

Cost-benefit analysis and returns from additional investment in Vocational Education and Training

This report was prepared for TAFE Directors Australia

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Foreword

I am pleased to present this report, which aims to contribute to the Vocational Education and Training (VET) policy landscape by investigating the contribution that additional investment in VET can make to the Australian economy. We find that there are substantial economic returns available from increasing investment in VET. This is because VET plays an important role in providing skills to the Australian workforce that are in demand by industry. The key benefit takes the form of a boost to the employability of VET students, through higher labour force participation rates, lower unemployment and improved access to full-time jobs. This is true for students who complete part of VET qualifications, such as skill sets, as well as for students who undertake full VET qualifications.

This study has made a number of important innovations, which aim to fill some gaps in our current understanding of the economic returns from the VET system. Previous reports have focussed on the benefits from attaining full qualifications, but give less attention to the benefits from completing modules. In addition, other reports focus on education at a level higher than a student's previous qualification, and have less analysis of the benefits from education at the same or lower level. In contrast, this report takes all of these benefits into account. In addition, the benefits of VET are analysed in terms of the effect on the supply of and demand for a detailed set of occupations, which also means that the effects on different industries can be investigated. Finally, this report estimates the rate of return on investment in VET, which allows comparisons to be made with returns from alternative government priorities.

Technical and Further Education (TAFE) provide most of Australia's VET training. Their network comprises 61 TAFEs, including six dual sector universities with TAFE divisions. We are grateful to TAFE Directors Australia (TDA) for instigating and commissioning this report. In addition, Martin Riordan, CEO, and Martha Kinsman, project officer, shared their invaluable insights into the VET sector with us. I also wish to thank the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE) for funding this work.

While Independent Economics is responsible for any shortcomings of this report, I would like to acknowledge major contributors to the report's development. I thank the Industry Skills Councils, including Innovation and Business Skills Australia, AgriFood Skills Australia and the Transport and Logistics Industry Skills Council, for assisting our investigation of the benefits from skill sets. I would also like to thank the Australian Workplace and Productivity Agency (AWPA), Dr Tom Karmel, the outgoing Managing Director of the National Centre for Vocational Education Research (NCVER) and Professor Glenn Withers of the ANU for their helpful comments on the draft report. I am also grateful to the NCVER and the Australian Bureau of Statistics (ABS) for providing the detailed VET data. Last but not least, I acknowledge the great work of the Independent Economics team for this report including Kelly Neill, Nick Ward and Dinar Prihardini.



Chris Murphy

Director, Independent Economics

August 2013

Key results

Since 2011, national and state governments have committed to increasing their funding of Vocational Education and Training (VET). This report estimates the economy-wide benefits and costs, firstly, of this committed funding increase under the National Agreement on Skills and Workforce Development (NASWD) and, secondly, of a larger expansion of VET funding.

The real annual internal rate of return on additional investment in VET, targeted at Certificate III and above, is estimated at a high 18 per cent¹. This compares to returns on business investment that may be around 9 per cent. Such high returns from VET support the case for further VET funding.

The high returns from additional VET funding reflects a range of benefits and costs. Taking the committed increase in funding under NASWD, which is 5.6 per cent over the five years from 2013 to 2017 (compared to previously foreshadowed funding for the same years under 2011 policy settings), the costs and benefits expressed in 2013 (present value) terms are as follows.

- The total costs are \$7.0 billion. This includes tuition costs of \$2.3 billion, including the contributions from governments, students and businesses. It also includes foregone earnings of \$4.7 billion by students who are studying and therefore less available for work.
- The total benefits are \$20.4 billion. This consists mainly of employability benefits of \$18.4 billion, as workers with VET training are more likely to participate in the workforce, less likely to be unemployed and more likely to work full time than those with no post-school qualification. It also includes productivity benefits of \$2.0 billion because VET training leads to work in more highly-skilled occupations.

Hence, the benefits easily outweigh the costs, yielding a net benefit of \$13.4 billion. On an ongoing basis, key benefits include:

- households are better off by \$0.6 billion per year;
- the workforce is more skilled e.g. employment of Technicians and Trades workers is 0.3 per cent higher than under the baseline scenario;
- there is significant expansion of industries that are relatively dependent on VET skills, including manufacturing, automotive repair and personal services (e.g. hairdressing); and
- in aggregate, real GDP and employment are 0.1 per cent higher.

The further expansion scenario involves a larger 5-year boost to VET funding, of 13.7 per cent rather than 5.6 per cent, resulting in commensurately larger economic impacts. For example, the total net benefit is boosted from \$13.4 billion to \$32.5 billion, and the gain to household living standards per year is boosted from \$0.6 billion to \$1.4 billion.

Graduates who obtain higher level qualifications generate the largest employability and productivity benefits. However, this report builds on previous work by more fully recognising the following.

- There are significant benefits to completing part of a VET qualification, for both employability and productivity. Module completers make up a large proportion of VET students and include students who undertake Skill Sets.
- VET training at a level that is not higher than a student's previous education (re-skilling) can improve employability by helping students to adapt to changing industry needs.

¹ This relates to investment in VET at the Certificate III level and above, because this has been to focus of recent policy.

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List of acronyms

ABS Australian Bureau of Statistics

ANZSCO Australian and New Zealand Standard Classification of Occupations

ANZSIC Australian and New Zealand Standard Industrial Classification

AWPA Australian Workforce and Productivity Agency

CGE Computable General Equilibrium

COAG Council of Australian Governments

DIICCSRTE Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education

ISC Industry Skills Council

IRR Internal Rate of Return

GNP Gross National Product

GDP Gross Domestic Product

FTE Full Time Equivalent

HE Higher Education

HELP Higher Education Loan Program

NASWD National Agreement on Skills and Workforce Development

NCVER National Centre for Vocational Education Research

NP National Partnership Agreement on Skills Reform

NPV Net Present Value

TAFE Technical and Further Education institutes

TDA TAFE Directors Australia

VET Vocational Education and Training

Glossary

CGE model means Computable General Equilibrium model, which is a class of economy-wide model. A CGE model describes the choices of economic agents, including businesses, households, governments and foreigners, using equations based on economic principles. Interactions between agents are mediated in markets where prices adjust to balance demand and supply. Because of the large numbers of parameters in these models relative to the amount of available historical data, the values of these parameters are typically calibrated to a single year rather than estimated econometrically using data for a span of years. The focus is on micro-economic policy analysis. For example, in this report we use the Independent CGE model to answer the question ‘What if more money were spent on VET?’

Current education level refers to the level of a qualification in which a student is enrolled.

Employability refers to the probability that a person would be employed, on a full-time-equivalent basis. It is estimated as total full-time-equivalent employment divided by the total working age population. It is a general measure of employability, encompassing the effects of participation rates, unemployment rates and the likelihood of working on a full time basis.

Field of study describes the broad area of study related to a qualification or subject in which a student is enrolled.

Highest educational attainment level refers to the highest level of education a student had successfully completed.

High Skill Labour refers to occupations comprising of managers and professionals.

Internal rate of return (IRR) is the discount rate that equates the present value of the costs of an investment with the present value of its benefits. It is a measurement of the rate of financial return from an investment.

Labour Productivity refers to output per unit of labour input. **Average** productivity is calculated from total output and total labour input, while **marginal** productivity refers to the additional output from one additional unit of labour input. In general, the marginal productivity of labour is reflected in the before-tax wage. (The circumstances under which this may not be true are discussed in Appendix C.2.)

Low Skill Labour refers to occupations comprising of sales workers, machinery operators and drivers and labourers.

Medium Skill Labour refers to occupations comprising of technicians and trades workers, community and personal service workers, and clerical and administrative workers.

Module refers to a sub-component of a qualification, usually consisting of one or more competency units from nationally endorsed training packages. A **module completer** is a student who has undertaken modules, rather than a full qualification.

NASWD refers to the National Agreement on Skills and Workforce Development, an agreement between the Commonwealth and State and Territory Governments, made in April 2012. It identifies the long-term objectives of the Commonwealth and State and Territory Governments in the areas of skills and workforce development, including for VET education.

Non-accredited formal training refers to training which is structured, delivered in institutions or workplaces, and does not provide individuals with a nationally-recognised outcome, upon completion.

Non-accredited informal training refers to unstructured, non-institutionalised training activities that can be related to work, family, community or leisure and does not provide individuals with a nationally-recognised outcome, upon completion.

SEIFA refers to the Socio-Economic Indexes for Areas, a set of four indexes that summarise different aspects of the socio-economic conditions of people living in an area (postcode). For each index, every geographic area in Australia is given a SEIFA number which shows how relatively 'disadvantaged' that area is compared with other areas in Australia.

SEIFA Index of Economic Resources (IER) is the index chosen in this report to represent the socio-economic status of students. The index measures the economic resources of households within an area. According to the Australian Bureau of Statistics, in this index, “a **low** score indicates a relative lack of access to economic resources in general, for example, an area may have a low score if there are: many households with low income, or many households paying low rent, and few households with high income, or few owned homes. A **high** score indicates relatively greater access to economic resources in general. For example, an area may have a high score if there are: many households with high income, or many owned homes, and few low income households, or few households paying low rent.” www.abs.gov.au.

Skill sets refer to single units of competency or combinations of units of competency from a nationally endorsed Training Package, which link to a licence or regulatory requirement, or to a defined regional or enterprise specific need.

Executive summary

Introduction

Since 2011, national and state governments have committed to significantly increase the number of individuals with qualifications at the Certificate III level and above under the National Agreement on Skills and Workforce Development (NASWD). This report explores two key policy questions.

- *Are there net economic benefits from increasing investment in VET beyond the 2011 policy settings? If so, how large are these benefits?*
- *If there are net benefits, is it better to simply invest in additional VET places, or is it better to also undertake reforms to improve completion rates or the quality of training?*

Independent Economics has been commissioned to undertake this study by TAFE Directors Australia (TDA), under funding from the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCS RTE). As part of this study, Independent Economics has collaborated with three Industry Skills Councils in researching the costs and benefits of ‘skill sets’. For ease of reference, the sections in this executive summary correspond to the sections in the main body of the report, which can be consulted for more detailed information.

Economic drivers of the benefits and costs of VET

To evaluate whether funding for VET should be increased, the benefits of doing so are compared against the costs.

The two main benefits of VET boost the pre-tax earnings of students.

- The most important benefit from VET is improvements in the **employability** of students. Those students are more likely to participate in the workforce, less likely to be unemployed, and more likely to work full-time compared to those with no post-school education.
- VET also improves the **productivity** of students. VET study allows students to work in more highly-skilled occupations which command higher wages.

However, obtaining these benefits involves two main costs.

- VET study involves a **tuition** cost, which is borne by governments, students and businesses.
- Some students also **forego earnings opportunities** because they spend time in training that they could otherwise have spent earning income. Alternatively, their earnings may be reduced by working as an apprentice.

Most studies examining the economy-wide benefits and costs of VET focus on the benefits associated with students who complete a full qualification at a higher level than their previous study – that is, students who are both *graduates* and *up-skillers*. However, VET also benefits two other important types of students – module completers and re-skillers.

Module completers do not graduate with a full qualification but instead complete components of a qualification. This includes, but is not limited to, those undertaking Skill Sets that meet particular licencing or industry needs. According to Industry Skills Councils, skill sets have gained prominence in recent years because employers view them as a more flexible way of meeting their changing requirements than a full qualification, due to their shorter time-frame and lower costs. At present Skill Sets completers are not reported separately from other module completers. In any case, evidence from Karmel and Nguyen (2006) suggests that module completers are expected to generate 50 to 70 per cent of the employability and productivity benefits of graduates, depending on their level of study.

Re-skillers undertake study at the same or lower level than their previously-held qualification. This can benefit students by allowing them to adapt to changing industry needs. Data on outcomes for re-skilling students shows that some of these students benefit through enhanced employability.

By investigating the costs and benefits for module completers and re-skillers in detail, this report builds on previous studies. Other studies, such as a 2012 analysis by the Productivity Commission, take a more narrow approach by devoting most attention to the benefits to students who both up-skill and graduate with a full qualification.

This study also extends previous work by modelling the effect of VET on the supply of and demand for a detailed set of occupations. The effect on employment of 43 different occupations in 120 different industries is modelled. This modelling approach also recognises that industry demand for each occupation is not unlimited.

Internal rate of return on additional VET investment

After taking all of these benefits and costs into account, additional investment in VET is expected to result in significant net economic benefits. The focus is on expanding investment in Certificate III and above, in line with the priorities of the NASWD. The real internal rate of return (IRR)² summarises the net economic benefit to the Australian economy per additional dollar invested in VET. Estimating the IRR allows comparisons to be made with returns from alternative government priorities. To estimate this IRR, benefits generated by all three of the main types of students are included. This has been done in three successive steps in Chart A.

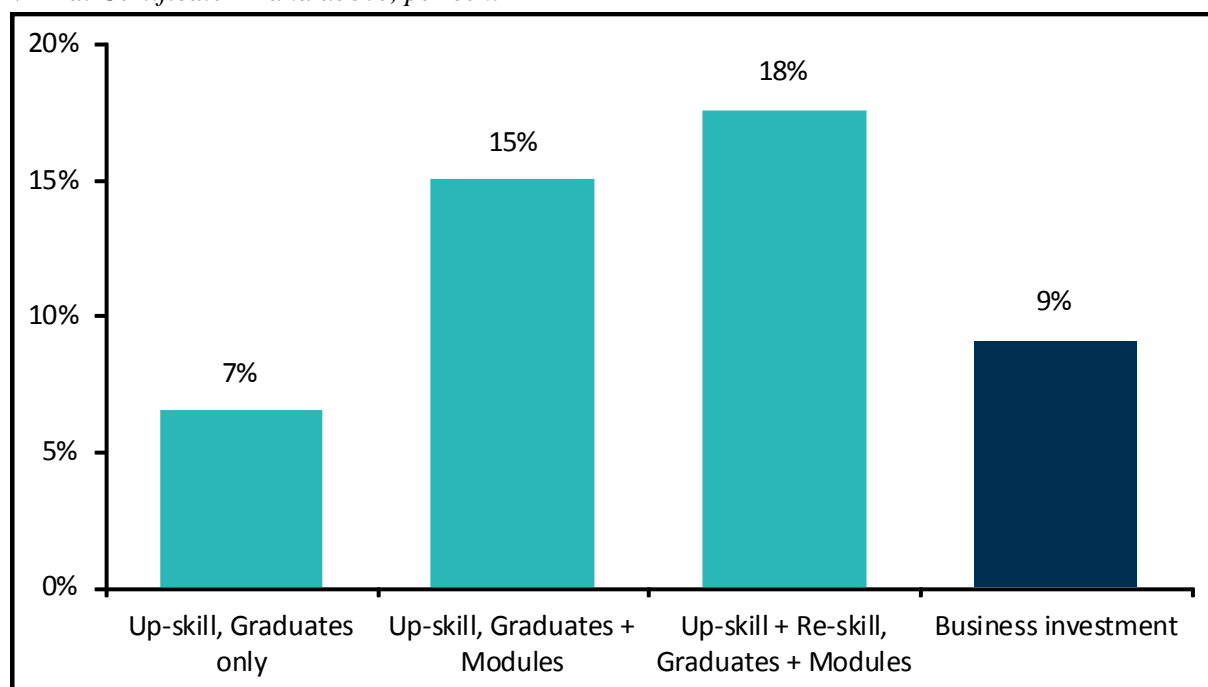
As a first step, the employability and productivity benefits to the 22 per cent of enrolled (Certificate III and above) VET students who both *up-skill and graduate* are taken into account. This results in an estimated IRR of 7 per cent. However, this narrow approach excludes the benefits generated by other groups of VET students, while still allowing for their costs.

Therefore, in a second step, the benefits to the 37 per cent of students who *up-skill and module complete* are added, including students undertaking skill sets or other non-accredited training. This more than doubles the IRR on investment in VET, to 15 per cent.

In the third step, the benefits generated by the 31 per cent of students who *re-skill and either graduate or module complete* are also added to the benefits from students who up-skill. As a result, the estimated IRR is higher again, at 18 per cent. The remaining 10 per cent of students do not complete any modules and are not included in the calculation of benefits.

² Technically, the real Internal Rate of Return is the discount rate that equates the present value of the real costs with the present value of the real benefits.

Chart A: Three cumulative steps in estimating the real internal rate of return (IRR) on investment in VET at Certificate III and above, per cent



Source: Independent Economics estimates using Independent Education Model

Note: *Up-skill, Graduates only* is the estimated IRR when only the benefits from students who complete a full qualification at a higher level than their previous qualification are included.

Up-skill, Graduates + Modules is the estimated IRR when only the benefits from students who complete a full qualification or modules at a higher level than their previous qualification are included.

Up-skill + Re-skill, Graduates + Modules is the estimated IRR when the benefits from students who complete a full qualification or modules at a higher, equivalent or lower level than their previous qualification are included.

This means that when all of the benefits and costs are taken into account, rather than just some, each dollar invested by governments, students or businesses in VET is expected to generate 18 cents of ongoing annual net benefits for the Australian economy.

This IRR is substantial, especially when compared to returns on business investment, which may be around 9 per cent. The high estimated return of 18 per cent indicates that, at 2011 policy settings, there is likely to have been under-investment in VET. This under-investment is likely to have been caused by myopia in potential students and limited access to loans to finance students' investment in VET. Both of these market failures would discourage potential students from undertaking VET study, despite the high returns. These market failures are a reason for government support for VET.

Policy scenarios

This IRR of 18 per cent from additional VET funding reflects a range of benefits and costs that are now quantified in dollar terms. This is done for a range of VET funding scenarios.

- The **baseline scenario** represents the future economic outcomes if government VET policy were unchanged from 2011³.

³ The 2011 policy settings are chosen as the reference point against which to compare the effects of additional funding commitments, because 2011 is the latest year for which funding data is available.

- The **committed funding scenario** represents the economic outcomes if total VET expenditure is higher than the baseline scenario to reflect policy commitments from governments made since 2011 under NASWD. It assumes that private spending increases in line with government VET funding. Overall, this scenario assumes that an additional \$2.7 billion is invested in VET from government and private sources, between 2013 and 2017, compared to what would have been spent at 2011 policy settings.
- The **further expansion scenario** also models economic outcomes under higher VET funding, but in this scenario the expansion in spending is larger at \$6.7 billion rather than \$2.7 billion.

The benefit and costs of additional investment in VET are estimated by comparing outcomes in the two scenarios with higher VET spending to the outcomes in baseline scenario.

Economic impact of higher VET funding

Results for the committed funding scenario are considered first. Compared to the baseline scenario, the committed funding scenario provides for a 5.6 per cent expansion to the VET system, lasting for five years and concentrating on students undertaking Certificate III level or above.

The costs of this additional VET funding are borne over the 5-year period from 2013 to 2017 as additional students are trained, while the benefits develop over the much long timeframe of their working careers. Given these different timeframes, valid comparisons of these costs and benefits need to allow for the time value of money. This can be done by converting the future streams of costs and benefits to present value terms i.e. their total value in 2013.

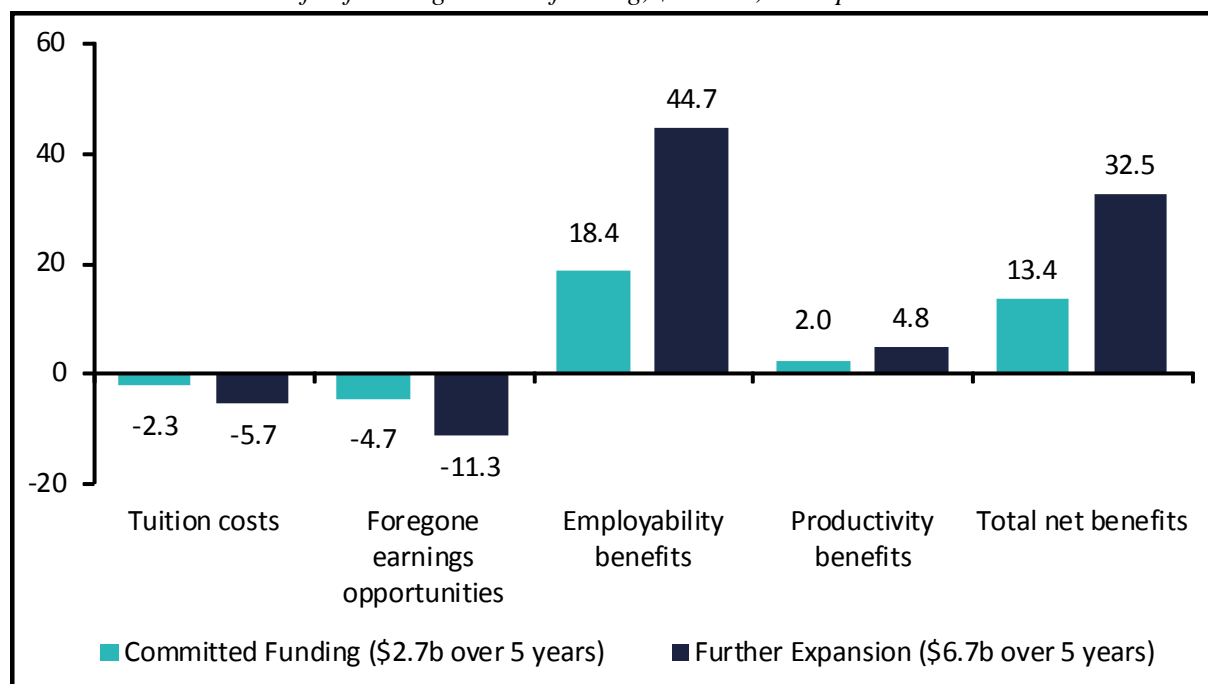
Chart B shows the present value of each cost and benefit for both of the additional funding scenarios. It can be seen that the committed funding scenario involves total costs of \$7.0 billion, made up of tuition costs of \$2.3 billion and foregone earnings opportunities of \$4.7 billion. Tuition costs include all direct costs of tuition, including the contributions from governments, students and businesses. Foregone earnings opportunities refer to the potential earnings that are lost while students are studying and hence are less available for work.

While the total costs of this investment are \$7.0 billion, these are easily outweighed by the total benefits of \$20.4 billion, yielding a net benefit of \$13.4 billion. As seen in Chart B, the total benefits include employability benefits of \$18.4 billion and productivity benefits of \$2.0 billion.

As noted earlier, the employability benefit arises because VET students are more likely to participate in the workforce, less likely to be unemployed, and more likely to work full-time compared to those with no post-school education. The productivity benefit arises because VET study allows students to work in more highly-skilled occupations. The finding of this study that the employability benefits from VET study are larger than the productivity benefits is consistent with other studies.

Of these findings, the most important is that the additional VET funding under the committed funding scenario lifts the net benefit from the VET system by \$13.4 billion, after all future additional benefits and costs are taken into account. The further expansion scenario involves a larger 5-year boost to VET funding, of 13.7 per cent rather than 5.6 per cent, and Chart B shows that the net benefit is commensurately larger at \$32.5 billion.

Chart B: Costs and Benefits from higher VET funding, \$ billion, 2013 present value



Source: Independent Economics estimates using the Independent Education Model

These net benefits are expressed as present values, which are capital amounts. Alternatively, they can be expressed as equivalent annual, ongoing net benefits. On that basis, the annual net benefit from the funding boost under the committed funding scenario is \$0.6 billion per year, while for the larger boost to funding under the further expansion scenario it is \$1.4 billion per year. This annual net benefit takes the form of higher household living standards as measured by real household consumption.

These additions to the numbers of VET students also lead to a significantly more skilled workforce. For example, under the committed funding scenario, employment of Technicians and Trades workers is 0.3 per cent higher than under the baseline scenario, while employment of Labourers is 0.2 per cent lower. This results in significant expansion of industries that are relatively dependent on VET skills. These industries include manufacturing, automotive repair and personal services (e.g. hairdressing). The education and training industry, as the provider of VET services, also receives a significant boost.

The net benefits from VET are also seen at the macro level. The committed funding scenario results in permanent gains to real GDP and employment of 0.1 per cent compared to the baseline scenario.

Economic impact of alternative VET policies to improve completion rates or the quality of training

The net benefits estimated above refer to using additional VET funding to simply expand the current VET system by increasing the number of places (at the Certificate III level and above). If VET places are currently provided on an optimal basis, then the best value for money would be obtained in this manner. On the other hand, to the extent that the VET system has limitations, it may be desirable to direct some of the additional funding to lifting completion rates and/or the quality of tuition.

While policies to **lift completion rates** can be expected to increase the benefits generated by students, they also involve additional costs from students staying in the system longer and being encouraged to do so. Whether it is better to direct some of the additional funds to policies aimed at lifting

completion rates depends on the costs and benefits. For example, Karmel and Fieger (2012) find that, for students who are not employed before study, the benefit from completing a full qualification is significantly larger than the benefits from completing modules. If policies to lift completion rates can be targeted to those students, then it may be better to spend some of the additional funds on such policies. However, firmer, more detailed conclusions require more research to investigate the costs and benefits of module completion relative to those of qualification completion.

Similarly, policies to **improve the quality of VET tuition** can increase the employability and productivity benefits from VET training, but will also involve additional costs per student. Whether it is better to use all of the additional funds to expand VET places or to use some of the additional funds to improve quality depends on the extent to which such quality-oriented funding improves student outcomes. For example, an additional 10 per cent per student spent on improving quality would need to raise the productivity of students by more than 6.5 per cent, or deliver an equivalent gain in employability, to achieve a better outcome than simply increasing the number of student places.

It has been suggested that the quality of VET training provided by private RTOs is variable. However, while there is detailed data available on the public VET system, data on the private VET system is limited, restricting comparisons of the benefits and costs under each system. As a result, a comparison of the quality of the public and private VET systems has not been made.

International students

VET can play a role in increasing the size of the labour force by attracting international students who go on to work in Australia. A 50 per cent increase in the number of international VET students granted work visas upon completing their studies is expected to boost per capita consumption levels.

Policy implications and further research

Significant economic gains are available from investing in additional VET places. These net benefits are generated by graduates, module completers and re-skillers. The large size of these net benefits indicates that, at 2011 policy settings, there is likely to have been under-investment in VET. This may have been caused by market failures, which is a reason for government support for VET. Policies to improve completion rates or training quality should be evaluated by comparing the net benefits of these policies against spending the same funds on expanding VET in its current form.

This study highlights some key areas where further research would contribute to policy development.

- Additional data that separates students who undertake skill sets from other module completers would allow the analysis to be extended to estimate the net benefits of skill sets.
- There is currently limited data available on VET providers that do not receive government funding. This restricts public versus private comparisons of the costs and benefits of VET.
- A more detailed understanding of the costs of module completion, relative to the benefits, is required to fully assess the net benefits of policies aimed at lifting completion rates.
- This report does not analyse the costs and benefits of specific policies to lift completion rates or the quality of training. Similarly, we have not assessed the quality of the Australian VET system against international benchmarks. We leave both of these analyses to future research.

1 Introduction

Vocational education and training (VET) offers an important instrument through which the skills available in Australia's workforce can be improved. Individuals who have completed either a full VET qualification or selected VET courses are more likely to be employed and earn higher wages than their counterparts who have not undertaken any post-school study. VET also plays an important role in re-skilling the workforce, enabling it to be more flexible and responsive to changes in economic conditions. In addition, VET may play a role in increasing the size of the population, by attracting international students to the Australian labour force.

Independent Economics has been commissioned by TAFE Directors Australia (TDA) to conduct a detailed cost-benefit analysis of additional investment in VET. The analysis estimates the incremental economic effects of additional VET funding, including the additional funding already committed by the Commonwealth Government. The report is funded by the Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education (DIICCSRTE).

As part of this project, Independent Economics has collaborated with Industry Skills Councils in researching the costs and benefits of 'skill sets'. Skill sets are sub-components of a VET qualification which link to a licence or regulatory requirement or a defined industry need.

1.1 Purpose and context

In light of VET's economic contribution, governments at the state and national level have made commitments to raise their investment in VET through policy initiatives to support the outcomes and targets of the National Agreement on Skills and Workforce Development (NASWD). The ambitious aspirational targets of the April 2012 NASWD for achievement over the period from 2009 to 2020 include (COAG, 2012):

- halving the proportion of Australians nationally aged 20-64 without a qualification at Certificate III level or above; and
- doubling the number of higher qualification completions (Diploma and Advanced Diploma).

In this context, this report examines the economy-wide benefits and costs of an increase in funding for VET places at the Certificate III level and above. It estimates the *incremental* effect of additional investment in VET, compared to a situation in which government VET policy were unchanged from 2011. Focussing on the effect of additional investment in VET, rather than on the economic contribution of the VET sector as a whole, means that the results from this report can be used to examine two key policy questions.

- *Are there net economic benefits from increasing investment in VET beyond the 2011 policy settings? If so, how large are these benefits?*
- *If there are net benefits, is it better to simply invest in additional VET places, or is it better to also undertake reforms to improve completion rates or the quality of training?*

In April 2012, the Productivity Commission (the Commission) released a report on the impact of Council of Australian Governments (COAG) VET policy initiatives, which support the attainment of NASWD outcomes and targets. The Commission's report provides a good start to understanding the relationship between VET and economic outcomes such as participation and labour productivity.

For this study, Independent Economics has investigated the important features of the Australian VET system and developed a modelling approach which includes a number of innovations compared to previous work.

- First, the Commission's analysis mainly focusses on the benefits of completing full qualifications, and gives only limited consideration to the benefits of completing modules. This study extends the Commission's approach by including detailed estimates of the costs and benefits of completing modules, based on econometric evidence from the NCVER (Karmel and Nguyen 2006).
- Second, the Commission's analysis mainly focusses on students undertaking study at a level higher than their previous education, and includes only limited analysis of the benefits from education at the same or lower level. This study extends the analysis by systematically modelling the benefits of VET study at the same or lower level as an individual's previous education.
- Third, the benefits of VET are analysed by modelling the supply of and demand for a detailed set of occupations. This allows the effects on wages for each occupation, and employment in each industry, to be estimated. This also leads to more robust estimates of impacts on economic activity in each industry.
- Finally, this report includes estimates of the rate of return to investment in VET, which allows comparisons to be made with returns from alternative government priorities.

1.2 Structure of this report

This report is set out as follows.

- **Section 2** considers the key economic drivers of the costs and benefits arising from the VET system. It also describes how these key drivers are incorporated into the modelling approach. This discussion is elaborated on in Appendices C to F.
- **Section 3** presents estimates of the internal rate of return on investment in VET – or the annual benefits per dollar invested.
- **Section 4** describes the policy scenarios considered in this report.
- **Section 5** presents the incremental economic benefits of various VET policy options, including the effect of additional government and private VET spending.
- **Section 6** summarises the policy implications of the findings in this report.

- **Appendix A** lists the occupations included in the modelling, which are based on the 2-digit ANZSIC classification. It also presents data on the occupations demanded by different industries.
- **Appendix B** includes detailed industry results.
- **Appendix C** provides detailed discussion of the economic benefits of VET (outlined in section 2).
- **Appendix D** provides detailed discussion of the costs associated with VET (outlined in section 2).
- **Appendix E** provides detailed discussion of the types of students who benefit from VET, including module completers and re-skillers. It also includes a discussion of the extent of unmet demand for VET.
- **Appendix F** provides a detailed discussion of the Independent Education model used in this report.
- **Appendix G** provides additional detail on non-accredited training, which includes skill sets.

While all care, skill and consideration has been used in the preparation of this report, the findings refer to the terms of reference of *TAFE Directors Australia* and are designed to be used only for the specific purpose set out below. If you believe that your terms of reference are different from those set out below, or you wish to use this report or information contained within it for another purpose, please contact us.

The specific purpose of this report is to estimate the economy-wide costs and benefits of increased VET funding.

The findings in this report are subject to unavoidable statistical variation. While all care has been taken to ensure that the statistical variation is kept to a minimum, care should be taken whenever using this information. This report only takes into account information available to Independent Economics up to the date of this report and so its findings may be affected by new information. The information in this report does not represent advice, whether express or inferred, as to the performance of any investment. Should you require clarification of any material, please contact us.

2 Economic drivers of the benefits and costs of VET

To determine the net economic benefit of investing additional funds in VET, both the benefits and costs of the additional investment are considered. This section focusses on identifying these economic drivers and assessing their relative importance for students studying in VET at the Certificate III level or above. This assessment is then used to inform the modelling approach used in the remainder of this report.

This section first identifies the main benefits of additional investment in VET, and considers evidence on the size of these benefits. Next, it identifies the main costs and the size of these costs.

In a significant improvement compared to other studies, this section then examines the types of students who benefit from VET education. Most comparable studies focus mainly on the economic benefits generated by students who complete a full VET qualification at a higher level than their previous education. However, this report extends this approach by also considering the benefits to students who partially complete a qualification and to students who are studying at a level lower than, or equal to, their previous education.

Having identified the main factors driving the benefits and costs of VET, this section then outlines the effects which are included in the modelling approach used in this report. This includes a discussion of the innovations developed for this report.

Appendices C to F include more detail on how each of the benefits and costs are estimated and modelled.

2.1 Economic benefits of VET

The direct economic benefits of investment in education, including VET, take four main forms:

1. higher employability;
2. higher labour productivity;
3. a larger population, through attracting international students; and
4. other benefits, including external benefits and pathways to higher education.

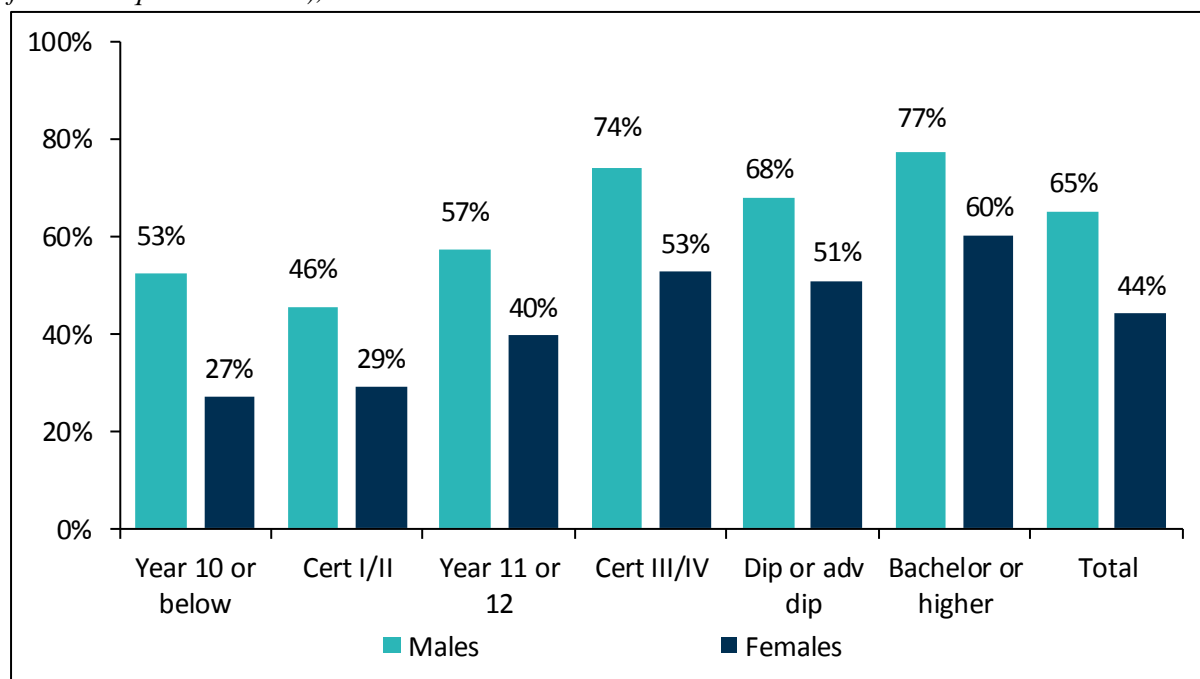
This section considers each of these benefits in turn.

2.1.1 Employability

A variety of evidence shows that one of the most important benefits of VET is to increase the employability of its students. Those with a VET qualification are more likely to participate in the labour force compared to their counterparts with no post-school qualification. They are also less likely to be unemployed and more likely to work full-time rather than part time. In this report, the term ‘employability’ is used to capture these three effects. Specifically, ‘employability’ refers to full-time equivalent employment rates among people aged from 15 to 64.

Chart 2.1 below shows employability for groups with different levels of education, as measured by the proportion of each group that is employed. To incorporate the contribution to employability of working full time rather than part time, the employment data used is on a full time equivalent (FTE) basis.

Chart 2.1 Employability by level of education (population 15-64 not at school, per cent employed on a full-time equivalent basis), 2009



Source: ABS, Education and Training Experience, 2009

The chart suggests that, for males and females, VET qualifications increase employability. More specifically, it shows that, for both genders, those whose highest level of attainment is a Certificate III/IV or Diploma/Advanced Diploma have higher employability than those with lower levels of education.

Some studies use econometric analysis to estimate the incremental effects on employability from a VET qualification. Some results from these studies are summarised in Table 2.1. One limitation of these other studies is that they use a narrower definition of employability. Their definition takes into account the benefits (from education) on the probability of being employed, but not on the probability of holding a full-time job rather than a part-time job. They are therefore likely to understate the employability benefits from education. Hence, it is unsurprising that the employability benefits from VET in Table 2.1 are lower than those implied by Chart 2.1.

Nonetheless, Table 2.1 does show that VET qualifications add significantly to the probability of being employed. For example, for male students who have previously completed year 12, going on to complete a Certificate III/IV is expected to increase their probability of being employed by 9 per cent⁴. According to ABS data, males with year 11 or 12 as their highest level of attainment have a 65 per cent probability of being employed, either full-time or part-time⁵. Therefore, obtaining a

⁴ Note that this is a per cent increase, not a percentage point increase.

⁵ Note that this is not comparable to the data in Chart 2.1, because Chart 2.1 is on a full-time equivalent basis.

Certificate III/IV is expected to raise this probability to 71 per cent. For females, the impact is even larger. Appendix C discusses the employability benefits of VET in more detail.

Table 2.1 Impact of VET on probability of employment, per cent

	Females	Males
Relative to year 11 or 12		
Certificate III/IV	13%	9%
Diploma / Adv Diploma	7%	5%
Relative to year 10 or lower		
Certificate III/IV	36%	23%
Diploma / Adv Diploma	32%	21%

Source: Karmel and Nguyen (2006), Breuch and Gray (2004), ABS and Independent Economics calculations

Note: These effects refer to per cent impacts, rather than percentage point impacts.

These estimates have been adjusted downward by 10 per cent to take into account the potential for ‘ability bias’ to lead to an overestimate of the effect of VET education on wages. This is discussed in detail in Appendix F.

The employability benefits discussed above refer to students who complete a full VET qualification. However, as discussed later in section 2.3, students who complete sub-components of a full qualification (or modules) are also expected to gain employability benefits. In addition, data shows that students who study at the same (or lower) level than their previous qualification can also obtain employability benefits.

2.1.2 Labour Productivity

In addition to the employability benefits discussed in the previous section, there is also evidence of productivity benefits from VET. Individuals with VET qualifications tend to receive higher wages than their counterparts with lower levels of education. This ‘wage premium’ can be used to indicate the productivity benefit from VET, as explained in Appendix C.2.

Table 2.2 summarises the results from a number of studies estimating the wage premium associated with VET education. It shows that individuals with a Certificate III or higher are expected to be more productive and earn higher wages than those with year 12 or lower.

Table 2.2 Impact of VET on productivity and wages, per cent

	Females	Males
Relative to year 11 or 12		
Certificate III/IV	1%	1%
Diploma / Adv Diploma	10%	12%
Relative to year 10 or lower		
Certificate III/IV	6%	8%
Diploma / Adv Diploma	15%	19%

Source: Leigh (2008), Karmel and Nguyen (2006), Lee and Coelli (2010), Independent Economics calculations

Note: These estimates have been adjusted downward by 10 per cent to take into account the potential for ‘ability bias’ to lead to an overestimate of the effect of VET education on wages. This is discussed in detail in Appendix F.

For example, a female who had previously completed year 12 is expected to be 10 per cent more productive if she goes on to complete a Diploma. As a result, she is expected to earn a 10 per cent higher wage than if she had not undertaken the Diploma.

Table 2.2 shows that while the productivity benefits are substantial for Diplomas and Advanced Diplomas, they are less important for Certificate III/IV, particularly for students who already have year 11 or 12.

Comparing the labour productivity and employability benefits from VET shows that:

- for students at the Certificate III/IV level, employability is the main benefit from VET education; and
- for students studying at the Diploma/Advanced Diploma level, both the employability and productivity benefits are substantial.

2.1.3 Population

VET can contribute to population growth in Australia by attracting international students who, upon completing their studies, may go on to join the Australian labour force. While an expansion in the labour force may be expected to lead to a larger economy, it is not necessarily the case that this will raise living standards. To assess whether living standards are raised, the benefits should be judged on a per capita basis.

A number of studies have examined the impact of skilled migration on the Australian economy and found that it can generate net economic benefits.

- A study conducted by Independent Economics (then trading as Econtech) in 2006 estimated that a 50 per cent increase in skilled migration to Australia would boost per capita consumption by 1.1 per cent in the long run.

- In addition, a 2006 study by the Productivity Commission concluded that a 50 per cent increase in skilled migration would raise per capita Gross National Product (GNP) by 0.6 per cent.

When international VET students are granted visas to work in Australia following the completion of their studies, this may boost the skill level of the Australian labour force and carry economic benefits. Compared to domestic VET students, international students tend to undertake higher qualification levels and tend to be younger. These two factors mean that international VET students have a greater earnings potential than domestic VET students.

International VET students, including trends in the number of students and visas granted, are discussed in more detail in Appendix C.

2.1.4 External benefits from VET

The previous sections have discussed the returns to VET education that can be most readily measured – including effects on employability, productivity and population. There is also a body of literature which considers whether higher levels of education may also lead to additional *external* benefits, which are benefits accruing to society as a whole. Some examples of these are below.

- There may be spill-over productivity benefits associated with a more educated workforce. For example, workers with higher education may pass some of their knowledge and skills on to workers with lower levels of education.
- There may be health benefits associated with higher levels of education. For example, adults with post-school education may be less likely to smoke or less likely to be obese compared with those with no post-school qualifications.
- There may be improved social outcomes from higher levels of education, such as improved levels of tolerance, crime and social cohesion.

Overall, the evidence supporting the existence of these external returns from VET is limited and mixed. In addition, the studies which have been able to identify and quantify the above-mentioned benefits indicate that external benefits are likely to be more important for university than for VET. These studies are discussed in more detail in Appendix C.

2.1.5 Pathways to higher education

An additional benefit of VET education is its role as a pathway to higher education, by allowing students to gain admission to the higher education system. Out of the 336,000 domestic students commencing higher education qualifications in 2010, around 30,000, or 9 per cent, had previously undertaken VET courses (NCVER, 2012). This indicates that VET may be an important pathway to higher education. For these students, part of the benefits of their post school education can be attributed to VET, and part can be attributed to higher education.

2.2 Economic costs of VET

The previous section discussed the economic benefits associated with VET. To determine whether additional investment in VET is worthwhile, the benefits need to be weighed against the costs. Therefore, this report assesses the costs from an economy-wide perspective, including the costs borne by students, governments and businesses. The size of the costs of VET study depends on the level of study and how long each student remains in the VET system. The main costs are:

1. direct tuition costs; and
2. foregone earnings opportunities.

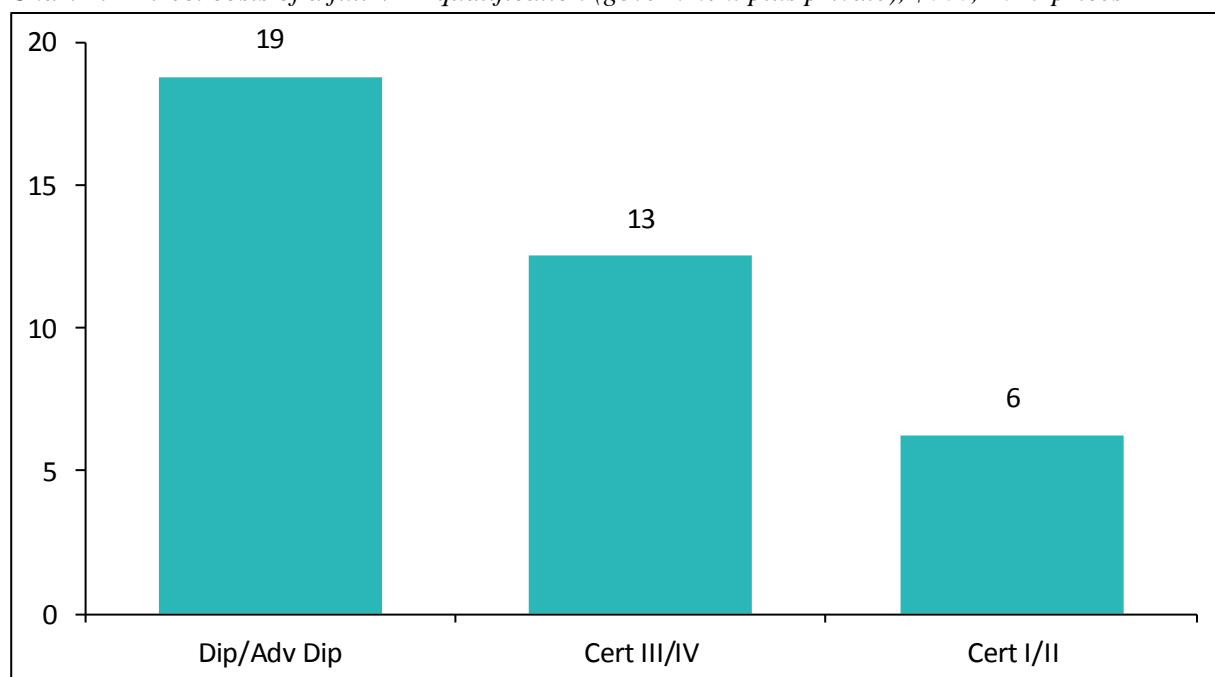
Both of these costs are considered below. Appendix D discusses the estimation of these costs in more detail.

Importantly, only true economic costs are taken into account in this report. These costs involve payments by governments, students and businesses in exchange for VET education. Living expenses, such as rent and food are not considered to be a cost of VET, because living expenses are incurred irrespective of whether an individual is studying. Likewise, assistance payments to VET students, such as Austudy and Youth Allowance, are transfers between individuals and do not represent a net economic cost – the cost borne by taxpayers is offset by the benefits to students receiving the transfer.

2.2.1 Direct tuition costs

Governments bear part of the direct cost of VET tuition through their provision of funds to the VET sector. In addition, students and businesses also bear part of the cost through their payment of fees. The estimated total direct tuition cost borne by these three parties for each qualification is shown in Chart 2.2. As expected, the more time required to complete a qualification, the more costly it is.

Chart 2.2 Direct costs of a full VET qualification (government plus private), \$000, 2013 prices



Source: Independent Economics estimate based on NCVER data

2.2.2 Foregone earnings opportunities

By spending time in VET, students forego time that they otherwise could have spent earning income. The cost of this foregone earnings opportunity will be different for each individual, depending on the wage that they otherwise could have earned.

- A student who otherwise could have worked during the time that they spend in VET foregoes the earnings that they would have earned. For example, a student may have to work part-time rather than full-time in order to accommodate their studies. The value of the lost earnings opportunity depends on the occupation that they would have held.
- A student who is employed as an apprentice foregoes earnings because they are paid only a proportion of the wage of a fully-qualified worker. If they had not worked as an apprentice, they may have been employed in another occupation which commanded a higher wage.
- A student who would not otherwise have been employed during the time that they spend in VET is not considered to incur a cost in terms of foregone earnings opportunities.

This is discussed further in Appendix D.

2.3 Groups benefiting from VET

Most studies examining the benefits of education focus on individuals who graduate with a full qualification. They also implicitly assume that benefits can only be gained from undertaking study at a level higher than the individual's previous study. Indeed, data is more readily available for this kind of analysis.

However, in VET, a large proportion of students do not complete a full qualification. As discussed later in this section, there is evidence to show that these students still generate some benefits from their VET education. Therefore, this report considers how the benefits and costs of VET differ depending on the proportion of a course that is completed.

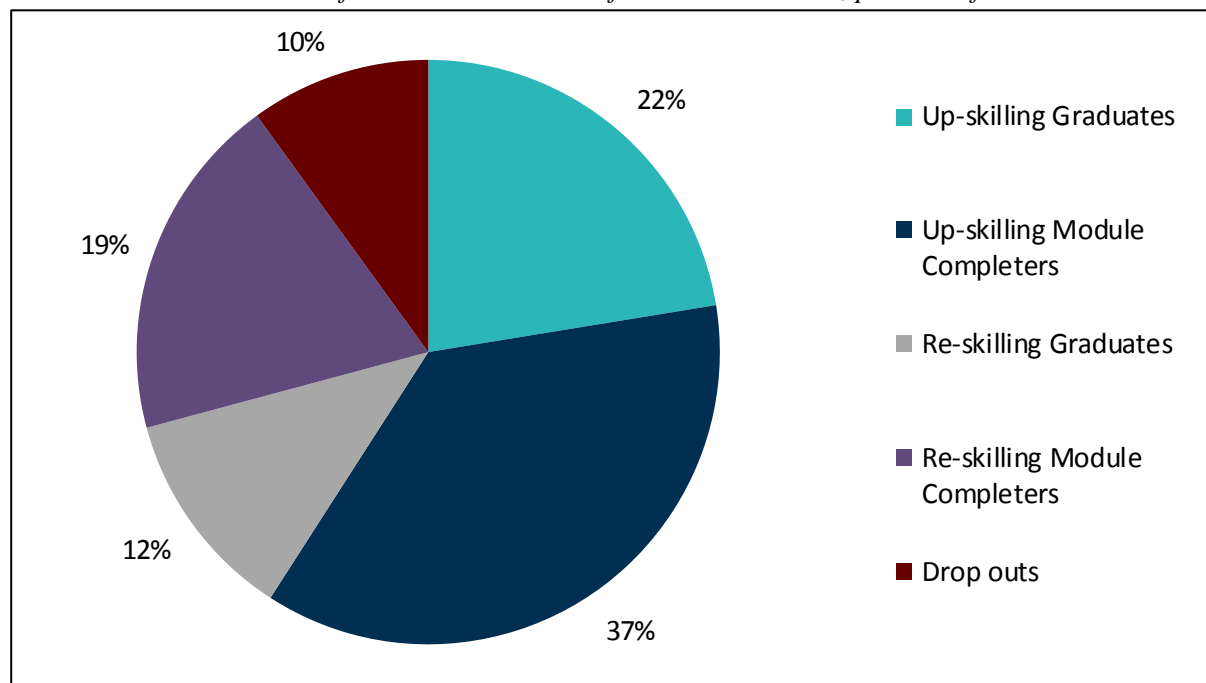
- *Graduates* are students who complete a full qualification.
- *Module completers* are students who do not graduate with a full qualification but instead complete components of a qualification (modules).
- *Drop-outs* are students who commence but do not complete any modules.

In addition, many VET students study at the same or lower level than the qualification that they already hold. Therefore, this report explicitly considers how the benefits of VET depend on a student's previous education.

- *Up-skillers* are students who undertake study at a higher level than their previously-held qualification.
- *Re-skillers* are students who undertake study at the same or lower level than their previously-held qualification.

As mentioned, many other studies focus on the benefits of VET associated with students who are both graduates and up-skillers. However, as shown in Chart 2.3, this represents only represent 22 per cent of VET students.

Chart 2.3: Characteristics of VET students at Certificate III and above, per cent of total students



Source: Independent Education Model

Note: The chart refers to results from the modelling undertaken for this report, rather than raw data.

In fact, up-skilling students who are module completers make up the largest proportion of VET students, at 37 per cent. In addition, re-skillers who either graduate or module-complete make up 31 per cent of total students.

Therefore, it is important to carefully consider the benefits and costs associated with module completion and re-skilling. Evidence from the econometric literature and recent data shows that these types of students are expected to generate employability and productivity benefits. To avoid understating the net benefits from investing in VET, the benefits and costs generated by these students are taken into account. These benefits and costs are discussed below.

2.3.1 Benefits and costs of module completion

As discussed above, a large proportion of VET students do not complete full qualifications. An important reason for this is that a full qualification may not be required for a student's chosen occupation. Instead, students may only need to complete modules to achieve their desired outcome. For example, 'skill sets' are groupings of modules, often developed by Industry Skills Councils, which are designed to meet particular industry or licencing needs. Skill sets are discussed briefly below, and in more detail in Appendix G.

While there is limited data that can be used to estimate the benefits of skill sets, the benefits of module completion more broadly can be estimated. A number of studies provide evidence of the extent of the benefits from module completion. These benefits are taken into account in this report, which is an important improvement on previous work in the area.

Skill sets

Within the group of module completers are individuals completing skill sets. Skill sets are single units of competency or combinations of units of competency from a nationally endorsed Training Package. Skill sets are not qualifications, but are a way of identifying logical groupings of units of competency to meet an identified learning outcome. They link to a licence or regulatory requirement, or a defined industry need, and are often designed by Industry Skills Councils.

Independent Economics conducted detailed interviews with representatives of three Industry Skills Councils (ISC): Innovation and Business Skills Australia (IBSA); AgriFood Skills Australia and Transport and Logistics Industry Skills Council (TLISC). The interviews were used to investigate the costs and benefits of industry-specific non-accredited training, such as skill sets.

Skill sets have gained prominence in the last few years because employers view them as a more flexible way of meeting changing industry requirements, due to their shorter time-frame and lower costs.

- Skill sets can provide an individual with enough competencies to gain a licence to work in a specific job.
- Employers are more willing to provide training when it is specific to the requirements of their business or industry. The narrower scope of skill sets can help businesses to avoid training workers in skills that may make them more attractive to other competing employers or industries.
- Skill sets provide experienced workers with a more flexible way to update their skills compared to a full qualification.

Recently, Mills et al. (2012) conducted a study of students who had participated in skill sets training. The work found that the primary reasons for undertaking skill sets were licencing and regulatory requirements, upgrading skills and gaining knowledge of an emerging area. These findings are consistent with the interviews Independent Economics held with ISC representatives.

Currently, there is little quantitative research into the benefits of skill sets. One reason for this is a lack of specific data which separately identifies how many people have enrolled in and completed skill sets. Therefore, it has not been possible to quantify the economic costs and benefits associated with skill sets or other industry-specific non-accredited training.

Although the benefits of skill sets cannot be separately identified, they are included in the modelling in this report. This is because individuals who complete skill sets have completed modules within the VET system. Therefore, because this report explicitly takes into account the benefits and costs for module completers, it also includes the benefits and costs for skill sets. The benefits and costs of module completion are discussed below.

Benefits of module completion

A 2006 study by Karmel and Nguyen has shown that, at least for some individuals, there are benefits from completing modules in terms of higher wages. Broadly, they find that students receive productivity and wage benefits from module completion if the module is at a higher level than the student's previous level of education.

The estimates undertaken by Karmel and Nguyen (2006) allow an interesting comparison between students who complete modules and student who complete a full qualification. Specifically:

- module completers at the Certificate IV level or higher are expected to generate wage benefits that are between 60 and 80 per cent as large as the benefits generated by graduates; and
- module completers at the Certificate III level are expected to generate wage benefits that are between 40 and 60 per cent as large as the benefits generated by graduates.

More recent work by Karmel and Fieger (2012) also provides evidence of the benefits accruing to module completers compared to graduates, including employability benefits in addition to wage benefits. They find that, on average, the full-time wage earned by a module completer is well over 90 per cent of the full time wage earned by a graduate. In addition, the probability that module completers are employed is 82 per cent of the probability for graduates.

In the final version of their 2012 report, the Productivity Commission also considered the employability and productivity benefits of completing modules. However, their analysis is based on a number of assumptions that can be improved. Compared to the evidence discussed above, the Productivity Commission underestimates the productivity and employment benefits for module completers.

This evidence supporting the benefits of module completion is discussed in more detail in Appendix E.

Costs of module completion

To estimate the net benefits from completing modules, an estimate of the cost of module completion is also required. As discussed in section 2.2, these costs include direct tuition costs, borne by the government, students and businesses, as well as foregone earnings opportunities, borne by students. However, there is limited information on the costs of module completion compared to a full qualification. Therefore, this report makes a neutral assumption that both the benefits and the costs of VET study depend on the proportion of the full qualification undertaken. This is discussed further in section 2.6.

2.3.2 Benefits and costs of re-skilling

An additional feature of the Australian VET system is the large proportion of students who study at a level equal to, or lower than, their previous level of education. Rather than up-skilling, these individuals can be thought of as *re-skilling*. This section discusses the economic benefits and costs that arise from VET's role in re-skilling the labour force. Investigating and explicitly including these benefits represents an important improvement compared to previous studies.

Benefits of re-skilling

Karmel and Nguyen (2006) discuss the motivations for individuals to study at a level at or below the qualification they already hold, considering two seemingly conflicting pieces of evidence.

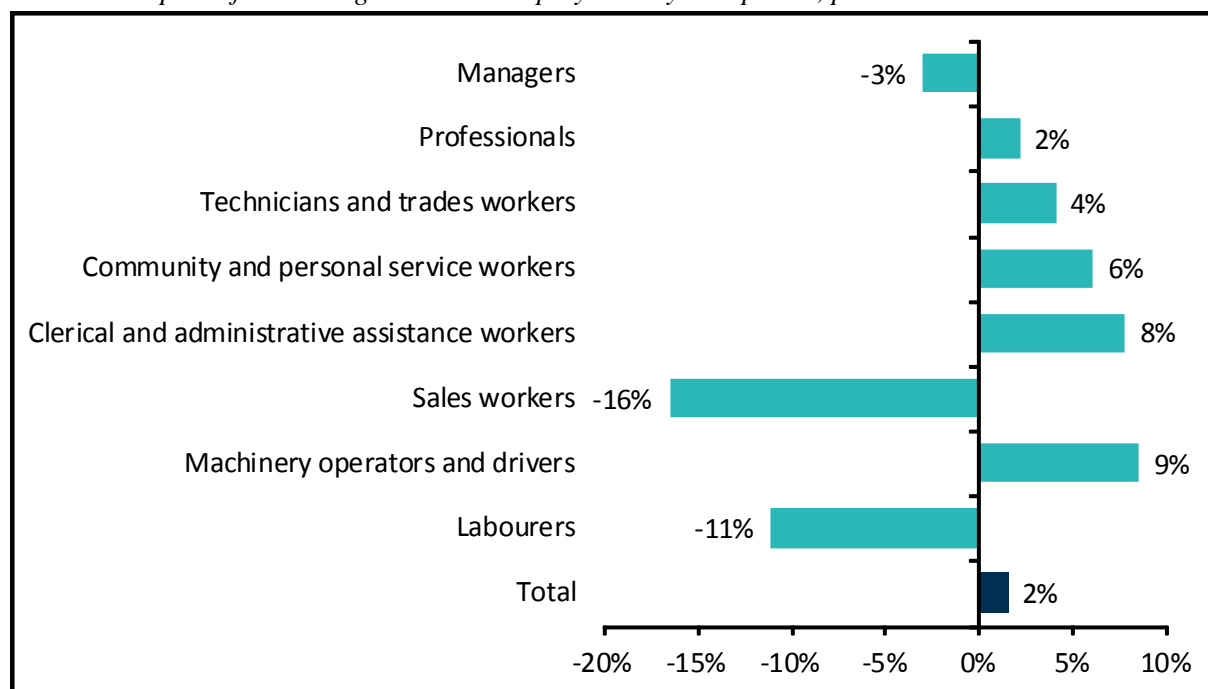
- Generally, econometric estimates indicate that there are no wage benefits from undertaking VET study at a level the same or lower than previous education.
- On the other hand, many students who are undertaking study at the same or lower level report that they are doing so for employment-related reasons.

Karmel and Nguyen (2006) reconcile these two pieces of information by recognising VET's role in re-skilling the labour force. For example, a university graduate may have undertaken a "poor or unmarketable degree (performing art, say)" (Karmel and Nguyen 2006, p24) and be unable to find employment. Undertaking a VET course may then allow them to obtain more marketable skills and improve their employment prospects. Although this would lead to a lower wage than would have been expected with a bachelor degree on average, the particular individual may benefit from study at a lower level because they may then be able to supply skills that are in higher demand.

Skills Australia (2011) emphasises the role of VET in re-skilling the labour force and allowing it to adapt to changing industry demands. For example, Skills Australia notes that "vocational education and training will also be expected to equip the workers of the future with the capability to adapt continuously and engage in learning throughout their working lives" (Skills Australia, 2011, p110). They also recognise that re-skilling can potentially help to address skills shortages.

The idea that there are benefits from re-skilling is supported by data on individuals who have undertaken study at the same or lower level than their previous attainment. Chart 2.4 below compares employment patterns before and after re-skilling, for the group of VET students who completed their re-skilling in 2011. For the re-skillers shown in Chart 2.4, an additional 2 per cent were employed after re-skilling than before. Some individuals also moved from low-skilled occupations to higher-skilled occupations. Fewer students were working as labourers or sales workers after re-skilling and more were working in higher-skilled occupations.

Chart 2.4 Impact of re-skilling in VET on employment by occupation, per cent



Source: NCVER student outcomes survey, 2011, unpublished data

Costs of re-skilling

The costs for re-skillers are assumed to be the same as the costs for up-skillers. As discussed in section 2.2, these costs include the direct costs of tuition, which are borne by governments, students and businesses, as well as the costs of foregone earnings, which are borne by students. Like up-skillers, re-skillers can graduate, module complete or drop out, and the total cost depends on the proportion of the full qualification that is undertaken.

2.3.3 Socio-economic groups

A 2007 study by Foley indicates that students living in low socio-economic areas have high participation in VET. VET participation is highest in low socio-economic areas, where 12 per cent of the population participate in VET. This compares to an average of 8.7 per cent for high socio-economic areas and 10.8 per cent for Australia as a whole. Students from low socio-economic areas are over-represented in the VET sector, and these students tend to undertake lower-level courses. Interestingly, the study also found that VET students from lower socio-economic areas have better-than-average completion rates, although no reason was given for this result.

Karmel and Lim (2013) also find that low SES students have high participation rates on lower level VET qualifications. They interpret this as meaning that VET is “providing what might be described as preparatory or remedial courses” for these students. They also find that, medium and low SES groups have very similar participation rates in certificates III/IV and diplomas. High SES students have high participation rates in diplomas, but low participation rates in other VET qualifications.

Therefore, a policy’s effect on low SES students will depend on the level of study at which it is aimed. The government targets under NASWD are aimed at increasing the number of individuals with qualifications at the Certificate III level or above. Increasing the number of places available for

Certificate III/IV may be more likely to benefit medium and low SES groups. On the other hand, increasing the number of places available at the Diploma level or higher may have a larger benefit for high SES groups. This is discussed further in Appendix E.

2.4 Unmet demand for VET

For additional spending on VET to yield any net benefits, the additional places must first be taken up by new students. If there is no student demand for additional VET places, then even if the government offers additional funding, there would be no additional enrolments, and therefore no additional costs or benefits. Similarly, once the additional students complete their studies, there must be industry demand for their new skills in order for any benefits to be generated. These two issues are addressed in this section, and discussed in more detail in Appendix E.

ABS data suggests that there is unmet student demand for VET places. In both 2008 and 2007, around 40,000 students applied to commence VET, but were unable to gain a place. If these students had been able to gain a place, then commencements for these years would have been around 16 per cent higher than was the case. Since that time, the number of students who applied for VET study but were unable to gain a place has remained stable⁶.

In addition, there are a number of studies which indicate that industry demand for VET skills is not met by the current availability of these skills.

The Australian Workforce and Productivity Agency (AWPA) calls for additional VET spending, from public and private sources, in their 2013 report. The report notes that, under the National Partnership Agreement on Skills Reform (NP), targets were set to increase completions compared to a 2008/09 baseline by 375,000 nationally between 2012 and 2017. This represents a 3.7 per cent average annual growth in completions over that period. AWPA concludes that these additional completions would not be sufficient to satisfy projected industry demand in two out of its three most realistic scenarios.

However, as shown in section 5, the additional VET funding examined in this report results in fewer graduations than is targeted by the NP. Thus, the skills acquired by the additional VET students modelled in this report are unlikely to exhaust the unmet demand for those skills.

In addition, a forthcoming study by Karmel concludes that, while the supply of workers with post-school education has increased dramatically, demand for higher qualifications is increasing in line with supply. Specifically, the study finds that, between 1997 and 2009:

- industry demand shifted towards workers with higher level qualifications, including diplomas; and
- industry demand shifted towards workers with a certificate III/IV (although, in the case of males, this is only true for workers who had also completed year 12).

Overall, Karmel concludes: “at an aggregate level, the evidence in this paper indicates fairly strongly that, at least up to 2009, we do not have too many graduates” (Karmel, forthcoming, p14).

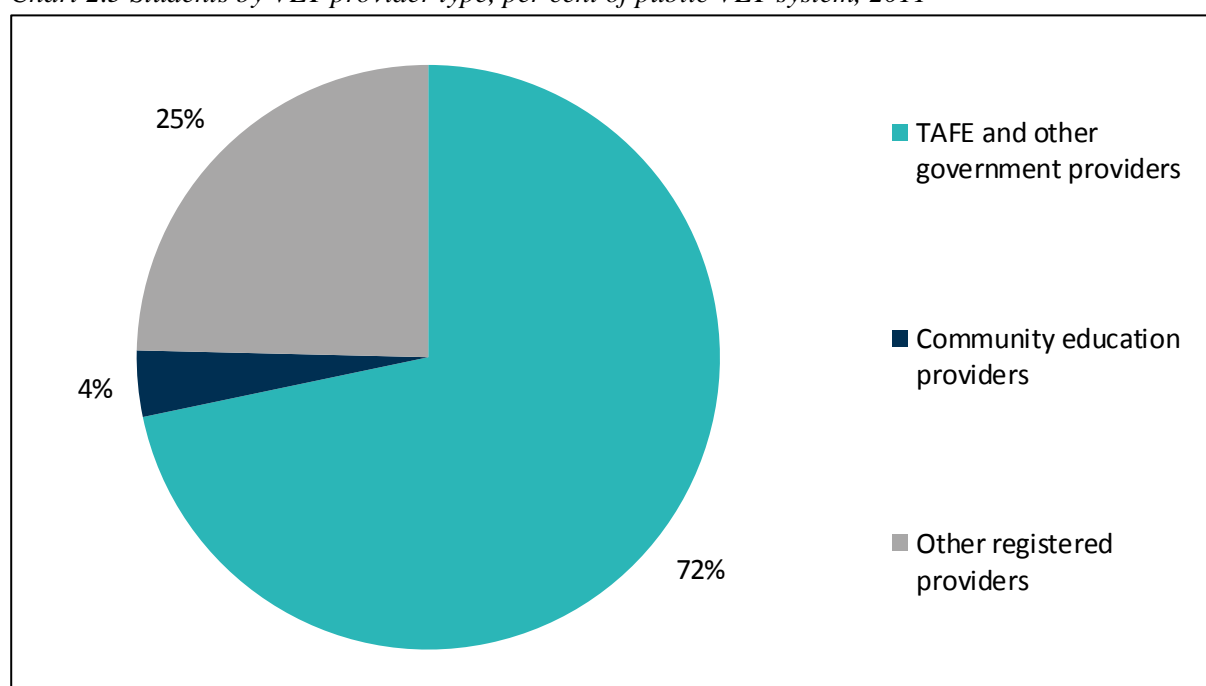
⁶ However, ABS commencements data is not available later than 2008, which means that the rate of unmet demand cannot be estimated.

2.5 VET providers

The Australian VET sector encompasses a broad range of providers. This includes both government and private institutions. According to the ABS (2012), Technical and Further Education (TAFE) institutes provide the majority of VET services in Australia. Although there are a large number of private providers, TAFE colleges tend to be larger, multi-purpose institutions, catering for larger numbers of students.

The 'public VET system' comprises both government and private VET providers who receive some government funding. Detailed data is available for the public VET system. As shown in Chart 2.5 below, TAFE and other government providers accounted for 72 per cent of all VET students in the public VET system in 2011. On the other hand, private providers accounted for 25 per cent of students.

Chart 2.5 Students by VET provider type, per cent of public VET system, 2011



Source: NCVER, Students and Courses

Note: The number of students is measured in Full Year Training Equivalents

This data only includes VET providers that receive some government funding.

This report examines the economic benefits and costs from higher investment in VET as a whole. As the number of VET places is expanded, this report does not make any distinction based on whether these places are provided by public or private VET institutions. This is discussed further in section 2.6 below.

2.6 Benefits and costs included in the modelling approach

This report models the economy-wide benefits and costs from additional investment in VET. The modelling takes into account the main benefits and costs that have been discussed above.

2.6.1 Modelling the benefits of investment in VET

As discussed above, the main benefits from additional investment in VET education are improved employability and productivity outcomes for students. In turn, these two benefits raise the before-tax earning capacity of students and the productive capacity of the economy. The modelling in this report takes both the employability and labour productivity benefits of VET into account.

Most studies estimating the economy-wide effects of education use external estimates of the employability and labour productivity benefits of VET, and impose these benefits on the students who complete their study.

In contrast, this study adopts a more structural approach to capturing the employability and productivity benefits from the changes in educational attainment resulting from additional investment in VET. A detailed analysis is performed of employability for different levels of educational attainment and how the supply of labour according to educational attainment translates into the supply of labour according to occupation. Both the employability and productivity benefits from additional investment in VET are then introduced to our economy-wide model as changes to labour supply in the model's occupations.

The benefits of VET are then analysed through fully-integrated modelling of the supply of and demand for a detailed set of occupations, which realistically reflects the workings of the labour market.

- Additional VET education impacts on the supply of certain occupations – for example, it allows some students to become ‘construction trades workers’ rather than ‘food preparation assistants’. In this report, each student’s change in occupation is estimated based on their age, gender and level of education. In this way, the effect of additional investment in VET on the supply of a detailed set of 43 different occupations (at the ANZSIC 2 digit level) is estimated.
- An increased supply of skilled occupations is only beneficial to the extent that industries demand those occupations. Therefore, demand for the 43 different occupations is modelled for 120 different industries. This demand depends on the occupations that tend to be employed in each industry (according to data). It also recognises that industry demand for each occupation is not unlimited, but depends on the wage.

The focus on the supply of and demand for occupations allows the impact of higher VET funding to be estimated for a detailed set of industries. It also means that as increased investment in VET boosts the supply of certain skills, the wage for these skills is likely to be lower than otherwise. In this way, the modelling is realistic and explicitly models the effects that other studies impose externally.

However, there are two other potential benefits from investment in VET which are not taken into account in this report. As such, the estimates may be considered conservative.

Section 2.1.4 discussed the potential for spill-over productivity benefits and health benefits from VET. However, as discussed, evidence on the size of these benefits is inconclusive, particularly for VET. Therefore, we exclude these external benefits from our analysis. In other words, the analysis in this report assumes that the full benefits from VET education are related to the higher employability and productivity of the students themselves.

Section 2.1.5 discussed the benefits of VET as a pathway to higher education. For students using VET as a pathway, part of the overall productivity and employability benefits from their post-school education can be attributed to VET and part can be attributed to higher education. To avoid overstating the benefits of VET, this report takes into account only the component that can be directly attributed to VET. This is the employability and productivity benefits that the student would have gained from their VET education, if they had not continued to higher education. This may be a conservative estimate of the contribution of VET to the student's before tax earnings if the student otherwise would not have been able to attend university without first undertaking VET education.

2.6.2 Modelling the costs of investment in VET

As discussed in section 2.2.1, the direct tuition cost for each VET qualification is the average total tuition cost borne by governments, students and businesses. They depend on the average total cost of VET tuition per hour and the number of hours spent in training for each qualification. These direct tuition costs are modelled as additional expenditure on VET education by the government and the private sector.

As discussed in section 2.2.2, some students forego earnings opportunities by spending time in VET training. The value of the foregone earnings opportunities depends on the wage that they could otherwise have earned and the proportion of a normal working week spent in VET. Importantly, the wage that they could have earned depends on the type of occupation that they would have held if they were not studying. The foregone earnings opportunities are estimated by modelling the reduction in employment and leisure time as a result of the additional time spent in VET.

Importantly, only true economic costs are taken into account. In particular, living expenses are not included because these costs would have been incurred regardless of whether the individual is studying. In addition, assistance payments to VET students are not included because the costs of these transfers to taxpayers are assumed to be offset by the benefits to students.

2.6.3 Taking into account module completers and re-skillers

This report makes an important contribution to understanding VET's contribution to the Australian economy by paying special attention to the benefits and costs associated with module completion and re-skilling. These benefits and costs were identified and quantified in section 2.3 above.

This report makes use of the results in Karmel and Nguyen (2006) to model the employability and productivity benefits of module completions. The benefits of module completion can be considered to reflect the proportion of the modules in the course that have been completed. Under this approach, wherever there is a benefit from completing a qualification, there will also be a benefit from partially completing it, although the benefit will be proportionately smaller.

In the modelling for this report, we have assumed the following, based on the results from Karmel and Nguyen (2006).

- Individuals completing modules in a Diploma or Advanced Diploma attract 70 per cent of the productivity and employability benefits of the full qualification.
- Individuals completing modules in Certificate Level III/IV attract 50 per cent of the productivity and employability benefits of the full qualification.

These assumptions are also broadly consistent with the more recent study by Karmel and Fieger (2012) of both the productivity and employability benefits for module completers relative to graduates.

On the other hand, the benefits of module completion in this report are higher than the benefits assumed by the Productivity Commission (2012). However, as discussed in Appendix E, the Productivity Commission's analysis is likely to understate the benefits from module completion.

To model the economic effect of module completion, the benefits are compared to the costs. As noted in section 2.3.1, there is limited information available to estimate these costs. Therefore, this report makes a neutral assumption that both the benefits and the costs of VET study depend on the proportion of the full qualification undertaken. Under this neutral assumption regarding costs and benefits, the modelling results are relatively insensitive to the proportion of the course that is assumed to be completed. Nevertheless, the assumed proportions are as follows.

- An average module completer at the Diploma or Advanced Diploma level is expected to remain in VET for 70 per cent of the time compared to a graduate, generating 70 per cent of the costs. They also generate 70 per cent of the benefits of a graduate.
- Likewise, an average module completer at the Certificate III or IV level is expected to remain in VET for 50 per cent of the time compared to a graduate, generating 50 per cent of the costs and 50 per cent of the benefits.

Importantly, this report also includes the benefits and costs expected from students who undertake study at the same or lower level than their previous education. To model the benefits from re-skilling, this study uses data on outcomes for VET students who have re-skilled at the Certificate III level or higher. This data was summarised in section 2.3.2 above. This data shows that for the group of students who re-skill in VET, 2 per cent more are employed (on a FTE basis) after re-skilling than before re-skilling. It also shows that the types of occupations that these students hold are different after re-skilling. Using this data on actual outcomes to determine the benefits from re-skilling means that the modelling takes into account that not all re-skillers receive employment-related benefits. This avoids overstating the benefits from re-skilling.

As discussed in section 2.3.2, the costs for re-skillers are assumed to be the same as the costs for up-skillers. Like up-skillers, re-skillers can graduate, module complete or drop out, and the total cost depends on the proportion of the full qualification that is undertaken.

2.6.4 Public and private VET

The main policy issue examined in this report is the effect of increased funding for VET, from government, students and businesses. The modelling results presented in this report refer to an expansion of the current VET system as a whole, rather than expanding only the public VET system or only the private VET system.

However, the VET sector encompasses a broad range of providers, including public institutions, such as Technical and Further Education (TAFE) institutes, as well as private providers. Extensive data is available on the public VET system – which includes both public and private institutions that receive at least some government funding. On the other hand, data on private VET providers who do not receive any government funding is limited. This data limitation means that the modelling cannot distinguish between students attending public institutions and students attending private institutions. Therefore, it is assumed that, on average, the costs and benefits of VET are the same at both public and private institutions. By making this neutral assumption, there is no focus on any differences between private and public VET.

It has been suggested that the costs and benefits of VET training may differ between public and private institutions. However, while there is detailed data available on the public VET system, data on the private VET system is limited, restricting comparisons of the benefits and costs under each system. As a result, a comparison of the quality of the public and private VET systems has not been made. Nevertheless, this issue is explored further in section 5.2.

Formal training can also occur outside the VET system, including training conducted in-house by large private companies. For example, the mineral sector spends more on training per employee than most industries and significantly more than the national average (Minerals Council of Australia, 2012). Some of this training is provided in-house and is non-accredited. While such in-house training is likely to have economic benefits, it is outside the scope of this report.

3 Internal rate of return on VET investment

Based on the drivers of the economic benefits and costs of VET identified in the previous section, this section provides an answer to the main policy question addressed in this report.

Are there net economic benefits from increasing investment in VET beyond the 2011 policy settings? If so, how large are these benefits?

Specifically, it estimates the annual net benefit to the Australian economy per dollar invested in expanding the number of VET places. This is done by estimating the real internal rate of return (IRR)⁷ on investment in VET, which summarises the annual net benefit to the economy per dollar invested. The focus is on investment in Certificate III and above, in line with the priorities of the NASWD.

In estimating the IRR, the main benefits of investment in VET have been included, as discussed in section 2.

- The major benefit from VET is an improvement in the employability of students, because they are more likely to participate in the workforce, less likely to be unemployed and are more likely to work full time.
- VET also improves productivity of students, which means that they are able to work in occupations which command higher wages.

Both of these benefits raise the productive capacity of the Australian economy and lift living standards. They also result in higher pre-tax earnings for VET students than otherwise would have been the case.

The costs of VET are also weighed against the benefits, as also discussed in section 2.

- VET involves a direct cost to pay for the tuition, which is borne partly by government and partly by students or businesses.
- Some students also forego earnings opportunities by spending time in training that they could otherwise have spent working. Other students earn lower wages as apprentices compared to what they otherwise may have earned.

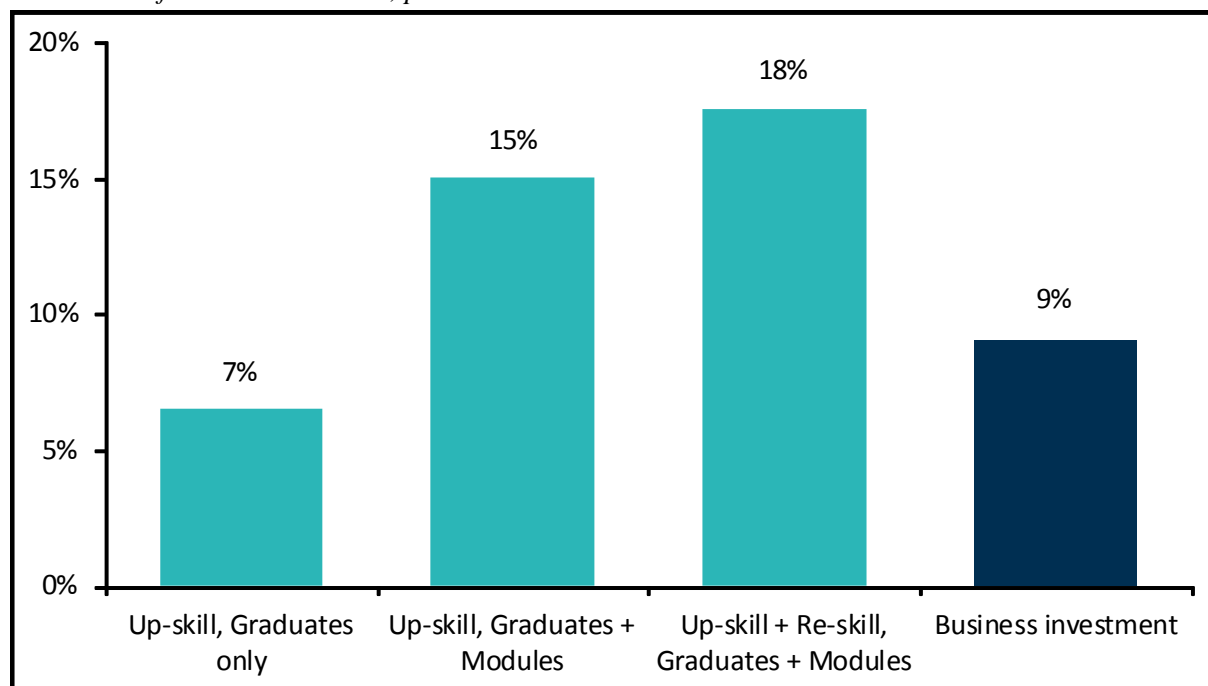
Importantly, this report improves on modelling in other studies by explicitly incorporating the benefits and costs associated with all of the types of VET students, rather than just some. In addition to the benefits associated with graduates who have up-skilled, the benefits to module completers and re-skillers are also included, as discussed in section 2. Chart 3.1 below presents estimates of the real internal rate of return (IRR)⁸ to VET in three successive steps, with each step adding the benefits from one of these three main groups of VET students.

⁷ This is the real Internal Rate of Return, which is the discount rate that equates the real present value of the costs with the real present value of the benefits.

⁸ Technically, the real Internal Rate of Return is the discount rate that equates the present value of the real costs with the present value of the real benefits.

The benefits of VET are generally associated with individuals who complete a qualification at a higher level than the one that they previously held. Therefore, as a first step, the employability and productivity benefits to students who both *up-skill and graduate* are taken into account. This results in an estimated IRR of 7 per cent, as shown in Chart 3.1. However, this narrow approach only includes 22 per cent of total VET students studying at Certificate level III and above, and excludes the benefits generated by other students.

Chart 3.1: Three cumulative steps in estimating the real internal rate of return (IRR) on investment in VET at Certificate III and above, per cent



Source: Independent Economics estimates using Independent Education Model (making use of NCVER and ABS data)

Note: *Up-skill, Graduates only* is the estimated IRR when only the benefits from students who complete a full qualification at a higher level than their previous qualification are included.

Up-skill, Graduates + Modules is the estimated IRR when only the benefits from students who complete a full qualification or modules at a higher level than their previous qualification are included.

Up-skill + Re-skill, Graduates + Modules is the estimated IRR when the benefits from students who complete a full qualification or modules at a higher, equivalent or lower level than their previous qualification are included.

An important feature of the VET system is the large proportion of students who complete modules. This includes students undertaking skill sets or other non-accredited training. There are a number of reasons for completing modules rather than a full qualification, but a commonly cited one is that a full qualification may not be required for a student's chosen occupation. Evidence from Karmel and Nguyen (2006) shows that module completers are expected to generate around 50 or 70 per cent of the benefits received by graduates, depending on the level of study.

Therefore, in a second step, the benefits to the 37 per cent of students who *up-skill and module complete* are added. Including the benefits accruing to module completers more than doubles the rate of return on VET investment, to 15 per cent.

Importantly, it is assumed that both the costs and the benefits are proportional to the number of modules completed. That is, if a student completes 50 per cent of a full qualification, then they are

assumed to generate 50 per cent of the costs and 50 per cent of the benefits. This means that the benefits of VET *relative to the costs* are similar for both module completers and graduates.

Another important feature of the VET system is that a significant proportion of VET students undertake study at a level that is the same or lower than the qualification they already hold. Therefore, in the third step, the benefits generated by the 31 per cent of students who *re-skill and either graduate or module complete* are also added to the benefits from students who up-skill. Data on outcomes for re-skilling students shows that some of these students benefit through enhanced employability. This is because the re-skilling function of VET allows the workforce to respond to changes in skills demand from industry, improving its flexibility and employability. After including the benefits generated by students who re-skill, the estimated IRR is higher again, at 18 per cent.

This means that when all of the benefits and costs are taken into account, rather than just some, each dollar invested by governments, students or businesses in VET is expected to generate 18 cents of ongoing annual benefits for the Australian economy. Most of the benefits are in the form of greater employability, both for up-skillers and re-skillers.

This IRR is high, especially when compared to returns on business investment, which may be around 9 per cent⁹. An appropriate required rate of return for investment in VET would be even lower than 9 per cent, because of the relatively low riskiness of this investment¹⁰.

The high returns from increasing investment in VET indicate that, at 2011 policy settings, there is likely to have been under-investment in VET. This under-investment may be explained by three factors.

Firstly, potential students may exhibit myopia, or near-sightedness. Potential students may place a high value on current consumption, and therefore be less willing to bear the upfront costs of VET, despite the high rate of return on this investment.

Studies have shown that individuals with lower levels of education place a very high value on current consumption compared to future consumption. For example, Warner and Pleeter (2001) showed that those without a college degree required a 3.0 per cent higher rate of return than their counterparts with a college degree before they would make an investment. Likewise, individuals without a college degree required a 7.5 per cent higher rate of return than individuals with graduate education (such as masters or PhD) before making an investment. This indicates that potential VET students, who may have low education levels, are more likely to act myopically, and choose not to invest in VET, despite the high rate of return.

⁹ Submissions to the ACCC suggest that the market risk premium for Australia is between 6 and 7 per cent. Together with a real risk free rate of return of 2.5 per cent, this suggests that the IRR for a typical business investment is between 8.5 and 9.5 per cent. However, post GFC, many observers consider that rates of return are likely to be lower in the future, reflecting higher levels of global savings relative to investment opportunities.

¹⁰ A real discount rate of 4.4 per cent has been chosen for this analysis. This can be broken into a real risk-free interest rate of 2.5 per cent, consistent with the historical average rate on government bonds, plus a 2 per cent risk premium. It is consistent with estimates of the real rate of return to business capital, that have been made by Independent Economics using ABS data on capital stocks and capital income. The Productivity Commission used a higher real discount rate, of 6.0 per cent. One reason for the difference between the rates used in these two studies may be that the 4.4 per cent rate used in this study excludes the effect of economic rents, whereas the 6.0 per cent rate used in the Productivity Commission's analysis may not have adjusted for this.

Secondly, incomplete financial markets may discourage potential students from undertaking VET study. For example, income-contingent loans are currently available to VET students through VET FEE-HELP, but these are only available for students studying at the Diploma level or higher. In addition, for some students, there is a 20 per cent loan fee (Study Assist, 2013). Governments are planning to extend eligibility for VET FEE-HELP to more students, which is likely to reduce the extent of underinvestment in VET. The introduction of income-contingent loans similar to those available to students in higher education, covering the student contribution for students who are partially government funded, is also being considered.

Both myopia and incomplete financial markets are market failures, which are reasons for government support of VET education.

A third factor leading to underinvestment in VET education is that, at 2011 policy settings, there is likely to have been significant unmet demand for student places. That is, government restrictions to VET provision meant that the supply of VET places was smaller than the number demanded. Section 2.4 explained that there is likely to be unmet student demand for VET places as well as unmet industry demand for VET skills.

The rate of return on VET, 18 per cent, can also be compared to previous estimates of the rate of return to investment in education in Australia. A report for Universities Australia by KPMG Econtech (2010) estimated that the rate of return to university study is around 14 per cent. This is lower than the return to VET estimated in this report, but still higher than the standard rate for business investments. Investment in university would have a lower rate of return than investment in VET if the extent of underinvestment is lower in university than in VET. This may come about because barriers to investment in university are likely to be smaller than barriers to investment in VET. Potential university students may be less myopic or have better access to finance through the Higher Education Loan Program (HELP). In addition, the estimated rate of return may be lower because the KPMG Econtech study did not take into account any benefits from partial completions or re-skilling, although these benefits are likely to be smaller for university than for VET.

The internal rate of return is a summary indicator, because it shows the annual net benefit received *per dollar* invested in VET. It may be expected that the IRR would be lower when the additional investment in VET is higher. This is because, as additional students complete their study, the extent of under-investment in VET is reduced and the benefit from each additional student is smaller than otherwise.

To test whether this is the case for the levels of investment considered in this report, the two scenarios involving higher funding (presented in section 4) have been used to estimate the IRR for additional investment of \$2.7 billion and \$6.7 billion over five years. The IRR is estimated to be 18 per cent for both of these levels of additional investment. The rates of return are the same for each scenario, because the addition to VET spending is relatively small. For these scenarios, VET spending is 5.6 per cent and 13.7 per cent higher than it would otherwise have been over five years. Further, when the additional VET students enter the labour force, their impact on the total supply of labour is relatively small in both scenarios when viewed on comparison to total employment in Australia. Therefore, although the return per dollar of investment in VET is high, since the level of additional investment considered is relatively small, the IRR is the same in both scenarios considered in this report.

4 Policy scenarios

The previous section showed that the annual net benefit to the Australian economy *per dollar* invested in expanding the number of VET places is high at 18 cents per year. This high net benefit from additional VET funding reflects a range of benefits and costs. In this report, those costs and benefits are quantified for a range of scenarios for additional VET funding. This section explains the funding scenarios, while the following section details the costs and benefits for each scenario.

Since 2011, national and state governments have committed to increasing their funding of Vocational Education and Training (VET) under the National Agreement on Skills and Workforce Development (NASWD). We model the effects of this committed increase in VET funding, relative to a baseline scenario without this new funding policy. We also model the effects of a larger expansion in VET funding, relative to the same baseline scenario.

The benefit and costs of additional investment in VET are estimated by comparing outcomes in the two scenarios with higher VET funding to the outcomes in baseline scenario. This section also presents alternative VET funding scenarios, focussed at increasing qualification completion rates or the quality of training. The main aim of these scenarios, considered together, is to address our two key policy questions.

- *Are there net economic benefits from increasing investment in VET beyond the 2011 policy settings (of the baseline scenario)? If so, how large are these benefits?*
- *If there are net benefits, is it better to simply invest in additional VET places, or is it better to also undertake reforms to improve completion rates or the quality of training?*

Further details of the baseline scenario, committed funding scenario and further expansion scenario are now provided in turn. This section then turns to the alternative funding scenarios. Finally, it outlines a scenario concerned with adjusting policy towards international students.

4.1.1 Baseline Scenario

The baseline scenario represents the Australian economy for the case where there is no change in VET policy from the settings that were in place in 2011. It serves as a reference point with which alternative VET policy scenarios are compared. The *deviations* in VET funding and economic outcomes between the policy scenarios and the baseline scenario are used to estimate the impact of policy changes. The level of VET funding and the economic outcomes in the baseline scenario itself are less important.

The baseline scenario assumes that funding in the VET sector follows the pattern in the 2011 data. This is the year for which the latest data is available on VET funding by different sources. Based on NCVER data¹¹, the public VET sector received funding of around \$8.0 billion in 2011, as seen in Table 4.1.

¹¹ NCVER, Australian vocational education and training statistics: Financial Information 2011

Table 4.1 Breakdown of VET expenditure in the baseline scenario (\$ billion)

	Annual expenditure, 2011	Baseline scenario total five-year expenditure, 2013-2017
	Actual	Estimated
Student fees and charges	1.4	8.6
State Expenditure excluding Victoria	2.8	17.4
VIC State Expenditure	1.2	7.6
Commonwealth funding under National Agreements	1.3	7.8
Commonwealth excluding National Agreements	1.2	7.4
Total	8.0	48.8

Source: NCVET Financial Information data and Independent Economic estimates

Note: Funding under National Agreements refers to the funding from the Commonwealth Government under the National Agreement for Skills and Workforce Development (NASWD). This table shows the funding for the **baseline scenario**, which assumes that funding patterns remain at the 2011 policy settings. This means that the funding relates to the NASWD which came into effect on January 2009.

Funding under *Commonwealth funding excluding National Agreements* is all other Commonwealth Government funding. In 2011, Other Commonwealth funding included the National Partnership Agreement on Productivity Places Program (NPAPP), which was in effect between January 2009 and June 2012. Other major Commonwealth expenditure items include funding for capital purposes, other Commonwealth administered programs and DEEWR-funded national programs.

In the baseline scenario, it is assumed that VET funding from all five sources grows at the same rate as nominal GDP¹². This ensures that the nominal size of the VET sector, as a proportion of the total economy, remains at the 2011 benchmark. This is a broadly neutral assumption and represents an unchanged policy position from 2011.

Nominal GDP is projected using assumptions that are broadly in line with Treasury's growth assumptions. Specifically, nominal GDP is expected to grow by 5 per cent in 2012 and 5.25 per cent per year over the remaining projection period. VET funding from all sources has been projected using these growth rates.

Table 4.1 below shows the baseline funding assumptions for 2013 to 2017. Over these five years, a total of around \$49 billion is assumed to be spent in the public VET system from government and private sources, with spending following its 2011 pattern.

¹² This includes funding from the Victorian Government, which is assumed to grow in line with GDP in the baseline scenario.

4.1.2 Higher funding scenarios

The main focus of this report is to estimate the incremental effect of higher VET spending. This is achieved by comparing the two higher funding policy scenarios against the baseline scenario. These scenarios examine the impact of higher funding only, and include no other reforms to the VET system. These policy scenarios are briefly listed below, and then each is described in more detail.

- The **committed funding scenario** includes the impact of higher VET expenditure as committed in policy announcements that have occurred since 2011. Broadly, this includes a net increase in Commonwealth funding over the 5 years between 2013 and 2017, and reduced funding in Victoria.
- The **further expansion scenario** also includes higher VET funding, but the investment is assumed to be larger than current policy commitments.

Committed funding scenario

The Commonwealth Government has an agreement on skills funding with the states and territories under the National Agreement for Skills and Workforce Development (NASWD). Under the NASWD, and as part of the 2011-12 Commonwealth Budget, the Commonwealth Government committed \$1.75 billion over five years for a new National Partnership Agreement on Skills Reform (NP). The agreement was signed at COAG on 13 April 2012. This funding for the NP is in addition to the amount previously allocated to States each year for the VET system. The Commonwealth Government has also made adjustments to other funding programs. The Productivity Places Program has been replaced by the National Workforce Development fund, which has reduced the funding under Commonwealth administered programs by around \$0.75 billion. Compared to the baseline, this represents a net increase of around \$1 billion over that same period.

The Victorian Government is currently implementing policies which are expected to reduce its VET funding. The Victorian TAFE Association¹³ report that funding from the Victorian Government is expected to be \$290 million lower in 2013 than in 2012. This 2013 decrease is included in the committed funding arrangement scenario. In 2014, Victorian Government expenditure is assumed to return to its 2012 level. Beyond 2014, Victorian Government expenditure is then assumed to grow in line with nominal GDP.

These changes to funding policies are included in the committed funding scenario. However, there is limited information available from State and Territory budget papers about their VET funding arrangements. Therefore, in this scenario, funding from States and Territories other than Victoria, is assumed to be higher than the baseline by the same proportion as the increase in Commonwealth funding as share of their baseline funding under the NASWD.

It is also assumed that the overall boost to government funding will induce additional funding for VET from students and businesses. It is assumed that funding from student fees and charges is higher by the same proportion as total government spending from state and federal governments (5.6 per cent).

¹³ Victorian TAFE Association, Victorian TAFE Demands Federal Intervention, Media Release, 3 May 2012.

Overall, this scenario involves VET funding of \$51.6 billion over the five years from 2013 to 2017, which is an increase in funding of \$2.7 billion, or 5.6 per cent. Table 4.2 shows the total funding over the five years from 2013 to 2017 from each of these sources in the committed funding scenario. It also shows the additional funding compared to the baseline scenario over the same five years.

Importantly, it is assumed that, in all states other than Victoria, the additional student places made available by this funding are taken up by new students. As discussed in section 2, there is expected to have been unmet student and industry demand for VET education at 2011 policy settings.

In addition, the extent to which government funding crowds-out private investment in VET is not modelled. Instead, the focus of the modelling is an increase in VET funding, rather than the source of this funding. In fact, the source of the funding, whether public or private, is not central to estimating the costs and benefits of VET.

Further expansion scenario

The further expansion scenario focuses on an expansion of the VET sector, which is larger than current government commitments.

- The Commonwealth government is assumed to raise VET funding by \$2 billion for the five years from 2013 to 2017, which is double the net increase of the committed funding scenario.
- Victorian Government spending is at the same level as the committed funding scenario.
- The other States and Territories are assumed to increase funding by the same proportion as the Commonwealth Government funding under the NP (26 per cent).
- Students are assumed to increase their spending on VET by the same proportion as total government funding (13.7 per cent).

Overall, this scenario involves total VET funding of \$55.5 billion over the five years from 2013 to 2017, which is an increase in funding by \$6.7 billion, or 13.7 per cent compared to the baseline scenario over the same five years. Table 4.2 shows the total funding from each of these sources in the further expansion scenario. It also shows the additional funding compared to the baseline scenario.

As shown in Table 4.2, in the Further Expansion scenario it is assumed that the addition to Commonwealth, State and Territory governments' VET spending compared to the baseline is twice as large as the addition in the Committed Funding scenario. The exception is that Victoria is not assumed to double its reduction in spending, but rather to maintain the same reduction. For this reason, the overall addition to VET spending is more than twice as large as the addition in the Committed Funding scenario.

Table 4.2: Total funding between 2013 and 2017, baseline levels and net increase for policy scenarios

	Baseline scenario	Committed funding scenario		Further expansion scenario	
	Total funding	Total funding	Change from baseline	Total funding	Change from baseline
Student fees and charges	8.6	9.0	0.5	9.7	1.2
State Expenditure excluding Victoria	17.4	19.6	2.2	21.9	4.5
VIC State Expenditure	7.6	6.6	-1.0	6.6	-1.0
Commonwealth funding under National Agreements	7.8	9.6	1.75	11.3	3.5
Commonwealth excluding National Agreements	7.4	6.7	-0.75	5.9	-1.5
Total	48.8	51.6	2.7	55.5	6.7

Source: NCVET Financial Information data and Independent Economic estimates

Note: The funding in the **Baseline scenario** is the estimated level of spending for the case where VET funding remains at its 2011 policy settings, at which time the NASWD as agreed in 2009 was in place.

The funding in the **Committed Funding scenario** is the estimated VET spending taking into account the additional funding commitments since 2011, including spending relating to the most recent NASWD agreed in April 2012. It also includes the reduction in funding due to replacing the Productivity Places Program with the National Workforce Development Fund.

The funding in the **Further Expansion scenario** is illustrative of VET spending greater than the funding commitments included in the Committed Funding scenario.

The additional spending in the further expansion scenario is in line with the spending recommendations made by the Australian Workforce and Productivity Agency (AWPA) in their report, Future Focus 2013 National Workforce Development Strategy (AWPA, 2013). This report recommended that, to meet industry demand for skills and qualifications, annual spending on tertiary education from both public and private sources should grow by at least 3 per cent each year in real terms. The real spending in the Further Expansion scenario implies an average annual growth rate of 3.6 per cent over the five years between 2013 and 2017¹⁴.

Again, it is assumed that the additional student places made available by this additional funding are taken up by new students, because there is evidence of ongoing student and industry demand for VET skills. In addition, as discussed above, the increased government funding is not assumed to crowd-out private funding. The focus of this report is an overall increase in VET funding, rather than the source of this funding.

¹⁴ This real growth rate is calculated by assuming that the price of VET education increases by 4 per cent each year, in line with annual wages growth, because staff wages are expected to drive the price VET education.

4.1.3 Alternative VET policies

As mentioned, the reforms discussed above only consider the effect of using increased overall VET funding levels to 2017 to expand the number of places within the current VET system. However, a recent focus of VET policy has been the consideration of improving completion rates or the quality of VET training. A number of policies may be implemented to achieve these targets, such as higher teacher to student ratios, or additional student support services. These policies are likely to raise the cost of VET per student.

To gauge whether such policies would be better than simply expanding the number of VET places, both the costs and the benefits of each policy would need to be examined on a case by case basis. Importantly, these costs and benefits should be measured in terms of their overall outcomes for the economy. For example, although higher teacher student ratios may succeed in boosting completion rates, the benefits to student outcomes should outweigh the costs for the policy to be worthwhile.

This report presents scenarios illustrating whether it is better to spend part of the additional VET funding on policies to improve completion rates or tuition quality, or whether it is better to spend the funds on simply increasing student numbers. It does this by considering two scenarios with the following features.

1. First, it is assumed that additional VET funding is the same as the committed funding scenario presented in the previous section. That is, an additional \$2.7 billion is invested in VET between 2013 and 2017, from public and private sources, compared to the baseline.
2. Next, it is assumed that, from this \$2.7 billion in funding, an additional 10 per cent per student per semester is spent on policies to improve either completion rates or the quality of VET training. For example, VET institutions may spend an additional 10 per cent per student per semester to increase teacher to student ratios.
3. Finally, using the Independent Education model, the improvement in either completion rates or tuition quality required to yield the same net benefits as simply spending the additional funds on increasing student numbers is estimated.
 - In the completion rate scenario, it is assumed that the hypothetical policy increases probability that students who otherwise would have completed modules or dropped out will graduate. The completion rate is adjusted upward until the net benefits from the additional VET spending are the same as the net benefits from the committed funding scenario.
 - In the second of these scenarios, it is assumed that the hypothetical policy to increase the quality of VET training raises the productivity of students once they have graduated. It does not affect the length of time spent studying or the employability of the students¹⁵. The productivity of students is adjusted upward until the net benefits from the additional VET spending are the same as the net benefits from the committed funding scenario.

The completion rate or productivity improvement that achieves this outcome will be the ‘break-even’ improvement. If an actual policy is able to achieve a larger boost in completion rates or quality for

¹⁵ Equally, improved quality could have been assumed to increase the employability of students.

the same cost, then it would be worthwhile to spend part of the funds on the policy, rather than just on higher student numbers.

Explicitly modelling the costs and benefits of specific policies is beyond the scope of this report. Instead, the scenarios are designed to illustrate the important issues that need to be considered when designing policies to improve completion rates or the quality of tuition.

4.1.4 International student scenario

As discussed in section 2, VET can contribute to the size of the Australian labour force by attracting international students who, upon completing their studies, go on to work in Australia. For example, the Temporary Graduate (subclass 485) visa currently allows international university students to work in Australia following the completion of their studies for up to four years. If eligibility for this visa were to be extended to the VET sector, then a greater number of international VET students may join and remain in the Australian workforce following their studies.

The committed funding scenario and the further expansion scenario discussed above assume that there is no change to the number of international students, because international students are not eligible for government funding. These scenarios also assume that there is no change in the number of international students joining the Australian workforce upon completion of their studies.

The international student scenario also assumes that there is no change in the number of international students. However, it models the effect of a relaxation in visa requirements, resulting in a 50 per cent increase in the number of international VET students joining the Australian workforce following their studies.

Specifically, in this scenario, VET funding is boosted to the same level as the committed funding arrangement scenario, \$2.7 billion between 2012 and 2017. While this increases the number of domestic students, it does not have any effect on international student numbers, because they are not eligible for government funding. In addition, a change to visa requirements is assumed to lead to a 50 per cent increase in the number of international students granted visas over the five years between 2013 and 2017. As discussed in Appendix C, there is estimated to be between 8,000 and 11,000 individuals granted visas to work in Australia following their VET studies each year. Over five years, a 50 per cent increase is equivalent to granting approximately 24,700 additional visas to individuals with VET qualifications. It is assumed that 16 per cent of these students are granted temporary visas, allowing them to work in Australia for an average duration of 3 years. The remainder are assumed to be granted permanent visas.

5 Economic impact of VET policies

This section presents the results of the economic modelling of the VET policy scenarios that were set out in section 4. The economic modelling is conducted using the Independent Education model, which was discussed in general terms in section 2.6 and in greater detail in Appendix F.

The various policy scenarios in this section are considered in the following sequence.

- To estimate how large the potential net benefits from additional investment in VET are, this section begins by considering the effects of the two scenarios involving an increase in VET funding in isolation from any other changes to the VET system (committed funding scenario; further expansion scenario).
- To estimate whether it is better to spend additional VET funding on simply increasing student numbers or to spend some of it on improving completion rates or the quality of VET training, the two scenarios involving such additional policy changes are then analysed (completion rates scenario; quality scenario).
- Finally, to estimate the effect of allowing additional international VET students to join the Australian labour force after completing their studies, a scenario of this nature is considered (international students scenario).

The economic outcomes in each of the policy scenarios are compared to the outcomes in the baseline scenario, which represents the situation if VET policy had remained from its 2011 settings. All results are presented as deviations from the outcomes in the baseline scenario. In this way, the impact of the additional funding (and any other policy change) can be separately identified. Section 4 included a detailed discussion of the design of each policy scenario.

The analysis in this section takes into account a large number of features of the Australian VET system. Some major innovations in this modelling compared to previous studies are briefly outlined below.

- In addition to considering the benefits from students who complete full qualifications, this report includes detailed consideration of the benefits and costs of students who complete modules. This includes students who undertake skill sets.
- This report systematically models the benefits of VET study at the same (or lower) level as an individual's previous education. This re-skilling function of VET improves the employability of students, and allows them to work in occupations in higher demand by industry.
- The benefits of VET are analysed through fully-integrated modelling of the supply and demand for different types of occupations. VET education alters the supply of certain types of occupations – for example, it allows students to become trades workers rather than labourers. At the same time, industries demand certain types of occupations, but this demand is not unlimited.

The results reported in this section include impacts on student numbers, household living standards, employment by occupation, labour productivity, wages, the government budget and Gross Domestic Product (GDP).

5.1 Higher VET funding

This section builds on the analysis presented in section 3, and assists in answering the question:

Are there net economic benefits from increasing investment in VET beyond the 2011 policy settings (of the baseline scenario)? If so, how large are these benefits?

To do this, it considers two scenarios in which the level of spending on VET from public and private sources is increased and no other reforms are implemented. That is, the scenarios examine an expansion of the VET system, in its current form.

- The **committed funding scenario** involves an increase in total VET funding of \$2.7 billion over the 5 years between 2013 and 2017, compared to VET funding in the baseline scenario over the same five years. This represents the impact of increased funding that has been committed by governments under policy changes since 2011.
- The **further expansion scenario** also includes higher VET funding compared to the baseline, with an increase of \$6.7 billion over the 5 years between 2013 and 2017. This represents the impact of additional funding greater than that already committed by governments. For example, it involves the Commonwealth Government doubling its net additional funding from \$1 billion to \$2 billion.

Details of the design of each of these policy scenarios were discussed in section 4.

5.1.1 Student numbers

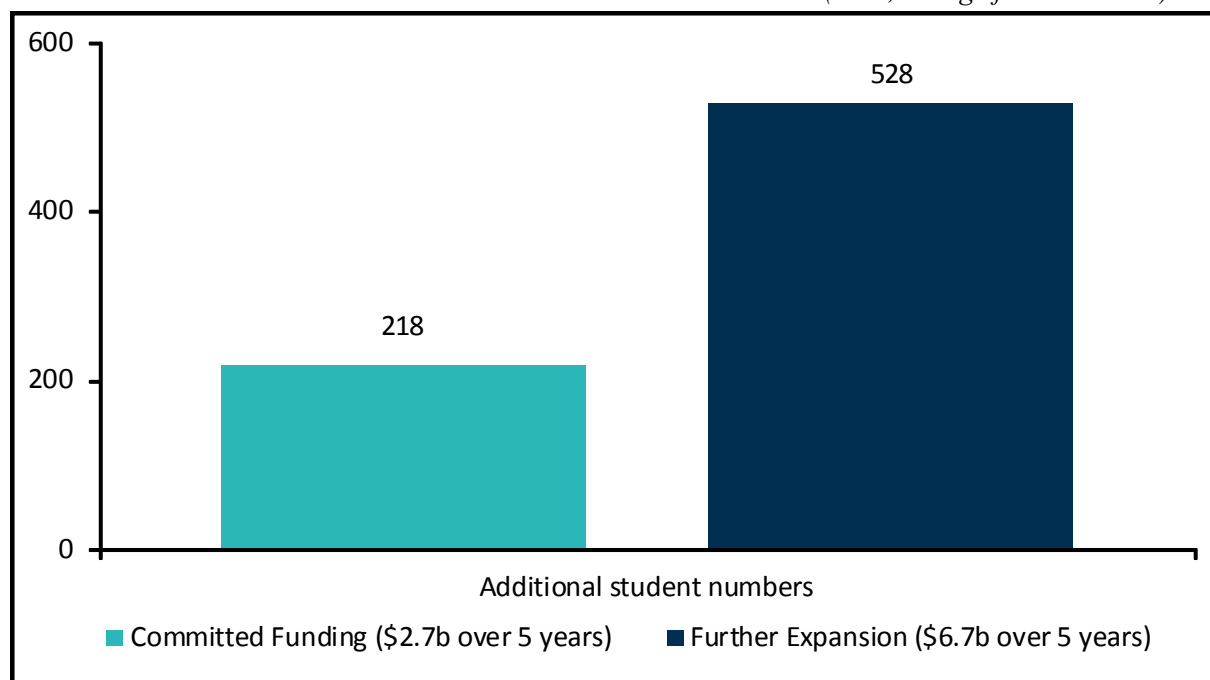
The direct impact of higher VET funding is that additional students are able to enter the VET system between 2013 and 2017. The number of additional students that can be funded by the additional VET expenditure is shown in Chart 5.1.

The current government policies are aimed at increasing the number of people with qualifications at the Certificate III level or above. Therefore, the additional funding is assumed to be reserved for students studying at this level. Based on student data from the NCVER, it is assumed that 22 per cent of the additional students choose to study at the Diploma or Advanced Diploma level, and 78 per cent of the additional students choose to study at the Certificate III or IV level.

As shown in Chart 5.1, as a result of an additional \$2.7 billion in spending on VET tuition costs, an additional 218,000 students would be able to undertake VET study at the Certificate III level or above. The number of additional students is higher if there is more funding. Not all of these additional students are likely to graduate with a full qualification. Specifically around 34 per cent of these students are likely to graduate with a full qualification at their chosen level. This means that, compared to the baseline scenario, over the five years between 2013 and 2017:

- around 72,000 additional graduates are expected under the committed funding scenario; and
- around 174,000 additional graduates are expected under the further expansion scenario.

Chart 5.1: Total additional student numbers between 2013 and 2017 ('000, change from Baseline)



Source: Independent Economics estimates using Independent Education Model

The majority of the remaining students are expected to complete modules. Some of these module completers would undertake skill sets, which are combinations of units of competency from a nationally endorsed Training Package, linking to a licence or regulatory requirement, or a defined industry need. As discussed in Appendix G, skill sets are gaining in prominence for a number of reasons, but the number of students completing skill sets cannot be estimated due to a lack of data.

5.1.2 Benefits and costs

These additional students are trained over the 5-year period from 2013 to 2017, and so the policy costs are borne over the same 5-year period. However, the policy benefits develop over the much long timeframe of these students working careers. Given these different timeframes, valid comparisons of these costs and benefits need to allow for the time value of money. This can be done by converting the future streams of costs and benefits to present value terms i.e. their total value in 2013. Chart 5.2 shows the present value of each cost and benefit for both of the additional funding scenarios.

It can be seen that the committed funding scenario involves total costs of \$7.0 billion, made up of tuition costs of \$2.3 billion and foregone earnings opportunities of \$4.7 billion.

Tuition costs include all direct costs of tuition, including the contributions from governments, students and businesses. Under committed funding arrangements, the additional expenditure on VET of \$2.7 billion between 2013 and 2017 has a present value of around \$2.3 billion in 2013 terms.

Foregone earnings opportunities refer to the potential earnings that are lost while students are studying and hence are less available for work. In the committed funding scenario, the additional students are estimated to forego a total of around \$4.7 billion in these costs in 2013 present value terms. As discussed in Appendix D, this loss is estimated based on the additional earnings that the students would have generated if they had not been studying.

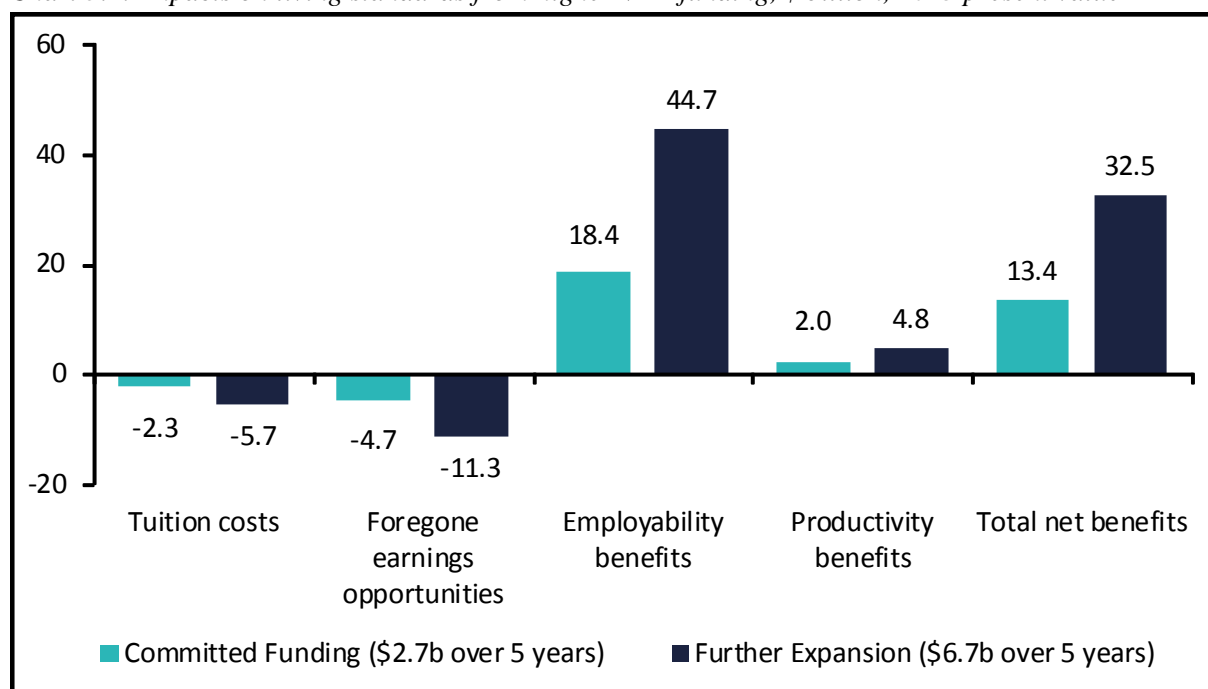
While the total costs of this investment are \$7.0 billion, these are easily outweighed by the total benefits of \$20.4 billion, yielding a net benefit of \$13.4 billion. As seen in Chart 5.2, the total benefits include employability benefits of \$18.4 billion and productivity benefits of \$2.0 billion.

As noted earlier, the employability benefit arises because VET students are more likely to participate in the workforce, less likely to be unemployed, and more likely to work full-time compared to those with no post-school education. In the committed funding scenario, these employability benefits are estimated to raise the pre-tax earnings of the students over their working lives by a total of \$18.4 billion in present value terms.

The productivity benefit arises because VET study allows students to work in more highly-skilled occupations. These productivity benefits over the working lives of the students are estimated to raise their pre-tax earnings by a total of \$2.0 billion in present value terms. The finding of this study that the employability benefits from VET study are larger than the productivity benefits is consistent with other studies.

Of these findings, the most important is that the additional VET funding under the committed funding scenario lifts the net benefit from the VET system by \$13.4 billion in present value terms, after all future additional benefits and costs are taken into account. The further expansion scenario involves a larger 5-year boost to VET funding, of 13.7 per cent rather than 5.6 per cent, and Chart 5.2 shows that the net benefit is commensurately larger at \$32.5 billion.

Chart 5.2: Impacts on living standards from higher VET funding, \$ billion, 2013 present value



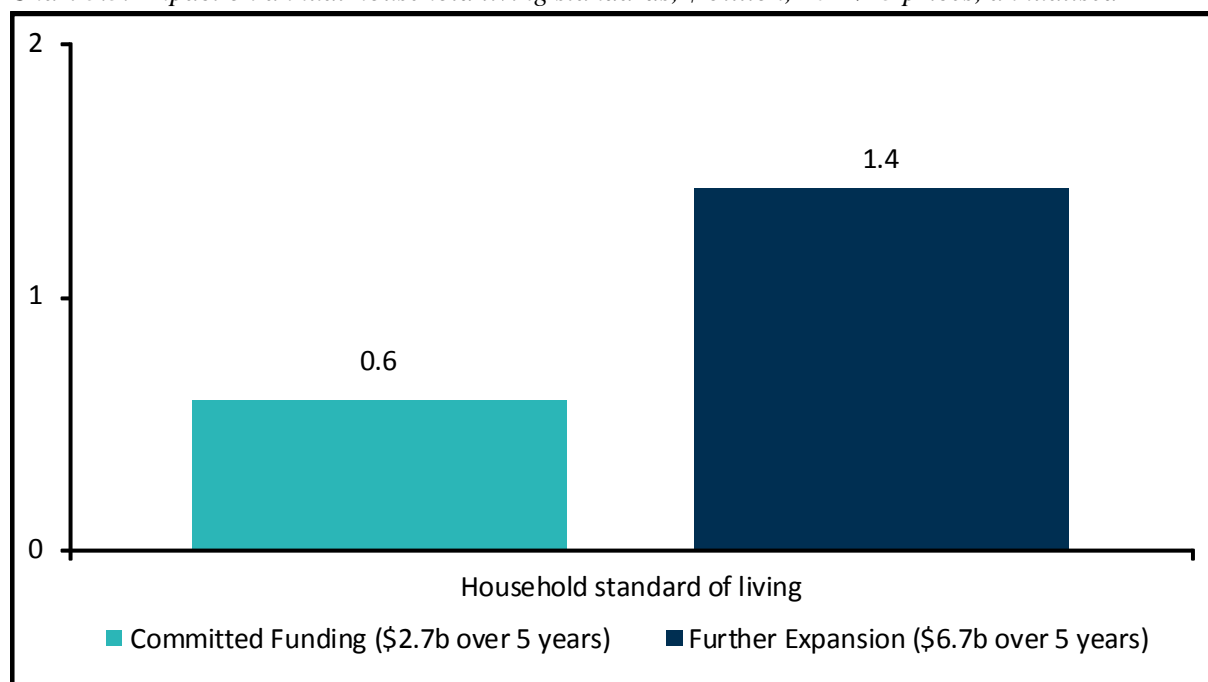
Source: Independent Economics estimates using the Independent Education Model

5.1.3 Household living standards

These net benefits are expressed as present values, which are capital amounts. As just noted, the Net Present Value (NPV) of net benefits was 13.4 billion for the committed funding scenario and \$32.5 billion for the further expansion scenario.

Alternatively, the net benefits can be expressed as equivalent annual, ongoing net benefits. On that basis, the ongoing, annual net benefit from the funding boost under the committed funding scenario is \$0.6 billion per year, while for the larger boost to funding under the further expansion scenario it is \$1.4 billion per year¹⁶. This annual net benefit takes the form of higher household living standards. The impact on living standards is the most important measure for judging the net benefit of a policy because it takes into account all of the costs and benefits of higher VET spending to households¹⁷.

Chart 5.3: Impact on annual household living standards, \$ billion, 2012/13 prices, annualised



Source: Independent Economics estimates using the Independent Education Model

The flow-on effects from the higher VET funding are now discussed. First, the net impact on employment by occupation is described. This is followed by the impact on wages and labour productivity and the government budget. Finally, the impact of higher VET expenditure on GDP by expenditure and GDP by industry is considered.

5.1.4 Employability

As discussed above, the main benefit from additional investment in VET is an expansion in employment. This is particularly true for students undertaking a Certificate III or IV. Under the committed funding scenario, it is estimated that national employment would be higher by 0.1 per cent compared to the baseline. This effect is larger under the further expansion scenario, at 0.2 per cent, as shown in Chart 5.4.

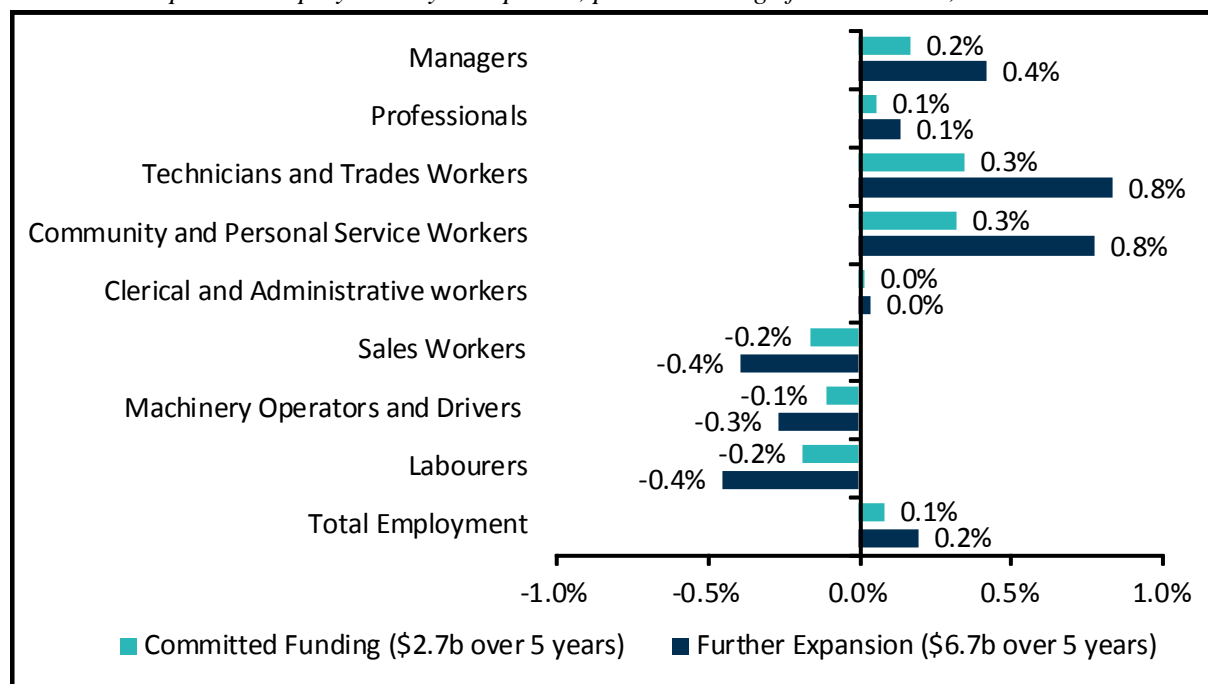
For the additional students themselves, around 16 per cent more are employed after the VET study, than were employed before. This represents a gain in their employment rate of around 9 percentage

¹⁶ The results show the annual ongoing annual impact that is equivalent to the net effects of the policy. That is, the results are reported as perpetuity equivalents. This is an important indicator of the extent to which households are better off.

¹⁷ The Independent CGE model provides valid measures of changes in living standards, from welfare economics. Specifically, it uses the equivalent variation from welfare economics to measure the change in living standards. The equivalent variation is the income transfer that would need to be given to households before the policy change to enable the same level of utility as they would have after the change.

points from the higher VET funding. This employability benefit is lower than the estimates from the econometric literature, which were summarised in section 2. This is because the estimates presented in section 2 compare the employment rate for those who have completed a full VET qualification against those who have no post-school qualification. However, in reality, some students do not complete full qualifications and some students enter VET having completed higher qualifications than school. Both of these factors tend to reduce the estimated employability effects compared to the estimates presented in section 2.

Chart 5.4: Impact on employment by occupation, per cent change from baseline, annualised



Source: Independent Economics estimates using the Independent Education Model

Chart 5.4 also summarises the expected impact of the expansion of the VET sector on the pattern of employment by occupation. With a more educated and productive labour force, workers move into occupations which are more highly skilled and command higher wages. Employment moves away from occupations with low skill levels and toward occupations with higher skill levels and wages.

While Chart 5.4 shows the general pattern of the change in the occupation profile by aggregating up to eight broad occupation categories, the modelling is undertaken separately for 43 different occupations. Employment in each of these categories is affected differently. A list of the occupations identified in the model is included in Appendix A, together with detailed data showing estimated demand for each occupation by industry (in the baseline).

5.1.5 Labour Productivity

The additional investment in VET is expected to raise the productivity of the labour force. With the move toward more highly skilled occupations, the average after-tax real wage is higher than it would otherwise have been.

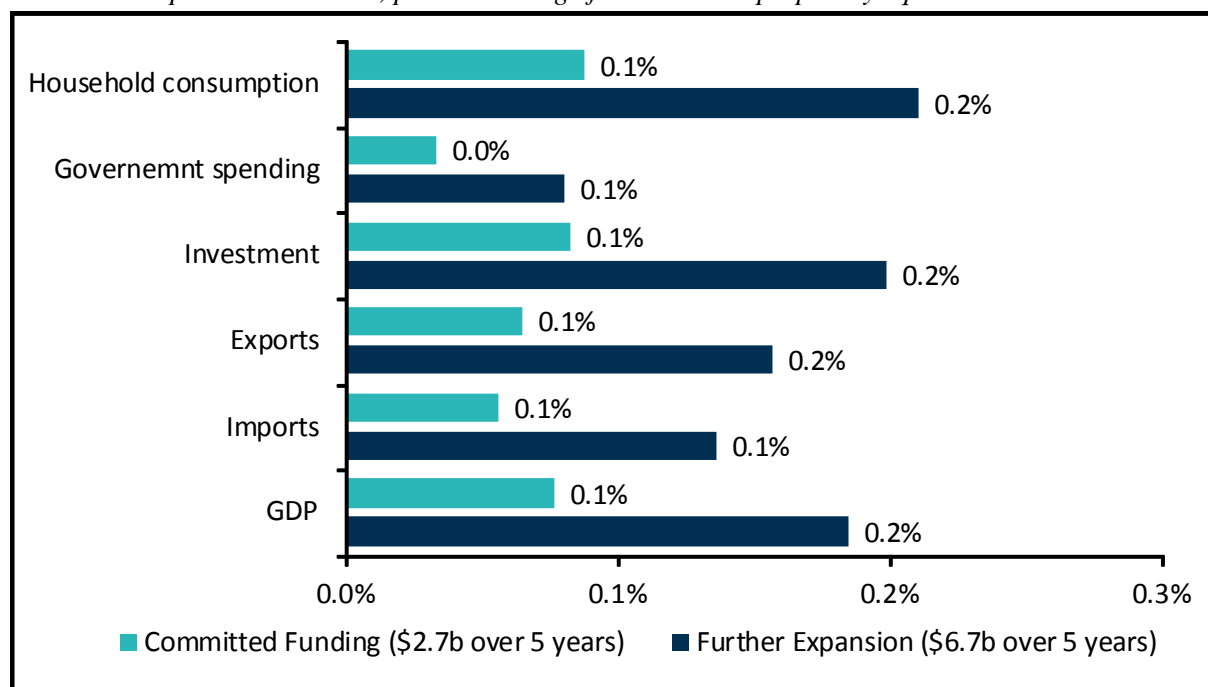
For the additional students themselves, the average wage is estimated to be around 2 per cent higher than would have been the case without the additional investment in VET (i.e. in the baseline). This implies that, students who are employed before and after the additional VET education are, on

average, estimated to be 2 per cent more productive as a result of their VET training. Similar to the employability results, these wage benefits are smaller than the wage premiums summarised in section 2. The econometric estimates presented in section 2 compare the wages of those who have completed a full VET qualification against those who have no post-school qualification. However, in reality, some students do not complete full qualifications and some students enter VET having completed higher qualifications than school. Both of these factors tend to reduce the estimated labour productivity effects of VET compared to the estimates presented in section 2.

5.1.6 Gross Domestic Product

The merits of additional investment in VET are most appropriately assessed from the estimated gain in household living standards and the IRR, which have been presented above and in section 3 respectively. However, the additional investment in VET is also expected to result in higher levels of GDP than would otherwise be the case. This is because the higher levels of employment and labour productivity lead to an expansion in the productive capacity of the economy. The impact on GDP overall and on each of its expenditure components is shown in Chart 5.5.

Chart 5.5: Impact on real GDP, per cent change from baseline perpetuity equivalent



Source: Independent Economics estimates using the Independent Education Model

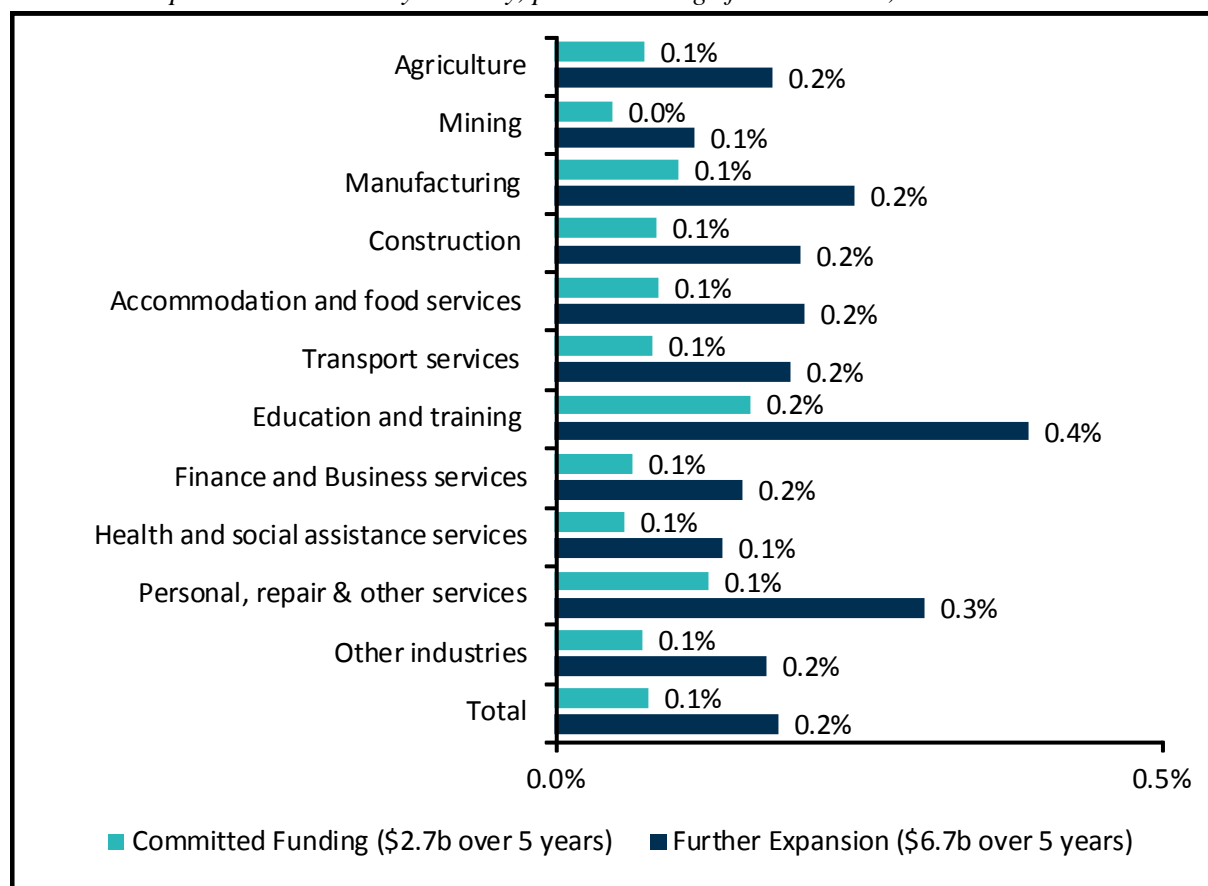
Higher employment and labour productivity lead to higher household incomes, boosting household consumption. With more productive labour, industry activity expands and businesses raise their capital stocks, leading to higher investment levels than would otherwise be the case. Government spending is higher by a small amount, reflecting their higher spending on VET education. Higher demand from households, government and investors leads to higher imports. Higher exports are also expected, offsetting the effect of higher imports on the external account.

Overall, real GDP is expected to be higher than would otherwise be the case by an annualised 0.1 per cent for the committed funding scenario and 0.2 per cent for the further expansion scenario. Chart 5.6 shows how this impact is distributed across different industries.

Higher VET funding has a different impact on GDP in each industry, depending on a number of factors.

- The greater an industry's reliance on labour trained in the VET system, the more likely the industry is to benefit from higher VET expenditure.
- The higher the share of labour in an industry's total inputs, the more likely the industry is to benefit from higher VET expenditure.

Chart 5.6: Impact on real GDP by industry, per cent change from baseline, annualised



Source: Independent Economics estimates using the Independent Education Model

Note: The Finance and Business services industry includes four different industries, which are: Financial and insurance Services; Rental, hiring and real estate services; Professional, scientific and technical services; and Administrative and support services.

GDP in the Education and Training industry is boosted directly by the higher spending on VET from government and private sources.

The Personal Repair and Other Services industry provides services such as automotive repair and personal services. It is expected to experience the greatest boost to activity as a result of higher VET funding, for two reasons. First, it relies heavily on workers with VET training, such as automotive repair workers and hairdressers. Second, labour makes up a large share of total inputs into this sector.

The Manufacturing, Construction and Transport industries also rely heavily on labour with VET qualifications, meaning that it experiences a relatively large boost in its output when VET funding is higher.

In contrast, GDP in Mining is estimated to receive only a small boost from the additional investment in VET. This is because capital and natural resources are important inputs into this industry, so that activity is not as responsive to the changes in the labour market.

More detailed industry results are included in Appendix B.

5.2 Alternative VET policies

The previous section examined the economic costs and benefits of using additional funds to expand the number of student places within the current VET system. If VET places are currently provided on a cost-effective basis, then the best value for money would be obtained in this manner.

Currently, policies to improve completion rates and the quality of VET training are also being considered. A number of policies may be implemented to achieve these targets, such as higher teacher to student ratios, or additional student support services. While there is likely to be benefits from these policies, they are also likely to raise the cost of VET provision. Therefore, this section assists in answering the question:

If there are net benefits from increasing funding for VET, is it better to only invest in additional VET places, or is it better to use some of the additional funding to undertake policies aimed at lifting completion rates or the quality of VET training?

In this section, illustrative scenarios are presented to assist in determining whether it is better simply invest in additional VET places, or to use some of the additional funding to change the nature of VET. The scenarios emphasise that policies to lift completion rates or the quality of training should be evaluated on a case-by-case basis by considering the tuition and foregone earnings costs and comparing them with the benefits for student employment and productivity.

In undertaking this analysis, this report does not make any recommendations for specific policies which may increase completion rates or the quality of VET training. Explicitly modelling the costs and benefits of such policies is beyond the scope of this report.

Hypothetical policies to increase completion rates or the quality of tuition that raise the direct cost of VET tuition by 10 per cent per student per semester are considered. The increase in completion rates or quality that is required for the benefits of the policy to be at least as large as simply spending the same funds on additional student places is then estimated. The method for undertaking this exercise was explained in more detail in section 4.

More specific VET-related policy proposals could also be analysed in future work and are discussed further in the Appendices to this report. These include policies to improve the literacy and numeracy of VET students and to increase the focus on skill sets (Appendix G). They also include policies to enhance the role of VET as a pathway to Higher Education and to increase the focus of VET on students with low socio-economic status (Appendix E).

5.2.1 Increasing completion rates

According to the NCVER data, only around 34 per cent of students who commence VET studies at the Certificate III level or above graduate with a full qualification. As discussed in section 2, there are

a number of reasons for this. For example, completing modules may be sufficient to meet the requirements of a student's chosen occupation.

On the other hand, many students intend to complete a full qualification but for various reasons do not. For example, Karmel and Fieger (2012) estimate that most students (95 per cent) intend to complete their full qualifications. This contrasts to only 34 per cent who actually do complete. Given that the benefits from a graduating with full qualification are higher than the benefits of module completion and that a large proportion of students intend to complete their studies, Karmel and Fieger conclude that the "overall low completion rates are a serious matter of concern". However, this study did not consider the costs involved if students complete full qualifications rather than modules.

Therefore, this section explores the potential effects of policies to increase the low VET completion rates. Importantly, the *net* benefit of achieving higher completion rates is considered, which depends on the size of the benefits relative to the size of the costs. Information on the costs of module completion is limited, so the estimates presented in this section use neutral assumptions. However, until concrete data is available on the costs of module completion, it is difficult to draw firm conclusions on the net benefits of obtaining higher completion rates.

The wage and productivity benefits from completing a full qualification are higher than the benefits from module completing. As discussed in section 2, based on Karmel and Nguyen (2006), this report assumes that module completers at the Diploma or Advanced Diploma level generate around 70 per cent of the benefits that graduates generate. Module completers at the Certificate III or IV level generate around 50 per cent of the benefits that graduates generate.

At the same time, the costs of completing a full qualification are also higher than the costs of completing only modules, because a student will remain in study for a longer period. However, evidence on the costs of module completion is limited. Therefore, as discussed in section 2, this report makes a neutral assumption – that both the benefits and costs of VET study are proportional to the number of modules completed. If a student completes 50 per cent of the course, then they generate 50 per cent of the benefits, and 50 per cent of the costs. In other words, two students who complete half of a course generate the same costs and benefits as one student who completes the full course.

If this neutral assumption is reasonable, then encouraging students who would otherwise complete only modules to continue studying until they have a full qualification may not be better than simply expanding the number of VET places. With each student remaining in VET for longer, fewer students can be funded for given amount of VET funding. However, fewer students spending longer in VET would generate similar net benefits to more students spending a shorter period in VET.

The modelling in this section assumes that the hypothetical modelled policy lifts the chances of both module completers and drop-outs to graduate with the full qualification.

Under the assumptions described above, if an additional 10 per cent per student per semester is spent on policies to increase completion rates, then it is estimated that completion rates would need to more than double for this policy to yield the same benefits as simply spending the same money on additional students. That is, completion rates need to be increased to at least 80 per cent before spending an additional 10 per cent per student per semester is at least as good as spending the same amount on additional students. Equally, if completion rates cannot be raised to 80 per cent by

implementing policies which add 10 per cent to the cost per student per semester, then this modelling indicates that it would be better to direct funds to increasing student numbers.

The assumptions described above are very important in determining the result. In fact, making the neutral assumption that both the costs and benefits increase in proportion to the number of modules completed is equivalent to assuming that there is no particular reason to focus on increasing completion rates.

Table 5.2. Completion rates required to make a 10 per cent expenditure worthwhile

	Current completion rates	Required completion rates	Required change in completion rates
Completion rates			
Diploma or advanced diploma	34%	80%	46%
Certificate III or IV	34%	80%	46%
Module completion rates			
Diploma or advanced diploma	56%	17%	-39%
Certificate III or IV	56%	17%	-39%
Drop-out rates			
Diploma or advanced diploma	10%	3%	-7%
Certificate III or IV	10%	3%	-7%

Note: The initial share of students who drop out without completing any modules, 10 per cent, is based on the estimate by the Productivity Commission (2012, p197). Initial completion rates are sourced from the NCVER. The initial module completion rate is estimated by Independent Economics, as discussed below.

Note: The share of students who complete one or more modules, or the module completion rate, is estimated to be 56 per cent. Each student must be identified as having either completed a full qualification, completed modules or dropped out without completing any modules. The students who are not identified as having either graduated with a full qualification or dropped out are deemed to have completed modules. The initial module completion rate shown in the table is a different concept to the load pass rates identified in the NCVER data. The NCVER estimates that module pass rates are currently around 80 per cent, meaning that 80 per cent of students who begin a particular course in a given semester will pass it. Some of these students will become module completers, while others will become full graduates.

Note: These estimates rely on the assumption that both the costs and benefits of VET study increase in proportion to the number of modules completed.

However, it may be the case that the additional benefits from completing a qualification are high relative to the cost of doing so. For example, Karmel and Fieger (2012) find that, for the group of students who are not employed before study, the employability benefit from completing a qualification rather than modules is very large. For example, for students not in the labour force before VET training, the probability of being employed after finishing VET study is twice as high for those who complete their qualification compared to those who complete only modules. In this case, if a student completes a qualification rather than only modules then the benefits may increase by a larger proportion than the costs. If policies to improve completion rates can be directed to these students, then these policies may be better than simply spending the same funds on additional VET places.

Importantly, even in this situation, for an improvement in completion rates to be better than simply spending the same funds on additional student places, the benefits must increase by enough to cover the additional cost from the extra time spent studying, plus the additional cost of the policy to obtain the higher completion rates.

Finally, because this report focuses on the benefits directly associated with VET, the estimates do not include the potential benefits that may be associated with completing a VET qualification as a pathway to higher education. For example, if completing a full qualification improves the probability that a student can go on to study in university, then the benefits of improving completion rates may be underestimated in this report. If this is the case, then completion rates may not need to be raised as high as 80 per cent for the policy to be better than using the funds to simply increase the number of students.

Overall, there are a number of important factors determining the net benefits from raising completion rates which would benefit from further research. These are:

- the average costs of module completion;
- the ability for completion rate improvement policies to be targeted to students for whom the benefits of improving completion rates is high compared to the costs; and
- the sensitivity of completion rates to additional spending per student per semester.

5.2.2 Improving quality

Alternatively, rather than focussing on increasing the proportion of students who graduate, policies could be enacted to improve the overall quality of VET teaching. According to the NCVER, international evidence “provides an inconclusive picture about the effectiveness of Australia’s national VET system” (NCVER, 2003 p27).

Policies to improve the quality of VET tuition may improve the productivity of VET students once they join the workforce. Alternatively, it may improve their employability. Again, the effect of this policy will depend on the benefits of measures to improve the quality VET training, compared to the costs of this improvement.

In this scenario, an improvement in the quality of VET training is assumed to lead to graduates and module completers being more productive than they otherwise would have been.

If an additional 10 per cent per student per semester is spent on policies to improve VET quality, then these policies would need to raise the productivity students by at least 6.5 per cent to yield the same benefits as simply spending the same amount on additional students. That is, for each 10 per cent increase in the cost per student per semester, the policy is expected to be better than simply spending the money on additional students if the productivity of students is raised by 6.5 per cent or more.

Equally, if spending an additional 10 per cent per student per semester would raise the productivity of students by less than 6.5 per cent, then this indicates that net benefits could be achieved by reducing current per-student costs and instead redirecting the funds to increasing student numbers.

This analysis could also have been undertaken assuming that spending 10 per cent more per student per semester would improve the employability of students. In this case, the employment rate for

graduates and module completers would need to be 6.5 per cent higher than the currently expected rate for this policy to be better than spending the same money on additional student places.

Whether this result is achievable depends on the sensitivity of productivity and employability outcomes to the additional spending on policies to improve the quality of tuition. For example, if students are currently studying in poor-quality institutions, and these institutions have the same costs as other higher-quality institutions, then there may be an opportunity to increase the quality of tuition for these students without significant increases in costs. If students from such low-quality institutions can be transferred to institutions with higher quality but similar costs, then this may have the potential to generate net benefits.

Further research on the impact on student productivity and employability outcomes from additional spending to improve VET quality would contribute to VET policy development.

In New South Wales, Independent Pricing and Regulatory Tribunal (IPART) is currently undertaking a review into appropriate mechanisms to determine price and fee arrangements for government-funded VET. This review will include “investigating and understanding the efficient costs of providing VET courses, qualifications and units of competency at the required quality standard” (IPART, 2013, p28). Some of the work undertaken in this review may inform estimates of the impact of spending more per student per semester on the productivity and employability outcomes for VET students.

The results above emphasise the importance of evaluating both the costs and benefits of potential policies to improve completion rates or the quality of training. To the extent that VET places are currently provided on an optimal basis, the best value for money would be obtained by using additional funds to expand the number of VET places, as is the case in the committed funding and expansion scenarios presented above.

5.2.3 Completion rates and quality in public and private VET institutions

Recently, there has been public debate surrounding the effect of introducing contestability between government and private providers of VET, particularly in the context of completion rates and quality. Private Registered Training Organisations (RTOs) bring competition to the VET sector by directly contesting with public providers for VET funding from the government. This can provide advantages to students including increased opportunities for training and greater choice in terms of the content and flexibility of the training offered.

While it is argued that private RTOs can improve VET completion rates, concerns have been raised that the quality of VET training provided by private RTOs is variable, and can reduce the overall quality of VET training. This concern has been raised in several studies including Essential Services Commission (ESC, 2011) and Productivity Commission (2012). The ESC study noted that “there is some evidence that competition drives down quality where there is an inadequate quality control regime... the attempt to increase choice under the current regime may in fact undermine their goals. Students are seeking a qualification and will often seek the cheapest, quickest and easiest pathway and provider. They are not in a position to understand how their choice of provider and delivery method may impact on the adequacy of their learning or their employability.”

In 2011, the Australian Skills Quality Authority (ASQA) was established to regulate courses and training providers, with the aim of ensuring that certain quality standards are met. The National Skills

Standards Council (NSSC) is currently reviewing the standards used to regulate the VET system, focussing on issues of quality.

Comparing the costs and benefits of VET education for public and private providers would require data on student outcomes, total tuition costs and time spent in study. While this information is available for the public VET system (providers who receive some government funding) it is not currently available for the private VET system (providers who do not receive any government funding). Therefore, this report has been unable to the relative costs and benefits of public and private VET provision. If the necessary data becomes available, further research in this area would make a useful contribution to policy making.

5.3 International students

VET can contribute to the size of the Australian labour force by attracting international students who, upon completing their studies, go on to work in Australia. International students in VET were discussed in briefly in section 2. A more detailed discussion is included in Appendix C. This section presents modelling of a scenario in which reform to visa requirements allows a larger proportion of international VET students to work in Australia following the completion of their studies.

For example, the Temporary Graduate (subclass 485) visa currently allows international university students to work in Australia following the completion of their studies for up to four years. If eligibility for this visa were to be extended to the VET sector, then a larger number of international VET students may join and remain in the Australian workforce following their studies.

Specifically, the scenario presented in this section involves two policy changes.

- First, it is assumed that governments and the private sector increase VET funding by the same amount as the committed funding scenario, presented in section 5.1. As discussed previously, this involves an increase in total VET funding compared to the baseline by \$2.7 billion over the 5 years between 2013 and 2017.
- Second, a change to visa requirements is assumed to lead to a 50 per cent increase in the number of international students granted visas over the five years between 2013 and 2017. As discussed in Appendix C, there is estimated to be between 8,000 and 11,000 individuals granted visas to work in Australia following their VET studies each year. Over five years, a 50 per cent increase would therefore be equivalent to granting approximately 24,000 additional visas to individuals with VET qualifications. It is assumed that 16 per cent of these visas are temporary, and that the remainder are permanent.

5.3.1 Student numbers

The additional funding compared to the baseline in both the committed funding scenario and the international student scenario increases the number of domestic VET students. Therefore, additional student numbers are the same in both scenarios, at 218,000. All of these additional students are domestic students who receive at least some government support for their VET studies.

Importantly, the additional funding is assumed not to have any effect on international student numbers, because they are not eligible for government funding. In addition, the changes to visa requirements for international students are assumed not to have any impact on international student

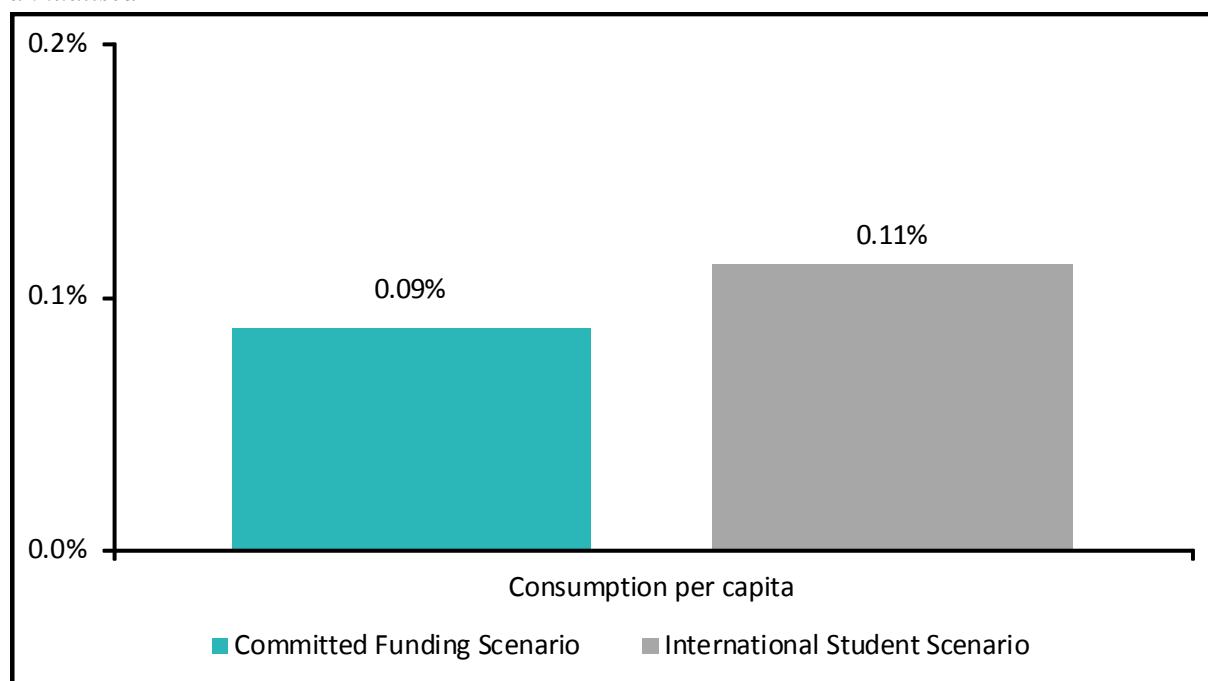
numbers. If, instead, the reforms to visa policy encouraged additional international students to study in Australia, this would result in additional export earnings for the VET sector which are not included in the results below.

5.3.2 Household living standards

Allowing additional international students to remain in Australia following the completion of their studies involves increasing the population living in Australia. Therefore, to evaluate the benefit of this policy, it is important to measure the change in household living standards per capita. This has been approximated by examining the change in consumption per capita.

Chart 5.7 shows the annualised impact on per capita real consumption from both the committed funding scenario and the international student scenario. Per capita consumption is higher when additional international students are allowed to remain in Australia following the completion of their studies. The committed funding scenario is estimated to raise real consumption per capita by 0.09 per cent. In addition to the committed funding, if 50 per cent more international VET students are permitted to join the labour force, consumption per capita is estimated to be 0.11 per cent higher than would otherwise be the case.

Chart 5.7: Impact on real consumption and GDP per capita, per cent change from baseline, annualised



Source: Independent Economics estimates using the Independent Education Model

In general, for domestic students the same four factors drive the net impacts on consumption per capita, as were discussed for the committed funding scenario in section 5.1. Specifically, the greater spending on domestic students in both the committed funding scenario and international student scenario has the following effects.

- First, governments and domestic students bear the direct costs of tuition.
- Second, domestic students bear the costs of foregone earnings and leisure.

- Third, the additional VET education for domestic students improves their employability of the, because they have a higher probability of participating in the labour force and of being employed. They also have a higher probability of working full time.
- Finally, the higher level of education for domestic students raises their productivity, allowing them to work in occupations with higher wages.

In both scenarios, this leads to a boost to per capita consumption of an annualised 0.09 per cent. In the international student scenario, also allowing a greater proportion of international students to work in Australia following their studies has an additional benefit for per capita consumption of 0.02 per cent, raising the overall net impact for this scenario to 0.11 per cent. Allowing additional international students to work in Australia following their studies boosts the proportion of the labour force that is skilled, raising average earnings and average consumption. In particular, international VET students have a number of attributes which contribute to their effect on consumption per capita.

- Firstly, international VET students tend to undertake higher levels of qualification compared to domestic VET students. For example, around 80 per cent of international VET students study at Diploma level or Advanced Diploma¹⁸. On the other hand, it is estimated that around 22 per cent of the additional domestic students study at this level under the reforms considered in this report. This means that the productivity and wages of the average international VET graduate are expected to be higher than the productivity and wages earned by the average domestic VET graduate.
- Second, only 27 per cent of international students are aged 25 years or older¹⁹. This compares to domestic VET students, 57 per cent of whom are 25 years or older. This means that international students tend to be younger and have a longer working life remaining after they complete their studies, and can therefore generate greater earnings benefits.

Importantly, this scenario assumes that there is no change to the total number of international students studying in Australia's VET institutions. That is, the reforms to the visa system are assumed to allow a greater proportion of international students to remain in Australia upon completing their studies, but not to induce additional students to study in Australia. If the reforms did encourage additional VET students to study in Australia, then the benefits from additional export earnings would need to be added to the results of this scenario.

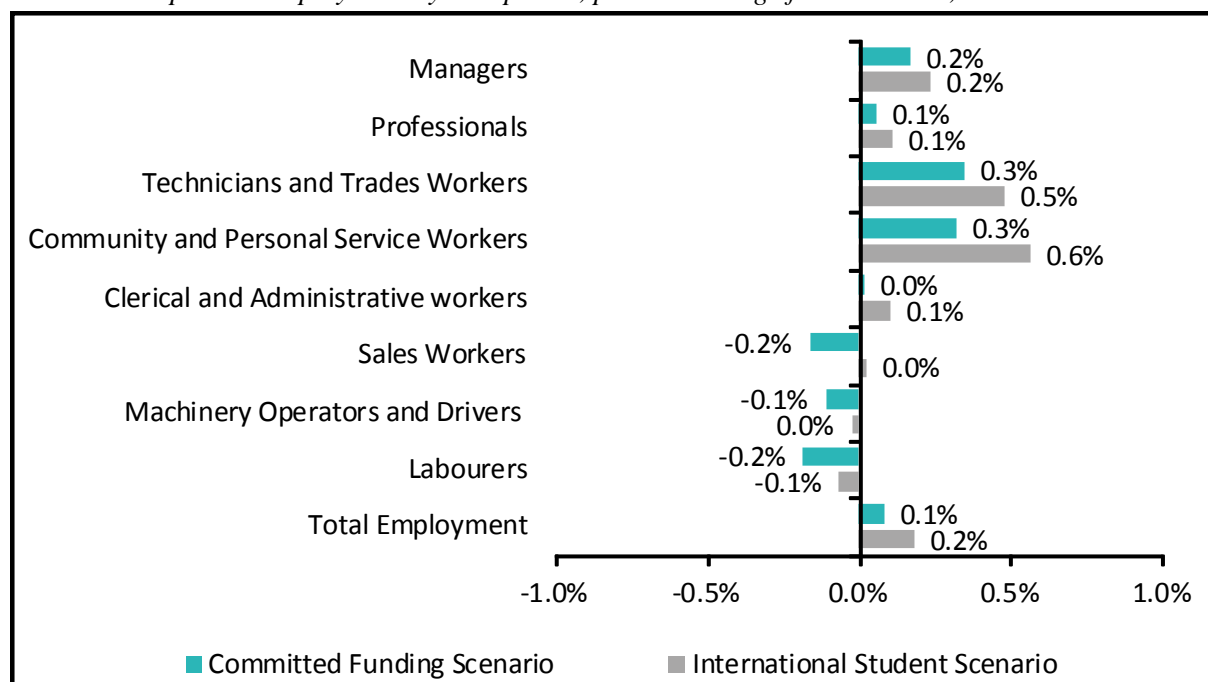
5.3.3 Employment

Similar to the committed funding scenario, the expansion of VET funding raises overall employment for domestic VET students. In addition, allowing a greater number of international VET students to work in Australia further increases the size of the labour force and adds to employment. As shown in Chart 5.8, employment impacts are larger in the international student scenario. Chart 5.8 also summarises the expected impact on the pattern of employment by occupation. With a more educated and productive labour force, workers move into occupations which are more highly skilled and command higher wages. Additional international students joining the workforce further boost employment in occupations which have a large proportion of VET-trained workers, such as Technicians and Trades workers, and Community and Personal Service workers.

¹⁸ABS, International students in Australia, Australian Yearbook 2007, CAT 4102.0

¹⁹ABS, International students in Australia, Australian Yearbook 2007, CAT 4102.0

Chart 5.8: Impact on employment by occupation, per cent change from baseline, annualised

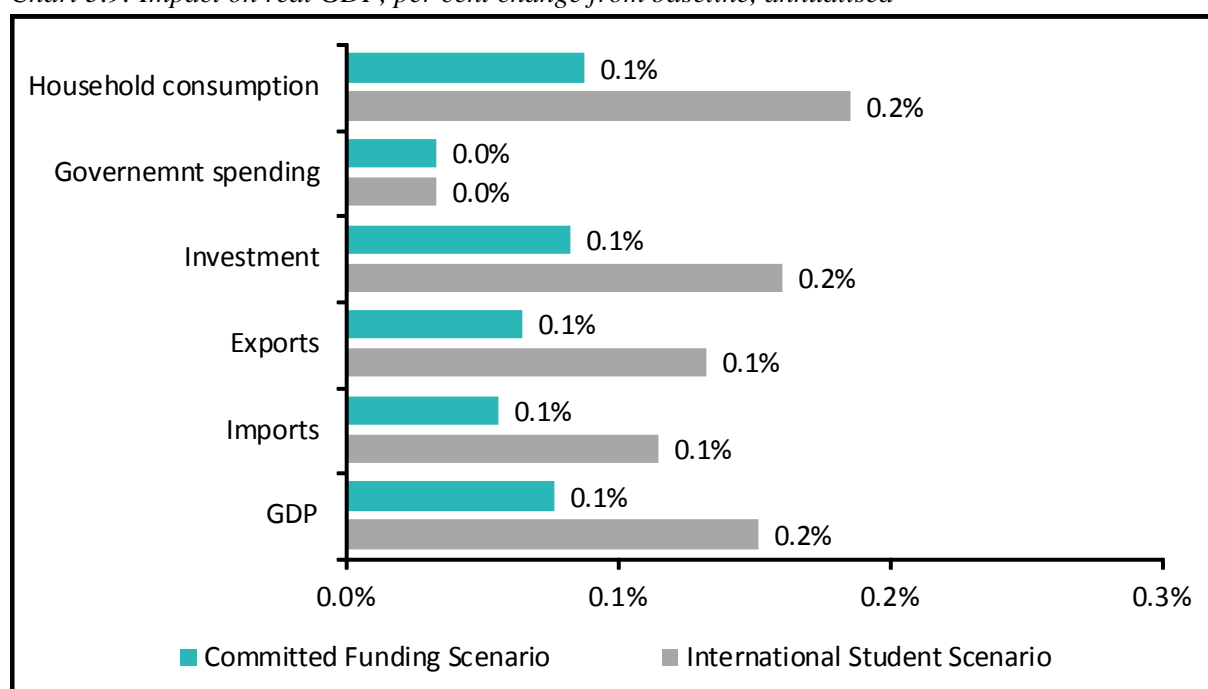


Source: Independent Economics estimates using the Independent Education Model

5.3.4 Gross Domestic Product (GDP)

These higher levels of employment and labour productivity lead to an expansion in the productive capacity of the economy. This results in higher levels of GDP than would otherwise be the case. The impact on GDP overall and on each of its components is shown in Chart 5.9 below.

Chart 5.9: Impact on real GDP, per cent change from baseline, annualised

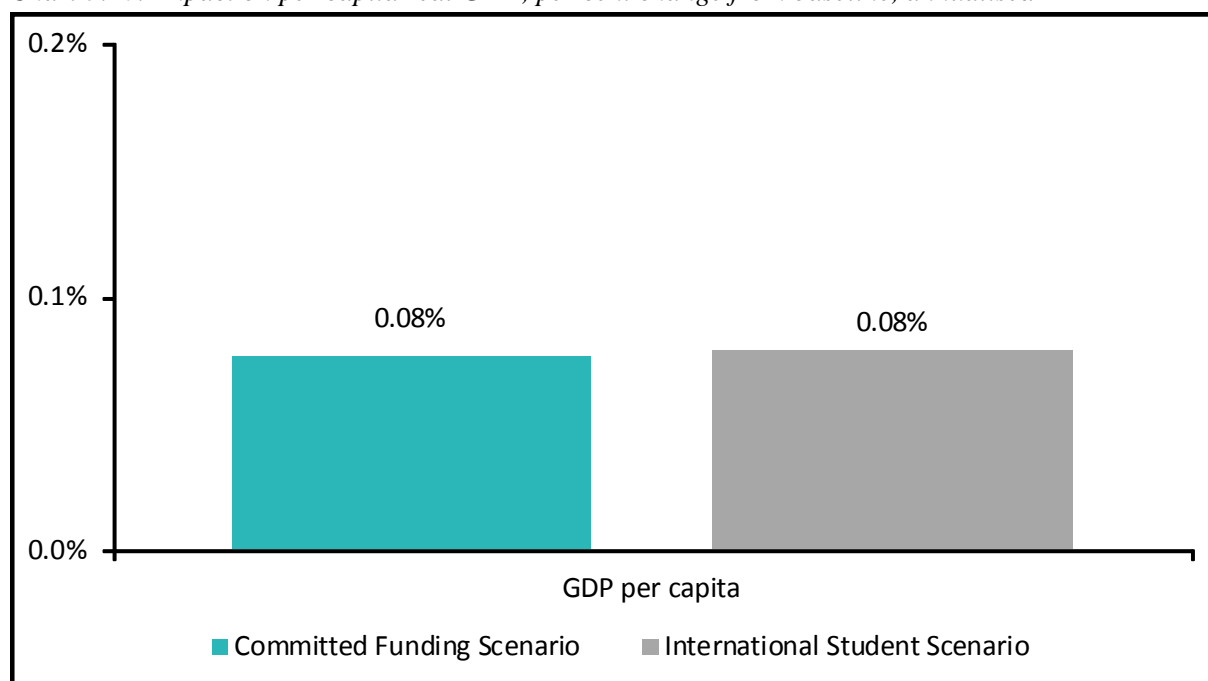


Source: Independent Economics estimates using the Independent Education Model

Comparing the results from the two scenarios indicates that allowing additional international students to work in Australia upon completing their studies can boost the effect on total GDP. While higher VET funding under the committed funding scenario is expected add 0.1 per cent to GDP, if 50 per cent more international students are also allowed to join the labour force, this impact doubles to 0.2 per cent.

However, part of this gain to overall GDP will come about because of the larger workforce and population. Therefore, the effect on *per capita* GDP is a better indicator of the effect of allowing additional international students to join the labour force. This is shown in Chart 5.10 below. The results indicate that granting additional visas to VET students when they finish has a negligible effect on per capita GDP. The effect on per capita GDP is smaller than the effect on per capita consumption because GDP includes the effect of other factors, such as the amount of capital used per worker.

Chart 5.10: Impact on per capita real GDP, per cent change from baseline, annualised



Source: Independent Economics estimates using the Independent Education Model

Importantly, the impact on per capita consumption is a better indicator than per capita GDP of the net benefits of allowing additional international students to work in Australia upon completing their studies. Based on this consumption measure, this policy would be expected to yield net benefits to Australian living standards.

5.4 Comparison to other studies

As discussed in sections 3 and 5, this report finds that the net benefits from investment in VET are substantial. In particular, the results are significantly larger than the benefits estimated in the main modelling in a recent report by the Productivity Commission (2012). Table 5.3 below shows that the main reason for these differences is that the current report more fully includes the benefits of module completions as well as graduations, and also includes benefits from re-skillers as well as up-skillers.

Table 5.3. Comparison of Productivity Commission and Independent Economics results

		Productivity Commission [1]	Independent Economics [2]	Independent Economics [3]
	units	graduates & up-skill only	graduates & up-skill only	all groups (incl modules & re- skill)
Additional students	persons	387,000	218,000	218,000
Qualifications granted				
Dip/Adv dip	persons	21,637	13,046	13,046
Certs III/IV	persons	95,313	58,619	58,619
Total net benefits (present value)	\$m	5,039	2,055	13,395
Annualised net benefits	\$m	302	90	589
Annualised net benefits per student	\$	781	416	2,704

Source: Productivity Commission 2012, p65 and p145; Independent Economics estimates

The most relevant scenario for comparison with the Commission's modelling is a scenario estimating the effect of the National Partnership Agreement on Productivity Places Program (NPAPPP). The results from this scenario are shown in column [1] of the table above. The Commission estimates that the NPAPPP has allowed 387,000 additional students to enter the VET system. Taking into account only the benefits from students who complete a full qualification at a level higher than their previous education, the Commission estimates that these additional students generated a net benefit of \$5.0 billion in present value terms. This implies that the annualised²⁰ net benefit is around \$0.3 billion. Therefore, the per-student annualised net benefits are estimated to be \$781.

The most comparable scenario analysed in this report is the Committed Funding Scenario, presented in section 5.1. This scenario estimates the impact of \$2.7 billion in additional VET spending over five years, which is expected to allow an additional 218,000 students to undertake study at the Certificate III level or above. Our complete modelling includes the benefits of module completers, graduates, re-skillers and up-skills, and some key results from this complete modelling are reproduced in column [3] of the table above.

However, to allow comparison between the Independent Economics and Productivity Commission modelling, the effects of the Committed Funding Scenario have been estimated excluding the benefits

²⁰ This has been calculated as the perpetuity equivalent of the total net benefit, which is the annual stream of payments, received indefinitely, that has the same present value. The discount rate used is that assumed by the Commission, 6.0 per cent.

from module completions and re-skilling. This is presented in column [2] of the table above. As shown in the table, this policy involves fewer VET students than the NPAPPP policy analysed by the Commission. It can also be seen that, before allowing for the benefits from module completions and re-skilling, this report's estimates of the annualised net benefits per student from expanding VET are more conservative than those of the Productivity Commission, at \$416 against \$781.

As discussed in section 2 of this report, module completers and re-skillers make up a large proportion of VET students, and there is strong evidence that these students also generate employability and productivity benefits. When these benefits are also taken into account, the per-student net benefits are substantially higher, at \$2,704. This is our complete estimate of the net benefits of VET education.

The Productivity Commission does include an estimate of the benefits from module completers and re-skillers for one of its policy scenarios (the 'Potential' scenario), raising the net benefit by 55 per cent. Assuming the net benefit per student increases by the same percentage, it would increase from \$781 to \$1,211, which is well below this report's estimate of \$2,704. The lower estimate from the Productive Commission reflects restrictive assumptions that confine the benefits from module completing and re-skilling to only a proportion of mature age learners, with no benefits for younger learners. Our estimate reflects a careful review of the relevant econometric literature, as detailed earlier.

6 Policy implications

Governments at the state and national level have committed to ambitious targets for the Australian VET sector, which aim to increase the proportion of the population with qualifications at the Certificate III level or above. This report has examined the benefits and costs of expanding the VET sector in its current form. It has also explored the effects of policies to improve completion rates and the quality of VET tuition. The effect of allowing additional international VET students to join the Australian labour force after completing their studies has also been estimated. This section summarises the policy implications that can be drawn from this report.

6.1 Benefits and costs of VET policies

Are there net economic benefits from increasing investment in VET beyond the 2011 policy settings? If so, how large are these benefits?

Overall, net economic benefits can be expected from increasing government investment in VET beyond 2011 policy settings. Specifically, the internal rate of return²¹ on investment in VET at the Certificate III level and above is estimated to be 18 per cent. This is driven by four main costs and benefits.

- First, governments, students and businesses bear the direct costs of tuition.
- Second, students bear the costs of foregone earnings opportunities while they are studying.
- Third, the main benefit of VET education is that it improves the employability of students, boosting their pre-tax earnings. Their probability of participating in the labour force is higher and their probability of being unemployed is lower. VET also raises the probability that an individual works full time.
- Fourth, VET raises the productivity of its students, allowing them to work in occupations which command higher wages than they otherwise would, also raising pre-tax earnings.

Importantly, the estimates in this report take into account a number of considerations not commonly included in analyses of this kind. First, while previous studies mainly focus on benefits generated by students attaining full qualifications, this study also fully takes into account the benefits from completing modules. Second, while other studies mainly focus on study at a level higher than previously-held qualifications, this report also models the benefits from study at the same or lower level than previously-held qualifications. Third, the benefits of VET are analysed in terms of the effect on the supply of and demand for a detailed set of occupations, meaning that the effects on different industries can be investigated. Finally, this report estimates the rate of return on investment in VET, which allows comparisons to be made with returns from alternative government policies.

At 18 per cent, the rate of return on investment in VET is high. This is especially true when compared to returns on business investment, which may be around 9 per cent. Such high returns indicate that there may be under-investment in VET. This may be explained by myopia in potential

²¹ The Internal Rate of Return is the discount rate that equates the present value of the costs with the present value of the benefits.

students, inadequate access to loans and unmet student demand for places. This under-investment and market failure is a reason for government support for VET.

Governments have already committed additional funding for VET over the period from 2013 to 2017. An increase in spending from public and private sources is likely to yield net economic benefits.

- Based on current policy commitments, it is estimated that governments and the private sector will spend an additional \$2.7 billion on VET between 2013 and 2017, compared to 2011 policy settings. If this increase in VET spending is achieved, and students forego some earnings to undertake VET courses, Australian living standards are expected to be higher by a net amount equivalent to receiving \$0.6 billion every year indefinitely (in 2012/13 terms).
- If governments and the private sector instead spent a larger amount on VET, the net benefits would also be larger. If an additional \$6.7 billion is spent on direct tuition costs between 2013 and 2017, and students forego some earnings to undertake VET courses, living standards are expected to be higher by a net amount equivalent to receiving \$1.4 billion every year indefinitely.

This higher level of VET spending implies real annual growth of 3.6 per cent on average over the five years between 2013 and 2017. This is in line with recommendations from AWP, for 3 per cent annual growth in real spending on tertiary education (AWP, 2013). The findings in this report confirm AWP's expectations that this additional spending would yield net benefits.

As discussed above, these estimates include the costs and benefits associated with both graduates and module completers. Within the group of module completers are students who complete skill-sets. Skill sets are not qualifications, but units of competency, or combinations of units of competency, from a nationally endorsed Training Package, and often link to a licence or regulatory requirement. Skill sets are gaining prominence because employers view them as a flexible way of meeting changing industry requirements. However, the ability to design policy directly targeting skill sets is limited because students completing skill sets cannot be separately identified from the broader group of module completers.

The econometric literature and the modelling in this report indicate that a major benefit from VET is its impact on the employability of students. Therefore, if government funding can be directed to students who are not employed prior to undertaking study, then the net benefits from investment in VET are likely to be higher than estimated in this report.

If there are net benefits from increasing funding for VET, is it better simply invest in additional VET places, or is it better to also undertake reforms to improve completion rates or the quality of training?

The net benefits presented above are the effect of simply expanding the current VET system by increasing the number of places available at the Certificate III level or higher. If VET places are currently provided on an optimal basis, then the best value for money would be obtained in this manner.

However, there is debate concerning the effectiveness of Australia's current VET system, and international comparisons are inconclusive about its overall quality. Therefore, this section considers two alternative uses of the additional VET funds. Specifically, it considers, in general terms, whether it is better to spend part of the additional funds on improving completion rates or on improving the quality of training, rather than on simply increasing student numbers.

The results emphasise that it is important to consider both the costs and benefits of such policies compared to using the same funds simply expand the number of VET places. However, further research is required before determining whether specific policies to improve completion rates or the quality of tuition are better than spending the same amount on additional VET places.

While policies to **improve completion rates** may increase the benefits generated by students, they also involve additional costs. For example, teacher to student ratios may need to be higher to encourage more students to complete. Most importantly, higher completion rates also mean that students remain in the VET system for longer, resulting in higher tuition costs and foregone earnings opportunities. Whether it is better to use the additional funds to simply expand VET places or to improve completion rates depends on the benefits of higher completion rates relative to the costs.

- If both the benefits and the costs of module completion increase in proportion to the number of modules completed, then improving completion rates may not be better than simply increasing the number of places available. This is because fewer students spending longer in VET would generate similar net benefits to more students spending a shorter period in VET.
- If the benefits of VET are more than proportional to the number of modules completed, but the costs are proportional, then it may be better to increase completion rates than increase the number of VET places. For example, Karmel and Fieger (2012) find that, for students who are not employed before study, the benefit from completing a full qualification is significantly larger than the benefits from completing modules. If policies to improve completion rates can be targeted to these students, then it may be better to spend some of the additional funds on such policies rather than simply increasing the number of students.

To judge which of these scenarios is most likely, more research is required to investigate the costs of module completion, relative to the benefits.

Policies to **improve the quality of VET tuition** can improve the employability and productivity of VET students, but will involve additional costs per student. Whether a better result can be achieved from spending some of the additional funds on the quality of VET tuition rather than on additional student places depends on the extent to which the additional funding improves student outcomes. For example, if an additional 10 per cent per student per semester can raise the productivity of students by

more than 6.5 per cent, or if an equivalent employability gain can be generated, then it may be better to spend some of the funds on improving quality rather than simply increasing student numbers. Equally, if the student outcomes can be raised by less than this amount, then net benefits could be achieved by reducing per-student costs and redirecting the funds to increasing student numbers.

It has been suggested that the quality of VET training provided by private RTOs is variable. However, while there is detailed data available on the public VET system, data on the private VET system is limited, restricting comparisons of the benefits and costs under each system. As a result, a comparison of the quality of the public and private VET systems has not been made.

What is the effect of allowing additional international VET students to join the Australian labour force?

A 50 per cent increase in the number of international VET students granted visas to work in Australia upon completing their studies is expected to boost per capita consumption levels. Further, this does not take into account the additional export earnings that may be available if the increased likelihood of working in Australia encourages additional international students to study in Australia.

6.2 Further research

This report does not analyse the costs and benefits of specific policies to lift completion rates or the quality of training. Similarly, we have not assessed the quality of the Australian VET system against international benchmarks. We leave both of these analyses to future research.

This study highlights some key areas in which further research would contribute to policy development. These are briefly listed below.

- This report takes into account the benefits and costs of module completers in general, but additional data is required to estimate the net benefits of undertaking skill sets. Collecting and publishing data on students who undertake skill sets would allow the analysis in this report to be extended.
- There is currently limited data available on VET providers that do not receive government funding. This restricts analysis comparing the costs and benefits of VET in the public and private sectors.
- A more detailed understanding of the costs of module completion, relative to the benefits, is required to fully understand the net benefits of improving completion rates.
- This report does not analyse the costs and benefits of specific policies to lift completion rates or the quality of training. Similarly, we have not assessed the quality of the Australian VET system against international benchmarks. We leave both of these analyses to future research.

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Appendix A Occupations data used in the Independent Education model

The table below lists each of the 43 occupations identified and separately modelled in the Independent Education model. These classifications are based on the ANZSCO classifications from the ABS. They are used in both the labour market module and the Independent CGE model.

Table A.1 Occupations in the Independent Education Model

1. Managers	5. Clerical and Administrative Workers
Chief Executives, General Managers and Legislators	Office Managers and Program Administrators
Farmers and Farm Managers	Personal Assistants and Secretaries
Specialist Managers	General Clerical Workers
Hospitality, Retail and Service Managers	Inquiry Clerks and Receptionists
	Numerical Clerks
	Clerical and Office Support Workers
	Other Clerical and Administrative Workers
2. Professionals	6. Sales Workers
Arts and Media Professionals	Sales Representatives and Agents
Business, Human Resource and Marketing Professionals	Sales Assistants and Salespersons
Design, Engineering, Science and Transport Professionals	Sales Support Workers
Education Professionals	
Health Professionals	
ICT Professionals	
Legal, Social and Welfare Professionals	
3. Technicians and Trades Workers	7. Machinery Operators and Drivers
Engineering, ICT and Science Technicians	Machine and Stationary Plant Operators
Automotive and Engineering Trades Workers	Mobile Plant Operators
Construction Trades Workers	Road and Rail Drivers
Electrotechnology and Telecommunications Trades Workers	Storepersons
Food Trades Workers	
Skilled Animal and Horticultural Workers	
Other Technicians and Trades Workers	
4. Community and Personal Service Workers	8. Labourers
Health and Welfare Support Workers	Cleaners and Laundry Workers
Carers and Aides	Construction and Mining Labourers
Hospitality Workers	Factory Process Workers
Protective Service Workers	Farm, Forestry and Garden Workers
Sports and Personal Service Workers	Food Preparation Assistants
	Other Labourers

Table A.2. Occupation shares of employment for each industry

	Agriculture, forestry and fishing	Mining	Manufacturing	Electricity, gas, water and waste services
Chief Executives, General Managers and Legislators	1%	2%	1%	2%
Farmers and Farm Managers	55%	0%	0%	0%
Specialist Managers	2%	19%	8%	13%
Hospitality, Retail and Service Managers	3%	0%	2%	0%
Arts and Media Professionals	0%	0%	1%	0%
Business, Human Resource and Marketing Professionals	1%	5%	3%	10%
Design, Engineering, Science and Transport Professionals	1%	11%	4%	11%
Education Professionals	0%	0%	0%	0%
Health Professionals	0%	1%	0%	1%
ICT Professionals	0%	1%	1%	4%
Legal, Social and Welfare Professionals	0%	0%	0%	1%
Engineering, ICT and Science Technicians	1%	6%	4%	4%
Automotive and Engineering Trades Workers	2%	10%	12%	4%
Construction Trades Workers	0%	0%	2%	1%
Electrotechnology and Telecommunications Trades Workers	0%	3%	3%	7%
Food Trades Workers	0%	0%	3%	0%
Skilled Animal and Horticultural Workers	1%	0%	1%	0%
Other Technicians and Trades Workers	0%	1%	6%	1%
Health and Welfare Support Workers	0%	0%	0%	0%
Carers and Aides	0%	0%	0%	0%
Hospitality Workers	0%	0%	0%	0%
Protective Service Workers	0%	0%	0%	0%
Sports and Personal Service Workers	0%	0%	0%	0%
Office Managers and Program Administrators	1%	2%	1%	8%
Personal Assistants and Secretaries	1%	1%	0%	2%
General Clerical Workers	1%	1%	2%	1%
Inquiry Clerks and Receptionists	0%	0%	1%	0%
Numerical Clerks	2%	2%	2%	4%
Clerical and Office Support Workers	0%	0%	0%	1%
Other Clerical and Administrative Workers	0%	2%	2%	4%
Sales Representatives and Agents	0%	0%	2%	2%
Sales Assistants and Salespersons	0%	0%	2%	0%
Sales Support Workers	0%	0%	0%	0%
Machine and Stationary Plant Operators	0%	20%	6%	9%
Mobile Plant Operators	4%	2%	2%	2%
Road and Rail Drivers	1%	2%	2%	1%
Storepersons	0%	0%	4%	0%
Cleaners and Laundry Workers	0%	0%	3%	0%
Construction and Mining Labourers	2%	3%	1%	3%

Factory Process Workers	3%	0%	14%	1%
Farm, Forestry and Garden Workers	16%	0%	1%	0%
Food Preparation Assistants	0%	0%	0%	0%
Other Labourers	1%	1%	2%	3%
Total	100%	100%	100%	100%

Source: Independent Economics estimates based on ABS data

Table A.2 continued. Occupation shares of employment for each industry

	Construction	Wholesale trade	Retail trade	Accommodation and food services
Chief Executives, General Managers and Legislators	1%	1%	2%	5%
Farmers and Farm Managers	0%	2%	0%	0%
Specialist Managers	6%	7%	5%	7%
Hospitality, Retail and Service Managers	3%	10%	15%	11%
Arts and Media Professionals	0%	0%	0%	0%
Business, Human Resource and Marketing Professionals	1%	6%	2%	1%
Design, Engineering, Science and Transport Professionals	1%	1%	1%	0%
Education Professionals	0%	0%	0%	0%
Health Professionals	0%	0%	2%	0%
ICT Professionals	0%	1%	1%	0%
Legal, Social and Welfare Professionals	0%	0%	0%	0%
Engineering, ICT and Science Technicians	5%	0%	2%	0%
Automotive and Engineering Trades Workers	4%	1%	4%	0%
Construction Trades Workers	28%	0%	0%	0%
Electrotechnology and Telecommunications Trades Workers	10%	1%	1%	0%
Food Trades Workers	1%	3%	0%	15%
Skilled Animal and Horticultural Workers	6%	1%	0%	1%
Other Technicians and Trades Workers	1%	0%	1%	0%
Health and Welfare Support Workers	0%	0%	0%	0%
Carers and Aides	0%	0%	0%	0%
Hospitality Workers	0%	0%	0%	21%
Protective Service Workers	0%	0%	0%	0%
Sports and Personal Service Workers	0%	0%	0%	0%
Office Managers and Program Administrators	2%	1%	2%	1%
Personal Assistants and Secretaries	1%	1%	1%	0%
General Clerical Workers	2%	10%	0%	0%
Inquiry Clerks and Receptionists	1%	5%	0%	0%
Numerical Clerks	2%	3%	3%	2%
Clerical and Office Support Workers	0%	0%	0%	0%
Other Clerical and Administrative Workers	0%	2%	3%	1%
Sales Representatives and Agents	1%	3%	1%	2%
Sales Assistants and Salespersons	0%	11%	34%	6%

Sales Support Workers	0%	3%	8%	1%
Machine and Stationary Plant Operators	1%	1%	1%	0%
Mobile Plant Operators	3%	2%	1%	0%
Road and Rail Drivers	2%	6%	1%	1%
Storepersons	0%	11%	2%	0%
Cleaners and Laundry Workers	4%	1%	0%	3%
Construction and Mining Labourers	10%	0%	0%	0%
Factory Process Workers	0%	2%	1%	0%
Farm, Forestry and Garden Workers	1%	2%	0%	0%
Food Preparation Assistants	0%	0%	1%	16%
Other Labourers	2%	0%	7%	2%
Total	100%	100%	100%	100%

Source: Independent Economics estimates based on ABS data

Table A.2 continued. Occupation shares of employment for each industry

	Transport, postal and warehousing	Information media and telecommunications	Financial and insurance services	Rental, hiring and real estate services
Chief Executives, General Managers and Legislators	1%	2%	4%	3%
Farmers and Farm Managers	0%	0%	0%	0%
Specialist Managers	8%	5%	23%	9%
Hospitality, Retail and Service Managers	1%	6%	3%	4%
Arts and Media Professionals	0%	17%	0%	0%
Business, Human Resource and Marketing Professionals	3%	8%	43%	8%
Design, Engineering, Science and Transport Professionals	2%	4%	1%	1%
Education Professionals	0%	2%	0%	0%
Health Professionals	0%	0%	1%	0%
ICT Professionals	1%	7%	10%	1%
Legal, Social and Welfare Professionals	0%	0%	2%	0%
Engineering, ICT and Science Technicians	1%	4%	0%	1%
Automotive and Engineering Trades Workers	3%	0%	0%	1%
Construction Trades Workers	0%	0%	0%	0%
Electrotechnology and Telecommunications Trades Workers	1%	6%	0%	0%
Food Trades Workers	0%	0%	0%	1%
Skilled Animal and Horticultural Workers	0%	0%	0%	1%
Other Technicians and Trades Workers	0%	7%	0%	0%
Health and Welfare Support Workers	0%	0%	0%	0%
Carers and Aides	0%	0%	0%	0%
Hospitality Workers	0%	0%	0%	0%
Protective Service Workers	1%	0%	0%	0%
Sports and Personal Service Workers	2%	0%	0%	0%

Office Managers and Program Administrators	3%	1%	1%	4%
Personal Assistants and Secretaries	1%	1%	1%	3%
General Clerical Workers	2%	4%	1%	4%
Inquiry Clerks and Receptionists	1%	8%	0%	4%
Numerical Clerks	3%	2%	7%	4%
Clerical and Office Support Workers	7%	1%	0%	0%
Other Clerical and Administrative Workers	8%	2%	1%	2%
Sales Representatives and Agents	2%	3%	1%	30%
Sales Assistants and Salespersons	1%	4%	0%	9%
Sales Support Workers	1%	1%	0%	0%
Machine and Stationary Plant Operators	3%	0%	0%	1%
Mobile Plant Operators	8%	0%	0%	1%
Road and Rail Drivers	28%	0%	0%	1%
Storepersons	2%	1%	0%	1%
Cleaners and Laundry Workers	1%	1%	0%	1%
Construction and Mining Labourers	0%	0%	0%	1%
Factory Process Workers	0%	0%	0%	0%
Farm, Forestry and Garden Workers	0%	0%	0%	0%
Food Preparation Assistants	0%	0%	0%	0%
Other Labourers	4%	1%	0%	2%
Total	100%	100%	100%	100%

Source: Independent Economics estimates based on ABS data

Table A.2 continued. Occupation shares of employment for each industry

	Professional , scientific and technical services	Administrativ e and support services	Public administratio n and safety	Educatio n and training
Chief Executives, General Managers and Legislators	2%	3%	1%	1%
Farmers and Farm Managers	0%	0%	0%	0%
Specialist Managers	8%	9%	8%	8%
Hospitality, Retail and Service Managers	0%	0%	4%	0%
Arts and Media Professionals	1%	0%	2%	0%
Business, Human Resource and Marketing Professionals	20%	14%	8%	5%
Design, Engineering, Science and Transport Professionals	18%	1%	4%	3%
Education Professionals	0%	0%	3%	52%
Health Professionals	1%	2%	2%	1%
ICT Professionals	11%	2%	2%	2%
Legal, Social and Welfare Professionals	8%	1%	3%	2%
Engineering, ICT and Science Technicians	8%	2%	3%	2%
Automotive and Engineering Trades Workers	1%	2%	1%	0%
Construction Trades Workers	0%	1%	0%	0%
Electrotechnology and Telecommunications Trades Workers	1%	2%	0%	0%

Food Trades Workers	0%	0%	1%	0%
Skilled Animal and Horticultural Workers	1%	0%	1%	0%
Other Technicians and Trades Workers	1%	0%	1%	1%
Health and Welfare Support Workers	0%	1%	5%	1%
Carers and Aides	0%	0%	4%	3%
Hospitality Workers	0%	0%	1%	0%
Protective Service Workers	0%	0%	7%	1%
Sports and Personal Service Workers	0%	8%	2%	5%
Office Managers and Program Administrators	3%	4%	6%	5%
Personal Assistants and Secretaries	3%	2%	2%	2%
General Clerical Workers	1%	0%	10%	0%
Inquiry Clerks and Receptionists	1%	0%	3%	0%
Numerical Clerks	4%	3%	3%	2%
Clerical and Office Support Workers	2%	1%	1%	0%
Other Clerical and Administrative Workers	3%	3%	8%	2%
Sales Representatives and Agents	1%	3%	0%	0%
Sales Assistants and Salespersons	0%	0%	0%	0%
Sales Support Workers	0%	0%	0%	0%
Machine and Stationary Plant Operators	0%	1%	0%	0%
Mobile Plant Operators	0%	1%	1%	0%
Road and Rail Drivers	0%	0%	1%	0%
Storepersons	0%	0%	0%	0%
Cleaners and Laundry Workers	0%	5%	1%	0%
Construction and Mining Labourers	0%	6%	1%	0%
Factory Process Workers	0%	6%	0%	0%
Farm, Forestry and Garden Workers	0%	1%	0%	0%
Food Preparation Assistants	0%	1%	0%	0%
Other Labourers	0%	15%	1%	2%
Total	100%	100%	100%	100%

Source: Independent Economics estimates based on ABS data

Table A.2 continued. Occupation shares of employment for each industry

	Health care and social assistance	Arts and recreation services	Other services
Chief Executives, General Managers and Legislators	1%	1%	1%
Farmers and Farm Managers	0%	0%	0%
Specialist Managers	4%	4%	2%
Hospitality, Retail and Service Managers	0%	12%	6%
Arts and Media Professionals	0%	10%	2%
Business, Human Resource and Marketing Professionals	2%	3%	2%
Design, Engineering, Science and Transport Professionals	1%	1%	1%
Education Professionals	0%	3%	3%

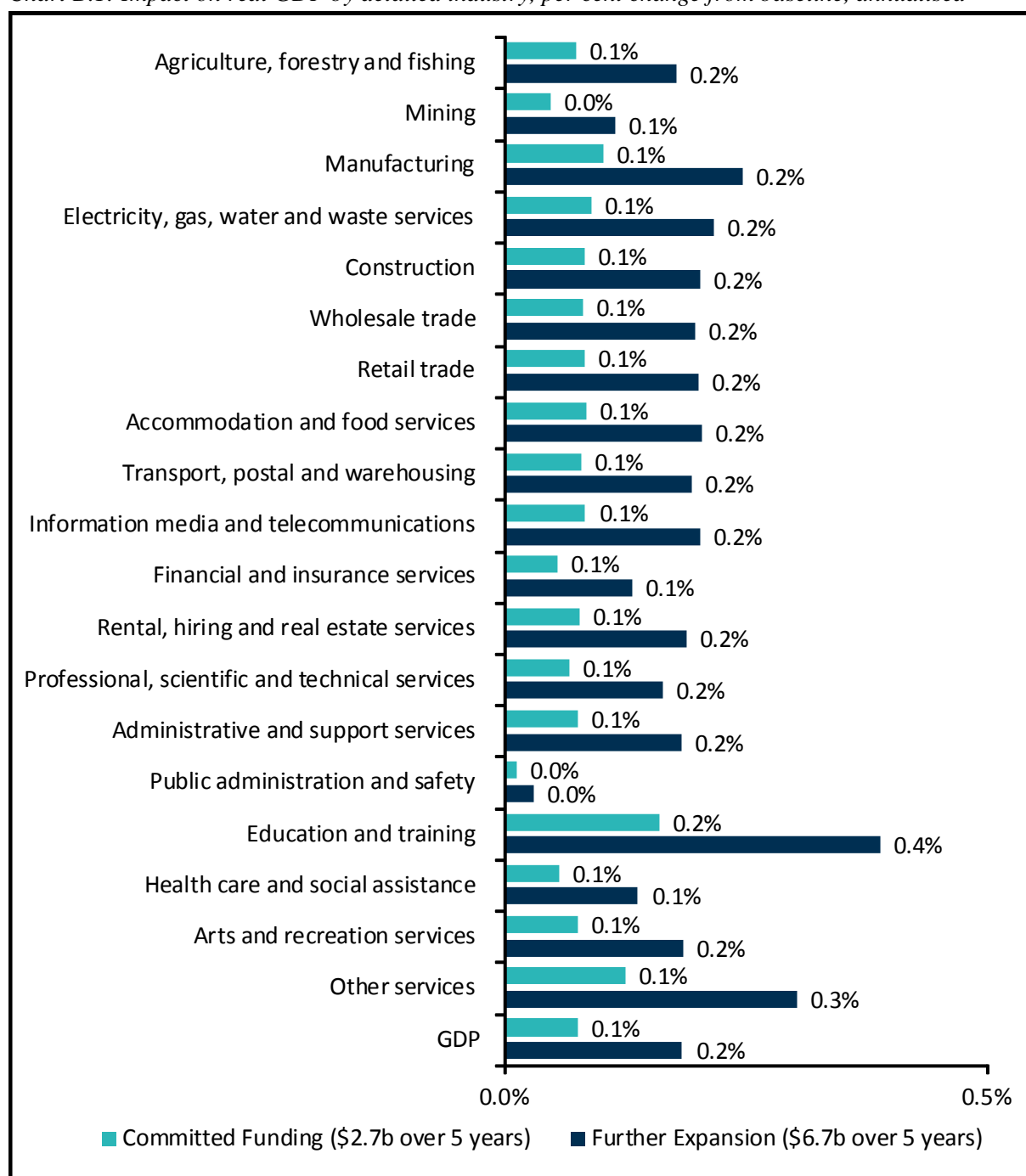
Health Professionals	30%	0%	0%
ICT Professionals	0%	1%	0%
Legal, Social and Welfare Professionals	6%	0%	2%
Engineering, ICT and Science Technicians	2%	1%	2%
Automotive and Engineering Trades Workers	0%	0%	15%
Construction Trades Workers	0%	0%	2%
Electrotechnology and Telecommunications Trades Workers	0%	1%	2%
Food Trades Workers	1%	1%	6%
Skilled Animal and Horticultural Workers	0%	10%	11%
Other Technicians and Trades Workers	1%	1%	14%
Health and Welfare Support Workers	12%	0%	1%
Carers and Aides	16%	3%	2%
Hospitality Workers	0%	16%	3%
Protective Service Workers	0%	1%	0%
Sports and Personal Service Workers	1%	6%	3%
Office Managers and Program Administrators	5%	1%	1%
Personal Assistants and Secretaries	1%	0%	1%
General Clerical Workers	2%	3%	4%
Inquiry Clerks and Receptionists	4%	5%	3%
Numerical Clerks	2%	1%	1%
Clerical and Office Support Workers	1%	1%	0%
Other Clerical and Administrative Workers	1%	0%	0%
Sales Representatives and Agents	0%	0%	0%
Sales Assistants and Salespersons	0%	2%	1%
Sales Support Workers	0%	1%	0%
Machine and Stationary Plant Operators	0%	0%	0%
Mobile Plant Operators	0%	0%	0%
Road and Rail Drivers	0%	1%	1%
Storepersons	0%	0%	0%
Cleaners and Laundry Workers	2%	2%	6%
Construction and Mining Labourers	0%	0%	0%
Factory Process Workers	1%	0%	0%
Farm, Forestry and Garden Workers	0%	3%	0%
Food Preparation Assistants	2%	0%	0%
Other Labourers	1%	1%	1%
Total	100%	100%	100%

Source: Independent Economics estimates based on ABS data

Appendix B Detailed industry results

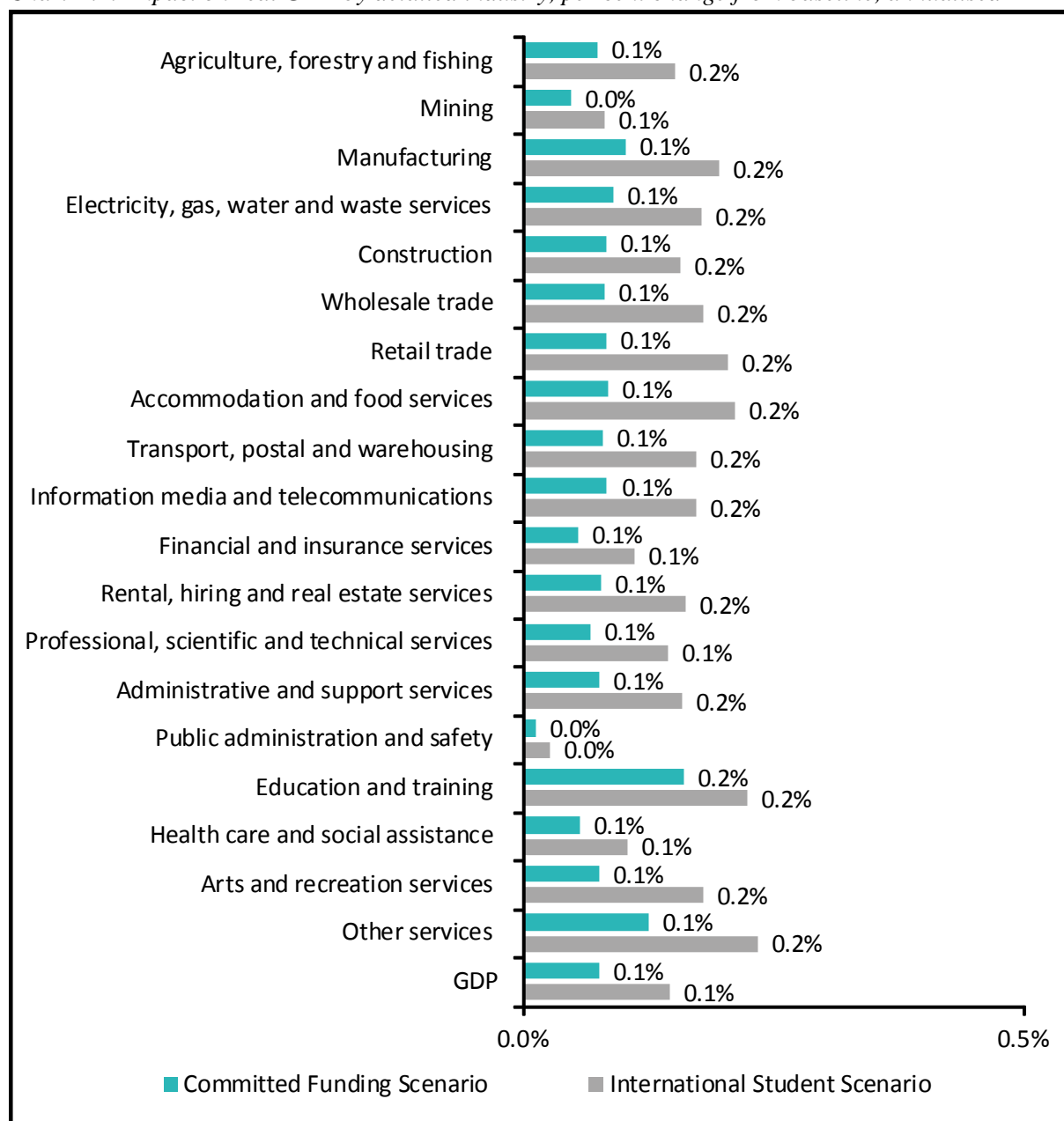
The table below shows the impacts of higher VET funding on GDP in each industry for each of the scenarios examined in this report. As discussed in section 5, the size of the impact on each industry depend on how reliant that industry is on labour trained in the VET system, and also on the share of labour in total inputs. The higher employment in the education sector is a direct result of the greater student numbers in the VET sector.

Chart B.1: Impact on real GDP by detailed industry, per cent change from baseline, annualised



Source: Independent Economics estimates using the Independent Education Model

Chart B.2: Impact on real GDP by detailed industry, per cent change from baseline, annualised



Source: Independent Economics estimates using the Independent Education Model

Appendix C Economic benefits of VET

The potential economic benefits of investment in VET take four main forms:

1. higher employability;
2. higher labour productivity;
3. a larger population, through attracting international students; and
4. other benefits, including external benefits and pathways to higher education.

These benefits were discussed in section 2 of this report. This appendix gives more detailed information on how the benefits of VET have been quantified. The analysis in this section underpins the modelling approach developed in the remainder of this report, and provides important parameters which have been used to estimate the costs and benefits of higher VET funding.

Most studies examining the benefits of education focus on individuals who graduate with a full qualification that is higher than the level of education that they had previously undertaken. Indeed, data is more readily available for this kind of analysis. Evidence of the employability and productivity benefits for these students are considered in this section.

This report also makes use of evidence showing that VET education can benefit a broader group of students, not just those completing full qualifications at a higher level than their previous education. Appendix E discusses the other groups of VET students that are expected to generate employability and productivity benefits. First, there is evidence that students who partially complete a qualification also generate employability and productivity gains. In addition, students undertaking VET study at a level lower than or equal to their currently-held qualification benefit through better matching their skills with the available jobs, improving their employability.

C.1 Employability

One of the major economic benefits of obtaining a VET qualification is that it increases the probability that an individual participates in the labour force and decreases the probability that they are unemployed. To capture both of these benefits, the term ‘employability’ is used to refer to employment rates among people aged 15 to 64.

A number of studies estimate the effect of education on employment after allowing for the effects of other attributes, such as age and gender. In general, the studies find that completing a Certificate or Diploma leads to greater workforce participation than having no post-school qualifications.

For example, Dawkins, Lim and Summers (2004) present estimates of the effect of education on the probability of labour force participation for a number of different types of individuals. They find that education improves participation for females more than for males. They also find that higher-level qualifications tend to have a larger impact on participation.

Other studies, such as Laplange, Glover and Shomos (2007) and Productivity Commission (2012) also estimate the effect of VET education on the probability of participating in the labour force.

In addition, some studies directly estimate the impact of VET qualifications on the probability of employment. Results from two examples are shown in Table C.1 below.

Karmel and Nguyen (2006) predict the probability of employment depending on an individual's gender and level of education. Using these estimates, the expected impact on the probability employment from undertaking a higher level VET qualification can be estimated, as shown in Table C.1. For example, the probability of employment for a female who had previously finished year 12 would be 7.6 percentage points higher if she also completes a Certificate III or IV.

Table C.1. Impact of VET education on probability of employment, percentage point

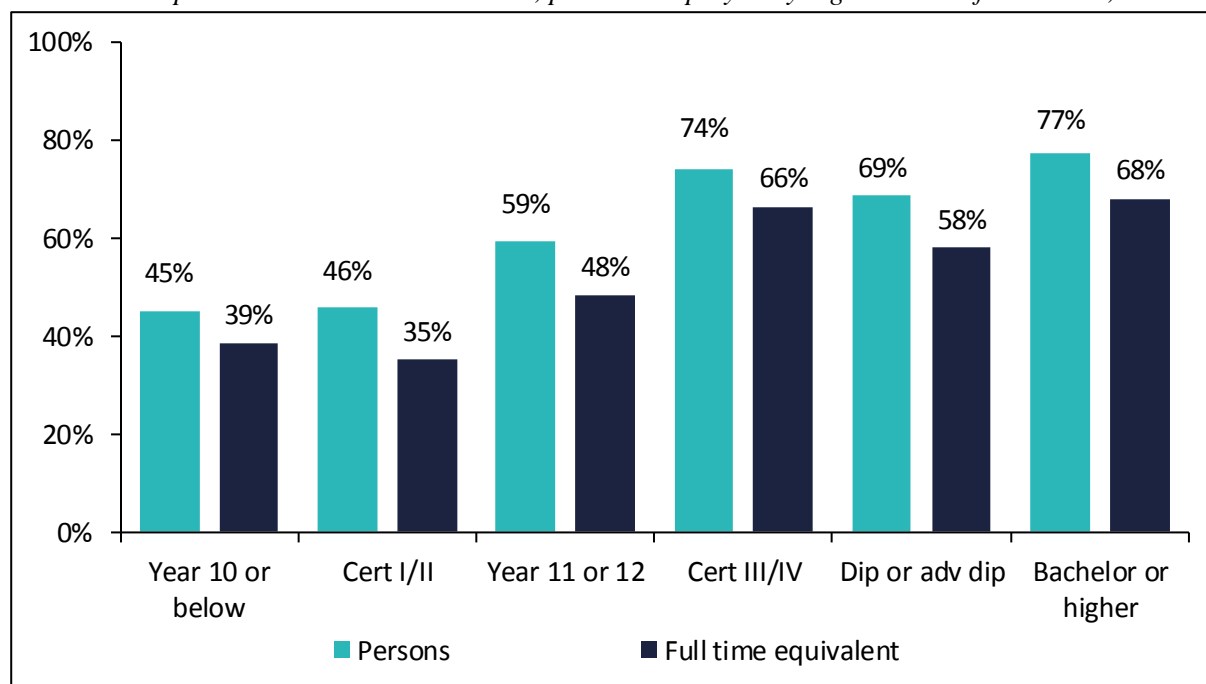
	Karmel and Nguyen 2006		Breusch and Gray 2004	
	female	male	female	male
Relative to year 11 or 12				
Certificate III/IV	7.6%	6.6%		
Diploma or Advanced Diploma	4.3%	3.8%		
Relative to year 10 or lower				
Year 12	9.5%	8.6%	13.7%	17.8%
Certificate I/II	0.0%	0.0%	13.9%	15.4%
Certificate III/IV	15.1%	13.5%	13.9%	15.4%
Diploma or Advanced Diploma	11.9%	10.7%	13.9%	15.4%

Source: Karmel and Nguyen (2006), Breuch and Gray (2004) and Independent Economics calculations

In addition, Breusch and Gray (2004) include estimates of the effect of education on employment. They estimate that a 'Trade' qualification adds around 15 percentage points to the probability of employment compared to having less than year 12.

These employability benefits are also reflected in recent data. As shown in Chart C.1 below, the proportion of the population employed is higher for those with a VET qualification than those with no post-school qualification. In addition, employment rates for those with a Diploma or Certificate III or IV are similar to those with a university level qualification.

Chart C.1. Population 15 to 64 not at school, per cent employed by highest level of education, 2009

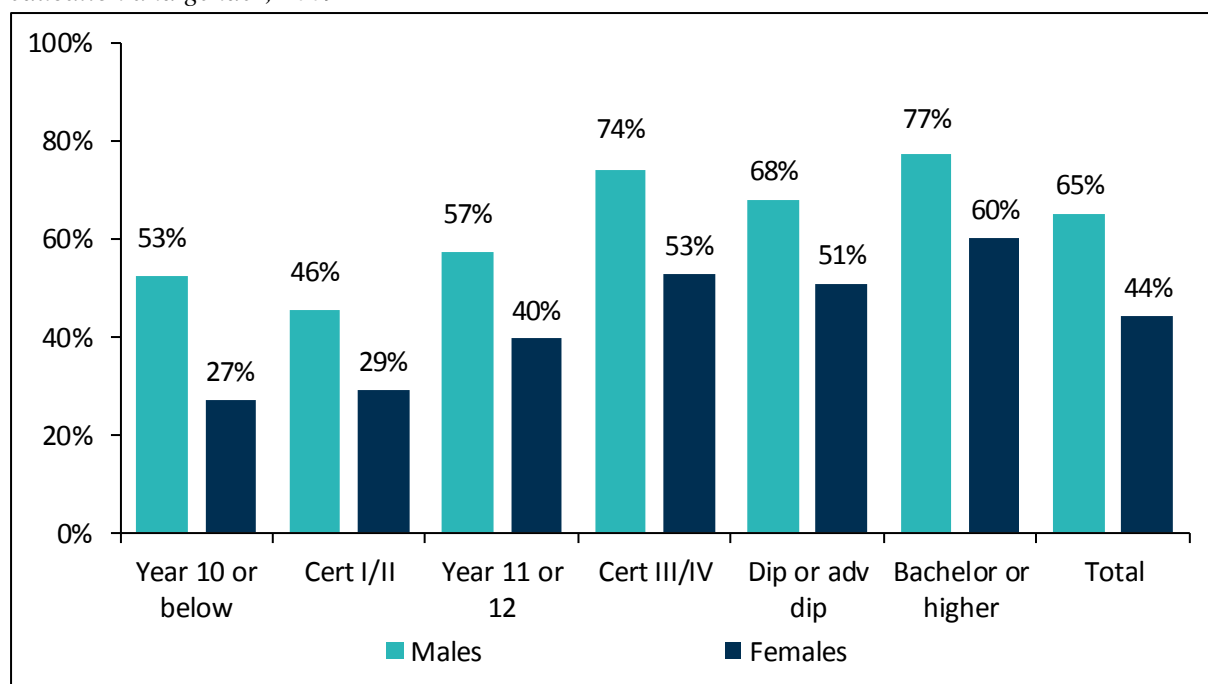


Source: ABS, Education and Training Experience, May 2009.

This report also takes into account that those with a higher level of qualification are more likely to work full time (rather than part time). For example, while 63 per cent of all workers who have completed year 11 or 12 work full time, 79 per cent of workers with a Certificate level III or IV work full time. This pattern can be seen in the full-time equivalent employment (FTE) rates shown in Chart C.1. Only 48 per cent of the population with year 11 or 12 as their highest level of qualification are employed on a FTE basis. On the other hand, 66 per cent of the population with Certificate III or IV are employed on a FTE basis.

The employment rates shown in Chart C.1 are reported in more detail in Chart C.2 below, showing the different employment rates for males and females. Males have higher FTE employment rates than females at all levels of education. However, as found in the studies discussed above, the data also indicates that VET education has a greater impact on employment rates for females than for males. For example, males with a Diploma or Advanced Diploma have FTE employment rates 16 percentage points higher than males with year 10 or lower. On the other hand, females with a Diploma or Advanced Diploma have FTE employment rates 24 percentage points higher than females with year 10 or lower.

Chart C.2. Population 15 to 65 not at school, per cent employed (FTE basis) by highest level of education and gender, 2009



Source: ABS, Education and Training Experience, May 2009.

The modelling in this report uses the FTE employment rates by level of education to estimate the employability benefits from VET education. Rather than using estimates of the employability effect from the econometric literature, this study uses information on an individual's gender and level of education to determine their probability of employment. To do this, it directly uses the FTE employment rates by gender and education shown in Chart C.2.

The advantage of this approach is that it is more comprehensive in capturing employability benefits from VET. It takes into account the gain from VET training in both a student's probability of employment and of the probability of holding a full-time job rather than a part-time job, whereas the econometric literature focusses only on the former benefit.

C.2 Productivity

A large number of studies have confirmed the positive impact that VET has on productivity, and these studies are discussed in this section.

In general, workers are paid an amount equal to the value of their marginal product. That is, the pre-tax wage that an individual earns reflects the value of their addition to their employer's production. Therefore, most studies use the amount that a VET qualification adds to wages to measure the impact of VET on productivity.

However, the proposition that workers are paid their marginal product is based on the twin assumptions that businesses choose their output to maximise profit and sell into competitive markets. There are some cases in which these assumptions may not hold.

- The concept of profit-maximising supply is difficult to apply to public services, such as health and education. Such services may be provided free, making it difficult to place an accurate value on them. So it is possible that labour used in producing public services may be paid either less or more than the value of its marginal product.
- Some businesses have market power because they do not have many competitors or sell a product that is differentiated from their competitors' products. Where a business has market power, it has an incentive to limit production to elevate price, resulting in labour being paid less than the value of its marginal product.

While acknowledging these qualifications, this report adopts the standard practice of using wages as an indicator of productivity. This is because wages are likely to be a broadly reasonable indicator of productivity, and there is a lack of alternative indicators.

A standard approach for estimating the effect of education on wages is to estimate a Mincer equation, or wage equation. Mincer equations estimate the statistical relationship between an individual's earnings and their personal attributes, including their level of educational attainment. The percentage addition to an individual's wage from an educational qualification is known as the 'wage premium'. This section considers the results from a number of recent Australian studies which estimate the wage premium for workers who have studied in the VET system.

The studies discussed below find that individuals who have graduated with a VET qualification receive a positive wage premium. However, the size of the wage premium is dependent on the level of education that they undertake and whether the individual has completed year 12. In general, individuals who have completed year 12 are found to gain no additional wage premiums for completing VET education at Certificate III or below. This implies that, from a productivity perspective, a Certificate III is roughly equivalent to obtaining a year 12 qualification. On the other hand, individuals who have not completed year 12 are not generally found to see a wage benefit from study at Certificate II or below. This implies that, from a productivity perspective, a Certificate II is roughly equivalent to a school at lower than year 12. In addition, for those who have not completed year 12, part of the wage premium from obtaining a Certificate III could be thought of as 'catch-up' to those who have completed year 12.

On the other hand, Diploma level qualifications deliver positive wage premiums for both groups, implying that Diplomas are considered to be a higher level of education attainment than year 12.

Therefore, the productivity benefit from completing a VET qualification depends, in part, on the student's level of high school education. (This will also be true for employability benefits.) To capture this, the modelling identifies two separate levels of high school attainment – those whose highest attainment is year 10 or below are modelled separately to those whose highest level is year 11 or 12.²²

A number of recent econometric studies estimate wage premiums for Australia. These studies are discussed below, and summarised in Table C.2.

²² Year 11 and 12 are grouped together in this study based on evidence from Leigh (2008) which suggests that the employability benefit to completing year 12 is similar to the employability benefit from undertaking year 11. This is judged to be appropriate because employability is one of the main benefits from VET education.

Table C.2 Wage premiums from an individual's highest level of educational attainment, per cent

	Leigh 2008	Karmel & Nguyen 2006 females	Karmel & Nguyen 2006 males	Lee & Coelli 2010 females	Lee & Coelli 2010 males
Individuals who completed year 12					
Certificate Level I	na	0.0%	0.0%	0.0%	0.0%
Certificate Level II	na	0.0%	0.0%	0.0%	0.0%
Certificate Level III	0.0%	0.0%	0.0%	0.0%	0.0%
Certificate Level IV	0.0%	6.2%	7.7%	0.0%	0.0%
Diploma	14.0%	11.1%	9.7%	6.0%	16.6%
Advanced Diploma	14.0%	13.7%	10.8%	6.0%	16.6%
Bachelor	35.0%	41.4%	21.7%	33.8%	31.5%
Grad. Dipl or Grad. Cert	39.0%	41.4%	21.7%	33.8%	31.5%
Masters or Doctorate	45.0%	41.4%	21.7%	33.8%	20.3%
Individuals who did not complete year 12					
Certificate Level I	0.0%	4.3%	0.0%	0.0%	0.0%
Certificate Level II	0.0%	0.0%	0.0%	0.0%	0.0%
Certificate Level III	7.0%	0.0%	0.0%	5.2%	12.0%
Certificate Level IV	7.0%	13.7%	12.4%	5.2%	12.0%
Diploma	13.0%	18.6%	14.4%	18.7%	36.3%
Advanced Diploma	13.0%	21.2%	15.5%	18.7%	36.3%
Bachelor	na	48.9%	26.4%	50.8%	41.7%
Grad. Dipl or Grad. Cert	na	48.9%	26.4%	50.8%	41.7%
Masters or Doctorate	na	48.9%	26.4%	50.8%	41.7%

Source: Leigh (2008), Karmel and Nguyen (2006), Lee and Coelli (2010), adjusted by Independent Economics

Note: The top panel shows results for individuals who have completed year 12, but may have also completed additional qualifications. Wage premiums are relative to individuals who have completed year 12 only.
The bottom panel shows results for individuals who have not completed year 12, but may have completed other qualifications. Wage premiums are relative to individuals who have school education less than year 12, and no other qualifications.

Note: Karmel and Nguyen (2006) estimates have been adjusted to show the per cent addition to wages compared to individuals whose highest level of attainment is year 12 for the top panel and year 10 for the bottom panel.

Note: Lee and Coelli (2010) estimates are the average of the results from the 2001 and 2005 SET data because these use the ASCED definition of qualifications, which is readily comparable to qualifications considered in this study. They have also been adjusted to percentage changes in the standard way, and as outlined in Lee and Coelli (2010)

Leigh (2008) uses the HILDA data set to estimate the wage premiums from completing various qualifications. The estimates show that the returns to VET qualifications are different depending on whether the individual has completed year 12. For example, for individuals who have not completed year 12, wages are expected to be 7 per cent higher if they complete Certificate Level III or IV compared to the case where they undertake no post-school qualifications. On the other hand, for individuals who have completed year 12, a Certificate III or IV qualification is not expected to add to

wages. Wage premiums for undertaking Diplomas or Advanced Diplomas are estimated to be 13 or 14 per cent depending on whether the individual has completed school.

Karmel and Nguyen (2006) estimate the wage premiums that accrue to an individuals' highest level of attainment²³, including a variety of different VET qualifications. They show that an individual who has completed year 12 is not expected to receive a wage premium from graduating with a Certificate Level III or lower. However, there are significant wage premiums estimated for the higher-level VET qualifications. For example, a Certificate Level IV is expected to add 7.7 per cent to a male's wages compared to what he would have earned with only a year 12 qualification. Karmel and Nguyen (2006) use data from the NCVER 2003 Student Outcomes Survey²⁴. The authors note that their results may be misleading because the data is collected six months after completing a VET course. This may not be sufficient time for the individual to transition to new employment related to their new qualification, and so the wage premiums estimated may be lower than otherwise.

Lee and Coelli (2010) use the ABS Surveys of Education and Training (SET) for 1993, 1997, 2001 and 2005 to estimate the returns to various VET qualifications. They also estimate the wage premiums for those who have completed year 12 separately to the wage premiums for those who have not, and find a similar pattern to the two studies discussed above. Specifically, while an individual who has completed year 12 is not expected to receive a wage premium from completing a Certificate level qualification, those who have not completed year 12 would receive a wage premium from completing Certificates III or IV.

In this study, rather than imposing estimated wage premiums on individuals who complete a VET qualification, the effect of VET on the supply of different occupations is modelled. In doing so, it models the productivity and wage benefits from VET's role in enabling individuals to move to higher-paying occupations. For example, an individual who undertakes VET may be able to change from being a labourer to a construction trades worker, enhancing the employment and earnings potential of this individual. There are a number of advantages to using occupation as a vehicle for modelling the benefits of VET, which are discussed in Appendix F.

²³ This is distinct from their most recent level of educational attainment, which may be at a lower level than their previous education.

²⁴ Although this data is from 2003, the results are in line with the other studies considered in this section, indicating that the returns to education have been relatively stable over time.

C.3 Discounting the employability and productivity benefits

The econometric literature recognises that the employability and wage benefits estimated using standard techniques, such as those discussed in section C.1 and C.2, are likely to overestimate the returns to improving the educational attainment of the Australian population. There are three potential reasons for this.

- **Labour supply effect:** Higher education levels can increase the overall supply of labour in the economy because of its positive effect on participation, as discussed in Section 2.1. It can also increase the supply of particular types of labour compared to others. For example, a government policy may encourage the training of health practitioners over other qualifications. Greater labour supply has the effect of reducing the wage of each worker. This is because, as more qualified individuals enter the labour market, they may have to accept lower wages in order to find employment since there are limits on industry demand for particular skills.
- **Market signalling or ‘ability bias’ effect:** Individuals with higher innate ability levels tend to undertake more education. There are a number of possible explanations for this: for example, compared to low-ability individuals, high-ability individuals may find education easier or receive a larger wage premium from education. Alternatively, high-ability individuals may use education to signal their high-ability to potential employers. Since ability and education are related, but ability cannot be directly measured, standard econometric methods cannot fully separate the effects of ability and education on an individual’s productivity or wage. Instead, estimates of the effect of education on productivity and wages will overstate the return to education, because they also partly include the effect of an individual’s ability.
- **Marginal ability effect:** The estimates of the productivity benefit and wage premium from a certain education level will reflect the average ability of the students in the data. An expansion of the VET sector would involve a greater number of students beginning VET studies. However, to expand the number of VET students, the entrance requirements may need to be lowered. Thus, as the sector expands, the ability of the new students is likely to be lower than the existing pool of students. That is, each additional student will be likely to receive less than the average wage premium from VET study.

This report systematically models the most important of these three effects – the labour supply effect. It also makes an adjustment for ability bias, but no adjustment is necessary for the marginal ability effect. The discussion below explains this modelling.

Adjustment for labour supply effect

Wages are lower than they would otherwise be when supply of labour is higher. As additional workers enter the labour market, they may need to accept lower wages to secure a job since there are limits to industry demand for particular skills.

This effect is captured in the economy-wide modelling undertaken for this study. Supply of each occupation is determined by the education levels of the population. Demand for each occupation is

determined by the demand from each industry. If labour supply is greater than labour demand, then the wage adjusts downward in the model. Likewise, if labour supply is greater than demand, the wage adjusts upwards.

Adjustment for market signalling or ability bias

It is well-established that ‘ability bias’ leads to over-estimates of the wage premiums from obtaining higher levels of education, as discussed above. This is because people who are of higher ability also tend to obtain higher education levels, and while both of these attributes increase wages, their effects cannot be separated because ability cannot be measured.

Leigh (2008) surveys the economic literature and concludes that ability adds around 10 per cent to the estimated wage premiums for each level of educational attainment, including both VET and university. The Productivity Commission (2012) follows Leigh’s assumption for VET. In other words, both studies assume that 90 per cent of the estimated wage premiums are attributable to education. This is at the lower end of a range of estimates that attempt to quantify the effect of ability bias on wage premiums (Leigh 2008).

In addition, ability bias is expected to have a smaller effect on estimates of the wage premiums for VET graduates than for university graduates. This is because, although VET students may generally have a lower level of ability, they are likely to have more varied ability levels than in university. This may occur because the entrance requirements for VET are less stringent than university entrance requirements. In university, high entrance requirements would lead to a concentration of high-ability students. However, this is not the case for VET, and the more diverse range of abilities in VET reduces the impact of ability bias on the estimated wage premiums. This is because the effect of students with high ability is partly offset by the effect of students with low ability.

Adjustment for marginal ability effect

An alternative interpretation of the effect of ability on participation and wages is that any additional student encouraged into the VET system by an increase in government funding is likely to have a lower ability than the average VET student. This is because, to expand the number of students, the entrance requirements for VET may need to be reduced. Thus, as the sector expands, the ability of the new students is likely to be lower than the existing pool of students. If the individual has a lower ability, then the participation and wage benefit that they would receive upon completion would be lower than the average benefits received by individuals already engaged in the VET system. This ‘marginal ability effect’ is supported by a number of papers.

However, once an adjustment has been made to remove the original ability bias from the estimated productivity and wage premiums, it is not necessary to make any further adjustments to account for the marginal ability effect. Even if an additional VET student has a lower ability level, their return from a VET qualification would be the same as all other students, since the adjusted productivity and wage premiums would reflect only the effect of education, and not of ability.

In making adjustments to the wage premiums, the Productivity Commission adjusts for both ability bias and the marginal ability effect. First, they adjust wage premiums downward by 10 per cent for

ability bias. On top of this, an adjustment for the marginal ability effect is also subtracted²⁵. This results in the Productivity Commission estimates of the effects of education on wages being inappropriately low. Specifically, the second adjustment unnecessarily reduces wage premiums by 6.2 per cent for Diploma graduates and 3.5 per cent for Certificate III/IV graduates.

Ability adjustments in the Independent modelling

In the modelling for the current report, we make a single adjustment to remove the effect of ability bias from the estimated benefits associated with educational attainment. We follow Leigh in assuming that ability bias leads to overestimates of the benefits by 10 per cent. This is at the low end of the potential range of the impact of ability bias on wages. It is also in line with estimates by Laplagne, Glover and Shomos (2007) of the effect of ability bias on participation.

To avoid double counting, no second adjustment is made for the marginal ability effect, as discussed above.

C.4 Population

In addition to participation and productivity, population is the other key driver of long term economic growth in Australia. VET can contribute to population growth in Australia by attracting international students who, upon completing their studies may go on to work in Australia.

A larger population leads to a larger economy, by expanding the working age population and stimulating economic activity. However, it is not necessarily the case that a population increase will raise the living standards of existing residents. Rather than examining the size of the economy as a whole, the implications of an expansion in the population should be judged on a per capita basis.

A number of studies have examined the impact of skilled migration on the Australian economy. A study conducted by Independent Economics (then trading as Econtech) in 2006 for the then Department of Immigration and Multicultural Affairs (DIMA) estimated the economic impact of a 50 per cent increase in skilled migration to Australia. The study concluded that, under this policy, real GDP in the long run would be 5 per cent larger than would otherwise be the case. However, the per capita benefit was smaller than this. Specifically, the study concluded that standard of living per capita (proxied by consumption per capita) would be 1.1 per cent higher in the long run than would otherwise be case.

In addition, a 2006 study by the Productivity Commission (the Commission) concluded that a 50 per cent increase in skilled migration would increase the per capita standard of living (proxied by Gross national Product (GNP) per capita) by 0.6 per cent. This is a lower impact than the estimate from the Independent Economics report because the Independent Economics analysis used a more robust measure of consumption per capita to determine the standard of living impacts. Additionally, the Commission's modelling did not allow for the extra births from the additional skilled migrants, which lowered the population gains estimated by the Commission.

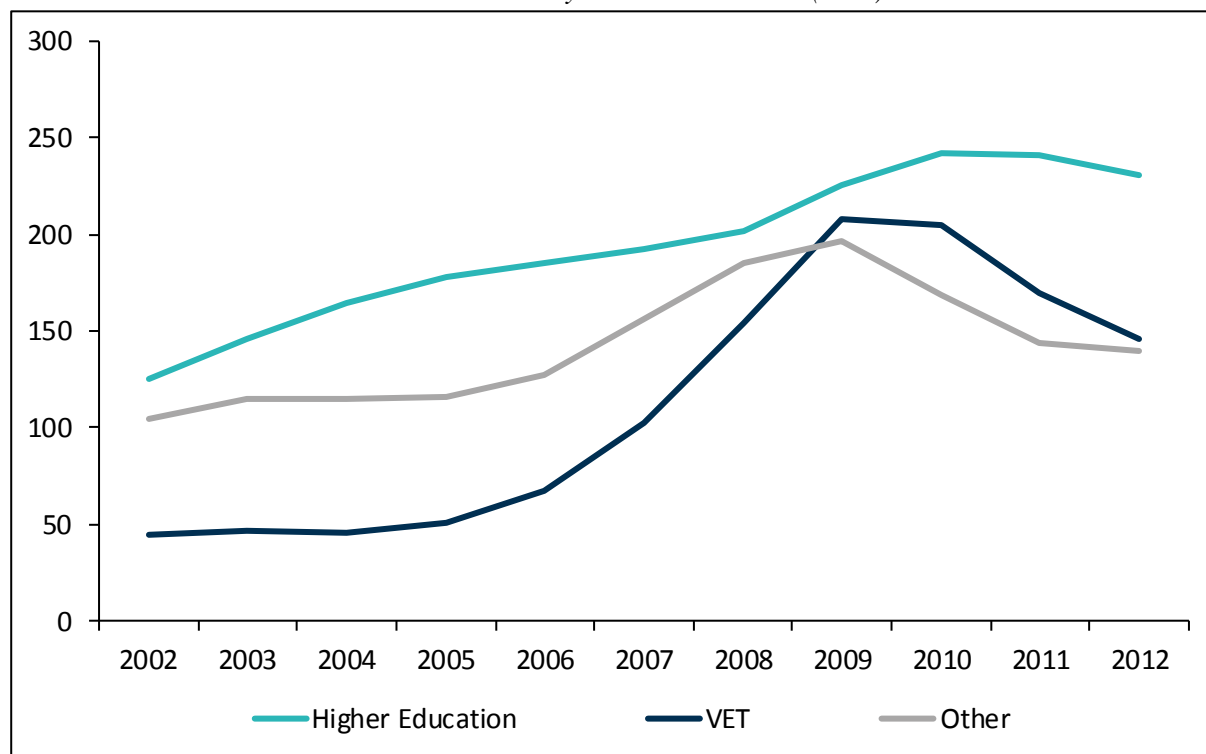
²⁵ The size of the second adjustment is halfway between the ability adjustment already made for the particular level of attainment and the ability adjustment made for the level of attainment below. That is, they are assumed to have an ability between the average ability of the educational group that they are joining and the group that they are leaving.

Nevertheless, both the studies show that there are positive gains associated with skilled migration in terms of the per capita standard of living in Australia.

International student enrolments and the Australian labour force

Chart C.3 below shows international student enrolments in different sectors, including the VET and higher education sectors, over the period from 2002 to 2012.

Chart C.3: International Students enrolments by educational sector ('000)



Source: Australian Education International (AEI)

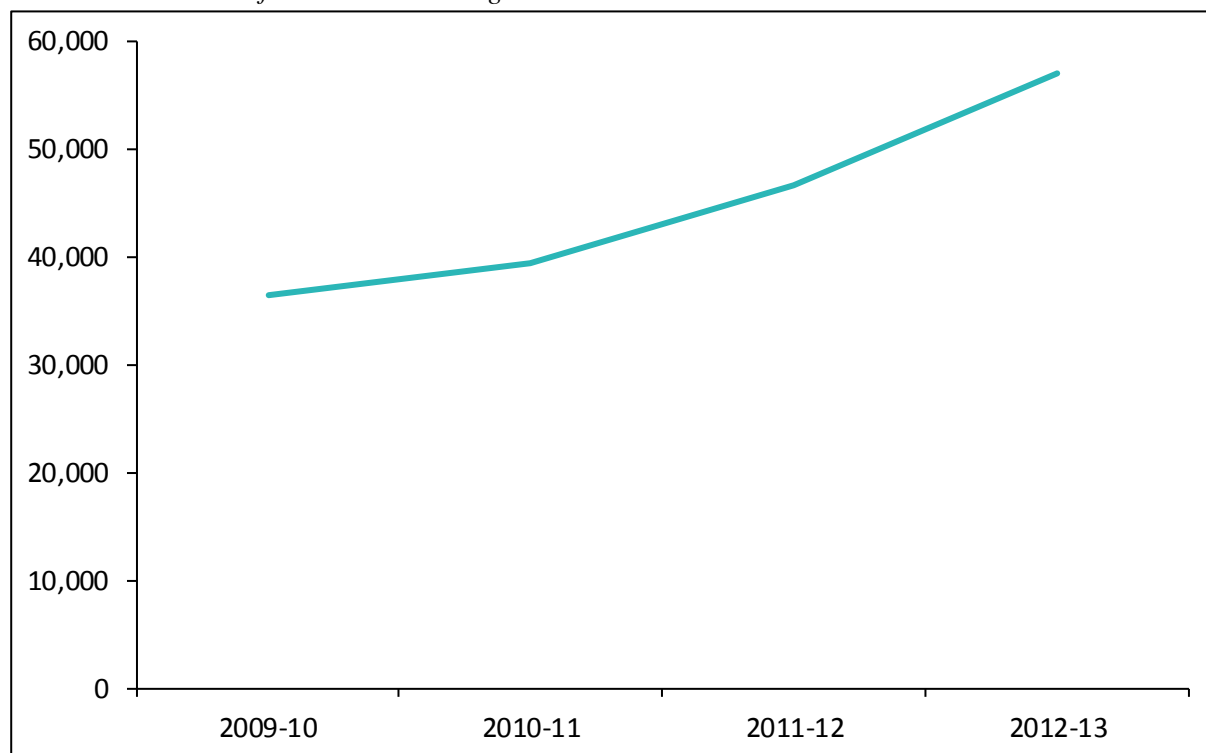
In 2012, there were around 150,000 and 230,000 enrolments in the VET sector and higher education sector respectively. The chart shows that international student enrolments grew over the period from 2002 to 2009, with the sharpest growth in the VET sector. However, since 2010, international student enrolments in all sectors have been experiencing a downward trend. This may be related to lower demand from international students because of the appreciation of the Australian dollar as well as instability in the global economy in recent years.

Chart C.4 shows the trend in the number of visas granted to individuals who were previously on student visas. This includes international students previously studying at higher education, VET and other institutions, and who were subsequently granted non-student visas. Chart C.5 shows that the annual number of visas granted to students after they complete their studies has risen since 2009, to around 60,000.

Detailed data is not available on the total number of international VET students who join the Australian labour force after their studies. However, other information can be used to make reasonable estimates. VET students make up around 32 per cent of total international student commencements, and may be expected to make up a similar share of those granted visas following

their studies. In addition, between 45 and 63 per cent²⁶ of international students who are granted visas upon completing their studies may be expected to join the Australian labour force, at least temporarily. Based on this information, it is estimated that in 2012/13 between 8,000 and 11,000 international VET students are likely to join the labour force upon completing their studies.

Chart C.4: Number of non-student visas granted where last visa held was a student visa



Source: Department of Immigration and Citizenship, Student visa program quarterly report, various issues

Economic impacts of international VET students

The decision of international students to study and work in Australia is likely to be unaffected by an increase in Government funding for VET, because international students are not eligible for Australian government funding. Instead, the exchange rate and visa conditions are likely to be significant factors influencing a student's decision to study and work in Australia. The exchange rate determines the affordability of their study, while the visa requirements determine how quickly and easily a student can permanently join the Australian labour force upon completion.

This report considers a scenario in which reform to visa requirements allows a larger proportion of VET students to work in Australia following the completion of their studies. For example, the Temporary Graduate (subclass 485) visa currently allows international university students to work in Australia following the completion of their studies for up to four years. If VET students were offered similar visa conditions, then a larger number of international VET students may join the Australian workforce following their studies. This could potentially lead to economic benefits, as discussed above. There are also likely to be limited direct costs associated with granting additional visas,

²⁶ Independent Economics calculations, based on Department of Immigration and Citizenship, Student visa program quarterly report, December 2012. The proportion is less than 100 per cent because some students are granted tourist or visitor visas following the completion of their studies.

because any administrative costs are generally borne by the students applying for the visas. Illustrative modelling of this scenario and is included in Section 5.

C.5 External benefits from VET

The previous sections have discussed the returns to VET education that can be most readily measured – including effects on employability, productivity and population. There is also a body of literature which considers whether higher levels of education may also lead to additional *external* benefits, which are benefits accruing to society as a whole. Examples include benefits to productivity, health and crime levels. However, there are also studies which find no evidence for these. At the extreme, as pointed out by Leigh, “if education is merely a credential, signalling ability without raising productivity, then the social [*or external*] return might be lower than the private return” (Leigh 2008, p236, terms in parentheses added).

Leigh (2008) gives an overview of the literature dealing with the external returns to education. In general, quantifying these benefits of education is difficult. However, there have been a number of studies doing so, with mixed results. While some studies find positive external benefits, others do not. The following is a discussion of some examples from this literature.

Some authors argue that there are spill-over productivity benefits associated with a more educated workforce. As pointed out by Moretti, these benefits may come about because “social interactions among workers create learning opportunities that enhance productivity” (Moretti, 2002, p1). The higher the general education level of the workforce, the more that these spill-overs can occur. Moretti’s 2002 study finds evidence for these spill-over benefits, and also finds that the higher productivity results in higher wages. However, this study is related to college education, rather than vocational education.

A number of studies identify that additional education is related to better health outcomes. While some health benefits are associated with VET education, the benefits associated with university-level education are generally larger.

The ABS’s 2008 yearbook considered data drawn from the National Health Survey (NHS), conducted by the ABS in 1995, 2001 and 2004-05. The publication found that adults with post-school education were less likely to be obese compared with those with no post school qualifications. The study showed that in 2004-05, 20.1 per cent of those without a post-school qualification were considered to be obese. This compared to 19.3 per cent of those with a certificate, and 12.9 per cent of those with a diploma, degree or higher.

As part of a 2008 study, the Australian Institute of Health and Welfare (AIHW) examined the link between education and health outcomes for individuals and the overall population. The study concluded that tobacco smoking was the most preventable cause of ill-health and death in Australia. It also concluded that individuals without post-school qualifications were more likely to be smokers than those with post-school qualifications. Similarly, Scollo and Winstanley (2008) found that the likelihood of smoking diminishes with higher levels of education. However, this study concluded that the largest decline in smoking rates was seen amongst those who had attended university.

A 2006 study by Descy used European data to examine the relationship between education and social outcomes, such as national levels of tolerance, crime and social cohesion. While they did not find

evidence of a direct effect, they concluded that there may be an indirect link between education and macro-social benefits, because of education's role in "reducing poverty, unemployment and inequality in income distribution."

Psacharopoulos and Patrinos (2004) review the literature estimating the external returns to education. They find that the evidence is mixed and inconclusive, with a number of studies finding zero or negligible external returns. However, some studies in Africa have found evidence of positive external returns to a more educated population.

Overall, the evidence supporting the existence of external returns to VET over and above private returns is limited and mixed. In addition, the studies discussed above indicate that external benefits are likely to be more important for university than for VET. Therefore, we adopt a similar approach to Leigh (2008) and exclude these external benefits from our analysis. In other words, the analysis in this report assumes that the full benefits from a higher level of education are private benefits, related to higher employability and productivity, as discussed in sections C.1 to C.3. In this sense, if there are additional external benefits from higher levels of VET education, then the estimates in this report can be considered conservative.

C.6 Pathways to higher education

An additional benefit of VET education is its role as a pathway to higher education, by allowing students to gain admission to the higher education system. The Tertiary Education and Training in Australia report (NCVER, 2012) contains information on students commencing higher education in 2010. Out of the 336,000 domestic students commencing higher education qualifications that year, around 30,000, or 9 per cent, had previously undertaken VET courses.

For students who undertake VET study and then use it as a pathway to higher education, part of the overall productivity and employability benefits from their post-school education can be attributed to VET and part can be attributed to higher education.

To avoid overstating the benefits of VET, this report takes into account only the component that can be directly attributed to VET. This component is valued at the before-tax earnings benefit that the student would have gained from their VET education, if they had not continued to higher education. This may be a conservative estimate of the contribution of VET to the student's before tax earnings if the student otherwise would not have been able to attend university without first undertaking VET education.

Appendix D Economic costs of VET

The previous appendix discussed the economic benefits associated with VET. However, educating students in the VET system also involves costs. This appendix details the costs of VET study, elaborating on the discussion in section 2 of this report.

This report assesses the costs from an economy-wide perspective, and includes the costs borne by students, governments and businesses. To determine whether investment in VET is worthwhile, the benefits need to be weighed against the costs. The size of the costs of VET study depends on the level of study and how long each student remains in the VET system. The main costs are:

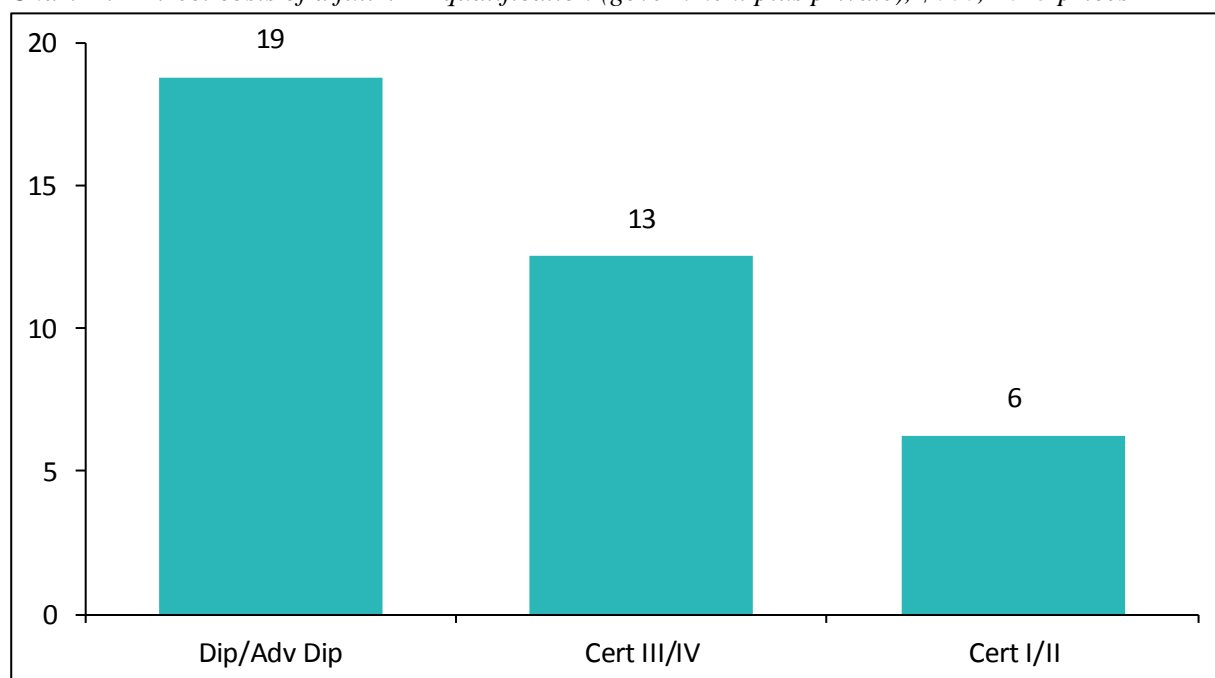
1. direct tuition costs; and
2. foregone earnings opportunities.

D.1 Direct tuition costs

Governments, students and businesses cover the direct costs of VET education. NCVER data shows that in 2011, state and national governments spent \$6.6 billion on VET, while \$1.4 billion was received from private sources. This NCVER funding data relates to students who are both fully and partly government funded. It includes both public and private VET institutions, as long as they receive some government funding (that is, the public VET system). It excludes providers who do not receive any government funding.

This data has been used to estimate the total hourly cost of providing VET education, as shown in Chart D.1 below.

Chart D.1 Direct costs of a full VET qualification (government plus private), \$000, 2013 prices



Source: Independent Economics estimate based on NCVER data

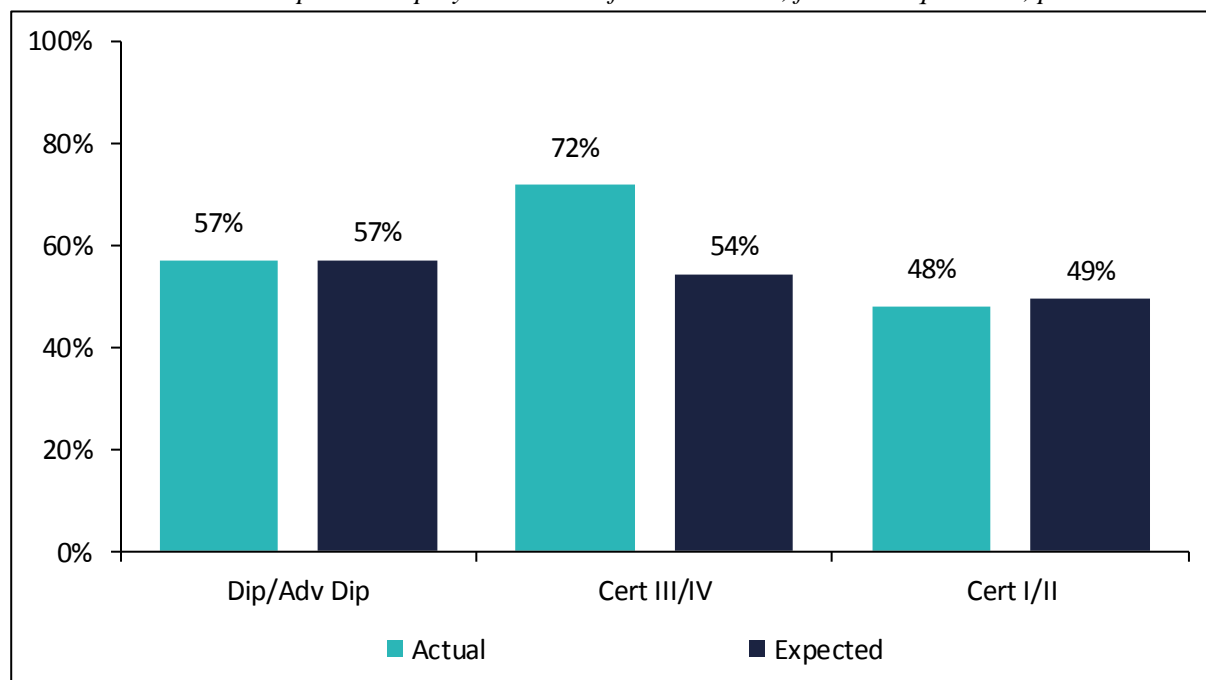
The national average total cost per student-hour in the publicly funded VET system is estimated to be \$15.60 in 2010, which is very similar to the hourly cost estimated by DEEWR (2010). Based on these hourly costs and the time required to complete different qualifications, the direct cost of each category of VET qualification has been estimated, as shown in Chart D.1 above. These costs have been escalated to express them in 2013 prices.

D.2 Foregone earnings opportunities

By spending time in VET, students forego time that they otherwise may have spent either earning income, or alternatively, taking leisure. The cost of this foregone earnings opportunity will be different for each individual, depending on the wage that they could have otherwise earned.

Chart D.2 shows the actual employment rates of VET students, by level. It compares this to the employment rate that would be expected for that group of students, had they not been studying. This expected employment rate has been estimated based on their age, gender and previous level of education. Interestingly, students studying a Diploma or Advanced Diploma, or a Certificate I/II are equally likely to be employed as their counterparts who are not studying (on a full time equivalent basis). This suggests that students at this level do not generally sacrifice a large amount of working time to undertake their studies. For example, they may study outside working hours. On the other hand, students at the Certificate III/IV level have a higher employment rate than their counterparts who are not studying. This is because of the large number of students who undertake apprenticeships at this level and are therefore employed.

Chart D.2 Actual and expected employment rates of VET students, full time equivalent, per cent



Source: ABS Education and Work, Independent Economics estimates

However, this employment data does not fully represent the costs to individuals from studying.

- A student who is employed and undertakes VET studies foregoes some time that they may otherwise have spent either in work or leisure within a normal working week²⁷.
- A student who is employed as an apprentice foregoes earnings because they are paid only a proportion of the wage of a fully-qualified worker.

Therefore, an alternative method for estimating the cost of foregone earnings and leisure is required. This report estimates the cost of foregone earnings opportunities based on the time spent studying and the wage that the student would have earned had they not been studying.

The proportion of time that a student spends studying is based on the contact hours for each level, plus an allowance for study outside of class hours. The estimate also takes into account the mix between part-time and full-time students.

- An average student undertaking a Diploma or Advanced Diploma is estimated to spend 37 per cent of a normal working week studying.
- An average student undertaking a Certificate III/IV is estimated to spend 30 per cent of a normal working week studying.
- An average student undertaking a Certificate I/II is estimated to spend 25 per cent of a normal working week studying.

From this information, the loss from the reduction in time that the student has available to work can be estimated.

For individuals who are likely to have been employed if they had not entered VET, the value of their foregone earnings opportunities can be estimated using the wage that they would have earned, based on the occupation that they would have had if they were not studying.

On the other hand, for individuals who would not have been employed if they had not entered VET, there are limited indicators on the value of their time. However, it may be reasonable to assume that these individuals would like to work but are unemployed because they do not yet have the skills to find work. If this is the case, then the cost in terms of foregone earnings will be small, because they had limited opportunities to earn income. Therefore, for simplicity, it is assumed that those who would not have been employed before entering VET do not bear any cost in terms of foregone earnings opportunities.

²⁷ The value of time spent in leisure is the same as the value of time spent working because, by spending time in leisure, an individual foregoes the income that they would have earned if they had worked instead. In other words, each hour taken as leisure within the normal working week costs an amount equal to the hourly wage.

D.3 Other costs

D.3.1 Economic costs of taxes

Government expenditure on VET requires that taxes eventually be raised to fund the expenditure. Any tax could be used to raise this revenue. However, since personal income tax is one of the main revenue raisers, this report assumes that personal income tax is used to fund additional government spending on VET.

Raising the personal income tax rate reduces take home pay for households. In turn, this reduces the incentive to work, resulting in costs for the economy. We have previously used our Independent CGE model to estimate this cost. For each dollar of revenue raised by an increase in the personal income tax rate, households are estimated to be worse off by \$0.27 over and above the tax paid. This cost is included in our analysis for this report.

D.3.2 Living costs and student assistance payments

The costs considered above are all true economic costs, because they involve losses to government (or tax-payers) and students from obtaining additional VET education.

Other costs are sometimes associated with undertaking VET courses, such as living costs or student assistance payments. Neither of these costs are considered to be true economic costs of VET, for the following reasons.

- Living costs, such as rent and food costs would be incurred whether or not the individual was studying, and so are not considered to be directly related to VET study.
- Government support is provided to VET students through assistance payments, such as Austudy and Youth Allowance. However, these payments are transfers between different groups of households and so do not represent a net cost to the economy as a whole. That is, the cost to the tax-payer is offset by the benefit to students.

Therefore, living costs and transfer payments are excluded from this analysis.

Appendix E Groups benefiting from VET

Most studies examining the benefits of education focus on individuals who graduate with a full qualification, including many of the studies discussed in Appendix C. They also implicitly assume that benefits can only be gained from undertaking study at a level higher than the individual has previously undertaken. For example, the Productivity Commissions 2012 report included only limited modelling of module completion and education at the same or lower level than a previous qualification. Indeed, data is more readily available for this kind of analysis.

However, there are two other important groups benefiting from VET study, including *module completers* and *re-skillers*. The benefits and costs associated with these students are discussed in this appendix. This extends the discussion included in section 2.

For a number of reasons, a large proportion of VET students do not complete a qualification and instead choose to complete modules, including skills sets. There is growing evidence showing that benefits can be gained from partially completing a qualification. The benefits of module completion are considered in section E.1. Appendix G includes a detailed discussion of the benefits from completing skill sets and other non-accredited training, based on interviews with a number of Industry Skills Councils.

In addition, around 35 per cent of all VET students are studying at the same or lower level than the qualification that they already hold, based on NCVER data. These individuals are said to be re-skilling. The benefits from this include achieving a better match between the skills of workers and the available jobs. For example, there are benefits associated with completing a qualification in high demand, even when the qualification is at the same level or below one already held, because it can improve an individual's probability of being employed. We consider the benefits of VET study at a level lower than or equal to the level currently-held in section E.2.

This appendix also considers the socio-economic status of VET students. It also examines evidence on the level of unmet demand for VET.

E.1 Graduates and module completers

The benefits of module completion are first examined in Section E.1.1 below. Included within the group of module completers are those undertaking skills sets. Skill sets are groupings of units of competency to meet an identified learning outcome, such as acquiring a licence. These are discussed further in section E.1.2.

E.1.1 Module completions

The NCVER data suggests that only around 34 per cent²⁸ of students who commence VET studies at a certificate III level or above graduate with a qualification. Instead of graduating, some students complete 'modules', which are sub-components of a qualification. There are a number of reasons for

²⁸ Based on NCVER data: *Australian vocational education and training statistics: Likelihood of completing a VET qualification, 2006-09*

this, but a commonly cited reason is that a full qualification may not be required for a student's chosen occupation.

A 2006 study by Karmel and Nguyen has shown that, at least for some individuals, there are benefits from completing modules in terms of higher wages. Broadly, they find that individuals will receive a productivity benefit and wage premium for module completion if the module is at a higher level than the qualification already held. This is consistent with findings for VET graduates discussed in Appendix C.

Table E.1 below shows Karmel and Nguyen's (2006) estimates of the wage premium for individuals who have completed a module at the Certificate III level or higher, compared to completing a module at the Certificate I/II level. The results are reported separately depending on the individual's previous level of attainment. For example, a female who was employed full time before commencing her study and had already completed a full Certificate III and then returns to VET to complete a module at the Certificate IV level or higher would be expected to earn a 14 per cent higher wage than an identical female who returns to VET to complete a Certificate Level I/II. Since, in terms of wage premiums, completing a Certificate I/II qualification can be regarded as equivalent to completing less than year 12, the 14 per cent wage premium can be interpreted as the full benefit from completing a module at Certificate Level IV or higher, for an individual who has previously completed a Certificate III.

Table E.1 Impact on wage from module completion, per cent

	Previous Level of Attainment (full qualification)					
	Certificate II or lower		Certificate III		Certificate IV or higher	
	female	male	female	male	female	male
Module from Certificate IV or higher						
FT employed before	13%	7%	14%	0%	0%	0%
PT employed before	8%	8%	0%	9%	0%	2%
Module from Certificate III						
FT employed before	0%	0%	5%	0%	0%	0%
PT employed before	2%	8%	0%	19%	0%	1%

Source: Karmel and Nguyen (2006)

Note: Following the approach taken by Karmel and Nguyen (2006) any negative estimates of wage premiums have been set to zero.

FT means full time and PT means part time

The estimates undertaken by Karmel and Nguyen (2006) allow an interesting comparison between those completing modules and those completing the full qualification. This has been undertaken in Table E.2, which shows the wage premium for completing a module divided by the wage premium for graduating from a full qualification. The comparison shows that completing a module at the Certificate IV level or higher is expected to lead to a wage premium between 60 and 80 per cent of the premium from graduating with the full qualification. For Certificate III, the gap between the earnings of module completers and graduates is larger, with module completers obtaining a wage premium of around 40 to 60 per cent of graduates.

Table E.2 Wage premium for module completers as a proportion of wage premium for graduates

	Previous Level of Attainment (full qualification)					
	Certificate II or lower		Certificate III		Certificate IV or higher	
	female	male	female	male	female	male
Module from Certificate IV or higher						
FT employed before	81%	71%	88%	na	na	na
PT employed before	82%	81%	0%	59%	na	na
Module from Certificate III						
FT employed before	na	na	38%	na	na	na
PT employed before	58%	44%	0%	na	na	na

Source: Independent Economics calculations based on Karmel and Nguyen (2006)

Note: Following the approach taken by Karmel and Nguyen (2006), any negative estimates of wage premiums have been set to zero.

Note: 'na' indicates a ratio that could not be calculated because the benefits for graduates are zero.

More recent work, by Karmel and Fieger (2012) also provides evidence of the benefits accruing to module completers compared to graduates, in terms of both wage and employment benefits.

Karmel and Fieger (2012) estimate that, on average, the full-time wage earned by module completers to close to that earned by holders of the full qualification. However, there is some pay-off to completion, and it is different depending on the level of study undertaken.

- Module completers at the Certificate III/IV level earn 98 per cent of the wages of graduates.
- Module completers at the Diploma or Advanced Diploma level earn 94 per cent of the wages of graduates.

In addition, the probability of employment is estimated to be 21.7 per cent higher if an individual completes their qualification, compared to if they complete modules. Viewed the other way around, the probability that module completers are employed is 82 per cent of the probability that graduates are employed.

In the final version of their 2012 report, the Productivity Commission also considered the productivity and employability benefits of completing modules (partial completions). However, their analysis is based on a number of assumptions which, based on the evidence discussed above, can be improved.

- The Commission first assumes that productivity and employment premiums for module completers are 50 per cent of graduate wage premiums. The Commission then conducts a sensitivity analysis by instead assuming that module completers' wage premiums are 25 per cent of graduates'. However, no justification is given for these assumptions.
- These productivity and employment premiums for module completion are assumed to only accrue to mature learners (those between 25 and 64 years old) who have responded in an NCVER survey that they have "learnt the skills required", "achieved their training objective" or "have received vocational benefits". This reduces the proportion of mature module

completers who are receiving wage premiums to 12.4 per cent in Diploma/Advanced Diploma and 20.2 per cent in Certificate III/IV.

Module completion assumptions in this report

Independent Economics has made use of the results in Karmel and Nguyen (2006) to model the employability and wage benefits of module completions. As discussed above, the benefits of module completion can be considered as proportional to the benefits of graduation, but the proportions will depend on the level of study. This is the approach taken in this study, for both the employability and productivity benefits of VET. As such, wherever there is a benefit from completing a qualification, there will also be a benefit from partially completing it, although the benefit will be smaller.

Specifically, in the modelling for this report, we have assumed the following, based on the results from Karmel and Nguyen (2006).

- Individuals completing modules in a Diploma or Advanced Diploma attract 70 per cent of the productivity and employability benefits of the full qualification.
- Individuals completing modules in Certificate Level III or IV attract 50 per cent of the productivity and employability benefits of the full qualification.

These assumptions are also broadly consistent with the more recent study by Karmel and Fieger (2012) of both the productivity and employability benefits for module completers relative to graduates.

On the other hand, the benefits of module completion in this report are higher than the benefits assumed by the Productivity Commission (2012).

- Firstly, the Productivity Commission assumes that the most that a student could benefit from module completion is 50 per cent of the benefits from the full qualification. However, based on the literature discussed above this is actually at the low end of the benefits received.
- Secondly, the benefits in this study are relevant to module completers of all ages, rather than only for mature learners who reported that they received a benefit. This is because the estimates by Karmel and Nguyen (2006) and Karmel and Fieger (2012) relate to the whole population of module completers, not just those of a particular age, or those reporting benefits. This means that they already take into account that some module completers may not receive any benefit from their studies.

To estimate the net benefits from completing modules, an estimate of the cost of module completion is also required. As discussed in Appendix D, these costs include direct tuition costs, borne by the government, students and businesses, as well as foregone earnings opportunities, borne by students.

There is limited information available to estimate these costs. Therefore, this report makes a neutral assumption that both the benefits and the costs of VET study depend on the proportion of the full qualification undertaken. Under this neutral assumption regarding costs and benefits, the modelling results are relatively insensitive to the proportion of the course that is assumed to be completed. Nevertheless, the assumed proportions are as follows.

- An average module completer at the Diploma or Advanced Diploma level is expected to remain in VET for 70 per cent of the time compared to a graduate, generating 70 per cent of the costs. They also generate 70 per cent of the benefits of a graduate.
- Likewise, an average module completer at the Certificate III or IV level is expected to remain in VET for 50 per cent of the time compared to a graduate, generating 50 per cent of the costs and 50 per cent of the benefits.

E.1.2 Pathways to higher education

As discussed in section 2, an additional benefit of VET education is its role as a pathway to higher education, by allowing students to gain admission to the higher education system.

Out of the 336,000 domestic students commencing higher education in 2010, around 30,000, or 9 per cent, had previously undertaken VET courses (NCVER, 2012). Of these students with VET training, 84 per cent had completed a full qualification, while only 16 per cent had completed modules.

In addition Karmel and Fieger (2012) estimate that, on average, VET graduates are more than twice as likely as VET module completers to be enrolled in further education after their study.

Both of these pieces of evidence indicate that VET students are more likely to be able to gain admission to higher education if they have graduated with a full VET qualification, rather than completed modules.

This report focusses on the direct benefits of VET education, in terms of employability and productivity, rather than the indirect benefits of VET as a pathway to higher education. Although greater pathways to higher education may be available from completing a full qualification than from module completion, this is not taken into account in this report. In this sense, the estimated benefits of graduating with a full VET qualification compared to module completion are likely to be conservative.

E.2 Up-skillers and re-skillers

Until now, the discussion has considered the benefits to individuals who complete or partially complete a qualification at a level higher than the one that they already held. These are the economic benefits from VET's role in *up-skilling* the labour force.

However, around 35 per cent of VET students undertake study at a level that is the same or lower than the qualification that they already hold. Rather than up-skilling, these individuals can be thought of as *re-skilling*. This section discusses the economic benefits that arise from VET's role in re-skilling the labour force.

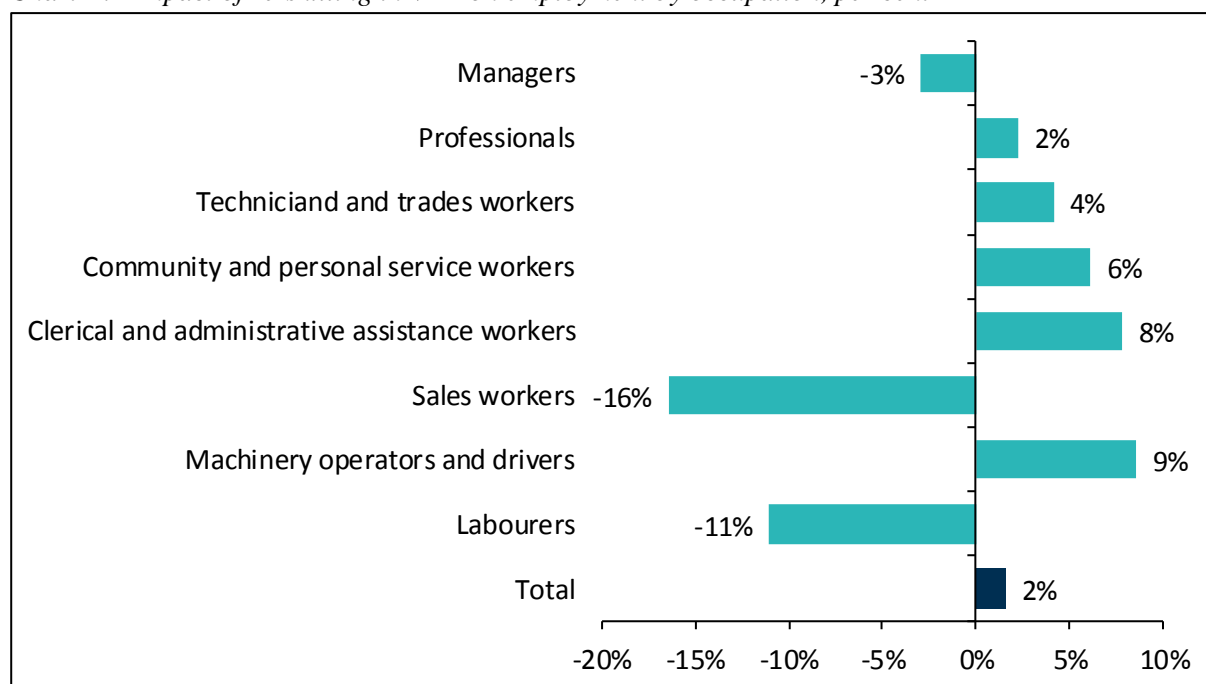
Karmel and Nguyen (2006) discuss the motivations for individuals to study at a level at or below the qualification already held, considering two seemingly conflicting pieces of evidence.

- Generally, econometric estimates of wage premiums indicate that there are no productivity benefits from undertaking VET study at a level the same or below the individual's highest level of attainment. This is the case for the studies discussed in Appendix C above.
- On the other hand, many students who are undertaking study at the same or lower level report that they are doing so for employment-related reasons. For example, the Productivity Commission estimates that 90 per cent of mature students undertaking study at the same level as a previous qualification are doing so for employment-related reasons.

Karmel and Nguyen (2006) reconcile these two pieces of information by recognising VET's role in re-skilling the labour force. For example, a university graduate may have undertaken a "poor or unmarketable degree (performing art, say)" (Karmel and Nguyen 2006, p24) and be unable to find employment. They may then undertake a VET course to obtain more marketable skills and improve their employment prospects. Although this would lead to a lower wage than would have been expected with a bachelor degree on average, the individual may benefit from study at a lower level because they will be able to supply skills that are in higher demand, and therefore be more able to find employment.

This view of re-skilling is supported by the data on individuals who have undertaken study at the same or lower level than their previous attainment. Chart E.1 below shows the change in employment by occupation for the group of VET students who completed their reskilling in 2011. For this group, an additional 2 per cent were employed after re-skilling. In addition, it shows that, through re-skilling, individuals move from low-skilled occupations to higher-skilled occupations. For example, fewer people were working as labourers or sales workers after re-skilling. Instead, they were able to find employment in occupations which rely more heavily on VET skills.

Chart E.1 Impact of re-skilling in VET on employment by occupation, per cent



Source: NCVER student outcomes survey, 2011, unpublished data

Skills Australia (2011) emphasises the role of VET in re-skilling the labour force and allowing it to adapt to changing industry demands. For example, Skills Australia notes that “vocational education and training will also be expected to equip the workers of the future with the capability to adapt continuously and engage in learning throughout their working lives” (Skills Australia, 2011, p110). In addition, re-training can potentially contribute to reductions in skills shortages. “Skills shortages, especially, need a response in the occupations where the lack of a skill would significantly impede production, where the training lead time is long, and where there is a strong relationship between the person’s training and employment in that field. According to Skills Australia’s analysis on ‘specialised’ occupations, approximately 20 per cent of occupations and about the same proportion of employment fall into these categories.” (Skills Australia, 2011, p27)

Ryan (2002) uses the 1997 SET data to estimate the wage premium of completing a “follow-up” VET qualification at a lower or equivalent level to that already held. Unlike the studies discussed above, Ryan (2002) finds evidence of a wage premium from re-skilling by obtaining a follow-up qualification. Specifically, an additional year of follow-up VET study is estimated to attract a wage premium of 3.0 per cent for males and 3.3 per cent for females.

The Productivity Commission also recognises the value of VET’s role in re-skilling the labour force. It undertakes modelling of the costs and benefits of completions at the same or lower level as the individual’s highest level of attainment. Using the estimates from Ryan (2002), the Commission assumes that a mature learner who completes a Diploma, and already has one, obtains a wage premium of 6.5 per cent. Mature learners who complete a Certificate III or IV, and already have a qualification at least as high as this, obtain a wage premium of 5.7 per cent. They also assume that the employability benefit from re-skilling is 75 per cent of the benefit from up-skilling, although no source is given for this estimate. Like module completions, the Commission assumes that the benefits from re-skilling only apply to mature learners.

The approach taken by the Productivity Commission to model re-skilling is similar to its approach to modelling VET’s role in up-skilling the labour force. However, as discussed above, the main impact of re-skilling is that it allows labour to respond more readily to demands for particular skills from different sectors of the economy. For example, high demand in the mining sector may raise demand for mining-related occupations. Without the re-skilling function of VET, the labour market would be less able to supply the occupational skills demanded by the mining sector, and would therefore be less employable.

To model the benefits from re-skilling, this study uses data on outcomes for VET students who have re-skilled at the Certificate III level or higher, shown in Chart E.1 above. This data shows that for the group of students who re-skill in VET, 2 per cent more are employed (on a FTE basis) after re-skilling than before re-skilling. It also shows that the types of occupations that these students hold are different after re-skilling. Using this data on actual outcomes to determine the benefits from re-skilling means that the modelling takes into account that not all re-skillers receive employment-related benefits. This avoids overstating the benefits from re-skilling.

E.3 Socio-economic groups

This section considers the Socio-Economic Status (SES) of students enrolled in the VET sector.

There is a significant body of Australian literature examining the relationship between SES and education. In general, the research has found that students from higher socio-economic backgrounds have greater participation and achievement in education than students from lower socio-economic backgrounds.

A 2007 study by Foley, examined the relationship between SES and participation and achievement in the VET sector. The research investigated the extent to which training opportunities provided by the public VET system were taken up by people from different socio-economic backgrounds and the achievements and outcomes for different groups in the VET population.

Foley's research indicates that students living in low socio-economic areas have high participation in VET. VET participation is greatest in low socio-economic areas, where 12 per cent of the population participate in VET. This compares to an average of 8.7 per cent for high socio-economic areas and 10.8 per cent for Australia as a whole. Students from low socio-economic areas are over-represented in the VET sector, and these students tend to undertake lower-level courses.

Interestingly, the study also found that VET students from lower socio-economic areas have a better-than-average completion rates, although no reason was given for this result. He found that "students from low socio-economic areas were awarded a higher proportion of qualifications (30.5%) than their share of total enrolments (28.8%)" (Foley, 2007 p8).

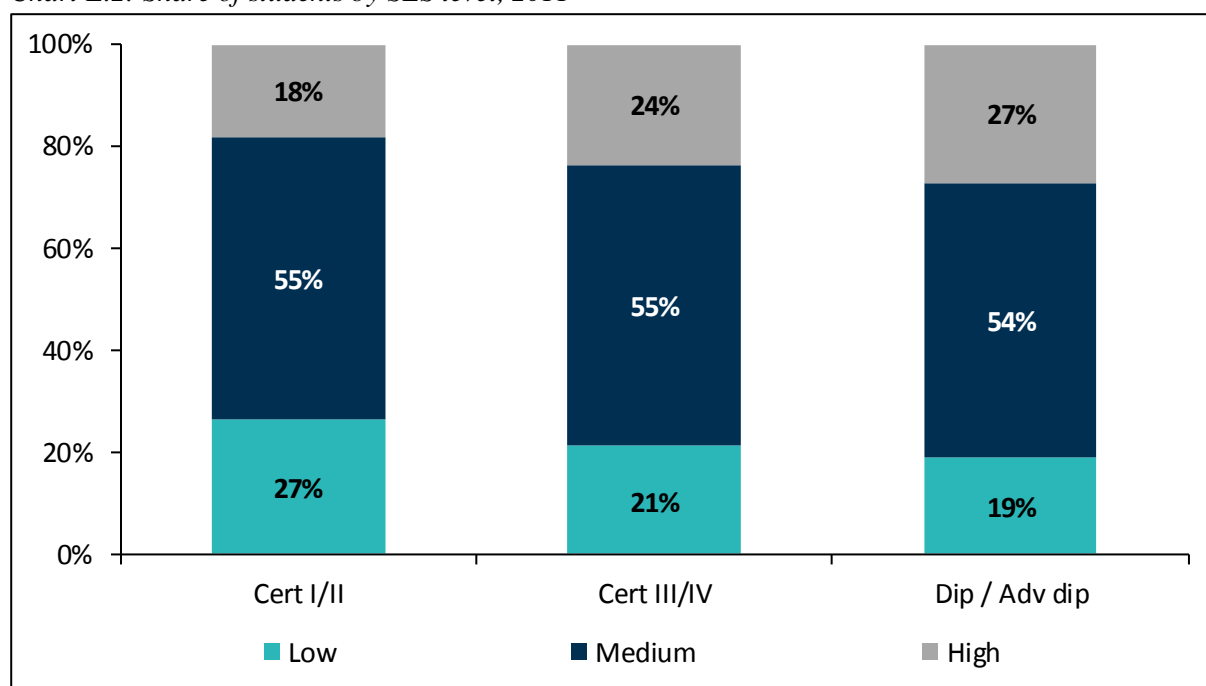
The findings from Foley 2007 are also reflected in more recent data from the NCVER, for 2011. Chart E.1 below shows the proportion of students studying at each VET level who have low, medium or high SES²⁹, where:

- low SES students are from areas with a socio-economic status in the lowest 25 per cent;
- medium SES students are from areas with a socio-economic status in the middle 50 per cent; and
- high SES students are from areas with a socio-economic status in the highest 25 per cent.

The chart shows that medium SES students are over-represented in all levels of VET, making up around 55 per cent of students at all levels. On the other hand, low SES students are over-represented in low levels of study (Certificate I/II) and high SES students are over-represented in high levels of study (Diplomas). Importantly, this data relates to students in publicly-funded VET institutions. Data relating to privately funded VET institutions is not available.

²⁹ The NCVER estimates the SES of enrolled VET students using four different forms of ABS's 2006 SEIFA indexes. Consistent with Foley's study, of these four options, this report uses the Index of Economic Resources (IER) to represent the SES of VET students. The IER index reflects the economic resources of a household such as income and housing. The NCVER data breaks the SES of the enrolled student into 5 quintiles. Quintile 1 represents the lowest SES while the Quintile 5 reports the highest SES. Independent Economics has used this information to classify the SES into three categories including low SES (the lowest 25 per cent of IER), medium SES (the middle 50 per cent of IER) and high SES (the top 25 per cent of IER). This is to be consistent with the literature that breaks down the SES status by low, medium and high.

Chart E.2: Share of students by SES level, 2011



Source: NCVER unpublished data, 2011

Note: SES is measured by the Index of Economic Resources (IER). Low SES students have an IER in the lowest 25 per cent; medium SES students have an IER in the middle 50 per cent; and high SES students have an IER status in the highest 25 per cent.

Karmel and Lim (2013) take a different approach and examine the VET participation rates of each SES group, for younger students aged 15 to 19 years. That is, they examine the proportion of the population in each SES group that participate in VET. They find that low SES students have a high participation rates on lower level VET qualifications, meaning that VET is “providing what might be described as preparatory or remedial courses” for these students. They also find that, for younger students, “the participation rates for certificates III/IV and diplomas are the same or virtually the same for [the medium and low SES] groups.” In line with the data shown above, high SES students have high participation rates in diplomas, but low participation rates in other VET qualifications. (Karmel and Lim, 2013, p19).

Therefore, a policy’s effect on low SES students will depend on the level of study at which it is aimed. As discussed in section 1, the government targets under NASWD are aimed at increasing the number of individuals with qualifications at the Certificate III level or above. Increasing the number of students in the Certificate III/IV may be more likely to benefit medium and low SES groups. On the other hand, increasing the number of Diplomas may have a larger benefit for high SES groups.

Although low SES students tend to undertake lower level courses, these courses may act as a pathway to achieving higher levels of education. A study by Wheelahan (2009) examined the extent to which VET can provide a pathway for students from low-socio economic backgrounds to higher education.

Wheelahan concluded that “VET pathways do not, on the whole, widen participation of low SES groups in higher education” (Wheelahan, 2009, p21). That is, the VET pathways are not sufficient to counteract current the under-representation of students from low SES backgrounds in higher education. However, as Wheelahan notes, her results should be interpreted with caution, because only

pathways from higher level VET qualifications (including Diploma and Advanced Diploma) to university were examined. However, low SES students are under-represented at the Diploma and Advanced Diploma level, and so would not be expected to significantly benefit from using these qualifications as a pathway to university.

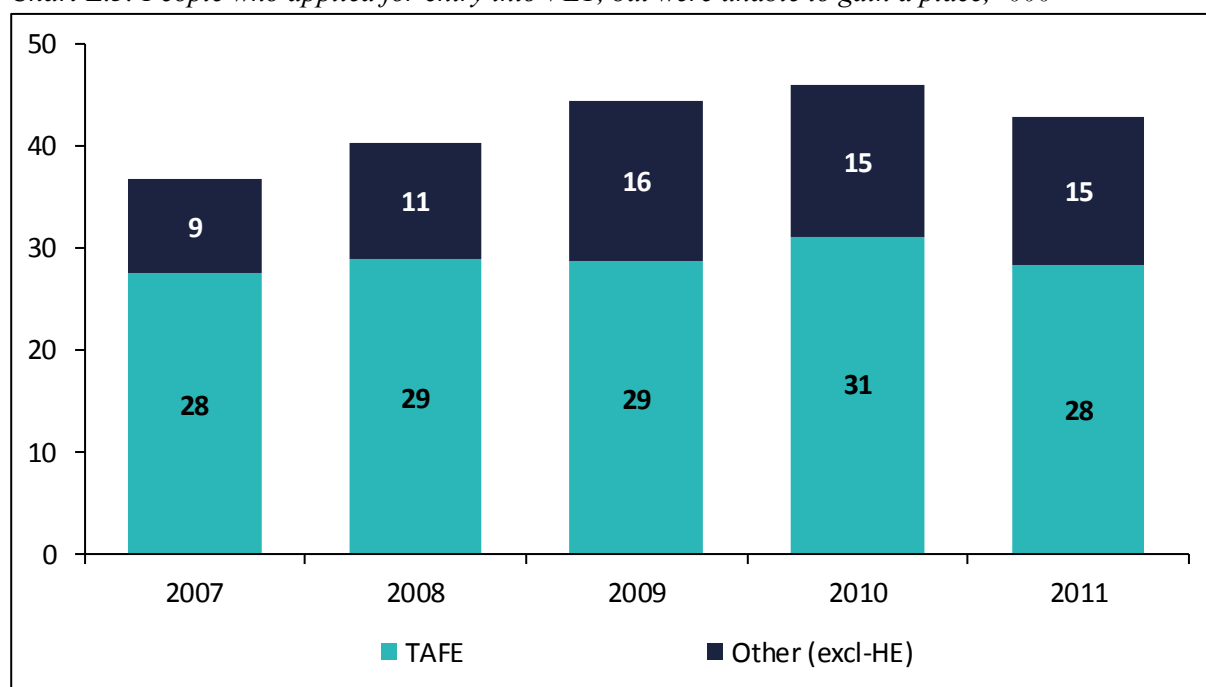
E.4 Unmet demand for VET

For additional government spending on VET to yield any net benefits, the additional places offered by the government funding must first be taken up by new students. If there is no student demand for additional VET places, then even if the government offers additional funding, there would be no additional enrolments, and therefore no additional costs or benefits. Similarly, once the additional students complete their studies, there must be industry demand for their new skills in order for any benefits to be generated. These two issues are addressed in this section.

E.4.1 Student demand for VET places

The ABS publishes statistics on the level of unmet student demand for VET places. According to this data, each year between 2007 and 2011, around 30,000 individuals who applied were unable to gain entry into TAFE. This is shown in Chart E.3 below. Similarly, around 10,000 to 15,000 people have applied but not gained a place in other non-school, non-higher education institutions. These ‘other’ institutions can be considered representative of non-TAFE VET providers.

Chart E.3: People who applied for entry into VET, but were unable to gain a place, ‘000



Source: ABS Survey of Education and Work, various years

Note: Other refers to institutions or establishments that offer educational courses such as industry skills centres, professional or industry associations, equipment/product manufacturers or suppliers, and instances where insufficient information was available to determine the type of educational institution.

Filling this unmet student demand for VET places would boost the number of VET students. The per cent boost in funding required depends on how the additional students affect the total number of VET commencements.

In 2008 (the most recent year for which the ABS included commencement data in its Education and Work publication), around 254,000 students commenced study at the VET level. During the same year, around 40,000 students applied to commence VET, but did not gain a place, as shown in Chart E.3. If all students who wanted to commence VET study were able to do so, 2008 commencements would have been around 16 per cent higher than they were. This rate of unmet demand is unchanged from 2007. If this has been an ongoing rate, then overall real VET spending from public and private sources would need to be 16 per cent higher than it has been in order to fill the unmet demand for places.

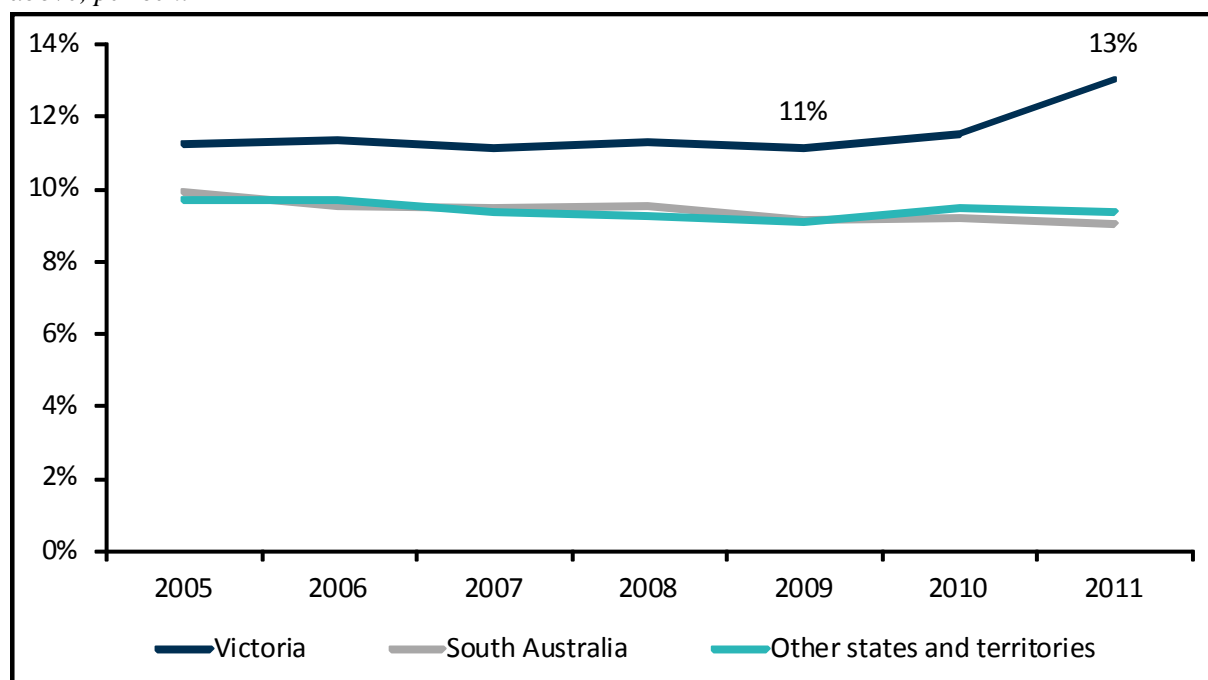
Recently, government have been implementing policies to address this unmet demand for VET places. Prior to 2009, all governments restricted the total government funding for VET, thus restricting enrolments. Under this policy, once all of the available VET places were filled, no more enrolments could be offered, even if there were still students who wanted to undertake VET study.

Since 2009, governments have been shifting towards a demand-driven system of VET provision, with the Victorian government leading this change. Between 2009 and 2011, Victoria phased in an entitlement system, and government VET funding was made available to anyone who met certain eligibility criteria³⁰. This entitlement system was extended to private registered training organisations (RTOs), enhancing competition between public and private providers. These reforms mean that the number of VET places is uncapped, and the supply of VET courses is more responsive to demand. As a result of these changes, the number of enrolment increased dramatically. (Productivity Commission, 2012)

Chart E.4 below shows the VET enrolments in Victoria as a proportion of its working-age population (15 to 64 years). Compared to the average of other states and territories, Victoria has historically had a high proportion of its working-age population undertaking VET study, at around 11 per cent. Nevertheless, following the reforms to uncap VET places from 2009, this share rose to 13 per cent. That is, while the proportion of the population in VET was stable up until 2009, it jumped by 2 percentage points between 2009 and 2011. This indicates that, prior to the reforms, there was significant unmet demand for VET in Victoria.

³⁰ For example, these eligibility criteria include whether the student is undertaking study at a higher level than their previous qualification.

Chart E.4: VET Students in the public VET system as proportion of population aged 15 years and above, per cent



Source: NCVER Students and Courses, 2011, and ABS Labour Force, Australia 6202.0

Chart E.4 indicates that, compared to Victoria, the other states have a smaller proportion of their working age population enrolled in VET, and this proportion has been relatively stable between 2005 and 2011. This low VET participation rate may indicate that these states have even greater unmet demand for VET than in Victoria. If this is the case, then additional funding in these states is likely to generate an increase in student numbers.

This was the case in South Australia, which implemented its ‘Skills for All’ entitlement policy in July 2012. A Skills SA report (2013) indicates that, in the first year of the Skills for All policy, the number of enrolments were significantly higher than the previous year. “Final qualification data for the first six months of Skills for All indicates a 43 per cent increase in enrolments when compared to the same period in 2011.” (Skills SA, 2013, p4)

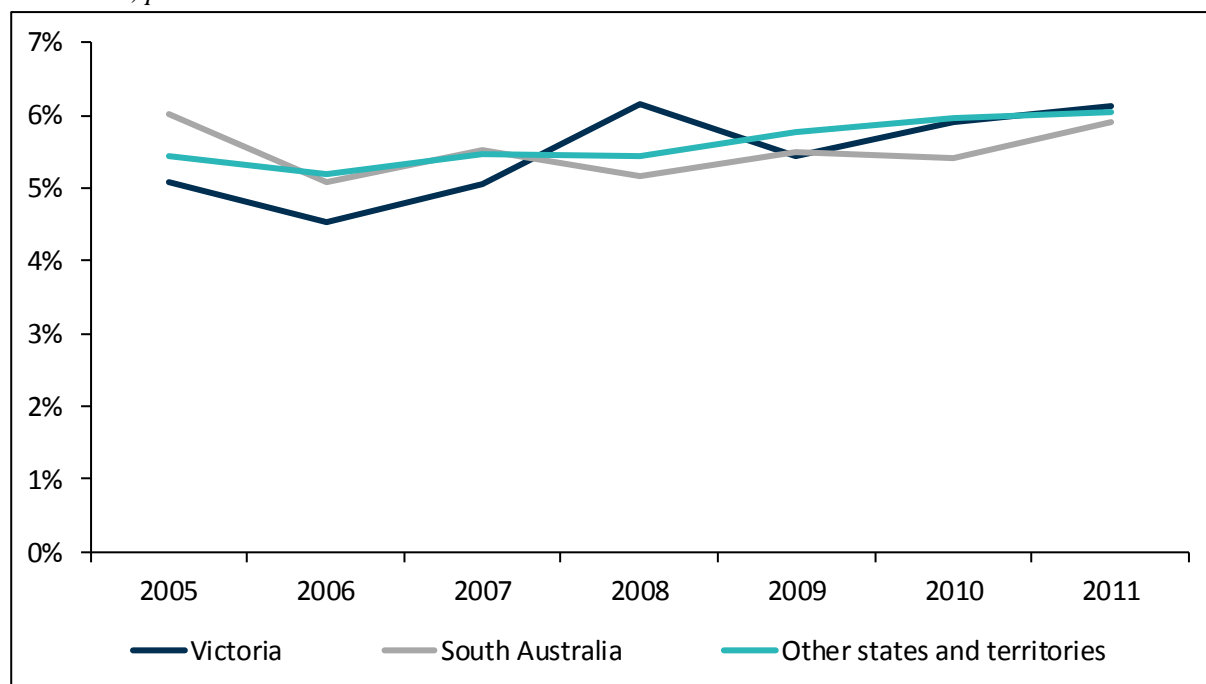
Other governments are also moving toward implementing a demand-driven system of VET provision. For example, in April 2012, as part of the National Agreement for Skills and Workforce Development (NASWD), all governments agreed to implement a national training entitlement which would allocate government funding to all students who meet certain criteria, rather than capping VET places.

However, the data used in Chart E.4 above is collected by the NCVER and refers to the ‘public VET system’ only. That is, it excludes students studying at VET institutions which do not receive any government funding. Therefore, it is possible the sharp increase in VET participation rates shown in Chart E.4 could simply be students transferring from the private vet system into the public VET system.

To confirm the trend shown in Chart E.4, participation rates can also be calculated from ABS data. The ABS data, shown in Chart E.5, is collected from surveys of the Australian population, and so can be expected to cover both the public and private VET system. However, because it is collected at a

single point in time (May of the relevant year) it shows a smaller proportion of students compared to the NCVER data, which includes students who studied at any time during the whole year. The ABS data in Chart E.5, shows a steady increase in the proportion of the population participating in VET in Victoria from 2009, rather than the sharp increase shown in Chart E.4.

Chart E.5: VET students in the public and private systems, as proportion of population aged 15 years and above, per cent



Source: ABS, Education and Work, various issues

Note: This data refers to the number of students in May of the relevant year

Comparing Chart E.5 with Chart E.4 indicates that the growth in participation rate prior to this period may have been due to growth in the private VET system, while growth since 2009 may have been due to growth in both the public and private VET sectors. However, the data does not allow these two sources of growth to be analysed separately.

Together, the three different sources of data discussed above indicate that overall, as government spending on VET increases, it is likely to contribute toward filling unmet student demand for VET places, raising the total number of students undertaking VET study.

This study examines the impact of greater investment in VET from both government and private sources. The extent to which government funding crowds-out private investment in VET is not modelled. The source of the increased funding, whether public or private, is not important for estimating the costs and benefits of additional investment in VET. However, if governments wish to minimise any crowding-out effect from higher public funding, this could be achieved through the design of income contingent loans. The increase in spending from public and private sources assumed in this report is discussed in section 4.

E.4.2 Industry demand for VET skills

There are a number of studies which quantify the extent to which industry demand for VET skills is not met by the current availability of these skills.

The Australian Workforce and Productivity Agency (AWPA) report (2013) calls for additional VET spending, from public and private sources. The report notes that, under the National Partnership Agreement on Skills Reform (NP), targets were set to increase completions compared to a 2008/09 baseline by 375,000 nationally between 2012 and 2017. This represents a 3.7 per cent average annual growth in completions over that period. AWPA concludes that these additional completions would not be sufficient to satisfy projected industry demand in two out of its three most realistic scenarios.

However, as discussed in the following sections, the additional VET funding examined in this report results in fewer graduations than is targeted by the NP. Thus, the skills acquired by the additional VET students considered in this report are likely to assist in filling unmet demand for VET places.

In addition, a forthcoming study by Tom Karmel also concludes that demand for VET skills has increased over time. This work updates a previous study by Karmel (1997). By examining changes in the supply of each type of qualification and the wages earned by each group, the trend in industry demand can be determined. Karmel finds that, overall, while the supply of workers with post-school education has increased dramatically, wages for each level have been relatively stable. This implies that demand for higher qualifications is increasing in line with supply.

We focus on Karmel's findings for the qualifications relevant to this report, diplomas and certificate III/IV, for the period between 1997 and 2009.

- Industry demand has shifted towards workers with higher level qualifications, including diplomas, for both males and females.
- For males, industry demand has shifted towards workers with a certificate III/IV *and* year 12. Workers with certificate III / IV but without year 12 have maintained parity with workers whose highest level of attainment is year 12.
- For females, industry demand has shifted towards workers with a certificate III/IV, irrespective of year 12 completion.

Karmel concludes with “at an aggregate level, the evidence in this paper indicates fairly strongly that, at least up to 2009, we do not have too many graduates” (Karmel, forthcoming, p14).

Appendix F Independent Education Model

This appendix presents technical details on the modelling approach used in this report. First, the general structure of the model is discussed. Next, details on each of the three models contained within the Independent Education model are discussed in turn:

- the VET Expenditure Model;
- the Education and Labour Market Model; and
- the Independent Computable General Equilibrium (CGE) model.

Together, these three models estimate the number of VET students that can be funded from a given level of government spending, and the flow on costs and benefits of these additional students.

Following this, the modelling approach in this report is compared to other approaches, and some assumptions regarding occupations are pointed out.

F.1 Overview of the Independent Education model

The Independent Education model consists of three inter-connected models. Together, these three models estimate the number of VET students that can be funded from a given level of additional government spending, and the flow-on costs and benefits of these additional students. The models are shown in Diagram F.1 below, and include:

- the VET Expenditure Model;
- the Education and Labour Market Model; and
- the Independent Computable General Equilibrium (CGE) model.

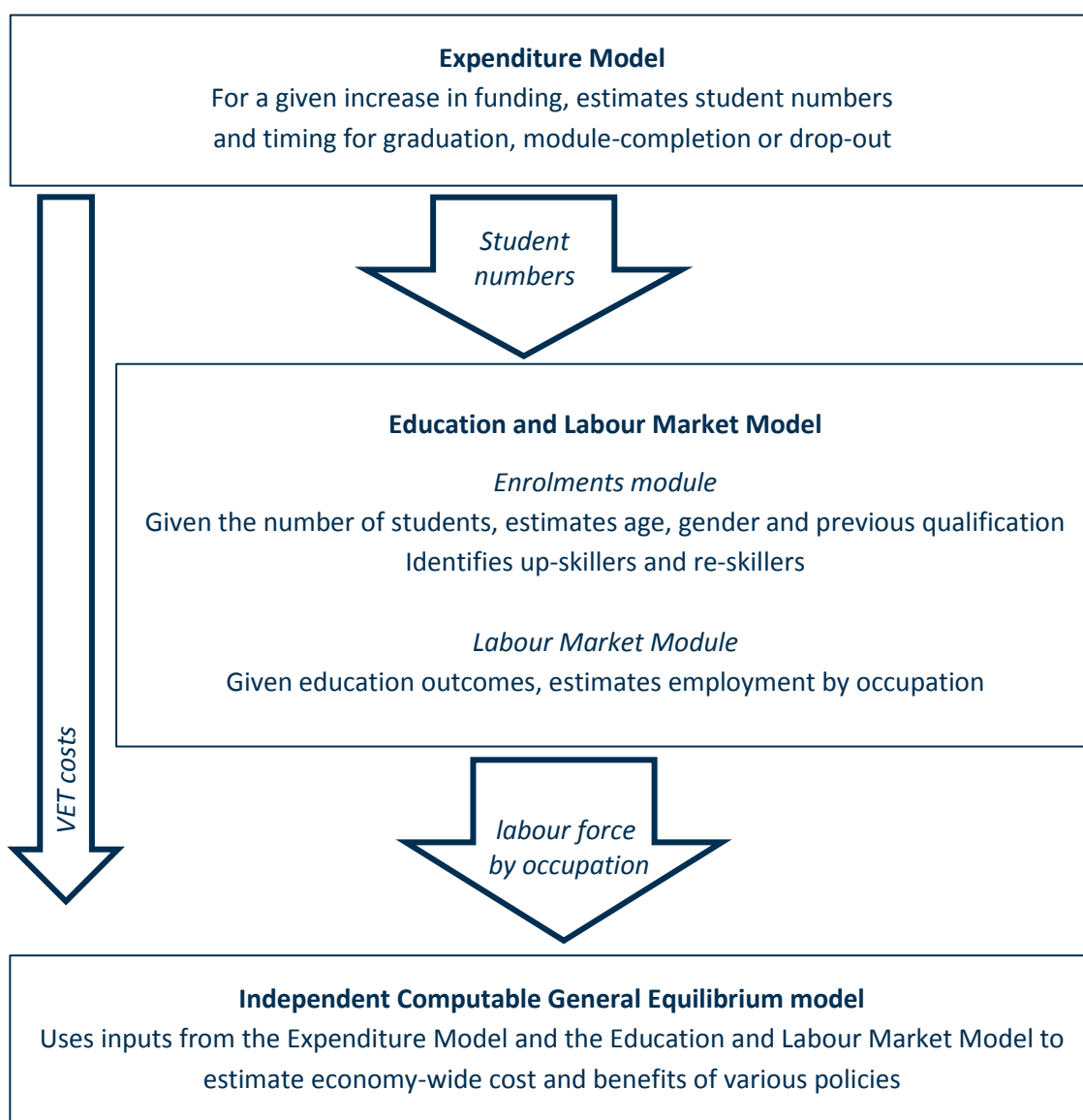
The **VET Expenditure Model** estimates the number of students that can be supported by a given level of VET spending. Taking into account the direct cost of each student, it estimates the number of students supported by the funding between 2012 and 2017, according to their level of study and whether they are full-time or part-time students. It also estimates when these students complete their studies (as graduates or module completers) or when they drop out of the VET system without completing any courses.

The **Education and Labour Market model** provides the link between student numbers and potential labour supply. First, it models how the educational attainment of the Australian population changes because of the additional VET students. Additional students mean that the proportion of the population with VET level qualifications will increase, depending on their age, gender and previous level of education. These educational outcomes are used to estimate the potential labour supply for 43 different occupations³¹. For example, the number of people working in occupations associated with VET training, such as *Construction Trades Workers* or *Food Trades Workers* will increase. These estimates also take into account that as individuals become more educated they are more likely to be employed.

³¹ The 43 occupations included in the model are based on the ANZSCO 2-digit classification, and a table containing a list of these occupations is included in Appendix A.

The **Independent CGE model** uses the outcomes for the costs and benefits of VET from the other two models to estimate the economy-wide effects of higher VET funding. Given the additional government spending from the VET Expenditure model, the effect on tax rates and the broader economy is modelled. Given the potential labour supply by 43 occupations from the Education and Labour Market model, the effect on the labour market and broader economy is modelled. Importantly, an individual's occupation affects the industry in which they work and the wage that they earn. In addition, the interaction between supply and demand for each of the 43 different occupations affects the wage earned by workers in each occupation.

Diagram F.1: The VET modelling framework



These three models have been carefully designed to ensure that they capture the time profile of the costs and benefits of VET funding in a consistent way. The costs are incurred during the five years of the policy (from 2013 to 2017), whilst the benefits continue to accrue each year over the working life of the additional students.

Both the costs and benefits are converted into a consistent measure so that they can be compared against each other. Specifically, the total costs and benefits are converted into the annual amount, received indefinitely, that has the same value as the cost or benefit received over a finite period. In other words, the costs and benefits are converted into their ‘perpetuity equivalent’. After converting to the perpetuity equivalent, the costs can be compared with the benefits and used as inputs into the Independent CGE model. The discount rate used to make this comparison is discussed in Box 5.1 below.

Box F.1: Discount rate used in this study

A real discount rate of 4.4 per cent has been chosen for this analysis, which can be broken into two parts:

- a real risk-free interest rate of around 2.5 per cent, which is consistent with the 10 year historical average rate on government bonds (RBA F2), but higher than the current rate of around 1 per cent;
- plus a 2 per cent risk premium.

The 4.4 per cent real discount rate is chosen because it is consistent with estimates of the real rate of return to business capital that have been made by Independent Economics using historical ABS data on capital stocks and capital income. The Productivity Commission (2012) used a higher real discount rate, of 6.0 per cent. One reason for the difference between the rates used in these two studies may be that the 4.4 per cent rate used in this study excludes the effect of economic rents, whereas the 6.0 per cent rate used in the Productivity Commission’s analysis may not have adjusted for this.

F.2 VET expenditure model

The VET Expenditure Model focusses on the costs of expanding the VET sector. The key input to the VET Expenditure Model is total funding for VET between 2013 and 2017. This includes funding from Commonwealth and State governments as well as fees for service and student fees³² received by public training providers. The VET expenditure model uses this information to estimate the following:

- the number of enrolments across three levels of study (Diploma/Advanced Diploma, Certificate III/IV and Certificate I/II);
- attrition by level of education, through either drop-out or module completion; and
- graduations.

Each of these functions are discussed in turn below.

F.2.1 Student enrolments, attrition and graduation

The VET Expenditure model estimates the number of places that can be funded using a given amount of spending over the five years considered in the modelling (2013 to 2017 inclusive).

The share of students enrolling in each level of study is estimated using historical enrolment patterns based on NCVER data. These students will then remain in the VET system, progressing through semesters over time, until they exit. The timing of their exit from the VET system is estimated using the following information.

- The share of students who undertake part-time and full-time study at each level is assumed to be the same as historical patterns.
- The amount of time that it takes to complete a certain qualification for a full time student is estimated based on the standardised number of hours for each qualification, as reported in Annual National Reports by DEEWR. The average time to complete a qualification for a part time student is then estimated using data on the number of full-time equivalent students compared to the number of actual students.
- The average rate of drop out, module completion and graduation is used, based on NCVER estimates. Separate rates are used for each level of study. By keeping track of module completers as well as graduates, the modelling gives a fuller picture of the benefits of VET.
- Assumptions about the average proportion of each full qualification that is completed by module completers were discussed in Appendix E.
- Each student is assumed to hold 1.23 enrolments. This is in line with 2011 data on the number of students and enrolments from the NCVER.

The cost per enrolment per semester is estimated using data on total spending and total enrolments. These costs have then been compared against data from Annual National Reports published by DEEWR. Over time, the nominal cost per enrolment per semester is assumed to grow in line with the

³² Includes administration charges, tuition fees, materials fees and student amenities fees

rate of wages growth, since the cost of education is driven by the cost of labour. The cost per enrolment per semester is then scaled down appropriately for part time students.

The parameters used in the VET Expenditure Module for the functions described above are shown in the table below.

Table F.1: VET Expenditure Model Enrolment Parameters

	Diploma or Advanced Diploma	Certificate III or IV	Certificate I or II
Years to complete full qualification (full time)	1.5	1.0	0.5
Years to complete full qualification (part time)	4.0	2.5	1.5
Share of students studying full time	38%	17%	7%
Graduation rate	34%	34%	20%
Module completion rate	56%	56%	70%
Dropout rate	10%	10%	10%
2013 cost per full time enrolment per year (\$, 2013 prices)	12,539	12,539	12,539
Share of total students	22%	78%	0%

Source: NCVER original data and Independent Economics calculations.

The graduation rates used in the model are defined as the proportion of the qualifications started in a certain year which are eventually completed. The graduation rates presented in Table F.1 are based on rates estimated by the NCVER. It is not possible to directly calculate these rates from data, because to do this, individuals would need to be monitored over a long time frame to allow them sufficient time to complete. As discussed in Bednarz (2012), the NCVER track a cohort of students over a period of time and use this information to “extrapolate the behaviour observed during this time window to predict the long-term completion rate” (Bednarz, 2012, p10). These completion rates are acknowledged as being the best estimates currently available by the Department of Innovation, Industry, Innovation, Science, Research and Tertiary Education (see Productivity Commission 2012, Vol. 3, p141).

Using the estimates of enrolments and cost per enrolment per semester, total spending over the five years between 2013 and 2017 is estimated. The total number of students commencing each semester is then chosen so that the total spending over the five years is consistent with the total funding for the scenario.

To estimate the full benefit of additional spending over the five years of each policy, the student numbers are estimated assuming that funding is only allocated to students expected to finish their studies by the end of the period under consideration. That is, all students who enter the VET system because of the additional funding also exit the system (through either drop-out, module completion or graduation) before the end of 2017. This assumption means that the full benefit of the additional VET spending can be estimated, because the educational outcome for each of the additional students is finalised.

F.2.2 Costs of VET

The direct costs associated with the expansion of the VET sector are the costs of the VET funding itself, which are borne by both governments and students. In addition, some students forego earnings opportunities because they spend time in VET rather than working. Specifically, the costs associated with the expansion of VET sector are as follows:

1. additional government funding (Commonwealth and State);
2. additional private funding; and
3. the economic cost foregone earnings.

The first two costs are estimated in the VET Expenditure model and are discussed below.

Direct government spending on VET (by Commonwealth and State governments) is an input into the VET Expenditure Model. The level of government spending varies depending on the policy scenario being considered. The assumed additional spending under various scenarios was discussed in Section 4 of the report.

Spending by households on VET is also an input into the model. Assumptions regarding the increase in private spending for each scenario are discussed in Section 4.

The focus of this analysis is an expansion of government funding. Therefore, there is assumed to be no change in the number of students who are fully self-funded.

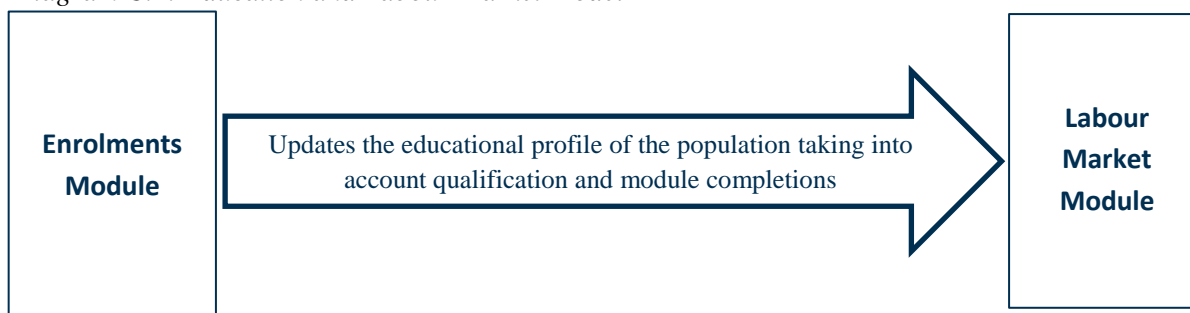
The costs of foregone earnings were discussed in Appendix D. They are estimated in the Education and Labour market module, and are also briefly outlined in the following section.

F.3 Education and labour market model

The Education and Labour Market Model uses the estimated student numbers from the VET Expenditure Model to estimate the supply of labour by 43 occupations. These labour supply estimates are then used in the Independent CGE model to estimate the economy-wide impact of VET policy scenarios.

The Education and Labour Market Model consists of two modules. The Enrolment Module estimates the age and gender of students, by level of education. The Labour Market Module then estimates the population by age, gender and educational attainment. It also estimates the size of the labour force in each occupation, in full time equivalent terms. The following diagram illustrates how these two modules work together.

Diagram C.1: Education and Labour Market Model



As shown in the diagram, these two modules are interconnected. They model both students and labour supply by age, gender and level of education. The characteristics of individuals enrolling in VET are based on historical data. The functions of each of these modules are discussed in turn below.

F.3.1 Enrolments module

The main function of the Enrolments Module is to update the education profile of the population in the Labour Market Module. To do this, the Enrolments Module performs the following key tasks:

- estimates the demographic profile of the student population;
- estimates the number of students who are up-skilling and re-skilling;
- information on qualification and module completions from the Enrolments Module is used to update the education profile of the population in the Labour Market module.

Profile of enrolments

While student numbers are estimated in the Expenditure Model, the demographic profile of these students is estimated in the Enrolments Module. The characteristics of new enrolments is based on historical enrolment data showing the age, gender and previous highest educational attainment level for students enrolled in each level of education. A summary of the data on 2011 enrolments by age, gender and education level is provided in Table F.3 below.

Table F.3: Enrolments in tertiary qualifications, level of current study—by age and sex, 2011, (000)

	15–19		20–24		25–34		35–44		45–64		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Postgraduate Degree	0	1	18	25	42	52	24	20	18	18	102	116
Graduate Diploma/Graduate Certificate	0	1	2	5	8	11	4	7	4	9	17	33
Bachelor Degree	91	118	170	213	53	76	18	35	9	20	341	462
Advanced Diploma/Diploma	16	15	31	40	38	53	22	36	15	30	122	174
Certificate III/IV	76	32	77	43	56	48	25	54	23	49	256	225
Certificate I/II	14	5	3	7	7	4	2	6	3	8	29	29
Certificate n.f.d.	5	3	10	7	6	10	3	4	7	8	31	32
Total	207	178	313	346	221	263	104	170	81	149	927	1106

Note: M stands for Males and F stands for Females. Source: ABS Survey of Education and Work, May 2011

Up-skilling

As discussed in section 2, individuals can generate employability and productivity benefits from VET if they undertake a higher level of education than the one previously held. Table F.4 presents historical data from the NCVER on enrolments, which shows that between 65 per cent and 72 per cent of VET students are enrolled in a level of education higher than the one that they previously held. That is, between 65 and 72 per cent of students are up-skilling.

Table F.4 Enrolments in VET levels, by previous education level (per cent of enrolments)

	Certificate I/II	Certificate III/IV	Associate degree, advanced diploma and diploma
Previous qualification of students			
Higher than TAFE	4	7	11
Associate degree, advanced diploma and diploma	2	5	11
Certificate III/IV	6	16	32
Certificate I/II	3	3	1
High school	72	62	38
Not known	12	8	8
Total	100	100	100
Per cent of students up-skilling	72	65	70

Source: NCVER

If a student has up-skilled as a result of the additional VET funding, by either completing modules or graduating at a level of education higher than they otherwise would have, then the Enrolments Module transfers them to a population cohort with a higher level of education. For example, without the additional VET funding, an individual may have been in the cohort of 20 year old males whose highest level of education is school. If the additional funding allows them to enrol in and graduate with a Certificate III/IV, then this individual would be transferred to the cohort of 20 year old males who hold a Certificate III/IV.

Re-skilling

Any student who is not up-skilling, is re-skilling. The gender and age profile of students who are re-skilling is estimated in the enrolments module. The effect of this reskilling on the employability and occupation of these students is modelled in the labour market module, and this is explained in section F.5.

Update labour market module

For up-skillers, the Enrolments Module estimates the number of people who transfer between different cohorts according to their age, gender and level of education. This information is then transferred to the Labour Market Module so that the effect on employment by occupation can be estimated.

For re-skillers, the Enrolments Module estimates the number of students according to their age, gender and level of education. This information is then transferred to the Labour Market Module so that the effect on employment by occupation can be estimated.

F.4 Labour market module

The Labour Market Module estimates the effect that additional VET students have on labour supply by occupation. This information on labour supply by occupation is then used in the Independent CGE model to estimate the economy-wide effects.

The tasks performed by the Labour Market Module are as follows:

- estimating the population by age, gender and highest educational attainment level using information on graduates and module completers, for up-skillers and re-skillers from the Enrolments Module;
- estimating employment by age, gender and educational attainment;
- estimating employment by occupation, using information on employment by age, gender and educational attainment.

Population

Outcomes from the Enrolment Module are used to estimate the education profile of the population by age, gender and level of education.

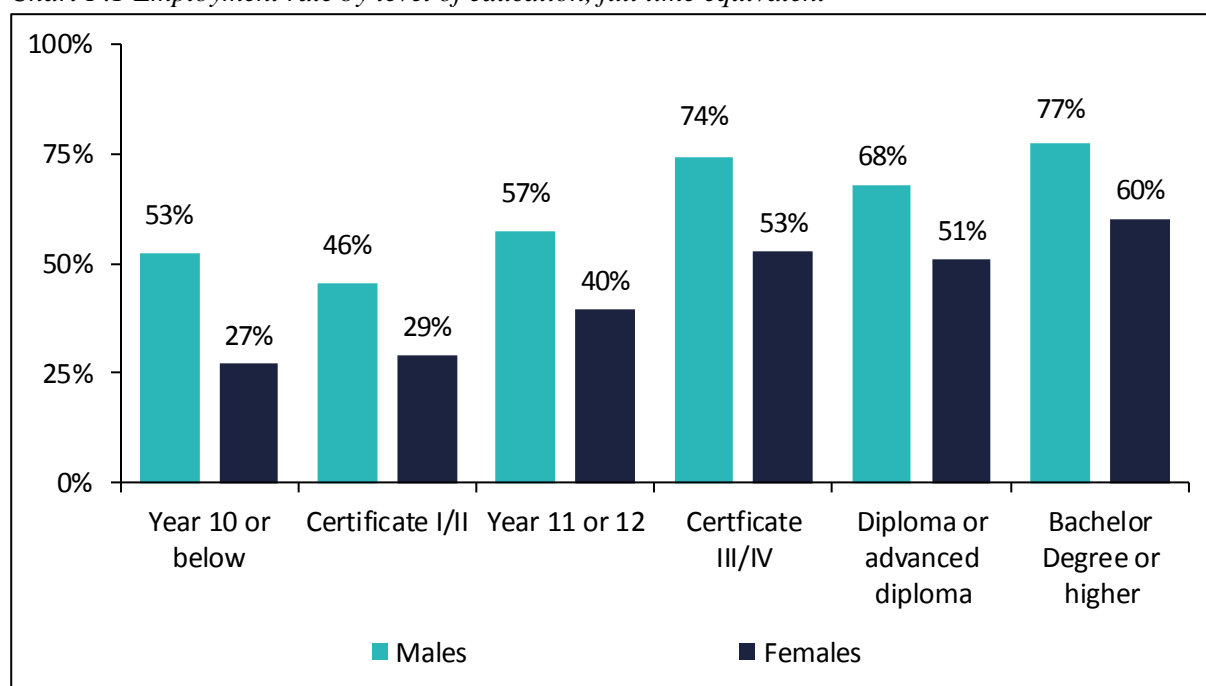
Employment

The Labour Market Module then estimates employment for each cohort. As discussed in section 2 and Appendix C, people with higher education levels are more likely to participate in the labour force, be employed and work full time. Thus, if funding for education is expanded, individuals who have up-skilled move to cohorts with higher levels of education, which means that overall employment is higher.

In addition, an offsetting reduction in employment is estimated for each cohort to take into account that some students will have fewer opportunities to work while they are undertaking VET study. The assumptions used for these estimates are discussed in Appendix D.

The employment rates used in the model are based on full time equivalent measures of employment, so that it takes into account that individuals with higher levels of education are also more likely to work full time than individuals with lower levels. These are shown in Chart F.1 below.

Chart F.1 Employment rate by level of education, full time equivalent



Source: Independent Economics estimates based on Education and Training Experience 2009, ABS, Mar 2010

Employment by occupation

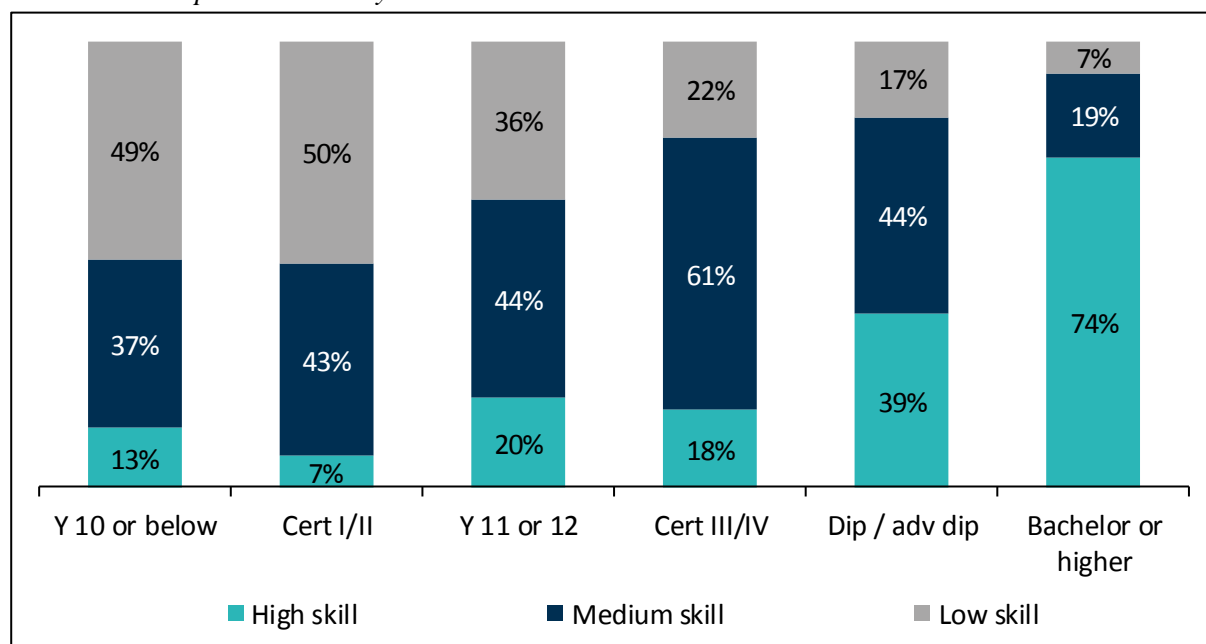
Given overall employment for each cohort, the Labour Market Module then estimates the occupation of these individuals. This is done based on historical data from a number of data sources on occupation by age, gender and level of education. This includes the ABS Education and Training Experience publication and the 2011 census. This data is summarised in Chart F.2 below, which shows the share of high, medium and low skill employment for individuals with each level of education. The three skill levels shown in the chart summarise the occupational detail actually used in the model. They are defined as follows:

- **High Skill Labour:** Managers and Professionals;
- **Medium Skill Labour:** Technicians and Trades Workers, Community and Personal Service Workers, and Clerical and Administrative workers; and
- **Low Skill Labour:** Sales Workers, Machinery Operators and Drivers and Labourers.

The detail in the chart has been kept to a minimum to enable the easy-identification of trends. However, the actual level of detail included in the Labour Market Module is significantly more detailed, identifying 43 separate occupations. The occupations included in the modelling are listed in Appendix A.

The Chart shows that those who have completed a Certificate are likely to be employed in a medium skill occupation. On the other hand, those who have completed a Diploma or Advanced Diploma are equally likely to be employed in a high or medium skill occupation.

Chart F.2 Occupation shares by education level



Source: Education and Training Experience, 2009, ABS

The supply of skills

The labour market module captures how additional VET funding changes the skill profile of the labour force and how this affects employment outcomes. Additional VET training means that the students are more employable and are able to enter occupations associated with higher skill levels.

This can be illustrated with the following simple example, using data on the occupational profile of 20 year old males which is summarised in Table F5 below.

Table F.5 Occupation profile for 20 year males not currently studying, by education level

	With high-school only	With Certificate III/IV
Managers	3%	3%
Professionals	1%	2%
Technicians and trades workers	21%	57%
Community and personal service workers	6%	5%
Clerical and administrative workers	3%	2%
Sales workers	9%	4%
Machinery operators and drivers	9%	4%
Labourers	19%	10%
Unemployed, not in labour force, or other	28%	13%

Source: 2011 Census (ABS)

The occupational profile of 20 year old males who are not studying and whose highest qualification is school is shown in the first column of Table F.5. Over a quarter of them are not employed, and nearly 20 per cent work as a labourer. In contrast, the occupational profile for 20 year old males who are not

studying and who have a Certificate III/IV is skewed towards technical and trades jobs, and has far fewer people who are not employed.

The additional VET funding reduces the population of 20 year old males whose highest level of education is school, and increases the population whose highest level of education is Certificate III/IV. Based on the employment profile of these two groups, the labour market module estimates the employment rate and likely occupations of these students.

The information shown in Table F.5 is a summary of the actual information used in the Labour Market module. As discussed above, the modelling is undertaken for 43 different occupations, based on the 2-digit ANZSCO classifications. The occupations included in the modelling are listed in Appendix A. This detailed occupation disaggregation enables better mapping between educational attainments and occupations.

However, the final employment-related benefits from the additional VET education will depend on the interaction between the supply and demand forces for each occupation. The Labour Market Module focusses on the effects of additional VET funding on potential labour supply. The Independent CGE model is then used to model the interaction between the demand for and supply of workers. This includes estimating the effect of the additional VET education on the after tax real wage earned in each occupation.

Re-skilling

This detailed occupational modelling also allows the impact of reskilling to be captured in a systematic way. Data on re-skillers has been obtained from unpublished data from the NCVER students and outcomes survey. This data shows that re-skillers have a higher employment rate after re-skilling, and are also able to change occupations after reskilling. This data was summarised in Appendix E. Using this information, the labour market module estimates the potential labour supply of students who have re-skilled.

As for up-skillers, the final benefits of re-skilling depend on the interactions between demand and supply. These interactions are modelled in the Independent CGE model, as discussed below.

F.5 Independent CGE model

The Independent CGE Model is Independent Economics' Computable General Equilibrium (CGE) model of the Australian economy. The estimates of the costs of VET from the VET Expenditure model, including the higher spending on education, are fed into the model. At the same time, the impacts on potential labour supply from the Education and Labour Market model are also entered. The Independent CGE model then uses this information to estimate the overall effects of higher VET funding on the economy, including the following aspects:

- employment by industry and wages by occupation;
- household incomes, consumption and living standards; and
- the change in the personal income tax rate necessary to fund the expenditure.

This section briefly outlines the broad features of the Independent CGE model, and then discusses the three aspects of the analysis listed above. It also describes the enhancements that have been undertaken for this project to extend the modelling of labour demand by each industry.

The Independent CGE model is well suited to modelling the impact of increased VET funding on the Australian economy. Some notable features are as follows.

- The model is designed to represent a normalised version of 2012/13 Australian economy, using the latest information available. It takes as its starting point the 2007/08 Input-Output (IO) tables, which are then uprated to allow for growth in prices, productivity and labour supply from 2007/08 to 2012/13.
- The model has a detailed treatment of industry demand for different factors of production. There are 120 different industries, which use a variety of inputs, including labour, nine types of capital, land and natural resources. Each industry's demand for these inputs is price sensitive. For example, if labour becomes more productive, and therefore, more cost effective, then the demand for labour will be higher.
- The model provides a valid measure of changes in consumer welfare or living standards based on welfare economics, so that policy changes can be correctly evaluated in terms of the public interest.

A detailed discussion of the Independent CGE model can be found on the Independent Economics website, www.independenteconomics.com.au.

Employment by industry and wages by occupation

A major benefit of using the Independent CGE model is that labour demand by each industry can be modelled in an economy-wide framework. Each of the 120 industries identified in the model use different types of labour as inputs into production. This takes into account that different industries have different labour intensities. For example, in the mining sector, labour is a relatively small share of production costs, while in services industries, such as education and health, it is a large share of production costs.

Each industry can substitute labour for other inputs, such as capital, as the prices of each of these inputs change. Labour is relatively substitutable with capital – if capital becomes more expensive, an industry may choose to use more labour instead. Specifically, if the ratio of the wage to the cost of capital is one per cent higher, then the ratio of labour to capital will be 0.9 per cent lower.³³

For this study, it is important to appropriately model industry demand for more than one type of labour. Distinguishing industry demand for labour according to occupation allows for a more complete analysis of how the VET system contributes to activity in different industries, because different industries use different types of labour. For example, while the Health industry would employ Health and Welfare Support Workers, the Hotel industry would employ Cleaners and Laundry Workers. It will also allow modelling of VET's role in re-skilling, which transfers individuals from one occupation to another, allowing the labour force to be more responsive to industry demands.

The modelling approach in the Independent CGE model takes into account three main features of the labour market.

- Firstly, different industries demand different kinds of labour, depending on their skill level and occupation.
- Secondly, to a certain extent, industries are able to substitute between the types of labour that they use.
- Thirdly, through training and education (including formal and informal learning), individuals are able to adjust their skills and occupations in response to industry demand.

Taking these features of labour demand into account, the Independent CGE model estimates the benefits that VET provides through its role in allowing individuals to move from one occupation to another. The modelling approach is discussed below.

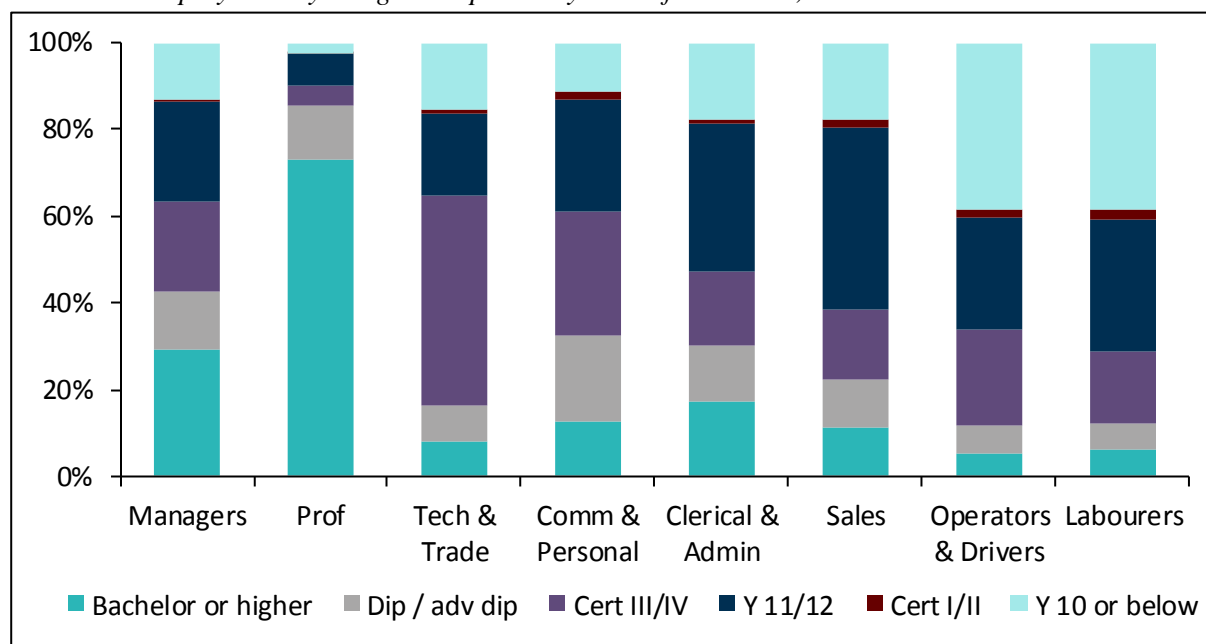
Firstly, the model takes into account that different industries demand different kinds of labour. For example, the Automotive and Engineering Trades Workers make up a relatively large share of employment in manufacturing industries, compared to their share of employment in the finance industry.

The initial pattern of employment in each industry is based on a number of ABS data sources showing employment by occupation by industry. Specifically, detailed data from the recent census is used to enhance data from the Labour Force Survey to estimate the pattern of employment in each of the 120 industries in the model. The occupations employed by each industry are summarised in Appendix A, which shows the share of employment represented by each of the 43 different occupations for broad industry categories.

Chart F.3 below shows the educational makeup of employment in broad occupational groups as defined at the ANZSCO 1 digit level. This is a summary of the occupational detail in the model, which includes 43 different categories, based on the ANZSCO 2 digit classification.

³³ The elasticity of substitution for labour and capital measures the per cent increase in the ratio of labour to capital for a 1 per cent decrease in the ratio of their prices. Gunning et al. (2007) review the CGE modelling literature, showing that the consensus for this elasticity appears to be between 0.7 and 1.0. Following this, we set the elasticity of substitution between labour and non-structure capital at 0.9.

Chart F.3. Employment by 1-digit occupation by level of education, share



Source: ABS, Education and Training Experience, 2009

Chart F.3 shows a clear pattern, the higher-skilled occupations, such as Managers and Professionals have a large share of individuals with a Bachelor degree or higher. On the other hand, Technicians and Trade Workers and Community and Personal Service Workers have a large share of individuals with VET qualifications.

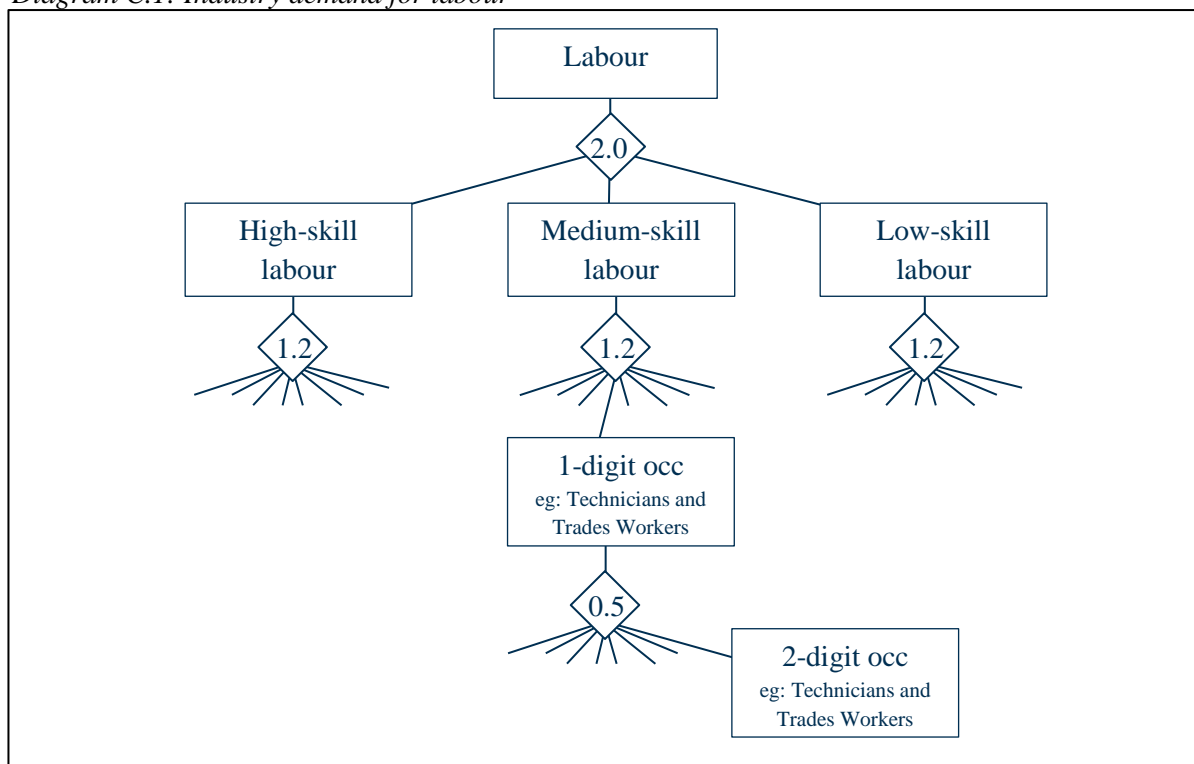
Each of the broad occupational groups shown in Chart F.3 can be broken down further into 2-digit ANZSCO classifications. These are narrower definitions, grouping workers more closely to skills required by particular industries. For example, the Technicians and Trades Workers occupation includes:

- Engineering, ICT and Science Technicians;
- Automotive and Engineering Trades Workers;
- Construction Trades Workers;
- Electrotechnology and Telecommunications Trades Workers;
- Food Trades Workers;
- Skilled Animal and Horticultural Workers; and
- Other Technicians and Trades Workers.

Therefore, it can be said that an individual's level of education is a broad indicator of their 1-digit occupation, and their field of study is a broad indicator of their 2 digit occupation. In other words, their skill *level* is related to their 1 digit occupation, while their skill *type* is related to their 2-digit occupation.

Independent Economics has developed a system to model labour demand in line with these observations. Specifically, a three-tiered system is used to model labour demand. This is represented in the following diagram, and then discussed below.

Diagram C.1: Industry demand for labour



Generally, the modelling of industry demand for each occupation takes into account that while industries can substitute relatively easily between broad skill levels, they are less able to substitute between more detailed types of occupations. In addition, the parameters used in the model take into account that the occupational pattern of labour supply can respond to labour demand from industry. This is discussed below.

As shown in Diagram C.1 above, an industry first distinguishes between the different skill levels that it requires. These skill levels are defined as broad groupings of the 1-digit ANZSCO occupations.

- **High Skill Labour:** Managers and Professionals
- **Medium Skill Labour:** Technicians and Trades Workers, Community and Personal Service Workers, and Clerical and Administrative workers
- **Low Skill Labour:** Sales Workers, Machinery Operators and Drivers and Labourers

The econometric literature provides evidence that the elasticity of substitution between broad skill categories is relatively high. If it is cost-effective to do so, firms can substitute low, medium or high skilled labour relatively easily. This does not imply that the workers need to be substituted one for one. For example, the work of a team of Low Skill Workers might instead be undertaken by a smaller team of Medium Skill Workers. A firm's choice between lower and higher skilled workers will depend on the wages paid to each type of worker, and their relative productivities. However, industries will always need to use some combination of the three types of workers. The elasticity of substitution for the broad skill types is set at 2.0 – that is if the wage for high skill labour relative to the other types of labour is higher by 1 per cent, then demand for high skill labour is 2.0 per cent lower.

This level of substitutability is slightly higher than estimates from Katz and Murphy (1992) and Acemoglu and Autor (2010). This is to allow for flexibility in the supply side of the labour market. For example, if industries increase their demand for high-skilled labour, then households are likely to respond by undertaking more education or training so that they can supply this kind of labour.

After the amount of high, medium and low skilled labour is chosen, industries then choose the amount of labour from each broad (1-digit) occupation to employ. To recognise that industries are less able to substitute workers at this 1-digit occupational level, a lower elasticity of substitution is used, of 1.2. That is, if the wage for Clerical and Administrative workers relative to other medium skill occupations is higher by 1 per cent, then the demand for Clerical and Administrative workers relative to other medium skill occupations is lower by 1.2 per cent.

This elasticity is set relatively high to mimic the responsiveness of labour supply to changes in industry demand. Supply side responses are likely to have a relatively large effect at this level, because retraining from a Clerical and Administrative worker to a Community and Personal Service worker in response to industry demand is likely to be easier than retraining from a medium skill worker to a high skill worker.

Finally, industries distinguish between the more specialised fields of skills that it requires, as represented by the 2-digit ANZSCO occupations. These 43 different occupations are listed in Appendix A, and represent skills which are closely associated with work in particular industries. The modelling takes into account that it is relatively difficult for firm's to substitute between different types of labour at this detailed occupational level. Therefore, the elasticity of substitution between these one digit occupations is set lower, at 0.5.

Both labour demand and labour supply have an influence on the wage paid to each occupation. The wage is determined in the labour markets in the Independent CGE model. If demand for a particular occupation is larger than supply, then the wage will be bid upwards. Likewise, if demand for a particular occupation is smaller than supply, then the wage will be bid downwards. The wage continues to adjust until demand for labour equals the supply for labour in the long run.

Household incomes, consumption and living standards

Households in the Independent CGE model generate income from three main sources.

- Labour income is the after-tax labour income that households can earn by supplying their labour. The labour income tax rate is set by government policy. As discussed above, the wage for each type of labour is determined in the labour market. Households choose to supply more labour, and take less leisure, if the real after tax wage is higher. The elasticity of labour supply is 0.2 – that is, if the after tax real wage is 1 per cent higher, then households will choose to supply 0.2 per cent more labour. This elasticity is similar to that used by de Mooij and Devereux (2011).
- Households also generate income from owning a certain amount of capital and other assets such as land and natural resources.
- Households also receive income through government transfers.

Households cannot spend more than their income. After taking into account tax and saving at a sustainable rate, households can spend their income on leisure (by choosing not to work) and consumption. They make price-sensitive decisions about the 116 different goods and services they consume. Households in the Independent CGE model derive well-being (or utility) from leisure and their consumption of the 116 different goods and services.

Increase in tax revenue to fund the additional VET expenditure

The additional government funding for VET will require additional tax revenue to be raised³⁴. However, the net impact of additional spending on VET on the government budget may be positive or negative. This is because additional VET spending is expected to raise labour force participation and productivity, which would lead to higher wage earnings, and higher tax revenue. It is also expected to boost revenue from other tax sources such as GST and company tax. Therefore, the *net* impact on the government budget would be estimated in the modelling.

In the Independent CGE model, a tax rate is chosen to automatically adjust to balance the government budget. The primary mechanism through which the Commonwealth Government raises tax revenue is personal income tax. In 2010/11 personal income tax represented 58 per cent of total Commonwealth Government revenues. Therefore, the model allows the average rate of personal income tax to automatically adjust to balance the government budget. If tax revenue is less than government spending, then the rate will be increased. If tax revenue is higher than government spending, then the rate is decreased.

Raising the rate of personal income tax reduces the after-tax real wage. This reduces the incentive to work, resulting in a cost to the economy and households. We have previously used our Independent CGE model to estimate the total cost to households of raising personal income tax. For each dollar of revenue raised by an increase in the personal income tax rate, households are estimated to be worse off by \$1.27. The Independent CGE model will take these flow-on effects from a change in the personal income tax into account.

Comparing costs and benefits over time

Importantly, the cost of VET is borne upfront, whilst the annual benefits continue to grow in the medium to longer term, as more individuals complete their study and join the labour force. One way to compare these costs and benefits, which vary over time, is by estimating an internal rate of return. The internal rate of return (IRR) on investment in VET education is the real annual return for every additional dollar spent on VET. Specifically, it is the discount rate which equates the present value of the costs of investing in VET with the present value of the benefits, or the discount rate which gives the investment a net present value of zero.

The internal rate of return also allows a comparison between spending on VET and other forms of government spending. Given that governments have limited funds and competing priorities, a ranking of policy initiatives according to the IRRs would enable government to allocate funds to those reforms and initiatives which have the highest rate of return. That is, governments can compare the IRR from

³⁴ Additional funds for expanding the VET sector could also be raised by reducing government expenditure on other items. Assessing the economic impact of such a policy is outside the scope of this report.

investing in VET reforms with the return from other policy initiatives to determine whether investing in VET is the most efficient use of government funds.

The IRR summarises the benefits of VET funding options, after taking into account all of the costs, and will be estimated in stage three of this project.

F.6 Comparison to other approaches

This section compares aspects of the modelling approach used in this study with an alternative approach that has been used in other work.

A key focus of the Independent Education model is the role of the VET system in allowing individuals to change occupations. As discussed above, VET education impacts the supply of and demand for workers in each occupation. Both of these features of the labour market are systematically modelled in this report. As outlined in the previous sections, employability benefits come about when an individual changes to a level of education with a higher employment rate. Productivity benefits come about when an individual moves to an occupation with a higher wage.

Other studies, such as the Productivity Commission's 2012 analysis, impose productivity benefits based on estimates in the econometric literature. However, there are two main benefits of modelling the productivity benefits of VET through its impact on occupation, rather than imposing external estimates.

- Firstly, the wage premiums estimated in the econometric literature do not take into account the effect of additional labour supply on the wage earned in each occupation. For example, as a result of higher VET funding, labour supply of construction trades workers may be higher, while the supply of labourers may be lower. This would tend to lower the average wage received by all construction trades workers and raise the average wage received by all labourers. By modelling the impact of VET on labour supply by occupation, the Independent Education model takes these wage responses into account.
- Secondly, as discussed in Appendix E.2, the econometric literature has limited tools with which to estimate the benefits of re-skilling. As a result, as pointed out by Karmel and Nguyen (2006), wage premium estimates generally indicate that there are no benefits to undertaking VET study at the same or lower level than a previous qualification. However, by using data on student outcomes to focus on the effect of re-skilling VET on an individual's employability and occupation, the benefits of re-skilling can be estimated.

Therefore, the Independent Education model focusses on the impact of additional VET expenditure on the occupation profile of the labour force. The overall impacts on employment and wages can then be modelled through the effects on labour supply and demand in each occupation.

Although the wage earned by workers in the Independent Education model does not directly make use of the econometric literature, the modelling outcomes are consistent with its concepts. The econometric literature generally uses an individual's age, gender and educational attainment to estimate their wage and probability of employment. These are the same attributes used to generate wage and employment outcomes in the Independent Education model. As described in Appendix C,

an individual's occupation depends on their age, gender and educational attainment, which, in turn, affects their probability of employment and their wage.

F.7 Assumptions in modelling the supply of and demand for occupations

An important innovation in this modelling is that it focusses on both the supply and demand for occupations. There are two important assumptions made in the occupations modelling, which are discussed below.

The first assumption relates to the supply of occupations. The occupations held by each group of additional students are estimated depending on their age, gender and level of education. For each group, the probability of joining a certain occupation has been estimated using ABS data.

Karmel (2011) finds that the relationship between occupation and education is different between age groups. Specifically, comparing individuals from different age groups, Karmel (2011) finds that older workers tend to have lower qualifications than younger workers in the same occupation. The modelling in this report takes this pattern into account by estimating the occupations for each group separately, according to their age, gender and level of education.

Karmel (2011) also finds that the relationship has been changing over time. Comparing census data from 1996 and 2006, Karmel (2011) finds that, in general, a given occupation requires a higher level of education in 2006 than it did in 1996. Karmel (2011) attributes this trend to increasing credentialism, where educational attainments are overemphasised as a signal of an individual's ability.

As discussed in Appendix C, the modelling in this report follows Leigh (2008) to correct for this potential bias from signalling behaviour by scaling back the estimated employability and productivity benefits from additional education. The modelling in this report uses the most recent census data, from 2011, to reflect the current relationship between qualifications and occupations. For assessing current policy assumptions, this approach is appropriate. Of course, when generating long-term future projections of labour supply by occupation, it is important to take into account the gradually changing relationship between education levels and occupations.

The second assumption relates to the interaction between demand and supply for each occupation. The short-run effects of investment in VET are abstracted from, to focus on appropriately modelling the long-run impact of this investment. Over time, additional VET training would raise the supply of certain skills, and the wage earned by each occupation is likely to adjust in response. For example, with a greater supply of Construction Trades Workers, the wage earned by these workers is likely to be lower than would otherwise be the case because demand from industry is not unlimited. In addition, the types of occupations held by workers are likely to adjust in response to changes in industry demand. For example, if industry demand for Automotive and Engineering Trades workers is higher relative to other occupations, boosting the wages earned by these workers, then more individuals are likely to undertake courses to gain the relevant skills.

The results presented in this report are the annualised impacts *after* these wage adjustments have occurred. That is, they are the long-run impacts of additional investment in VET.

Under this long-run approach, the unemployment rate for each occupation converges to its ‘normal’ rate³⁵. For Australia, the normal rate of unemployment is around 5 per cent, and this is the overall unemployment rate assumed in this report. However, as discussed in Appendix C, this report takes into account that employment (and unemployment) rates differ for different groups depending on their gender and level of education. The unemployment rate for groups with lower levels of education is higher than the average of 5 per cent, while the unemployment rate for groups with higher levels of education is lower than 5 per cent.

³⁵ the non-inflation accelerating rate of unemployment (NAIRU)

Appendix G Non-accredited training

Non-accredited training provided by the VET sector plays an important role improving the employability and productivity of the workforce. Non-accredited training refers to training which upon completion does not provide students with a nationally-recognised outcome. However, despite not providing a nationally recognised outcome, it can provide benefits including:

- a pathway to accredited training;
- skills and knowledge tailored to the needs of the individual; and
- industry-recognised skills.

There are broadly two different types of non-accredited training including formal training and informal training. Formal training refers to training which is structured and taught in institutions and organisations. On the other hand, informal training is unstructured, non-institutionalised training that can be related to work, family, community or leisure. Informal training generally occurs on a self-directed basis.

In this section, the discussion is limited to the role of VET in providing industry-specific non-accredited formal training. This is because the VET sector plays a very limited role, if any, in providing non-accredited, informal training. However, it should be noted that informal training can provide benefits by improving basic numerical, language, literacy and non-cognitive skills.

Within non-accredited formal training there are two main types of training including industry-specific training, which is specifically tailored to meet the workforce skills needs of industries, and adult and community education focusing on language, literacy and numeracy skills. These types of non-accredited training are discussed in sections G.1 and G.2 below.

Some non-accredited formal training can also occur outside of the VET system, including training conducted in-house by large private companies. For example, according to the Mineral Resource Council of Australia (Minerals Council of Australia, 2012), the mineral sector spends more on training per employee than most industries and significantly more than the national average. Some of this training is provided in-house while some is provided through the VET system to meet the workforce skills demanded by the industry. The in-house training provided by large private companies could potentially have spill-over benefits to other industries, as the employees who have received training move to other industries.

The following sections discuss in detail the two types of non-accredited formal training provided by VET. These are industry-specific training and language, literacy and numeracy skills training.

G.1 Industry-specific non-accredited training

In this report, the discussion on industry specific non-accredited training focuses on skill sets. Skill sets refer to single units of competency or combinations of units of competency from a nationally endorsed Training Package, which link to a licence or regulatory requirement, or a defined industry need (Mills et al., 2012). Units of competency that form a skill set can be drawn from one or more Training Packages. Skill sets are not qualifications but are a way of identifying logical groupings of units of competency to meet an identified learning outcome. Upon completion of a unit of competency, individuals are eligible to receive a certificate of attainment. The purpose of skill sets is not to replace full qualifications but to provide an alternative to qualifications, which in many cases may help a participant create a pathway to a qualification.

At present there are two types of skill sets in the Australian VET system: skill sets in training packages developed by Industry Skill Councils (ISC) and skill sets developed by Registered Training Organisations (RTOs). These two types of skill sets vary in their composition. Training package skill sets developed by ISCs are pre-arranged and therefore cannot be changed. It can only comprise of select units from a specific training package. In contrast, skill sets developed by RTOs can contain any unit from any qualification within a training packages or other nationally or state-accredited qualifications, with the aim of meeting the skills development needs of an individual, enterprise or industry client (Mills et al., 2012).

Independent Economics conducted detailed interviews with representatives of three Industry Skills Councils (ISC): Innovation and Business Skills Australia (IBSA), AgriFood Skills Australia and Transport and Logistics Industry Skills Council (TLISC). The aim of the interviews was to identify quantitative and qualitative information on the costs and benefits associated with industry-specific non-accredited training, such as skill sets, as well as the reasons individuals choose to complete a skill set instead of a full qualification.

The common theme of the interviews was that the industry specific non-accredited training such as skill sets has gained prominence in the last few years. This is because employers view skill sets as a more flexible way of meeting changing industry skills requirements due to the lower time-frame and costs involved. Skill sets also provide the opportunity to build up confidence amongst those who may be apprehensive about the prospect of undertaking the full formal accredited training associated with a full qualification. The three main reasons identified, during the interviews, for undertaking skill sets are as follows:

- licensing needs;
- “pull factor” from the resource and construction industries; and
- updating skills.

Licensing and regulatory requirements

One of the reasons why skill sets have gained prominence is due to the licensing and regulatory requirements that are needed in a particular occupation. This is particularly the case in TLISC-related industries. Skill sets provide an individual with enough competencies to gain the licence to work in a

job. Based on TLISC's survey of RTOs in 2011, the most significant reason for undertaking skill sets, identified by 54 per cent of RTOs was related to licencing needs. In the majority of TLISC-related industries, obtaining a full qualification takes a long time due to different licencing requirements which must be met. For example, in Maritime, it could take around 20 years to obtain the highest qualification through traditional training pathways as individuals need to fulfil a number of licencing requirements. Therefore, people prefer to undertake skill sets rather than full qualifications.

Pull factor

Another reason why industries prefer skill sets over full qualifications, identified during the interviews, is related to the "pull factor" from the resource and construction industries. Employers have little incentive to provide employees with a full qualification. This is because once fully qualified, employees are drawn to more attractive roles in more lucrative industries such as, the mining and construction industries. Based on the Workforce Planning and Development survey, conducted by TLISC in 2012, 29.5 per cent of the employers do not provide training because of their concern that employees will become more attractive to other employers and will leave their current job.

Updating Skills

An additional reason for undertaking skill sets, identified during the interviews, is to update existing skills. Due to constantly changing working environments, experienced workers need to keep their skills up to date to remain employable and progress further in their current jobs. Skill sets provide these experienced workers with a more flexible way to brush up and acquire new skills than a full qualification as it involves less time and costs.

Case Study: Workforce skills development and engagement in training through skill sets

Recently, Mills et al (2012), conducted a case study of the learning and employment pathways of students who have participated in skill sets training developed by TAFE NSW and the agri-foods industry. As part of the study, they compared these students with other students enrolled in TAFE NSW's agricultural qualification. The case study investigated the roles that skill sets have played in:

- encouraging engagement of agri-food workers, many of whom are new entrants, into formal VET;
- acting as a building block to agri-food VET qualifications and their completion;
- meeting agri-food industry needs for post-initial qualification skills development; and
- developing workforce skills and productivity in agri-food industries.

The case study was based on interviews with 62 students who were split into two groups. Group 1 comprised those whose first experience of training with TAFE NSW was through the Statement of Attainment in Rural Production Studies and students who had only completed skill sets. Group 2 comprised students who had completed qualifications as well as skill sets. This includes students who

completed the Diploma in Agriculture between 2004 and 2011 and skill sets prior to or after completion of the diploma.

The main findings of the case study was that the primary reasons for undertaking the skill sets training developed by RTOs were the licencing and regulatory requirements, upgrading of skills and gaining knowledge of an emerging area. These findings are consistent with the interviews Independent Economics held with ISC representatives.

The case study supports the idea that training in skill sets improve employment opportunities and there was strong support for the positive impact of skill sets on productivity. The small group of employers amongst the students interviewed were overwhelmingly supportive of the value of the training in skill sets to their operations. Common reasons reported for improvement in productivity due to training in skill sets include: removing the need to hire someone else to perform the job; improved quality of the product; positive impact on farm decision processes, leading to improvement in efficiency and compliance and business safety requirements. One of the interviewees commented that skill set training has led to significant operational changes and has contributed to a 25 per cent rise in productivity on farm (Mills et al., 2012).

The majority of the interview participants also reported positive impacts of their skill set training on their higher-level qualification, supporting the idea that skill sets acts as a stepping stone to a full qualification. The majority of the participant's view was that skill sets helped them with the completion of higher-level qualification mainly through credit transfers for equivalent units already completed or through the recognition of prior learning.

Availability of quantitative information to conduct economic costs and benefit analysis of industry-specific non-accredited training

Currently, there is little publicly-available quantitative research into the contribution that non-accredited industry-specific training has made to workforce skills development. Independent Economics conducted detailed interviews with the three ISC including IBSA, AgriFood Skills Australia and TLISC, to identify quantitative and qualitative information on the costs and benefits associated with the industry-specific non-accredited training such as skill sets. Unfortunately, quantitative information which separates out non-accredited industry-specific training or skill sets is scarce. Further, we have been unable to locate detailed information that can be used to quantify the economic costs and benefits associated with industry specific non-accredited training.

One reason for this lack of specific data is that skill sets in training packages do not currently have any codes attached to them to identify how many people have enrolled and completed the skill sets. There are also no comprehensive national data available on skill sets developed by RTOs. In addition, surveys conducted by the ABS focus mainly on collecting information on an individual's highest level of educational attainment, which is a qualifications-based concept. Therefore, it is not possible at this stage to quantify the economic costs and benefits associated with industry-specific non-accredited training. However, the case study reported above and the ISC interviews clearly suggest that non-accredited industry-specific training can lead to improved productivity and employability as well as a pathway towards higher-level qualification.

However, although the benefits of skill sets cannot be separately identified, they are included as part of the wider costs and benefits of VET funding. This is because individuals who complete skill sets have completed modules within the VET system. Therefore, the benefits of skills sets are already contained in the Independent Economics analysis because the benefits of module completion are taken into account. However, as discussed, there is not sufficient data to separately identify individuals completing skill sets from within the group of module completers.

G.2 Language, literacy and numeracy skills

Language, literacy and numeracy (LLN) skills play a vital role in enhancing productivity, participation and social inclusion in the workforce. It enables students to acquire new skills more quickly and helps them to participate more fully in the workforce and society. According to ISCs, over the last twenty years, LLN skills have been frequently relabelled. For example, terms such as core skills, foundation skills, essential skills, key competencies, generic skills, basic skills, employability skills, enabling skills have all been used. ISCs define LLN as “enabling, context-sensitive skills that can be demonstrated over a continuum from basic to advanced practices” (ISC, 2012).

According to the 2006 Adult Literacy and Life Skills survey (ALLS)³⁶, almost half of Australia’s adult population has literacy and numeracy skills below the minimum level required to adequately function on a day-to-day basis in an advanced economy. This proportion is largely unchanged from the previous international literacy survey in the mid-1990s (ABS 1996).

Recognising the importance of LLN skills in improving the productivity, participation and social inclusion of the workforce, the Government has put in place a number of programs targeted at improving the LLN skills of the Australian population. This includes the Workplace English Language and Literacy (WELL) and Language, Literacy and Numeracy Program (LLNP).

The impact of improved LLN skills on labour force participation and on productivity is well documented both qualitatively and quantitatively. The ALLS survey also shows that the higher an individual’s literacy and numeracy skills, the more likely it is that he or she will be employed and productive. There is also a number of case studies which illustrate the positive relationship between LLN and an efficient workforce. This includes the Romeo Retail Group (RRG), building the bridge, breaking the barriers, brother to brother projects, financed under the WELL/IEP program³⁷.

Recent research by the Productivity Commission (Shomos, 2010) found that increasing the LLN skill levels of individuals from level 1 (lowest) to level 3 (medium) as measured through the ALLS survey would result in notable increases in labour force participation and productivity for both males and females. In particular, it is estimated that an improvement in LLN skills from level 1 to level 3 would: increase the likelihood of labour force participation by about 15 percentage points for women and about 5 percentage points for men and increase hourly wage rates by about 25 and 30 per cent for women and men respectively.

³⁶ Reported in a NCVER publication, *Building the foundations: outcomes from the adult language, literacy and numeracy search conference*, NCVER Discussion Paper, 2011

³⁷ Up to speed, a booklet by Industry Skills Council for tackling language, literacy and numeracy issues in the Workplace and building your workforce capability