

Perspectives on Skill Shortages

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Perspectives On Skill Shortages

Abstract

The topic of skill shortages has reemerged as an important issue with calls for increased levels of government intervention to alleviate this problem. In order for intervention to be successful it is important that there is some understanding of the economics of skill shortages. This document aims to provide a brief outline of the economics of skill shortages as well as evaluating the effects that different responses aimed at alleviating such shortages may have. It is shown that training is only one of many possible responses and, in the case of Queensland, the available data suggests that options beyond increases in the level of publicly funded training may need to be considered to overcome current shortages.

1 Introduction

Discussions of problems caused by skill shortages are regularly highlighted in the media drawing comments from governments, employers and unions. Shah and Burke (2003) note that reports of shortages are more likely during times of economic boom while surpluses are more likely during recessions. From an economic perspective the concept of shortages poses something of a problem. For example, frequently shortages are defined as the situation where the numbers of workers required with a particular skill exceeds the number available in this skill area (see, for example, Shah and Burke 2003 or Veneri 1999). A problem with this sort of definition is that it ignores the role of the price or the wage rate of workers with these skills may/can play in acting as a rationing device.

From a purely economic perspective, shortages occur as a result of short-run imbalances as the economy adjusts to a new equilibrium position due to changes in the demand for or supply of specific products. What frequently occurs in any specific market however, is that some resources, in the current situation skilled labour, may become increasingly scarce. In the market for these particular skills this increased scarcity will be signaled by an increase in the price of this resource, i.e. the wages offered for this type of skill. Only in cases where institutional factors prevent the wage from responding enough to bring supply and demand into equilibrium will shortages occur.

These changes in the scarcity or shortage of the skilled labour may be due to a number of factors, on the demand side, new products, new technology; new workplace arrangements and shifts in the composition of industry associated with globalisation will result in changes in the demand for certain types of skills. The supply of skills can change for reasons such as the ageing of the workforce, changed attractiveness of particular employment, and changes in numbers entering and completing training.

A shortage of skilled labour can therefore be caused or removed by changes in a number of factors affecting the supply and demand of skills. Within the media such problems are frequently attributed to training, however, this is only one of the many mechanisms affecting the relationship between the demand and supply of skills. Shah and Burke (2003) note that whether changes in the provision of training is the

appropriate response to a scarcity of particular skills depends on the type of scarcity, the level of its severity and the factors causing it.

This paper aims to contribute to an understanding of the issues surrounding skill scarcity or shortages in Queensland. Section 2 of the paper provides a working definition of skill shortages and also provides an outline of some of the methods used to infer skill shortages. Section 3 of this paper provides an analysis of the possible responses to skill shortages. These responses take place through the adjustment of the price of skilled labour or through the demand and supply side of skilled labour. Section 4 of this paper provides a preliminary analysis of the factors responsible for skill shortages in Queensland. It is shown that for several occupations a training response alone may not alleviate the problem.

2 The definition and measurement of skill shortages

Employers, employees and policy analysts have varying perspectives on what skill shortages mean. The lack of a common understanding of the concept often obscures analyses of the problem. For this reason some proposals for solving shortage problems stem from a misunderstanding of the causes of shortages as well as from an exaggeration of the evidence.

Generally speaking, what are frequently termed skill shortages occur when the amount of labour demanded within particular occupational categories or skills exceeds the available supplies of these skills. Furthermore, for a shortage to occur some institutional factors must be in place which prevent prices from increasing or increasing sufficiently to restore this imbalance. Consequently, shortages should not persist in situations where prices are flexible.

In the analysis of skill shortages it is important to differentiate between the concepts of scarcity and shortage, a fact frequently overlooked within the popular media. Scarcity measures the value of the goods and services placed by the prospective buyer and sellers in the marketplace. Shortage, on the other hand, measures the excess demand for goods or services at the prevailing prices. According to these two definitions, a good or service may be scarce but there is no shortage of it as long as the price of that good or service is allowed to rise enough to bring into balance the amount demanded and supplied. Conversely, a good or service may not be scarce but a shortage will occur if its price is fixed below its market clearing level.

Taking the difference between scarcity and shortages into consideration, we can define skill shortages as the existence of a shortage of skilled workers who possess the ability to perform a productive task at a certain level of competence expected by their employers at the prevailing wages and working conditions.

Shah and Burke (2003) note that to develop policy responses to an imbalance of skill it is necessary to have an indication of the size of the imbalance between supply and demand, the causes of this imbalance, the extent to which the imbalance affects production, whether on current trends and policy settings, and if the imbalance will diminish rapidly. In practice, skill is usually defined according to professional qualifications or occupations. Therefore, skill shortage may be alternatively defined either as the shortage in workers possessing certain qualification or the shortage in workers working in certain occupations.

A range of measures has been proposed to undertake this analysis and Veneri (1999) suggests that data limitations mean that it is generally impossible to provide an unambiguous single measure, for this reason it is generally necessary to use a range of measures to indicate the existence and possible size of an imbalance. Approaches to identifying shortages and estimating their extent are varied although in general, the measures fall in two broad classes. The first class of measures includes market economic indicators, such as vacancy, hiring and separation rates, relative wage movements and employment and unemployment changes. The second class utilises employer-based surveys.

These market indicators are used to infer imbalances for particular occupational groups. Shah and Burke (2003) note that these measures provide a market-wide perspective and identify shortages only if there are insufficient number of appropriately skilled people in the market to fill vacancies at the going wage rates and employment conditions. Frequently used indicators include vacancy rates, unemployment rates, the unemployment to vacancy (U/V) ratio and wages.

Unfilled vacancy rates are sometimes used to assess the tightness in the labour market. A situation with a large number of unfilled vacancies that are hard to fill is indicative of a skills shortage. There are, however, problems in interpreting unfilled vacancy statistics from ad hoc employer based surveys with Shah and Burke (2003) noting that these problems are mainly to do with the inconsistent interpretation of various aspects of skills shortages by employers in self reported surveys. This suggests that care should be taken when using results published in say, the National skills shortage list published by DEWR¹, which probably overstates the extent of skill shortages.

Occupational unemployment rates can provide indications of skill shortages. A high unemployment rate may suggest a surplus and a low rate a shortage. However, it would be naive to think that any positive unemployment rate is an indication of a surplus. There are numerous reasons why the observed and equilibrium occupational unemployment rates are never zero. The challenge with this type of analysis is in determining what is the normal (equilibrium) unemployment rate, above which would be considered a surplus situation. However, with the data available in Australia it is very difficult at the individual occupational level to determine this normal rate.

If both vacancy and unemployment statistics are available, then the unemployment-vacancy (U/V) rate can be used to assess skills shortages. A simple interpretation would be that if the number of vacancies is larger (smaller) than the number of unemployed persons then a shortage (surplus) could be said to exist.

In a market economy, where wages and prices moved freely, occupational labour imbalance would translate to changes in relative labour remuneration, including wages and salaries. A shortage should push relative remuneration up while a surplus should push it down. Changes in relative wages, taken to indicate total remuneration, have therefore been used to study occupational labour market imbalances. As the market slowly adjusts to the shortage for particular skills by increasing wages, this

¹Appendix 1 provides an extract from the DEWR National skills shortage list covering the trade occupational categories.

trend will be observed as increasing wage differential over time.

Problems in the interpretation of wages data arise when institutional factors rather than increased demand drive wages up. Furthermore, Shah and Burke (2003) outline cross-country evidence suggesting that wages are relatively inflexible and do not respond strongly to current market conditions. These authors contend that this is the main reason for the wide dispersion in unemployment rates across occupational groups.

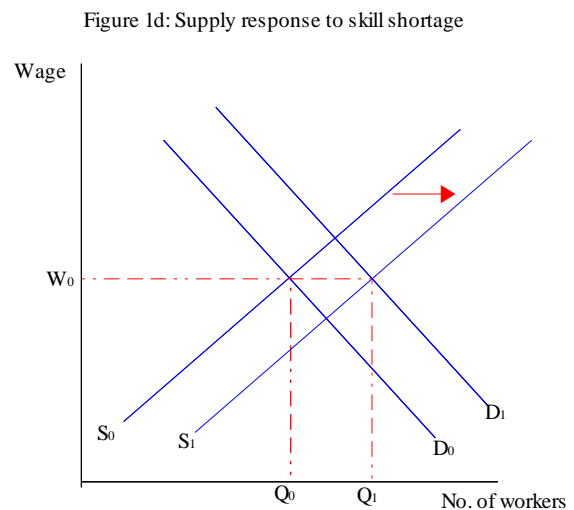
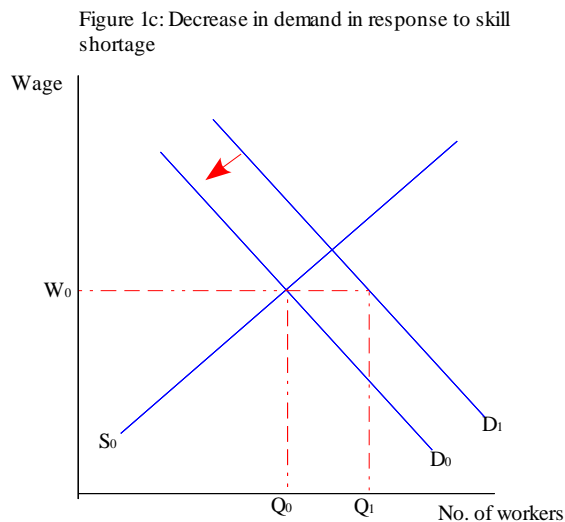
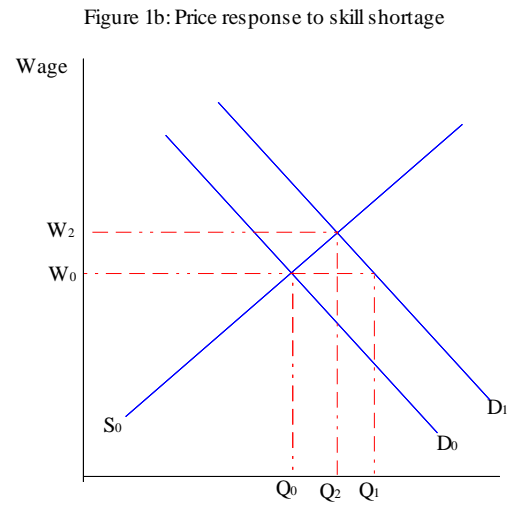
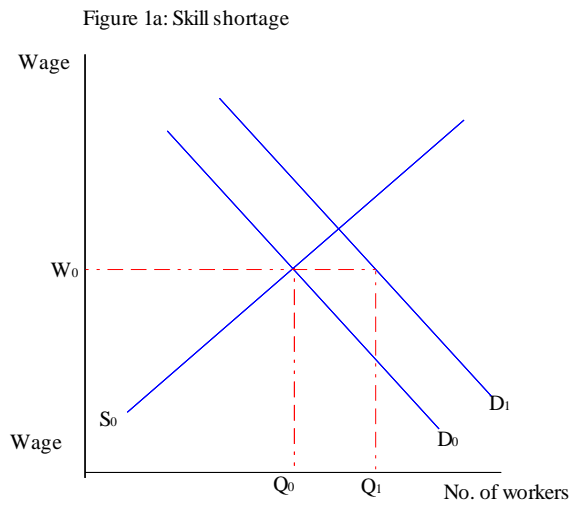
Shah and Burke (2003) note that a variety of other indicators, besides the above mentioned have been used in analysing skills imbalances. Their potential usefulness once again depends on data reliability and interpretation. Some indicators they note that have been used in the past include: hours and intensity of work (i.e. overtime, short-time etc), production levels, employment levels, flows of new entrants and leavers, training expenditure by firms, levels of subcontracting, hiring standards and levels of immigration.

3 Responses to skill shortages

There are many possible responses to a shortage of skilled labour including a price response, the substitution of skilled labour for other factors in the production process, such as less skilled labour or capital equipment or alternately, a supply response, increasing the supply of skilled workers. Figure 1 outlines how these responses overcome the skill shortage problem.

Figure 1a shows the outcome when there is no response. In this figure, the demand for skilled labour has increased, shifting the demand curve out from D_0 to D_1 . If there is no response the labour market will demand Q_1 units of skilled labour. However, at the going wage rate workers will only supply Q_0 . Consequently a shortage equal to the distance $Q_1 - Q_0$ will exist.

Figure 1: Skill shortages and possible responses



An obvious response by firms facing skill shortages would be to increase the wages and/or working conditions of desirable workers. Higher wages and better working conditions would tend to attract more workers with desirable skills to enter the labour market for the particular skill category. At the same time the higher labour costs would deter employers hiring intentions. As a consequence, the skill shortage may be reduced or even eliminated by adjusting the wage rate.

Figure 1b outlines the effect of a wage response. After the outward shift in the demand curve, firms demand Q_1 units of skilled labour. With an upward sloping supply curve, additional labour will only be attracted by an increase in the wage rate. However, the higher wages will result in a decrease in the amount of labour that firms demand. In the example presented in figure 1b, the wage rate will increase to W_2 with the demand for workers falling from Q_1 to Q_2 . At this point demand will equal supply and the shortage will disappear.

Several factors may prevent wages from responding, chief among these being that it has generally been observed that wages are not highly flexible. There may be several reasons for this, including that while collective agreements are more flexible than the centralised wage setting system they may not offer enough scope to alleviate shortages. In addition, the wage leadership model of wage determination concludes that workers and unions respond to changes in wage relativities, meaning that award changes in response to the scarcity of certain skills may result in industrial unrest and wage inflation.

An alternate response is provided in figure 1c. In this case the demand curve shifts from D_1 back towards D_0 . In this situation the demand for skilled labour falls in response to the shortage to bring about an equilibrium. There are two possible ways by which this might come about. Firstly, the production methods may be altered so that less skilled workers are able to replace skilled workers or secondly, the firm may undertake capital investment, replacing labour with machinery. The investment in capital or the change in production processes will see the demand for skilled labour shift inwards either diminishing the shortage or leading to its complete disappearance as in the case illustrated in figure 1c where the demand curve moves all the way back to its initial position.

Replacing skilled workers with capital equipment is a long term solution to skill shortages. Examples where this has occurred in Australia with both the Wholesale and Finance and insurance industries, and to a lesser degree Mining and Manufacturing industries, recorded a substantial increase in labour productivity in the past decade to 2002-03 due to capital deepening and the use of information technology. In contrast, employment, as measured by total hours worked, only recorded subdued or negative growth over the same period. This highlights the fact that skills, to a certain degree, may be substituted by other factors of production in the long term. Of course, changes in production methods and the substitution of certain skill sets by physical capital or technology will create demand for other skills, which may in turn lead to skill shortage in other occupation groups.

Another long term responses to a persistent skill shortage that may be employed by the private sector is to alter the production methods to reduce the skill levels required in the production process. One example is the extensive division of labour in modern production processes such that low-skilled or unskilled workers may be able to replace high-skilled workers. More importantly, modern production technologies have become increasingly firm-specific, skills acquired by workers in one firm may not be readily transferable to another firm. Since workers endowed with firm-specific skills are less likely to change jobs, the problem of retention of skilled workers may be reduced.

Another possible response to a persistent skill shortage would be to provide additional training. This can be done by the firm or by the public training provider. The effect of this response is shown in figure 1d. In this case, the increase in training results in an increase in the supply of skilled labour, shifting the supply curve outwards towards S_1 . In this case, wages have not increased and the excess demand for skilled labour has disappeared. There may be two limiting factors to this response in the case of the firm. Firstly, smaller firms may not have the financial resources to engage in systematic training and secondly, the difficulties in retaining trained workers deter

employers from providing workers with more generic skills.

The effect of increased training will be the same whether this additional training is provided by the public or private sectors, although interestingly, when training is provided by the public sector the cost is shifted outside the firm, suggesting a reason why an increase in publicly provided training is frequently called for by industry when skill shortages occur.

4 A training response to skill shortages?

Recently, in Queensland, there have been widespread reports in the media that there are shortages of skilled workers, particularly among tradespersons. An obvious response by the government to address these shortages is to provide more publicly funded training. Publicly funded training may be justified economically if the social benefits outweigh the social costs of extra training places provided. This is especially the case if employers are unwilling to provide sufficient training places due to the difficulties to retain trained workers. In this case the government may step in to fill the gap. Public funded training also helps those who are unable to fund their own training.

However, an increase in the public provision of training may only be an appropriate response to skill shortages if there is some evidence that there has been a decline in the ratio of persons being trained to total employment, or the “in-training” ratio. Table 1 provides data on in-training ratios, defined as the number enrolled in public providers divided by the number employed for each of the Associate professional and Trades occupational categories. The data in this table suggests that the in-training ratios for Business and administration associate professionals have decreased from 3.0% to 1.1% of total employed over the 1999 to 2003 period while the in-training ratios of Mechanical and fabrication engineering trades has declined by 3% points over the same period.

Table 1: Percent of employment "in-training", Diploman and above/Apprenticeships, by minor occupational gro

ASCO	Minor Occupation group	1999	2000	2001	2002	2003
31	Science, Engineering and Related Assoc Prof	3.5	3.1	3.9	3.4	2.9
32	Business and Administration Assoc Prof	3.0	3.2	2.2	1.4	1.1
33	Managing Supervisors	0.3	0.3	0.4	0.2	0.2
34	Health and Welfare Assoc Prof	0.6	2.7	5.5	4.7	5.2
39	Other Assoc Prof	0.6	0.3	0.3	1.0	1.9
41	Mechanical and Fabrication Engineering Tradespersons	10.9	10.1	9.5	9.0	7.9
42	Automotive Tradespersons	12.9	15.2	15.7	17.3	18.1
43	Electrical and Electronics Tradespersons	9.9	11.2	12.4	11.3	10.0
44	Construction Tradespersons	8.8	10.0	9.8	10.6	11.4
45	Food Tradespersons	24.6	19.8	22.9	22.9	29.6
46	Skilled Agricultural and Horticultural Workers	2.0	2.8	2.9	2.9	3.1
49	Other Tradespersons and Related Workers	10.3	11.1	10.6	10.2	11.0

In contrast, the in-training ratios for a number of the occupations shown in table 1 have increased over the 1999 to 2003 period, suggesting that an increase in-training will not alleviate any skill shortages experienced within these occupational categories. This is particularly the case for Automotive tradespersons where the in-training ratio has increased from 12.9% to 18.1% over the 1999 to 2003 period, Construction tradespersons where the in-training ratio has increased from 8.8% to 11.4% and Food tradespersons (24.6% to 29.6%).

For this reason, the data suggests that while an increase in training may be appropriate for Business and administration associate professionals and Mechanical and fabrication engineering trades, where the in-training ratios have been in decline, for many of the remaining occupations, in-training ratios have shown an increase. This suggests that, for the remaining occupations, if skill shortages are being experienced, alternate responses may be more appropriate.

In the cases of many of the Associate professional and Trade occupations, skill shortages may be the result of many factors. Table 2 provides labour market data for these occupations with the data in this table indicating that many of these occupations have experienced strong demand growth over the last 5 years.

Table 2: Employment and training data

Asco occupational category	Employment 2003-04	Growth 02/03 to 03/04	Ave annual growth 99/00 to 03/04	Turnover (%)	Job opportunities (%)
31 Science, Engineering and Related Assoc Profs	25.1	17.8	-0.6	15.6	33.4
32 Business and Administration Ass Profs	65.5	15.4	12.7	16.7	32.1
33 Managing Supervisors (Sales and Service)	70.4	9.8	7.6	17.9	27.6
34 Health and Welfare Assoc Profs	12.7	-5.4	-1.9	15.2	9.7
39 Other Assoc Profs	16.2	-17.6	4.8	13.9	-3.7
41 Mechanical and Fabrication Engineering Trades	41.0	9.9	0.1	16.7	26.6
42 Automotive Tradespersons	20.6	1.6	0.0	17.5	19.2
43 Electrical and Electronics Tradespersons	33.2	24.7	1.6	16.7	41.4
44 Construction Tradespersons	31.7	12.2	1.8	14.9	27.1
45 Food Tradespersons	13.9	-23.1	-3.8	28.6	5.5
46 Skilled Agricultural and Horticultural Workers	11.8	11.8	9.2	18.2	30.0
49 Other Tradespersons and Related Workers	32.2	-2.2	1.6	16.7	14.5
Average: Associate professionals and trades		4.6	2.8	17.4	21.9
Average : All occupations		3.0	2.5	18.3	21.3

Several of these occupational categories also have high rates of turnover and a high proportion of job opportunities² to total employment as shown in the final two columns of table 2. This suggests that for many of these occupational categories, a more appropriate response may be to improve working conditions, either in terms of increasing wages or other conditions to reduce the loss of staff within these occupational categories.

In this case a training response may not alleviate skill shortages, or at best it will only have a temporary effect as the high turnover rates will mean that the additional skilled persons will continue to exit the occupation. While increased training may reduce the shortage in the medium to longer term when the trainees finish their respective course a more efficient response may be to improve working conditions or increase wages to reduce staff turnover. High rates of turnover are also costly to the firm as the new staff, even if they have the appropriate training, will need some initial firm specific training before they can become productive. Thus it should be recognised that staff turnover imposes a significant cost on the firm.

² Turnover here has been derived by dividing total employment by average duration of employment to approximate the number of persons lost per year. This estimate probably overstates employment turnover as it includes all moves between employers. Ideally only moves from occupations should be used. Total job opportunities is derived by adding employment growth and turnover.

5 Conclusions

This paper has shown that skill shortages may arise for many reasons, in addition, there are many possible responses to skill shortages, only one of which involves an increase in training. Skill shortages may be exacerbated by the public sector if it has not appropriately responded to a change in the type of skills that an occupation requires or in cases where it has misread market information and decreased training places when demand for those occupational skills has increased.

Overall, little evidence of this type of mismatch has been found and perhaps increased publicly provided training is called for primarily in two occupational categories (at the ASCO 2 digit level), being Business and administration associate professionals and Mechanical and fabrication engineering trades. In both of these occupational categories the in-training ratios have been in decline.

The data suggests that if shortages are being experienced in other occupational categories they are more likely due to labour market rather than training problems. In particular, high turnover and high ratios of total job opportunities to total employment may be resulting in shortages across some skill categories. In this situation it is less likely that an increase in training will alleviate the problem and a more efficient solution might be for industry to investigate ways in which it can retain skilled staff.

6 References

Shah, C. and Burke, G. (2003) Skill shortages: concept measurement and implications, *Centre for the economics of education and Training*, Working paper no. 52, November 2003.

Department of Employment and Workplace Relations (DEWR) 2003, *National Skills Shortage Lists Australia - 2003*, <<http://www.workplace.gov.au/WP/Content/Files/WP/EmploymentPublications/NSSFeb2003.pdf>>

Veneri, C 1999, 'Can occupational labor shortages be identified using available data?' *Monthly Labor Review*, March 1999, pp. 15-21.

Appendix 1. The DEWR definition of skill shortages and occupations identified by DEWR to be in shortage

DEWR publishes the National and State Skill Shortage Lists once a year, identifying shortages in trade, professional and information technology and communications occupations. DEWR, through its Economic and Labour Market Analysis Branch and Labour Economics Offices (LEOs) in each State's capital city and Darwin, surveys employers who have recently advertised vacancies for selected skilled occupations. In addition, statistical information on the trends on demand and supply for the selected occupations are also considered by the DEWR.

Skill shortage and recruitment difficulties (D) are separately identified in the List. For each State, skill shortages are rated as evident in the capital city only (M - metropolitan), in regional areas (R - other than the capital city) or statewide (S). If there are shortages in the three largest States, or in a majority of States, then the occupation is rated as being in national shortage (N).

Table A1 shows the skill shortage by trades in the latest skill shortage list. Skill shortage in Queensland is mainly located in engineering, printing and vehicle trades. Interestingly, despite the housing boom in Queensland, construction trades experienced relatively less skill shortage than nationally.

The focus of the DEWR program is in assessing skills shortages and recruitment difficulties. Recruitment difficulty is assessed in an occupation when an adequate number of suitably qualified persons may be available to fill the positions in the occupation but employers are still unable to recruit them for a variety of reasons. Although the prime focus of DEWR's approach is surveying employers who have recently advertised for selected skilled occupations, other statistics on the demand and supply are also considered before final assessment of skills shortages is made.

Table A1: Skill Shortage List 2004 – Trades

ASCO	Occupation	AUST	NSW	VIC	QLD	SA	WA	TAS	NT
ENGINEERING TRADES									
4112-11	Metal Fitters*	N	S*	S	S	S	S		S
4112-13	Metal Machinist*	N	S*	S	S	S	S		S
4113-11	Toolmaker*	N	S*	S	S	S	D		
4122-11	Metal Fabricator*	N	S*	S	S	S	S	S	R
4122-15	Welder*	N	S*	S	S	S	S	S	R
4124-11	Sheetmetal Worker*	N	M*	S	S	S	S	S	S
VEHICLE TRADES									
4211-11	Motor Mechanic*	N	S*	S	S	S	S	S	S
4212-11	Auto Electrician	N	S	S	S	S	S	S	S
4213-11	Panel Beater	N	S	S	S	S	S	S	S
4214-11	Vehicle Painter	N	S	S	S	S	S	S	S
ELECTRICAL / ELECTRONICS¹									
4311-11,13	Electrician*	N	S*	R-D	S*	S		S	D
4312-11	Refrigeration and Airconditioning Mechanic*	N	S*	S	S	S		S	S
4313	Electrical Powerline Trades			S					
4314	Electronic Instrument Trades Electronic Equipment				D				
4315	Trades*		S*		D	S*		S	
4316	Communication Trades*		S*						
CONSTRUCTION TRADES¹									
4411-11	Carpenter and Joiner*	N	M*	R-D	S			S	D
4412-11	Fibrous Plasterer*	N	S*	S				S	
4413-11	Roof Slater and Tiler			R-D					
				R, M-					
4414-11	Bricklayer	N	S	D	S	S	S	S	S
4415-11	Solid Platerer	N	S	S			D	S	
					M,				
4431-11	Plumber*	N	S	D*	R-D	S	S	S	S
FOOD TRADES¹									
3322	Chef*	N	S*	S	R		S*	R-D	S
4512-11	Baker		S						S
4513-11	Cook	N	S	S	R				S
4512-13	Pastrycook*	N	S*	S	S			S	S
PRINTING TRADES									
4911-11	Graphic Pre-press Trades				S				
4912	Printing Machinist		R		S	D			
4913-11	Binder and Finisher			D	S				
WOOD TRADES¹									
4921-11	Wood Machinist*		S*			S			
4922-11	Cabinetmaker	N	S	S	S	S	S		D
OTHER TRADES									
4931-11	Hairdresser	N	S	S	S	S	S	S	S
4942-11	Furniture Upholsterer*	N	S*	S	S	S	S	S	

¹ = Not all occupations assessed in all States

* = See comments on specialisations

N = National shortage

S = State-wide shortage

M = Shortage in metropolitan areas

R = Shortage in regional areas

D = Recruitment difficulties

R-D = Recruitment difficulties in regional areas

M-D = Recruitment difficulties in metropolitan areas