



The return to education – an occupational perspective

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Executive Summary

Our starting point is that there has been a very large increase in credentials between 2011 and 2021 accompanied by considerable change in the occupational structure of the labour market. These two factors have fashioned the opportunities available to individuals with different qualifications. Earlier work (Karmel 2023) concluded that credentials have become more important even in the lowest jobs. In this paper, we explore the implications of the structural change on incomes by investigating the average weekly incomes of full-time workers on the basis of their qualification (higher degree, degree, diploma or certificate III/IV) and their occupation. The occupational classification we have used is the four digit ANZSCO with some 470 individual occupations. The data comes from the Population Censuses of 2011 and 2021.

We are hopeful that the analysis will provide some evidence on the extent of ‘credentialism’ by which we mean that qualifications are being used to get a job in a specific occupation rather than being necessary for that occupation, as contrasted to the alternative interpretation of ‘skills deepening’ in which qualifications are directly *feeding* into productivity.

The first point that is clear is that there is no doubt that qualifications on average lead to higher incomes (and therefore reflect higher productivity). As a reference point we use the average weekly income of those with no post-school qualification without completing year 12. Based on those in full-time employment at the 2021 Census, the average weekly income of those with a higher degree had average incomes 71.5% higher than the benchmark group, those with a bachelor degree 53.1% higher, those with a diploma 28.5% higher and those with a certificate III/IV 14.6% higher. Completion of year 12 also had an income premium. The relativities indicate that the length of the period of study matters.

The second point to emerge is that qualifications have an effect on average incomes over and above the occupations that different qualifications lead to. In particular, we find that within occupations qualifications matter. This provides clear evidence that qualifications do lead to an increase in productivity. A simple example is that nurses with higher degrees had average incomes in 2021 of \$1989 per week compared to \$1744 for nurses with a bachelor degree. In this example, we infer that the different incomes reflect the differential skills and productivity of the persons with the qualification.

There is an important caveat here, though. The pay-off to higher level qualifications depends on getting a commensurate job – the pay-off is marginal or in some cases negative if the job does not match the qualification. For example, the main contributors to the return to those with a higher degree occurs for those individuals working as managers or professionals. In these jobs, the return to the qualification has two elements: higher average incomes in general because the occupations are paid well and higher average incomes within the fine level occupation.

For those with bachelor degrees, the return is highest for those working as professionals, with positive returns also for those working as managers and community and personal service workers.

In respect of VET qualifications we find that the returns for those with diplomas come from those working as managers, professionals, and community and personal service workers. In respect of those with a certificates III/IV the return is dominated by employment in technicians and trades occupations; employment as clerical and administrative workers, machinery operators and drivers and labourers detracts from the income premium.

It is the change in the premium attached to qualifications that is of particular interest. We find that between 2011 and 2021 there has been a decline in the premium attached to all qualifications, from certificates III/IV to higher degrees. The decline was highest for those with a higher degree (from 93.3% to 71.5%, followed by those with a degree (from 57.2% to 53.1%). There were smaller declines for those with diplomas (from 30.9% to 28.4%) and certificates III/IV (from 16.6% to 14.6%).

The decline in the premium for those with a higher degree is driven by both a change in the distribution of jobs and the premium within occupations. In essence, the premium has declined because a smaller proportion are working as managers and professionals and because the premium attached to a higher degree has declined within managers and professionals. This shows that in a broad sense the supply of persons with higher degrees has outstripped the demand.

The decline in the premium for those with a degree is largely driven by a decline in the proportion of those in professional occupations.

In terms of the 'credentialism' versus 'skills deepening' debate, the decline in the premium for those with higher degrees within occupations is supportive of increasing credentialism. Put simply, increasing the numbers of persons with a higher degree in an occupation may not improve productivity. The increase in the proportion of those with higher degree or degree qualifications, outside managers and professionals, also suggests that the qualifications are increasingly being used for getting a job, rather than directly improving productivity.

We briefly looked at those in part-time employment. The main conclusion was that those in part-time employment tend to work in less remunerative occupations, irrespective of qualification level. Changes in employment patterns for those working part-time between 2011 and 2021 led to a decline in the return to qualifications of a similar magnitude to those relating to those in full-time employment.

Our overall conclusion is that no doubt, there is on average an income premium associated with qualifications, and the size of the premium is related to the length of study. If we take income to reflect productivity then on average those with qualifications are more productive. However, there is a big *but*; the income benefits of qualifications depends on positive job matching. For those with higher degrees and bachelor degrees, the higher incomes depend largely upon getting a job as a professional or, to a lesser extent, a manager. For those with a certificate III/IV the payoffs occur for those working as technicians and trades workers. The implication is we need to be wary of the syllogism that goes *education is good, therefore more education is better*. While there is a clear return to a qualification on average, at the margin the return may be a lot lower. If the supply of persons with qualifications grows faster than can easily be absorbed by the labour market then we can expect to see the income premium associated with qualifications decline, as we have seen over the period 2011 to 2021.

1. Introduction

In an earlier paper (Karmel 2023) I looked at changes in the occupational structure and the level of qualifications over the period 2011 to 2021. Key findings were:

- Occupational change has been significant. Job growth was strongest in professional, management and community and personal services occupations. All other occupational groups had less than average growth with the lowest growth being in sales, technicians, trades and clerical occupations.
- New full-time jobs were biased towards the most highly paid jobs, while all jobs were biased toward the highest paid jobs and the lowest paid jobs – a hollowing out of the distribution.
- Credentials have exploded. There are now more people in the workforce with a bachelor degree than a certificate III/IV. The growth in credentials has far outstripped that needed to cater for the occupational change we have seen.

It is clear that credential growth has impacted on career opportunities.

- The largest increase in credentials in the past 10 years has been in bachelor and higher degrees. Employed persons with higher degrees almost doubled, from 5.1% in 2011 to 9.1% in 2021.
- In regard to new jobs 20% of bachelor degree holders and 12% of those with a higher degree were employed in the two lowest income deciles (defined by full-time income in 2011). Over 50% of new jobs for VET graduates with a certificate III/IV were in the two lowest income deciles. 45% of new jobs for VET graduates with a diploma were in the two lowest income deciles.
- For those with a certificate I/II or without a post school qualification employment opportunities are in rapid decline.

Put simply, credentials have become important even in the lowest paid jobs. The payoff to a degree for individual students has become less certain. For VET graduates credential inflation means many will end up in poorly paid jobs. A similar phenomenon has been seen in the US with graduate degree holders crowding out the bachelor's degree holders from better paying bachelor's occupations. The bachelor's degree holders, in turn, are crowding out high school graduates from better paying high school jobs (Kamis and Habibi 2022). There is also evidence that the return to a degree has declined in Australia (see Fisher-Post *et al* 2022 and Corliss *et al* 2020) and in the United Kingdom (Stansbury *et al.* 2023).

In this paper, we continue the analysis by focussing on the return to education in terms of income but using occupation as a mediating factor. The idea is to decompose income differentials into a component which captures the occupations that persons with a certain qualification work in, and a component which reflects the differences in income that persons with different levels of qualification achieve within an occupation. Thus the difference in income levels between a person, say with a bachelor degree, and a person with a certificate III/IV can be split into a component reflecting the occupational outcomes and a component reflecting the differences in pay within each occupation. This analysis is an attempt at examining the differential productivity of persons with different qualifications. By undertaking the analysis at a very fine level of occupational disaggregation, we hope to throw light on whether the expansion in qualifications has led to

‘credentialism’ or ‘skills deepening’ (Karmel 2015, Karmel *et al* 2015). If the pay rates for people with different levels of education are the same within occupations then it suggests that productivity within the occupation does not depend on education. In this case any expansion in qualifications within an occupation is suggestive of ‘credentialism’ in which the credential affects the probability of getting a job in that occupation. A similar concept is that of over education (see, for example, Kamis and Habibi 2022) in which individuals have qualifications higher than that needed for the job. On the other hand, if qualifications attract a premium within an occupation, then we would interpret the premium as a reflection of productivity. If that premium were maintained at the same time as qualification levels increased then this would suggest that ‘skills deepening’ has occurred and overall productivity has increased.

Thus we wish to look at a number of aspects:

- The premium associated with qualifications.
- The extent to which the premium is due to the occupational distribution of persons with qualifications, and the extent to which it is due to a premium within occupations.
- The way the premium associated with qualifications has changed as the proportion of persons with a qualification has increased.
- The extent to which changes to premia have occurred within occupations, and the extent to which changes have been driven by changes to the distribution of persons with particular qualifications across occupations.

Our interest is primarily in pay rates, so we focus on full-time workers. We undertake the analysis for both 2011 and 2021 which allows us to look at how the returns to education have changed and the role of occupational change (and credential inflation) in these changes.¹ Our expectation is that it is likely that there has been a decline in the return to some qualifications, given the earlier paper – Corliss *et al* (2020) certainly found a decline in the return to a degree between 2006 and 2016 in most disciplines.

We have used the language of ‘return to education’. The orthodox human capital approach is to model pay as depending on the level of education and the length of work experience (usually work experience squared). In our analysis, however, we look at average income over the whole population which will include individuals at all ages. Thus our concept is more akin to average lifetime earnings rather than earnings dependent on age. Additionally, our average is based on the current age distribution and historical education levels and does not represent the expected earning of a new cohort of individuals. Nevertheless, we argue that the average income of individuals with different education levels represents a sensible measure of the income benefits of the education.

Before we present the data we need to sound a word of caution. Our measure of earnings is the weekly income variable collected in the census. This variable is expressed in ranges and so we need to impute an average income for the group of employed (full-time) persons we are interested in. Our methodology is to:

- Exclude those whose income was less than \$400 per week in 2011 and less than \$650 in 2021. These figures were chosen as the income range that was less than the legal minimum wage of \$589.30 per week in 2011 and \$772.60 per week in 2021 (Hamilton 2022, page 74). Those with negative incomes were also excluded.

¹ All tables in the paper have been derived from the ABS Census TableBuilder Pro for the 2011 and 2021 Censuses of Population and Housing based on individuals’ characteristics.

- Estimate an upper bound for the top income interval of more than \$2000 per week in 2011 and \$3500 in 2021. This was done by assuming that the distribution in the top two intervals (i.e. \$1500-\$2000 and \$2000 plus in 2011) was uniform. For example, in 2011 if there were 1000 persons in the 1500-2000 interval and 1500 in the 2000+ interval the upper bound was estimated by $\$2000 + 1500/1000 * 500 = \2750 .
- Use the mid-point of each income interval in the calculation of the average.
- Exclude those without a legal ANZSCO occupation code.

There are two issues with this methodology which need to be highlighted. The first is that the methodology is dependent on the ranges used in the respective censuses. In particular, the upper range in the 2011 census implied that a relatively large number of individuals recorded income in the top (unbounded) range while in the 2021 census the number in the top range was much smaller. This means that there is a degree of uncertainty attached to the 2011 premia for groups with high incomes. To address this, we undertake a robustness test in which we construct income bands for the 2021 data which mimic the bands used in 2011. The second issue is that the methodology is non-linear and this means that the average income for, say, people with a degree calculated by pooling all those people with a degree will be different from the average derived from the average income for people with a degree within each occupation. The data show that the average incomes derived from the occupations are greater than from the pooled qualification data and are our preference because they are based on data with a higher level of disaggregation.

Our choice of qualifications is, of course, somewhat arbitrary. It is derived from two census variables – the highest post-school qualifications (qallp2) and the highest level of schooling. In order to keep the analysis tractable we use the following qualification levels (from highest to lowest):

- Higher degree
- Bachelor degree
- Diploma or advanced diploma
- Certificate III/IV
- Other certificate, completed year 12
- Other certificate, not completed year 12
- No post-school qualification, completed year 12
- No post-school qualification, not completed year 12.

Finally, we look briefly at those in part-time work. To keep the analysis manageable we assume that the rate of pay for part-time workers is the same as for full-time workers. While this is not ideal, we can look at how the distribution of employment across occupations impacts on the return to education.

In the following sections we present the results of our calculations, beginning with the qualifications premium in 2021, followed by a decomposition of that premium. In Section 4 we look at the changes in the qualifications premium between 2011 and 2021, followed by a brief look at part-time employment. The paper ends with a discussion.

2. Overall qualifications premia

In Table 1 we present the decomposition of the estimated average weekly income for each of our qualification levels for 2021. Note that the premia are expressed relative to the income of the lowest level of qualification (not completed year 12 and no post-school qualification).

Table 1: Weekly Income premium associated with qualifications for those in full-time employment, relative to a person with no post school qualification and did not complete year 12, 2021

| | Average weekly income (\$2021) | Premium relative to no post-school qualification, not completed year 12 (%) |
|----------------------------------|--------------------------------|---|
| Higher degree | 2407 | 71.5 |
| Degree | 2149 | 53.1 |
| Diploma | 1803 | 28.4 |
| Cert III/IV | 1609 | 14.6 |
| Other cert with year 12 | 1547 | 10.2 |
| Other cert no year 12 | 1489 | 6.0 |
| No post school qual with year 12 | 1524 | 8.5 |
| No post school qual no year 12 | 1404 | 0.0 |

Our base qualification is *No qualification without year 12*. By definition, it has a premium of 0%. As can be seen from the table persons in other qualification categories have higher incomes and hence a positive premium, ranging from 6.0% for those with an *other certificate without year 12* to 71.5% for those with a higher degree. We note that completion of year 12 has a premium of 8.5% if the person has no post-school qualification and 10.2% if the person has an *other certificate*. This suggests that year 12 has a premium but lower level certificates are worth little. The table also shows that a certificate III/IV has a further premium. It is clear that that higher level qualifications have significant premia which are related to the length of study. So the premium for diplomas is 28.4% compared to 53.1% for persons with a bachelor degree and 71.5% for persons with a higher degree.

The size of the qualifications premium obviously depends on occupation. Not all persons, for example, with a higher degree will receive the average weekly income as in Table 1, particularly if they have a job that does not require a degree. To illustrate the magnitude of the variation we present the average weekly income within each of the ANZSCO broad occupation groups.

Table 2: Average weekly income associated with qualifications for those in full-time employment, by broad occupation group, 2021 (\$2021)

| | Higher degree | Bachelor degree | Diploma | Cert III/IV | Other cert with year 12 | Other cert no year 12 | No post school qual with year 12 | No post school qual no year 12 |
|---|---------------|-----------------|---------|-------------|-------------------------|-----------------------|----------------------------------|--------------------------------|
| Managers | 2965 | 2659 | 2206 | 1910 | 1971 | 1860 | 1955 | 1745 |
| Professionals | 2414 | 2202 | 2031 | 1814 | 2010 | 1853 | 2011 | 1827 |
| Technicians and Trades Workers | 1673 | 1641 | 1699 | 1647 | 1387 | 1470 | 1268 | 1302 |
| Community and Personal Service Workers | 1509 | 1566 | 1525 | 1308 | 1290 | 1270 | 1359 | 1290 |
| Clerical and Administrative Workers | 1881 | 1715 | 1556 | 1414 | 1397 | 1381 | 1393 | 1353 |
| Sales Workers | 1762 | 1827 | 1669 | 1459 | 1498 | 1413 | 1395 | 1287 |
| Machinery Operators and Drivers | 1304 | 1385 | 1469 | 1617 | 1436 | 1503 | 1394 | 1441 |
| Labourers | 1191 | 1229 | 1294 | 1377 | 1202 | 1256 | 1189 | 1187 |
| Total | 2407 | 2149 | 1803 | 1609 | 1547 | 1489 | 1524 | 1404 |

We note that the premium associated with qualifications has two components. The first is the type of occupation that the qualification leads to and the second is the premium within occupations. To further illustrate this we present the data in Table 2 relative to a person with no post school qualification who did not complete year 12 within each broad occupation.

Table 3: Average weekly income premium associated with qualifications for those in full-time employment, relative to a person with no post school qualification and did not complete year 12, within broad occupations, 2021 (%)

| | Higher degree | Bachelor degree | Diploma | Cert III/IV | Other cert with year 12 | Other cert no year 12 | No post school qual with year 12 | No post school qual no year 12 |
|---|---------------|-----------------|---------|-------------|-------------------------|-----------------------|----------------------------------|--------------------------------|
| Managers | 70.0 | 52.4 | 26.5 | 9.5 | 13.0 | 6.6 | 12.0 | 0 |
| Professionals | 32.2 | 20.5 | 11.2 | -0.7 | 10.0 | 1.5 | 10.1 | 0 |
| Technicians and Trades Workers | 28.5 | 26.0 | 30.5 | 26.4 | 6.5 | 12.8 | -2.6 | 0 |
| Community and Personal Service Workers | 16.9 | 21.3 | 18.2 | 1.4 | 0.0 | -1.6 | 5.3 | 0 |
| Clerical and Administrative Workers | 39.0 | 26.7 | 15.0 | 4.5 | 3.2 | 2.0 | 2.9 | 0 |
| Sales Workers | 36.9 | 41.9 | 29.6 | 13.3 | 16.4 | 9.7 | 8.4 | 0 |
| Machinery Operators and Drivers | -9.5 | -3.9 | 2.0 | 12.2 | -0.4 | 4.3 | -3.3 | 0 |
| Labourers | 0.4 | 3.6 | 9.1 | 16.0 | 1.3 | 5.9 | 0.2 | 0 |
| Total | 71.5 | 53.1 | 28.4 | 14.6 | 10.2 | 6.0 | 8.5 | 0 |

In each row we have bolded the qualification with the highest premium. While overall the premium tends to increase with the length of study, this is not necessarily true within the broad occupations. So community and personal service workers with bachelor degrees have higher incomes than those with higher degrees. Similarly, degrees and diplomas have little value among machinery operators and drivers and labourers. The role of occupation is also emphasised by the variation in income

across occupation. So, for example, sales workers with higher degrees have income which is 36.9% higher than the base category within the occupation but that income is lower than that of professionals with a diploma or certificate III/IV. This is an example where conceivably sales workers with degrees are more productive than sales workers with lower qualifications, but productivity is very low relative to the case where the occupation is more commensurate with the qualification.

We now explore the relationship between income and occupation in more detail.

3. Decomposing the qualifications premia

The income premium associated with each qualification (relative to the income of a person without a post-school qualification who has not completed year 12) can be split into two components. The first is the premium within each occupation (noting that we are using a very detailed occupation classification –ANZSCO4 with some 470+ categories) while the second reflects the distribution of those in full-time employment across distributions. The algebra is shown in Appendix I, but essentially we are decomposing the difference in average income of two qualification categories. The within each occupation component is driven by the difference in incomes within each occupation, weighted by the average number of persons in the two qualification categories, while the across occupation component is derived from the difference in the proportions of persons in the two qualifications within each occupation, weighted by the average income of the two categories in the occupation.²

We note that the decomposition is conditional on the occupational classification. In particular a very broad classification will assign more of the premium to the ‘within occupation’ component than a more detailed classification. In the extreme case where there is only one occupation then all the premium would be assigned to the ‘within occupation’ premium. In our analysis we use a very detailed occupational classification (ANZSCO 4). This means that the ‘across occupation’ component will account for a relatively large part of the income premium. It also means that it is likely that any variation in income within an occupation that is related to qualification level is likely to reflect the differential skills and productivity of the persons with the qualification.

For example, in 2021 we observe that a registered nurse on average with a higher degree earned \$1989 in weekly income in comparison with \$1744 for one who had a bachelor degree. We would interpret this as reflecting differences in skills and therefore productivity, with the higher degrees associated with specialisation.

The overall results of the decomposition are presented in Table 4.

² We have chosen to present the premium relative to the ‘no post-school qualification, no year 12’ category. However, the choice of the base category does not affect the results because the formula is linear.

Table 4: Decomposition of the average weekly income premium by qualification level relative to the average income of a full-time employed person with no post-school qualification who has not completed year 12, 2021

| | Within occupation premium (\$2021) | Occupational distribution premium (\$2021) | Total premium (\$2021) | Within occupation premium (%pts) | Occupational distribution premium (%pts) | Total premium (%pts) |
|--|------------------------------------|--|------------------------|----------------------------------|--|----------------------|
| Higher degrees | 531 | 472 | 1003 | 37.8 | 33.6 | 71.5 |
| Bachelor degrees | 416 | 330 | 745 | 29.6 | 23.5 | 53.1 |
| Diplomas and advanced diplomas | 256 | 143 | 399 | 18.2 | 10.2 | 28.4 |
| Certificates III/IV | 135 | 69 | 205 | 9.6 | 4.9 | 14.6 |
| Other certificates with year 12 | 61 | 82 | 143 | 4.3 | 5.8 | 10.2 |
| Other certificates, no year 12 | 68 | 17 | 85 | 4.8 | 1.2 | 6.0 |
| No post-school qualification, year 12 | 34 | 86 | 120 | 2.4 | 6.1 | 8.5 |

Note: The percentage point premia are relative to the average income of \$1404 of those full-time employed, no post-school qualification and did not complete year 12.

We see that in all qualification categories the ‘within occupation’ premium is a little larger than the ‘across occupation’ premium. That is, qualifications are correlated with incomes, on average, even if we hold occupations constant. This is supportive of the notion that qualifications improve productivity. However, we need to note that the results in Table 4 are the summation over 474 occupations, and it certainly is not the case that this holds true for all occupations. It is instructive to delve a little deeper, and this is what we do in Table 5 where we show the contributions to the within occupation and across occupation premia by broad occupational groupings (ANZSCO1). In this table we restrict ourselves to the qualification categories that have a clear advantage compared to our base case (i.e. higher degrees, bachelor degrees, diplomas and advanced diplomas, and certificates III/IV). We also show the distribution of full-time employment across the major occupation groups for each qualification level.

Table 5: Contributions to within occupation and across occupation average weekly income premia by broad occupational groupings, by occupation major groups, 2021, (\$2021 and percentages).

| | Within occupation premium (\$2021) | Occupational distribution premium (\$2021) | Total premium (\$2021) | Within occupation premium (%pts) | Occupational distribution premium (%pts) | Total premium (%pts) | Percentage of full-time employment |
|--|------------------------------------|--|------------------------|----------------------------------|--|----------------------|------------------------------------|
| Higher degrees | | | | | | | |
| Managers | 147 | 247 | 395 | 10.5 | 17.6 | 28.1 | 22.0 |
| Professionals | 222 | 1160 | 1382 | 15.8 | 82.6 | 98.4 | 60.1 |
| Technicians and Trades Workers | 80 | -200 | -120 | 5.7 | -14.3 | -8.6 | 2.8 |
| Community and Personal Service Workers | 11 | -30 | -19 | 0.8 | -2.1 | -1.4 | 2.7 |
| Clerical and Administrative Workers | 32 | -82 | -50 | 2.3 | -5.8 | -3.6 | 8.2 |
| Sales Workers | 12 | -73 | -61 | 0.8 | -5.2 | -4.4 | 2.0 |
| Machinery Operators and Drivers | 13 | -330 | -316 | 0.9 | -23.5 | -22.5 | 1.2 |
| Labourers | 15 | -221 | -206 | 1.1 | -15.7 | -14.7 | 1.1 |
| Total | 531 | 472 | 1003 | 37.8 | 33.6 | 71.5 | 100.0 |
| Bachelor degrees | | | | | | | |
| Managers | 103 | 169 | 272 | 7.3 | 12.0 | 19.4 | 19.9 |
| Professionals | 157 | 980 | 1137 | 11.2 | 69.8 | 81.0 | 54.8 |
| Technicians and Trades Workers | 79 | -176 | -98 | 5.6 | -12.6 | -7.0 | 4.2 |
| Community and Personal Service Workers | 11 | 7 | 18 | 0.8 | 0.5 | 1.3 | 5.0 |
| Clerical and Administrative Workers | 25 | -55 | -30 | 1.7 | -3.9 | -2.1 | 10.1 |
| Sales Workers | 14 | -58 | -44 | 1.0 | -4.1 | -3.1 | 2.8 |
| Machinery Operators and Drivers | 13 | -324 | -311 | 0.9 | -23.1 | -22.2 | 1.5 |
| Labourers | 15 | -214 | -199 | 1.1 | -15.2 | -14.2 | 1.7 |
| Total | 416 | 330 | 745 | 29.6 | 23.5 | 53.1 | 100.0 |

| | Within occupation premium (\$2021) | Occupational distribution premium (\$2021) | Total premium (\$2021) | Within occupation premium (%pts) | Occupational distribution premium (%pts) | Total premium (%pts) | Percentage of full-time employment |
|--|------------------------------------|--|------------------------|----------------------------------|--|----------------------|------------------------------------|
| Diplomas and advanced diplomas | | | | | | | |
| Managers | 51 | 183 | 234 | 3.6 | 13.0 | 16.7 | 22.3 |
| Professionals | 33 | 304 | 337 | 2.3 | 21.7 | 24.0 | 20.0 |
| Technicians and Trades Workers | 98 | -48 | 50 | 7.0 | -3.4 | 3.6 | 12.8 |
| Community and Personal Service Workers | 14 | 148 | 161 | 1.0 | 10.5 | 11.5 | 14.5 |
| Clerical and Administrative Workers | 19 | 48 | 67 | 1.4 | 3.4 | 4.8 | 17.4 |
| Sales Workers | 11 | -18 | -7 | 0.8 | -1.3 | -0.5 | 5.3 |
| Machinery Operators and Drivers | 14 | -283 | -269 | 1.0 | -20.2 | -19.2 | 4.3 |
| Labourers | 16 | -190 | -174 | 1.2 | -13.6 | -12.4 | 3.5 |
| Total | 256 | 143 | 399 | 18.2 | 10.2 | 28.4 | 100.0 |
| Certificates III/IV | | | | | | | |
| Managers | 9 | -4 | 4 | 0.6 | -0.3 | 0.3 | 13.7 |
| Professionals | -1 | 31 | 30 | 0.0 | 2.2 | 2.2 | 5.5 |
| Technicians and Trades Workers | 90 | 415 | 506 | 6.4 | 29.6 | 36.0 | 40.9 |
| Community and Personal Service Workers | 1 | 45 | 45 | 0.1 | 3.2 | 3.2 | 8.1 |
| Clerical and Administrative Workers | 3 | -52 | -49 | 0.2 | -3.7 | -3.5 | 10.9 |
| Sales Workers | 3 | -35 | -32 | 0.2 | -2.5 | -2.2 | 4.4 |
| Machinery Operators and Drivers | 14 | -196 | -182 | 1.0 | -14.0 | -13.0 | 9.2 |
| Labourers | 15 | -133 | -118 | 1.1 | -9.5 | -8.4 | 7.4 |
| Total | 135 | 69 | 205 | 9.6 | 4.9 | 14.6 | 100.0 |

Note: The percentage point premia are relative to the average income of \$1404 of those full-time employed, no post-school qualification and did not complete year 12.

The first point to emerge is that the within occupation premia are universally (almost) positive. This means that qualifications have a positive impact on incomes in almost all occupations. That said, in many cases these premia are very small. The clear exceptions are the premia that managers and professionals enjoyed by those with degrees (and more so higher degrees) and the premia in technicians and tradesperson for those holding diplomas and especially those with certificates III/IV.

The second point to emerge is that there are large positive and negatives in the 'across occupation' contribution to the qualifications premium. So for persons with a higher degree or a bachelor degree there are large positive contributions from the managers and professional occupations but negative contributions from all other occupational groups. For this group, it is clear the income premium will be negatively affected by any increase in the proportion of employment that occurs outside the managers and professional groups. We note that in 2021 the proportion of full-time employed persons with a higher degree in the manager and professional groups was 82.1% and the proportion for a bachelor degree was 74.7%. That is a sizable proportion of both qualification groups that were employed in jobs that did not support a wage premium (compared to no qualification without year 12). For persons with a diploma, there were four groups that contributed positively to the 'across occupation component: managers, professionals, clerical workers (to a small extent) and community and personal service workers. These groups represented around three quarters of full-time employment for persons with a diploma. Finally, for persons with a certificate III/IV it is employment in the technicians and tradespersons group that underpins the income premium (with very small contributions from the professionals group and community and personal service workers). The group's income premium is affected quite negatively to the extent that employment occurs in the broad groups of clerical and administrative workers, sales workers, machinery operators and drivers and labourers.

Putting these two together it is clear that the premium associated with a degree and higher degree is driven by the employment in the managers and professionals major groups. Not only are the average incomes higher in these groups but there is an additional premium associated with the higher qualifications. A similar comment relates to those with a certificate III/IV; it is employment in the technicians and trades group that provides the premium, although the within occupation premium in this group is relatively modest.

An implication of the above findings is that we need to be concerned that there is a proper match between qualifications and opportunities in the labour market. While there is no doubt that there are on average positive returns to education, and these are related to the length of courses, these returns will not eventuate if individuals end up in occupations which do not require the level of qualification in question. While there is evidence that qualifications do improve productivity (and hence income) within occupations, any return will be very small if the occupation does not fundamentally require the level of qualification. Hence, we do need to be concerned with credential creep whereby individuals with higher level qualifications end up working in lower skill occupations. Similarly, we should be aware of credentialism within an occupation where we see an ever increasing proportion of persons with higher qualifications that are not associated with higher earnings.

This observation makes a useful link with the next section where we look at changes to the return over the 10 years to 2021.

4. Changes in the qualifications premia 2011 to 2021

We have replicated the analysis presented in the previous section for 2011. This enables us to see how the average weekly income premia have changed and the extent to which any change can be attributed to change in relative wages within occupations (the ‘within occupation premium’) and changes in the distribution of employment (the ‘across occupation’ premium).

In Table 6 we present the overall results.

Table 6: Average weekly income premia of educational qualifications (relative to no post-school qualification without completion of year 12), 2011 and 2021

| | Premium in 2011 (%) | Premium in 2021 (%) | Change in return (% points) |
|----------------------------------|------------------------|------------------------|--------------------------------|
| Higher degree | 93.3 | 71.5 | -21.8 |
| Degree | 57.2 | 53.1 | -4.1 |
| Diploma | 30.9 | 28.4 | -2.5 |
| Cert III/IV | 16.6 | 14.6 | -2.0 |
| Other cert with year 12 | 9.0 | 10.2 | 1.2 |
| Other cert no year 12 | 3.1 | 6.0 | 2.9 |
| No post school qual with year 12 | 9.5 | 8.5 | -1.0 |
| No post school qual no year 12 | 0.0 | 0.0 | 0.0 |

We see that the premia has changed significantly between 2011 and 2021.

We see that in 2021 there are still healthy premia associated with completing year 12, a certificate III/IV, a bachelor degree or a higher degree. But for each of these qualifications that premia has declined with the decline greater the higher the qualification. Of particular note is the decline of around 22 percentage points in the premium associated with a higher degree. The decline for bachelor degrees is more modest at 4 percentage points, while the declines in the premia associated with diplomas and certificates III/IV were of the order of 2 to 2.5 percentage points.

One of the issues with comparing the educational premium across time is that the ABS has modified the income scale quite significantly. In hindsight, the ABS used a cut-off to define the top band which was too low - in 2011 around 39 per cent of people with a higher degree were in the top income band (\$2000 per week or more). This compares with 17.5% in 2021 (\$3500 per week or more). A concern is that the low upper band in 2011 was a factor behind the apparent decline in the return to a higher or bachelor degree. To investigate this possibility, we replicated the 2021 analysis by introducing an artificial upper band of \$2500 (which implied that 39% of those with a higher degree would have been in the top band). The results are shown in Appendix II but it appears that the findings are robust in respect of the methodology used to handle the top band. We conclude that it is reasonable to take the results shown in Table 6 at face value and that it is not the case that the results are being driven by the ABS definition of the top income band.

We note that from Table 6 in the premium of a higher degree has declined by around 22 percentage points from 93.3% to 71.5% and the premium associated with a bachelor degree from 57.2% to 53.1%. An obvious avenue to investigate is where this has occurred. Is it because of a change to the occupational distribution of persons with higher or bachelor degrees with more persons entering

lower paid occupations? Or is it because the premium associated with a degree has declined within an occupation?

In order to look at this issue we employ the decomposition introduced earlier and compare the various components across the two points in time.

Table 7: Change in average weekly income premium relative to no post-school qualification without year 12, 2011 to 2021

| | Within occupation premium (%pts) | | | Across occupation premium (%pts) | | | Total premium (%pts) | | |
|---|----------------------------------|------|--------|----------------------------------|------|--------|----------------------|------|--------|
| | 2011 | 2021 | Change | 2011 | 2021 | Change | 2011 | 2021 | Change |
| Higher degree | 51.7 | 37.8 | -13.8 | 41.6 | 33.6 | -8.0 | 93.3 | 71.5 | -21.8 |
| Degree | 33 | 29.6 | -3.7 | 23.8 | 23.5 | -0.4 | 57.2 | 53.1 | -4.1 |
| Diploma | 20.7 | 18.2 | -2.5 | 10.1 | 10.2 | 0.1 | 30.9 | 28.4 | -2.4 |
| Cert III/IV | 11.6 | 9.6 | -2.0 | 5.0 | 4.9 | -0.1 | 16.6 | 14.6 | -2.0 |
| Other cert with year 12 | 5.5 | 4.3 | -1.2 | 3.4 | 5.8 | 2.4 | 9.0 | 10.2 | 1.2 |
| Other cert no year 12 | 4.2 | 4.8 | 0.6 | -1.2 | 1.2 | 2.4 | 3.1 | 6.0 | 2.9 |
| No post school qual with year 12 | 3.2 | 2.4 | -0.8 | 6.3 | 6.1 | -0.2 | 9.5 | 8.5 | -1.0 |
| No post school qual no year 12 | 0 | 0.0 | 0.0 | 0 | | 0.0 | 0.0 | 0.0 | 0.0 |

We see that in respect of the premium associated with a higher degree the largest part of the decline is because of a decline in the return within occupations, although the across occupation premium has also declined significantly. In respect of the decline in premium for those with a degree almost all the decline relates to the within occupation component. It seems that within occupations the benefit associated with a higher qualification has declined, and this suggests we have observed credentialism at play. That is, individuals may be using higher degrees to get jobs rather than deepening the skills base of the occupation. This is not to say that there is no relationship between qualifications and productivity, rather that this relationship has been weakened as the numbers of people with a higher qualification has increased.

To add a bit more flesh to this analysis, we disaggregate the changes in premium for those with higher degrees (Table 8) and bachelor degrees (Table 9) across the major occupation groups.

Table 8: Decomposition of the change in the average weekly income premium for persons with a higher degree, 2011 to 2021

| | Within occupation premium (%pts) | | | Across occupation premium (%pts) | | |
|--|----------------------------------|-------------|--------------|----------------------------------|-------------|-------------|
| | 2011 | 2021 | Change | 2011 | 2021 | Change |
| Managers | 16.1 | 10.5 | -5.6 | 22.4 | 17.6 | -4.8 |
| Professionals | 21.7 | 15.8 | -5.9 | 90.0 | 82.6 | -7.4 |
| Technicians and Trades Workers | 7.0 | 5.7 | -1.3 | -15.6 | -14.3 | 1.3 |
| Community and Personal Service Workers | 0.9 | 0.8 | -0.2 | -3.6 | -2.1 | 1.5 |
| Clerical and Administrative Workers | 2.8 | 2.3 | -0.5 | -8.0 | -5.8 | 2.1 |
| Sales Workers | 1.2 | 0.8 | -0.3 | -6.5 | -5.2 | 1.3 |
| Machinery Operators and Drivers | 1.1 | 0.9 | -0.2 | -22.0 | -23.5 | -1.5 |
| Labourers | 0.9 | 1.1 | 0.2 | -15.1 | -15.7 | -0.6 |
| Total | 51.7 | 37.8 | -13.8 | 41.6 | 33.6 | -8.0 |

Table 9: Decomposition of the change in the average weekly income premium for persons with a bachelor degree, 2011 to 2021

| | Within occupation premium (%pts) | | | Across occupation premium (%pts) | | |
|--|----------------------------------|-------------|-------------|----------------------------------|-------------|-------------|
| | 2011 | 2021 | Change | 2011 | 2021 | Change |
| Managers | 8.1 | 7.3 | -0.7 | 10.8 | 12.0 | 1.3 |
| Professionals | 12.3 | 11.2 | -1.1 | 76.2 | 69.8 | -6.4 |
| Technicians and Trades Workers | 6.9 | 5.6 | -1.3 | -13.9 | -12.6 | 1.3 |
| Community and Personal Service Workers | 0.8 | 0.8 | 0.0 | -1.3 | 0.5 | 1.8 |
| Clerical and Administrative Workers | 1.9 | 1.7 | -0.1 | -6.4 | -3.9 | 2.5 |
| Sales Workers | 1.2 | 1.0 | -0.2 | -5.2 | -4.1 | 1.1 |
| Machinery Operators and Drivers | 1.0 | 0.9 | -0.1 | -21.5 | -23.1 | -1.6 |
| Labourers | 1.3 | 1.1 | -0.2 | -15.0 | -15.2 | -0.3 |
| Total | 33.3 | 29.6 | -3.7 | 23.8 | 23.5 | -0.4 |

We see that the decline in the premium for those with a higher degree is largely driven by what is happening among managers and professionals. Within these occupation groups the premium associated with a higher degree has declined. However, it is jobs in these occupations that underpins the overall premium associated with a higher degree.

For individuals with a degree the decline in the premium (modest as it is) is largely driven by declines in the premium within occupations which has been observed across all the occupational groups (apart from community and personal service workers where there has been no change). That said, there was a significant decline in the contribution of professionals to the across occupation component. That is, persons with bachelor degrees have seen a decline in the proportion obtaining

employment in professional occupations (in fact, the percentage declined from 58.6% to 54.8% between 2011 and 2021 for those in full-time employment).

5. What about part-time employment?

We saw in Karmel (2023) that pattern of growth in employment was rather different between full-time and total employment. In full-time employment the growth was strongest at the top of the skilled occupation distribution while in total employment there was strong growth at the top and the bottom of the distribution. Therefore it is worth looking at whether this pattern means that the return to qualifications has changed for those in part-time employment.

While the census data do contain the number of hours worked for pragmatic reasons we take a partial approach focussing on the distribution of those in part-time employment across occupations.³ By assuming that individuals in part-time employment get paid at the same hourly rate as those who are full-time within each occupation, we can look at whether the change in the occupational distributions has impacted on the return to qualifications for those who are part-time employed.

In Table 10 we present the average income for both 2011 and 2021 using, first, the occupation weights for full-time workers and, second the weights for part-time workers. In each case, the average weekly income for each qualification level is obtained by aggregating the average incomes over the 400 plus occupations,

³ We could in theory estimate average income and average hours worked for each occupation by qualification combination, and therefore decompose average income for each qualification into an hours worked component and a pay rate component within each occupation. Such an exercise is beyond the scope of this paper. Our simpler approach focuses on the impact of the occupation distribution which is the main purpose of the paper.

Table 10: Estimated average weekly income based on occupation weights for the full-time employed and the part-time employed. 2011 and 2021

| | 2011 income using FT weights (\$2011) | 2011 income using PT weights (\$2011) | 2011 ratio of PT to FT income (%) | 2021 income using FT weights (\$2021) | 2021 income using PT weights (\$2021) | 2021 ratio of PT to FT income (%) |
|--|---|---|---|---|---|--|
| Higher degrees | 1974 | 1657 | 83.9 | 2407 | 2036 | 84.6 |
| Bachelor degrees | 1605 | 1346 | 83.9 | 2149 | 1784 | 83.0 |
| Diplomas and advanced diplomas | 1337 | 1104 | 82.6 | 1803 | 1468 | 81.4 |
| Certificates III/IV | 1191 | 983 | 82.5 | 1609 | 1333 | 82.9 |
| Other certificates with year 12 | 1113 | 921 | 82.7 | 1547 | 1277 | 82.6 |
| Other certificates, no year 12 | 1053 | 886 | 84.1 | 1489 | 1260 | 84.6 |
| No post-school qualification, year 12 | 1119 | 916 | 81.9 | 1524 | 1256 | 82.4 |
| No post-school qualification, no year 12 | 1021 | 869 | 85.0 | 1404 | 1190 | 84.7 |

We see that in both periods the distribution of employment across occupations has a significant impact on average weekly income, with those in part-time employment earning a notional income that is 15-20 per cent lower than those in full-time employment. Note that, by construction, this difference is driven completely by the differences in the two distributions of employment, not by any difference in the hourly rate of those part-time employed relative to those who are employed full-time. That is, part-time workers are less likely to be employed in the more remunerative occupations. This is hardly surprising, because the opportunity cost of those working in more remunerative occupations is higher than those working in less well paid occupations.

In the next table, we present the same data but expressed in the premium relative to those with no post-school qualification, having not completed year 12.

Table 11: Average weekly incomes relative to those with no post-school qualification and without completing year 12 based on the distribution of full-time employed persons across occupations and the distribution of part-time employed persons across occupations, 2011 and 2021

| | 2011 premium using FT weights | 2011 premium using PT weights | 2021 premium using FT weights | 2021 premium using PT weights | Change in return, FT weights | Change in return, PT weights |
|--|--|--|--|--|------------------------------------|------------------------------------|
| | (%) | (%) | (%) | (%) | (% points) | (% points) |
| Higher degrees | 93.3 | 90.7 | 71.5 | 71.2 | -21.8 | -19.6 |
| Bachelor degrees | 57.2 | 55.0 | 53.1 | 49.9 | -4.1 | -5.1 |
| Diplomas and advanced diplomas | 30.9 | 27.1 | 28.4 | 23.4 | -2.4 | -3.8 |
| Certificates III/IV | 16.6 | 13.2 | 14.6 | 12.1 | -2.0 | -1.2 |
| Other certificates with year 12 | 9.0 | 6.0 | 10.2 | 7.3 | 1.2 | 1.3 |
| Other certificates, no year 12 | 3.1 | 2.0 | 6.0 | 5.9 | 2.9 | 3.9 |
| No post-school qualification, year 12 | 9.5 | 5.4 | 8.5 | 5.6 | -1.0 | 0.1 |
| No post-school qualification, no year 12 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

We see that in both 2011 and 2021 the premium associated with qualifications (that is, average income relative to persons with no post-school qualifications and without year 12) is lower for the part-time employed compared to the full-time employed. However, the differences are not huge.

When we look at the changes between 2011 and 2021, we observe that the sizable decline in the average weekly income premium associated with qualifications for those with qualifications ranging between certificates III/IV and higher degrees occurred for both those in part-time employment and those in full-time employment. In each case the decline in the return was greatest for those with higher degrees, followed by those with bachelor degrees, diplomas and finally those with a certificate III/IV.

Thus our general conclusion is that those with qualifications face lower returns for their qualification if they work part-time rather than full-time, and this is assuming that the hourly rate of pay at the occupation level is the same. That is, the part-timers have a tendency to work in occupations that are less remunerative. However, it does not appear that changes to the occupational distribution between 2011 and 2021 have impacted on those employed part-time more than those employed full-time to any significant degree.

6. Discussion

Our starting point is that there has been a very large increase in credentials between 2011 and 2021 which was accompanied by considerable change in the occupational structure of the labour market. These two factors have fashioned the opportunities available to individuals with different qualifications. Earlier work (Karmel 2023) concluded that credentials have become more important even in the lowest jobs. The payoff to a degree, at least in terms of occupational opportunities, for individual students has become less certain. For VET graduates credential inflation means many will end up in poorly paid jobs. In this paper, we explored the implications of the structural change on first incomes and, secondly, on productivity by investigating the average weekly incomes of full-time workers on the basis of their qualification (higher degree, degree, diploma or certificate III/IV) and

their occupation. The occupational classification we have used is the four digit ANZSCO with some 470 individual occupations. Further, we hope that the analysis will provide some evidence on the extent of 'credentialism' by which we mean that qualifications are being used to get a job in a specific occupation rather than being necessary for that occupation, as contrasted to the alternative interpretation of 'skills deepening' in which qualifications are directly feeding into productivity.

The first point that is clear is that there is no doubt that qualifications on average lead to higher incomes (and therefore reflect higher productivity). As a reference point we use the average income of those with the least qualifications which we defined to be those with no post-school qualification without completing year 12. Based on the 2021 Census data, compared to this comparison group those with a higher degree had average incomes 71.5% higher, those with a bachelor degree 53.1% higher, those with a diploma 28.5% higher and those with a certificate III/IV 14.6% higher. Completion of year 12 led to premia of 10.2% with a lower level certificate or 8.5% with no post-school qualification. The relativities indicate that the length of the period of study matters.

The second point to emerge is that education (qualifications) has an effect on average incomes over and above the occupations that different qualifications lead to. In particular, we find that within occupations qualifications matter. This provides clear evidence that qualifications do lead to an increase in productivity. A simple example is that nurses with higher degrees had average incomes in 2021 of \$1989 per week compared to \$1744 for a nurse with a bachelor degree. In this example, we infer that the different incomes reflect the differential skills and productivity of the persons with the qualification.

There is an important caveat here, though. The pay-off to higher level qualifications depends on getting a commensurate job – the pay-off is marginal or in some cases negative if the job does not match the qualification. For example, the main contributors to the return to those with a higher degree occurs for those individuals working as managers or professionals. In these jobs, the return to the qualification has two elements: higher average incomes in general because the occupations are paid well and higher average incomes within the fine level occupation. The return to having a higher degree will be reduced if there is an increase in the number of persons working in occupations outside managers and professionals.

For those with bachelor degrees, the return is highest for those working as professionals, with positive returns also for those working as managers and community and personal service workers.

In respect of VET qualifications we find that the returns for those with diplomas come from those working as managers, professionals, and community and personal service workers. In respect of those with a certificates III/IV the return is dominated by employment in technicians and trades occupations; employment as clerical and administrative workers, machinery operators and drivers and labourers detracts from the income premium.

It is the change in the premium attached to qualifications that is of particular interest. We find that between 2011 and 2021 there has been a decline in the premium attached to all qualifications, from certificate III/IV to higher degree. The decline was highest for those with a higher degree (from 93.3% to 71.5%, followed by those with a degree (from 57.2% to 53.1%). There were smaller declines for those with diplomas (from 30.9% to 28.4%) and certificates III/IV (from 16.6% to 14.6%).

The decline in the premium for those with a higher degree is driven by both a change in the distribution of jobs and the premium within occupations. In essence, the premium has declined because a smaller proportion are working as managers and professionals and the premium attached

to a higher degree has declined within occupations among managers and professionals, presumably driven by the increase in the proportion with a higher degree.

The decline in the premium for those with a degree is largely driven by a decline in the proportion of those in professional occupations.

In terms of the ‘credentialism’ versus ‘skills deepening’ debate, the decline in the premium for those with higher degrees within occupations is supportive of increasing credentialism. Put simply, increasing the numbers of persons with a higher degree in an occupation may not improve productivity. The increase in the proportion of those with higher degree or degree qualifications outside managers and professionals also suggests that the qualifications are increasingly being used for getting a job, rather than directly improving productivity.

We briefly looked at those in part-time employment. The main conclusion was that those in part-time employment tend to work in less remunerative occupations, irrespective of qualification level. Changes in employment patterns for those working part-time between 2011 and 2021 led to a decline in the return to qualifications of a similar magnitude to those relating to those in full-time employment.

Our overall conclusion is that no doubt, there is on average an income premium associated with qualifications, and the size of the premium is related to the length of study. If we take income to reflect productivity then on average those with qualifications are more productive. However, there is a big *but*; the income benefits of qualifications depends on positive job matching. For those with higher degrees and bachelor degrees, the higher incomes depend upon getting a job as a professional or, to a lesser extent, a manager. For those with a certificate III/IV the payoffs occur for those working as technicians and trades workers. The implication is we need to be wary of the syllogism that goes *education is good, therefore more education is better*. While there is a clear return to a qualification on average, at the margin the return may be a lot lower. If the supply of persons with qualifications grows faster than can easily be absorbed by the labour market then we can expect to see the return to qualifications decline, as we have seen over the period 2011 to 2021.

Finally, there is always more analysis that could be done. Two further dimensions would be interesting to pursue. The first is the role of gender – we know that the sex segregation is an important characteristic of Australia’s labour market. The most obvious question is whether the decline in the income premium to qualifications has occurred for both men and women, or has it been larger for women noting that the educational participation of women is considerably higher than that of men and has been growing at a faster rate. The second dimension is that of field of study. Have all fields been affected equally by a decline in the income premium? Or have some fields been more affected than others. For example, STEM fields have been often singled out as being particularly important for the economy but is it the case that these have been less affected by the decline in the income premium than more generic fields such as business studies?

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Appendix I: The decomposition of income with occupation as a mediating factor

Let w_{ij} be the average income for the i th education level in the j th occupation and let $w_{i.}$ be the average income for the i th education level

Let N_{ij} be the number of persons in full-time employment with an educational level of i in occupation j . Denote by $N_{i.}$ the total number of persons in full-time employment with an education level of i .⁴

In deriving a decomposition into ‘within occupations’ and ‘across occupations’ there are two possibilities. One possibility is to derive a decomposition based on average incomes for each occupation. This is somewhat problematic if income within an occupation is related to qualification level, because the mix of qualifications will impact on the average income for the occupation. In this case the average income for an occupation is not a good benchmark.

We address this by choosing a particular qualification level as the benchmark.

Without loss of generality we denote qualification 1 as the benchmark. Our immediate task is to consider the return to undertaking another qualification, say qualification i relative to qualification 1. That is, we focus on $w_{i.} - w_{1.}$

Then

$$w_{i.} - w_{1.} = \sum_j \frac{N_{ij}}{N_{i.}} w_{ij} - \sum_j \frac{N_{1j}}{N_{1.}} w_{1j}$$

And it is easy to show that

$$w_{i.} - w_{1.} = \sum_j \frac{N_{ij}}{N_{i.}} (w_{ij} - w_{1j}) + \sum_j \left(\frac{N_{ij}}{N_{i.}} - \frac{N_{1j}}{N_{1.}} \right) w_{1j}$$

The first term captures the income premium of qualification i within occupations relative to qualification 1 while the second term captures the income premium which can be attributed to the mix of occupations associated with qualification i relative to the mix associated with qualification 1.

We note that the ‘within occupation premium’ is weighted by the occupational mix of qualification i while the ‘occupational premium’ is weighted by the income of qualification 1. We could have reversed this approach and specified an alternative decomposition. By taking the mid-point of these decompositions we obtain a decomposition which is symmetrical, as follows.

$$w_{i.} - w_{1.} = \sum_j \frac{1}{2} \left(\frac{N_{ij}}{N_{i.}} + \frac{N_{1j}}{N_{1.}} \right) (w_{ij} - w_{1j}) + \sum_j \frac{1}{2} \left(\frac{N_{ij}}{N_{i.}} - \frac{N_{1j}}{N_{1.}} \right) (w_{ij} + w_{1j})$$

One issue we need to address is what to do in cases in which there are no observations. The simplest approach computationally is to assume that the income for this cell is zero. If we do this the formula, in the case that $w_{1.}$ is zero simplifies to

⁴ The dot refers to a summation over that index.

$$w_i = \sum_j \frac{1}{2} \left(\frac{N_{ij}}{N_i} \right) (w_{ij}) + \sum_j \frac{1}{2} \left(\frac{N_{ij}}{N_i} \right) (w_{ij})$$

Effectively this assigns half the income to the ‘within occupation premium’ and half to the ‘occupational mix’. An alternative approach is to impute an income for the missing cells, based on the income of persons with a ‘near by’ qualification⁵. The approach we have adopted for 2021 is the latter, and it turns out that it makes little difference (because this issue only arises in occupations where there are very few persons). Table A1 compares the ‘within occupation premium’ for the 2021 data based on the two approaches.

Table A1: Within occupational premium, alternative imputation methods, average weekly income \$2021

| | Based on zero income for missing cells | Based on imputed income for missing cells |
|-------------------------------------|--|---|
| Higher degree | 536 | 531 |
| Bachelor Degree | 423 | 416 |
| Diploma | 256 | 256 |
| Certificate III/IV | 135 | 135 |
| Other cert with year 12 | 60 | 61 |
| Other cert with no year 12 | 66 | 68 |
| No post school qual with year 12 | 34 | 34 |
| No post school qual with no year 12 | 0 | 0 |

⁵ The approach we took was to take the average income of the adjacent lower qualification. If that were not possible we took the average income of the adjacent higher qualification.

Appendix II Robustness test for upper income bounds

One concern is that the relatively low cut-off for the top income band in 2011 may be contributing to the apparent decline in the return to degrees between 2011 and 2021. To test this proposition we constructed a cut-off of \$2500 for 2021 and recalculated the decomposition on this basis (assuming that 50% of persons in the \$2000-\$3000 band were between \$2000 and \$2500 and 50% between \$2500 and \$3000). We note that the upper cut-off of \$2000 per week in 2011 is equivalent to \$2395 per week in 2021 if we apply the increase in the CPI to the 2011 figure.⁶

A comparison of the ABS cut-offs for the top band is shown in Table A2

Table A2: A comparison of the cut-offs used by the ABS to define the top income band (per cent of those in full-time employment)

| | % in top range 2011 | % in top range 2021 | % in imputed top range 2021 |
|---|------------------------|------------------------|--------------------------------|
| Higher degree | 39.1 | 17.5 | 39.0 |
| Bachelor degree | 24.9 | 11.9 | 30.4 |
| Diploma and advanced diploma | 14.6 | 5.7 | 19.3 |
| Certificate III/IV | 9.3 | 2.8 | 12.8 |
| Other certificate with year 12 | 8.1 | 3.7 | 11.8 |
| Other certificate no year 12 | 5.7 | 2.6 | 9.7 |
| No post school qual with year 12 | 8.3 | 3.7 | 11.3 |
| No post school qual no year 12 | 4.9 | 2.0 | 7.5 |
| Cut-off for top range in 2011 | 2000 per week (\$2011) | | |
| Cut-off for top range in 2021 | 3500 per week (\$2021) | | |
| Imputed cut-off for top range 2021 | 2500 per week (\$2021) | | |

Table A3 shows the impact of using the constructed upper cut-off for 2021 on estimates of average incomes by qualification. We see that the estimates for 2021 are insensitive to the construction of the upper cut-off and it makes little difference to estimates of the income premia associated with educational qualifications.

⁶ The all groups CPI, Australia increased from 99.2 in June 2011 to 118.8 in June 2021, series A2325846c, Australian Bureau of Statistics

Table A3: Estimation of average incomes and returns based on the actual and constructed cut-offs for 2021.

| | 2021 cut -off | imputed 2011 cut-off | imputed/ actual (%) | Return with 2021 cut-off | Return with imputed cut-off |
|---|----------------------|-----------------------------|----------------------------|---------------------------------|------------------------------------|
| Higher degree | 2407 | 2375 | 98.6 | 71.5 | 72.1 |
| Bachelor degree | 2149 | 2109 | 98.2 | 53.1 | 52.9 |
| Diploma and advanced diploma | 1803 | 1773 | 98.4 | 28.4 | 28.5 |
| Certificate III/IV | 1609 | 1586 | 98.6 | 14.6 | 15.0 |
| Other certificate with year 12 | 1547 | 1522 | 98.4 | 10.2 | 10.3 |
| Other certificate no year 12 | 1489 | 1465 | 98.4 | 6.0 | 6.2 |
| No post school qual with year 12 | 1524 | 1499 | 98.4 | 8.5 | 8.6 |
| No post school qual no year 12 | 1404 | 1380 | 98.3 | 0.0 | 0.0 |