



Attrition in the trades

Tom Karmel
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About the research

Attrition in the trades

Tom Karmel, Patrick Lim and Josie Misko, NCVER

Shortages in the trades are again becoming a prominent issue as Australia emerges from the Global Financial Crisis. The existence of shortages puts the immediate focus on the apparent inability of the training system to supply sufficient skilled tradespersons, but shortages in an occupation are as much related to the rate at which individuals leave the occupation as the rate at which the occupation attracts new entrants. Hence, this paper which focuses on attrition in the trades, using professional occupations as comparators. The analysis is restricted to males in order to abstract from the impact that family responsibilities have on women's labour mobility, noting that the trades are dominated by men, apart from hairdressing and, to a lesser extent, the food trades.

While attrition has a negative connotation, it may be positive for the individuals leaving a trade if they are moving to something better. Thus, by looking at the occupations ex-tradespersons move to, the paper also examines whether a trade offers a good start to a career.

Key messages

- Job and occupational mobility in the trades is not particularly different from that experienced in the professions, although there is considerable variation across the trades (and across the professions).
- The rate of attrition in the trades is remarkably similar in good times and in bad times, although the balance between job losers and job leavers is affected by economic conditions. However, job churn within a trade is higher in good times, and this gives the impression to employers that attrition is higher.
- The one trade occupation that stands out as good foundation for a future career is electrotechnology and communications.

The results of the paper bring us full circle. It seems that we should not be overly concerned about attrition in the trades when addressing skills shortages. Thus it is the output of the training system that should be the immediate focus and this puts the spotlight back on the commencement and completion rates of apprenticeships.

Tom Karmel
Managing Director, NCVER

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Abstract

Skill shortages in the trades are of growing concern as Australian industry emerges from the Global Financial Crisis. Although such shortages are often attributed to the inability of the training system to supply enough skilled tradespersons, they are just as much affected by the rate at which individuals leave their occupations.

In this paper, using professional occupations as comparators, we investigate attrition in the trades and the extent to which this is affected by good or bad economic times. We also ponder the question of whether a trade is a good start to a career by tracking the occupational destination of those who exit their trades.

Introduction

As Australia emerges from the Global Financial Crisis, shortages in the trades reappear as an issue, although less of a severe one than prior to the downturn (Department of Education, Employment and Workplace Relations 2010).¹

The existence of shortages puts the immediate focus on the apparent inability of the training system to supply sufficient skilled tradesmen, but there is another side to the story. Shortages in an occupation are as much related to the rate at which individuals leave the occupation as to the rate at which the occupation is attracting new entrants (as is recognised by, for example, Energy Skills Queensland 2009). As a simple piece of arithmetic, if attrition is low, then the need for new entrants will also be low, everything else being equal. While this argument is unexceptionable, the relevant literature suggests that more attention has been paid to non-completion of apprenticeships than to attrition of qualified tradespeople (for example, Group Training Australia & Group Training Victoria 2005; Ball & John 2005; Ray et al. 2000; Gow et al. 2008, Mangan & Trendle 2008; Snell & Hart 2007; Trendle 2007).

On the whole, training as a solution to skill shortages seems to get more attention than attrition. For example, the Australian Chamber of Commerce and Industry argues that training is one of four elements of a solution to skill shortages, the others being labour mobility, better skills utilisation and migration. The Australian Chamber of Commerce and Industry (2006) does not consider reducing attrition as a possible remedy. In addition, attrition is associated with additional costs for the organisation (Brereton, Beech & Cliff 2003), as well as for the individual, particularly if the attrition is employer-initiated (Boxall, Macky & Rasmussen 2003). However, in considering attrition, are we in a position to comment on whether attrition in the trades is unusually high? If it is, then it makes sense to focus on ways to reduce attrition. If it isn't, then the focus reverts back to the training system. There is another aspect of attrition also worth considering. It is often argued that attrition is not such an issue if those leaving the occupation are moving to 'better' jobs. According to this line of thinking, the trades are a good preparation for a range of careers.

The purpose of this paper is to examine these issues, exploiting data from the Australian Bureau of Statistics (ABS) Labour Mobility Survey. In the first part of the paper we examine attrition and the extent to which it occurs and compare the trades with professional occupations. We choose the professions as comparators because, first, the professions, like the trades, are credentialled occupations and thus require extensive periods of preparation and, second, occupations for individuals within these groups generally act as strong points of self-identity. Included in the analysis

¹ The Department of Education, Employment and Workplace Relations' 'Survey of Employers who recently advertised' (SERA) reports that in 2008 around half of recently advertised vacancies were filled, reflecting skill shortages across all trade occupations (2010). The proportion of filled vacancies for trades improved considerably in the downturn (that is, 2009), but a drop in filled vacancies and suitable applicants in 2010 again signals the advent of increasing shortages. In 2007 and 2008 the proportion of vacancies filled for trades was 48% and 51% respectively. For professions it was 57% and 50% for the same period. By 2009 the proportion of vacancies filled had risen for trades to 67% and by 2010 it had dropped to 62%. For professions the proportion of filled vacancies had climbed to 61% in 2009 and remained the same for 2010. This information indicates that, although the proportion of filled vacancies has picked up from 2007 and 2008 figures, employers are still continuing to experience difficulties in recruitment for substantial proportions of skilled vacancies in the trades and in the professions. Skill shortages are not evenly distributed and are greater in some trade occupations than others. In 2010 the filled vacancy rates for trades were lowest for automotive trades and hairdressers (49% and 47% respectively). It was highest for food trades (66%), followed by engineering trades (64%), construction trades (62%) and electrotechnology and telecommunication trades (61%).

is the engineering, information and communications technology (ICT) and science technician occupation. While the ABS includes this occupation in the same major group as the trades, it arguably has more in common with the professional occupations than with the trade occupations.

Shah and Burke (2003) have looked extensively at labour mobility and this paper builds on their work, although the approaches are not precisely the same. While Shah and Burke's aim was to examine mobility in relation to a wide range of characteristics – age, migration status, marital status, state and region, educational qualification, whether part-time or full-time, broad occupation (the trades are treated as one group), and industry – our interest is much narrower. Our focus is occupational mobility within the trades; we are less interested in whether the characteristics of individuals in the occupations, for example, level of qualification, help to 'explain' the mobility. Our aim is to understand the dynamics of the trade labour markets with a view to assessing whether attrition is a particular issue for the trades. There have been alternative approaches to measuring attrition in an indirect manner by comparing employment with the numbers of graduates from relevant training (for example, Folk & Yett 1968; Karmel & Ong 2007), but these are typically based on the very strong assumption that all graduates from a particular course will go into an occupation – perhaps not unreasonable for the trade apprentices but very heroic for some professional occupations. (How many law graduates become lawyers?) It is much better to measure mobility directly, and this is what makes the Labour Mobility Survey so valuable.

Our characterisation of attrition builds on what we know about mobility. The stylised model of the trades labour force is that entrants are young and then attrition occurs as the workers age. Karmel and Ong (2007) find that net attrition occurs in the trades once age cohorts reach 25 years. We also know that much turnover occurs at the beginning of a job. We could simply look at the labour mobility figures for trades relative to other occupations, but this would fail to take into account variations in the distribution of workers by age and tenure. Thus the crude calculations would not be comparing like with like. Our preferred approach would be to model the probability of a worker leaving the occupation as a function of age and tenure. This model can then be simply translated into a model of attrition, in which a cohort of new entrants into an occupation can be tracked over time. Thus we could compare attrition between various occupations after one year, two years and so on. However, such an approach is not possible with data from the Labour Mobility Survey because we only have the job tenure of the current individual (or previous job in some circumstances). We do not know how long people have been in an occupation.

We address this data limitation by splitting the analysis in two. First, we model job mobility, irrespective of whether a new job was in the same occupation or not. Here we can control for both age and tenure. Secondly, we model occupational mobility, by controlling for age only. We concentrate on the concept of gross attrition, which refers to the rate at which people leave an occupation. The idea of this is to help us to get an understanding of the dynamics of occupational mobility. Our concept of gross attrition is the same as the concept of total replacement demand defined by Shah and Burke (2001) and used in 'Jobs Australia' 2008 (Department of Education, Employment and Workplace Relations 2008). The concept is the outflow of workers from an occupation (hence gross attrition) and is also equal to the number of workers required to maintain numbers in a given occupation (hence total replacement demand).

We make one important simplification to the analysis by restricting it to male employees.² This reflects the domination of the trades by males (there are very few women in the trades apart from the food trades and hairdressing) and enables us to abstract from the complexities of the workforce participation of women associated with family formation.

From our empirical analysis of 2008 data a number of points emerge. The first is that job and occupational mobility in the trades is not particularly different from that of the professions. Within both groupings there is considerable variation but the distributions have much in common. So, for example, in the professions the probability of *leaving a job* in the following 12 months at age 30 ranges from 0.09 (arts and media, and education professionals) to 0.15 (ICT and legal, social and welfare professionals), while in the trades the range is 0.09 (construction and electrotechnology and telecommunications) to 0.17 (other technicians). We also find that attrition drops quickly with tenure, so that the probability of leaving a job within the first year is much higher than the probability after being in a job for, say, five years.

An examination of *occupational mobility* reinforces the similarities between the trades and the professions. The rates at which people leave professional and trade occupations vary across occupations but as a whole the rates in the trades are not very different from the rates in professions. So the probability at age 30 of leaving the occupation within the following 12 months in the professions ranges from 0.04 to 0.05 (arts and media, education, ICT) to 0.12 (legal, social and welfare professionals). The comparable range for trades is 0.06 (construction) to 0.11 (skilled animal and horticultural trades).

The characterisation of attrition is based on data from the 2008 ABS Labour Mobility Survey. This survey was conducted early in 2008 and looks back at mobility over the previous 12 months. Thus it covers a period in which the labour market was very buoyant, although the Global Financial Crisis was on the horizon. The second part of the study looks at the robustness of the characterisation by considering also the survey conducted in 1994 when the labour market was not as buoyant. In making the comparison between the two periods, our interest is how the nature of attrition changes according to the state of the labour market. When times are very good we would expect that most attrition is caused by individuals leaving jobs for other opportunities (job movers). By contrast, in poorer labour markets we would expect that more attrition would be due to employees being made redundant (job losers). It is an empirical question whether attrition is higher or lower in good times relative to bad – it is all a question of whether in the good times an increase in job movers outweighs the decline in job losers.

We find that overall attrition in the trades is remarkably similar in good times compared with bad. However, its composition changes: in bad times more tradespeople lose their jobs and exit from that occupation, while in good times more tradespeople leave their jobs for other occupations. A point of interest is that the pattern of job mobility changes, with many employees leaving one job for another in the same occupation in the good times. Thus from an employer's point of view attrition has increased, but from the occupation's point of view such a pattern is better thought of as job churn rather than attrition. While job mobility is more important to employers, occupational mobility is of more interest to policy-makers.

The final part of the study looks at what happens to tradespeople who leave their occupation, with a view to assessing whether the trades are a good stepping-off point for other careers. Using the Labour

² The Labour Mobility Survey collects information about owner–managers and employees. We have restricted the analysis to employees only. However, another area for future investigation is the extent to which occupational mobility is explained by employees moving out of their occupation to set up their own businesses.

Mobility Survey again, we can match the new occupations against the old occupations. Our interest lies in the nature of the new occupations. This type of analysis implies that we have a ranking of occupations. Here, we take three approaches. The first uses the five skill levels of the ANZSCO³ (trades are assigned to the middle rank). The second ranks occupations according to average earnings from the ABS Survey of Earnings and Hours. The third uses the Australian Socioeconomic Index (AUSE106) scale to rank occupations by their status. In relation to the first of these methods, we find that more tradespeople move to lower-skilled occupations, with movers doing rather better than job losers. The second method gives a very different picture, with a clear finding that most who leave a trade move to a better-paying occupation. The third approach discovers that job movers are more likely to have an increase in occupational prestige. For job losers the story is mixed, with job losers in some occupations suffering a substantial drop. The one occupation that stands out as a good stepping-off point is the electrotechnology trade.

The paper ends with some comments. While attrition in the trades is higher than some professional occupations, it compares fairly well with others. The implication is that if skill shortages need to be addressed, then attention needs to be paid more to the numbers entering an occupation than those leaving it. Thus the analysis, if anything, supports the notion that the output of the apprenticeship system is probably a more important policy lever than attrition. While no doubt attrition could be reduced, it does not stand out as being *the* issue.

One final comment relates to the existence of a ‘pecking order’ in the trades, and an anomaly in the ABS ANZSCO classification. The electrotechnology and telecommunications trade is clearly the most highly skilled trade (as is evident from the wages) and behaves more like a professional occupation than other trades. The anomaly in the ABS classification is engineering and building technicians. This occupation, while included by the ABS in the ANZSCO major group 3, appears to have characteristics more like those of a professional occupation than of a trade.

³ Australian and New Zealand Standard Classification of Occupations.

The extent of attrition

The ABS Labour Mobility Survey collects data over a 12-month period, ending in February each year. Its focus is on labour mobility rather than attrition from particular occupations, and the data it collects are not ideal for our purpose. If we accept the proposition that attrition from an occupation will vary with the time that an individual has been in the occupation, then ideally we would wish to collect data on tenure within an occupation and its relationship to the probability of exiting the occupation. However, the survey does not collect this. Rather it collects data on the duration of jobs, not the duration within an occupation. What this means is that we need to be somewhat creative in building up a picture of attrition from labour mobility and from the data on which occupation an individual is in at the survey date and a year earlier.

Our characterisation of mobility and attrition is based on age and (where possible) job tenure within the trades and selected professions (based on ANZSCO sub-major group classifications). Our expectation is that mobility declines with age and with job tenure until we get to the time when people begin to retire. We approach the task in two stages.

First, we consider the extent of job mobility within each of the occupations. Job mobility refers to the extent to which people change jobs and covers both changing employers (but not changing occupation), as well as changing occupations. Thus it considers job mobility from the point of view of the employer, not the occupation as a whole. We model the probability of changing jobs within a 12-month period, conditional on the occupation, age and job tenure. (To allow for increasing mobility at older ages we include quadratic terms for both age and tenure.)⁴

The second stage considers occupational mobility. This differs from job mobility in that it is possible to change jobs without changing occupations. Our mechanism is based on questions in the Labour Mobility Survey on occupation in February of one year and February of the following year. Ideally, one would want to model occupational mobility in terms of age and tenure in the occupation. Unfortunately, we do not have data on the latter, so our model is based on age (and age squared). Essentially, we expect occupational mobility to decline with age and then increase as people begin to leave the workforce.

Our model enables us to understand the dynamics of attrition. What we mean by this is that we are following what happens to a cohort entering an occupation. We want to know how many of, say, a 100 people entering an occupation at the ‘standard’ entry age are still in the occupation one year later, five years, ten years and so on. This describes what we label ‘gross attrition’.

The projections we calculate are based on a simple Markov chain that captures the flows we have modelled. Formally, we define a commencing cohort and a transition matrix containing the transition probabilities. For the ‘gross’ attrition projections the commencing vector consists of 100 people in the occupation and zero not in the occupation, and the transition matrix contains the probabilities of

⁴ We use a logistic regression in which the dependent variable is 1 if the individual changes job within the next 12 months, 0 otherwise, conditional on the occupation, age, age (squared), job tenure, job tenure (squared). Job changers are those whose current job tenure is less than 12 months and who were employed in the previous February. Job tenure is defined as at the previous February (see appendix A for the derivation of the variable). Shah and Burke (2003) use both a binary and multinomial logistic approach to estimate the probability of job and occupational mobility and attrition. We originally looked at using a multinomial approach but it complicated matters without adding a great deal to our understanding of occupational mobility.

exiting the occupation or staying in it, and each transition matrix is conditional on an age. Denote O_i^t as the number of people in occupation i at time t , and $O_{\sim i}^t$ as the number of people who have left the occupation. Then, for example, at the first time period we have

$$[O_i^1 \quad O_{\sim i}^1] = [100 \quad 0] \begin{bmatrix} p_{i,i}^1 & p_{i,\sim i}^1 \\ 0 & 1 \end{bmatrix}$$

and

$$[O_i^t \quad O_{\sim i}^t] = [O_i^{t-1} \quad O_{\sim i}^{t-1}] \begin{bmatrix} p_{i,i}^t & p_{i,\sim i}^t \\ 0 & 1 \end{bmatrix}$$

where $p_{i,i}^t$ is the probability of remaining in the occupation at time t and $p_{i,\sim i}^t$ is the probability of leaving the occupation.

We now proceed to present our results, beginning with the models of job mobility.

Job mobility

Recall that the job mobility models control for both age and tenure. Table 1 presents the results of the models by age, holding tenure constant.⁵ We arbitrarily choose tenure of two years to illustrate the impact of age. The two years of tenure gets over the initial period when job mobility is particularly high. In appendix B we provide a set of figures that indicate the spread of ages for those who leave their jobs in each of the trades and professions.

Table 1 Probability of exiting job in next 12 months by age, 2008, with job tenure of two years, for trades and professional occupations, males

ANZSCO sub-major group occupations	25 years	30 years	40 years	50 years
Arts and media professionals	0.16	0.13	0.09	0.08
Business, human resource and marketing professionals	0.24	0.22	0.20	0.19
Design, engineering, science and transport professionals	0.20	0.16	0.11	0.11
Education professionals	0.21	0.16	0.11	0.13
Health professionals	0.11	0.13	0.18	0.24
ICT professionals	0.15	0.18	0.21	0.19
Legal, social and welfare professionals	0.27	0.25	0.22	0.19
Engineering, ICT and science technicians	0.21	0.17	0.14	0.15
Automotive and engineering trades workers	0.20	0.20	0.19	0.19
Construction trades workers	0.18	0.17	0.16	0.17
Electrotechnology and telecommunications trades worker	0.20	0.20	0.18	0.13
Food trades workers	0.29	0.31	0.29	0.18
Skilled animal and horticultural workers	0.17	0.19	0.22	0.23
Other technicians and Trades workers	0.19	0.20	0.22	0.24

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

We note that on the whole job mobility is very stable by age, although mobility does decline in the food trades quite significantly among older workers. There is considerable variation by occupation, but with quite an overlap between the professions and the trades. The food trades stand out as having the highest job mobility at the younger ages (that is, 25 and 30 years), but not at the older ages.

Table 2 presents the tenure dimension of our model. We arbitrarily assume that an individual is aged 35 years.

⁵ Appendix A contains the model parameters.

Table 2 Probability of exiting job in next 12 months by job tenure, 2008, at age 35 years, for trades and professional occupations, males

ANZSCO sub-major group occupations	1 year	5 years	10 years
Arts and media professionals	0.16	0.04	0.02
Business, human resource and marketing professionals	0.24	0.13	0.07
Design, engineering, science and transport professionals	0.15	0.09	0.06
Education professionals	0.22	0.03	0.01
Health professionals	0.18	0.10	0.06
ICT professionals	0.24	0.13	0.08
Legal, social and welfare professionals	0.26	0.17	0.12
Engineering, ICT and science technicians	0.16	0.11	0.09
Automotive and engineering trades workers	0.25	0.10	0.05
Construction trades workers	0.20	0.08	0.04
Electrotechnology and telecommunications trades worker	0.25	0.10	0.05
Food trades workers	0.42	0.13	0.06
Skilled animal and horticultural workers	0.24	0.14	0.10
Other technicians and trades workers	0.23	0.15	0.10

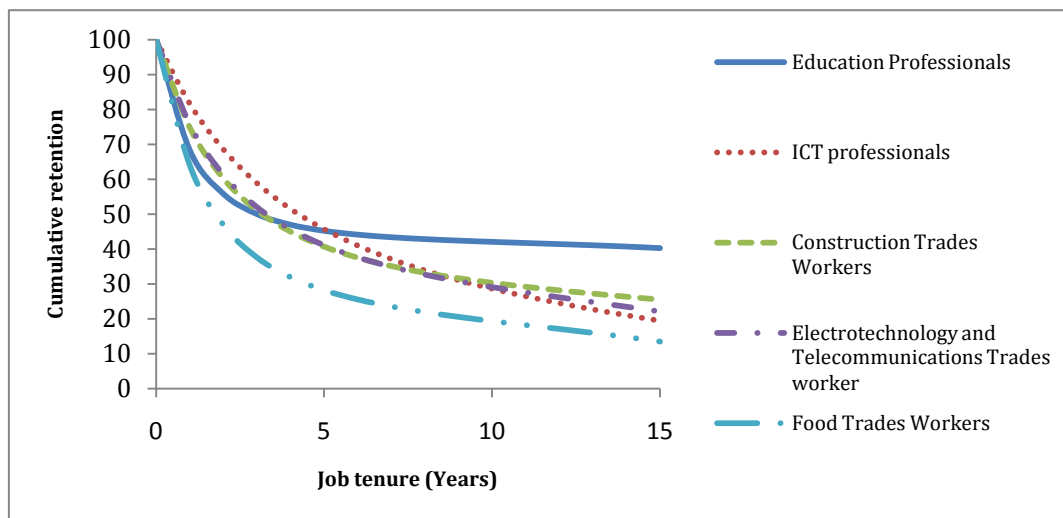
Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Not surprisingly, job mobility tends to be high at the beginning of a job with a specific employer and declines consistently as tenure increases (until retirements begin to take effect). More important for us, however, are the differences across occupations. At the one-year point, the probabilities of exit are comparable between the trades and the professions, although a couple of professional occupations (arts and media, and design, engineering, science and transport) have the lowest probabilities, while the food trades have the highest. After five years, the probabilities of exit for the trades are similar to the professions, and the probabilities of exit stabilise between five and ten years of tenure in a job.

Tables 1 and 2 are rather artificial because they don't take into account that tenure and age are related. A 20-year-old cannot have been in a job for ten years. This relationship makes it tricky to compare job mobility of different occupations, because entry level ages differ. To aid the comparison between occupations we construct notional cumulative retention rates that allow age and tenure to change in a consistent manner. It is useful to express these job mobility rates as cumulative, so that we can see the proportion of people who are still in a job after a certain period of time. Figure 1 provides a graphical representation of the proportions for selected occupations, beginning with a notional 100 people commencing a job in each occupation.⁶ The occupations are representative of professions and trades with high and low job mobility.

⁶ For these calculations we assume an entry age of 20 years for the trades and 25 years for the professions. Similarly, graphs can be derived from the models in appendix A. The choice of 20 years for trades and 25 years for the professions is arbitrary but broadly reflects the differences in the distributions of age at entry (see appendix C).

Figure 1 Cumulative retention rates in a job for commencing individuals in selected occupations^(a) by years of job tenure, males



Note: (a) ANZSCO sub-major group occupations. See appendix A for the relevant models.

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Of the occupations in figure 1, job mobility is lowest among education professionals. (Appendix A provides information on regression coefficients on all relevant occupations.) The highest job mobility in the early years is among the food trades. The construction trades and electrotechnology and telecommunications trades have similar levels of job mobility and their levels are lower than those of ICT professionals. Less than half of people are with the same employers after five years, apart from the educators. No doubt the low mobility of educators is a reflection of the large internal labour markets in which many of them work.

Occupational mobility

As noted earlier, job mobility does not necessarily imply exiting an occupation. From the point of view of industry planning, occupational mobility is more important.

We first look at the gross attrition models and show how the probability of exiting an occupation changes by age. Recall that these models are based on the number of persons remaining in an occupation from one February to the next. We first present the probabilities of exit. (Model parameters are shown in appendix A and chosen for presentational purposes.) As in the preceding section, the commencing ages of 20 for trades and 25 for professionals are chosen to represent a stylised new entrant. The entry age for trades is generally lower than that for professionals, with the median age of entry close to those used as the starting point in table 3 (analysis not shown).

Table 3 highlights a couple of issues. First, the rate of leaving an occupation does vary between occupations but by no means do the trades have particularly high rates of attrition. Among the trades the highest rates of leaving at say, 25 years, are in the skilled animal and horticultural workers. The construction industry trades have a consistently low rate of attrition that is similar to a number of the professional occupations. Second, the patterns are quite stable by age, with a tendency for the probabilities of leaving an occupation to decline with age (consistent with Shah & Burke 2003), although they do pick up at age 50 in a number of the occupations.

Using these probabilities we can now describe the gross attrition patterns. These are shown in the next table. As outlined earlier, we begin with 100 people in a cohort. The table then describes how many of

them remain in the occupation after one, five, 15, and 25 years. For the trades we assume the cohort enters the occupation at 20 years. For the professions we assume the cohort enters at 25 years.

Table 3 Probability of exiting an occupation in next 12 months by age, for trades and professional occupations, 2008, males

ANZSCO sub-major group occupations	20	25	30	40	50
Arts and media professionals	NA	0.11	0.07	0.04	0.03
Business, human resource and marketing professionals	NA	0.15	0.12	0.09	0.09
Design, engineering, science and transport professionals	NA	0.11	0.08	0.06	0.05
Education professionals	NA	0.11	0.08	0.05	0.05
Health professionals	NA	0.07	0.07	0.06	0.07
ICT professionals	NA	0.07	0.06	0.05	0.06
Legal, social and welfare professionals	NA	0.27	0.20	0.12	0.09
Engineering, ICT and science technicians	NA	0.19	0.13	0.08	0.08
Automotive and engineering trades workers	0.11	0.10	0.08	0.08	0.09
Construction trades workers	0.09	0.07	0.06	0.06	0.07
Electrotechnology and telecommunications trades worker	0.12	0.11	0.10	0.08	0.05
Food trades workers	0.14	0.11	0.09	0.07	0.06
Skilled animal and horticultural workers	0.14	0.13	0.12	0.11	0.10
Other technicians and trades workers	0.12	0.11	0.11	0.10	0.11

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

While the probabilities of exit seemed quite low in table 1, we see that they have a fair bite when accumulated over a number of years. So after 15 years we see that in every occupation there is less than 50% of an entering cohort remaining (table 4). Again there is quite a bit of variability across occupations. Among the trades, those with the least attrition are construction, automotive and engineering, electrotechnology and telecommunications trades workers and, perhaps surprisingly, the food trades. By contrast, a number of the professions have higher retention rates, notably, arts and media professionals, health, design, engineering, science and transport professionals, education professionals and ICT professionals.

Table 4 Gross attrition: the percentage of a cohort remaining in the occupation by period since entry, for trades and professional occupations, 2008, males

ANZSCO sub-major group occupations	0	1 yr	5 yrs	15 yrs	25 yrs
Arts and media professionals	100	90	64	38	28
Business, human resource and marketing professionals	100	86	50	17	7
Design, engineering, science and transport professionals	100	90	62	31	18
Education professionals	100	90	63	35	21
Health professionals	100	93	71	37	19
ICT professionals	100	93	72	42	24
Legal, social and welfare professionals	100	74	27	5	2
Engineering, ICT and science technicians	100	82	43	15	6
Automotive and engineering trades workers	100	89	58	24	10
Construction trades workers	100	91	66	35	20
Electrotechnology and telecommunications trades worker	100	88	55	20	9
Food trades workers	100	87	53	20	9
Skilled animal and horticultural workers	100	86	49	14	4
Other technicians and trades workers	100	88	55	18	6

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

From table 4 we can see that the retention rates after 15 years are higher for the well-defined professions than for the trades. The four professions with the highest retention rates have a rate that is around ten percentage points higher than most of the trades, with the exception of construction. The more amorphous professions and occupations (including business, human resources and marketing professionals, and engineering, ICT and science technicians) have lower retention rates than all trades except the skilled animal and horticultural worker trade. Legal, social and welfare professionals have the lowest retention of all.

Thus our broad conclusion is that on average and by comparison with professions and engineering, ICT and science technicians, attrition is not always highest in the trades. The corollary is that if entry into the trades is inadequate, then there are likely to be issues with labour supply.

Attrition and the state of the labour market

The modelling we presented in the previous section was based on data collected in 2008 for the previous year and thus captures job and occupational mobility at a time when the labour market was particularly buoyant. In February 2008 the unemployment rate was 4.0%. It is conventional wisdom that job mobility is related to the state of the economic cycle: in good times people move jobs because of the availability of alternative occupations; in bad times more people lose their jobs. As well as access to the 2008 labour mobility data, we also have that for 1994 when the February unemployment rate was 12.2%. So we deduce the impact of the state of the labour market on attrition by comparing mobility in 1994 and 2008. Table 7 presents a simple cross-tabulation comparing mobility in 1994 with 2008.

Table 7 Proportion of individuals staying in or losing or moving jobs in weak and strong economies, males (%)

	Weak economy (1994)	Strong economy (2008)
Job stayers	81.4	76.9
<i>Job losers</i>		
Losing and going to different occupation	1.5	1.9
Losing and leaving workforce	1.8	2.0
Losing and going into unemployment	4.0	1.1
Losing and going to same occupation	2.2	1.1
Total job losers	9.5	6.1
<i>Job movers</i>		
Moving to different occupation	2.4	6.2
Moving out of the workforce	1.8	1.2
Moving to unemployment	1.2	0.7
Moving to same occupation	3.8	8.9
Total job movers	9.2	17.0
Total staying in an occupation	87.3	86.9

Source: Generated from ABS Survey of Labour Mobility, 1994, 2008, confidentialised unit record file, cat.no.6209.

Table 7 confirms the conventional wisdom. Overall job mobility is higher in 2008, with increases in job movers, particularly those moving jobs within an occupation or between occupations, outweighing the decline in numbers losing their jobs. However, occupational mobility is very similar across the two years, with 87.3% staying in an occupation in 1994 and 86.9% in 2008.

However, our interest is particularly in the trades. Table 8 concentrates on the elements of interest: the proportion staying in the occupation; the number losing their job and exiting the occupation; and the number voluntarily leaving a job and exiting the occupation.⁷

⁷ These are calculated at the 2-digit ANZSCO level.

Table 8 Occupational staying and moving or losing jobs in weak and strong economies for trades, associate professionals and professionals, males (%)

Sub-major groups ^(a)	Weak economy (1994)	Strong economy (2008)
<i>Trades</i>		
Occupational staying (includes job losing and moving and going to the same occupation)	89.8	90.0
Losing for different occupation, unemployment or out of the labour force	7.1	3.8
Moving to different occupation, unemployment or out of the labour force	3.2	6.2
	100.0	100.0
<i>Professionals</i>		
Occupational staying (includes job losing and moving and going to the same occupation)	92.4	91.6
Losing for different occupation, unemployment or out of the labour force	4.4	3.8
Moving to different occupation, unemployment or out of the labour force	3.2	4.6
	100.0	100.0

Note: (a) Sub major-groups in 1994 are based on Australian Standard Classification of Occupations (ASCO; first edition); sub-major groups in 2008 are based on ABS ANZSCO.

Source: Generated from ABS Survey of Labour Mobility, 1994, 2008, confidentialised unit record file, cat.no.6209.

What this suggests is that in fact occupational mobility for the occupations we are interested in does not vary a great deal between the labour markets of 1994 and 2008. However, what does vary is the nature of job mobility. In less buoyant times, occupational exits are mostly driven by individuals losing their jobs rather than leaving their jobs (7.1% compared with 3.2% for the trades), while in more buoyant times the pattern is reversed. This phenomenon does not occur in the professions – job losing is much less important for professionals. What also changes is the extent of job churn – individuals moving jobs within an occupation – with the proportion of job stayers being considerably higher in the weaker labour market. Thus the complaints in buoyant times from employers about the difficulty of retaining and recruiting staff is a more a reflection of individuals changing jobs within an occupation than a reflection of increased occupational attrition.

Is a trade a good start to a career?

So far the paper has looked at occupational mobility from the point of view of the occupation, with an underlying inference that a high level of occupational attrition was a bad thing, and that skill shortages in the trades could be addressed by reducing attrition. However, from the point of the individual, occupational mobility may be a good thing. Is a trade background a useful foundation for other careers? Fehring, Malley and Robinson (2008) have also tried to answer this question by a follow-up study of a group of apprentices and higher education graduates who had completed their programs with the Royal Melbourne Institute of Technology and who had spent ten years in the workforce. They found that a trade was a good foundation for self-employment, with about 30% of apprentices in their sample moving on to own their own businesses, compared with 15% of higher education graduates.

We examine this idea by looking at a different aspect of occupational mobility; we concentrate on the occupations to which tradespeople go, again using the labour mobility survey data. We do this first by looking at whether the individual benefits in terms of moving into an occupation associated with higher or lower skill levels. We then look at whether the individual is moving into an occupation which has better or worse earnings. Finally, we investigate the change in occupational prestige⁸ for those who leave a trade occupation.

The first approach compares the skill levels of the new and old occupations for those leaving the trades. The skill levels are those assigned by ANZSCO and range from 1 (most skilled) to 5 (least skilled).⁹ Appendix D provides the skill level allocated to each ANZSCO sub-major occupation. From this appendix, we note that technicians are assigned a skill level of 2, while the trades, although in the same major ANZSCO group, are assigned a skill level of 3. For those occupations that span multiple skill levels, we have selected the most common skill level, using the unit group occupation classifications.

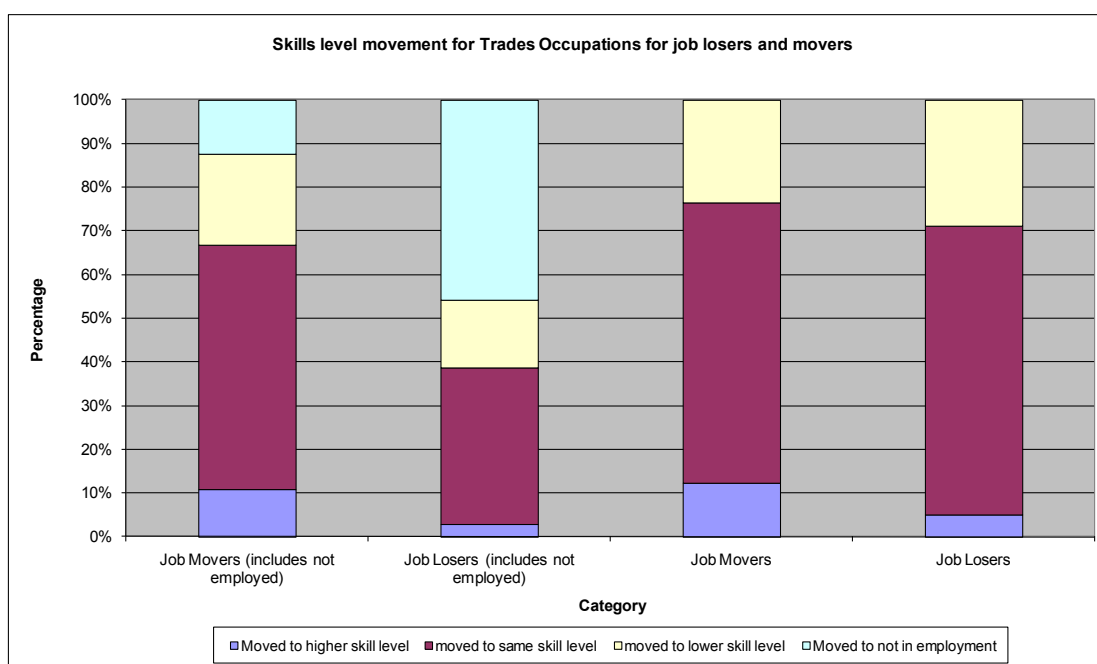
In thinking about whether leaving a trade is a good or a bad thing, we need to distinguish between job movers and job losers. One would expect those moving of their own volition would do better than those who lose their job. Figure 2 shows the destinations of those who exit a trade occupation. It does not include engineering, ICT and science technicians because, as we will see later, they behave quite differently from the other trade occupations (and are at skill level 2 rather than 3).

Figure 2 gives an overview of the skill levels of destination jobs for all job losers and job movers, including whether they move into unemployment. We see that almost one in eight job movers leaves employment, no doubt reflecting retirement. For job losers, almost 50% move to 'not in employment', indicating that many of these people have difficulty regaining employment. (Recall that we are comparing February 2008 with February 2007.)

⁸ We thank an anonymous referee for this suggestion.

⁹ In appendix D we provide a detailed account of skill levels associated with ANZSCO sub-major classifications.

Figure 2 Skill levels of destination occupations, job movers and job losers, trade occupations, 2008, males



Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

If we exclude those becoming 'not employed' (see columns 3 and 4 of figure 2), we find that job losers are more likely to move to a lower-skilled job than are job movers. Table 9 presents the change in average skill level for each trade for those who change occupations between February 2007 and February 2008. We focus only on those who move from one job to another, and also include engineering, ICT and science technicians in the table for completeness. Overall, the table is a little disquieting, with the average skill level declining (or at least not increasing) for job losers and movers in all trades and technicians occupations. However, there is some variation between the trades.

Table 9 Average changes in skill levels for occupational leavers from Feb. 2007 – Feb. 2008, males

ANZSCO sub-major group occupation in February 2007	Skill level in Feb. 2007	Average change in skill level for job movers	Average change in skill level for job losers	Average change in skill level for all occupation leavers ^(a)	Proportion moving to a higher skill level, all occupation leavers
Engineering, ICT & science technicians	2	0.5	1.0	0.6	54.1
Automotive & engineering trades workers	3	0.5	0.7	0.5	26.5
Construction trades workers	3	0.5	1.6	0.8	28.9
Electrotechnology trades workers	3	0.0	0.3	0.0	54.7
Food trades workers	3	1.0	1.7	1.2	19.9
Skilled animal & horticultural workers	3	0.4	0.0	0.4	41.0
Other technicians, trades workers	3	0.5	0.5	0.5	36.9

Notes: (a) This is the weighted average based on the proportions of job movers and job losers (data not shown).

An increase in the average skill level indicates a drop in skill level from February 2007.

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Two trade groups stand out. The electrotechnology and telecommunication trades are the best platform to move into a higher-skilled occupation, with over 50% of those changing occupation moving to a higher-skilled one. From appendix D we see that these more highly skilled occupations tend to be technical and professional jobs (specifically engineering, ICT and science technicians and ICT professionals). By contrast, only 19.9% of those in the food trades move to a more highly skilled occupation, and almost 75% of them move to a lower-skilled occupation. For the food trades, the most common more highly skilled occupation comprises hospitality, retail and service managers (appendix E).

The skill levels assigned by the ABS are very coarse. Another way to analyse the mobility data is to look at what happens to the wages of those who leave. We do not have data on wages before and after moving, but we can rank occupations according to their average wage levels. We take the average total weekly earnings for each occupation, based on the Survey of Employee Earnings and Hours (see appendix D), and use this to identify the potential wage gain or loss for those leaving the occupation.¹⁰

Table 10 tabulates our results for each of the trades. We include engineering, ICT and science technicians for completeness, although, as noted earlier, they are not usually considered a trade.

Table 10 Change in average weekly income for occupational leavers Feb. 2007 – Feb. 2008

ANZSCO sub-major group occupation in February 2007	Average weekly income Feb. 2007 (\$)	Average change in income for job movers (\$)	Average change in income for job losers (\$)	Average change in income for all occupation leavers ^(a) (\$)
Engineering, ICT & science technicians	1498.60	(79.80)	(280.10)	(113.20)
Automotive & engineering trades workers	1249.00	30.40	(42.50)	14.40
Construction trades workers	1107.60	182.50	(117.60)	93.60
Electrotechnology trades workers	1268.40	64.00	(36.60)	50.30
Food trades workers	852.70	266.8	13.00	208.30
Skilled animal & horticultural workers	835.20	344.60	272.40	337.40
Other technicians, trades workers	1149.30	22.10	14.00	19.20

Notes: (a) This is the weighted average based on the proportions of job movers and job losers (data not shown).

A figure in parenthesis indicates a negative dollar amount, that is, a decrease in weekly salary from February 2007 wage.

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209, published and unpublished data from the Survey of Employee Earnings and Hours, cat.no.6306.0 and unpublished data for managerial occupations.

The first point to note is the wide variability in average wages within the trades – from \$835 for skilled animal and horticultural workers, to \$1268 for electrotechnology and telecommunications workers. On average, all those exiting a trade go to occupations which are paid better (with the exception of automotive and engineering trades, where there is little change). The largest gains are for skilled animal and horticultural workers and food trades workers, who are the worst paid of the trades. Almost no one leaving any of these trades goes to an occupation that earns less. This suggests that wage differences between occupations are a factor behind occupational mobility.

This is a quite different picture from the one based on the ABS skill levels. It suggests that on the whole those leaving a trade for another occupation are doing it for positive reasons – to increase earnings. On the other hand, the evidence for trades providing a springboard to a career is rather

¹⁰ The ABS data used to determine wages specifically excludes business owners, contractors and subcontractors.

weak. From the skill level movements it seemed that the electrotechnology and telecommunication trades is the best platform from which to move on. However, the increase in earnings (as reflected by average salaries of destination occupations) for people leaving this occupation is quite modest, although they do move to the highest-paying occupations.

The third approach in determining whether a trade background is a useful foundation for other careers is to use the Australian Socioeconomic Index 2006 (McMillan, Beavis & Jones 2009) and compare the occupational prestige of their original trade occupation with that of their new occupation. Table 11 presents the average change in occupational prestige for those who leave their trade occupations. The scale measures the social standing or desirability of occupations, based on a model linking prestige ratings to the education, income and other socioeconomic characteristics of occupations. The scale ranges from 0 to 100, where labourers are scored at 0.0 and medical practitioners are rated at 100. As can be seen from table 12, trade occupations are not highly ranked (electrotechnology has a rank of 41, food trades 21).

In table 11, we see that job movers are likely to move up in occupational prestige, although the increases are modest. For job losers, the story is mixed, in that those who are engineering, ICT and science technicians, or in construction trades and automotive and engineering trades are more likely to suffer a substantial drop in occupational prestige, whereas the remaining occupations will experience an increase. In some cases this is a larger increase than for job movers who changed occupations. Food trades workers who move occupations experience the greatest increase in occupational prestige, while engineering and science technicians and construction trades workers who change occupations are more likely to experience the greatest drop in prestige.

What is observed here is similar to the story for wages, in which the majority of those who have left their occupation are doing better. In this case, however, we notice that construction trades workers fare worse, presumably because they have moved to a less-skilled occupation. Further, the engineering, ICT and science technicians who leave their occupation experience a drop in occupational prestige. This is matched by a corresponding drop in average weekly wage of the destination occupation relative to the origin occupation but an increase in overall skill level. One can't help but wonder if this is due to the qualification level of those in this category, in that they may now be competing for jobs with people who have higher-level qualifications.

Table 11 Change in occupational prestige for occupational leavers Feb. 2007 – Feb. 2008

ANZSCO sub-major group occupation in February 2007	AUSEI06 score in Feb. 2007	Average change in prestige for job movers	Average change in prestige for job losers	Average change in prestige for all occupation leavers ^(a)
Engineering, ICT & science technicians	57.7	1.6	-23.2	-2.5
Automotive & engineering trades workers	30.4	6.7	-3.7	4.4
Construction trades workers	36.4	1.2	-16.6	-4.1
Electrotechnology trades workers	41.0	6.6	-1.4	5.5
Food trades workers	21.2	7.3	7.4	7.3
Skilled animal & horticultural workers	32.7	4.6	3.7	4.5
Other technicians, trades workers	33.5	-0.5	5.2	1.5

Note: (a) This is the weighted average based on the proportions of job movers and job losers (data not shown).

Source: Generated from ABS Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209 and AUSEI06 Index from McMillan, Beavis and Jones (2009).

Taking these results together we get a rather mixed picture. First, the ABS skills index is really too coarse to be useful. Second, the six sub-major groups have quite different patterns. We observe that those who leave the electrotechnology, skilled animal and food trades experience an improvement in wages and prestige on average, but the first starts from a high base, while the others start from a much lower base.

Thus our answer to the question about whether a trade is a good stepping-off point, is 'yes' for the electrotechnology but 'not necessarily' for the other trades. This assessment is broadly consistent with Webster and Jarvis (2003).

Final comments

The motivation behind this paper was the existence of skill shortages in the trades. The intention of the paper was to look at attrition in the trades as a possible cause of skills shortages vis-a-vis inadequacies in the output of the training system.

As a matter of arithmetic, a reduction in attrition would go some way to addressing pressures on the labour supply for trades. However, our analysis did not produce any evidence that attrition is much more of an issue in the trades than it is in our comparator occupations, the professions.

Our conclusion, that attrition in the trades is not such an issue, implies that inadequacies in labour supply should be the focus if skill shortages emerge. However, entrants into the trades could be either apprentices or ex-tradespersons. A question for future research is the balance between these two sources: are apprenticeships the only game in town or are those who have previously left the trade a worthwhile source of supply?

The second interesting point to emerge from the analysis is the relationship between attrition and the economic cycle. From a reading of the popular press at times of boom one would get the impression that labour mobility is one of the causes of skills shortages. However, we argue that such mobility is more of a problem for particular employers than it is for an occupation. In boom times, job mobility increases but occupational mobility is largely unaffected: it is job churn rather than occupational attrition. In bad times, however, there is a difference between the trades and the professions. Tradespeople are much more likely to lose their jobs than are professionals.

We also examined the idea that occupational attrition in the trades may not be a 'bad' thing because individuals are going to better jobs; a trade is a good foundation for a career. Our analysis paints a mixed picture, and there is only one trade for which there is convincing evidence that the trade is a good foundation for a career – electrotechnology. Electrotechnology and telecommunications trade workers are the highest-paid, have the highest prestige of the trades and on average move on to better jobs.

In concentrating on employees, this study does not take into account those who move out of the trade to start up their own business in the trade, perhaps hoping for higher financial rewards. However, there is potential for a further study which investigates the extent to which occupational mobility is affected by movement out of the trades to self-employment. Becoming self-employed is especially observed in trades like construction, and in other technician and trade workers (for example, carpentry and joinery, and hairdressing).

A final comment is that the definition of a trade is a little problematic and the ABS includes a number of occupations in ANZSCO level 3 (technician and trades) that don't seem to fit very well with the common notion of a trade. At one end, the engineering, ICT and science technicians have characteristics more like those of professional occupations than of trades occupations. They are better paid, and are assessed as having skill level 2 not 3 by the ABS. At the other end of the scale are skilled animal and horticultural workers. These are the worst-paid in the group and those leaving this occupation appear to be quite disparate, with some going to management, technician and professional jobs, but over a half going to labouring and other lower-level jobs. While these classification issues do not affect our analysis to any great degree, they do indicate that one needs to be careful in interpreting data at the ANZSCO one-digit level.

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Appendix A

Table A1 Model parameters for logistic regression (1 = exit job within 12 months), males

ANZSCO sub-major group occupations	Sample size	Intercept	Age (years)	Age ^2	Tenure (mths)	Tenure^2
Arts and media professionals	160	-1.07	0.0972	-0.00091	0.0410	-0.00015
Business, human resource and marketing professionals	953	-0.34	0.0566	-0.00060	0.0193	-0.00005
Design, engineering, science and transport professionals	773	-1.63	0.1491	-0.00157	0.0124	-0.00003
Education professionals	508	-3.49	0.1957	-0.00232	0.0627	-0.00023
Health professionals	364	2.53	-0.0356	0.00005	0.0185	-0.00005
ICT professionals	463	3.78	-0.1412	0.00167	0.0110	-0.00006
Legal, social and welfare professionals	234	0.25	0.0182	-0.00004	0.0140	-0.00004
Engineering, ICT and science technicians	538	-1.44	0.1437	-0.00169	0.0112	-0.00004
Automotive and engineering trades workers	1167	0.31	0.0179	-0.00021	0.0329	-0.00012
Construction trades workers	1152	-0.30	0.0703	-0.00093	0.0275	-0.00008
Electrotechnology and telecommunications trades worker	666	1.70	-0.0690	0.00119	0.0311	-0.00011
Food trades workers	331	2.22	-0.1540	0.00241	0.0467	-0.00018
Skilled animal and horticultural workers	272	2.35	-0.0606	0.00063	0.0179	-0.00056
Other technicians and trades workers	384	1.50	-0.0126	0.00001	0.0133	-0.00003

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table A1 presents the regression coefficients of the regression model used to determine job exiting. In undertaking this regression job exiting, age and duration were derived from the 2008 ABS Labour Mobility Survey. Table A2 presents the standard errors of the regression coefficients.

The response variable of interest is that of job exiting. Job exiting was constructed using the following variables: LMWKNG2C – Whether working at February 2008; CHEMBUSC – Change of employer/business in the last 12 months; and LMWKINGC – Whether working at February 2007. An individual is defined to have changed jobs in the 12 months from February 2007 to February 2008 if there were working in February 2008 (LMWKNG2C = 1), and they have had at least one change of employer/business in the last 12 months (CHEMBUSC in [1,2,3,5]), or if they were not employed in February 2007 but are employed now, or if they were not employed in February 2008 but were employed in February 2007. Those who have changed jobs are coded with a 1, and those who did not change jobs are coded as 0.

The second variable under consideration is that of age. In the expanded CURF on the ABS RADL, age is a continuous variable and so is used directly from the dataset, although the age-squared variable is constructed.

Table A2 Standard errors for parameters (given in table A1) in job leaving regression, males

ANZSCO sub-major group occupations	Intercept	Age (years)	Age ²	Tenure (mths)	Tenure ²
Arts and media professionals	0.115	0.005	0.000	0.001	0.000
Business, human resource and marketing professionals	0.053	0.003	0.000	0.001	0.000
Design, engineering, science and transport professionals	0.063	0.003	0.000	0.000	0.000
Education professionals	0.088	0.004	0.000	0.000	0.000
Health professionals	0.105	0.004	0.000	0.000	0.000
ICT professionals	0.104	0.005	0.000	0.000	0.000
Legal, social and welfare professionals	0.122	0.005	0.000	0.000	0.000
Engineering, ICT and science technicians	0.066	0.003	0.000	0.000	0.000
Automotive and engineering trades workers	0.036	0.000	0.000	0.000	0.000
Construction trades workers	0.037	0.003	0.000	0.000	0.000
Electrotechnology and telecommunications trades worker	0.058	0.003	0.000	0.000	0.000
Food trades workers	0.065	0.004	0.000	0.000	0.000
Skilled animal and horticultural workers	0.092	0.004	0.000	0.000	0.000
Other technicians and trades workers	0.065	0.003	0.000	0.000	0.000

Note: The values with 0.000 represent very small standard errors, they are not zero.

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

The final variable to be constructed is that of job duration. The regression model is to include a respondent's job duration as at February 2007. However, duration with employer/business is not directly available for their job at February 2007. Job duration is collected in the Labour Mobility Survey for an individual's employer at February 2008 (DREM08CF), and for their duration in their last job (DURLJB2C, if applicable). These are categorical variables comprising the following ten categories:

0. Not applicable
1. Under 3 months
2. 3 and under 6 months
3. 6 and under 12 months
4. 1 and under 2 years
5. 2 and under 3 years
6. 2 and under 5 years
7. 5 and under 10 years
8. 10 and under 20 years
9. 20 years are over

We have converted this to a continuous variable by assigning duration to the mid-points of the ranges of these categories (in months), with the exception of under 3 months and 20 years and over, which have been assigned 1.5 months and 240 months respectively. In order to determine duration as at February 2007 (approximately), the following is used.

- If individual hasn't changed jobs between February 2007 to February 2008, then duration = duration of current job – 12 months

- If individual has changed jobs:
 - and currently not working and duration in last job is greater than or equal to 12 months, then job duration is duration of last job – 12 months
 - and currently not working and duration in last job less than 12 months, then job duration is duration of last job
 - currently employed, then job duration is duration of last job – 12 months + duration of current job.

This derivation gives us an approximate duration at February 2007. We hope that, in future, the ABS will collect job duration as at February 2007.

Given these variables, the logistic regression model (probability of job changing) is:

$$\text{logit}(y_i) = \alpha + \beta_1 X_1 + \beta_2 X_1^2 + \beta_3 X_2 + \beta_4 X_2^2 + \varepsilon$$

Where y_i is the vector of 0/1 responses indicating whether a respondent has changed jobs or not, α represents the intercept, β_1 is the regression coefficient for age, X_1 is the $n \times 1$ vector of ages, β_2 is the regression coefficient for age-squared, X_1^2 is the $n \times 1$ vector of squared ages, β_3 is the regression coefficient for duration, X_2 is the $n \times 1$ vector of duration, β_4 is the regression coefficient of duration-squared, and X_2^2 represents duration-squared.

The logistic regression model has been estimated using maximum likelihood methods in SAS. The resultant regression coefficients appear in table B1. The regression coefficients for each occupation have then been converted to the probability of job changing using:

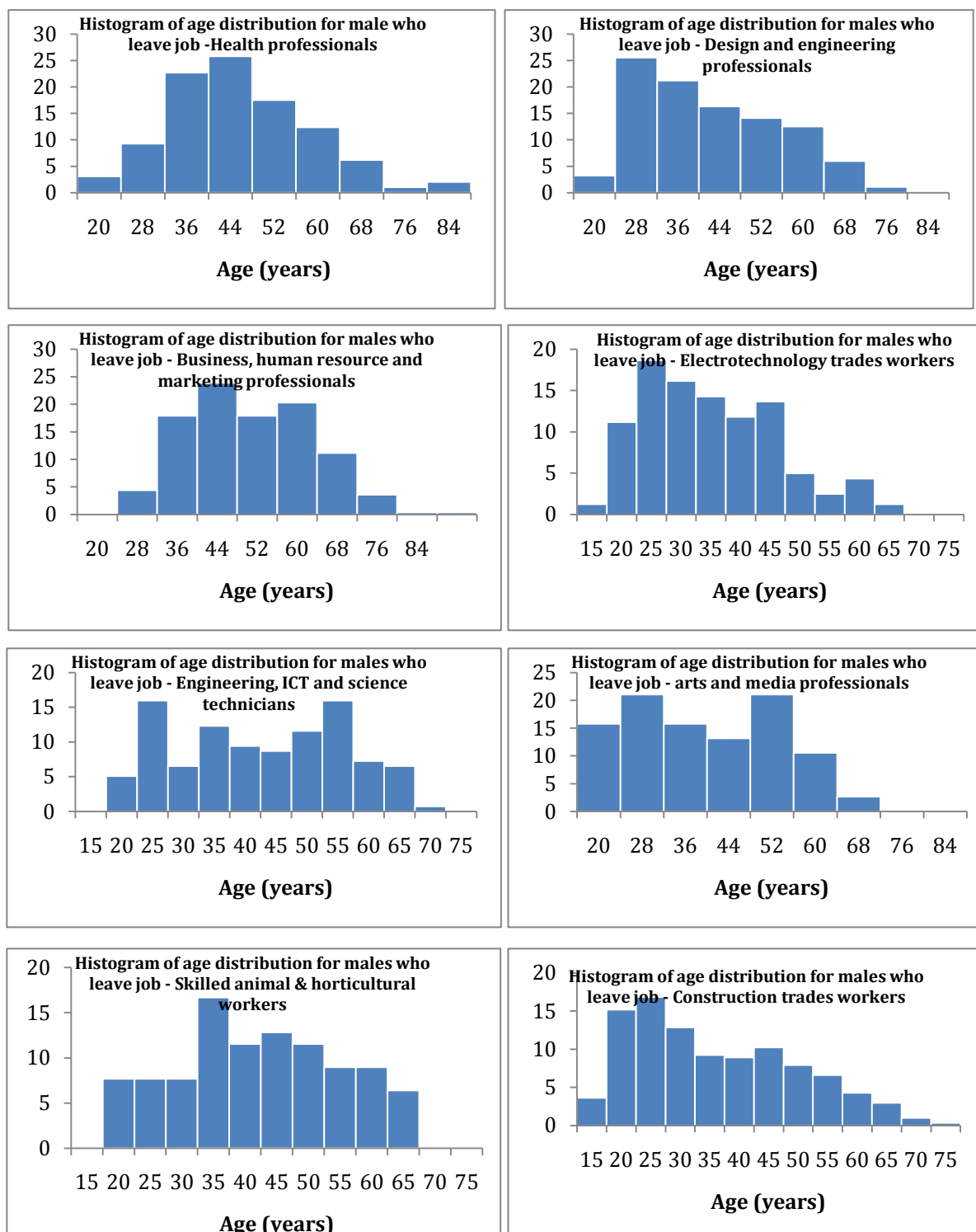
$$\hat{\pi}_i = \frac{e^{\eta_i}}{1 + e^{\eta_i}},$$

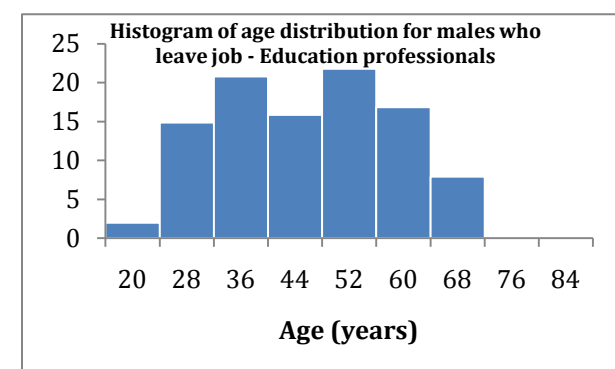
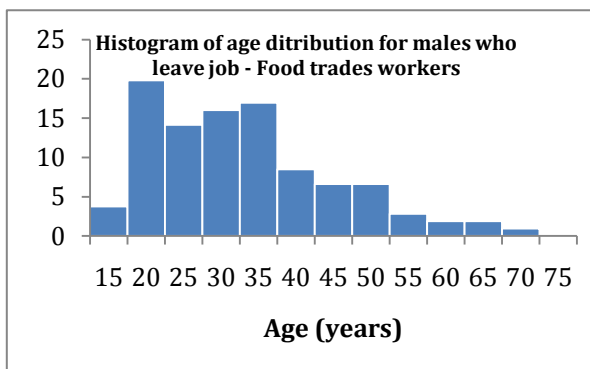
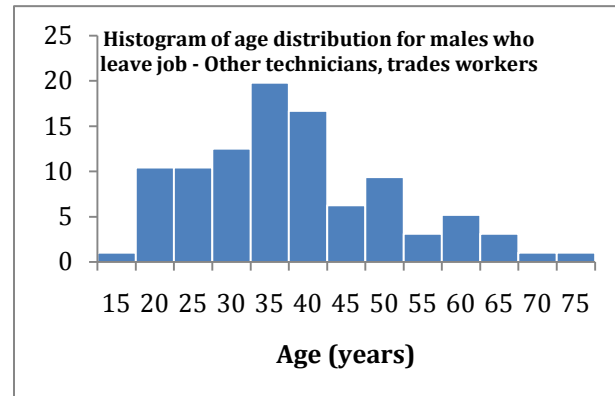
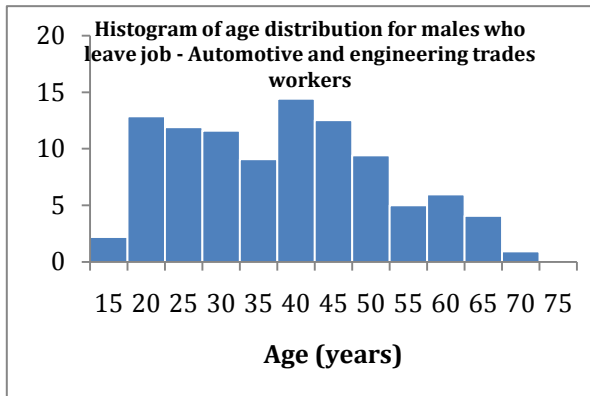
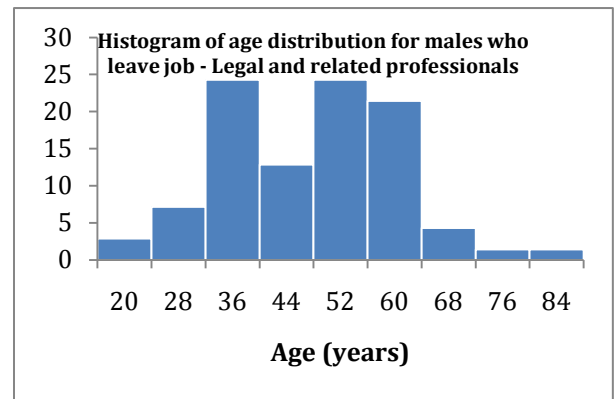
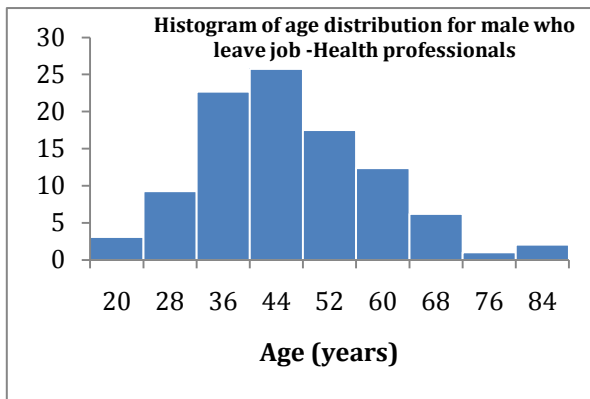
where μ_i is the predicted probability and η_i is the linear predictor from each regression model for each occupation.

Appendix B

Here we present the distributions of ages for those who exit *their jobs* for ANZSCO sub-major group professional and trade occupations.

Figure 3 Age distributions for males who leave their job, by occupation





Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Appendix C

In this section, we summarise the logistic regressions used to determine gross attrition. The variable for age (and age-squared) remains as described in appendix A.

The regression undertaken determines the probability of leaving an occupation in the following 12 months (from February 2007). The definition of leaving an occupation is found using two main variables, OCURSMEC – occupation at February 2008, and OCLYSMEC – occupation at February 2007 from the 2008 Labour Mobility Survey. The first criteria is that an individual must have been employed in February 2007 (LMWKNG2C = 1. An individual is deemed to have changed occupations if:

- Their occupation at February 2007 is not equal to occupation at February 2008 (at the ANZSCO, sub-major level), or
- They were employed at February 2007, and not employed at February 2008 (unemployed, or not in the labour force).

An individual has not changed occupation if their reported occupation at February 2007 is the same as their reported occupation at February 2008.

Occupational duration cannot be measured, and as such the regression model for occupation leaving is:

$$\text{logit}(y_i) = \alpha + \beta_1 X_1 + \beta_2 X_1^2 + \varepsilon$$

where the response y_i is the 0/1 variable indicating whether an individual left an occupation between February 2007 and February 2008, α is the intercept, β_1 is the regression coefficient for age, X_1 is the $n \times 1$ vector of ages for each individual, β_2 is the regression coefficient for age-squared, X_1^2 is the $n \times 1$ vector of squared ages for each individual, ε is the vector of residuals.

The regression coefficients (on the logit scale), for each occupation fitted separately are presented in table C1.

Table C1 Regression coefficients for leaving an occupation in the next 12 months, males

ANZSCO sub-major group occupations	Sample size	Intercept (α)	Age (β_1) (years)	Age ² (β_2)
Arts and media professionals	160	1.54	-0.186	0.0016
Business, human resource and marketing professionals	953	0.34	-0.113	0.0012
Design, engineering, science and transport professionals	773	0.57	-0.145	0.0015
Education professionals	508	2.09	-0.233	0.0026
Health professionals	364	-1.31	-0.076	0.0010
ICT professionals	463	-0.67	-0.111	0.0013
Legal, social and welfare professionals	234	1.82	-0.143	0.0012
Engineering, ICT and science technicians	538	2.53	-0.220	0.0024
Automotive and engineering trades workers	1167	-0.66	-0.095	0.0013
Construction trades workers	1152	-0.66	-0.112	0.0014
Electrotechnology and telecommunications trades worker	666	-1.77	-0.006	-0.0003
Food trades workers	331	-0.75	-0.065	0.0005
Skilled animal and horticultural workers	272	-1.47	-0.022	0.0002
Other technicians and trades workers	384	-1.48	-0.037	0.0005

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Standard errors for regression coefficients presented in table C1 appear in table C2.

Table C2 Standard errors of regression coefficients for occupation leaving, males

ANZSCO sub-major group occupations	Intercept (α)	Age (β_1) (years)	Age ² (β_2) [^]
Arts and media professionals	0.130	0.007	0.000
Business, human resource and marketing professionals	0.056	0.003	0.000
Design, engineering, science and transport professionals	0.072	0.003	0.000
Education professionals	0.092	0.004	0.000
Health professionals	0.118	0.005	0.000
ICT professionals	0.128	0.006	0.000
Legal, social and welfare professionals	0.123	0.005	0.000
Engineering, ICT and science technicians	0.066	0.003	0.000
Automotive and engineering trades workers	0.042	0.003	0.000
Construction trades workers	0.047	0.003	0.000
Electrotechnology and telecommunications trades worker	0.069	0.004	0.000
Food trades workers	0.076	0.004	0.000
Skilled animal and horticultural workers	0.095	0.004	0.000
Other technicians and trades workers	0.073	0.004	0.000

Note: The values with 0.000 represent very small standard errors, they are not zero.

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Appendix D

Table D1 ANZSCO occupation by average cash weekly earnings, 2008 and AUSEI06 prestige measures

Occupation: name and ANZSCO occupation	Average cash weekly earnings (\$)	AUSEI06	ABS skill level*
11 General managers	2352.60	78.2	1
12 Farm managers	1051.80	34.0	1
13 Specialist managers	2049.60	71.4	1
14 Hospitality, retail and service managers	1328.00	45.4	2
21 Arts and media professionals	1489.70	68.1	1
22 Business, human resource and marketing professionals	1617.80	77.3	1
23 Design, engineering, science and transport professionals	1663.20	81.2	1
24 Education professionals	1454.80	84.9	1
25 Health professionals	2096.60	85.1	1
26 ICT professionals	1689.60	81.3	1
27 Legal, social and welfare professionals	1528.30	84.4	1
30 Technicians and trade workers nfd	1236.10	35.9	3
31 Engineering, ICT and science technicians	1498.60	57.7	2
32 Automotive and engineering trades workers	1249.00	30.4	3
33 Construction trades workers	1107.60	36.4	3
34 Electrotechnology and telecommunications trades workers	1268.40	41.0	3
35 Food trades workers	852.70	21.2	2,3
36 Skilled animal and horticultural workers	835.20	32.7	3
39 Other technicians and trades workers	1149.30	33.5	3
41 Health and welfare support workers	1339.40	60.0	2
42 Carers and aides	888.50	34.9	4
43 Hospitality workers	845.00	34.7	4,5
44 Protective service workers	1382.60	47.8	2,3,4,5
45 Sports and personal service workers	1071.40	49.8	3,4
51 Office managers and program administrators	1363.60	57.4	2
52 Personal assistants and secretaries	1078.20	44.8	3
53 General clerical workers	1008.00	41.9	4
54 Inquiry clerks and receptionists	957.80	37.3	4
55 Numerical clerks	1091.20	48.8	4
56 Clerical and office support workers	971.30	37.7	5
59 Other clerical and administrative workers	1129.00	47.1	3,4,5
61 Sales representatives and agents	1219.40	50.7	2,3,4
62 Sales assistants and salespersons	947.80	30.8	5
63 Sales support workers	1062.50	32.0	5
70 Machinery operators nfd	1231.70	21.0	4
71 Machine and stationary plant operators	1414.70	25.1	4
72 Mobile plant operators	1264.40	14.7	4
73 Road and rail drivers	1207.30	21.1	4
74 Storepersons	924.10	20.8	4
80 Labourers	997.90	18.5	4,5
81 Cleaners and laundry workers	804.40	20.4	5
82 Construction and mining labourers	1243.70	23.3	4,5
83 Factory process workers	940.80	12.1	5
84 Farm, forestry and garden workers	828.00	11.0	5
85 Food preparation assistants	774.10	22.0	5
89 Other labourers	982.60	24.8	5

Note: * Where multiple skill levels exist, the bolded level is the one used.

Appendix E

Destinations of occupational movers in the trades, 2008

These tables have been generated from the ABS 2008 Survey of Labour Mobility. Occupations are based on ANZSCO sub-major group occupations.

Table E1 Engineering, ICT and science technicians (2008 ANZSCO 3), males

Upwards movement (%)		Downwards movement (%)		Across skill level movement (%)	
Specialist managers	5.9	Automotive and engineering trade workers	4.5		
Hospitality, retail and service managers	1.2	Construction trade workers	4.3		
Business human resources and marketing	11.6	Electrotechnology and telecommunications trades workers	5.1		
Design, engineering science and transport and education professionals	9.9	Skilled animal and horticultural workers	0.7		
		Personal assistants and secretaries	2.2		
Health professionals	2.4	General clerical workers	3.8		
ICT professionals	20.8	Inquiry clerks and receptionists	0.6		
		Numerical clerks	5.6		
Legal, social and welfare professionals	2.2	Other clerical and administrative workers	5.2		
		Machine operators nfd	8.2		
		Labourers	5.7		
Total	54.1	Total	45.9	Total	0.0

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table E2 Automotive and engineering (2008 ANZSCO 32), males

Upwards movement (%)		Downwards movement (%)		Across trades movement (%)	
Specialist managers	8.0			Construction trades	2.0
Managing supervisors (sales and service)	2.8	Road and rail drivers	8.5	Electrotechnology and telecommunications trades	6.1
Business human resources and marketing	0.8	Labourers	26.2	Skilled and animal horticultural workers	1.1
Design, engineering science and transport and education professionals	4.4	General clerical workers	0.4		
Engineering, ICT and science technicians	7.7	Inquiry clerks and receptionists	3.4		
Office managers and program administrators	2.9	Machine and stationary plant operators	3.9		
		Numerical clerks	1.7		
		Clerical and office support workers	1.5		
		Other clerical and administrative workers	2.4		
		Sales assistants and salespersons	7.1		
		Machinery operators nfd	2.1		
		Mobile plant operators	7.3		
Total	26.5	Total	64.3	Total	9.2

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table E3 Construction trades (2008 ANZSCO 33), males

Upwards movement (%)		Downwards movement (%)		Across trades movement (%)	
Specialist managers	17.1	Labourers	45.4	Automotive and engineering trades	1.9
Engineering, ICT and science technicians	4.8	Road and rail drivers	4.0		
Office managers and program administrators	7.0	Storepersons	7.7		
		Machinery and stationary plant operators	2.0		
		Sales representatives and agents	4.8		
		Sales assistants and sales persons	5.4		
Total	28.9	Total	69.3	Total	1.9

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table E4 Electrotechnology (2008 ANZSCO 34), males

Upwards movement (%)		Downwards movement (%)		Across trades movement (%)	
Business, human resource and marketing professionals	4.8	Labourers	11.7	Automotive and engineering trades	9.2
Engineering, ICT and science technicians	14.6	Storepersons	3.7	Construction trades	2.1
Hospitality, retail and service managers	5.2	Machinery and stationary plant operators	3.3		
Design, engineering science and transport and education professionals	6.9	Sales assistants and sales workers	8.6		
ICT professionals	14.5	Numerical clerks	4.2		
		Other clerical and administrative workers	2.6		
		Protective service workers	8.6		
Total	46.0	Total	42.7	Total	11.3

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table E5 Food trades (2008 ANZSCO 35), males

Upwards movement (%)		Downwards movement (%)		Across trades movement (%)	
Business, human resource and marketing professionals	3.0	Labourers	13.4	Construction trades	4.5
Hospitality, retail and service managers	11.3	Road and rail drivers	8.9	Other technician and trades workers	3.4
		Storepersons	6.5		
		Machinery and stationary plant operators	4.1		
		Sales assistants and sales persons	24.6		
		Sales representatives and agents	1.9		
		Carers and aides	9.0		
		Hospitality workers	3.8		
		Health and welfare support workers	5.6		
Total	14.3	Total	77.8	Total	7.9

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table E6 Skilled agricultural and horticultural workers (2008 ANZSCO 36), males

Upwards movement (%)		Downwards movement (%)		Across trades movement (%)	
General managers and farm managers	9.7	Labourers	28.4	Construction trades	7.9
Specialist managers	7.2	Sales assistants and sales persons	6.1		
Engineering, ICT and science technicians	13.0	General clerical workers	7.6		
Design, engineering science and transport and education professionals	11.1	Clerical and office support workers	9.0		
Total	41.0	Total	51.1	Total	7.9

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.

Table E7 Other technician and trade workers (2008 ANZSCO 39), males

Upwards movement (%)		Downwards movement (%)		Across trades movement (%)	
Business, human resource and marketing professionals	5.1	Labourers	7.3	Construction trades	6.3
Specialist managers	1.4	Road and rail drivers	4.8	Technicians and trades workers nfd	1.6
Engineering, ICT and science technicians	2.7	Machinery and stationary plant operators	9.6	Electrotechnology and telecommunications trades	1.2
Hospitality, retail and service managers	7.0	Sales support workers	5.2	Food trades	3.9
General managers and farm managers	5.2	Sales assistants and sales persons	9.1		
Design, engineering science and transport and education professionals	8.9	Inquiry clerks and receptionists	8.3		
Legal social and welfare professionals	6.7	Carers and aides	5.7		
Total	37.0	Total	50.0	Total	13.0

Source: Derived from ABS, Survey of Labour Mobility, 2008, confidentialised unit record file, cat.no.6209.



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