OXFORD ECONOMICS AUSTRALIA

TERTIARY EDUCATION QUALIFICATION DEMAND

Report produced for the Department of Education

December 2023

Oxford Economics Australia

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December 2023

The modelling and results presented are based on information provided by third parties available as of March 2023, upon which Oxford Economics Australia has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

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Executive Summary

Australia's solid economic growth outlook will drive demand for labour. Employment growth is expected to grow in line with GDP, peaking in 2026 before moderating to an average of 1.0% per annum from 2030 to 2050 as economic growth and productivity stabilise in the long run.

An additional 6.3 million jobs requiring tertiary education are expected to be added to the labour force over the next 30 years increasing tertiary educated employment – jobs requiring a worker with tertiary education – from 9.6 million jobs in 2023 to 15.9 million jobs in 2050. Of the new jobs that are added to the economy to 2050, 9 in 10 will require a tertiary qualification.

The share of employment requiring tertiary education is forecast to increase from 66% of all employed persons in 2020 to 82% in 2050 continuing strong historic trends. The share of employment requiring a VET degree is expected to remain around 31-32% with the share requiring a higher education degree expected to rise from 35% in 2020 to 51% over the same period. This outlook is based on current policy settings within the tertiary education sector, which can change and impact the split between VET and higher education within tertiary educated jobs.

An estimated 960,000 additional tertiary qualifications will be required each year on average over the next 30 years to meet labour market demand for tertiary jobs. If trends in skilled arrivals continue, this implies an estimated 610,000 additional tertiary qualifications will be required from Australia's tertiary education sector each year on average over the same period.

We estimate a tertiary attainment target of 82% of the working age population and 90% of 25 to 34 year olds by 2050 is required to meet labour market needs.[1] The higher rate of attainment in the younger cohort reflects the fact that most tertiary qualifications are attained earlier in a working career, and as workers age through the workforce over time it results in older cohorts having below average rates of attainment.

The outlook for strong demand in higher educated roles implies a higher education attainment target of 51% of the working age population and 57% of 25 to 34 year olds by 2050 is required to meet labour market demands. This implicitly includes historic policy settings, student preferences and the choices available to the labour market.

We estimate an annual average participation target of 5.6% for the working age population and 6.3% for 25 to 34 year olds is required to meet the tertiary attainment target domestically.[2] If the share of the working age population completing tertiary qualifications falls below 3.6% then the labour market would face significant challenges sourcing qualified workers even if skilled migration continued at historic levels.

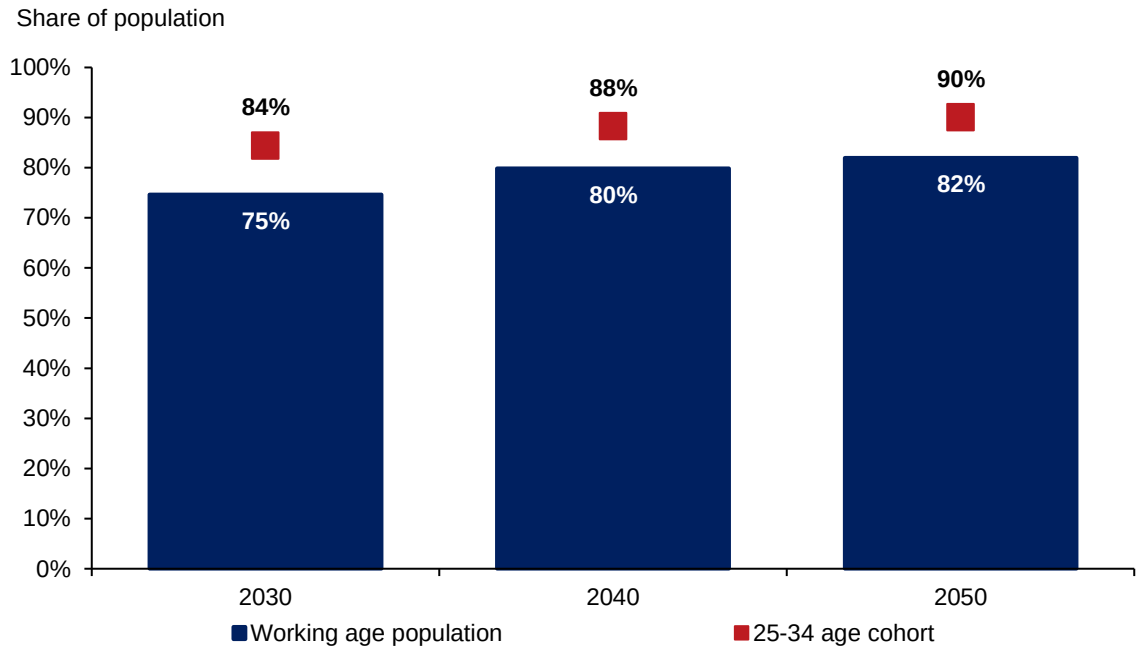
Australia's tertiary education sector is expected to supply the domestic labour market with 938,000 graduates on average per year over the next 30 years. Higher education graduates are expected to contribute roughly 41% of the supply of tertiary graduates over the forecast period, with VET graduates contributing the remaining 59%.

[1] Attainment targets are a stock measure of the tertiary qualifications required to be held by the Australian population to meet labour market needs and are calculated as the share of jobs in the labour market requiring a tertiary qualification.

[2] Participation targets are a flow measure and reflect the share of the working age population required to attain a qualification each year to meet the attainment targets.

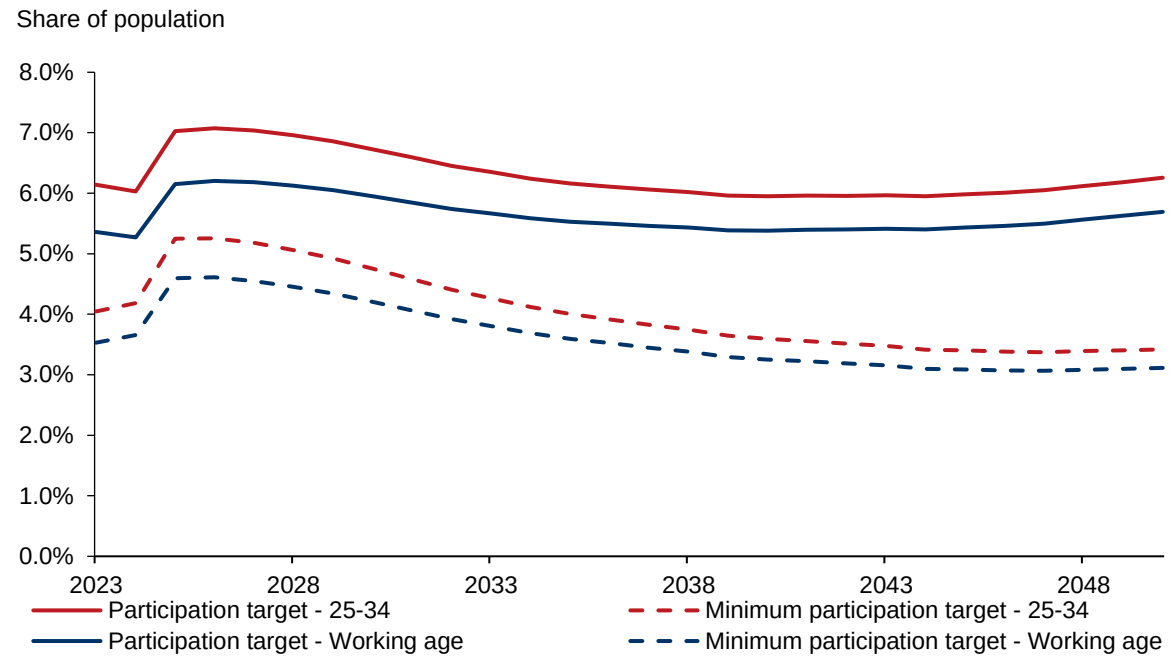
Despite current trends in the supply of tertiary qualifications expected to meet demand over the forecast period, there are likely to be leakages and imbalances at the industry level. Supply has historically exceeded net demand despite significant skills shortages. This is due to a mismatch between the qualifications supplied versus the qualifications in demand and underutilisation of qualifications within the economy.

Figure E 1.1 Tertiary attainment targets by age cohort, 2030, 2040 & 2050



Source: Oxford Economics Australia

Figure E 1.2 Tertiary participation targets by age cohort, 2023 to 2050



Source: Oxford Economics Australia

Figure E 1.3 Table of key labour market demand figures

Component	Measure	2035	2050
Employment demand	Total employment	17,110,000	19,373,000
	Tertiary employment	13,300,000	15,873,000
	Tertiary employment as a share of total employment	78%	82%
Qualification demand	Gross labour market demand for additional tertiary qualifications	946,000	1,102,000
	Employment of tertiary educated arrivals	331,000	499,000
	Net labour market demand for additional tertiary qualifications	615,000	603,000

Source: Oxford Economics Australia

Figure E 1.4 Table of attainment and participation targets

Target	Measure	2035	2050
Attainment target	Tertiary - working aged population	78%	82%
	Tertiary - 25 to 34 year olds	87%	90%
	Higher education - working aged population	46%	51%
	Higher education - 25 to 34 year olds	57%	57%
Participation target	Tertiary - working aged population	5.5%	5.7%
	Tertiary - 25 to 34 year old	6.2%	6.3%
	Higher education - working aged population	3.2%	3.4%

Source: Oxford Economics Australia

1. Introduction

The purpose of this report is to provide an evidence base for the 2023 Review of Australia's Higher Education System by forecasting future labour market demands for tertiary qualifications to inform the Department of Education's higher education and vocational education & training (VET) attainment and participation targets.

Oxford Economics Australia were engaged by the Department of Education in early 2023 to forecast future labour market demands for higher education qualifications and compared this demand to current trends in supply to identify potential gaps in the higher education system. This report extends on that initial analysis to consider labour market demand and supply trends in tertiary education which includes both higher education and VET.

Background to this report

The Government has established an Australian Universities Accord to drive lasting reform in Australia's higher education system. The Accord is a review (the review) of Australia's higher education system, led by the Minister for Education with advice from a panel of eminent Australians (the panel).[3]

The panel will make recommendations for Government, the sector and other relevant stakeholders to deliver a higher education system that meets the current and future needs of the nation, and targets to achieve this. The panel will report to the Minister for Education, providing an interim report on priority actions by June 2023, with a final report to be delivered by December 2023.[4]

The Panel has been asked to make recommendations for new targets and reforms, to address Australia's needs now and into the future, and to deliver a system that is fit for purpose. This task includes proposing a new long-term target for Australia's rates of tertiary and higher education participation and attainment.[5]

This is the first broad review of the higher education system since the 2008 Review of Higher Education (the Bradley Review). The Bradley Review of Higher Education recommended that Australia set a target that by 2020, 40% of 25 to 34 year old Australians have a university degree.[6]

However, the economy has undergone significant transformation since 2008 and the emergence of new technologies and industries has had a profound impact on the demand for tertiary educated labour and the higher education sector in general.

In 2022, 73% of Australian's aged 25 to 34 held a certificate 3 or higher (44.6% for bachelor and higher which is well above the 40% target from the 2008 review).[7] Australia's higher education providers - including universities, university colleges and private institutes - educate more than 1.6

[3] Australian Universities Accord (2022). Terms of Reference.
[4] Ibid.
[5] Ibid.
[6] Bradley, D., Noonan, P., Nugent, H., & Scales, B. (2008). Review of Australian higher education: Final report.
[7] Australian Bureau of Statistics (2022, May). Education and Work, Australia, ABS Website, accessed 21 April 2023.

million students per year.[8] In addition, there were over 500,000 nationally recognised qualification completions for Certificate 3 and above every year between 2018 and 2022.[9]

The type of qualifications and skills the labour market demands are rapidly changing. Jobs and Skills Australia estimates that more than 90% of new jobs in the workforces between 2021 and 2026 will require post-school qualifications including 50% which require a bachelors degree or higher.[10]

There is therefore a need to undertake contemporary forecasting to understand the demand and supply of tertiary qualifications under these changed conditions.[11] This work will help the Panel of the Australian Universities Accord to make informed recommendations about the capacity of the Australian education system to meet future labour market demands over the next 30 years.

The Panel released its interim report which contained five recommendations for priority action and raised issues for further discussion to inform the Review's final report.[12] This identified that the Panel will be giving further consideration to setting targets for tertiary education participation and attainment. This report aims to provide a solid evidence base on which to develop those targets.

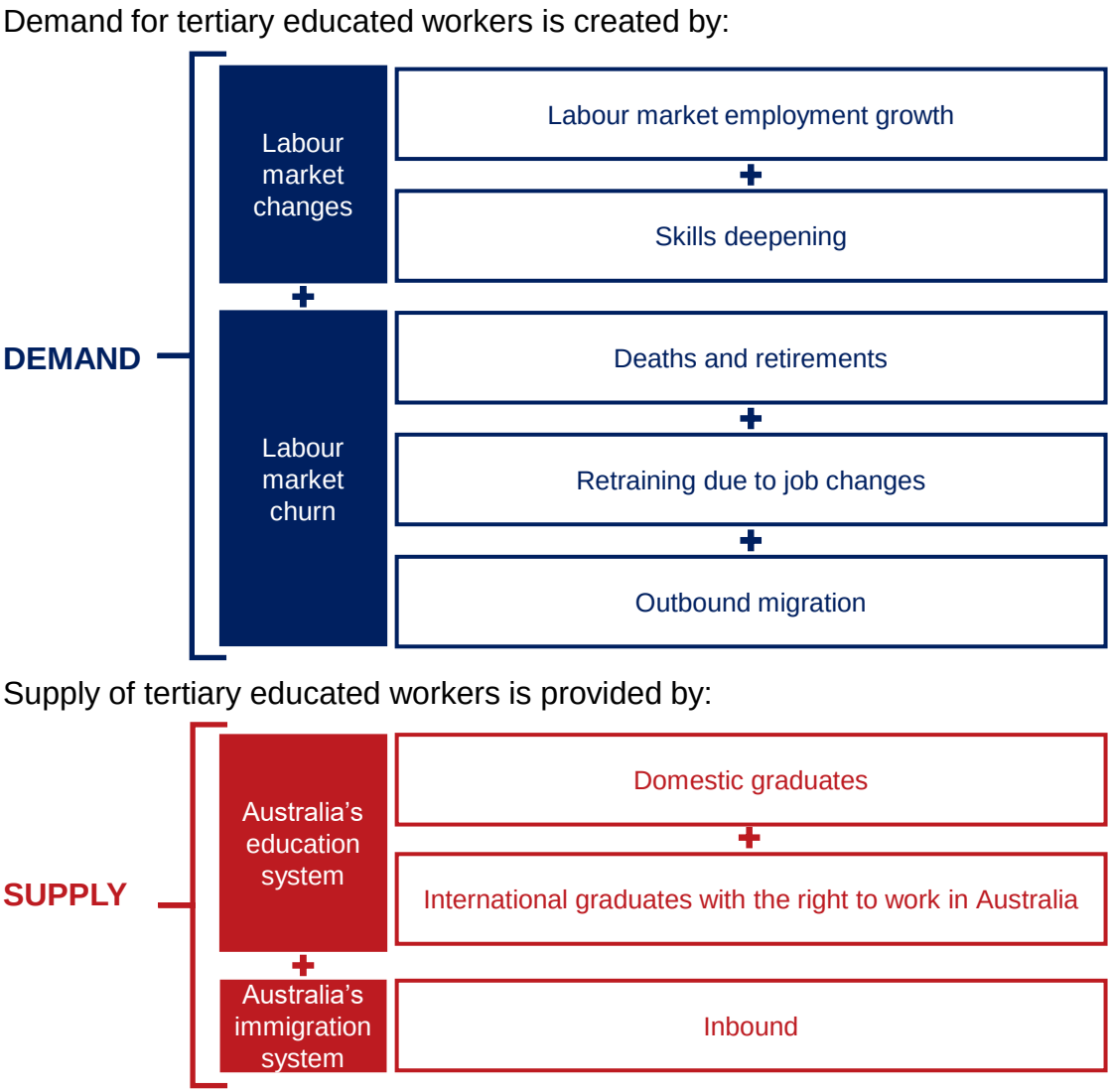
Approach and key concepts

Oxford Economics Australia's Qualification Demand Model takes long run forecasts of the Australian economy from our suite of Macroeconomic Models and forecasts demand for tertiary educated labour. For the purposes of this report:

- **Labour market demand** for tertiary educated workers refers to a job in the labour market which is filled by a person with a tertiary qualification as their highest level of education.
- **Gross demand** for additional qualifications is a flow measure and refers to the total number of additional qualifications that the labour market demands every year.
- **Net demand** for additional qualifications is a flow measure and refers to the number of additional qualifications required to satisfy labour market demand if trends in skilled arrivals continue.
- **Higher education qualifications** consist of bachelors degrees and above (AQF7 to AQF10) for all providers.
- **VET qualifications** consist of Certificate IIIs and above (AQF3 to AQF6) for all providers.
- **Tertiary qualifications** are the sum of higher education and vet qualifications (AQF3 to AQF10).
- **Attainment targets** are the share of the population that need to hold a tertiary qualification to meet labour market demand.
- **Participation targets** are the share of the population that are required to complete a qualification each year to achieve the attainment target.

[8] Department of Education. (2023, April 18). Selected Higher Education Statistics – 2021 Student data. DOE Website, accessed 21 April 2023.
[9] NCVER (2022). Total VET students and courses 2022: program completions DataBuilder, Total, Level of education, Type of training by Year.
[10] National Skills Commission. (2021). Employment outlook: Industry and occupation trends over the five years to November 2026.
[11] Jobs and Skills Australia will build and maintain a national supply and demand model to continue this work in the future.
[12] Australian Universities Accord (2022). Interim Report.

Figure 1.1 Stylised model flow diagram



Source: Oxford Economics Australia

We were tasked with modelling the labour market demand for tertiary education rather than undertaking a detailed bottom-up analysis of the number of roles that 'need' a degree to perform them. When we use the term 'require' in this report, we are referring to the qualifications demanded, or 'required' in labour market as a whole, rather than what a role 'needs'.

There are a number of reasons why the labour market demands more tertiary education than it strictly 'needs' and why high skill workers may end up in lower skill occupations, including:

- The higher level industry (ANZSIC level 1) and occupation (ANZSCO level 2) is comprised of a range of roles where some require tertiary education (e.g. in retail, logistics managers).
- Employees and employers use qualifications as a signal for quality regardless of whether the role strictly 'needs' that qualification, and this leads to changes in market demand over time.
- Workers choose jobs for many reasons (salary, location, job satisfaction, flexibility etc.) and therefore may choose a role which doesn't 'need' their degree.

At an aggregate level this leads to significant leakage of qualifications from their most efficient allocation and this leakage needs to be accounted for when considering gaps in supply.

Demand for tertiary educated labour is created through five channels:

1. **Employment growth** - holding all else equal, if the stock of labour grows the level of tertiary educated labour demanded by the labour market will increase.
2. **Skills deepening** – where the labour market demands a tertiary education qualification for a role which did not previously require it this will increase the share of the stock of labour which is required to be higher educated.
3. **Deaths and retirements** – the natural attrition of the labour force will result in employees which are tertiary educated being either unable or unwilling to continue contributing to the stock of labour.
4. **Retraining due to job changes** – internal churn within the labour market will result in individuals taking up jobs that require tertiary education where they previously did not or retraining to a more suitable field or level of education. Tertiary education may not be a prerequisite to start the role but may be required in the longer term and is prompted through a change in the education of a specific employee and not in the size of the stock of labour.
5. **Outbound migration** – a share of the tertiary educated stock of workers will leave the economy each year in the form of outbound departures. These outbound departures will include citizens, and those on visas leaving the country.

The total number of additional qualifications required by the labour market is referred to as ‘gross demand’.

The supply of tertiary educated labour comes through two channels:

1. **Graduates from Australia’s tertiary education system** – these graduates will be both domestic students, and a share of international students who after graduating from the education provider transition onto alternative visas to stay in Australia and find work post study.
2. **Skilled arrivals** – includes both returning citizens and those arriving on a visa which allow them to work. We exclude students and visitors due to the limitations of their working rights.

Migrants entering Australia have higher rates of employment and are more likely to hold a higher education degree than the general population. Australian migration policy is largely demand-based, setting targets on permanent arrivals for those on skilled, family and humanitarian visas and allowing temporary arrivals to be determined by the level of labour market demand for certain occupations and skills. Therefore, new immigrants fill a significant proportion of Australia’s labour market demand for additional tertiary qualifications each year.

'Net demand’ represents the number of additional qualifications required to satisfy labour market demand if trends in skilled arrivals continue.

Structure of this report

The rest of this report follows the structure below:

> **2. Economic overview** - provides an overview of the economic outlook in Australia. It analyses the historic conditions, short run trends and the longer run trajectory of the Australian economy which contribute to the modelling of higher education demand and supply.

3. Labour market demand for qualifications – provides a forecast of the number of jobs which will require tertiary educated workers over the next 30 years as well as how many qualifications will be required fill these jobs.

4. Tertiary attainment and participation targets – estimates the share of the population that need to hold a tertiary qualification to meet forecast labour market demand and the share of the population that need to complete a tertiary qualification each year to achieve the attainment target.

5. Tertiary education and supply gap analysis – estimates the number of tertiary education graduates expected over the forecast period based on current trends in commencements and completions and explores gaps between labour market demand and supply based on analysis from chapter 3 and 5.

6. Scenario analysis – explores the key uncertainties through scenario development, comparing results to the baseline including headline results for attainment and participation.

A1: Sensitivity analysis – presents the results of sensitivity modelling for key assumptions used and their impact on the results.

A2: Technical appendix – provides an overview of the modelling approach for each modelling task used in the analysis.

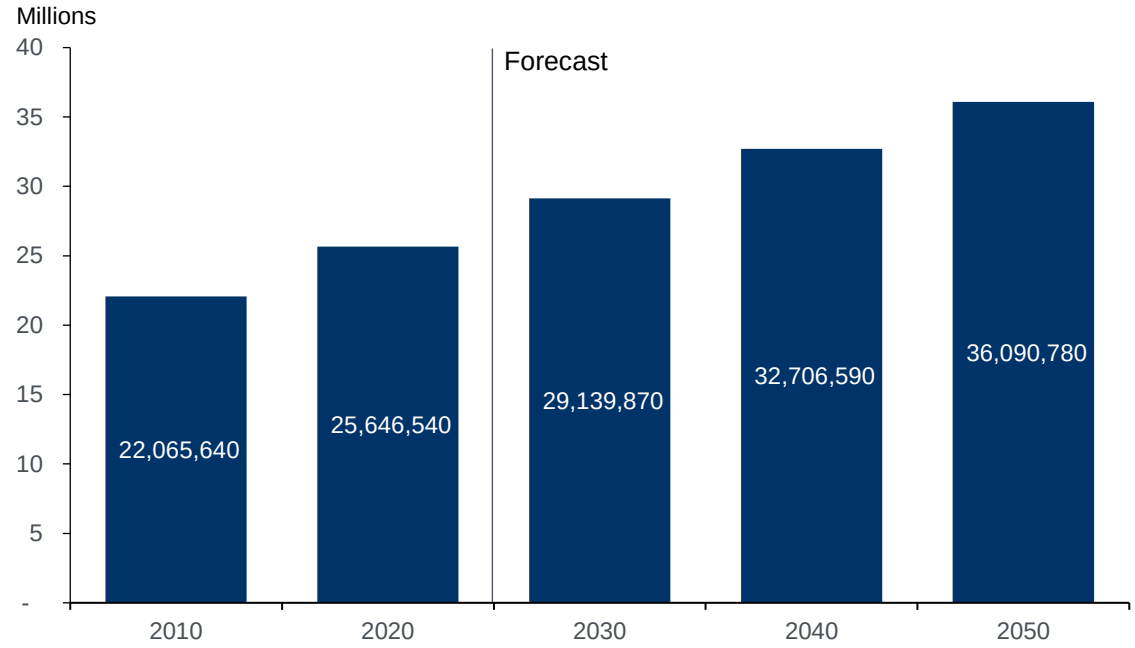
2. Economic overview

This section provides an overview of the economic outlook in Australia. It analyses the historic conditions, short run trends and the longer run trajectory of the Australian economy which contribute to the modelling of tertiary education demand and supply.

Drivers of Australia's long run growth

Population, labour market participation and Australia's future industrial structure will determine the outlook for the economy in the long run, driving outcomes for the labour market and the demand and supply of tertiary education.

Figure 2.1 Population, 2010 to 2050



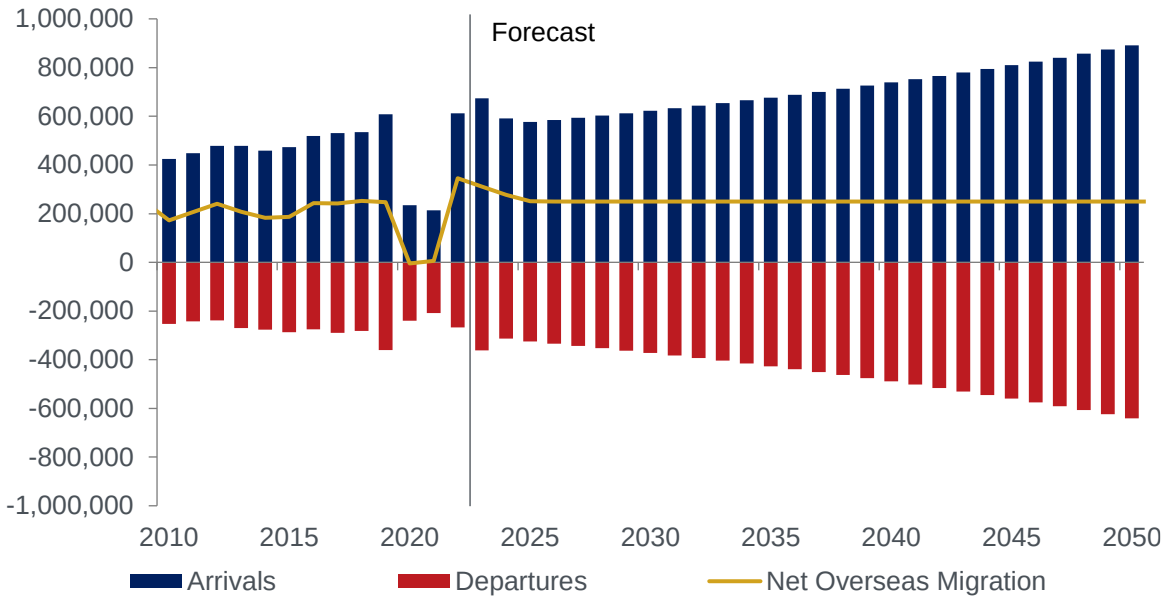
Source: ABS, Oxford Economics Australia

Australia's population has grown at an average of 1.4% per annum over the past two decades, driven by strong net overseas migration (NOM). The fall in overseas migrant arrivals during the pandemic reduced Australia's population growth to 0.3% in 2021. Overseas migration flows have largely normalised and are expected to drive population growth over the forecast period.

Australia's population is expected to reach 29.3 million by 2030 and 36.9 million people by 2050. As migration trends normalise, the pace of population growth is expected slow to an average of 1.2% per annum in the 2030s, reaching 0.9% by 2050. This is primarily driven by the birth rate declining to 1.6 children per women by 2025, comfortably below the replacement rate of 2.1.

Australia's declining birth rate increases the significance of net overseas migration as a source of population and economic growth over the long-term.

Figure 2.2 Migration arrivals & departures, 2010 to 2050
Persons



Source: ABS, Oxford Economics Australia

Net overseas migration supports population growth, stimulates economic activity, and is a key source of skilled labour. Federal Treasury estimates that migrants deliver a significant lifetime fiscal benefit of $127,000 more per person than the population overall.[13]

From 2002 to 2019 Australia's net overseas migration flows averaged 202,000 persons per annum. Over the pandemic, NOM turned negative for the first time in two decades with outflows of 5,000 persons in 2020 and 6,000 in 2021. In the lead up to the 2023/24 Budget, the Federal Government released its Migration System Final Report. Policy actions have been flagged for later in the year, specifically around ensuring there are transparent and competitive pathways from temporary to permanent migration. It is difficult at this point to conclude how Australia's NOM trajectory will be impacted however it is likely that our forecasts underestimate NOM especially in the short run.

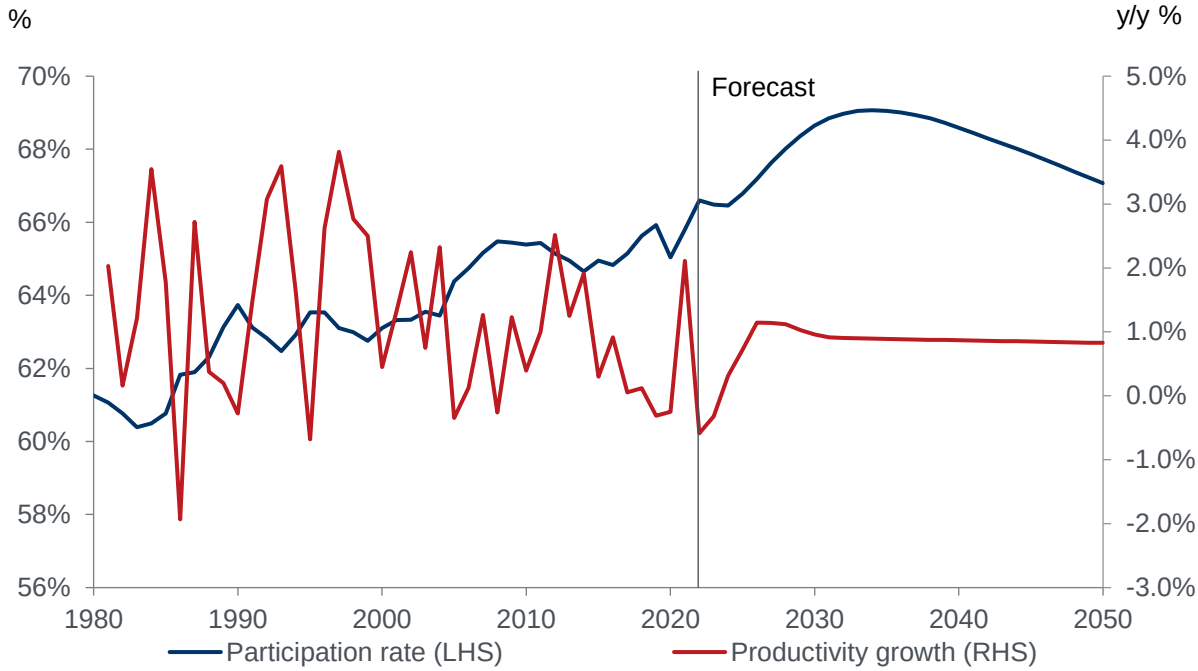
An increasing participation rate drives long run economic growth as it is a key factor in determining Australia's potential economic output.

With the exception of the GFC period, the participation rate has trended upwards over the previous two decades. Oxford Economics forecast the participation rate to peak at 69% in the 2030s driven by the continued rise of female participation rates and a decline in retirement rates as work shifts away from more physically demanding occupations. Beyond this, we forecast the ageing population to begin making a larger impact, reducing labour market participation as a greater proportion of the population enter the older age cohorts.

Productivity growth will be driven by changes to the capital labour mix. Productivity growth is forecast to remain subdued over the next few years as uncertainty within the economy dampens business investment. Productivity growth is expected to return to trend by 2025 as investment picks up, averaging 1.1% over the back half of the decade, and slowing to 0.8% by 2050.

[13] Australian Federal Treasury (2021). The lifetime fiscal impact of the Australian permanent migration program.

Figure 2.3 Productivity growth & participation rate, 1980 to 2050



Source: ABS, Oxford Economics Australia

The forecasts for the demand and supply of tertiary education contained in this report are consistent with this view of productivity and not the tertiary education that would be required to reach an 'optimal' level of productivity growth. In the long run increasing rates of education are likely to play an increasing role in productivity growth. The Productivity Commission have found that increasing workforce education and experience have accounted for 19% of labour productivity in recent decades with the share it contributes to productivity growth increasing over time.[14]

Strong headwinds from rising interest rates and high inflation have slowed the pace of economic growth in 2023. Despite these headwinds, the fundamentals for economic growth are well supported. Interest rates are near their peak and consumption will receive a boost from the tight labour market and strong overseas migration. We expect Gross Domestic Product (GDP) growth to slow but remain resolutely positive in both 2023 and 2024.

Employment growth has been very strong in Australia, growing 1.8% per year on average over the last decade. Strong economic activity in the aftermath of the COVID-19 crisis has helped to drive demand for labour, with the unemployment rate dropping to a historic low of 3.4% in late 2022 as supply failed to keep up with the rebound in activity. Employment growth is expected to soften after a period of strong growth over the last two years.

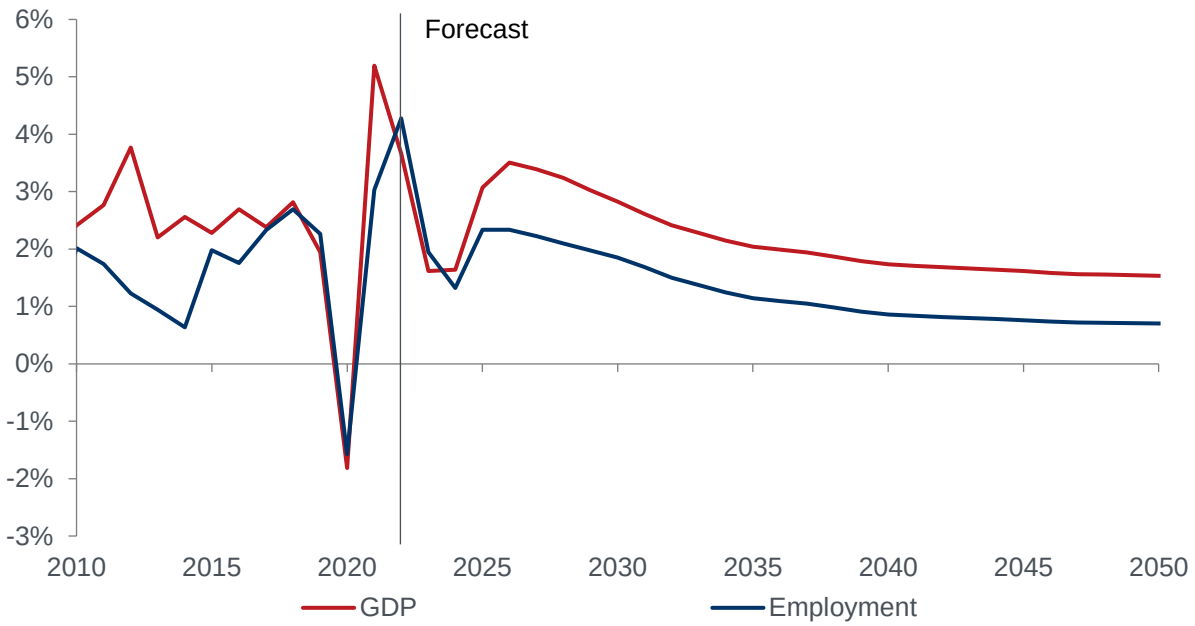
Job vacancies remain 71.5% higher in late 2023 than they were prior to the start of the pandemic [15] as labour shortages persist and Australia's economy operates beyond its potential. While this is likely to take time to unwind in the short term due to the stickiness of the labour market, in the longer term we expect the unemployment rate to return to its long-term trajectory triggering vacancy rates to fall.

[14] Productivity Commission (2022). 5-year Productivity Inquiry: From learning to growth, interim report.

[15] Australian Bureau of Statistics (August 2023), Job Vacancies, Australia.

There is a level of vacancy rate in the long run which represents the churn within the labour market as workers and businesses take time to match skills to suitable roles.

Figure 2.4 GDP & employment growth, 2010 to 2050
y/y%



Source: ABS, Oxford Economics Australia

As inflation normalises, we expect the RBA's policy rate to drift back to a long-run policy rate of 2.6%, driving a consumption and investment cycle out to 2026 where GDP and employment growth are expected to peak at 3.5% and 2.3% respectively. Beyond this, GDP growth is expected to slow in line with slowing population growth to average 1.8% p.a. from 2030 to 2050. Similarly, employment growth is expected to slow to an average annual rate of slow to average 1.0% per annum from 2030 to 2050 as economic growth and productivity stabilises in the long run.

Australia's long-run industrial mix

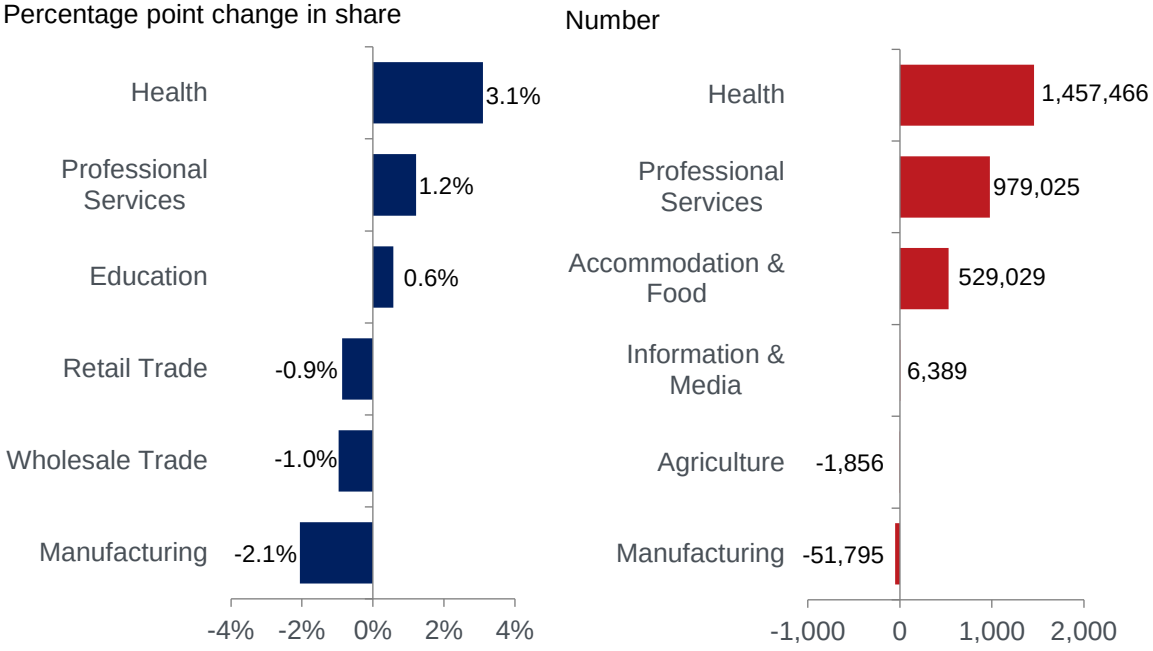
Australia's industry employment mix will continue to shift towards service sector industries which have historically had a greater proportion of higher educated workers, supporting demand for higher education. Australia's industry employment mix has changed substantially over the past two decades, shifting away from goods dominated industries towards the service sector. Large increases in employment have come from health and professional services while fewer workers are employed in manufacturing and agriculture whose shares of employment have declined 5.2% and 2.2% respectively.

Over the long-term, the structural decline of goods-focused industries as a share of employment will continue. Employment in health is forecast to increase its share of employment by 3.1 percentage points to 18.1% by 2050 as the population ages and the care requirement continues to increase. Similarly, professional services are expected to represent 11.6% of employment by 2050 on the back of strong investment in intellectual property product investment (which includes research and development) and an increased share of service consumption.

Employment in manufacturing is expected to continue declining and retail trade, though growing in level terms, will shrink as a share of employment to 8.0% by 2050.Information and media is expected to have minimal employment growth over the forecast period. However, strong employment growth in

ICT occupations is forecast since these occupations are employed across all industries and do not necessarily coalesce in the information and media industry specifically.

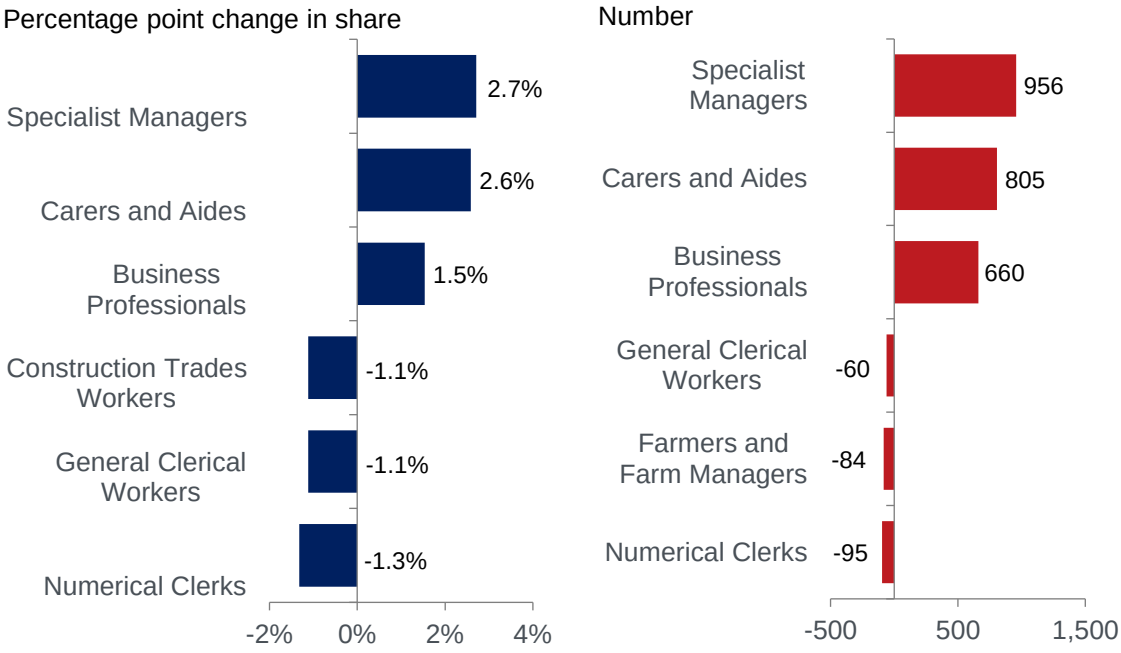
Figure 2.5 Top 3 largest & smallest growth in industry employment, 2022 to 2050



Source: ABS, Oxford Economics Australia

These changes to the industry mix, as well as occupational trends within industries, will drive growth in employment in occupations. Occupations that represent a higher proportion of employment in growing industries such as specialist managers in the professional services sector and, carers and aides in the health sector represent a higher proportion of employment growth over the forecast period.

Figure 2.6 Top 3 largest & smallest growth in occupation employment, 2022 to 2050



Source: ABS, Oxford Economics Australia

3. Labour market demand for qualifications

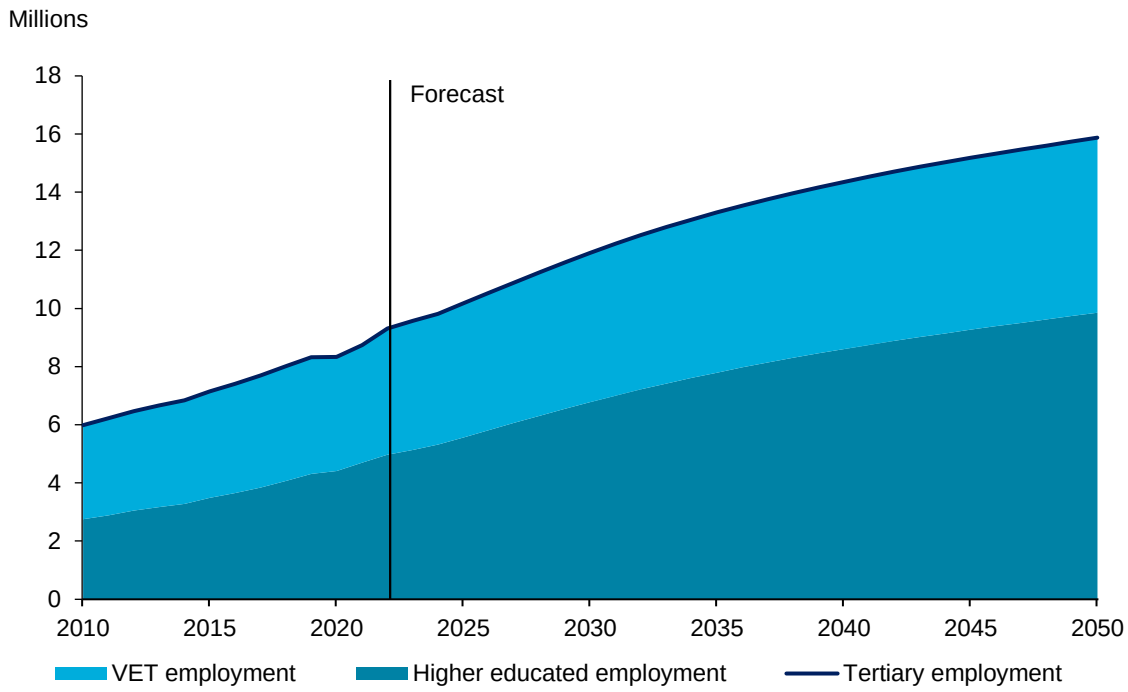
This chapter provides an estimate of the share of the population that need a tertiary qualification to meet labour market demand.

For the purposes of this report, 'demand' refers to the number of qualifications that the labour market needs to fill jobs requiring tertiary education.

Labour market demand for tertiary qualifications

An additional 6.3 million jobs requiring tertiary education will be added to the labour force by 2050, increasing tertiary educated employment – jobs requiring a worker with a Certificate III or above – from 9.6 million jobs in 2023 to 15.9 million tertiary educated jobs in 2050. Of the new jobs that are added to the economy over the next 30 years, 9 in 10 will require a tertiary qualification.[16]

Figure 3.1 Tertiary employment by higher education & VET, 2010 to 2050



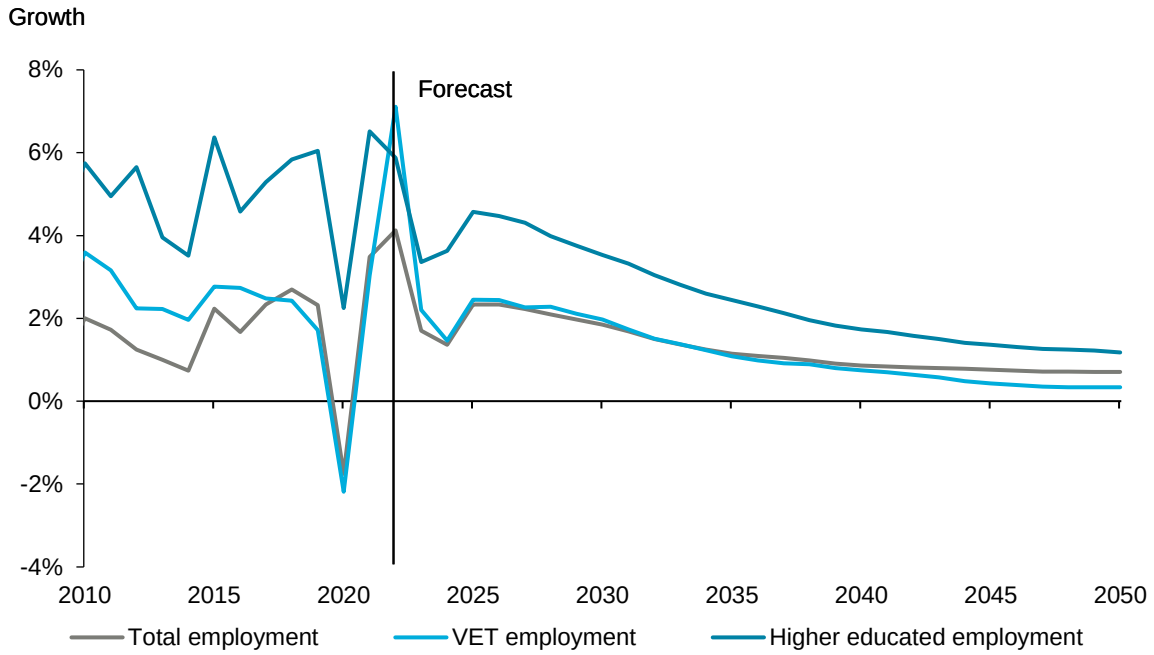
Source: ABS, Oxford Economics Australia
Note: The historic series between Census years is estimated.

Tertiary educated employment grew at more than double the rate of total employment growth over the decade prior to the pandemic driven by strong growth in higher educated employment – 5.2% annual growth for higher education versus 2.5% growth in VET employment. Both VET and higher educated employment grew faster than employment overall which averaged 1.8% over the decade prior to the pandemic. Long run growth in tertiary employment is expected to slow to an average annual rate of

[16] New jobs are calculated between 2021 & 2050 and exclude jobs which are converted from a non-tertiary educated role to a tertiary educated role.

1.5% between 2030 and 2050. The slowdown in long run growth is driven by the interaction between industry employment growth and slowing rates of skills deepening as occupations reach a 'saturation point' of tertiary educated workers.

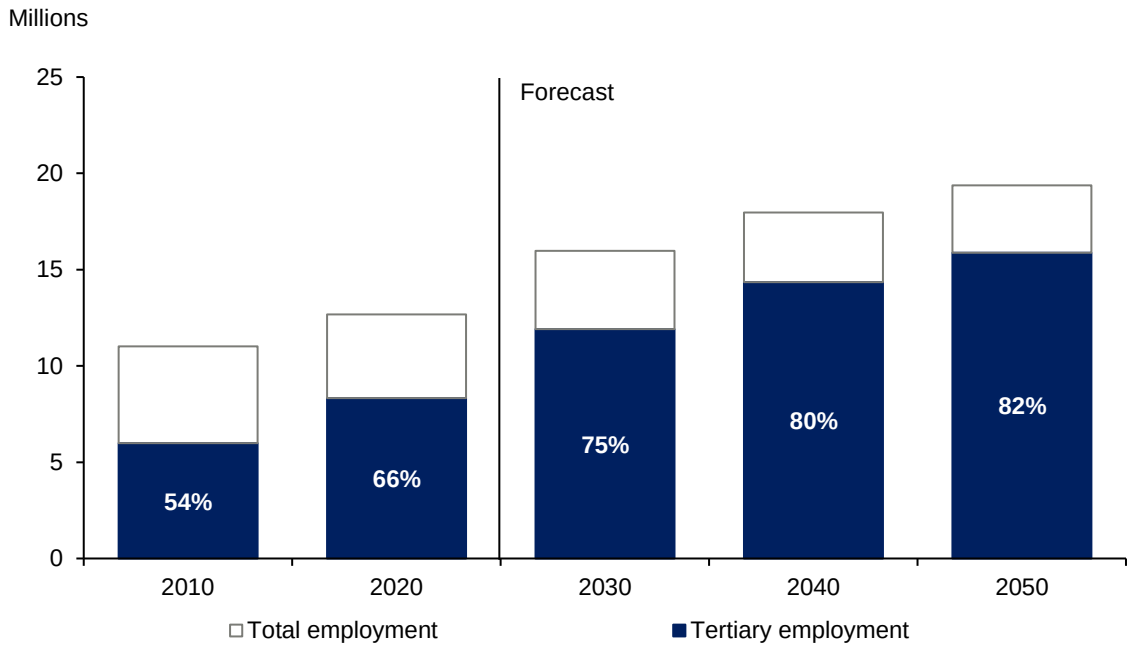
Figure 3.2 Annual growth in VET, higher education & tertiary employment, 2010 to 2050



Source: ABS, Oxford Economics Australia
Note: The historic series between Census years is estimated.

Labour market demand for tertiary educated employment – the number of jobs requiring a tertiary qualification - is expected to increase to 82% of the workforce by 2050, an increase of 16% from 66% in 2020.

Figure 3.3 Tertiary employment as a share of total employment, 2010 to 2050

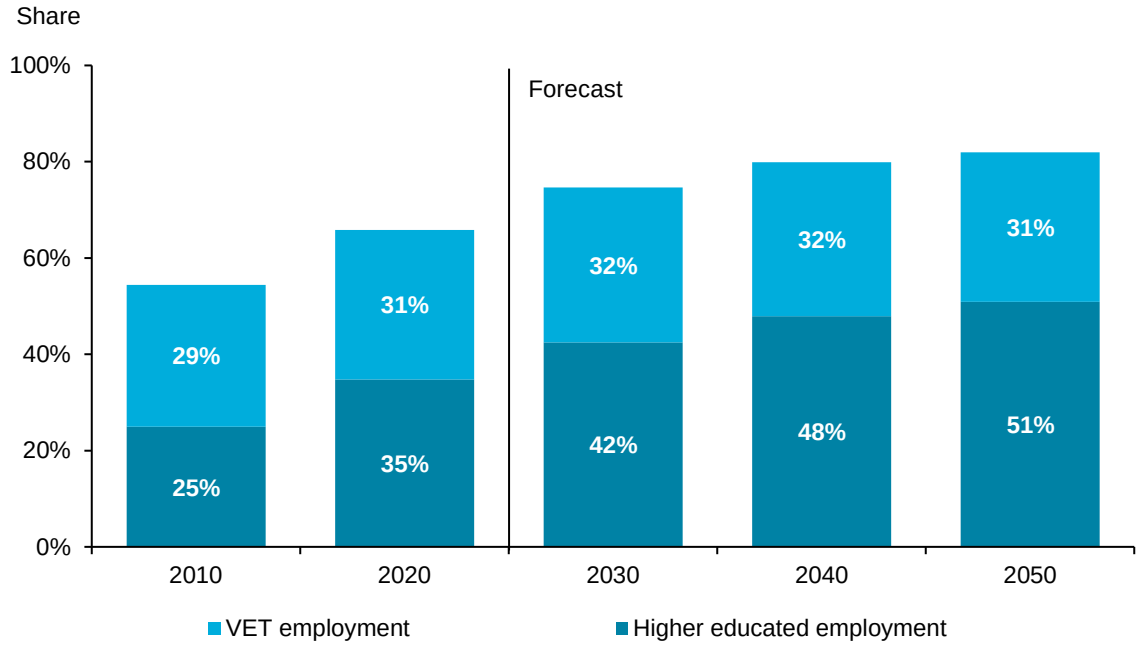


Source: ABS, Oxford Economics Australia. Note: The historic series between Census years is estimated.

Labour market demand for VET employment is expected to remain relatively stable between 31-32% of the workforce whilst higher education is expected to increase from 35% in 2020 to 51% in 2050. To some extent the strong growth in higher educated jobs reflects a 'skills deepening' at the expense of VET employment.

This outlook is based on current policy settings within the tertiary education sector. If these policy settings change this is likely to impact the split between VET and higher education within tertiary educated jobs.

Figure 3.4 Higher education & VET employment as a share of total employment, 2010 to 2050



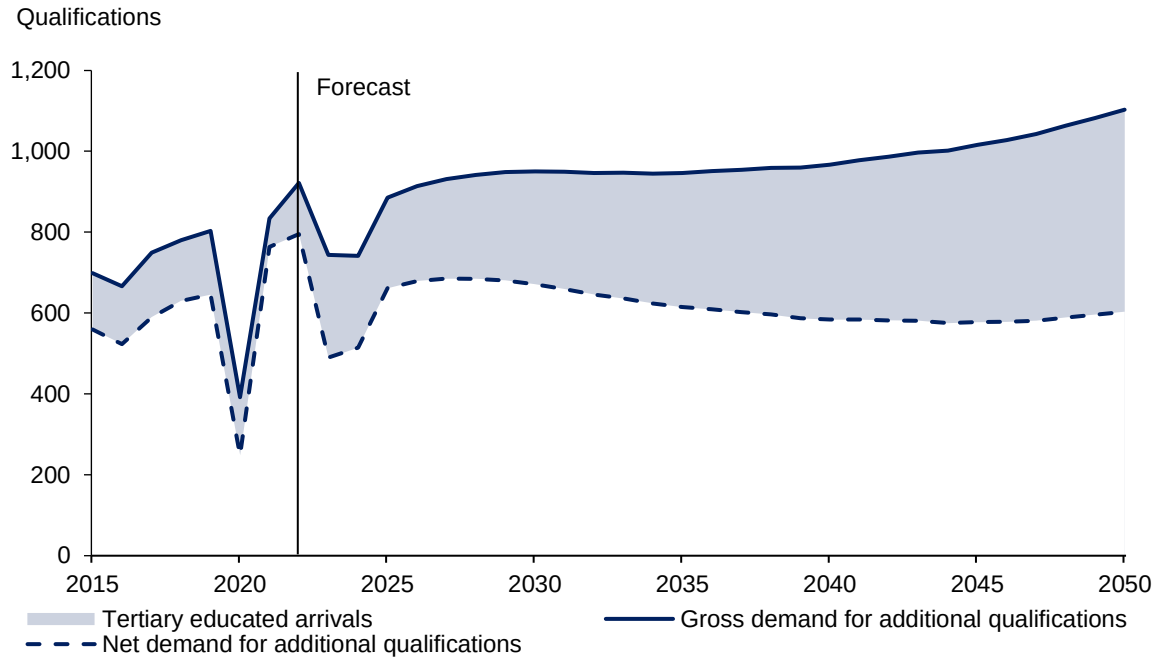
Source: ABS, Oxford Economics Australia
Note: The historic series between Census years is estimated.

Australia's labour market is expected to require an additional 960,000 tertiary qualifications every year on average over the next 30 years (gross demand) due to growing demand for tertiary employment, skills deepening within roles and churn within the labour market.

Once skilled arrivals are accounted for, demand moderates to 610,000 additional qualifications per year over the same period (net demand).[17] Based on historic trends, tertiary educated arrivals are expected to support an increasing proportion of gross demand for qualifications each year as net overseas migration plays a greater role in Australia's population growth.

[17] The total number of additional qualifications required by the labour market is referred to as 'gross demand'. 'Net demand' represents the number of higher education qualifications required to satisfy labour market demand if trends in skilled arrivals continue.

Figure 3.5 Flows of additional tertiary education qualifications to meet labour market demand, 2015 to 2050



Source: Oxford Economics Australia

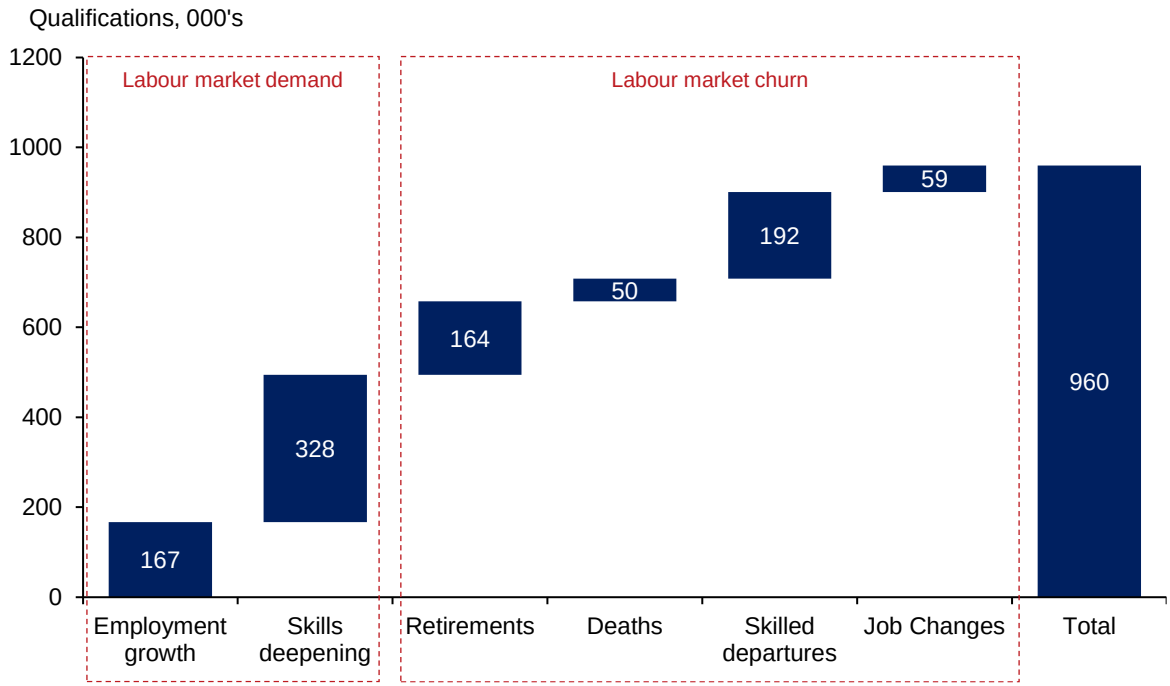
Labour market demand – which includes both employment growth and skills deepening – accounts for 52% of future demand for additional tertiary education qualifications. Employment growth in roles requiring tertiary education is expected to account for an average of 167,000 additional qualifications demanded per year over the forecast horizon as growth in industries with relatively higher tertiary education attainment are expected to outpace the wider economy.

Skills deepening will be the biggest driver of demand for additional tertiary qualifications accounting for an average of 328,000 additional tertiary qualifications demanded per year as the share within each role required to hold a tertiary qualification and the number of roles requiring a second qualification increases.

Labour market churn - consisting of retirements, deaths, tertiary educated departures and job changes - provides a positive and increasing contribution to demand for tertiary qualifications over the next 30 years. As the share of the labour market holding a tertiary qualification increases over time, labour market churn will be more likely to trigger an additional training instance.

Exits from the labour market due to outbound migration, retirement or death are expected to contribute demand for 406,000 additional qualifications per year requiring the vacant position to be filled with someone with similar skills and education. Job changes within the labour market will contribute demand for 59,000 additional qualifications per year, creating demand when a movement requires a tertiary qualification as part of the retraining process.

Figure 3.6 Flows of additional tertiary qualifications by driver of gross demand, annual average from 2023 to 2050



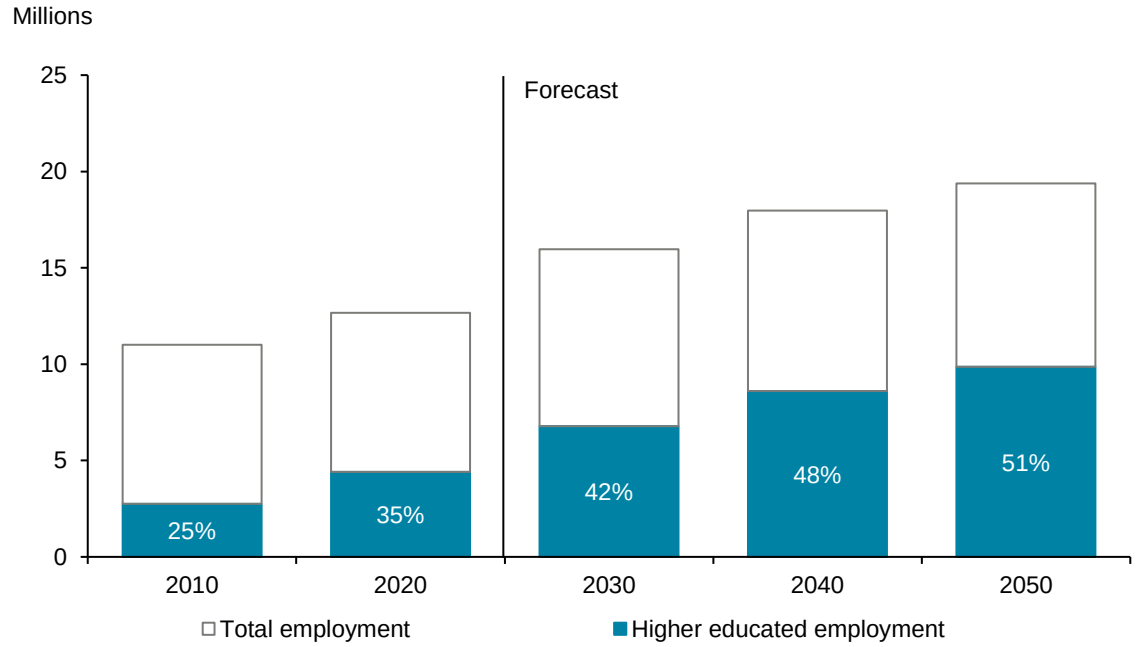
Source: Oxford Economics Australia

Labour market demand for higher education qualifications

Demand for higher educated workers has grown strongly, increasing from 25% of the workforce in 2010 to 35% of the workforce by 2020. This has been driven by both strong growth in the industries and occupations hiring higher educated workers as well as skills deepening across the workforce more broadly. These trends are expected to continue, albeit at a slower rate as some industry and occupation pairs reach a 'saturation point' of higher educated workers. Overall, 51% of the workforce is expected to require a higher education qualification by 2050.[18]

[18] We have revised our estimate of higher educated employment as a share of the workforce down slightly from our initial July estimate of 55% by 2050. On extending the model to include VET employment and reviewing the forecasts at the industry occupation level, it is our view that the previous estimates were overstating the degree to which higher education would replace VET in some industry occupation pairs. An example industry occupation pair is ICT professionals in the professional services sector where forecasts of higher education demand were revised down from 96% of the workforce to 95% in 2050 to retain a small share (3%) of VET roles.

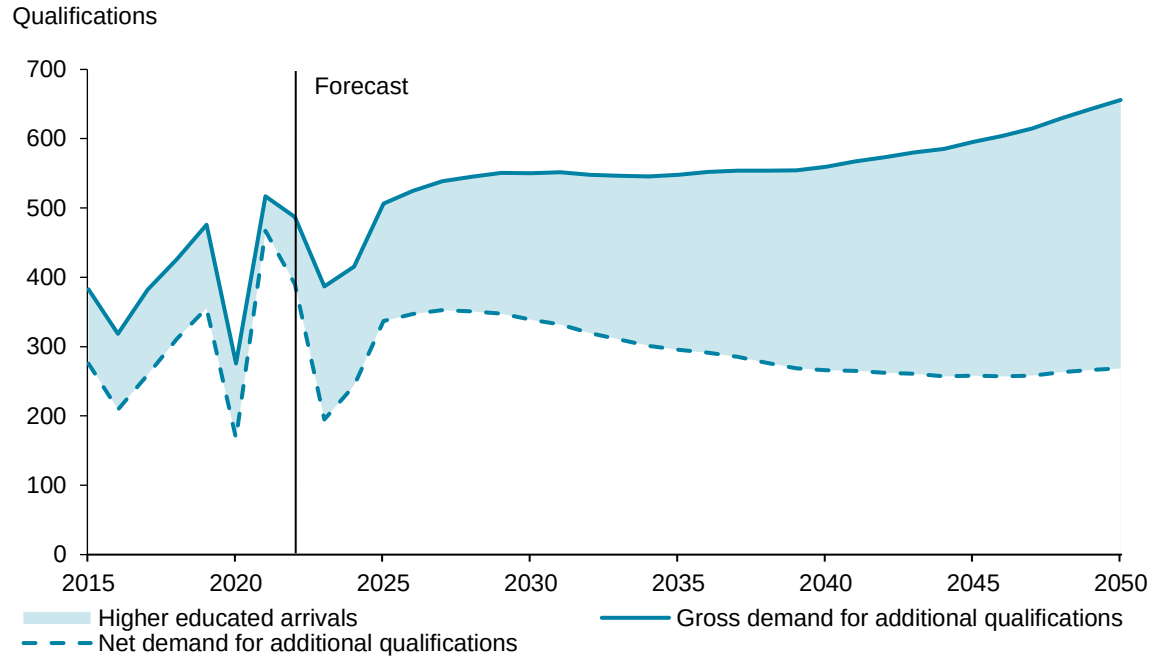
Figure 3.7 Stock of higher educated labour as a share of total employment, 2010 to 2050



Source: ABS, Oxford Economics Australia
Note: The historic series between Census years is estimated.

The labour market will demand an additional 556,000 higher education qualifications every year on average over the forecast period. Once skilled arrivals are accounted for, net demand is expected to moderate from 323,000 additional qualifications per year over the next decade, to 275,000 additional qualifications in the long run. Based on historic trends, higher educated arrivals fulfil a significant proportion of gross demand for qualifications each year. If trends continue, higher education arrivals are expected to play an increasing role in fulfilling demand for qualifications.

Figure 3.8 Flows of additional higher education qualifications to meet labour market demand, 2015 to 2050

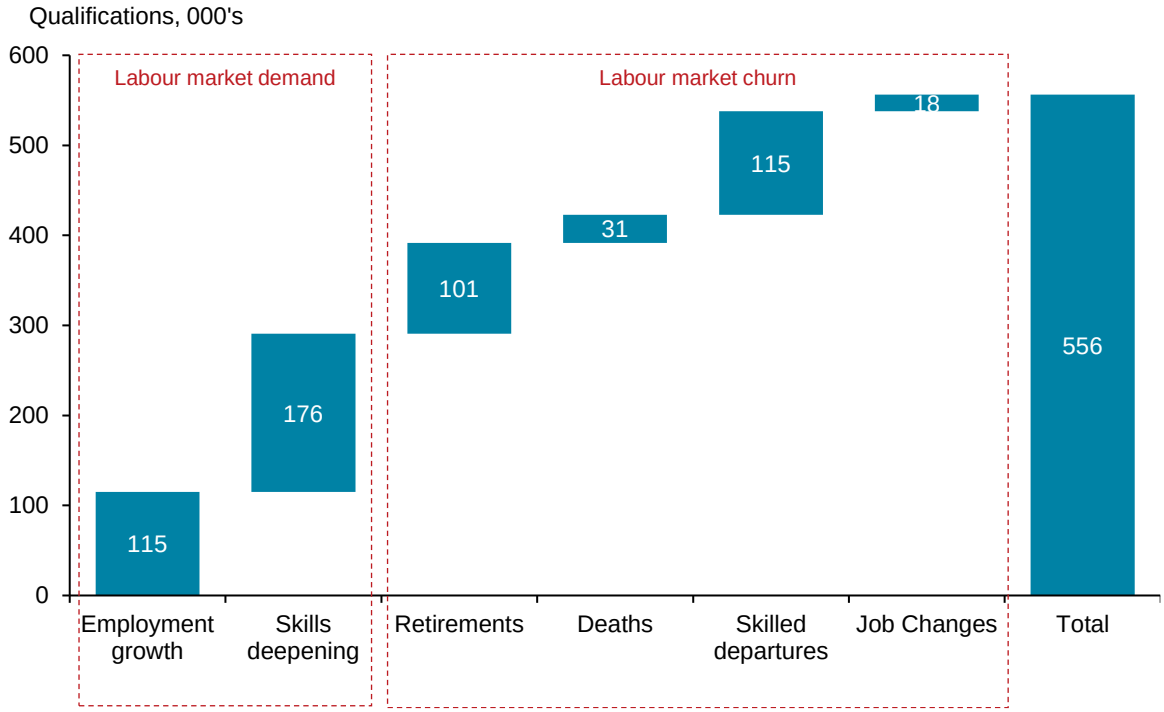


Source: Oxford Economics Australia

Labour market demand accounts for 52% of future demand for additional higher education qualifications, with employment growth and skills deepening creating demand for 115,000 and 176,000 additional higher education qualifications each year respectively. The strong increase in the share of the labour market requiring a higher education degree over the past 15 years is expected to continue, especially in industries also experiencing high employment growth. In addition, there is an increasing number of roles requiring a postgraduate degree which will add to demand for higher education qualifications.

Labour market churn accounts for 48% of future demand for additional higher education qualifications, driven primarily by skilled departures and retirements.

Figure 3.9 Flows of additional higher education qualifications by driver of gross demand, annual average from 2023 to 2050



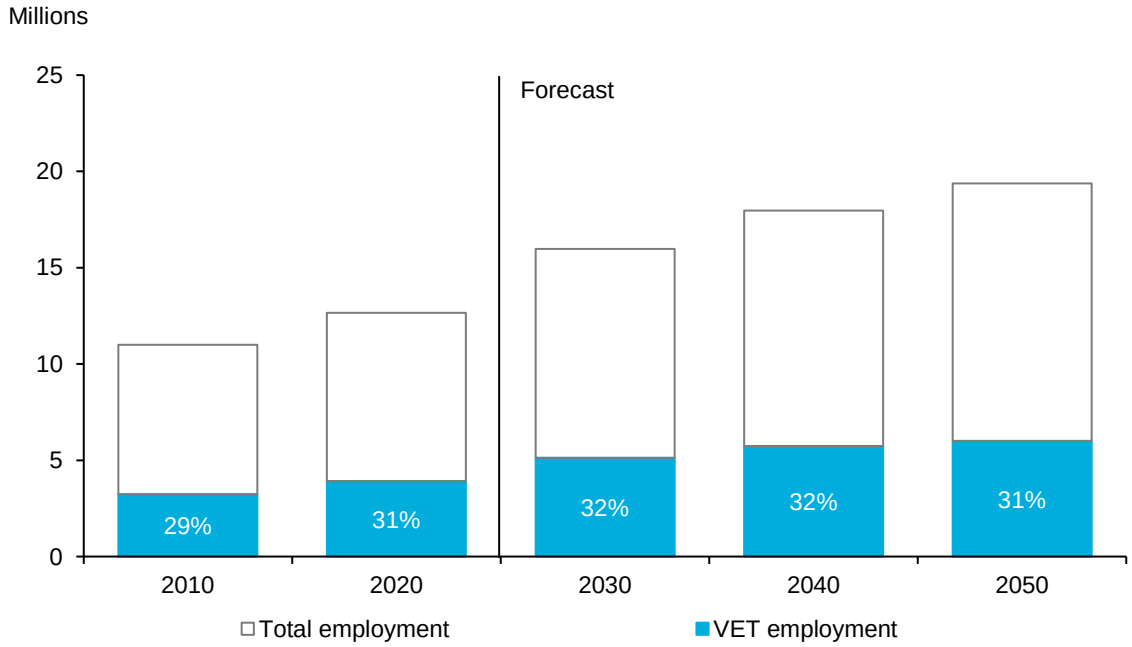
Source: Oxford Economics Australia

Labour market demand for VET qualifications

In 2010 a tertiary educated worker was more likely to have a VET qualification than a higher education qualification. However, higher educated workers have grown twice as fast as workers with a VET qualification and overtaken VET in their share of the labour force (31% for VET in 2020 compared to 35% for higher education).

The industries and occupations that have traditionally hired VET workers are expected to have slower growth over the forecast period than higher education dominated industries and occupations (see page 9 for additional analysis). This results in labour market demand for VET educated employment remaining stable around 32% to 31% of the workforce.

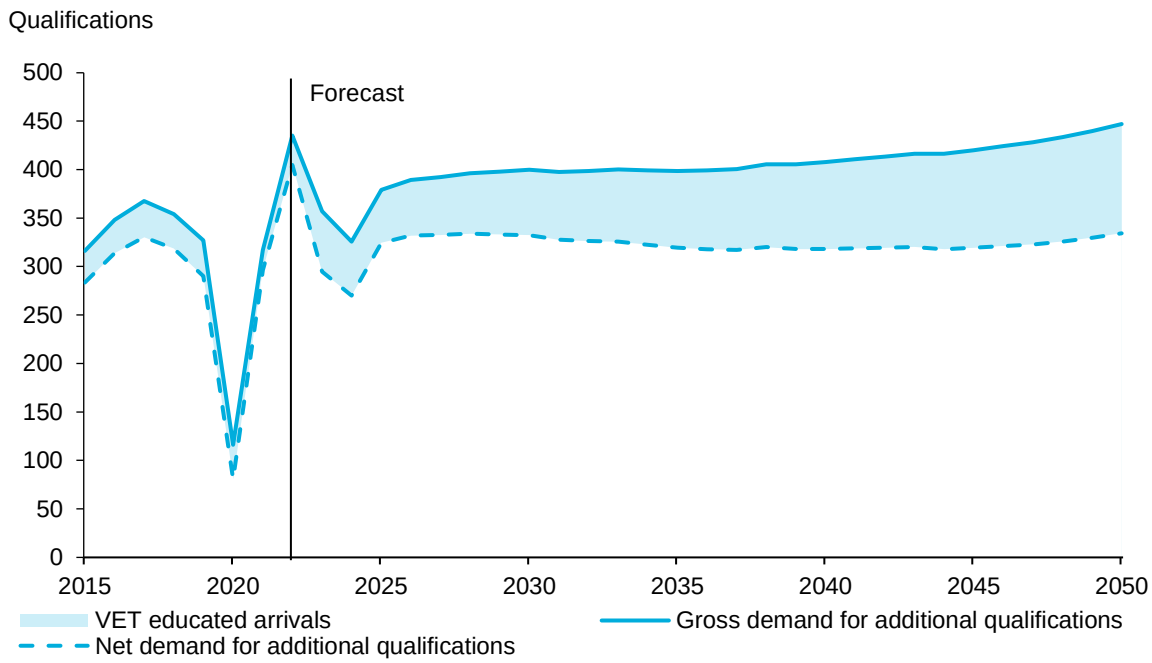
Figure 3.10 Stock of VET qualified labour as a share of total employment, 2010 to 2050



Source: ABS, Oxford Economics Australia
Note: The historic series between Census years is estimated.

Gross demand for qualifications needed to fill these VET jobs is expected to stay relatively stable at around 403,000 additional VET qualifications on average every year. However, taking into account the roughly 82,000 skilled arrivals expected to enter the workforce over the next 30 years, there is a net demand of 321,000 additional VET qualifications required every year on average.

Figure 3.11 Flows of additional VET qualifications required to meet labour demand, 2015 to 2050



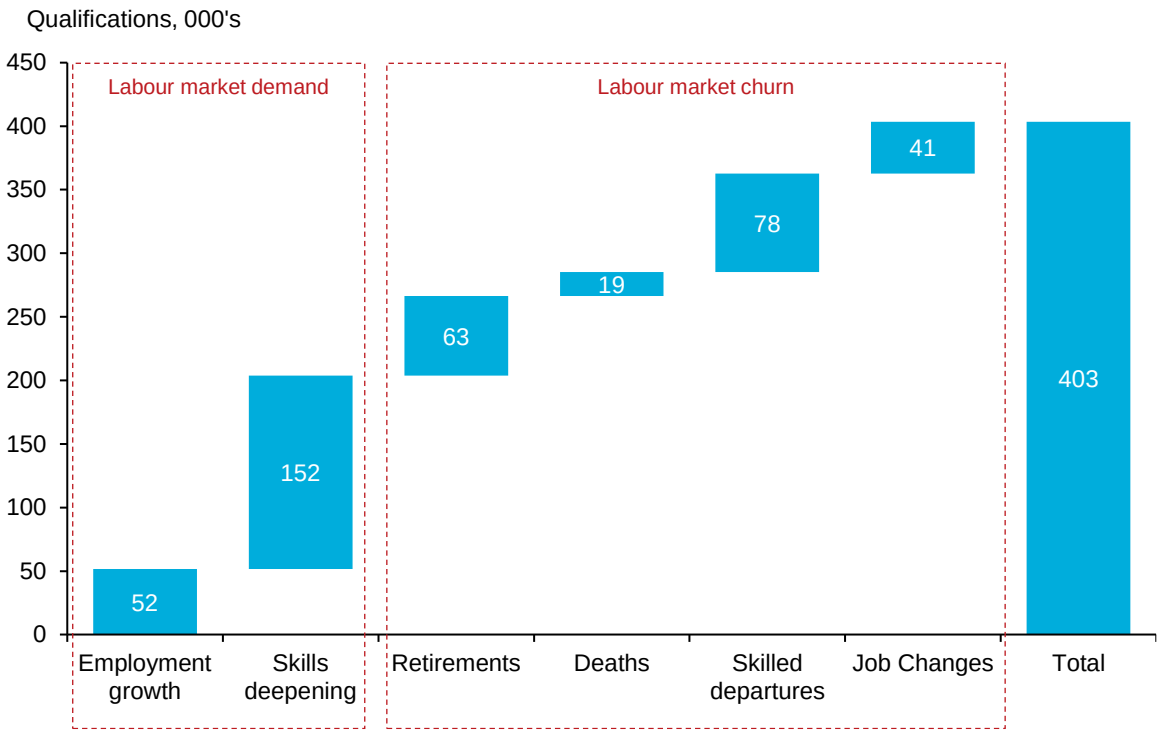
Source: Oxford Economics Australia

The ratio of additional VET qualifications to the stock of VET qualified labour is larger than higher education due a higher likelihood for a job change to trigger an instance of qualification demand and the high propensity of jobs that require two VET qualifications.

Labour market churn represents 50% of demand for additional VET qualifications over the forecast period. Job changes are more likely to trigger an instance of qualification demand relative to higher education as those job changes often result in a loss to the VET workforce as they enter the higher education workforce, creating demand for additional VET qualified workers to fill these roles.

Employment growth is a smaller driver of demand for VET qualifications relative to higher education. Industries with high shares of VET educated workers are forecast to have relatively weaker employment growth over the forecast period. This is offset by a larger share of demand driven by skills deepening as VET workers often hold two or more VET qualifications.

Figure 3.12 Flows of additional VET qualifications by driver of gross demand, annual average from 2023 to 2050

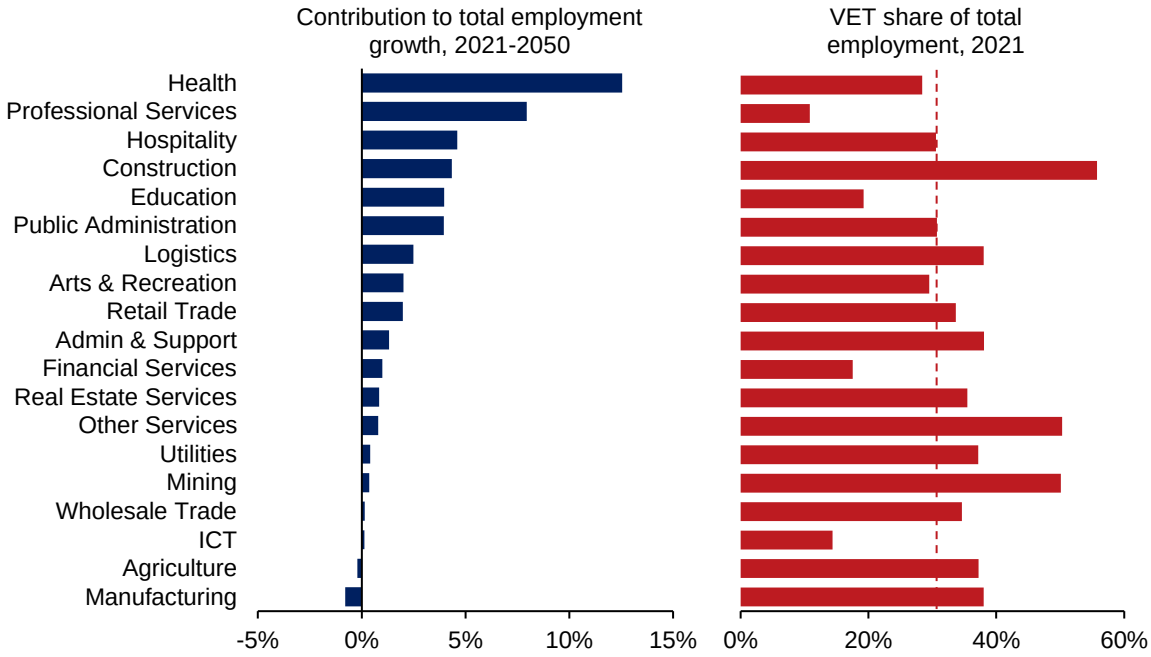


Source: Oxford Economics Australia

The stable share in labour market demand for VET qualifications is largely a result of the outlook for employment growth in each industry and occupation.

Industries with high shares of workers with VET qualifications are more likely to have a weak outlook for employment growth over the forecast period. Of the six industries contributing 80% of employment growth over the next 30 years, five have lower than average shares of VET workers. Of the remaining 13 industries which each contribute 2% or less to employment growth, 10 industries have higher than average shares of VET workers.

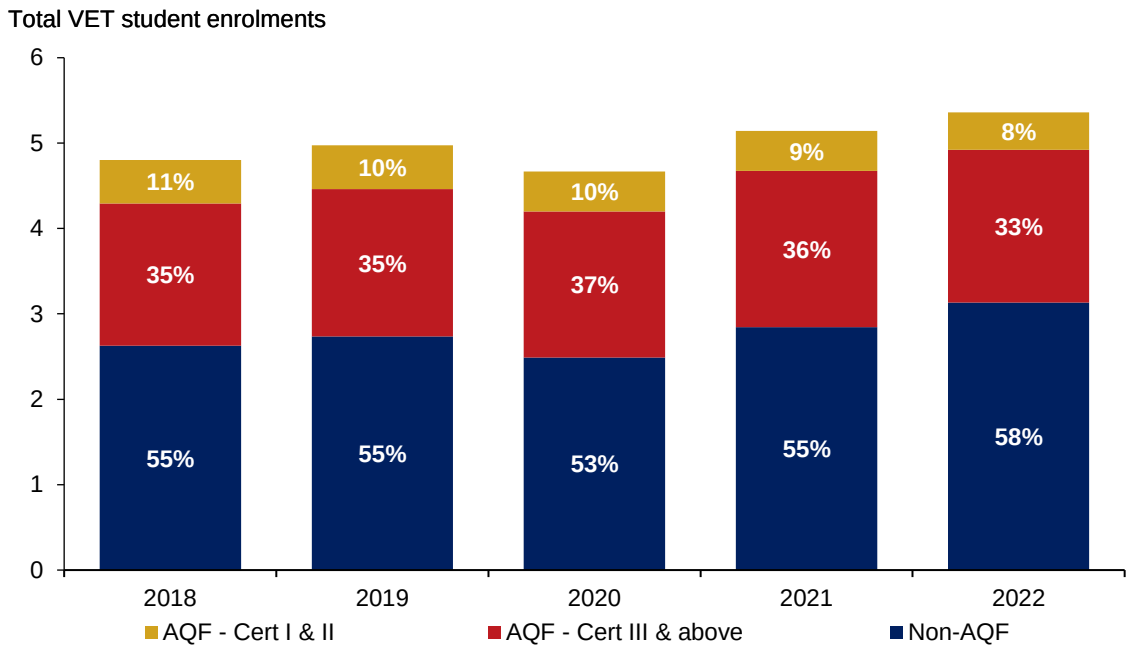
Figure 3.13 VET contribution to employment growth & employment share by industry, 2021 to 2050



Source: ABS, Oxford Economics Australia

The notable exception is the construction industry which has a 56% VET educated workforce and a strong outlook for growth. However, the industry has displayed an increasing trend towards non-AQF study pathways over recent years as workers opt to study competencies specifically required by their role instead of full certificates. This trend is also prevalent in a number of other industries.

Figure 3.14 VET students enrolled in AQF vs. non-AQF, 2018 to 2022



Source: NCVER

4. Tertiary attainment and participation targets

This chapter estimates the number of tertiary education graduates expected over the forecast period based on current trends in commencements and completions.

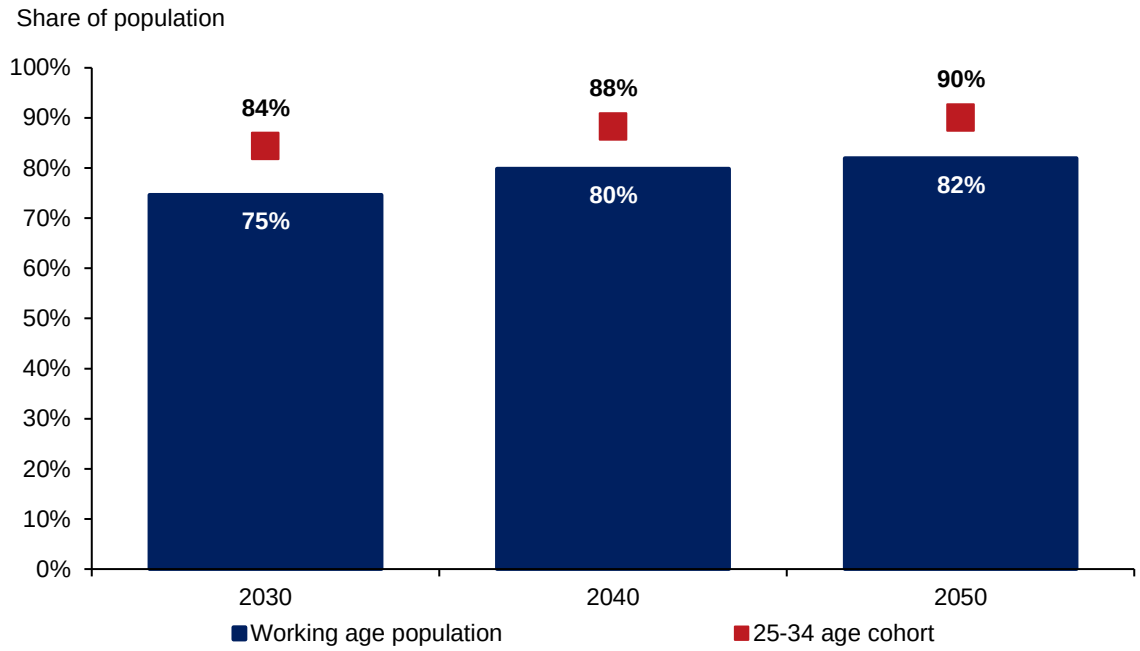
Tertiary targets by selected age cohorts

Attainment targets are a stock measure of the tertiary qualifications required to be held by the Australian population to meet labour market needs and are calculated as the share of jobs in the labour market requiring a tertiary qualification.[19]

Our modelling of labour market demand for tertiary workers suggests that by 2050, 82% of the working age population will require a tertiary qualification. To achieve this attainment target requires higher attainment amongst younger cohorts relative to the working age population overall – 90% of 25 to 34 year olds will require a tertiary qualification to maintain the tertiary working age population target.

Higher attainment is required in younger age cohorts because as they 'age through' the workforce over the next 30 years their attainment rates contribute significantly more to the overall attainment of the 2050 workforce - relative to 45 to 54 year olds for example - and are needed to offset lower attainment rates in older cohorts.

Figure 4.1 Tertiary attainment targets by age cohort, 2030, 2040 & 2050



Source: Oxford Economics Australia

[19] To ensure targets are reflective of the requirements of the total population we assume that people outside the labour force have the same likelihood of holding a qualification as those in the labour force.

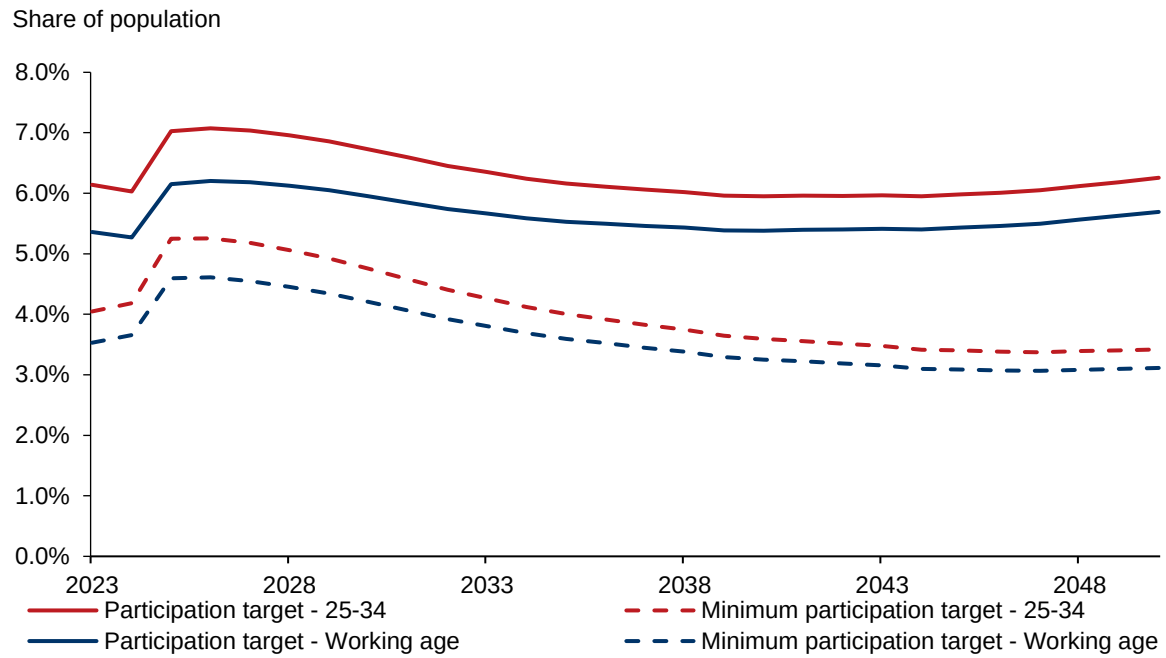
The increase over the next decade is required in these younger age cohorts to drive increasing attainment rates overall. We note that the pace of the increase is difficult to achieve in practice and we haven't modelled the feasibility. However, if rates for 25 to 34 year olds were lower than the overall target they would be a detractor on overall attainment for the next 30 years as they age through the workforce, and it would be difficult to 'catch up' attainment in these cohorts at older ages.

Participation targets are a flow measure and reflect the share of the working age population required to attain a qualification each year to meet the attainment targets. We estimate an average participation target of 5.6% for the working age population and 6.3% for 25 to 34 year olds is required to meet the attainment target domestically.

However skilled migration is also a source of qualified workers for Australia's labour market and the 'minimum participation target' reflects the minimum rate for the Australian population if trends in skilled arrivals continue. If the share of the working age population completing tertiary qualifications falls below 3.6% then the labour market would face significant challenges sourcing qualified workers even if skilled migration continued at historic levels.

The participation target is calculated using forecasts of gross demand and the minimum participation target uses forecasts of net demand. For discussion of these forecasts see Chapter 3.

Figure 4.2 Tertiary participation targets by age cohort, 2023 to 2050



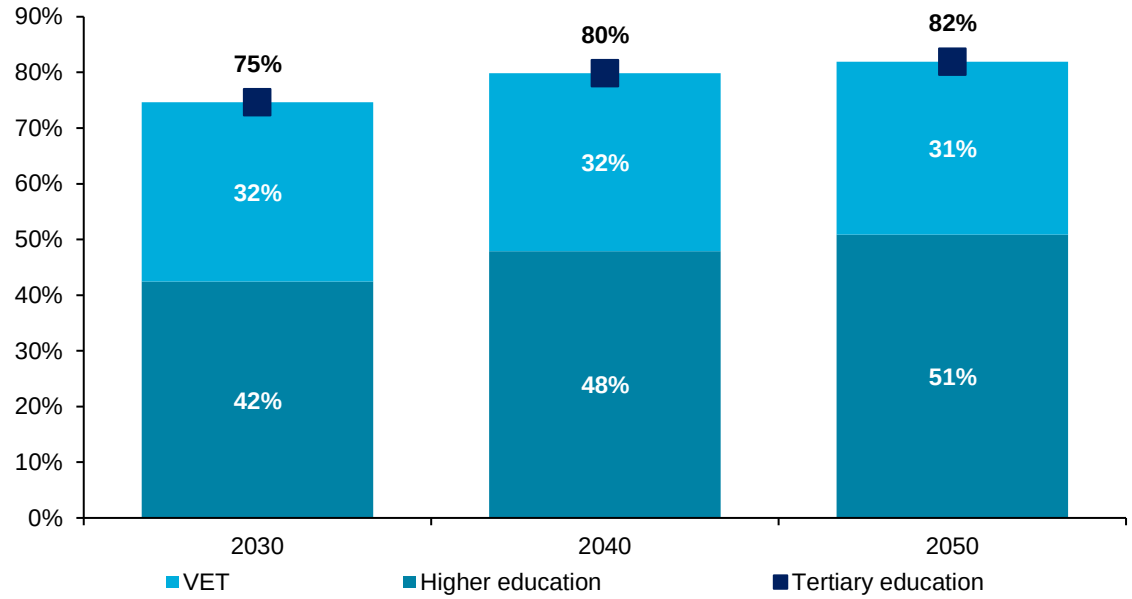
Source: Oxford Economics Australia

Higher education and VET targets

The targets for higher education and VET are based on future industry occupation structures and their demand for VET and higher educated workers over time - 51% of the working age population will require a higher education qualification and 31% will require a VET qualification by 2050. However, labour market demand for VET and higher educated workers implicitly includes historic policy settings, student preferences and the labour market employing available – rather than optimal – workers. So, while there is certainly an increasing demand for tertiary educated workers which will require a significant share of the population completing tertiary qualifications over the next 30 years, caution should be given to the higher education and VET targets below which reflect historic policy settings.

Figure 4.3 Higher education, VET and tertiary attainment targets for the working age population, 2030, 2040 & 2050

Share of population

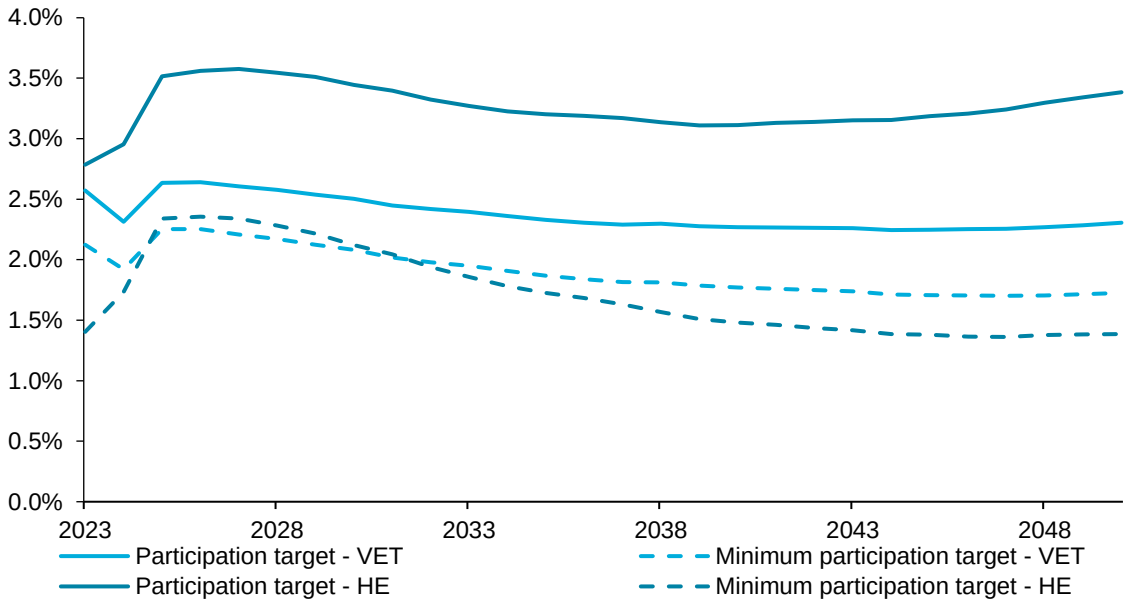


Source: Oxford Economics Australia

To achieve these attainment targets, 3.3% and 2.4% of the population need to complete a higher education and VET qualification on average each year respectively. If trends in skilled migration continues, then the 'minimum participation target' for higher education and VET qualifications is 1.7% and 1.9% respectively. Migrant arrivals are more likely to have higher education than a VET qualification and as a result the buffer between the participation target and minimum participation target is much smaller for VET than it is for higher education.

Figure 4.4 Higher education & VET participation targets for the working age population, 2023 to 2050

Share of population

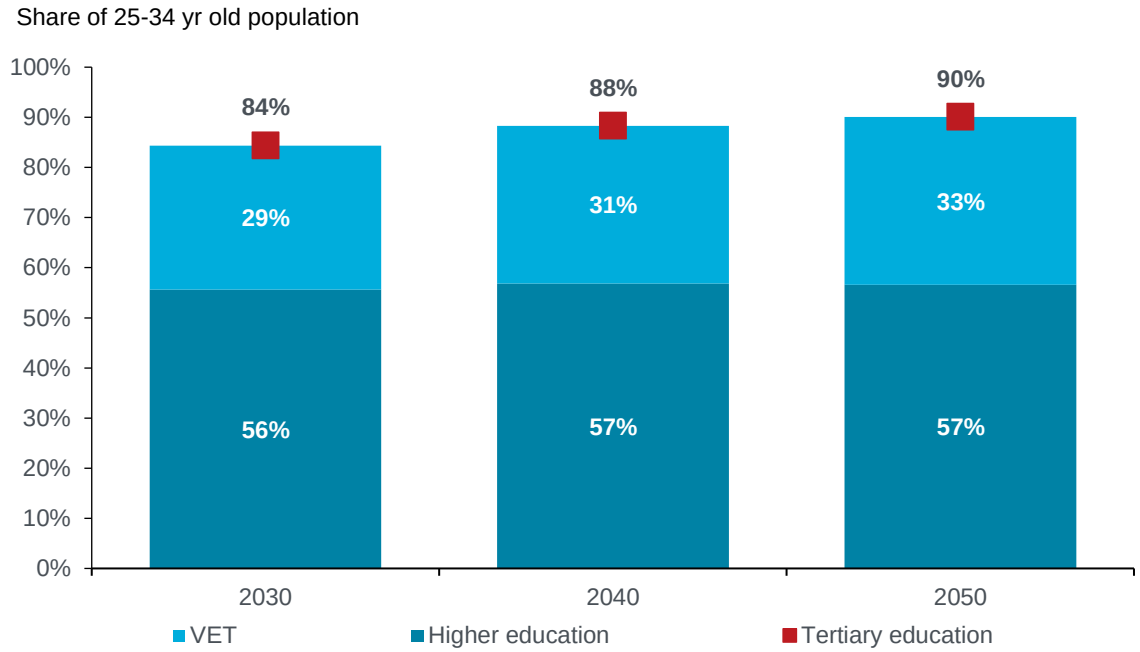


Source: Oxford Economics Australia

To achieve a working age population attainment target of 51% for higher education and 31% for VET by 2050 requires higher attainment for younger cohorts relative to the working age population overall. Roughly 57% of 25 to 34 year olds need to attain a higher education qualification and 33% of 25 to 34 year olds require a VET qualification if increases in attainment are focused on these cohorts.[20]

Higher education attainment is concentrated in younger cohorts reflecting the shift towards these qualifications over time. These trends are expected to continue, and as these cohorts age through the workforce they will continue to have lower rates of attainment than their younger peers. Current VET attainment is concentrated in older cohorts due to significant declines in attainment amongst younger cohorts. This would need to shift if the 25 to 34 year old cohort was to drive higher attainment across the workforce.

Figure 4.5 Higher education, VET & tertiary attainment targets for 25 to 34 year olds, 2030 to 2050



Source: Oxford Economics Australia

[20] To model attainment targets for this cohort we have made the explicit assumption that the additional VET qualifications required to meet the VET attainment target are met through the 20 to 34 year old age cohorts. This is in contrast to the current distribution of qualifications within the workforce.

5. Tertiary education supply and gap analysis

This chapter estimates the number of tertiary graduates expected over the forecast period based on current trends in commencements and completions and explores gaps between the demand and the supply of tertiary educated students.

For the purposes of this report:

- Supply of higher education graduates refers to students who complete a bachelor degree or higher at a higher education institution and are available to enter the domestic labour market.
- Supply of VET graduates refers to students who complete a Certificate III or higher at a vocational education institution and are available to enter the domestic labour market.

The projections presented here are based on current trends which implicitly continue current policy settings. Policy is likely to change in the future and this would have a significant impact on these projections.

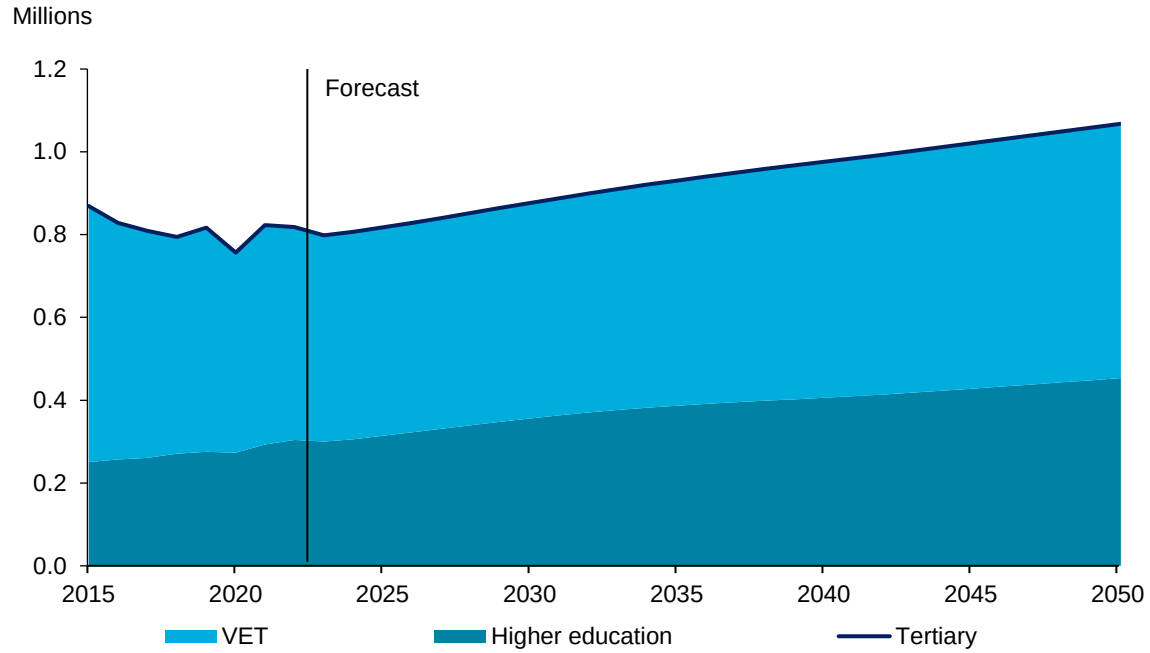
Outlook for tertiary graduate supply

The outlook for tertiary education graduates is based on forecast population and trends in commencement and completion rates. If trends in commencement and completion rates continue, Australia's tertiary education system is expected to supply the domestic labour market with 938,000 graduates on average per year over the next 30 years, with higher education graduates representing 41% and VET graduates 59%.

This represents a growth rate of 1.0% a year on average, stronger than the 0.4% growth rate achieved over the last five years. This is primarily driven by increasing commencement rates in higher education and a recovery in VET completions as the ageing population, coupled with strong completion rates in older cohorts, drives growth in the supply of VET graduates.

Over the last five years, the number of domestic graduate completions inclusive of bachelor and postgraduate degrees has grown at 3.2% a year on average, driven by increased commencement rates. International completions experienced rapid growth over the same time period growing 3.8% a year on average. At an aggregate level when combining both domestic and international students, higher education completions have grown at 3.2% per year over the last decade. Over the next five years growth in the number of higher education completions at an aggregate level is expected to average 1.7% per year, before slowing to 1.4% in the long term.

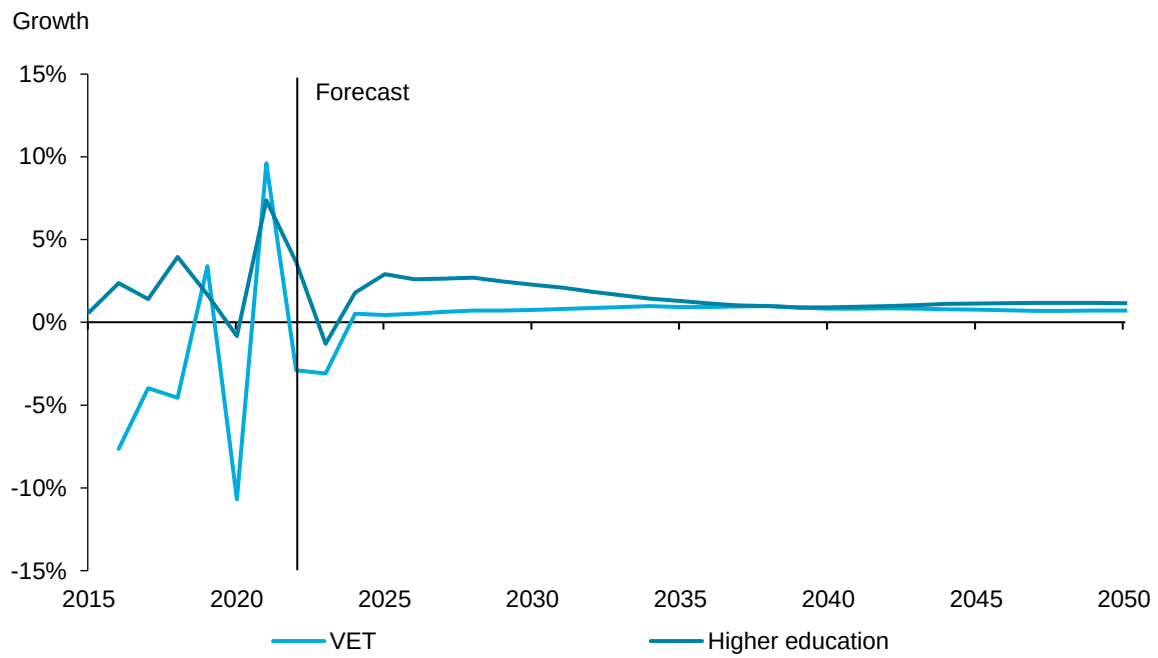
Figure 5.1 Supply of tertiary education graduates, 2015 to 2050



Source: Department of Education, NCVER, Oxford Economics Australia

The supply of VET graduates has been much more volatile than higher education which has exhibited consistent strong growth. VET completions have declined 1.0% on average over the last five years with significant volatility around the mean. Over the next five years VET completions are expected to remain subdued, declining by an average of 0.2% per year. In the long-term VET completions are expected to average a growth rate of 0.8% per year.

Figure 5.2 Growth in the supply of VET and higher education graduates, 2015 to 2050



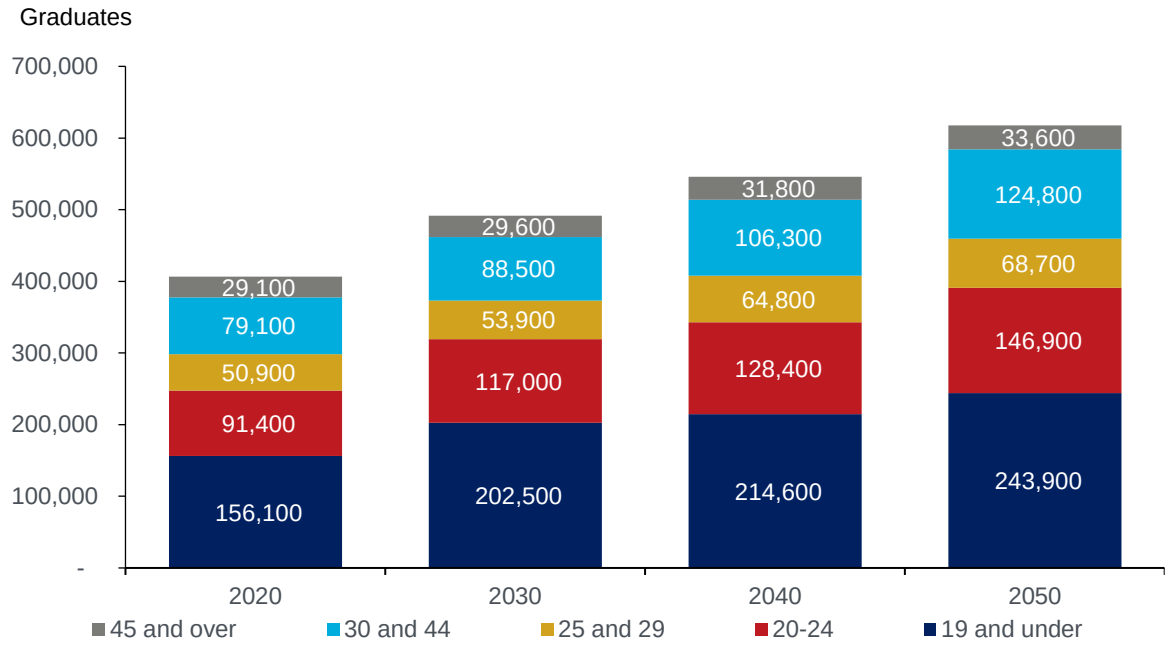
Source: Department of Education, NCVER, Oxford Economics Australia

Outlook for higher education graduate supply

The supply of higher education graduates is expected to increase from 304,000 graduates in 2022 to 453,000 graduates by 2050, reflecting an annual rate of 1.4% over the forecast period.

There is an increasing number of people commencing higher education in Australia and contributing to the supply of higher educated graduates. For every 100 persons, roughly 2.27 commenced higher education in 2012. By 2019, this number had increased to 2.82 before falling during the COVID-19 pandemic.[21]

Figure 5.3 Domestic higher education commencements by age bracket, 2020 to 2050



Source: Department of Education, Oxford Economics Australia

While commencements are increasing, completion rates across age cohorts and fields of education are either stable or declining. Overall, the completion ratio is forecast to fall from 47% in 2019 to 41% by 2052.[22] Additionally, the two largest cohorts which commence and complete university will experience a slowdown in population growth beyond 2032. The population of 15–19-year-olds will grow at 1.8% p.a. over the next decade, but slow in the long-run to average 0.6% p.a. from 2033 to 2050. Similarly, the population of 20 to 24 year olds will grow at 2.4% p.a. over the next decade, providing near-term support for completions, before trailing to just 0.4% p.a. over the two decades beyond that. The decline in completion rates and the slowdown in population growth amongst key age demographics will be a drag on the growth in the supply of graduates in the long run.

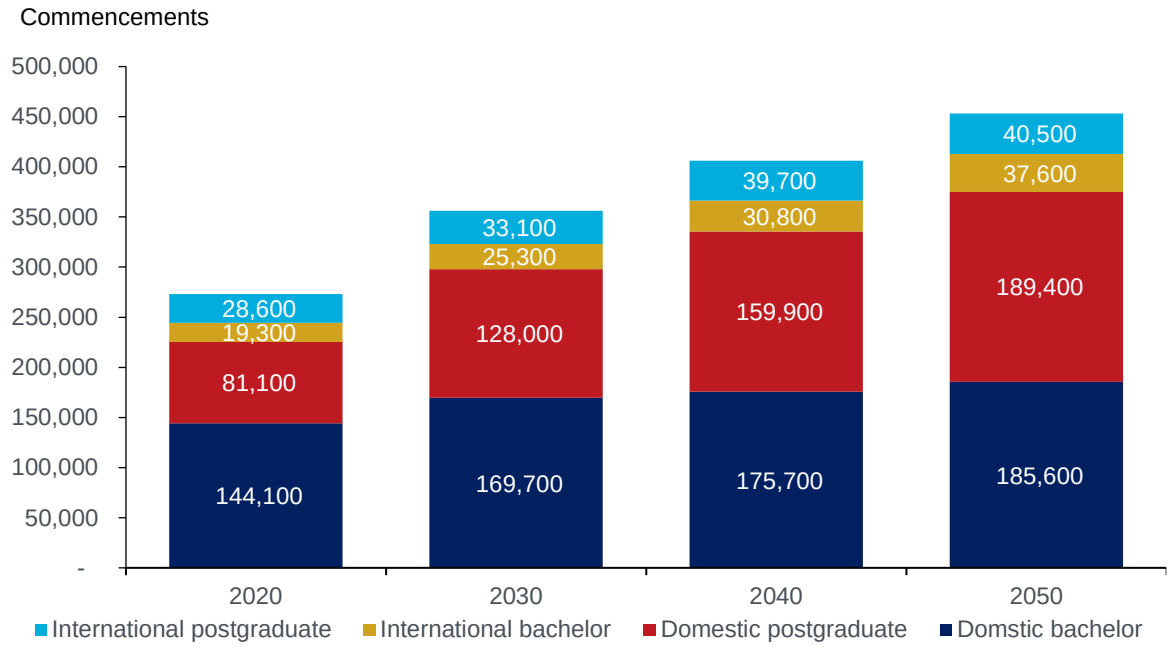
[21] This figure includes international students who remain in Australia to work. Years affected by the COVID-19 pandemic, are excluded from the trend analysis.

[22] A completion rate is the share of students that commence studying in a certain year who will complete their studies in the next three to nine years. These rates are estimated at an age and field of education level for modelling purposes. A completion ratio is a ratio of completions in a single year to commencements in that same year. This ratio is used to identify aggregate trends in completions across age groups and fields of education.

Supply of higher education graduates consists of both domestic students and international students who remain in Australia to work after they complete their degree.[23] International graduates are expected to contribute roughly 17% to the supply of higher education graduates over the forecast period.

From 1 July 2023, international higher education graduates with eligible qualifications will be granted an extra two years of post-study work rights. This is a significant increase from the current 2-4 year base (depending on qualification). The Federal Government has earmarked further reforms to address migrant worker exploitation (including of students) later in 2023, which are likely to impact the international graduate supply estimated below to the upside.

Figure 5.4 Supply of higher education graduates by type, 2020 to 2050



Source: Department of Education, Oxford Economics Australia

Domestic graduates are expected to grow at an annual rate of 1.6% over the forecast period. The growth in postgraduate degrees is expected to outpace the growth in bachelors degrees and by 2050, roughly one in two domestic completions is expected to be a postgraduate degree. The largest contributing fields of education to the number of postgraduate completions are forecast to be health and society and culture, contributing on average 1.2 and 0.6 percentage points to total domestic postgraduate completions per year on average over the forecast period.

Outlook for VET graduate supply

The supply of VET graduates is expected to increase from 514,000 graduates in 2022 to 613,000 graduates by 2050, reflecting an annual rate of 0.6% over the forecast period. VET graduates are older on average than higher education graduates – almost half of VET graduates in 2022 were over 30 compared to 25% for higher education. This age profile, coupled with varied trends in

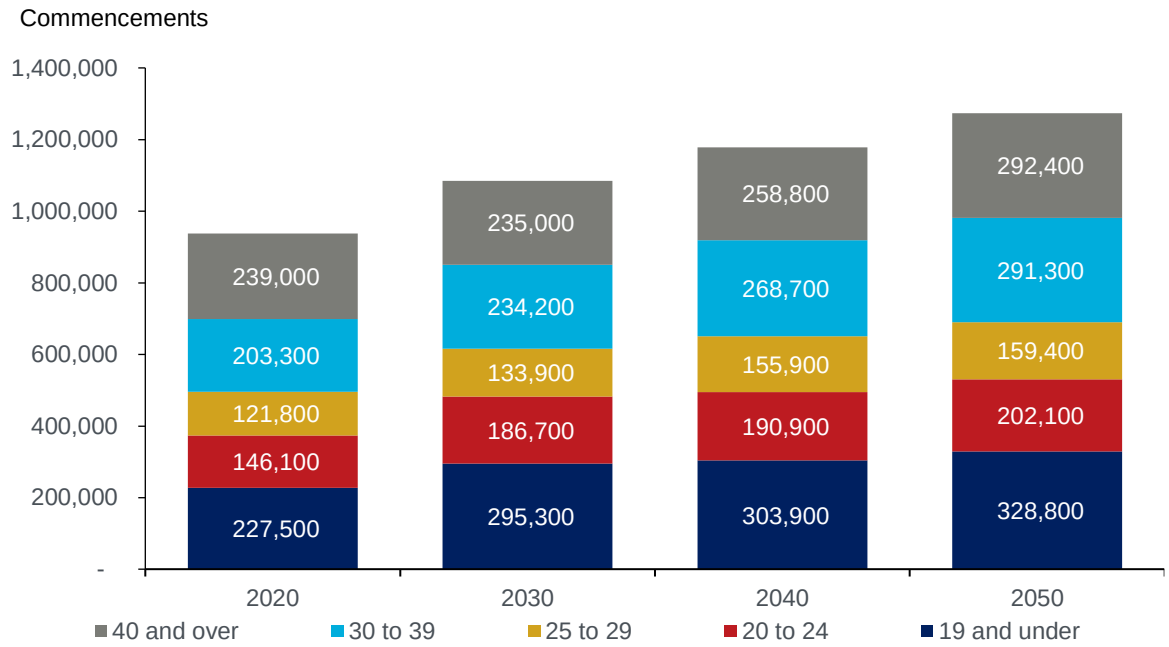
[23] We estimate international students who remain in Australia to work after they complete their degree using the historic ratio of Temporary Graduate visa (subclass 485) within the Post-Study Work stream relative to international student completions.

commencements and completions has a positive effect on the outlook for VET supply relative to historic trends.

As fee structures for the VET sector changed commencements fell from 2,161,000 in 2015 to 1,128,000 in 2018 and have since increased to 1,184,000 in 2022. Still, VET commencements are significantly larger than that of higher education with roughly 6.1 people commencing VET for every 1,000 people in 2019.

Over the past five years, commencements have been increasing across all age cohorts apart from 40 and over, with the most significant growth in the younger cohorts of 19 and under and 20 to 24, up a cumulative 27.7% and 16.4% respectively.

Figure 5.5 Domestic VET commencements by age cohort, 2020 to 2050



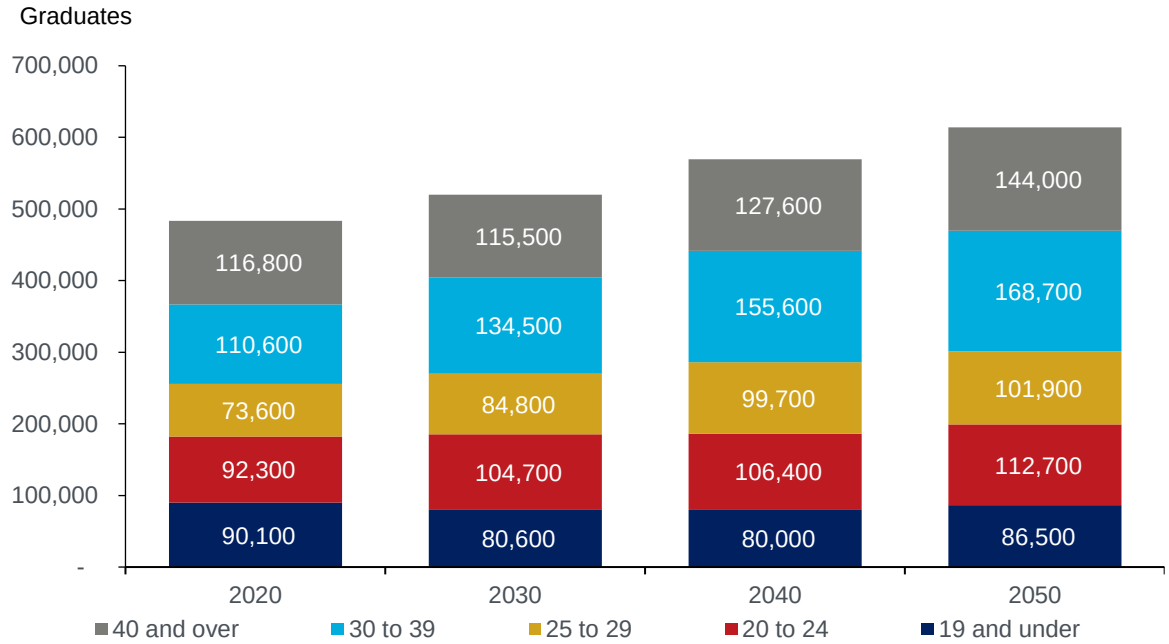
Source: NCVER, Oxford Economics Australia

Since 2016 the overall completion ratio has increased modestly by a cumulative 3.0 percentage points, with the strongest growth in the 30 to 39 age cohort at a cumulative 6.4 percentage points. Completion ratios have been volatile across all age cohorts since 2016, increasing across all age cohorts from 2016 to 2018 before holding steady or declining to 2022.

Completion ratios across age cohorts are forecast to remain relatively steady with marginal growth in older age cohorts and a small decline in younger age cohorts of 15 to 19 and 20 to 24 based on continued trends.

For younger age cohorts, a relatively weaker population outlook and stable completion ratios will be somewhat offset by growing commencement rates over the forecast period. For older cohorts, stronger population growth and marginal growth in completion ratios are expected to offset by declining commencement rates. Overall, completions amongst older cohorts are expected to experience stronger growth with the share of graduates aged 30 or older to increase from 48% in 2022 to 51% in 2050.

Figure 5.6 Supply of VET graduates by age cohort, 2020 to 2050



Source: NCVER, Oxford Economics Australia

Gross projected gap in the demand and supply of tertiary education

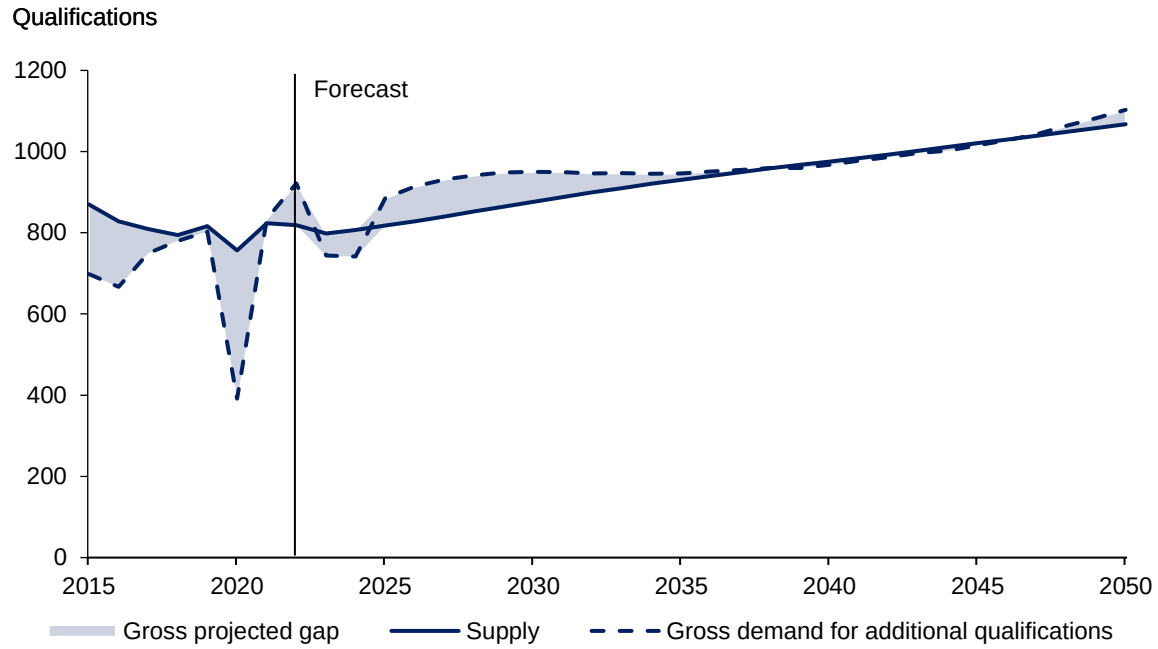
Over the next 30 years there is an average deficit of 21,000 qualifications per year required to meet gross demand (labour market demand for additional qualifications when skilled arrivals are not accounted for).

In the near-term, slower employment growth will reduce gross demand, and in-turn there will be a temporary gross surplus of tertiary qualifications. By 2026, economic activity and employment growth is expected to return to trend and gross demand for additional qualifications is forecast to grow at a faster rate than supply, resulting in a growing qualifications deficit, projected to reach a peak of 91,000 by 2027. Over the long-term, labour market demand for additional qualifications and the supply of graduates will be relatively balanced, until the later years of the forecast as the industry mix continues to trend towards tertiary dominated sectors.

At an aggregate level, gross demand and supply are expected to be relatively balanced over the forecast period. However, there are likely hidden leakages and imbalances at an industry and occupation level within the labour market. Mismatches between labour market demand and the qualifications that are supplied by Australia's tertiary education system may result in significant shortages for certain industries and occupations and equally significant oversupply of qualifications for others.

Additionally, there is likely underutilisation of qualifications within the economy. Supply of graduates from Australia's tertiary education system may either be employed in a sector where their qualification is not applicable or they may be outside the labour market completely and so will not be fulfilling labour market demand.

Figure 5.7 Projected gap in tertiary education qualifications without tertiary educated arrivals, 2015 to 2050



Source: Department of Education, NCVER, Oxford Economics Australia
Note: The historic series in this chart are estimated.

Net projected gap in the demand and supply of tertiary education

'Net demand' represents the number of tertiary qualifications required to satisfy labour market demand if trends in skilled arrivals continue. Australia's immigration system is largely demand-based and skilled arrivals play an important role in supporting our labour market and filling our skills gap.

Historic estimates of gross and net demand show the significant role skilled arrivals have played in supporting the labour market. Skilled arrivals contributed an average of 150,000 tertiary qualifications per year over the five years pre-pandemic. This has resulted in a net oversupply of tertiary qualifications of 234,000 qualifications per year over the same period. If current trends in skilled arrivals continue the net surplus is expected to average 329,000 qualifications over the forecast period.

Despite the net oversupply of tertiary graduates over the past five years, there have been significant skills shortages that have hampered economic activity. The 2023 skills priority list from Jobs and Skills Australia identified that 36% of occupations assessed were in shortage.[24]

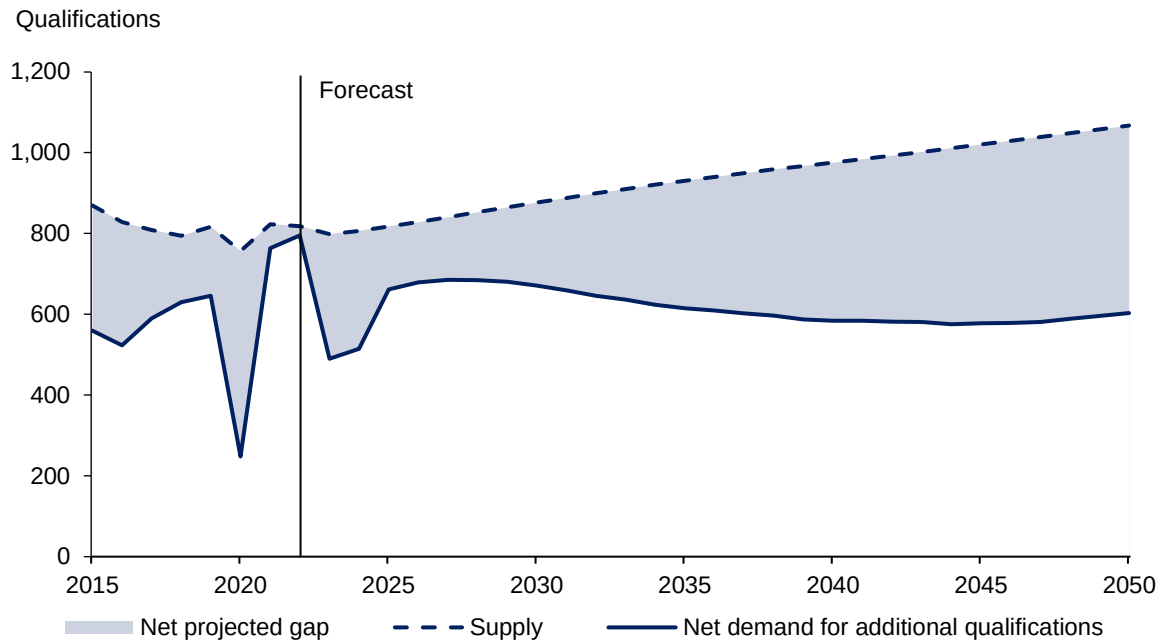
As with gross demand, there are likely imbalances in net demand at the industry and occupation level due to both domestic factors and inefficient allocation of migrant skills within the Australian labour market. These imbalances will differ to the gross demand picture because skilled arrivals have different qualifications to the supply from Australia's education system and work in different industries.

While migrant arrivals provide the qualifications demanded by the labour market in aggregate, there is a mismatch in their allocation to industry due to other factors that likely result in significant gaps mismatches across industries. Overseas permanent arrivals to Australia have on average a higher

[24] Jobs and Skills Australia (2023). SPL Key Findings Report, JSA Website, accessed 17 November 2023.

rate of employment and are more likely to hold a tertiary qualification, particularly higher education, than the general population. However, data on the characteristics of recent migrants suggests that only 54% of arrivals use their qualification in their first job. This rate is particularly low for arrivals who are employed as machinery operators and drivers, labourers, sales workers and community and personal service workers. Similarly, 54% of recent migrants currently work in a field not related to the qualification they obtained prior to arrival.

Figure 5.8 Net projected gap in tertiary education qualifications if trends in tertiary educated arrivals continue, 2015 to 2050



Source: Department of Education, NCVER, Oxford Economics Australia
Note: The historic series in this chart are estimated.

6. Scenario analysis

Scenario analysis is designed to model alternative future pathways which could feasibility eventuate and differ from our baseline view.

In this section we consider a scenario based on a view of the Australian economy consistent with the 2023 Intergenerational Report (IGR) to identify how the attainment and participation targets would differ under an IGR outlook compared to our own outlook.

Key scenario inputs

Oxford Economics Australia and the outlook presented in the 2023 Intergenerational Report are both plausible future pathways for the economy over the coming decades.

As in our baseline, the IGR scenario expects real GDP to slow relative to the last 30 years to an average 2.4% per annum to 2050 slightly above our forecast of 2.2% on average per annum. This difference is driven in part by a more optimistic view of productivity growth over the long term. The IGR scenario assumes long-term labour productivity growth around the 20-year average of 1.2% per year which is above our baseline forecast of 0.9% to 2050.

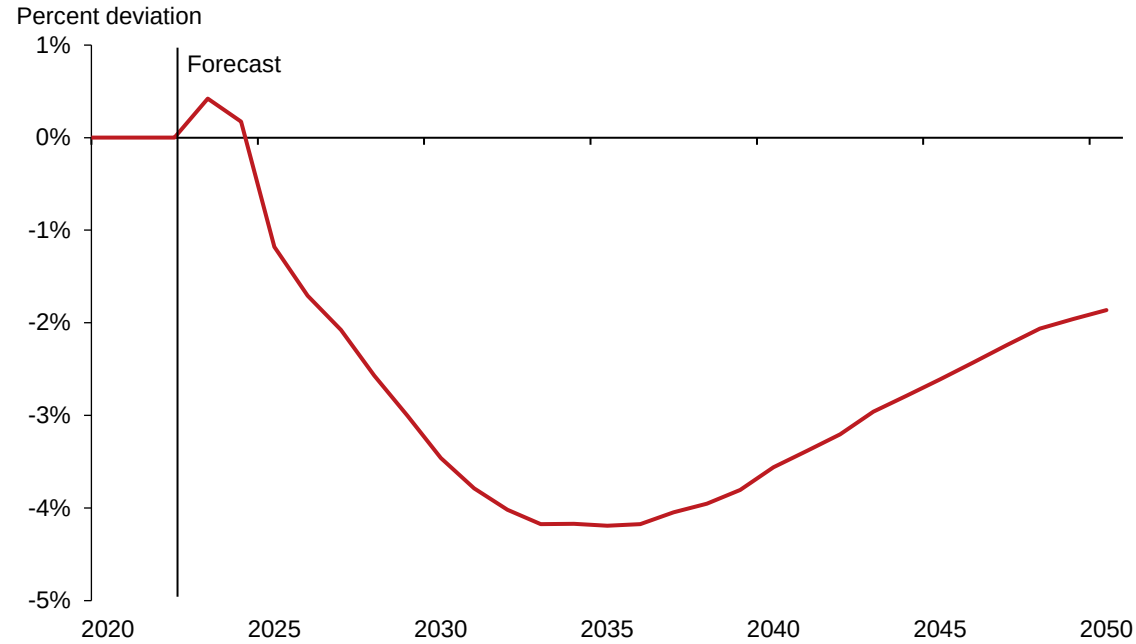
However, the key variables of interest that are relevant for demand of qualifications are labour supply, industry structure and population. [25]

The key difference between our baseline view of labour supply and the IGR scenario is the pathway participation rates will take over the next 30 years. We expect participation to peak in the 2030's while the IGR expects participation to have reached its peak in 2023. The IGR participation rate forecasts have been rising steadily over time as participation consistently exceeds forecasts.

The baseline and IGR scenario are aligned on Australia's population in the long run expecting Australia's population to reach just over 40 million by 2063. As a result, lower participation rates lead to lower employment under the IGR scenario. The difference between our baseline and IGR scenario peaks at 4% lower employment in the 2030s before converging back towards our baseline with 360,000 fewer jobs by 2050.

[25] Where the IGR did not provide a long term forecast of a required variable, we sought guidance from Treasury on inputs and assumptions consistent with the IGR view. In particular, Treasury indicated that the employment by industry forecasts published by Jobs and Skills Australia (JSA) should be adopted for an industrial structure consistent with the IGR outlook. The JSA data is only forecast to 2026 so to generate long run industry by employment projections industry shares are held constant from 2026.

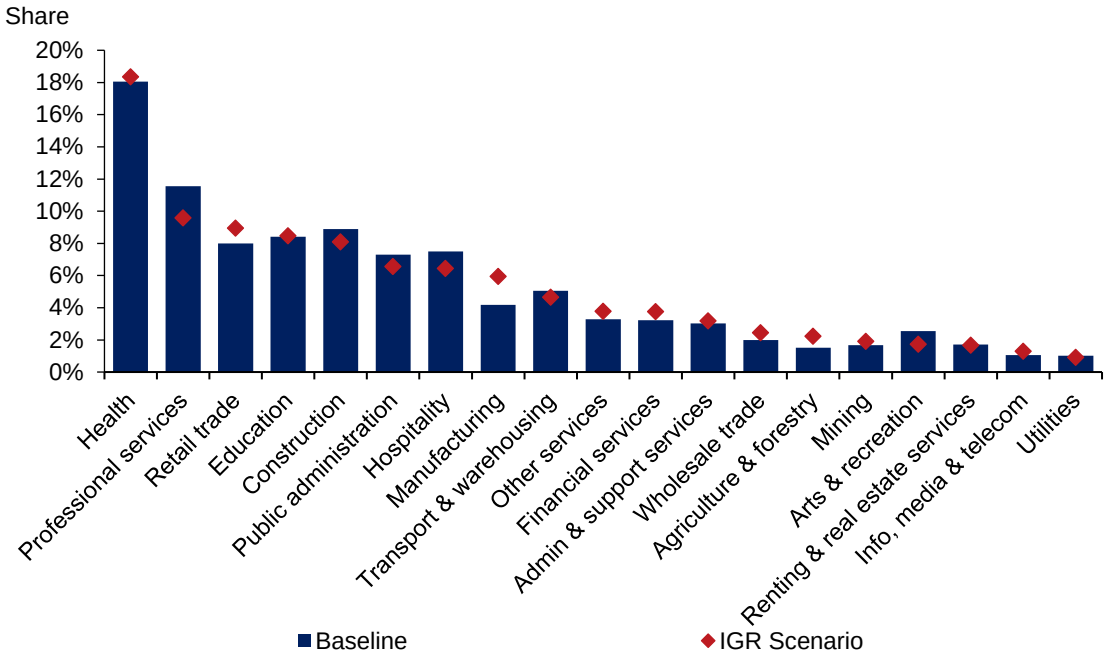
Figure 6.1 Employment deviation to baseline, 2020 to 2050



Source: Oxford Economics Australia, 2023 Intergenerational Report

The composition of the economy is important for the number of qualifications that will be demanded by the labour market. Holding the JSA's industry shares of employment constant over the forecast period results in a different industrial structure to our baseline outlook. In the IGR scenario the professional services industry is smaller by 415,000 jobs and manufacturing has 318,000 more jobs in 2050 than under our baseline.

Figure 6.2 Share of employment by industry under baseline & scenario, 2050

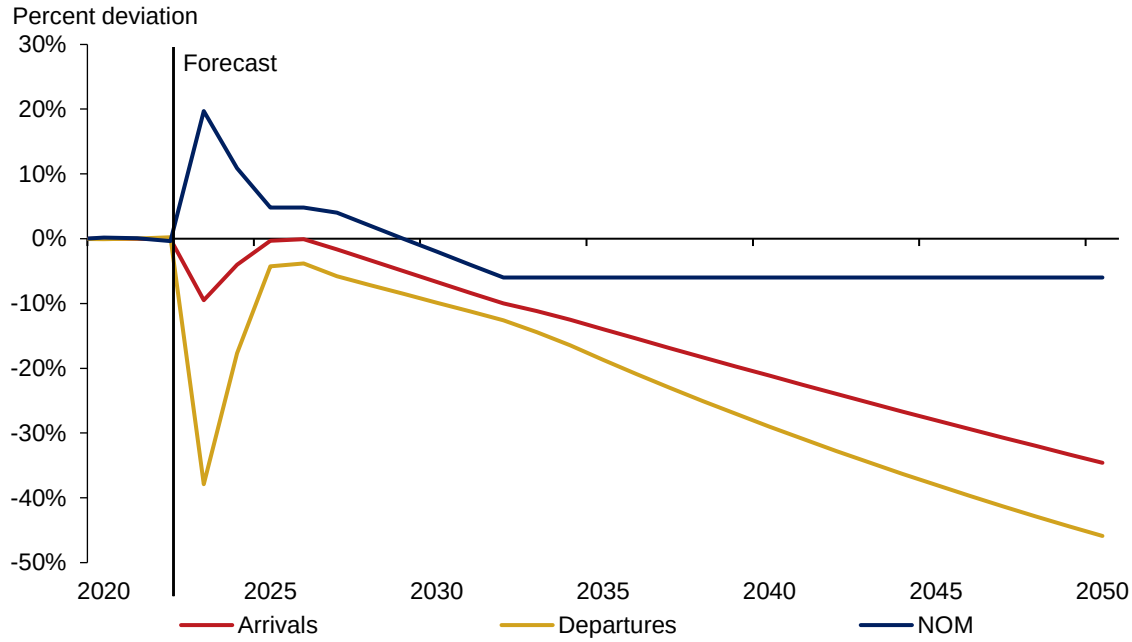


Source: Oxford Economics Australia, Jobs and Skills Australia, Intergenerational Report 2023

Net Overseas Migration (NOM) accounted for over 60% of Australian population growth over the past decade and IGR scenario also expects migration to continue to play an important role in our

population growth. Our baseline continues the trend of increased global labour mobility and as a result our arrivals and departures forecasts grow over time. In contrast, the IGR scenario has constant arrivals and departures which result in almost half as many departures by 2050. These differences net out at the NOM level. Baseline forecasts of NOM stabilise at 250,000 per annum, 15,000 people higher than the IGR scenario forecasts of 235,000 people per annum.

Figure 6.3 Arrivals, departures & NOM deviation to baseline, 2020 to 2050

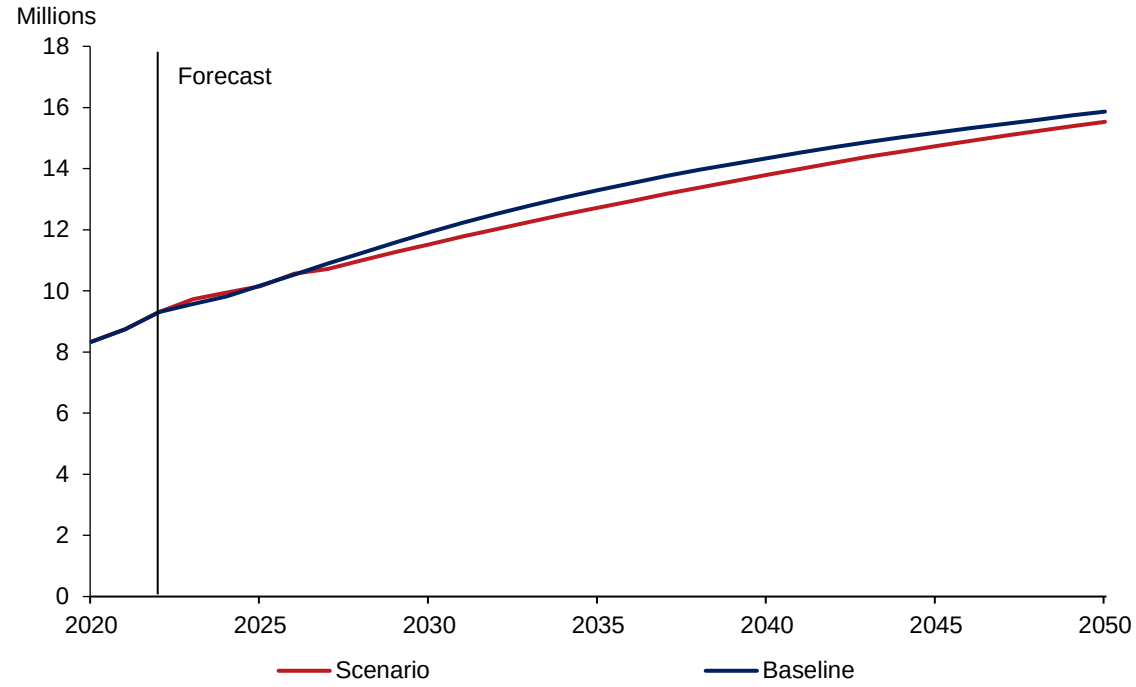


Source: Oxford Economics Australia, Treasury, Intergenerational Report 2023

IGR scenario impact on key results

Under the IGR scenario, lower employment and a different industrial structure results in 2.7% lower tertiary employment on average over the forecast period. The difference is greatest in the mid-2030's when the deviation in total employment is largest. By the end of the forecast period tertiary employment is 343,000 jobs lower than under our baseline however this is not a significant difference relative to the size of the labour market.

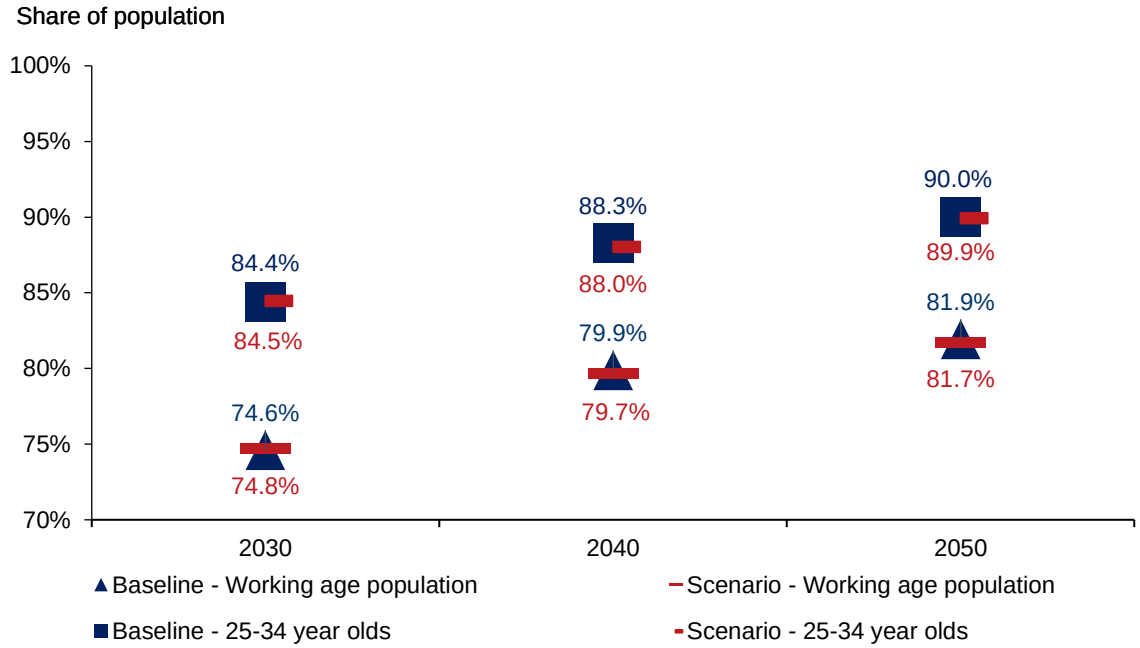
Figure 6.4 Tertiary employment under baseline & scenario, 2020 to 2050



Source: Oxford Economics Australia

Slightly lower tertiary employment under the scenario has an immaterial impact on attainment targets. The impact is small because the IGR scenario impacts both the tertiary education demanded as well as the workers available to attain it (i.e. both the numerator and denominator of the target).

Figure 6.5 Tertiary attainment targets by age cohort under baseline & scenario, 2030 to 2050



Source: Oxford Economics Australia

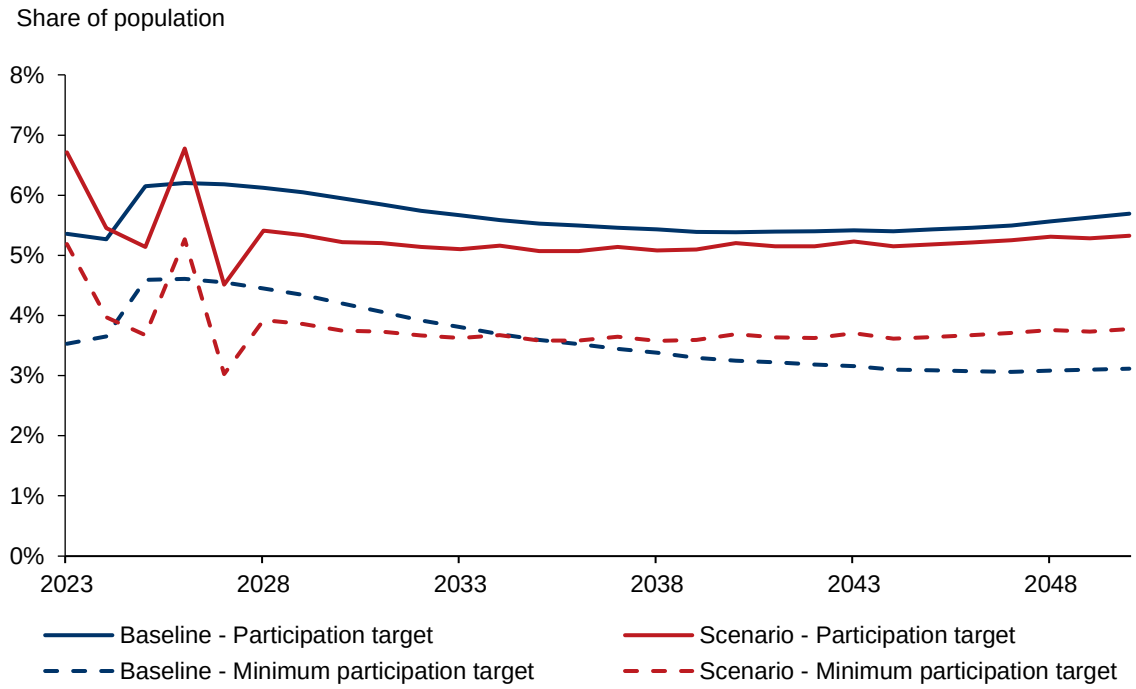
The scenario has a larger impact on the flow of qualification demand and therefore the participation targets. However, the impact is still small and within the range of the overall and minimum

participation target. The scenario participation target averages 5.3% over the forecast period relative to 5.6% under baseline.

The lower long run level of migration under the IGR scenario results in a smaller gap between the overall and minimum participation targets because fewer migrants are available to support labour market demand for tertiary qualifications.

The spike in the scenario participation targets in 2026 is due to the JSA industry employment shares being held constant from 2026 under the scenario.

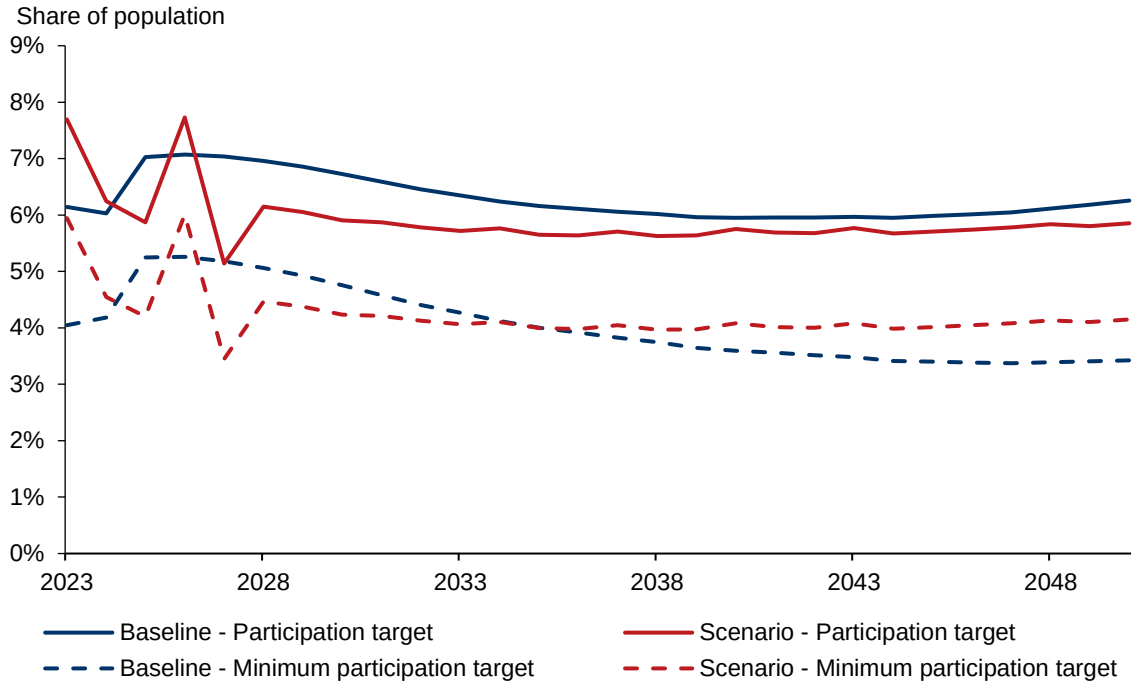
Figure 6.6 Tertiary participation targets for working age population under baseline & scenario, 2023 to 2050



Source: Oxford Economics Australia

Similarly, the participation targets for 25 to 34 years olds are not materially impacted under the scenario. Over the next 30 years, the scenario participation target for 25 to 34 year olds averages 5.9% relative to 6.3% under baseline.

Figure 6.7 Tertiary participation targets for 25-34 year olds under baseline & scenario, 2023 to 2050



Source: Oxford Economics Australia

A1. Sensitivity analysis

The purpose of the sensitivity analysis is to assess the impact of variations to inputs or assumptions which have been made through the modelling process.

Sensitivities have been conducted on the following key model variables:

1. Volume and education characteristics of higher educated migrant arrivals and departures
2. The labour market participation rate
3. Caps applied to 'saturation' rates, impacting the ceiling of skills deepening by occupation.

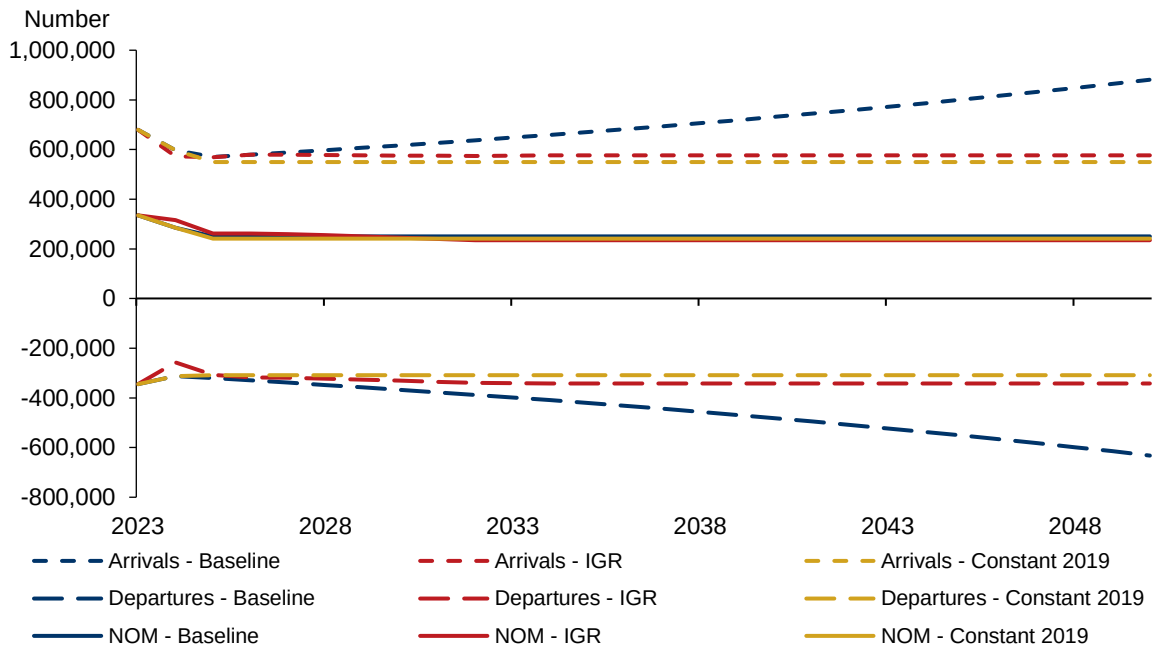
For a sensitivity to impact the attainment target it needs to impact labour market demand for tertiary education. In the cases where the sensitivity does impact the attainment target (saturation sensitivities) we have included charts and commentary. Where the sensitivity does not impact the attainment target (migration & participation sensitivities) we have explained why. All sensitivities impact participation targets.

Migration sensitivity analysis

The following model migration assumption have been tested through sensitivities:

1. Intergeneration report forecasts of arrivals and departures
2. Arrivals and departures set constant at 2019 levels over the forecast
3. Applying the assumed characteristics of arrivals to departures.

Figure A1. 1 Arrivals, departures and NOM under migration sensitivities, 2023 to 2050



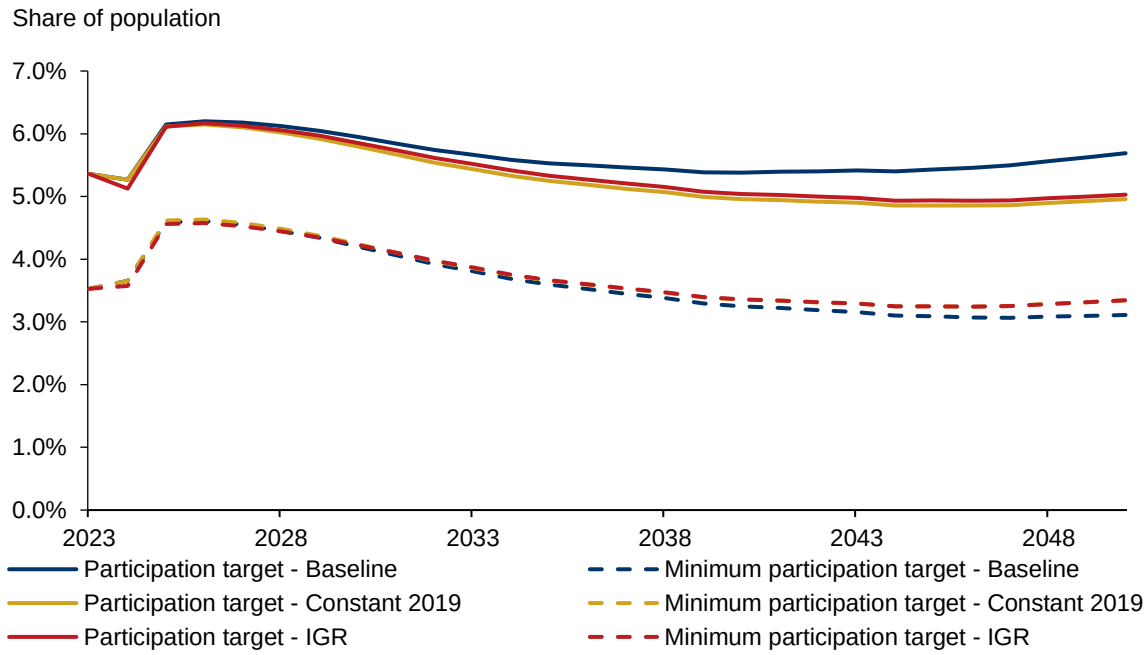
Source: 2023 Intergenerational Report, Oxford Economics Australia

Arrival and departure numbers do not directly impact labour market demand and therefore do not impact attainment targets. The participation target drops from an average of 5.6% under baseline to 5.4% and 5.3% under the IGR NOM assumptions and constant 2019 arrivals and departures sensitivities respectively. This is driven by lower numbers of departures compared to baseline.

Migration directly impacts the additional qualifications demanded by the labour market and therefore affects the participation target, with an additional qualification required to fill the vacant role left by a departure.

The minimum participation target – which accounts for skilled arrivals – is fairly insensitive to migration assumptions when arrivals and departures are balanced as they are in both the IGR and constant 2019 sensitivities (i.e. NOM is constant). The impact on the participation target depends on the difference between the *number* of arrivals and departures and the *propensity* for arrivals and departures to hold a tertiary qualification. The high share of qualified arrivals offsets a slightly lower share of qualified departures meaning the minimum participation targets are insensitive to changes when NOM is constant.

Figure A1. 2 Tertiary participation targets under migration sensitivities, 2023 to 2050

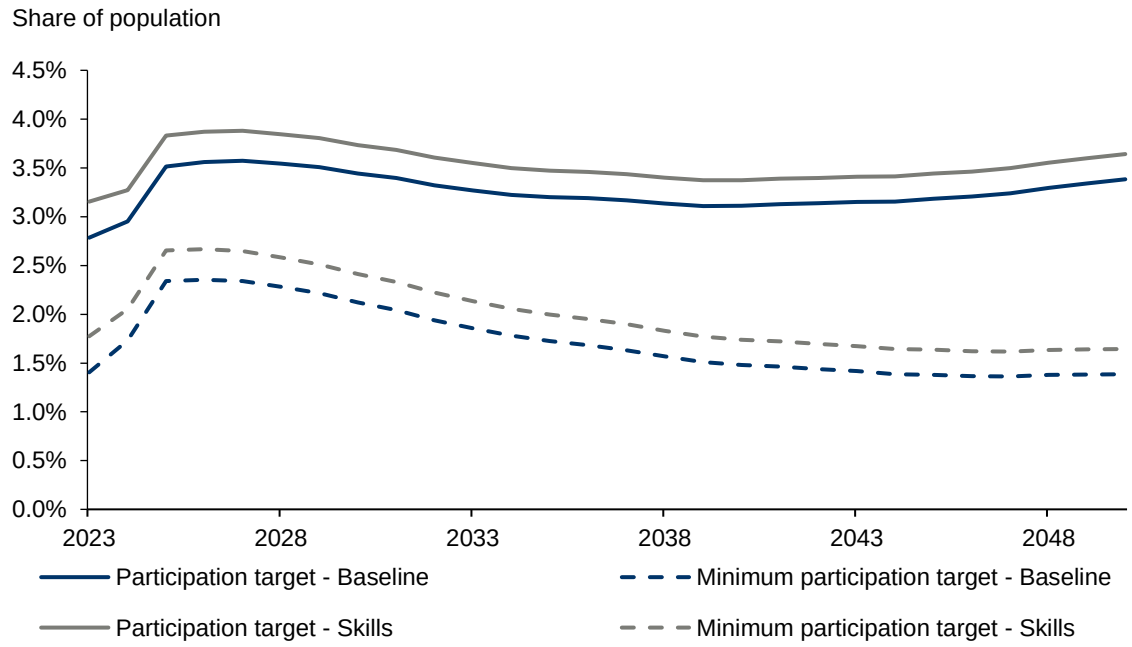


Source: Oxford Economics Australia

Applying the characteristics of arrivals to those departing Australia decreases the tertiary participation target from an average of 5.7% under baseline to 5.6%under the skills sensitivity. The small impact is a result of higher education and VET participation targets largely offsetting each other.

Arrivals are more likely to be higher educated and less likely to be VET educated than the domestic population under baseline assumptions. When these characteristics are applied to departures under the sensitivity, more higher education qualifications and fewer VET qualifications are required to replace those departing Australia than in the baseline.

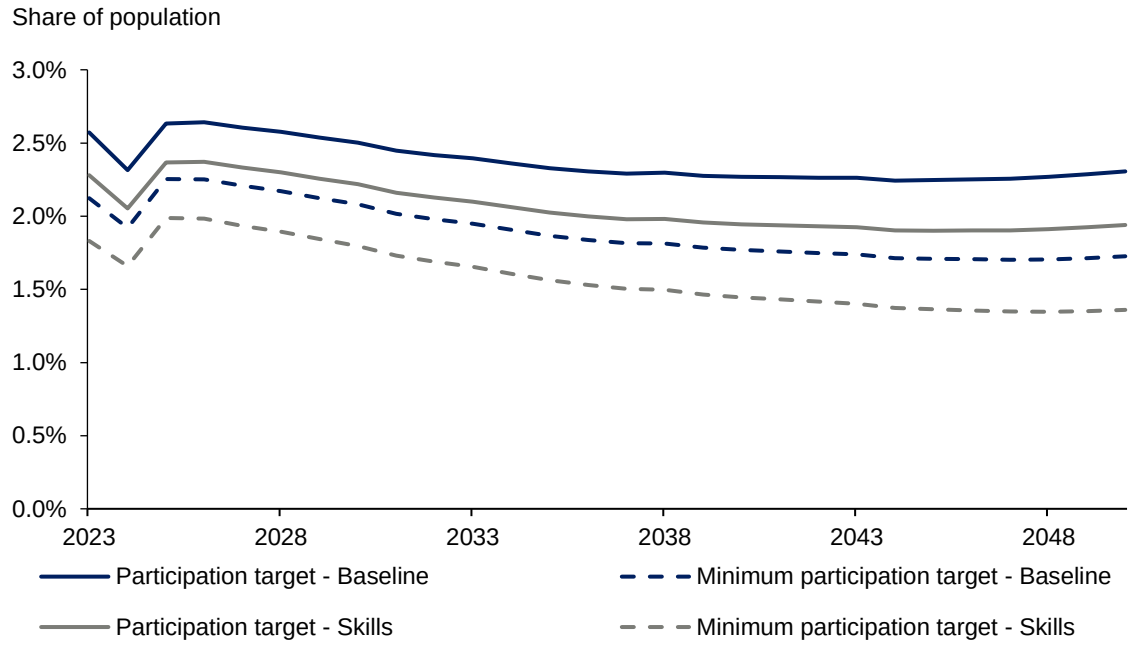
Figure A1. 3 Higher education participation targets under baseline and migration skills sensitivity, 2023 to 2050



Source: Oxford Economics Australia

The higher education participation target increases from 3.3% under baseline to 3.5% and the VET participation target decreases from 2.4% under baseline to 2.1% on average over the forecast period. The profile for arrivals remains unchanged under the sensitivity and therefore the minimum participation target adjusts by the same amount relative to the participation target.

Figure A1. 4 VET participation targets under baseline and migration skills sensitivity, 2023 to 2050

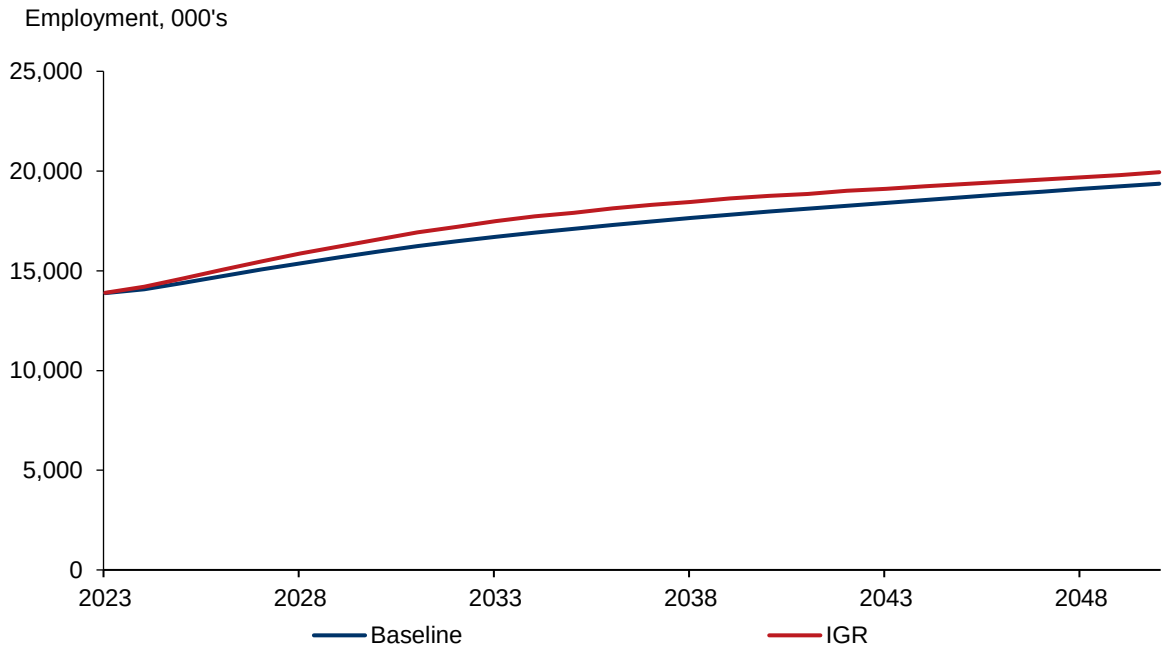


Source: Oxford Economics Australia

Participation rate sensitivity analysis

Sensitivity analysis of the labour force participation rate was undertaken by altering the level of total employment in Australia to reflect the labour force participation rate in the 2023 Intergenerational Report (IGR) released by Treasury, holding baseline population forecasts stable. The level of total employment for each year from FY2024 to FY2050 was adjusted by the ratio of IGR labour force participation to Oxford Economics Australia's baseline labour force participation. The baseline share of total employment and tertiary employment for each industry occupation pair was maintained. Total employment implied by the IGR labour force participation rate is 3.4% below baseline total employment on average from FY2024 to FY2050.

Figure A1. 5 Total employment – Baseline vs. IGR participation rate sensitivity analysis, 2023 to 2050



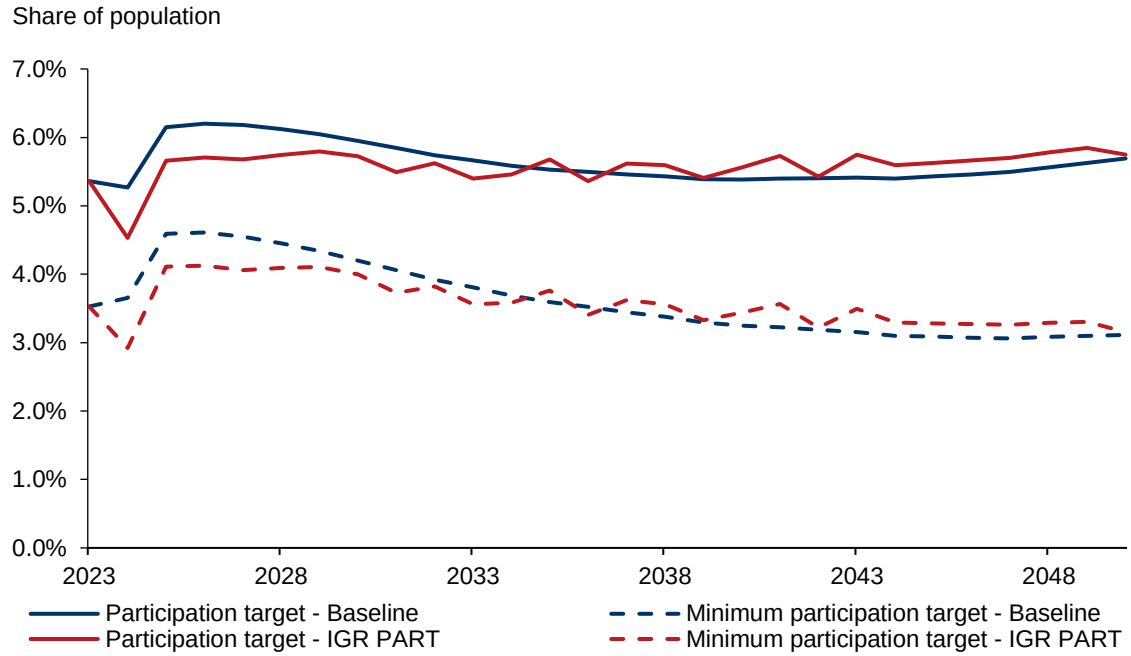
Source: Treasury, Oxford Economics Australia

The tertiary attainment target remains unchanged under this sensitivity as the industry and occupational mix of the labour market remains unchanged. The attainment target is a stock measure representing how many people in the population require a qualification. A person's participation in the labour force in one year does not preclude them from participating in a previous or future year and when they are outside the labour force they still contribute to attainment in the population. Due to this we assume that the tertiary attainment target should not be adjusted for labour force participation.

The participation targets are not materially different under this scenario, averaging 5.6% under both baseline and the IGR labour force participation sensitivity over the entire forecast period. The reduction in total employment under this sensitivity, averaging 3.4% over the forecast period, impacts the flows of additional tertiary qualifications both through labour market demand and churn.

In the near-term, labour market participation declines under the sensitivity and increases under baseline. This reduces the number of additional tertiary qualifications demanded by the labour market each year. However, as baseline participation hits the turning point, this negatively weighs on employment growth and so the IGR sensitivity participation target increases to a level relatively in-line with baseline participation requirement in the long run.

Figure A1. 6 Tertiary participation targets for IGR participation rate sensitivity, 2023 to 2050



Source: Treasury, Oxford Economics Australia

Skills deepening 'saturation' rate sensitivity analysis

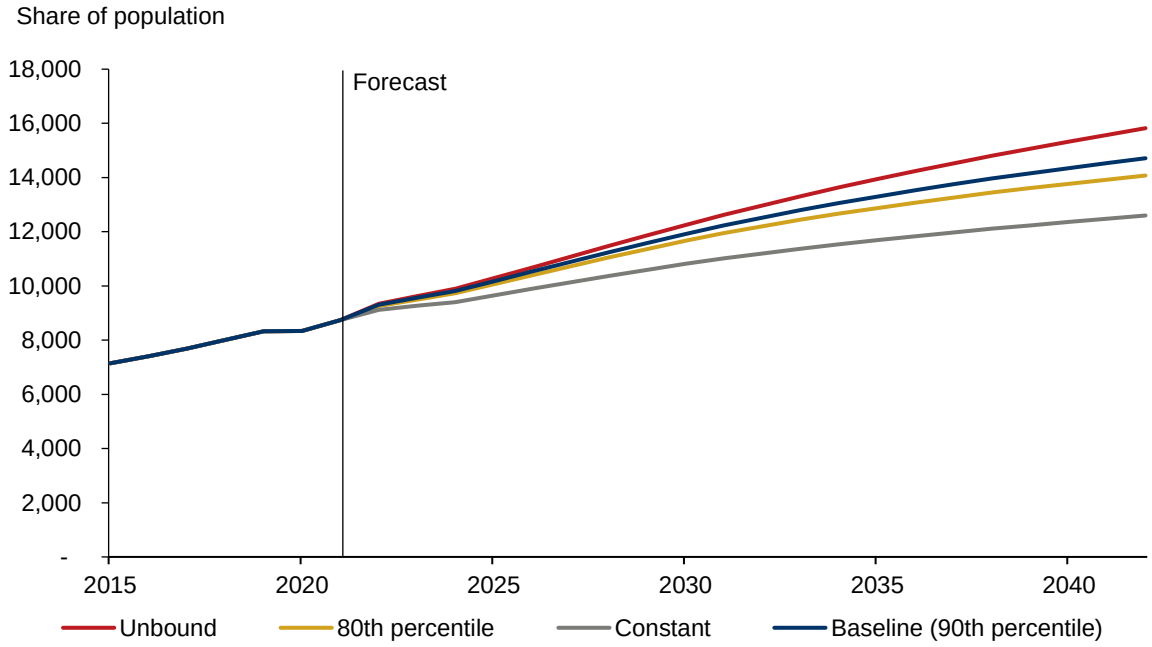
Sensitivity analysis of saturation rates was undertaken by altering or removing entirely the tertiary, higher education and VET cap which was placed on each occupation in the baseline analysis. The caps chosen in the baseline assumption were the 90th percentile of tertiary, higher education and VET attainment by skill level as classified by the ABS at the six-digit occupation level based on 2021 rates. It is then applied to the two-digit occupations undertaken in the analysis. A more detailed explanation of the methodology can be found in the technical appendix A1.1.2.

Three sensitivities were selected to capture a band around the baseline assumption:

1. **Unbound** – no cap is applied to the trends in educational attainment across the forecast period with all occupations able to cap out at the maximum of 100% tertiary educated, higher educated and VET educated workers if current trends allow. The unbound sensitivity would be considered the absolute upper bound of our trend analysis as it will contain shares of education which are unlikely to be compatible with the requirements of many occupations.
2. **80th percentile** – the caps are selected at the 80th percentile for each skill level instead of the 90th percentile as in the baseline, resulting in a lower saturation point of education for all occupations.
3. **Constant** – tertiary, higher education and VET attainment shares are held constant at 2021 levels for all industry occupation pairs for the duration of the forecast period.

Demand for tertiary educated labour is forecast to grow under all sensitivities as a result of the continued growth in employment and changes in the industry mix towards more tertiary education dominated sectors. The magnitude of this growth is dependent on the cap which is imposed on all industry occupation pairs across each sensitivity.

Figure A1. 7 Tertiary educated employment, saturation sensitivities 2015 to 2050



Source: Oxford Economics Australia

When there is no cap placed on saturation rates, the labour market demands 17.5 million tertiary educated jobs in 2050, compared to 15.9 million in the baseline. This equates to employers demanding an additional 7.9 million tertiary educated employees by 2050 compared to 2023 levels. This is an additional 1.6 million tertiary educated employees demanded compared to our baseline results.

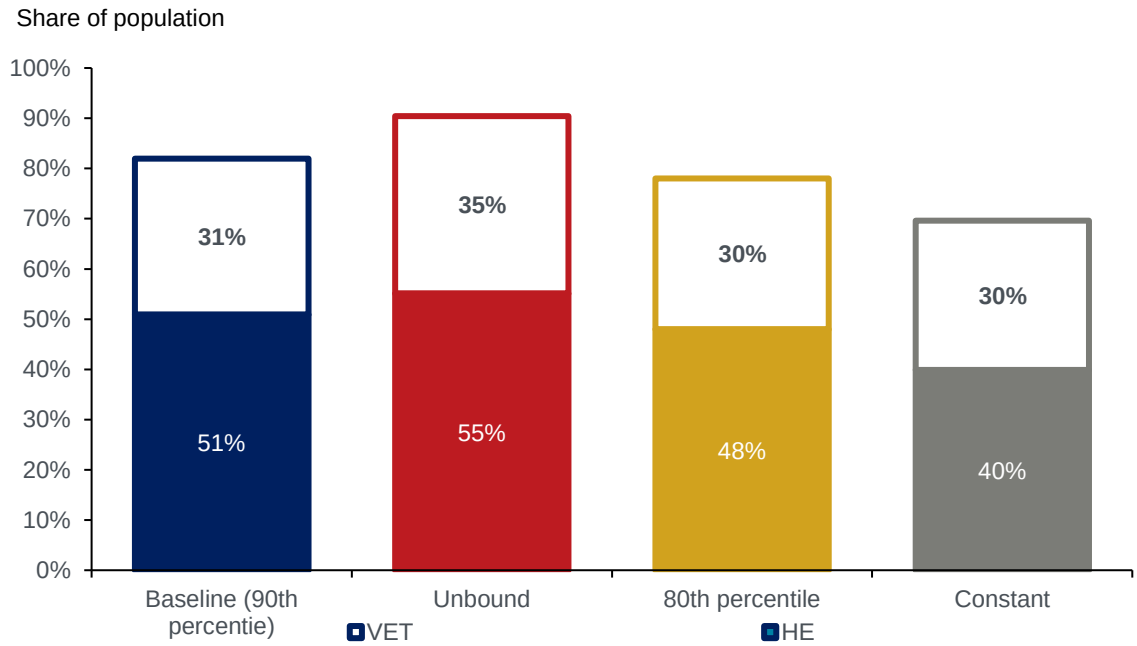
Conversely, when saturation rates are held constant at 2021 levels, 13.5 million tertiary educated jobs are required to meet labour market demand, with the labour market demanding an additional 4.2 million tertiary educated employees by 2050. At the 80th percentile 15.1 million tertiary educated jobs are demanded by 2050, resulting in an increase of 5.6 million tertiary educated roles being demanded.

The tertiary education attainment target by 2050 changes from 82% under the baseline assumptions to 90%, 78% and 70% under the unbound, 80th percentile and constant saturation sensitivities respectively. The attainment target by 2050 is above the tertiary share of total employment in 2023. Under the 80th percentile sensitivity there is minimal deviation from the baseline, whilst the attainment target under the unbound and constant sensitivities are above and below the baseline target respectively. The model is relatively sensitive to changes in the saturation caps. However, we place a low likelihood on saturation caps which result in significantly different targets – The unbound and constant sensitivities. An industry occupation pair requiring 100% of their workforce to be tertiary educated (unbound) or tertiary employment staying constant at current levels (constant) are relatively unrealistic future pathways. Despite being held constant for each industry occupation pair, the attainment target required to fulfil labour market demand by 2050 increases under the constant saturation sensitivity due to changes in the industrial makeup of employment. This is driven by stronger forecast employment growth in industries with greater proportions of tertiary education over the forecast period.

The higher education attainment target is more sensitive to the saturation caps than the VET attainment target. This is due to the strong historical growth in the share of higher educated labour as a share of total employment compared to relatively stagnant growth in the share of VET employment. This results in industry occupation pairs being more likely to hit their saturation cap for higher

education than VET. Overall, the higher education attainment target reaches 55%, 48% and 40% respectively for the unbound, 80th percentile and constant share sensitivities compared to 51% under baseline. The VET attainment target reaches 35%, 30% and 30% under the unbound, 80th percentile and constant share sensitivities compared to 31% under baseline.

Figure A1. 8 Tertiary attainment targets under baseline & saturation sensitivities, 2050

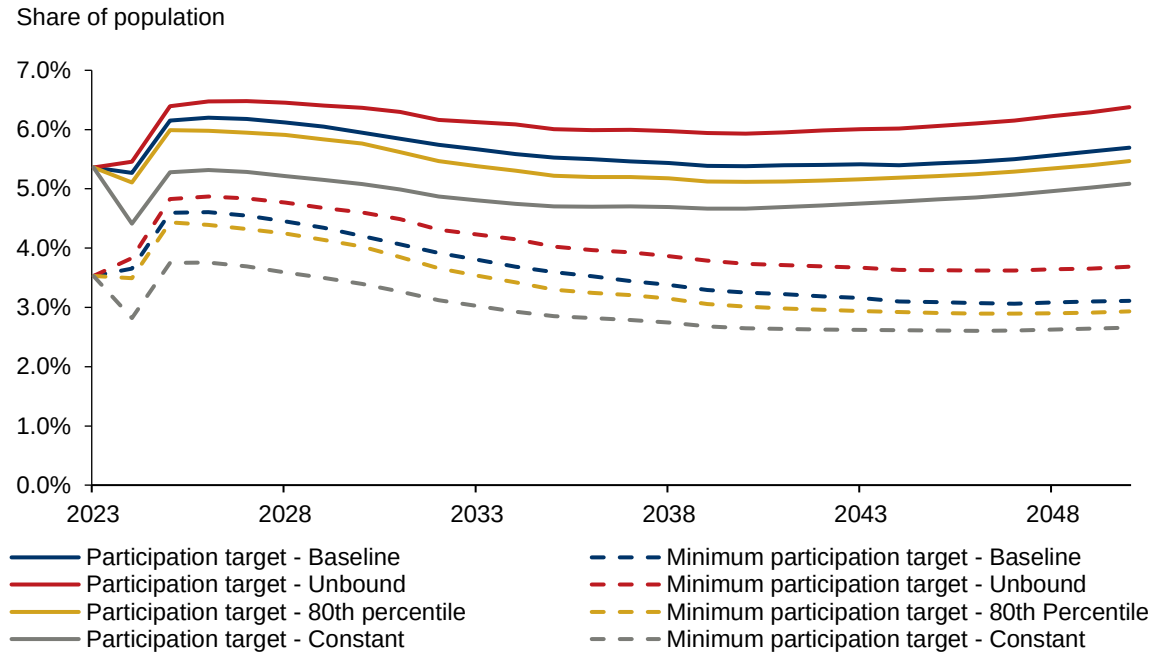


Source: Oxford Economics Australia

Similarly to the attainment target, the participation target is relatively sensitive to changes in the saturation rate caps, particularly under the unbound and constant sensitivities. Setting saturation caps at the 80th percentile sensitivity does not result in significant changes to the tertiary participation target, averaging 5.4% to 2050 compared to 5.6% under baseline. Under this sensitivity the minimum participation target reduces from 3.6% under baseline to 3.4% on average over the forecast period.

The unbound and constant saturation cap sensitivities are more impactful on the tertiary participation target. When tertiary, higher education and VET saturation caps are unbound the share of the labour market requiring tertiary education over the forecast period increases, driving increased demand each year for additional qualifications to fulfil this demand, requiring more people to participate in tertiary education. Under the unbound sensitivity, the participation target reaches 6.1% and the minimum participation target is 4.0%, both above the baseline targets. Conversely, with the saturation caps held constant, additional demand for tertiary employees is only driven by employment growth and churn, removing the impact of skills deepening that occurs under the baseline analysis. This results in a reduced tertiary participation rate required to achieve the attainment rate each year. Under the constant saturation rate sensitivity, the participation target averages 4.9% and the minimum participation target 3.0% over the next 30 years, both below the baseline targets.

Figure A1. 9 Tertiary participation targets under baseline & saturation sensitivities, 2023 to 2050



Source: Oxford Economics Australia

A2. Technical appendix

The technical appendix provides an overview of the modelling framework and the detailed approach for key modelling tasks.

Modelling framework

Oxford Economics Australia's Qualification Demand Model takes long run forecasts of the Australian economy from our suite of Macroeconomic Models and forecasts demand for tertiary educated labour and qualifications.

Demand for tertiary educated labour is created through five channels:

1. **Employment growth** - holding all else equal, if the stock of labour grows the level of tertiary educated labour demanded by the labour market will increase.
2. **Skills deepening** – where the labour market demands a tertiary education qualification for a role which did not previously require it this will increase the share of the stock of labour which is required to be higher educated.
3. **Deaths and retirements** – the natural attrition of the labour force will result in employees which are tertiary educated being either unable or unwilling to continue contributing to the stock of labour.
4. **Retraining due to job changes** – internal churn within the labour market will result in individuals taking up jobs that require tertiary education where they previously did not or retraining to a more suitable field or level of education. Tertiary education may not be a prerequisite to start the role but may be required in the longer term and is prompted through a change in the education of a specific employee and not in the size of the stock of labour.
5. **Outbound migration** – a share of the tertiary educated stock of workers will leave the economy each year in the form of outbound departures. These outbound departures will include citizens, and those on visas leaving the country.

The total number of additional qualifications required by the labour market is referred to as '**gross demand**'.

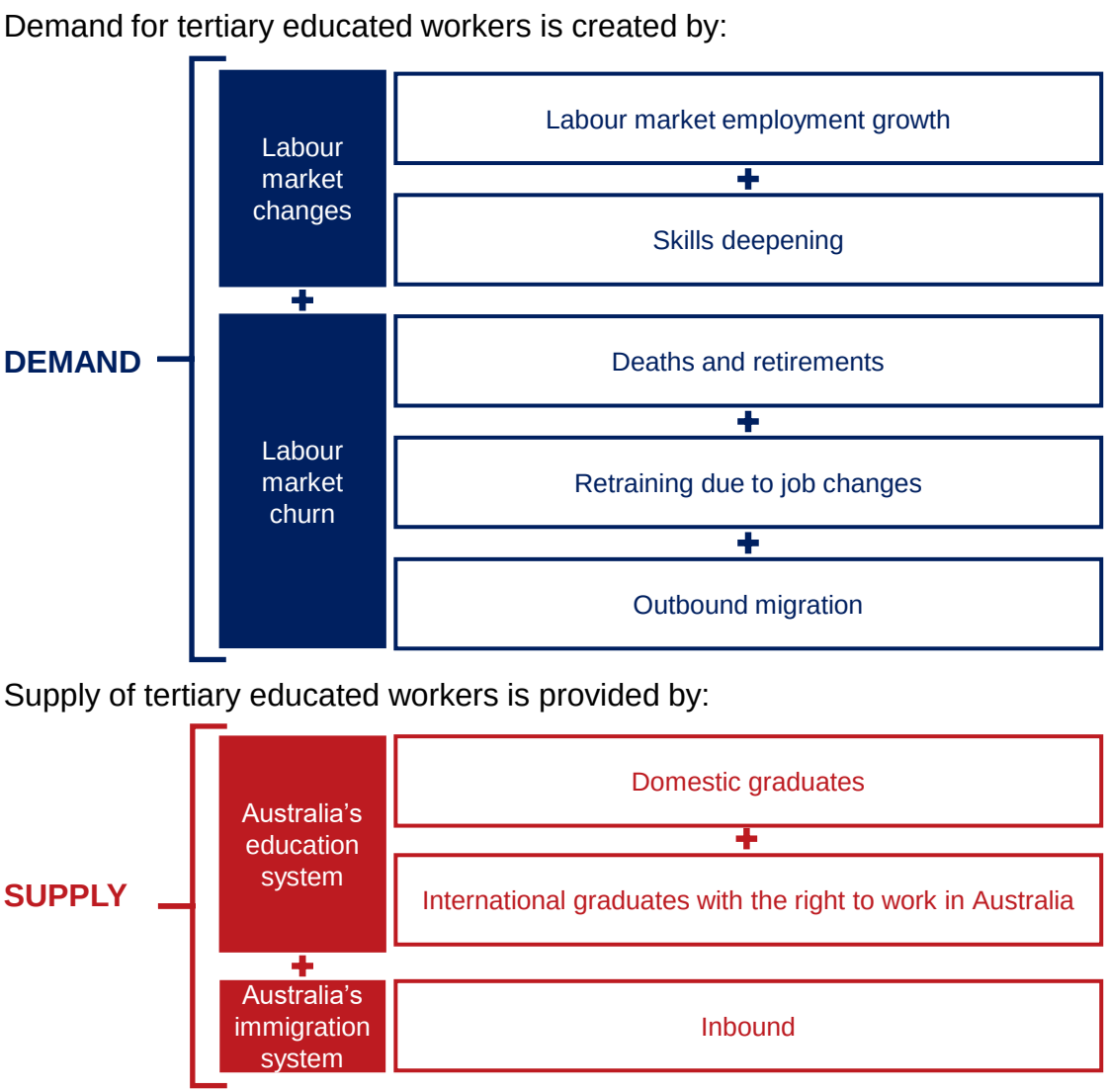
The supply of tertiary educated labour comes through two channels:

1. **Graduates from Australia's tertiary education system** – these graduates will be both domestic students, and a share of international students who after graduating from the education provider transition onto alternative visas to stay in Australia and find work post study.
2. **Skilled arrivals** – includes both returning citizens and those arriving on a visa which allow them to work. We exclude students and visitors due to the limitations of their working rights.

Migrants entering Australia have higher rates of employment and are more likely to hold a higher education degree than the general population. Australian migration policy is largely demand-based, setting targets on permanent arrivals for those on skilled, family and humanitarian visas and allowing temporary arrivals to be determined by the level of labour market demand for certain occupations and skills. Therefore, new immigrants fill a significant proportion of Australia's labour market demand for additional tertiary qualifications each year.

'Net demand' represents the number of additional qualifications required to satisfy labour market demand if trends in skilled arrivals continue.

Figure A2. 1 Stylised model flow diagram



Source: Oxford Economics Australia

Employment by industry & occupation pair

Occupation shares of industry employment are measured by the total number of jobs per 2-digit occupation within a 1-digit industry over the total number of jobs within each industry (ABS Census). For each industry occupation pair, the share of workers by occupation is forecast at trend growth.

Key assumptions: Census data includes the classifications "Inadequately described" and "Not stated" which include a share of persons employed within each industry. We assume that these workers are independent and identically distributed and do not skew to any occupations. We scale our occupation shares for each industry reallocate 'Inadequately described' and 'Not stated' workers.

Tertiary educated employment

For each industry occupation pair, the share of workers who have a higher education and VET qualification (ABS Census) is forecast at trend growth and capped at a saturation point.

Higher education and VET employment is calculated by multiplying forecasts of employment by the forecast share of higher educated/VET educated workers in each industry occupation pair. Tertiary educated employment is the sum of higher educated and VET employment.

Key assumptions: Tertiary educated employment will not reach 100% of jobs in any industry occupation pair but will reach some 'saturation point'.

Tertiary educated employment saturation points

The proportion of employed persons within an industry occupation pair with a higher education and VET qualification is capped at an estimated 'saturation point'. Saturation points are based on the skill level required to perform an occupation determined by the ABS. They are estimated in a two-stage process.

1. Skill level caps - Each 6-digit occupation is classified into a skill level from 1 to 5 by the ABS (1 the highest skilled, 5 the lowest). The 90th percentile value of current proportions of HE/VET educated labour by 6-digit occupation is chosen as the cap for that for each skill level from 1 to 5 (Figure A2. 2).
2. 2-digit occupation saturation points - The higher education and VET saturation point for each 2-digit occupation is then calculated as the weighted average of the skill level caps from the 6-digit occupation within that 2-digit occupation.

Key assumptions: Each skill level will not exceed the 90% percentile of weighted average higher education and VET qualifications within each 6-digit occupation. This assumption is tested in the sensitivity analysis.

Figure A2. 2 Estimated skill level caps

Skill level	VET skill level caps	Higher education skill level caps
1	32.8%	96.2%
2	60.7%	53.2%
3	75.9%	35.5%
4	46.7%	35.3%
5	37.1%	24.1%

Source: ABS, Oxford Economics Australia

Tertiary, HE & VET attainment targets

Attainment targets represent the share of the population that need to hold a qualification to meet labour market demand. They are calculated as the share of total employment that is tertiary/HE/VET educated.

Caution should be given to the higher education and VET targets as they implicitly include historic policy settings, student preferences and the labour market employing available – rather than optimal – workers.

Key assumptions: To ensure targets are reflective of the requirements of the total population we assume that people outside the labour force have the same likelihood of holding a qualification as those in the labour force.

Deaths & retirements triggering additional qualification demand

As tertiary educated workers die or retire they trigger an instance of additional qualification demand. Even if their role is filled by a worker with an existing tertiary qualification, a worker is required to fill their role and so on such that in aggregate the labor force requires an additional qualification.

The number of higher education and VET deaths and retirements is calculated by estimating the age profile of higher education and VET workers for each industry occupation pair and applying the

propensity for each worker to die or retire in a given year. Propensity for workers to retire is based on the ABS 'Retirement and Retirement Intentions, Australia, 2018-19' release.

Key assumptions: We assume that retirement intentions are the same across industry occupation pairs and don't change over the forecast period. We assume that the death rate for each age cohort does not differ by industry or occupation.

Skilled departures triggering additional qualification demand

Similar to deaths and retirements, departures of tertiary educated workers overseas triggers a need for an additional qualification. The number of tertiary educated migrant departures is calculated by multiplying total migrant departures by the higher education and VET educated share of employment by each industry occupation pair and the employment to population ratio.

Key assumptions: We assume that migrant departures have the same labour market characteristics as the Australian resident population.

Skilled arrivals satisfying additional qualification demand

As departures trigger a need for tertiary education, arrivals satisfy demand. Migrants entering Australia have higher rates of employment and are more likely to hold a higher education degree than the general population. Australian migration policy is largely demand-based, setting targets on permanent arrivals for those on skilled, family and humanitarian visas and allowing temporary arrivals to be determined by the level of labour market demand for certain occupations and skills. Therefore, new immigrants fill a significant proportion of Australia's labour market demand for additional tertiary qualifications each year.

The number of migrant arrivals satisfying additional qualification demand is modelled differently for citizens (Australia & NZ) and non-citizens. Citizen migrant arrivals are estimated to have the same labour market characteristics as the Australian resident population. Additional qualification demand satisfied by non-citizen arrivals is estimated by multiplying the number of non-citizen arrivals by the migrant employment rate and the migrant higher education and VET education rate (ABS Characteristics of recent migrants). We exclude students and visitors due to the limitations of their working rights.

Key assumptions: Non-citizen arrivals are assumed to have different labour market outcomes but are just as likely to enter an industry occupation pair as citizens. We assume there is not a change in the time it takes for migrants to find work overtime and therefore arrivals are employed within their first year. We are comfortable with this assumption because there are not significant cycles in the forecast.

Job changes triggering additional qualification demand

The number of job changes triggering demand for an additional qualification is calculated by estimating the number of job changes between industry occupation pairs (Australian Tax Office, Job movements between occupations) and the propensity for this change to require an additional tertiary qualification. The propensity for a job change to require an additional tertiary qualification is calculated as the difference in the proportion of HE/VET educated labour and the field of study mix between the exited and entered industry occupation pair (ABS, Job Mobility and Census). This is then adjusted for the extent to which qualifications are relevant to the current job (ABS, Qualifications and Employment). The proportion of movements in to, and out of, an industry is proportional to the size of the industry.

Key assumptions: We assume that the relevance of a qualification to a job is the same across all industry occupation pairs.

Employment & skills deepening triggering additional qualification demand

Additional qualification demand triggered purely by expansion in the workforce is modelled by assuming shares of tertiary employment by industry occupation pair remain the same as the year prior and calculating the change in the stock measure of tertiary employment. The additional qualifications demanded when the shares are allowed to grow between years reflects skills deepening.

There are additional cases when skills deepening triggers an instance of qualification demand which are not captured by changes in the stock measure. These are modelled as follows:

- Postgraduate attainment: The share of the labour market requiring a postgraduate degree was modelled for each industry occupation pair, at trend growth and capped at a saturation point. The demand for additional qualifications is then calculated as the difference between the amount of postgraduate educated labour each year.
- Additional VET degrees: The historic number of VET completions by someone who already holds a VET degree by industry occupations pair is trended over the forecast period based on their share of the total stock of VET in that industry occupation pair.
- Movement from VET to higher education as highest level of education: The proportion of the higher educated labour force that have previously completed a VET degree is estimated at 6% (ABS, Qualifications and Employment). This share is multiplied by the difference in higher educated labour each year to estimate the number of VET roles left vacant by someone transitioning from VET to higher education as their highest level of educational attainment.

Key assumptions: Postgraduate educated employment will not reach 100% of jobs in any industry occupation pair but will reach a ‘saturation point’.

Gross demand for additional qualifications

Gross demand for additional qualifications is the total number of additional qualifications required by the labour market each year. It is the sum of employment growth, skills deepening, deaths, retirements, skilled departures and job changes which trigger demand for an additional qualification.

Net demand for additional qualifications

Net demand represents the number of higher education qualifications required to satisfy labour market demand if trends in skilled arrivals continue. It is calculated as gross demand less skilled arrivals.

Tertiary, higher education & VET participation targets

Participation targets represent the share of the population that are required to complete a qualification each year to achieve the attainment target. They are calculated as gross demand for tertiary, higher education and VET over total employment.

The minimum participation targets reflect the minimum rate for the Australian population if trends in skilled arrivals continue. They are calculated as net demand for tertiary, higher education and VET over total employment.

Key assumptions: To ensure targets are reflective of the requirements of the total population we assume that people outside the labour force have the same likelihood of holding a qualification as those in the labour force.

25 to 34 year old attainment targets

To achieve the attainment target of the working age population requires higher attainment for younger cohorts relative to the working age population overall.

The 'BAU' attainment rate of 25 to 34 year olds is calculated by continuing trends in the current rates of attainment by age cohort (ABS, Detailed labour force) and the increase in attainment as cohorts 'age through' the workforce.

The additional qualifications required to meet the working age population attainment target is then calculated and applied to the 20 to 35 year old age cohorts. As the 20 to 35 year old cohorts age through the workforce, the attainment rate of the working age population overall increases to the attainment target.

Key assumptions: To model attainment targets for this cohort we have made the explicit assumption that the additional VET qualifications required to meet the VET attainment target are met through the 20 to 34 year old age cohort. This is in contrast to the current distribution of qualifications within the workforce.

Tertiary education supply

The objective of the tertiary education supply forecasts is to understand the gap between supply and demand if current trends continue. As a result, supply figures are not strictly forecasts but rather the continuation of current trends to assist in discussion and analysis.

Tertiary education supply is comprised of both domestic graduates and a share of international students who after graduating from the education provider are able to remain to work in Australia's labour market.

Commencement rates by age, student type and qualification level in a given year were calculated and continued based on current trends (Department of Education, NCVER).

Detailed completion rates were available for higher education but were not available at a sufficiently detailed level for VET. Higher education completions were calculated using trended completion rates, the share of students that commence studying in a certain year who will complete their studies in the next three to nine years. VET completions were calculated using trended completion ratios, the ratio of completions in a single year to commencements in that same year.

Whole of sector structural breaks were excluded from the trend calculations (the changes to VET fee structures in 2017/18 and the lower higher education commencements during the pandemic) but otherwise individual projections were not adjusted to deviate from their current trend.

International students are modelled as above and then adjusted to reflect only those that remain in Australia and are able to participate in the labour force. For higher education we apply the number of Temporary Graduate visas granted (subclass 485) within the Post-Study Work stream over the number of higher education completions (Department of Home Affairs). For VET we apply the number of international students who are employed in Australia 1 year after study (NCVER, Graduate Outcomes Survey).

Key assumptions: We assume that after 9 years no individual who commenced their higher education degree will complete it.

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