the probability of an individual being in the same occupation as their parent, this would provide support for the phenomenon of dynasty hysteresis. The second is the AUSEI06 measure of social status. This is an index ranging between zero and one hundred, to one decimal place, which incorporates a variety of education, occupation, income and other demographic effects that reflect an individual's social success (Jones & McMillan 2001; McMillan *et al.* 2008). The AUSEI06 allows for a continuous version of parental status to be used in order to determine if it influences an individual's occupational outcome.

Prior to presenting tables of measures and summary statistics which describe the data, it would be useful to return to the personality data. The HILDA dataset provides a rich array of variables that are rare within nationally representative datasets to examine the "dark matter" of the economics of personality factors (Heckman & Rubinstein 2001). The survey administered a questionnaire based on the FFM in Wave five. The test takes 30 questions consisting of adjectives that describe the respondent's typical behaviour from

the mini-marker test developed by Saucier (1994) and 6 questions from other valid personality tests. These personality tests are usually subjected to standard tests in order to ensure that they are valid psychometric instruments and can be used for meaningful analysis of unobserved psychological phenomena and are not purely mathematical constructs (Borghans *et al.* 2008a). The personality tests in HILDA are no exception and Losoncz (2007) provides an assessment of validity tests of the personality tests and finds that the derived psychometric instruments are valid.

Table 3: The Frequency of Occupations

Occupation	Frequency	Percentage
Managers	4,234	13.56
Professionals	8,259	26.44
Technicians and Trades Workers	3,905	12.5
Community and Personal Service Work	3,053	9.78
Clerical and Administrative Workers	5,014	16.05
Sales Workers	2,636	8.44
Machinery Operators and Drivers	1,599	5.12
Labourers	2,531	8.1

Table 4: Summary Statistics

Variable	Mean	S.D.	Min.	Max.
Age				
Age	39.1873	12.4450	15	83
Age Squared	4.4876	1.0806	1	7
Personality				
Agreeableness	5.3658	0.8791	1	7
Openness	5.1154	1.0137	1	7
Conscientiousness	5.1378	1.0419	1	7
Extraversion	4.3256	1.0196	1	7
Emotional Stability	1690.5180	1003.9180	225	6889
Parental Status				
Father's AUSEI06	46.3126	22.8780	0	100
Mother AUSEI06	43.0612	23.1785	3.4	100

Table 3 gives the frequency and relative frequency counts for occupational status categories used in the multinomial logit. The preponderance of professionals and clerical and administrative workers reflects the distribution of occupations in the population and mirrors outcomes of other Australian surveys. Table 4 contains summary statistics for

those variables where these measures are meaningful. Table 5 summarises the binary variables used in the analysis. For each binary the score is the proportion of the sample scoring one.

Table 5: Binary Variables

Variable	Proportion	Variable	Proportion	Variable	Proportion
Gender (Base: male)		Industry (Base: Manufacturing)		Father's occupation (Base: Professional)	
Female	0.4935	Agriculture	0.0384	Father Manager	0.2519
Education (Base: year 12)		Mining	0.0134	Father Technician	0.2423
PhD or master	0.0470	Electricity, gas and water	0.0087	Father Service	0.0357
Graduate diploma	0.0738	Construction	0.0680	Father Clerical	0.0627
Bachelor	0.1716	Wholesale trade	0.0326	Father Sales	0.0478
Advance diploma	0.1048	Retail trade	0.0945	Father Operator	0.0993
Certificate 3 or 4	0.2034	Accommodations and food service	0.0569	Father labourer	0.0888
Certificate 1 or 2	0.0113	Transport	0.0405	Mother's occupation (Base: Professional)	
Certificate not applicable	0.0023	Telecommunications	0.0295	Mother Manager	0.0985
Year 11 or Less	0.2276	Finance	0.0381	Mother Technician	0.0768
State (Base: New S Wales)		Real estate	0.0131	Mother Service	0.0834
Victoria	0.2512	Scientific and technical	0.0830	Mother Clerical	0.2327
Queensland	0.2092	Admin and support	0.0263	Mother Sales	0.1175
South Australia	0.0841	Public admin	0.0713	Mother Operator	0.0338
Western Australia	0.0962	Education	0.1159	mother labourer	0.1643
Tasmania	0.0311	Healthcare and social status	0.1225	Year (Base: 2001)	
Northern Territory	0.0070	Arts and recreation	0.0187	2002	0.1315
Australian Capital Territory	0.0251	Other	0.0375	2003	0.1375
Marital Status (Base: single)		Country of Origin (Base Australia)	0.0375	2004	0.1445
Married	0.5580	English Speaking country of origin	0.1152	2005	0.1632
Defacto	0.1416	Non English country of origin	0.0737	2006	0.1520
Separated	0.0284			2007	0.1475
Divorced	0.0531				
Widow	0.0084				

Estimation and Results

A multinomial logit model was estimated using STATA 10. The estimate was normalized on the modal occupation, professional. Using the test proposed by Long and Freese (2006) in their SPOST suite of STATA commands (not reported), which is a test based on the Cramer-Ridder test (Cramer & Ridder 1991), it can be concluded that none of the occupational states can be pooled together, suggesting that no further aggregation is

possible without biasing the results. Based on this, one should not expect violations of the independence of irrelevant alternatives (IIA) assumption

Rather than report the rather large numbers of estimated coefficients the marginal effects alone are reported. The analysis used the marginal effects estimated by the MARGEFF module used (Bartus 2005). Further, these are the mean marginal effects for the sample data rather than the marginal effects at means. For brevity, the average marginal effects for the personality traits, the focus of this study, are presented in Table 6 in the text. All other average marginal effects are reported and discussed in separate tables in the Appendix. In order to assess the relative impacts of discrete and continuous variables the paper compares the average effect of a change in a discrete variable from its minimum to maximum value to the same measure for a continuous variable⁴.

⁴ A comment on an earlier version of this paper suggested that comparisons of magnitudes in shift should be on the basis of a standard deviation shift rather than minimum to maximum. This is problematical given that a comparison maybe personality against education credentials, where the latter are binary and therefore discrete variables. The standard deviation is not a valid statistic for nomial variables (Stevens 1946)-and would produce poor estimates of the relative magnitudes of these effects especially in non-linear models such as the multinomial logit.

Table 6: Average Marginal Effects Personality Traits

Variable	Managers	Professionals	Technician	Service
Openness	0.00598***	0.01127***	0.00153	-0.00043
Conscientiousness	0.01205***	-0.00027	0.00156	-0.00077
Extraversion	0.01447***	-0.00147	0.0013	-0.00009
Agreeableness	-0.01481***	-0.00144	-0.00345*	0.00351*
Emotional Stability	0.00186	0.00694***	-0.00248	0.00242
	Clerical	Sales	Operator	Labourer
Openness	-0.00964***	-0.00046	-0.00421***	-0.00404**
Conscientiousness	0.00664***	-0.00826***	-0.00312**	-0.00783***
Extraversion	-0.01353***	0.00556***	-0.00008	-0.00616***
Agreeableness	0.00750***	0.00404**	0.00593***	-0.00129
Emotional Stability	-0.00824***	-0.00182	-0.00025	0.00157
Observations	31,231		Pseudo R²	0.3705
Legend	* p<0.1	** p<0.05	*** p<0.01	

Personality traits, discussion: Table 6 indicates that personality traits generally seem to have some influence on occupational outcomes with the average marginal effects frequently being statistically significant for traits and occupations.

Openness to experience, a trait related to receptiveness to training and accepting of new and different ideas, significantly increases the probability of individuals being found in management or professional roles. This is to be expected as both require individuals to deal with a variety of ideas, be accepting of new ideas and concepts and require training, as can be seen from Table 1. The trait openness also tends to reduce the probability of an individual being an operator and labourer. The tasks of an operator or labourer, as seen in Table 1, tend to be routine, thus openness would not be highly valued by employers. It is possible that individuals who tend not to be receptive to new ideas may choose jobs within these occupations as it allows for a narrow specialisation and consists primarily of a routine body of tasks. The effect of openness is relatively large and important. For example for a professional moving from the lowest possible score, one, to the highest, seven, gives an increase of 0.068, which is similar to the average effect of completion of High School on the probability of being in a professional occupation, see Table A1 in the Appendix.

Conscientiousness, the trait associated with hard work and effort, is found to significantly increase the probability of an individual being in a management or clerical position and decrease the probability of an individual being a salesperson, operator or labourer. One aspect of the personality trait conscientiousness is the ability to plan and be organised, an aspect that is central to the tasks performed in both management and clerical roles. Thus despite the trait being valuable in all labour market outcomes, as in Roy's (1951) model, people tend towards these occupations and are drawn away from those of salesperson, operators and labourers. The magnitude of the effects of conscientiousness are quite sizeable: moving from the lowest level to the highest level of this trait increases the probability of being in a management occupation by 0.0723 which has a greater effect than having a Bachelors degree (0.063), but lesser than a graduate diploma (0.109) or PhD or Masters (0.206), see Table A1 in the Appendix for details of these scores. These results highlight the potential for personality factors to matter more than traditional human capital variables.

Extraversion, the trait associated with being outgoing and desiring to engage with other individuals is found to significantly affect some occupational outcomes. Individuals who are observed with higher levels of extraversion have a higher probability of being in management and in sales while a lower probability of being in clerical or labourer occupations. These results make sense in that sales roles necessitate social interactions. In addition, management entails, as can be seen in Table 1, the organising of resources to complete tasks such as human labour and thus requires social interaction. Conversely, clerks and labourers tasks are generally not focused on interacting with others, and thus individuals who prefer less social interaction would tend to select these occupations. The effects of extraversion can matter more than a Bachelor degree on the probability of being a manager with similar size effects for clerical occupations.

Agreeableness has a negative effect on the probability of an individual being a manager or technician (albeit at the 10% level for the latter). As suggested earlier, certain occupations would tend to favour individuals who are concerned with pleasing others.

This can include occupations in which there is a greater focus on task completion and competition rather than interacting with others. This would include management and to a lesser extent technical positions. Conversely, individuals with high levels of agreeableness tend to be found in occupations of service, clerical, sales and operators. Sales and service were both expected to be affected by agreeableness as both are social occupations that require interpersonal interactions. It should be noted that individuals in many community service roles, such as security, police and military service, could benefit from being antagonistic. In addition to these social occupations, operators and clerks both have high levels of agreeableness. This could be both due to the fact that these occupations require more teamwork or that individuals with lower agreeableness tend to be able to progress into management roles at the expense of their more agreeable counterparts.

Emotional stability, the negative of neuroticism, is a trait associated with being less likely to experience negative emotions, and like all the other personality traits of the five factor model, has a significant effect on occupational choice. Individuals, who exhibit higher levels of emotional stability, tend to be professionals while those with lower levels of emotional stability tend to clerical work. This result seems to make sense as professional work involves a higher number of complex tasks requiring expert knowledge and independent thought which may be non-routine and stressful. The opposite can be expected with clerical occupations. In addition, this occupation is likely to be less risky, a factor known to influence occupational choice (DeLeire & Levy 2004).

Personality significantly influences the probability of an individual choosing or being chosen for a particular occupation, with each trait influencing at least one occupational outcome and all outcomes being influenced by at least one personality trait, at the ten percent significant level. Generally these effects are found to be modest in comparison to that of human capital but they can rival education credentials in certain occupations. Due to the persistence of personality effects in all occupations, we argue that personality effects are relatively more important than parental status; the effects of parent's social status tend to be similar if not smaller in magnitude and less persistent. It is possible that

the findings with regards to personality are suppressed as personality and parental status may also influence education and thus the indirect effect of personality is not captured by the current model. With regards to occupations, management tends to be most influenced by personality traits and this may reflect the lack of requirements of formal qualifications in many management positions.

Because personality traits are the source of novelty in this research, discussion of the results for other influences on occupation are left to the Appendix. However, in summary, it can be found that labour market heterogeneity is important as individuals are sorted between occupations based on the various other different characteristics nominated by theory and incorporated in the multinomial logit model. The results broadly indicate that education exhibits a non-linear effect in years, with arguably occupation specific education effects and that parental status has a small and limited scope of effects on occupational outcomes.

Conclusion

This paper examines the effect of human capital, parental status and personality on occupational outcomes for a representative panel of Australian households. Economic theory argues that individuals should select the occupation that grants them the highest utility and that because both individuals and tasks in the labour markets are quite heterogeneous individuals are sorted into occupations. Using a multinomial logit model, it is found that human capital exhibits a non-linear effect on occupational attainment, parental status has a limited influence and the broad personality traits of the highly validated five factor model have a significant, relatively strong, persistent and expected effect over occupational outcomes. Further developments can include the use of finer levels of occupations; introducing jobless individuals into the analysis; expansion into the dynamics of occupational choice exploiting transition between occupations captured in longitudinal data. There is also scope for separating out the direct and the indirect effects, through education, of personality and parental status on occupational choice. Further, an important addition would be the decomposition into the supply side and demand side effects of the variables on occupational choice.

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Appendix

Table A1: Human Capital Variables

Variable	Managers	Professional	Technician	Service
Age	0.01258***	-0.00071	-0.00296***	-0.00265***
Age squared	-0.00011***	0.00001	0.00002	0.00001
PhD or Masters	0.20595***	0.30553***	-0.06388***	-0.09727***
Graduate diploma	0.10870***	0.28661***	-0.03579***	-0.09567***
Bachelor	0.06334***	0.28609***	-0.02618***	-0.08175***
Advanced diploma	0.02588***	0.09155***	0.03174***	0.00795
Certificate 3 or 4	-0.02447***	-0.03507***	0.13930***	0.03043***
Certificate 1 or 2	-0.02863*	-0.10447***	0.02168	0.01626
Certificate NA	0.02224	-0.12212***	-0.03859	0.0183
Year 11 or less	-0.02669***	-0.08884***	0.00984*	-0.00484
	Clerical	Sales	Operator	Labourer
Age	0.00189*	-0.00668***	0.00325***	-0.00472***
Age squared	-0.00001	0.00007***	-0.00004***	0.00005***
PhD or Masters	-0.18301***	-0.04373***	-0.05088***	-0.07270***
Graduate diploma	-0.16158***	-0.01468*	-0.03062***	-0.05696***
Bachelor	-0.14686***	-0.01738***	-0.04341***	-0.03386***
Advanced diploma	-0.08978***	-0.01102**	-0.03465***	-0.02168***
Certificate 3 or 4	-0.07860***	-0.01158***	-0.00398	-0.01603***
Certificate 1 or 2	-0.03478*	-0.00614	0.04600***	0.09007***
Certificate NA	0.04256	-0.00995	0.05958	0.02798
Year 11 or less	-0.00235	0.00796**	0.03672***	0.06819***
Legend	* p<0.1	** p<0.05	*** p<0.01	

Human capital variables seem to exhibit significant effects on occupational choice. Age seems to increase, at a decreasing rate, the probability of an individual being a manager, clerical worker or operator while decreasing the probability of all other occupations significantly, with the exception of professionals. This is expected as these occupations relative to salespersons, labourers and service workers may require less physical exertion. It can also be seen as promotion with individuals moving across these occupations with experience. The size of these effects can be large with an extra decade increasing the probability of being in management by about 0.11. This finding confirms previous research that potential experience influences labour market outcomes such as occupational choice.

Education is specified as a series of education credentials in order to capture any possible non-linearity and occupational specific capital that would not be captured using the standard specification of education measured in years. It should be noted that all the effects of education are relative to that of an individual with a complete High School education. University level education, consisting of PhD or Masters, graduate diploma and the Bachelor degree, have a strong positive effect on the probability of an individual being in a profession and, to a less extent, manager. The estimated model suggests that the possession of university level education credentials draws individuals away from all other occupations fairly equally with the exception of a large decrease in the probability of being a clerical worker. This result is expected as professionals, Table 1 in the text, require the completion of conceptual, creative and analytical tasks based on a body of knowledge. This body of knowledge is typically gained from university education and is very important for professionals. The effects on management are also expected but are due individuals 'rising through the ranks' to management positions. Education credentials also exhibit some non-linearity, in terms of years, and some occupation specific human capital. Advanced diploma and Certificates 3 or 4 are an after High School qualification from technical colleges associated with the acquisition of a trade, technical or other applied skills. This credential has a significant positive effect on technician or service occupations but having a certificate 3 or 4 actually decreases the probability of being in a profession or management occupation relative to that of a high school graduate. This suggests that education does not just exhibit a constant linear effect and may possess occupational specific components.

Other possible occupation specific effects can be the increase in probability of being either an operator with a Certificate 1 or 2 and a service worker with a certificate 3 or 4. This highlights the importance of occupation when examining labour market outcomes and possible flaws with standard specification of human capital theory as that have been highlighted in previous literature (Shaw 1984; Shaw 1987; Heckman *et al.* 2003; Leigh 2008). Education has its largest effect on the outcomes of management and professional occupations, with a university degree increasing the probability of a professional occupation by approximately 0.3. Lack of education has a significant influence, with

people who fail to complete the final year of High School having reduced probabilities, compared to high school graduates, of being managers and professionals; they are more likely to be labourers, technicians, operators or salespersons.

Table A2: Dynasty Hysteresis Variables

Variable	Manager	Professional	Technician	Service
Father is manager	0.04255***	0.00333	-0.00391	-0.00247
Father is technician	-0.00442	-0.00646	0.03250***	-0.01529**
Father is service worker	0.0064	-0.00917	0.04339***	-0.02812***
Father is clerical worker	-0.00624	0.00796	0.03398***	-0.00744
Father is sales worker	-0.02276**	0.00805	0.00036	0.0135
Father is operator	0.00953	-0.02340*	0.01632	-0.00329
Father is labourer	0.01538	-0.03364**	0.02749**	-0.01719*
Mother is manager	0.03365***	-0.02359**	0.01063	-0.02189***
Mother is technician	0.00508	0.01027	0.03076**	-0.03162***
Mother is service worker	0.01203	-0.01461	-0.00069	-0.0028
Mother is clerical worker	0.02406**	-0.0139	0.02017**	-0.01135
Mother is sales worker	0.02423*	-0.03592***	-0.00361	-0.00304
Mother is operator	0.01365	0.00917	-0.01746	-0.02163
Mother is labourer	0.01360	-0.01624	0.01224	-0.01873
Father's AUSEI06	0.0000	0.00033*	0.00005	-0.00019
Mother's AUSEI06	0.00034	0.00006	0.00012	-0.00029
	Clerical	Sales	Operator	Labourer
Father is manager	-0.02701***	-0.01706***	-0.00488	0.00945
Father is technician	-0.00342	-0.01589**	-0.00746	0.02044**
Father is service worker	0.00263	-0.01416*	-0.00726	0.00629
Father is clerical worker	-0.00454	-0.01627**	-0.00867	0.00122
Father is sales worker	-0.01591	-0.00675	0.00564	0.01787*
Father is operator	-0.02267*	-0.00892	0.00052	0.03192***
Father is labourer	-0.02807**	-0.01236	0.00589	0.04250***
Mother is manager	0.00849	0.01390*	-0.02200***	0.00081
Mother is technician	0.01409	0.01544	-0.02951***	-0.01451
Mother is service worker	-0.00212	0.01964**	-0.02168**	0.01024
Mother is clerical worker	0.01339	0.00647	-0.02071***	-0.01812**
Mother is sales worker	0.03216**	0.02280**	-0.02271**	-0.01392
Mother is operator	0.02429	0.00948	-0.02906**	0.01156
Mother is labourer	0.01442	0.01821	-0.03247***	0.00897
Father's AUSEI06	-0.00013	-0.00005	-0.00013	0.00012
Mother's AUSEI06	0.00001	0.00032**	-0.00044***	-0.00013
Legend	* p<0.1	** p<0.05	*** p<0.01	

Parental status also seems to have significant effects on occupational choice outcomes, albeit these effects are much smaller than those of education. Generally, social status measured by the AUSEI06 seems to be insignificant for both mother and father. However, father's AUSEI06 is significant at the ten percent level for professionals while mother's score significantly increases the probability of being in sales and decreases the probability of being an operator.

The binary variables for parental occupation provide some support for the hypothesis of dynasty hysteresis. If the father or mother of an individual is a manager, then the probability of being a manager increases by an effect equal to about two-thirds or half of that of a Bachelor degree. This effect can be expected with the inheritance of business ownership within families. A similar effect is also observed for technicians for fathers and mothers and labourers for fathers. However, fathers being in service occupations seem to have a significant negative effect on this outcome. An anti-dynasty hysteresis for service occupations is an interesting finding but we will not speculate on this without further investigation. Generally, the effect of parent binaries are small and range from 0.01 to 0.04 compared to own education binaries, which range from 0.01 to 0.30.

Table A3: Demographics

Variable	Managers	Professional	Technician	Service
Female	-0.06055***	-0.01816***	-0.10548***	0.02357***
Married	0.04643***	0.00337	-0.02259***	0.00057
Defacto	0.01616**	0.01015	-0.01109**	-0.00515
Separated	0.01167	-0.00003	-0.02436**	0.01472
Divorced	-0.00214	-0.01911**	0.0135	0.01381*
Widow	0.04675**	-0.03393	-0.06801***	0.02012
English speaking	-0.00269	-0.00202	0.0034	0.00783
Non-English speaking	-0.04858***	-0.03086***	0.02143***	0.02846***
	Clerical	Sales	Operator	Labourer
Female	0.20787***	0.03513***	-0.05996***	-0.02243***
Married	0.01536**	-0.00952**	-0.01242***	-0.02119***
Defacto	0.00541	-0.01116***	-0.00305	-0.00128
Separated	-0.01141	0.00304	-0.01048	0.01685
Divorced	0.0135	-0.00617	-0.01445**	0.00106
Widow	0.03707*	-0.00872	-0.04914***	0.05586**
English speaking	-0.00109	-0.00212	-0.00921***	0.0059
Non-English speaking	-0.00114	0.00786	-0.01909***	0.04193***
Legend	* p<0.1	** p<0.05	*** p<0.01	

Table A4: Sectors

Variable	Manager	Professional	Technician	Service
Agriculture	0.34722	-0.07177	-0.12782	-0.00352
Mining	-0.09098	0.10451	-0.0293	-0.00881
Electricity, gas & water	-0.10001	0.06537	-0.03716	-0.00881
Construction	-0.04496	-0.06065	0.12923	-0.00817
Wholesale	0.01305	0.00242	-0.14642	-0.00696
Retail	0.08679	-0.08693	-0.13492	-0.00383
Accommodation & Food	0.18336	-0.13243	-0.10728	0.24545
Transport	-0.07585	-0.00172	-0.15748	0.02152
Telecommunication	-0.04904	0.1519	0.00094	-0.00208
Finance	-0.00302	0.1436	-0.17296	-0.00782
Property	-0.04768	-0.03118	-0.18579	0.00934
Scientific	-0.07511	0.25999	-0.05148	-0.0049
Administrative	-0.05784	0.06498	-0.11269	0.09221
Public admin and safety	-0.08688	0.06356	-0.13545	0.2250
Education	-0.11488	0.35194	-0.12834	0.19092
Health	-0.13825	0.20805	-0.1283	0.29941
Art and recreation	-0.05489	0.11241	-0.08833	0.23729
Other	-0.08742	0.03217	0.13837	0.11971
	Clerical	Sales	Operator	Labourer
Agriculture	-0.12613	-0.05324	-0.05355	0.08881
Mining	0.01378	-0.04442	0.1345	-0.0793
Electricity, gas & water	0.13545	-0.03692	0.00064	-0.01857
Construction	0.04371	-0.04827	-0.03826	0.02738
Wholesale	0.07128	0.14562	-0.0003	-0.07868
Retail	-0.10369	0.35954	-0.05758	-0.05939
Accommodation & Food	-0.13382	0.01057	-0.07036	0.0045
Transport	0.18906	-0.01977	0.11833	-0.07409
Telecommunication	0.07859	-0.00403	-0.06938	-0.10689
Finance	0.25837	-0.01528	-0.0849	-0.11799
Property	0.01599	0.37818	-0.07063	-0.06823
Scientific	0.09655	-0.03851	-0.08373	-0.10282
Administrative	-0.03433	-0.03311	-0.07941	0.16019
Public admin and safety	0.12943	-0.04504	-0.05969	-0.09092
Education	-0.08578	-0.0571	-0.08329	-0.07347
Health	-0.05257	-0.05661	-0.07298	-0.05877
Art and recreation	-0.06271	-0.02069	-0.07547	-0.0476
Other	-0.05969	-0.03112	-0.0779	-0.03411
Legend	* p<0.1	** p<0.05	*** p<0.01	

Table A5: Location and Date

Variable	Managers	Professional	Technician	Service
Victoria	-0.00588	0.00388	-0.00267	0.00382
Queensland	-			
	0.02195***	-0.01083**	0.01642***	0.00416
South Australia	-0.01224*	0.00501	-0.00876	-0.00873
Western Australia	-0.00131	0.02115***	0.00266	-0.01131**
Tasmania	-			
	0.03594***	0.01434	0.01478	-0.00824
Northern territory	0.04511*	-0.04489**	-0.00199	-0.01939
Australia CT	0.0164	0.02171*	0.01038	-0.03305***
2002	-0.00315	-0.0055	0.00102	0.00761
2003	-0.0011	-0.01214*	-0.00463	0.01249**
2004	-0.00086	-0.01066	0.00326	0.01106*
2005	-0.01193*	-0.01172*	0.00301	0.01700***
2006	-0.00338	-0.01544**	0.00229	0.01353**
2007	-0.01453**	-0.01695**	0.01226*	0.01638***
	Clerical	Sales	Operator	Labourer
Victoria	0.0048	0.00443	-0.00155	-0.00683*
Queensland	-0.00468	0.0054	-0.00428	0.01577***
South Australia	0.00485	0.00582	0.00508	0.00897
Western Australia	-0.00578	0.00623	0.00048	-0.01212**
Tasmania	-0.00176	0.00933	0.00157	0.00591
Northern territory	0.04549*	-0.02062	0.01256	-0.01628
Australia CT	0.01457	-0.00543	-0.00399	-0.02060**
2002	0.01067	-0.0051	0.00185	-0.0074
2003	0.00678	-0.00216	0.00287	-0.00211
2004	0.00218	0.0011	-0.002	-0.00406
2005	0.0079	-0.00399	-0.00029	0.00003
2006	0.00752	-0.00668	0.00078	0.00139
2007	0.00666	-0.00074	0.00265	-0.00574
Legend	* p<0.1	** p<0.05	*** p<0.01	

Table A6: Average effect of a one standard deviation change in personality traits

Variable	Managers	Professionals	Technician	Service
Openness	0.0061	0.0117	0.0015	-0.0006
Conscientiousness	0.0125	-0.0006	0.0014	-0.0008
Extraversion	0.0162	-0.0020	0.0012	-0.0004
Agreeableness	-0.0126	-0.0016	-0.0032	0.0031
Emotional Stability	0.0019	0.0071	-0.0026	0.0027
	Clerical	Sales	Operator	Labourer
Openness	-0.0098	-0.0005	-0.0044	-0.0041
Conscientiousness	0.0066	-0.0082	-0.0032	-0.0077
Extraversion	-0.0144	0.0060	-0.0000	-0.0066
Agreeableness	0.0065	0.0035	0.0054	-0.0012
Emotional Stability	-0.0084	-0.0020	-0.0004	0.0016

Table A7: Average effect of one standard deviation change in education credentials

Variable	Managers	Professionals	Technician	Service
Openness	0.0061	0.0117	0.0015	-0.0006
Conscientiousness	0.0125	-0.0006	0.0014	-0.0008
Extraversion	0.0162	-0.0020	0.0012	-0.0004
Agreeableness	-0.0126	-0.0016	-0.0032	0.0031
Emotional Stability	0.0019	0.0071	-0.0026	0.0027
	Clerical	Sales	Operator	Labourer
Openness	-0.0098	-0.0005	-0.0044	-0.0041
Conscientiousness	0.0066	-0.0082	-0.0032	-0.0077
Extraversion	-0.0144	0.0060	-0.0000	-0.0066
Agreeableness	0.0065	0.0035	0.0054	-0.0012
Emotional Stability	-0.0084	-0.0020	-0.0004	0.0016