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Abstract

Education and training among the working-age population has become an increasingly important policy issue as working lives have lengthened and the pace of technological change has quickened. This paper describes the effects of a reform that replaced a supply-driven model, in which government selected the number and providers of publicly subsidised Vocational Education and Training (VET), with a demand-driven approach that broadened access to adult training and gave working-age individuals greater freedom of VET course choice. Difference-in-differences analysis reveals that the large-scale reform, which was introduced in the Australian state of Victoria from 2009, substantively increased participation in VET among the population aged 25-54, and corresponded with an improved match between VET courses taken and objective *ex ante* measures of labour market demand. Indeed, the scheme was so popular that it resulted in a budget over-run by 2012 of $400 million (AUD, on a total budget of $1.3 billion).

JEL classification: I22, I28, H31

Keywords: Adult education, voucher, entitlement, Vocational Education and Training (VET), demand-driven subsidy

1 Introduction

The last half century has seen a sustained re-balancing of OECD labour markets out of low-skill occupations. This general trend has renewed emphasis on the development and maintenance of workforce skills, and seen growing importance placed on life-long-learning (e.g. Field, 2000, OECD, 2007). At the heart of the challenge for policy makers is the problem of how to allocate public funding in a way that improves the responsiveness of the education sector to the changing skill needs of the labour market. This report adds to the existing evidence base by reporting estimated effects of a substantive increase in the scale and method of delivery of publicly subsidised Vocational Education and Training (VET) for working-age individuals in the Australian state of Victoria gradually implemented between 2009 and 2011.

The existing literature underscores the difficulties associated with the design of effective publicly subsidised adult vocational education and training programmes. Although there is broad agreement that basic skills are important determinants of labour market success, empirical studies generally report limited returns to adult basic skills programmes (e.g. survey by Vorhaus *et al*., 2011).[1] Furthermore, in contrast to the generally positive effects associated with job search assistance and employer training programmes, the evidence for positive labour market returns to public adult training programmes is less clear (e.g., the survey by Wößmann, 2008, and the meta-analysis by Card *et al*., 2010). In the Australian context, empirical estimates have generally found positive labour market returns, but these are restricted to higher qualification levels (Ryan 2002; Leigh 2008; Lee and Coelli 2010) or qualifications attained at higher than existing levels (Polidano and Ryan 2016).[2] The reliance on classroom teaching of VET in Anglo-Saxon countries has also been cited as a hurdle to meet the needs of rapidly evolving labour markets (e.g. DBIS, 2009, and US Department of Education, 2012).

Australia's response to the challenges of public provisions for VET, implemented as part of the 2008 *National Partnership Agreement on Skills Reform*, has sought to increase course participation, and enhance the responsiveness of the VET sector to the skills demanded by the domestic labour market.[3] These dual objectives were pursued by expanding entitlements to publicly subsidised education, and by replacing the traditional supply-driven funding model, with a demand-driven model based on vouchers in which public course funding is allocated to courses chosen by students.

[1] In contrast, basic skills program interventions for younger people are usually associated with positive effects; see, e.g. Carneiro and Heckman (2003) for the US, and Machin and McNally (2008) for the UK.

[2] These studies focus on VET qualifications in general, rather than those obtained only later in life.

[3] The need of reform and the objectives of VET reforms were first spelt out in the *National Agreement for Skills and Workforce Development* (NASWD) in November 2008.

Key premises underlying the Australian reforms are that expanding access to public subsidies will increase participation, and that given greater freedom of choice, people will pursue skills that are in demand by employers. The validity of both of these propositions was, however, *a priori* uncertain.

Although expanding entitlements relaxes caps on the number of publicly funded courses, there is no guarantee that people will take-up the opportunity to participate in VET. This possibility is exaggerated by the wide range of barriers that have been associated with the decision to take up education and training in later life (see e.g., the review by Thompson *et al*., 2005, and Wooden *et al*., 2001, for Australia). These barriers include both objective limitations to participation in a course of study – such as financial commitments, health limitations, access to support, and time constraints – and attitudinal barriers toward further education.

Furthermore, even if an increase in publicly subsidised education was observed following the reform, it is possible that the effect on the total number of student enrolments would be substantively undone by substitution out of privately funded fee-for-service tuition. This could be the case, for example, if disadvantaged groups – who in principle stood most to gain from the new entitlements – chose not to respond.[4] The likelihood of this possibility is supported by results, reported by Schwerdt *et al*. (2012), indicating that low-educated individuals were less likely to take-up adult training vouchers in Switzerland.[5]

The implications of the voucher scheme for the alignment between course choices and the domestic labour market are similarly opaque. It is possible to argue, for example, that governments are generally better informed concerning skill-shortages than are prospective students, and are therefore better equipped to tailor the VET sector to evolving labour market needs (e.g. Lavy, 2006; Jensen, 2010; OECD, 2010; Productivity Commission, 2012). This may be particularly true in relation to individuals from disadvantaged backgrounds, who tend to exhibit difficulties in accessing and assessing information when making education choices (Hastings and Weinstein, 2008). Students have also been found to focus on the consumption value of (further) education, as distinct from the labour market benefits of alternative qualifications (e.g. Oreopoulos and Salvanes, 2011).

In contrast, proponents of the voucher system argue that students have strong incentives to identify courses that are in their best interests, and are better placed to respond to 'local' labour market information. Individuals may also be less influenced by lobbying from special interest groups, regulatory capture, and inertia (OECD, 2010). The policy reform considered by this paper provides a context for evaluating these countervailing views.

We conduct a Difference-in-Differences analysis to test both of the propositions underlying the 2008 National reform agenda. Although VET provision in Australia is guided by a national reform

[4] Schwerdt *et al.* (2012) report that low-educated individuals were least likely to respond to an adult training voucher offered in Switzerland.

[5] An effect of this sort is also reported for school children following introduction of private school vouchers in the United States (Levin, 1991, Ladd, 2002).

agenda, an important feature of the system is that it is administered at the state (and territory) level. Over the period of analysis explored here (January 2006-June 2012), the state of Victoria pursued the national reform agenda more rapidly and expansively than other states by implementing the *Victorian Training Guarantee* (VTG). It is this inter-state variation of the policy environment that we exploit for empirical analysis.

The analysis explores the effects of the VTG on VET enrolments by individuals aged 25 to 54, which was fully implemented from January 2011. Individuals aged 55 and over are omitted from the sample frame, recognising that people closer to retirement age are likely to have different motivations for study.[6] In the Australian context, this is of interest because the Victorian reforms give a defensible precursor of the efficacy of the national reform agenda. In an international context, the reforms considered here provide a useful case-study for the effects of a substantial expansion in VET funding for adults, when coupled with a shift from a supply-driven to a demand-driven funding model.

McVicar and Polidano (2015) estimate the effects of the Victorian reforms to VET funding discussed above on individuals aged 15-19. They find that, as well as increasing enrolments between 2008 and 2011, the voucher in VET increased significantly the proportion of enrolments in courses associated with skill shortages and high expected earnings. It is unclear, however, whether effects of the VTG evaluated for young people will carry over to the working-age population. The current focus on 25 to 54-year-olds is further motivated by the relatively thin evidence concerning the training decisions of people beyond continuous education.

We are aware of two previous policy experiments involving adult training vouchers that have been explored in the literature. The first, reported by Hidalgo *et al.* (2014), was a randomised field experiment in which a voucher was offered to 600 workers drawn from four sectors with large shares of low-skilled male workers in the Netherlands for training taken in 2007 and 2008. These vouchers were worth 1000 EUR, and could be used for a course of study of the worker's choice, subject to the restriction that the tuition should contribute to improve their labour market position. The second, reported by Schwerdt *et al*. (2012), was also a randomised field experiment in which vouchers were offered to 2437 adults randomly drawn from the population aged 20 to 60. These vouchers were worth 200, 750, or 1500 CHF, and could be used for short courses in classroom-based VET in Switzerland, subject to the condition that the course commence within the first six months of 2006.

Overall, both Hidalgo *et al*. and Schwerdt *et al.* report that vouchers resulted in greater adult participation in training, but had no significant impact on earnings or employment. It is unclear, however, whether these results will carry over to the current context. In the study by Hidalgo *et al.* the population was deliberately limited to low-skilled workers. In the study by Schwerdt *et al*. the voucher was only redeemable for short (42 hours on average) adult education courses (including

[6] Older workers may also receive less support from employers to undertake VET; see, e.g., Taylor and Urwin (2001) for the UK, and Wooden *et al*. (2001) for Australia.

language, leisure and job-related courses) that were outside the formal post-compulsory education sector in Switzerland. Furthermore, both studies focus on limited randomised field experiments. In contrast, the reform considered in this study provided a voucher entitlement to a broad-range of VET study to the entire adult population in the Australian state of Victoria, with the explicit objective of improving efficiency of the domestic labour market.

Section 2 provides an overview of the policy context. Section 3 describes the empirical method and data considered for analysis. Results are presented in Section 4, and Section 5 concludes.

2 Policy Background

The Australian Vocational Education and Training (VET) system is administered by state and territory governments, and has been subject to a national reform strategy since the early-1990's.[7] The evolving Australian national strategy for VET provision is described by a series of formal agreements between state and federal governments, in which states agree to pursue a list of objectives in return for financial support from the federal government. The states are responsible for the delivery of the objectives over the time horizon of the respective agreement, usually with substantial latitude to pursue state-specific objectives.

The current focus of the national reform agenda was broadly articulated in the National Agreement for Skills and Workforce Development (NASWD), implemented from July 2009 and updated in 2012.[8] The current analysis explores the effects of Victorian reforms introduced as part of the NASWD, relative to contemporaneous policy implemented in other Australian states. We begin by describing the approach to public subsidies for VET that were employed throughout Australia prior to the NASWD. We then discuss how the objectives of the NASWD were implemented in Victoria, and the other Australian states up to June 2012.

2.1 National policy context prior to 2008

Despite the latitude given to states under the various national agreements concerning VET provision, prior to 2008 there was a high level of consistency between states in the basic policies, principles, and practices that were applied (Adams, 2005, p. 26). The VET funding model applicable throughout Australia prior to 2008 can be categorised as supply-driven, with caps on the number of publicly-subsidised places determined centrally on the basis of historical enrolments and government forecasts. Public funds were paid directly to selected (mostly public) VET providers. In the supply-driven system, students who enrolled in subsidised courses paid a fee that was based on an hourly rate,

[7] Growing recognition of skills deficiencies in the Australian labour market in the late 1980's to early 1990's, and high rates of youth unemployment (particularly during the 1990-91 recession), led to the establishment of the National Training Board (1990), the National Board of Employment Education and Training (1991), and the Australian National Training Authority (1994).

[8] Implemented as part of the Intergovernmental Agreement on Federal Financial Relations, superseded by the The National Partnership on Skills Reform, 13 April 2012.

subject to an annual cap on the maximum fee payable. Access to a publicly-funded course was predominantly based on a first-come-first-served basis, but with priority given to specific groups. For example, the Guaranteed Place in TAFE program that operated in Victoria until 2009, prioritised public subsidies for people aged 16-19 with secondary school or equivalent qualifications. Prospective students who missed out on a publicly-funded place could enrol in a full-fee paying (unsubsidised) VET course with a public or private provider.

Figure 1 reports historical data describing the participation of VET in Australia, and the prevalence of government funded courses. The participation figures are for the population aged 25 to 49, and the prevalence of government funded courses are for all VET students. The age groups considered for the two panels of Figure 1 reflect the data that are publicly available as part of NCVER's *Historical time series of vocational education and training in Australia*. Furthermore, statistics for the Australian state of New South Wales are reported separately in the figure, as New South Wales is the most natural sub-national comparator for Victoria.

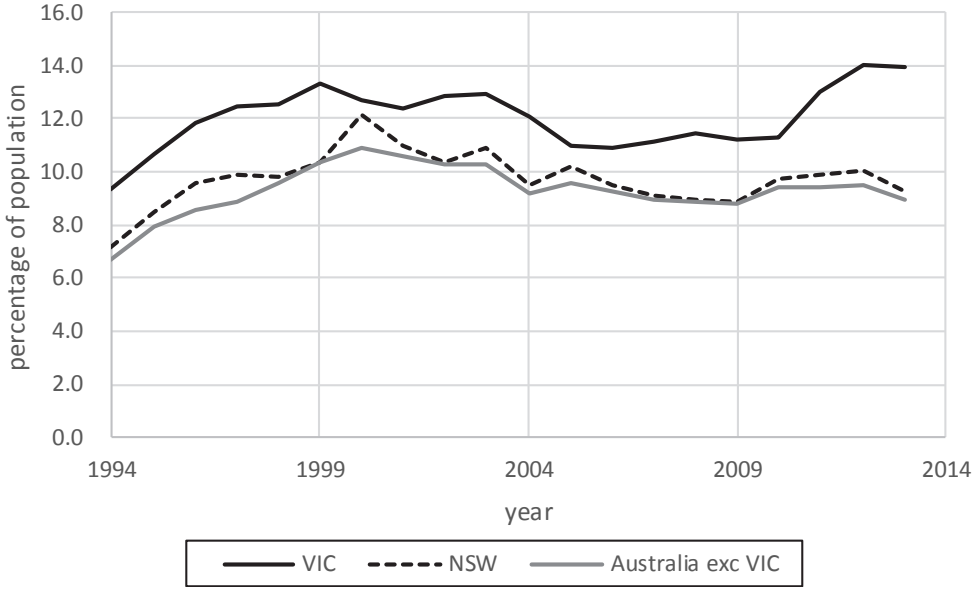
The top panel of the figure indicates that the participation of VET among the 25 to 49-year-old population displayed a similar trend in Victoria as in the remainder of Australia prior to 2009, rising from lows in 1994 to peak around 1999 before trending down toward 2009. Throughout this period, the participation of VET in Victoria was approximately 2 percentage points higher than in the remainder of Australia, averaging approximately 12 percent. It is of note that the most conspicuous departure of the series for Victoria, relative to the remainder of Australia is reported following 2009 – corresponding to the post-reform period – when the participation of VET spikes up by 3 percentage points.

The bottom panel of Figure 1 indicates the importance of public subsidies in the provision of VET in Australia. Throughout the sample period, the majority of VET students are reported to have been enrolled in a government subsidised course, although a substantively smaller share is generally reported for Victoria than the remainder of Australia. Remember that these figures also include students younger than 25.

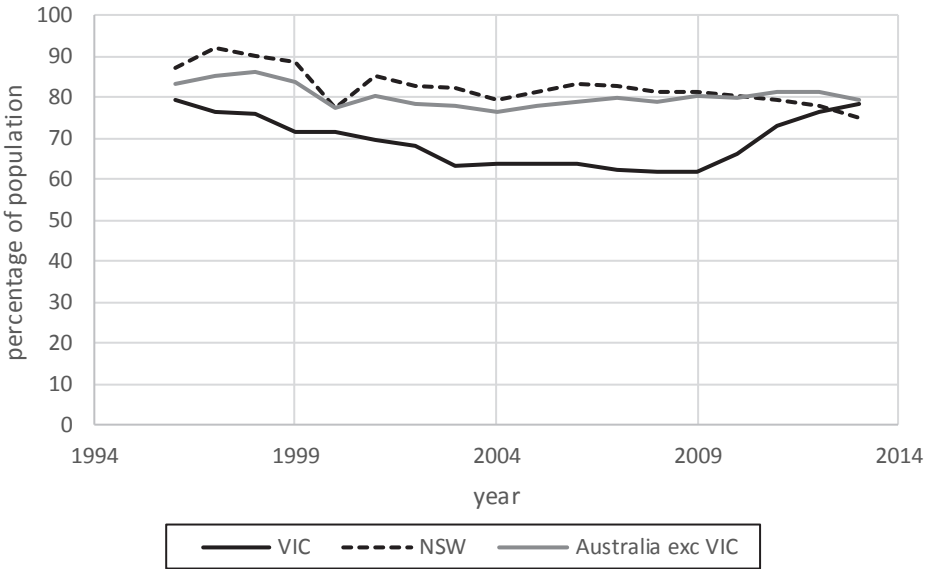
As for the participation statistics described in panel A, up until 2008 the shares of all VET students receiving a government subsidy display similar temporal variation in Victoria as in the remainder of Australia. Despite this similarity in trends, however, the degree to which the proportion of VET students in receipt of a public subsidy in Victoria understated those in the rest of Australia gradually increased throughout the reported period, from near parity in 1996 to 20 percentage points by 2008. Again, as for panel A, a sharp break is observable from 2009 for the Victorian series reported in panel B (the post-reform period), after which the proportion of VET students in receipt of a public subsidy in Victoria increased, both in absolute terms and relative to the rest of Australia. In the four years to 2012, the proportion of VET students in receipt of a public subsidy in Victoria closed to the nation average of 80 per cent.

Figure 1: Historical statistics for VET courses, by region and year

Panel A: Proportion of population aged 25 to 49 enrolled in VET



Panel B: Proportion of all VET students in publicly subsidised courses



Source: Authors' calculations using student numbers reported by Tables 3 and 10 of Historical time series of vocational education and training in Australia, NCVER, and population estimates reported in Tables 51 and 52 and 59 of ABS Cat. No. 3101.0 June 2016.

Note: Data do not include fee-for-service courses with private providers
Periods covered by graphs include all years for which comparable data were available at time of writing
Panel B reports data for all VET students, not only those aged 25-49, reflecting limitations of the publicly available data
Dip in NSW student numbers reported for 2004 due to problems with software compatibility associated with the introduction of new systems by many providers.

Comparative studies evaluating the Australian VET system in the wider international context up to 2008 generally came to favourable conclusions concerning the extent of national coordination, including the framework for awarding nationally recognised qualifications (e.g. Cully *et al*., 2009, European Training Foundation, 2012, Keating, 2008). Weaknesses identified for the system included

rigidities complicating the match between supply and demand for skills, and the limited role played by market principles in service delivery (see Bowman and McKenna, 2016, Section 3 for detailed discussion). These perceived limitations provided important motivation for the demand-driven reforms associated with the NASWD.

2.2 The Victorian Training Guarantee (VTG) for people aged 25-54

The objective to implement a demand-driven approach for the delivery of public subsidies for VET was most rigorously pursued in the Australian state of Victoria. In August 2008, the Victorian government announced the introduction of the Victorian Training Guarantee (VTG) to meet its commitments under the NASWD. The VTG provided Victorian residents with a new voucher entitlement to publicly subsidised VET. This reform had two key effects, relative to the traditional supply-driven funding model: it relaxed the caps on publicly subsidised VET courses; and it gave individuals far greater choice concerning their course provider (including with approved private sector providers).

For the population subgroup aged 25-54, the voucher entitlement was rolled out progressively between July 2009 and January 2011; see Table A.1 in Appendix A. The roadmap for reform, which was published by the Victorian government in August 2008 (DIIRD, 2008), indicated that the VTG would be introduced in two stages. The first stage, which ran between 2009 and 2010, involved trial introduction of the demand-driven funding model to selected employer sponsored students (Skills for Growth), and students for Diplomas and Advanced Diplomas (Skills for Life). This first stage concluded with a mid-term review published in October 2010, prior to universal roll-out of the programme in the second stage of the reform.

From January 2011, the VTG entitlement for 25 to 54-year-olds was provided to all permanent residents of Victoria seeking education to a higher level than any qualifications already held; referred to as the 'up-skilling requirement'. Exemptions to the up-skilling requirement included foundation courses (e.g. basic skills), courses undertaken as part of an apprenticeship, and courses undertaken by students with special circumstances (including asylum seekers, and people referred for training under the National Partnership for Single and Teenage Parents, VDEECD, 2012).

While the central changes introduced by the VTG were the uncapping of publicly funded places and the linking of funding to courses selected by students, the impacts estimated in this study may be attributable to more than these two factors. Other factors that may have contributed to observed variation include provider responses, in the form of enrolment inducements and variation of course fees. The VTG gave providers greater flexibility to compete on price within established caps on hourly rates and total course fees. Furthermore, the government increased fee caps for Diploma level courses to reflect the relatively high economic benefits to students associated with completing these courses. The effects of provider response are imperfectly controlled for by inclusion of provider type

and size as explanatory variables to the considered regression specifications. These issues are discussed further in Section 3.

2.3 National policy context between 2008 and 2012

An important feature of the discretion given to states as part of the NASWD concerns the timing of associated reforms; states were required only to maintain VET enrolments at average levels reported between 2005 and 2007, and were not subject to any formal deadline for implementing demand-driven reforms to public funding. Victoria was the first state to replace the traditional supply-driven model of public subsidies with a demand driven model, from July 2009. This was followed by South Australia in July 2012, Western Australia in January 2014, Queensland in July 2014, Tasmania in December 2014, and New South Wales in January 2015.

Importantly, during the period of analysis examined in this study – January 2006 to June 2012 – traditional supply-driven VET funding models remained in place in all states except Victoria.[9] Specifically, all states other than Victoria retained their overall caps on subsidised places, continued existing block funding of public providers, and limited publicly-funded places to priority areas. By comparing the Victorian experience against that of other states, it is consequently possible to consider the impact of the shift to a demand-driven approach, including the effects of un-capping subsidised places and giving individuals greater choice concerning course providers.

Although all Australian states other than Victoria retained their traditional supply-driven models for VET subsidies until at least July 2012, there is a question concerning whether expectations associated with the introduction of the demand-driven funding model may nevertheless have influenced VET course participation in other states in the period between 2008 and June 2012. We expect that, if there were such effects on VET participation outside of Victoria, then they were minor. This view stems from a number of observations. First, although the NASWD agreed in 2008 announced the intention to introduce a demand-driven approach to funding throughout Australia, all other aspects of the associated reform agenda – including the timing, scope, and method of introduction in each state – were unstated.

Secondly, the shift to a demand-driven model for VET subsidies was an experimental policy reform, and while the premises underlying the reform were known, no-one could foresee what effects it would have. The attention of other Australian states consequently focussed on the Victorian experience as a test case to identify appropriate terms for implementation of the policy. These two considerations introduced uncertainty that will have obscured whatever incentive effects for prospective students the demand-driven model for VET subsidies might otherwise have had prior to their introduction in each Australian state.

[9] Some national reforms were implemented between 2008 and 2012 that continued the traditional supply-driven model of VET subsidies (e.g. Noonan, 2016, p. 8); see Appendix A for a summary.

Thirdly, other state governments were critical of the relatively generous terms offered by the demand-driven entitlements introduced in Victoria. As a consequence, Victoria is the only Australian state to have introduced an entitlement in which the numbers of courses receiving public subsidy are uncapped. Other states have subsequently elected to raise student fees, and substantively restrict the qualifications eligible for subsidy, following introduction of demand-driven funding, which dampen the fundamental nature of the reform (see, e.g. NSWAO, 2015).

Finally, there is no evidence that VET participation outside of Victoria was delayed in anticipation of the demand-driven reforms during the period 2008 to 2012. Figure 1, for example, indicates that the proportions of the population aged 25 to 49 enrolled in VET outside of Victoria increased slightly between 2008 and the period 2009-2012.[10] The lower panel of Figure 1 also describes smooth trends in the proportion of VET courses outside Victoria receiving public subsidy throughout the period between 2004 and 2013. Furthermore, analysis of VET student characteristics (Table 2 below) indicates an increase in the incidence of low-income population subgroups between 2008 and 2012 in states outside of Victoria – including the young, lower educated, and unemployed. These population subgroups could be expected to be especially prone to delaying course take-up in anticipation of an expansion of public subsidies.

3 Data and Empirical Methods

This section begins by describing the data considered for analysis. The empirical methods employed, which were tailored to the available data, are then discussed.

3.1 Data sources

The analysis focuses upon data covering the period January 2006 to June 2012. The start date of this window is just under three years prior to the NASWD agreement. Data beyond June 2012 were not considered because the Victorian government subsequently scaled back the demand-driven nature of the VTG, partly in response to the substantive impact that the scheme was having on public finances. These new reforms, which included fee deregulation and additional limits on entitlements, are beyond the scope of the current study.

The considered survey data were drawn from several sources. The main data source is the individual student-level course enrolment data reported by the National VET Provider Collection (VETPC). Graduate wage data are drawn from the Student Outcomes Survey (SOS), and skill shortage information from lists published by the federal Department of Employment. Additional contextual detail is drawn from statistics reported by the Australian Bureau of Statistics (ABS).

[10] VET participation rates outside of Victoria increased by approximately 0.5 percentage points between 2008 and 2010, which is almost identical to the annual average year-on-year absolute variation in VET participation rates reported outside of Victoria for the period 1993-2008.

The National VET Provider Collection

The National VET Provider Collection (VETPC) is an administrative dataset of information reported by providers describing a wide set of variables covering course, college, and student specific characteristics. It is the most detailed data source of VET currently available for Australia, reporting on all publicly-funded VET course enrolments in Australia, including those with private VET providers. In addition to the universe of student enrolments in publicly funded courses, the dataset also describes fee-for-service courses delivered by public providers (Technical and Further Education, TAFE, and Adult and Community Education, ACE). Furthermore, some data are reported for fee-for-service courses delivered by private sector providers, although these institutions are under no formal obligation to do so.

Substitution of privately funded tuition for new public subsidies is an important issue of concern: Hildalgo *et al*. (2014), for example, project that almost 60% of workers taking up vouchers offered through the randomised control experiment administered in the Netherlands would have engaged in training in the absence of the voucher. The imperfect coverage of the VETPC of fee-for-service courses with private providers prevents us to conduct a detailed examination of this issue. Although there are no publicly available data that permit us to identify the scale of the omitted sample with precision, we can obtain a rough approximation. 16% of all publicly funded courses in 2008 were given by private providers, and 24% of all VET courses given by public providers in 2008 were fee-for-service.[11] Assuming that private and public VET providers deliver a similar share of their courses as fee-for-service (admittedly, a strong assumption) suggests that 4% of all VET courses provided in 2008 were fee-for-service with private providers.[12]

The sample that we consider consists of all new student enrolments among those aged 25 to 54 during the period of analysis, where student age is defined as at 1st January in the year of enrolment (determining VTG eligibility). A feature of VET is that students regularly enrol in more than one course within a year, including multiple courses at the same time. The analysis of VET enrolment rates focusses on the numbers of individuals commencing any course described by the VETPC, divided by the relevant population size as described by Census data. The analysis of VET course choice, in contrast, takes into consideration all of the course commencements described by the VETPC, so that a single individual may feature multiple times.

As well as a rich set of controls, an important feature of the VETPC for statistical purposes is that it reports detail for the entire population of a substantive component of the Australian education system. The size of the sample allows reasonably accurate statistics to be calculated for marginal population subgroups. In this study, the following disadvantaged groups are explored: individuals

[11] This calculation defines all TAFE, Adult Centres for Education and Universities as public providers, and all others (including industry RTOs and Private Colleges) as private providers.

[12] Using the same assumptions, 7.4% of all VET courses in 2012 were fee-for-service given by private providers, but this ignores the greater provisions for public subsidies to private providers under the VTG.

who did not complete secondary school and do not have any vocational equivalent qualification (Certificate III or above); the unemployed (out of work, but looking for work) at the time of course commencement; individuals living in low socio-economic (SES) areas (lowest 20% on the SEIFA[13] index of disadvantage); Aboriginal and Torres Strait Islanders (ATSI); and people from non-English speaking backgrounds who speak a language other than English at home. Other population subgroups considered in the study include women, people aged 45 to 54, and people living outside of an urban area. It is important to keep in mind that these sub-groups are not mutually exclusive; for example, someone living in a low SES area may also not have a secondary school qualification.

State level characteristics

The analysis of VET enrolments is disaggregated over a series of population specific characteristics. The characteristics that are included for analysis are presented in Table 1. These statistics provide some assurance that there were no major structural changes between 2006 and 2011 in Victoria that were not observed in the rest of Australia, which is important for the empirical analysis.

Table 1 reveals that the population share of most of the subgroups considered for analysis altered little between 2006 and 2011 (the years for which Census data are available, and which span the period of the considered policy reform). The most substantial variation is observed for education status, where the proportion of 25 to 54-year-olds reporting that they held a bachelor degree or above increased by five percentage points in Victoria and four percentage points in Australia, offset by a similar decline in the proportion of the population reporting none of the listed qualifications. The next most substantive shift is reported for the proportion of the population born in Australia, which increased by three percentage points in Victoria and four percentage points in the rest of Australia. Otherwise changes in the population characteristics reported in Table 1 are in the region of two percentage points or less.

A second notable feature revealed by Table 1 is the similarity of the distribution of population characteristics reported for Victoria and the remainder of Australia. Disparities of the population distribution in Victoria and the rest of Australia reported in the table are mostly less than one percentage point. The most important deviations are reported for the proportions of the respective populations living in rural locations, which are seven percentage points lower in Victoria than the national average. The basic similarities between the populations living in Victoria and the remainder of Australia are an *a priori* motivation for the use of the remainder of Australia as the basis for comparison in the analysis. We return to the assumed comparison population in Section 3.2.

[13] Socio-Economic Indexes for Areas, published by the ABS.

Table 1: Distribution of population aged 25 to 54 by geographic region and Census year (% except where otherwise stated)

	Victoria			Rest of Australia		
	2006	2011	diff	2006	2011	diff
Gender						
Male	49	49	0	49	49	0
Female	51	51	0	51	51	0
Age						
25-29	15	17	2	15	17	2
30-34	17	16	0	17	16	-1
35-39	18	17	-1	18	17	-1
40-44	17	17	0	18	17	0
45-49	17	16	-1	17	17	-1
50-54	15	16	0	16	16	0
Country of birth						
Australia	67	69	3	67	70	4
Foreign born	33	31	-3	33	30	-4
Indigenous status						
Indigenous	5	5	0	7	7	0
Non-indigenous	95	95	0	93	93	0
Place of residence						
Urban	95	96	1	88	89	0
Rural	5	4	-1	12	11	0
Highest previous education						
Bachelor and above	24	29	5	22	26	4
Advanced diploma / diploma	9	10	1	9	10	1
Certificate III & IV	16	17	1	17	18	1
Certificate I & II	1	1	0	1	1	0
Certificate nfd	2	2	0	2	2	0
Other	48	41	-7	50	43	-7
Has a disability	2	2	0	2	2	0
Labour force status						
Employed	78	80	2	78	79	2
Unemployed	3	3	0	4	3	0
Not in labour force	19	17	-2	19	18	-1
TOTAL ('000s)	2099	2164	65	8377	8619	242

Source: Authors' calculations using census data reported for 2006 and 2011, and employment status reported by Labour Force Survey, January 2006 and January 2011.
Estimates are subject to rounding error.

Analysis of course choices

The quality of a course choice extends over a broad set of dimensions, including private considerations of the students enrolled, their prospective employers, and the wider needs of the community. This study takes a relatively narrow perspective, focusing on the match between course choices and contemporaneous labour market demand. This focus was a key motivation underlying the reforms with

which we are concerned, and relates closely to an examination of the premise that students, if given the choice, will pursue skills that are in demand by the labour market.

The first metric that is considered is the proportion of course commencements that prepare students for occupations on the national annual skill shortage lists, identified at the time of enrolment. National skill shortage lists are constructed from employer interviews and skill forecasts and can be thought of as unmet demand for skills in the prevailing labour market. This measure is used because it is widely recognised, and a focus of interest of governments, education providers, and possibly prospective students.

National skill shortage occupations are reported at the 6-digit level of the Australian and New Zealand Standard Classification of Occupation (ANZSCO); see Appendix D for details. These are linked to courses using 4-digit ANZSCO codes reported for each course by the VETPC. Just over one third (37%) of all VET courses enrolments reported by the VETPC are not associated with an ANZSCO code, and these are consequently omitted from the analysis of national skill shortages. Foundation courses represent one important category of courses with no ANZSCO code, the implications of which are discussed in Section 4.

A number of factors make the national skill shortage lists an imperfect proxy for labour market demand, beyond the limitations of scope referred to above. Its binary nature means that the skill shortage lists cannot indicate the extent of any shortage. Absence from the list does not necessarily mean that a skill is not in shortage; rather, it may be that there was no information available concerning particular occupations at the time of publication. Furthermore, the national measure cannot identify regional differences in skill needs.

The analysis of course choices is consequently augmented to consider correlations with recent course graduate earnings, adjusted for student specific characteristics. The motivation for this analysis is that recent adjusted graduate earnings can be taken as a proxy for earnings expectations, if wages are not expected to change substantially during the period of study (typically 12-18 months), or if students are myopic. The term ‘myopic’ is intended here to describe the case where prospective students put more weight on prevailing labour market conditions, than conditional anticipated in the future. Such behaviour is supported by statistical evidence; see for example Ryoo and Rosen (2004).

The most recent data from the Student Outcome Survey (SOS) at the time of enrolment are used to estimate adjusted graduate earnings. The SOS is a large and nationally representative sample of VET graduates conducted in the year following course graduation (see http://www.ncver.edu.au/sos for more information). The sampling frame for the SOS is the population of VET graduates in the preceding year drawn from the VETPC dataset. The survey reports updated information for student characteristics and current labour market outcomes, including weekly earnings for those employed.

The wage returns to specific VET courses were estimated for individuals aged 25 to 54 who finished their course of study in the preceding year, using the following Mincer wage equation:

$$\ln(wage_{i,t}) = \Phi_{c,t} COURSE_{i,t-1} + \Psi_t INDIVIDUAL_{i,t} + v_{i,t} \quad (1)$$

where $wage_{i,t}$ denotes the weekly wage of individual i in year t, $COURSE_{i,t-1}$ is a vector of dummy variables describing courses of study completed in the preceding year, $INDIVIDUAL_{i,t}$ is a vector of student specific characteristics, capital Greek letters represent vectors of regression coefficients, and $v_{i,t}$ is a regression residual. $INDIVIDUAL_{i,t}$ describes a wide range of demographic, educational, and labour market characteristics, including age, gender, disability status, state of residency, identifiers for regional location (metropolitan, rural, and remote), self-reported English language proficiency, whether training is part of a traineeship or apprenticeship, prior education qualifications, labour force status prior to study, and full-time/part-time employment status.

The vector $COURSE_{i,t-1}$ is comprised of an indicator for whether the entire course of study was completed and 310 course-specific dummy variables, obtained by interacting 5 course-levels (certificate level I, II, III, IV and Diploma)[14] with 62 fields of study (based on 4-digit International Standard Classification of Education codes, including foundation courses).[15] The coefficients represented by $\Phi_{c,t}$ are interpreted as the average wage returns associated with each respective combination of level and field of VET study, conditional upon observed student controls, and on finding employment in the year after study. These returns are considered as dependent variables in the DiD analysis, as described below.

3.2 Empirical methodology

A Difference-in-Differences (DiD) analysis is used to explore the VET enrolment effects of the VTG (see Blundell and Costa Dias, 2009, for a review). The DiD empirical specification in the current context is represented by:

$$y_{i,t} = \alpha + \beta CONT_{i,t} + \theta Vic_{i,t} + \gamma Time_t + \delta Vic_{i,t}.Post_t + u_{i,t} \quad (2)$$

where $y_{i,t}$ denotes the considered enrolment metric of observation i at time t. In the analysis of enrolment rates, each observation is for a separate individual, and $y_{i,t}$ denotes the decision to commence a VET course. In the analysis of course choices, each observation is for a VET course undertaken, and $y_{i,t}$ is either an indicator of whether the course is on the national skill shortage list, or the respective estimated wage premium ($\Phi_{c,t}$, in equation 1). $CONT_{i,t}$ denotes a vector of observed variables included in the regression to control for explicit contemporaneous variation when evaluating the effects of the policy reform. We return to these controls below.

$Vic_{i,t}$ is a dummy variable taking the value 1 if the individual's enrolment was in Victoria and 0 otherwise. $Time_t$ denotes a vector of year specific dummy variables that account for common time

[14] The corresponding ISCED 1997 classifications are level 2C for certificate level I and II, 3C for certificate level 3, 4B for certificate level 4 and 5B for Diploma level courses (ABS, 2001).

[15] Of the SOS sample who report finishing their respective courses of study in the preceding between 2005 and 2011, 72% are identified as completing their course in Victoria and 70% in the rest of Australia.

trends (across states). $Post_t$ is a dummy variable taking the value 1 if the individual entered VET post-reform (January 2011 to June 2012). $u_{i,t}$ is a residual, and model parameters are represented with Greek letters. The parameter δ is commonly referred to as the treatment effect, and measures the change in Victorian outcomes from pre- to post-reform, over and above the coincident shifts observed in the respective control population. This coefficient is the focus of our interest, and is interpreted as the effect of the VTG, controlling for contemporaneous variation in the economic environment.

The control population selected for the analysis is all Australian states other than Victoria, which ensures that the results do not hinge on variation specific to any one state. As noted in Section 2.1, New South Wales is the most natural state-specific alternative to adopt as the control population for Victoria. Adopting New South Wales as the control population for analysis was found to have no substantive impact on results; see Appendix B for detail.

Analysis of enrolment rates

As discussed in Section 3.1, enrolment rates are evaluated by dividing aggregate numbers of student enrolments reported in the VETPC by associated population aggregates described by Census data. This approach, which is dictated by data availability, limits the analysis of enrolment rates to statistics that can be computed using simple cross-tabulations.

Analysis focuses on evaluation of marginal effects implied by equation (2), omitting individual specific controls $CONT_i$, separately for each population subgroup reported in Table 1.[16] Enrolment rates for analysis are evaluated over 12 month intervals to neutralise seasonal effects. The pre-reform period is the year to December 2008. The post-reform period is the year to June 2012 (as opposed to the calendar year), which was selected to mitigate the influence of potential behavioural inertia in responses to the VTG while avoiding inclusion of responses to reforms introduced after the VTG (from July 2012).

Standard deviations for the analysis of enrolment rates are approximated by the standard specification for proportions.[17] This is because both the VETPC and Census describe data for the full Australian population (full data sets for both censuses were accessed via TableBuilder Pro). The aggregates calculated using these data sources are therefore population statistics, and are not subject to the usual concerns associated with random sampling. Although the use of linear interpolations to approximate population numbers for 2008 and 2012 from Census data reported in 2006 and 2011 introduces some additional error to the enrolment rates considered for analysis, the limited historical

[16] In a probit regression of participation based on equation (2), which only accounts for whether an individual is in the pre-treatment (0) or post-treatment period (1), and whether the individual is a member of the control (C) or treatment (T) subgroups, the estimated marginal treatment effect can be evaluated as (pr(T,1) – pr(T,0) – (pr(C,1) – pr(C,0)), where pr(i,t) is the participation rate observed for population subgroup i in period t evaluated in a cross-tab.

[17] For any given proportion p, the variance is given by p(1-p).

population variation over the subgroups considered here (see Table 1) suggests that this error will be very small.

Analysis of course choice

The data considered for analysis of course choices permit consideration of a wide set of controls, represented by the vector $CONT_{i,t}$ in equation (2). All course choice regression specifications include a minimum set of variables as part of $CONT_{i,t}$. We begin by describing this default set of control variables, before discussing associated extensions.

Month specific dummy variables are included to allow for seasonal variation of enrolments. In Australia, VET enrolments generally peak in January/February (start of the school year in Australia) and in July (start of the second semester), although they can commence at any time throughout the year.

The *unemployment rate* from the student's statistical local area at their time of enrolment is included to account for the influence on VET of contemporaneous variation of local economic conditions at the postcode level.

An indicator variable is included that identifies students studying *interstate*, that is, outside of their state of residence. This indicator is included to control for the possibility that the Victorian reforms generated spill-over effects to other states. Specifically, it is possible that the additional generosity of the Victorian VET subsidies encouraged some prospective students living in other states to enrol in Victoria rather than in their state of residence. While the distances involved (given Australia's geography) are likely to have made such spill-over effects impractical for most of the population, failure to account for the possibility could distort the estimated treatment effects.

We recognise three potential channels through which the VTG may have influenced VET course choices: by providing the existing pool of VET students with greater freedom of choice; by altering the pool of VET students; and by altering the pool of VET course providers. We explore the influence of each of these channels, by considering the sensitivity of the estimated treatment effects to including student and provider characteristics in the set of considered controls. We interpret the component of the estimated treatment effect that is unexplained by these controls as a product of the greater flexibility of course choice afforded by the VTG. Note however, that this will only be true in-so-far as the controls that are included for analysis account for the alternative two channels noted here.

The set of *student specific controls* includes: gender; age expressed in five-year bands; indicators for migrant status and whether English is spoken at home; whether Aboriginal or Torres Strait Islanders (ATSI); five major ABS remoteness indicators assigned to the student's residential postcode (major city – very remote Australia); SEIFA quintiles of relative disadvantage for 2006 (pre-reform periods) and 2011 (post-reform periods) applied to the student's residential postcodes; employment status identifiers; and highest education level attained measured as less than Year 12 or vocational equivalent (Certificate III), Year 12 or vocational equivalent and tertiary qualification (Certificate IV

and above). The set of *provider specific controls* includes provider size (enrolment numbers within five bands), and type (TAFE, ACE, university, industry/professional body or non-government organisation, private business and other).

A key assumption of the standard DiD approach is that, in the absence of the VTG, course enrolments in Victoria would have followed the same post-reform trends as observed in the rest of Australia (the common trends assumption). Sensitivity of results to this assumption is explored by expanding the set of controls to accommodate state-specific time trends, following Angrist and Pischke (2009); for applications, see Mora and Reggio (2012), Jayachandran *et al.* (2010) and Groen and Polivka (2008). Empirical identification of divergent time trends is complicated by the limited time frame covered by the data, which starts in January 2006. Analysis of course choices consequently considers six alternative sets of assumptions, distinguishing between models with and without linear divergent trends, subject to three alternative end dates for the pre-reform period (2 x 3 = 6).

Recall from Section 2.2 that the VTG was rolled out progressively between 2009 and 2011. In the interval between July 2009 and December 2010, the VTG was made available only to selected subgroups of the population aged 25 to 54 and on a temporary basis, with the remainder of the population subject to the pre-reform supply-driven model for VET subsidies. The three alternative end dates considered for the pre-reform period are December 2008, December 2009, and December 2010, reflecting the limited nature of the roll-out of the VTG prior to January 2011. In all course choice regressions, the post-reform period is from January 2011 to June 2012.

Of the six alternative regression specifications considered for the course choice analysis, our preferred specification is the variant that accommodates linear divergent trends with the pre-reform period extending to December 2009. In our view, this specification strikes an appropriate balance between empirical identification of pre-reform divergent trends (a linear function estimated on four rather than three annual observations; 2006 to 2009), and mis-allocation of treatment effects. Although estimates reported in the main body of the paper are limited to our preferred specification, full results for the five alternative regression specifications are reported in Appendix B. Furthermore, the discussion in Section 4 explicitly notes wherever conclusions are sensitive to the considered empirical specification.

When estimating statistical significance, a common issue is correlation in the errors terms across observations (u_i), which can severely bias standard errors and resulting p-values. A concern here is that correlation in observations within a state, because of common institutional and policy settings, leads to standard errors that are grossly under-estimated (Bertrand *et al.*, 2004) thereby exaggerating the possibility of Type I errors. One approach taken in the current study to address this problem is via the evaluation of cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015). Nevertheless, Cameron and Miller (2015) suggest that a cluster sample size of 30-40 is required to obtain robust standard errors in context of inter-group correlations, and the current

analysis includes only 8 (one for each Australian state and territory). Sensitivity analysis has consequently also been undertaken by estimating p-values based on wild bootstrapped standard errors (1000 draws), which Cameron *et al*. (2008) show perform well when the group size is small. Results obtained were broadly insensitive to this difference in approach (see Appendix B for further details).

4 Empirical Results

The empirical analysis distinguishes between two key effects of the demand-driven approach to public subsidies for VET introduced by the VTG: the influence on participation rates, and the match of course choices with skills in demand. These two margins of effect are discussed in turn.

4.1 The influence of the VTG on VET enrolment rates

Table 2 summarises the unconditional DiD analysis (equation 2, omitting the vector $CONT_{i,t}$) of the effects of the VTG on participation in VET among the population aged 25 to 54 years. The analysis focuses on the incidence of enrolments reported during the 2008 calendar year, and in the 12 months between July 2011 and June 2012, excluding multiple enrolments by the same individual.

Enrolment rates for 25 to 54-year-olds evaluated for Victoria are reported on the left-hand-side of the table, adjacent to those for the rest of Australia (excluding Victoria). The right-most column reports the difference in the change in enrolment rates between 2008 and 2011/12 reported for Victoria, relative to the rest of Australia, or the unconditional difference-in-differences treatment effects.

The bottom row of Table 2 indicates that VET enrolment rates for 25 to 54-year-olds increased from 6.3% to 11.3% in Victoria, and from 4.9% to 5.8% in the rest of Australia. These statistics reflect those displayed in Panel A of Figure 1, but are smaller because the table excludes students who commenced their course in a previous year. Hence, the VET enrolment rate for 25 to 54-year-olds in Victoria, relative to the remainder of Australia, increased by 4.2 percentage points—or two-thirds of its 2008 value—following introduction of the VTG. Recall that this effect for Victoria controls for the coincident expansion in commonwealth government funding for VET to advance toward the NASWD's medium term VET enrolment objectives for 2020. It is consequently appropriate to interpret this unconditional treatment effect as the bearing that uncapping of public subsidies for VET courses had on study participation among 25 to 54-year-olds.

The substantive increase in VET participation following introduction of the VTG reflects associated results reported for adult training vouchers by Hidalgo *et al.* (2014) and Schwerdt *et al*. (2012). It is important to recognise, however, that whereas the studies by Hidalgo *et al*. and Schwerdt *et al.* applied to limited experimental populations, the current analysis refers to the entire population of an Australian state. In three years, the proportion of working-aged people commencing VET in Victoria almost doubled (increasing from 6.3 to 11.3 per cent), and went up by two thirds after taking into account coincident increases in VET enrolments in other Australian states. In absolute terms, the

numbers of students aged 25 to 54 enrolled in VET increased by 120,000 between 2008 and 2011, to 260,000. This response substantively exceeded government expectations for the reform. Prior to 2009, the Victorian budget of VET subsidies was approximately $800 million per annum. Although the reform was expected to increase this cost to $900 million per annum, the realised cost in 2011/12 stood at over $1.3 billion, at which time the government noted that the scale of the scheme had become 'unsustainable' (VDEECD, 2012).

The disaggregation of enrolment rates by individual characteristics describes some interesting variation. Statistics reported toward the top of the table indicate that VET enrolment rates for men and women were similar during the period of analysis; enrolment rates for men in Victoria increased by just under one percentage point more than they do for women, after adjusting for contemporaneous shifts reported for the rest of Australia (4.5 c.f. 3.8 percentage points).

Disaggregating VET enrolment rates by age group reveals that the rise reported for Victoria, relative to the rest of Australia, was concentrated toward individuals at the beginning of their working lifetimes. VET enrolment rates among individuals aged 25 to 29 increased between 2008 and 2011/12 by 5.1 percentage points more in Victoria than they did in the rest of Australia, compared with an increase of 3.3 percentage points among individuals aged 50 to 54. This interpretation of the data, however, ignores the fact that enrolment rates tend to decline with age. The proportional increase in enrolment rates estimated for Victoria, relative to the rest of Australia, tends to rise with age, from just under 60% for 25 to 29-year-olds, up to just under 80% for 50 to 54-year-olds. This is a somewhat surprising result, given the barriers commonly associated with VET among older people as discussed in the introduction (e.g., the review by Thompson *et al*., 2005).

The VTG therefore appears to have eroded the gap between the age groups reported here. This is consistent with the fact that a common set of reforms affected this entire population subgroup. It also suggests that up-skilling requirements imposed as part of the reforms did not disproportionately restrict VET participation of older workers. We return to discuss the influence of up-skilling requirements in the following subsection.

Australia has one of the highest proportions of foreign born residents of any OECD country.[18] Table 2 indicates that the enrolment rate in VET among foreign born residents exceeded the rate among the Australian born population by just over a fifth in Victoria in 2008, and by just over a quarter in the rest of Australia. These disparities widened between 2008 and 2011/12, in both Victoria and the rest of Australia. The last column of the table indicates that enrolment rates in VET increased by just over four percentage points between 2008 and 2011/12 among both natives and foreign born

[18] Data reported for 2011 by the OECD (the most recent series available) indicate that Australia had the third highest proportion of residents born overseas (26.6%), slightly behind Switzerland (27.3%), and more substantively behind Luxembourg (42.1%); Table A4. Stocks of foreign-born population in OECD countries and the Russian Federation, *International Migration Outlook 2013*, OECD.

residents in Victoria, relative to the rest of Australia. This is consistent with the fact that the VTG reforms omitted any explicit distinction by migrant status.

Statistics reported for the indigenous population (ATSI) represent outliers in Table 2. In particular, Table 2 shows a small increase in indigenous VET participation in Victoria following the VTG, which does not keep pace with the increase observed in the rest of Australia. One potential reason for the lack of response to the VTG among indigenous people in Victoria is that indigenous people had priority access to a publicly-funded place in VET prior to the reforms that are considered here. The results consequently suggest that these individuals were unconstrained by the funding caps imposed prior to the VTG reforms.

Statistics reported in Table 2 indicate that VET participation among 25 to 54-year-olds was higher for people living in rural areas compared to people living in urban areas. The higher rates of VET participation in rural areas may reflect differences in the rural and urban labour markets. Generally speaking, a higher proportion of the labour market is employed in non-professional occupations in rural areas, especially in primary industries, which rely more on skills developed through VET than they do on higher education.[19] In absolute terms, the VET enrolment rates appear to have increased between 2008 and 2011/12 by a slightly higher margin for populations living in rural relative to urban areas in Victoria, relative to the rest of Australia. However, the urban population appears to have responded more strongly to the VTG reforms, proportional to their enrolment rates in 2008.

The enrolment rates distinguished by highest level of previous qualifications indicate that most of the increase between 2008 and 2011/12 in Victoria, relative to the remainder of Australia, was concentrated among individuals with relatively low prior qualifications. This is in contrast to the study by Schwardt *et al.* (2012), who report that low-educated individuals were less likely to take-up adult training vouchers in the Swiss randomised control experiment.

Enrolment rates are reported to increase most strongly in Victoria among individuals with lower level Certificate I and II qualifications, rising by 12.7 percentage points, relative to the rest of Australia. The next largest effects on enrolment rates are reported for the 'other' education group, which includes individuals with no post-school qualification—and increased by 7.9 percentage points in Victoria, relative to the remainder of Australia. The only other group displaying a relative increase in enrolment rates in Victoria are individuals with Certificate III and IV qualifications, which increased by 6.7 percentage points relative to the rest of Australia. In contrast, enrolment rates in Victoria declined slightly, relative to the rest of Australia, among individuals with bachelor degrees or above. These shifts in emphasis by prior educational qualifications are consistent with the focus of the VTG on qualification up-skilling.

[19] Data from the Household Income and Labour Dynamics Australia survey suggests that 39% of employed people living in urban centres were employed in professional and managerial jobs compared to 28% of the working population outside of urban centres in 2013.

Table 2: VET course commencement rates among population aged 25 to 54, by year and population subgroup (%)

	Victoria			Rest of Australia[a]			DID[b]
	2008	2011/12	Change	2008	2011/12	Change	
Gender							
Male	6.4	12.0	5.5	4.5	5.4	1.0	4.5
Female	6.2	10.7	4.6	5.4	6.1	0.7	3.8
Age							
25-29	8.5	14.7	6.1	6.7	7.7	1.0	5.1
30-34	7.0	12.5	5.5	5.6	6.7	1.1	4.4
35-39	6.6	11.6	4.9	5.3	6.0	0.7	4.2
40-44	6.0	11.0	5.0	4.7	5.6	0.8	4.2
45-49	5.5	9.9	4.4	4.2	4.9	0.7	3.7
50-54	4.1	8.1	4.0	3.2	3.9	0.7	3.3
Country of birth							
Australia	5.9	10.5	4.7	4.5	5.0	0.5	4.2
Not Australia	7.2	13.2	6.0	5.8	7.6	1.8	4.2
Indigenous status							
Indigenous	2.0	2.7	0.7	3.8	5.5	1.7	-1.0
Non-indigenous	6.6	11.8	5.2	5.0	5.8	0.8	4.5
Place of residence							
Urban	6.2	11.1	4.9	4.7	5.4	0.8	4.2
Rural	9.4	16.6	7.3	6.7	8.0	1.4	5.9
Highest previous education							
Bachelor and above	2.7	2.6	-0.1	2.4	3.0	0.6	-0.7
Adv. diploma/diploma	5.3	6.4	1.1	4.3	5.5	1.2	-0.1
Certificate III & IV	6.1	14.5	8.4	4.9	6.7	1.7	6.7
Certificate I & II	11.6	25.6	14.0	9.5	10.8	1.3	12.7
Certificate nfd	3.0	4.3	1.3	2.1	3.3	1.2	0.1
No post-secondary quals.	8.7	17.4	8.7	6.3	7.0	0.8	7.9
Has a disability[c]	24.0	40.3	16.3	15.9	20.3	4.4	11.9
Labour force status							
Employed	4.4	9.1	4.7	3.6	4.0	0.4	4.4
Unemployed	36.8	81.1	44.3	28.6	36.6	8.0	36.3
Not in labour force	10.0	9.5	-0.5	7.3	8.1	0.8	-1.3
TOTAL	6.3	11.3	5.0	4.9	5.8	0.8	4.2

Source: Authors' calculations. Enrolment numbers evaluated from VETPC micro-data, for the 2008 calendar year, and July 2011 to June 2012. Population aggregates evaluated using Census data reported in 2006 and 2011, and labour force status reported in January 2008 and January 2011 waves of the Labour Force Survey.

Notes: Population aggregates for 2008 and 2011/12 approximated by assuming linear interpolations from Census data. [a] Rest of Australia is data for the whole of Australia excluding data from Victoria. [b] DID is unconditional difference-in-differences, or differences in the change in Victoria and the change in the rest of Australia. [c] Disability identified in the VETPC as positive responses to the question “Do you consider yourself to have a disability, impairment or long-term condition?” Disability identified in the Census as positive responses to the question "Has need for assistance with core activities".

The questions used to impute disability status differ between the VETPC and Census. The statistics reported in Table 2 for the disability subgroup should consequently be interpreted as approximate only. Nevertheless, the DiD statistics reported for this subgroup are substantial,

indicating a 12% increase in VET enrolment rates in Victoria, relative to the rest of Australia associated with the VTG. While this treatment effect is clearly important, it should not be over-emphasised; the disabled subgroup (as defined for analysis) comprise 2 percent of the population sample.

Effects distinguished by labour status are also striking. For all three labour subgroups, the statistics reported for 2008 indicate higher rates of VET enrolments among individuals aged 25 to 54 in Victoria than in the rest of Australia. The largest differences between Victoria and the rest of Australia reported for 2008 are for the unemployed, where the proportion of individuals enrolled in VET in Victoria is just under 37%, relative to 29% for the rest of Australia. Although VET enrolment rates among the unemployed in the rest of Australia increased by eight percentage points from 2008 to 2011/12, this was a fraction of the associated increase observed for Victoria during the same period, so that the difference between Victoria and the rest of Australia widened by 36 percentage points. In 2011/12, just over 4 out of every 5 unemployed Victorians aged 25 to 54 were reported to be enrolled in a VET course.[20]

In contrast to results reported for the unemployed, the participation response for employed people is more subdued. Results reported for employed individuals indicate a relative increase in VET enrolment rates in Victoria, relative to the rest of Australia, which—at 4.4%—is similar to the wider population (4.2% on average). The large estimated increase in VET participation among unemployed people is consistent with the strong response of people with low qualification levels (less than Certificate III) and suggests that people who stand to benefit most from improved employment opportunities are the ones who most readily take advantage of increased access to VET. The large increase in unemployed VET participation is also likely to be driven by improved access to foundation courses afforded under the VTG, especially general skills training courses that aim to improve employability. We estimate that the VTG is associated with a 13 percentage point increase in foundation course enrolments among the unemployed (see Appendix C for further details).

The existing empirical literature generally reports weak economic benefits associated with active labour market policies (e.g. Card *et al*., 2010, and Kluve, 2010). It also highlights the importance of prior learning as a facilitator of labour returns to adult vocational education and training (e.g. Carneiro *et al.*, 2010). The strength of the increase in VET participation that we identify among the unemployed and people with low education qualifications consequently raises questions about the VTG's ability to improve the match between the VET sector and labour market needs. This was one of the concerns of the Victorian government in its review of the VTG, which motivated subsequent

[20] This result is due to large changes in the number of people in VET in Victoria who report being unemployed in the VETPC collection and not due to changes in the number of unemployed in Victoria from Census. Over this period there were also no changes in the way unemployed was identified in the VETPC that may have biased the results. Unemployed in the VETPC is defined as not currently in work, but seeking full-time or part-time work.

reforms to VET both in Victoria and other Australian states (e.g. VDEECD, 2012, NSWAO, 2015). The data necessary to explore the influence that the VTG had on the match between course choices and labour market needs has recently become available via the VETPC, and we turn to explore that issue below.

4.2 Alignment of course choice with skill demands

Unconditional and conditional difference-in-differences results for course choice are presented in Tables 3 and 4 respectively. As discussed in Section 3.1, analysis focuses on the alignment of course choices with the National Skill Shortages Lists, and with expected returns as described by a wage regression. Unlike the analysis of student enrolment rates presented above, the course choice estimates reported in this section are based on all publicly-funded VET enrolments, including multiple enrolments by the same student. Table 4 extends the analysis reported in Table 3 by adding controls for potential compositional changes in the student body and provider characteristics to the regression specifications. Results in both Tables 3 and 4 control for national trends in course choice, regional economic trends, seasonal factors, and changes in (across the border) interstate study. The main results of interest are the estimated treatment effects highlighted in bold. The other coefficients reported in Tables 3 and 4 describe the annual national variation in the outcome measures relative to 2008, and the effect of Victoria-specific factors that are unchanged over the period (Vic), such as differences in courses offered in Victoria.

Recall from Section 3.2 that the pre-reform data of our preferred regression specification are from January 2006 to December 2009, and the post-reform data are from January 2011 to June 2012. These data permit alternative assumptions to be accommodated concerning the underlying time trends of the dependent variables. Three alternative assumptions concerning time trends are reported in the Table 3: no time trend, separate linear time trends in Victoria and all other states, and state specific linear time trends. Specifications that consider December 2008 and December 2010 as the end of the pre-treatment period are reported in Appendix B.

If the standard DiD assumption of common time trends in Victoria and the rest of Australia was supported by the data, then estimated treatment effects would not be significantly different between the sets of columns 2 and 3, and 4 and 5 in Table 3. The results reported in the table consequently reject this hypothesis.[21] In contrast, results reported in the table indicate that relaxing the assumption of common time trends in all states other than Victoria had no significant impact on estimated

[21] More formally, we test diverging trends by estimating equation (2) except we replace $Post_i$ with year dummies $Year_i$ for 2007, 2008 and 2009 (2006 is the baseline) on the pre-reform period. We estimate that the growth in skill shortage enrolments in 2007, 2008 and 2009 (relative to 2006) are 8 percentage points, 4 percentage points and 4 percentage points higher in Victoria than in the rest of Australia. In contrast, the estimated growth in expected returns from enrolments in Victoria is 5%, 3% and 4% *less* than in the rest of over the same time frame. The diverging trends in Victoria relative to the rest of Australia are significant for both outcomes, as measured by the joint significance (at the 1% level) of the $Year_i$xVic dummies from a Wald test.

treatment effects (columns 4 and 5 c.f. columns 6 and 7). These observations broadly reflect the time variation across geographic regions reported for VET participation and public subsidies discussed in Section 2.1 (see Figure 1).

The results reported in Table 3 motivate our focus in the remainder of this section on regression specifications that accommodate state-specific time trends, bearing in mind the lack of sensitivity to the more restrictive assumption of common linear trends between states outside of Victoria (e.g. Mora and Reggio, 2012). Nevertheless, estimates based on the alternative assumption of common time trends are reported in Appendix B for completeness. As the results in Table 3 suggest, estimated treatment effects obtained using alternative time trend assumptions vary in intensity, but describe consistent overarching conclusions regarding the bearing of the VTG on the match between course choices and labour market demand.

Table 3: Estimated marginal effects of the VTG on course choice outcomes for ages 25-54, January 2011-June 2012, unconditional difference-in-differences estimation with and without time trends

	No time trends		**Linear time trends Victoria vs all other states**		**Linear time trends state-specific**	
	National skill shortage	Expected returns	National skill shortage	Expected returns	National skill shortage	Expected returns
common time dummies[a]						
2006	-0.024	0.046***	-0.02	0.040***	-0.033***	0.061***
	(0.015)	(0.009)	(0.015)	(0.005)	(0.009)	(0.004)
2007	-0.051**	-0.082***	-0.049**	-0.085***	-0.055***	-0.075***
	(0.016)	(0.005)	(0.018)	(0.007)	(0.014)	(0.008)
2009	0.020***	0.009	0.018***	0.013*	0.024***	0.003
	(0.003)	(0.006)	(0.003)	(0.005)	(0.005)	(0.003)
2011	-0.056***	0.024***	-0.055**	0.021***	-0.037	-0.01
	(0.016)	(0.002)	(0.017)	(0.003)	(0.031)	(0.007)
2012	-0.041***	-0.052***	-0.042***	-0.051***	-0.018	-0.091***
	(0.012)	(0.006)	(0.011)	(0.006)	(0.030)	(0.006)
Vic	-0.036***	0.014***	-0.052***	0.040***	-0.059***	0.036***
	(0.005)	(0.001)	(0.011)	(0.007)	(0.011)	(0.004)
Vic*Post	**0.066*** **	**-0.004**	**0.044**	**0.036*** **	**0.044**	**0.037*** **
	(0.009)	**(0.005)**	**(0.026)**	**(0.008)**	**(0.026)**	**(0.008)**
R-squared	0.015	0.048	0.015	0.048	0.015	0.049

Notes: *a*: reference year is 2008. Pre-treatment period from January 2006 to December 2009. All models are estimated with SLA unemployment rates, and dummies describing month and year of enrolment, and indicators where the state of residence is different to the state of study. Results unconditional in sense that they do not include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 1696867 observations for "national skill shortage" regressions, and 2631412 for expected returns regressions

The right-most two columns of Table 3 indicate that, for the population aged 25 to 54, the demand-driven reforms introduced by the VTG are associated with course choice changes that significantly increased the expected earnings at graduation, by 3.7 per cent in the post-reform period (January 2011 to June 2012). Furthermore, although the estimated treatment effect on enrolments in skill shortage areas is not statistically significant, the point estimate suggests a rise of 4.4 percentage points.

These results are highly consistent with the magnitude of results reported for 15 to 19-year-olds in McVicar and Polidano (2015) under linear time trend assumptions. Specifically, McVicar and Polidano (2015) report significant positive effects for 15 to 19-year-olds between 2010 and 2012 for both measures — 3.3 percent increase in expected wage and 4.7 percentage point increase in the proportion of enrolments in skill shortage areas. The insignificant skill shortage effect estimated in this study may reflects the greater variability in the use of skill shortage information among 25-54 (relative to 15 to 19-year-olds), possibly because they may be motivated by a wider range of factors, such as finding higher paid work.

The results reported in Section 4.1 indicate that there was a very substantial shift in the rates of participation in VET during our period of analysis, and substantive shifts in Victoria relative to the rest of Australia following introduction of the VTG. This suggests that important shifts may have also occurred in the characteristics of the VET student population. Furthermore, the VTG was explicitly designed to encourage greater involvement of the private sector in the provision of VET. The influence of each of these factors on the results reported in Table 3 were explored by adding controls in the regression specification for changes in the composition of students and providers. Results from this analysis are reported in Table 4.

Table 4 indicates that including additional controls for student and provider composition had no statistically significant impact on estimated treatment effects of the VTG for individuals aged 25 to 54. This result suggests that any improvement in course alignment with labour market needs reported in Table 3 can be predominantly attributed to the increased freedom of student choice under the demand-driven reforms introduced by the VTG. The result is in contrast with estimates reported for 15 to 19-year-olds by McVicar and Polidano (2015); in that analysis, including controls for course providers (weakly) increased the estimated improvement in alignment between VET courses and national skills shortage lists. This disparity in results may indicate that people of working-age were less likely than 15 to 19-year-olds to be swayed by increased availability of privately-run courses with high consumption value, but low labour market benefit, which were later cited by the Victorian government as a reason for the subsequent refocussing of the VTG reform (VDEECD, 2012).

Table 4: Estimated marginal effects of the VTG on course choice outcomes for ages 25-54, January 2011-June 2012, difference-in-differences estimation with state-specific time trends

	Unconditional		**With student controls**		**With student and provider controls**	
	National skill shortage	Expected returns	National skill shortage	Expected returns	National skill shortage	Expected returns
common time dummies[a]						
2006	-0.033***	0.061***	-0.033**	0.060***	-0.032**	0.060***
	(0.009)	(0.004)	(0.010)	(0.004)	(0.011)	(0.004)
2007	-0.055***	-0.075***	-0.054***	-0.076***	-0.054***	-0.076***
	(0.014)	(0.008)	(0.014)	(0.008)	(0.014)	(0.008)
2009	0.024***	0.003	0.021**	0.004	0.022***	0.004
	(0.005)	(0.003)	(0.006)	(0.003)	(0.005)	(0.004)
2011	-0.037	-0.01	-0.04	-0.009	-0.039	-0.008
	(0.031)	(0.007)	(0.032)	(0.008)	(0.029)	(0.008)
2012	-0.018	-0.091***	-0.024	-0.088***	-0.024	-0.087***
	(0.030)	(0.006)	(0.032)	(0.008)	(0.028)	(0.008)
Vic	-0.059***	0.036***	-0.056***	0.036***	-0.064***	0.036***
	(0.011)	(0.004)	(0.009)	(0.004)	(0.006)	(0.004)
VicxPost	**0.044**	**0.037*** **	**0.043**	**0.036*** **	**0.049***	**0.038*** **
	(0.026)	**(0.008)**	**(0.025)**	**(0.009)**	**(0.022)**	**(0.009)**
N	1696867	2631412	1688994	2619664	1687846	2617586
R-squared	0.018	0.044	0.034	0.061	0.042	0.061

Notes: *a*: reference year is 2008. Pre-treatment period from January 2006 to December 2009. All models are estimated with SLA unemployment rates, and dummies describing month and year of enrolment, and indicators where the state of residence is different to the state of study. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes.

Analysis of individual courses of VET study did not reveal any clear subset of the system that was responsible for the estimated improvement in the match to labour market needs in Victoria following the VTG (see Appendix C for further details). Nevertheless, key features defining the VTG do appear to have had an important influence on VET participation in Victoria in the post-reform period, with relatively strong increases in enrolments in foundation courses (7%) and apprenticeships/traineeships (5%) that were not subject to the upskilling requirement, and in the proportion of 25 to 54-year-olds enrolling at a higher-level qualification than originally held (19%).

Effects by student subgroup

The analysis of population aggregate effects may mask important differences between the effects that the VTG had on alternative population subgroups. Estimates that permit the effects of the VTG to vary between population subgroups are consequently reported in Table 5. The empirical specifications

reported in Table 5 extend the specification that is reported in Table 4, which includes student and provider controls, by interacting all explanatory variables with a dummy identifier for the respective population subgroup. These controls are included here to focus on the influence of the VTG on student course choices, as distinct from any influence that the reform had on the composition of VET students and providers. Nevertheless, as above, including student and provider controls had little impact on estimated treatment effects on course choices.

Working through the columns in Table 5 from left to right, the second column reports the (marginal) treatment effects of the VTG on members of the subgroup that is listed in the left-most column. The fourth column of the table reports effects for all members of the sample population who were not identified in the considered population subgroup. For example, the population not in the subgroup aged 25-34 years reported in the table, includes all individuals aged 35-54. The sixth column of Table 5 reports differences in the estimated marginal effects of the VTG between the subgroup members and non-members.[22] The seventh column reports the subgroup size, which is useful for interpreting the importance of the respective effects in influencing the population average effects discussed previously in this subsection. The final column reports measures of fit.

Of the 44 estimated sub-group specific treatment effects reported in Table 5, none are significantly less than zero, and 35 are significantly greater than zero at the 90% confidence interval.[23] Furthermore, 12 of the 22 difference statistics that are reported in Table 5 are not statistically significant at the 95% confidence interval. These results underscore the broad-based nature of the improvement in the match been VET courses and labour market needs observed following introduction of the VTG.

Among the "non-disadvantaged" population subgroups reported toward the top of the table, statistically significant differences indicate that the improvement in the match between VET courses and metrics of labour market demand were larger among younger people, men, and urban dwellers, than in the wider population. In all of these cases, significant differences between population subgroups are reported for the proportion of courses associated with national skill shortages. This suggests that the lack of significance of the population aggregate effects reported in Table 4 for the match between VET courses and national skill shortage lists is partly attributable to heterogeneity of effects across population subgroups. Focussing on estimated treatment effects of people aged 25 to 34,

[22] Subgroup dummy variables are interacted with all other explanatory variables considered for analysis, so that subgroup specific time-trends are accommodated by the analysis. An implication is that the weighted sums of the estimated treatment effects between pair-wise population subgroups reported in Table 5 do not match up precisely with the population aggregate effects reported in the right-most columns of Table 4. Nevertheless, the weighted sum of the subgroup specific treatment effects reported in Table 5 all differ from the respective aggregate effect reported in Table 4 by less than a single standard deviation of the estimates reported in Table 4.

[23] Of the 220 estimated treatment effects estimated for the five alternative regression specifications that are reported in Tables B.5 to B.9 of Appendix B, 7 are significantly less than zero at the 90% confidence interval, of which 2 are significant at the 99% confidence interval. All 7 of these estimates are for expected (earnings) returns, based on specifications that assume common time trends. Furthermore, 6 of these 7 treatment effects were estimated for the specification that extends the pre-treatment period to December 2008 (Table B.6).

men, and urban population subgroups, for example, results reported in Table 5 indicate that the proportion of VET courses associated with national skills shortage lists increased (highly) significantly following the VTG, offset by weak point estimates for effects among counter-party population subgroups (none of which are significantly different from zero).

Estimates reported in the bottom panel indicate that most of the treatment effects for disadvantaged population subgroups are not statistically different from those for the wider population (95% confidence interval). Of the four statistics identified as being significantly different for disadvantaged subgroups, one shows a more substantial improvement in the match between VET courses and labour market demand (skill shortage lists for people from non-English speaking backgrounds), and the remaining three show a smaller improvement (skill shortage lists for both disabled and lower educated, and expected returns for aboriginal and Torres Strait Islanders).

One important feature underlying the positive treatment effects reported here is the empirical specification considered for analysis. As reported in Table 3, assuming common time trends across states in place of linear divergent trends reduces estimated treatment effects for expected returns, and increases positive treatment effects in terms of skill shortage lists. This shift appears to be amplified when the end date considered for the pre-treatment period is December 2008, in which case the estimated treatment effects for expected returns become negative for some population subgroups (see Tables B.2 and B.6 of Appendix B), while estimated positive effects for skill shortage lists are generally increased.

Despite this sensitivity, the results reported here are striking, especially when contrasted with the general finding in the literature that labour returns to publicly subsidised training are not statistically significant (e.g. Schwerdt *et al*., 2012, Hidalgo, *et al*., 2014 for adult training vouchers, and Wößmann, 2008, Leigh, 2008 on subsidies in general). In the case of the unemployed, for example, our results contrast with previous studies that report marginal returns to active labour market programmes. Similarly, the positive effects that we report for individuals without secondary qualifications contrast with the related literature that highlights the difficulties involved in delivering adult basic skill courses associated with positive labour market returns (e.g. the review by Ananiadou *et al*., 2004).[24]

[24] It is important to bear in mind that there may be benefits to basic skill courses that extend beyond the limited scope of the labour market that is considered here. Basic skills have been associated with a wide range of benefits, including supporting social inclusion and active citizenship, improved health behaviours, life satisfaction, and intergenerational effects by supporting parents to participate in the learning activities of their children (e.g., Learning and Work Institute, 2016).

Table 5: Estimated marginal effects of the VTG on course choice outcomes across various student groups for ages 25-54, conditional difference-in-differences estimation with time trends

group	members		non-members		difference		no. of members	R-squared
Aged 25-34								
National skill shortage	0.092***	(0.025)	0.021	(0.022)	0.071***	(0.011)	674613	0.046
Expected returns	0.041***	(0.008)	0.036***	(0.009)	0.005	(0.003)	1055285	0.063
Aged 35-44								
National skill shortage	0.033	(0.022)	0.058**	(0.022)	-0.025***	(0.004)	591214	0.043
Expected returns	0.037***	(0.009)	0.038***	(0.009)	-0.002	(0.001)	916855	0.061
Aged 45-54								
National skill shortage	0.004	(0.023)	0.064**	(0.023)	-0.061***	(0.010)	341942	0.044
Expected returns	0.035**	(0.010)	0.039***	(0.008)	-0.004	(0.003)	534113	0.063
Female								
National skill shortage	0.004	(0.017)	0.099***	(0.023)	-0.095***	(0.014)	715748	0.062
Expected returns	0.035***	(0.009)	0.039***	(0.009)	-0.003	(0.003)	1133834	0.066
Rural								
National skill shortage	-0.001	(0.032)	0.077***	(0.020)	-0.078**	(0.024)	528875	0.047
Expected returns	0.022**	(0.009)	0.047***	(0.009)	-0.024***	(0.005)	826262	0.063
Disadvantaged groups								
Unemployed								
National skill shortage	0.038***	(0.010)	0.049*	(0.024)	-0.011	(0.014)	431211	0.048
Expected returns	0.045***	(0.009)	0.033**	(0.011)	0.012	(0.012)	778999	0.067
Without secondary qualification or equivalent								
National skill shortage	0.009	(0.030)	0.075**	(0.022)	-0.066***	(0.009)	701139	0.045
Expected returns	0.033**	(0.011)	0.042***	(0.008)	-0.009	(0.009)	1140275	0.064
Aboriginal or Torres Strait Islander (indigenous)								
National skill shortage	0.074***	(0.014)	0.051*	(0.023)	0.023*	(0.012)	80538	0.043
Expected returns	0.009	(0.017)	0.041***	(0.008)	-0.032**	(0.012)	134396	0.062
Has a disability								
National skill shortage	0.025	(0.019)	0.051*	(0.022)	-0.026**	(0.008)	106372	0.043
Expected returns	0.026**	(0.011)	0.039***	(0.009)	-0.012	(0.008)	192707	0.063
Live in a low SES area								
National skill shortage	0.054**	(0.016)	0.053*	(0.024)	0.002	(0.024)	172550	0.043
Expected returns	0.032**	(0.012)	0.040***	(0.008)	-0.008	(0.007)	275608	0.062
Non-English speaking background								
National skill shortage	0.127***	(0.022)	0.028	(0.025)	0.099**	(0.031)	284089	0.048
Expected returns	0.051***	(0.010)	0.033**	(0.010)	0.019	(0.012)	536848	0.065

Notes: Pre-treatment period from January 2006 to December 2009. All models are estimated with SLA unemployment rates, dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 1687846 observations for "national skill shortage" regressions, and 2617586 for expected returns regressions

As discussed previously, individuals with non-English speaking backgrounds feature prominently in the VET student populations considered here. Approximately half of all VET students from non-English speaking backgrounds were identified as unemployed in our sample, just over 30% were reported to have no secondary qualification or equivalent, and 16% were reported to be both unemployed and with no prior education qualifications. It is consequently of note that the estimated treatment effect of the VTG on the match between course choice and the skills shortage lists reported for individuals with "non-English speaking backgrounds" stands-out at over 10 percentage points. In contrast, the point estimate of the associated coefficient reported for the remainder of the population is almost identical to zero.

These results suggest one potential explanation for the positive treatment effects estimated for the VTG on the match between course choices and measures of labour market demand. In context of Victoria, the VET system may play an important role in integrating immigrants into the domestic labour market, which is of particular importance given the scale of Australia's migratory intake.[25]

Another potential explanation for the positive effects reported here is the scale of the considered reform, which is in stark contrast to the modest scale of most adult basic skill programme interventions considered in the literature (e.g. review by Carneiro, *et al.*, 2010). The VTG provided the entire population of Victoria with an entitlement to a publicly subsided foundation level VET course. The scale of this reform may have off-set limiting factors (e.g. information access, social stigma) associated with smaller targeted schemes.

Alternatively, the broad-based nature of the positive treatment effects of the VTG on the match between course choice and labour market demand reported here could be attributable to the current focus on hypothetical returns. Whereas the current study considers the match between course choices and observable metrics of labour market demand at the time of enrolment, the literature more commonly focusses upon labour income following course completion. Whether the positive expected wage returns identified here did materialise following graduation remains an issue for further research. Nevertheless, the results reported here are important, indicating that people aged 25 to 54 did generally choose courses that were associated with higher expected wage returns than they had previously, and that courses chosen by some population subgroups displayed closer alignment with national skill shortage lists. Put another way, the shift in VET course choices of working-age people following the VTG was *ex ante* rationalizable from an economic perspective, which is an important result, whatever the *ex post* impact on earnings turns out to be.

[25] Note, however, that the treatment effects on expected returns estimated for people from non-English speaking backgrounds are significantly less than zero when common trends are assumed and the pre-treatment period extends to either December 2008 or December 2009 (Tables B.5 and B.6).

5 Conclusions

Australian state and commonwealth governments announced in 2008 their intention to replace long-standing supply-driven models for publicly subsidised Vocational Education and Training by a demand-driven approach based upon voucher entitlements that would give individuals greater freedom over their training decisions. Key assumptions underlying this reform were that the demand-driven approach to public subsidies for VET would encourage people to engage more in training, and to choose courses that were better aligned with the skill needs of the labour market. This study tests these propositions, focussing on responses of the working-age population to the introduction of the Victorian Training Guarantee (VTG), which was implemented between July 2009 and January 2011.

The VTG un-capped the courses eligible for public subsidy, and gave individuals greater freedom over course provider (including with approved private sector providers). This reform stands-out, in that it was introduced well before, and was more generous than associated reforms introduced in other Australian states. The analysis is undertaken using a Difference-in-Differences (DiD) approach, which compares changes in VET enrolments observed pre- and post-reform in Victoria against associated observations reported for other Australian states. Results obtained suggest that the VTG was successful in both encouraging greater VET participation among the population aged 25 to 54, and promoting a closer correspondence between the courses taken and two metrics of labour market demand.

We find that between 2008 and 2011/12, the annual rate of VET participation in Victoria among working-age people increased by five percentage points (from 6.3% to 11.3%) in absolute terms, and by 4.2 percentage points relative to other Australian states and territories. Bearing in mind that the analysis does not control for substitution out of fee-for-service tuition with private sector providers (for whom no data are publicly available), this represents a two-thirds increase in the VET participation rate among individuals aged 25 to 54 following the VTG reform.

Importantly, the increase in participation in VET reported for 25 to 54-year-olds associated with introduction of the VTG entitlement was observed across a broad range of population subgroups. Particularly pronounced increases in participation were observed among unemployed people (36 percentage points), people with a disability (12 percentage points), and people with at most low-level (Certificate I & II) VET qualifications (13 percentage points). In contrast, introduction of the entitlement is not associated with any increase in VET participation among higher educated individuals, people not in the labour force, and Aboriginal and Torres Strait Islanders (ATSIs). In the case of the higher educated, this reflects the requirement placed on the entitlement that training be for a higher qualification. In the case of ATSIs, the muted response to the VTG is consistent with the preferential access to publicly subsidised VET courses that that population subgroup enjoyed prior to the reform.

Furthermore, empirical estimates obtained indicate that reforms introduced as part of the VTG resulted in a closer match between VET courses chosen by 25 to 54-year-olds, and two measures of labour market demand. On the basis of our preferred empirical specification, we find that changes in the course mix associated with the entitlement resulted in an increase of 3.7 percent in expected graduate earnings. Although the estimated aggregate effect on alignment with national skill shortage lists is not statistically significant, this masks substantial improvements estimated for some population subgroups, including for men, urban dwellers, people with more than secondary education, and people from non-English speaking backgrounds.

In common with the participation effects, we find that the improvement in the match between course choices and metrics of labour market demand associated with the VTG were observed across a broad cross-section of the population aged 25 to 54. Importantly, this includes disadvantaged population subgroups, who are often found to face disproportionate hurdles in relation to information access and associated processing.

The findings from this study consequently support the conjecture that giving working-age people freedom of choice concerning subsidised VET can result in positive outcomes, in terms of both take-up and correspondence with *ex ante* labour market needs. Our results in this regard are consistent with the proposition that people of working-age, including those from disadvantaged backgrounds, will seek-out VET courses with good labour market prospects when given a degree of choice.

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Appendix A. Australian Reforms to VET, 2008 to 2012

The Australian state of Victoria was party to all reforms reported in Table A.1, other than the National Partnership Agreement on Productivity Places Program (NPAPPP), which commenced on 1 January 2009 and concluded June 2012. This scheme involved a commitment to deliver an extra 400 000 additional training places for qualifications of national priority, defined by prevailing skill shortages and emerging skill needs. Around 130 000 places were allocated to job seekers and 270 000 to existing workers. Victoria was the only Australian state not party to the NPAPPP, as it negotiated a separate agreement to receive its share of the NPAPPP funding without the attendant conditions imposed on other states. This separate agreement was made possible by the uncapping of subsidised VET places in Victoria due to introduction of the VTG.

Table A.1: Major VET policy reforms implemented in Australia, 2008-2012

start date	end date	reform name	VIC	AUST	age band	labour limitations	courses affected	Places limited
Jan-09	Jun-12	NPAPP (1)		*	15+	Job seekers and employed	Up-skilling and foundation	Yes
Jul-09	Dec-11	Compact with Retrenched Workers	*	*	25+	Retrenched workers	All	Yes
Jul-09	Jan-11	VTG Skills for Growth	*		20+	Employees with SMEs	Up-skilling and foundation	No
Jul-09	Jan-11	VTG Skills for Life	*		20+	All	Up-skilling for diplomas and above	No
Jul-09	on-going	VET FEE-HELP	*	*	All	All	Diploma and above	Yes
Jul-09	on-going	Employment Pathway Fund	*	*	All	Job seekers	All	Yes
Jan-10	Jan-11	VTG with Retrenched Workers	*		25+	Retrenched workers	Up-skilling and foundation	No
Jan-11	on-going	VTG extension	*		20+	All	Up-skilling and foundation	No
Jul-12	on-going	Refocussing VET	*		All	All	Up-skilling and foundation	No

(1) National Partnership Agreement on Productivity Places

(2) Upskilling limited to Certificate II+ for job seekers and III+ for employees, in areas with skill shortages

(3) Entitlements and eligibility depend upon post-school qualifications obtained, and are subject to annual caps imposed. See text for details.

VTG: Victorian Training Guarantee; VIC: Victoria; AUST: Australia, excluding Victoria

Appendix B. Sensitivity Test Results

The empirical methodology in this study is based on a number of key assumptions. This Appendix reports results obtained on alternative assumptions to those reported in the main body of the paper.

Table B.1 replicates statistics for VET participation reported in Table 2 of Section 4.1, substituting New South Wales in place of the remainder of Australia for the unconditional DiD analysis.

The remainder of the tables reported in this appendix describe sensitivity of the course choice analysis that is reported in Section 4.2 of the paper. Tables B.2 and B.3 replicate results presented in Table 3 describing the influence of the assumptions of common and state-specific time trends on estimated treatment effects. These tables describe sensitivity of results to alternative assumptions regarding the end date considered for the pre-reform period, and the assumption of NSW as an alternative to the remainder of Australia as a control population for Victoria.

Table B.4 replicates results presented in Table 4 describing the effects of including student and provider controls on estimated treatment effects. This table indicates sensitivity of results to the end date considered for the pre-reform period.

Tables B.5 to B.9 replicate results presented in Table 5 describing population heterogeneity of estimated treatment effects. These tables describe sensitivity of results to alternative assumptions regarding common and linear-divergent state specific trends, and the end date considered for the pre-reform period.

Table B.1: VET course commencement rates among population aged 25 to 54, by year and population subgroup (%)

	Victoria			New South Wales			DID[b]
	2008	2011/12	Change	2008	2011/12	Change	
Gender							
Male	6.4	12.0	5.5	3.7	4.2	0.5	5.0
Female	6.2	10.7	4.6	5.0	6.2	1.2	3.4
Age							
25-29	8.5	14.7	6.1	6.0	6.7	0.6	5.5
30-34	7.0	12.5	5.5	4.9	5.8	0.9	4.6
35-39	6.6	11.6	4.9	4.6	5.4	0.9	4.1
40-44	6.0	11.0	5.0	4.2	5.1	0.9	4.1
45-49	5.5	9.9	4.4	3.7	4.5	0.8	3.6
50-54	4.1	8.1	4.0	2.8	3.6	0.9	3.1
Country of birth							
Australia	5.9	10.5	4.7	3.7	4.6	0.9	3.8
Not Australia	7.2	13.2	6.0	5.4	6.4	0.9	5.0
Indigenous status							
Indigenous	2.0	2.7	0.7	3.1	4.1	1.0	-0.3
Non-indigenous	6.6	11.8	5.2	4.4	5.3	0.8	4.4
Place of residence							
Urban	6.2	11.1	4.9	4.2	5.0	0.8	4.1
Rural	9.4	16.6	7.3	6.4	7.5	1.2	6.1
Highest previous education							
Bachelor and above	2.7	2.6	-0.1	2.5	3.4	0.9	-1.0
Adv. diploma/diploma	5.3	6.4	1.1	4.5	6.1	1.5	-0.5
Certificate III & IV	6.1	14.5	8.4	5.5	7.6	2.1	6.3
Certificate I & II	11.6	25.6	14.0	11.7	12.1	0.4	13.6
Certificate nfd	3.0	4.3	1.3	2.4	2.9	0.5	0.8
No post-secondary quals.	8.7	17.4	8.7	4.8	5.0	0.3	8.4
Has a disability[c]	24.0	40.3	16.3	17.1	21.4	4.4	11.9
Labour force status							
Employed	4.4	9.1	4.7	3.2	3.9	0.7	4.0
Unemployed	36.8	81.1	44.3	30.4	41.4	11.0	33.3
Not in labour force	10.0	9.5	-0.5	5.1	4.5	-0.6	0.1
TOTAL	6.3	11.3	5.0	4.3	5.2	0.8	4.2

Source: Authors' calculations. Enrolment numbers evaluated from VETPC micro-data, for the 2008 calendar year, and July 2011 to June 2012. Population aggregates evaluated using Census data reported in 2006 and 2011, and labour force status reported in January 2008 and January 2011 waves of the Labour Force Survey.

Notes: Population aggregates for 2008 and 2011/12 approximated by assuming linear interpolations from Census data.
[b] DID is unconditional difference-in-differences, or differences in the change in Victoria and the change in NSW.
[c] Disability identified in the VETPC as positive responses to the question “Do you consider yourself to have a disability, impairment or long-term condition?” Disability identified in the Census as positive responses to the question "Has need for assistance with core activities".

Table B.2: Estimated marginal effects of the VTG on course choice outcomes for ages 25-54 under alternative modelling assumptions, conditional difference-in-differences estimation

Model	Common trends		Linear divergent		Common trends		Linear divergent		Common trends		Linear divergent	
Pre-treatment to	Dec, 2009 (omit 2010)		Dec, 2009 (omit 2010)		Dec, 2008 (omit 2009-10)		Dec, 2008 (omit 2009-10)		Dec, 2010		Dec, 2010	
Effect	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings
2006	-0.026	0.046***	-0.032**	0.060***	-0.025	0.045***	-0.039***	0.063***	-0.026	0.045***	-0.043***	0.059***
	(0.014)	(0.010)	(0.011)	(0.004)	(0.014)	(0.010)	(0.010)	(0.003)	(0.014)	(0.010)	(0.008)	(0.005)
2007	-0.051**	-0.084***	-0.054***	-0.076***	-0.051**	-0.084***	-0.057***	-0.075***	-0.051**	-0.084***	-0.060**	-0.077***
	(0.016)	(0.005)	(0.014)	(0.008)	(0.015)	(0.005)	(0.014)	(0.008)	(0.016)	(0.005)	(0.017)	(0.008)
2009	0.019***	0.011*	0.022***	0.004	-	-	-	-	0.019***	0.01	0.028***	0.004
	(0.004)	(0.006)	(0.005)	(0.004)	-	-	-	-	(0.004)	(0.006)	(0.004)	(0.004)
2010	-	-	-	-	-	-	-	-	-0.055**	-0.027**	-0.037**	-0.040***
	-	-	-	-	-	-	-	-	(0.018)	(0.008)	(0.014)	(0.003)
2011	-0.052***	0.027***	-0.039	-0.008	-0.053***	0.027***	-0.02	-0.017	-0.049**	0.024***	-0.01	-0.006
	(0.015)	(0.002)	(0.029)	(0.008)	(0.014)	(0.002)	(0.033)	(0.012)	(0.014)	(0.003)	(0.016)	(0.010)
2012	-0.039***	-0.047***	-0.024	-0.087***	-0.039***	-0.045***	-0.001	-0.096***	-0.037***	-0.051***	0.01	-0.086***
	(0.011)	(0.005)	(0.028)	(0.008)	(0.010)	(0.005)	(0.031)	(0.008)	(0.010)	(0.005)	(0.013)	(0.009)
Vic	-0.038***	0.012***	-0.064***	0.036***	-0.040***	0.016***	-0.075***	0.040***	-0.025***	0.011***	-0.081***	0.036***
	(0.008)	(0.001)	(0.006)	(0.004)	(0.008)	(0.002)	(0.007)	(0.004)	(0.007)	(0.002)	(0.003)	(0.004)
VicxPost	**0.064*** **	**-0.003**	**0.049***	**0.038*** **	**0.063*** **	**-0.007**	**0.022**	**0.050*** **	**0.051*** **	**0.003**	**0.011**	**0.035** **
	(0.008)	**(0.005)**	**(0.022)**	**(0.009)**	**(0.007)**	**(0.005)**	**(0.026)**	**(0.010)**	**(0.005)**	**(0.003)**	**(0.007)**	**(0.010)**
N	1687836	2617586	1687836	2617586	1373442	2162518	1373442	2162518	2027704	3119136	2027704	3119136
R-squared	0.042	0.06	0.042	0.061	0.038	0.068	0.038	0.069	0.036	0.05	0.038	0.050

Notes: "NSS": National Skill Shortage effects; "Earnings": expected earnings effects. All models are estimated with SLA unemployment rates, and dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Pre-treatment period from January 2006. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Standard errors are in round brackets.

Table B.3: Estimated marginal effects of the VTG on course choice outcomes for ages 25-54 under alternative modelling assumptions, conditional difference-in-differences estimation; NSW as the control population

Model	Common trends		Linear divergent		Common trends		Linear divergent		Common trends		Linear divergent	
Pre-treatment to	Dec, 2008		Dec, 2008		Dec, 2009		Dec, 2009		Dec, 2010		Dec, 2010	
Effect	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings
2006	-0.027	0.054	-0.046	0.064*	-0.027	0.054	-0.043	0.064*	-0.027	0.054	-0.046	0.06
	(0.034)	(0.017)	(0.017)	(0.007)	(0.034)	(0.017)	(0.020)	(0.007)	(0.034)	(0.017)	(0.016)	(0.011)
2007	-0.028*	-0.087*	-0.038	-0.082	-0.028*	-0.087*	-0.036	-0.082	-0.028*	-0.088*	-0.038	-0.085*
	(0.004)	(0.010)	(0.012)	(0.015)	(0.004)	(0.010)	(0.011)	(0.015)	(0.004)	(0.010)	(0.012)	(0.013)
2009	-	-	-	-	0.016	0.011	0.024*	0.007	0.016	0.01	0.025	0.008
	-	-	-	-	(0.005)	(0.007)	(0.002)	(0.002)	(0.004)	(0.007)	(0.004)	(0.004)
2010	-	-	-	-	-	-	-	-	-0.04	-0.038**	-0.022	-0.043*
	-	-	-	-	-	-	-	-	(0.022)	(0.002)	(0.004)	(0.005)
2011	-0.052*	0.029**	0.023	-0.013	-0.049**	0.026*	0.008	-0.013	-0.043**	0.025*	0.019	0.004
	(0.006)	(0.001)	(0.019)	(0.012)	(0.003)	(0.002)	(0.012)	(0.008)	(0.003)	(0.003)	(0.012)	(0.004)
2012	-0.045	-0.046*	0.038	-0.091**	-0.042*	-0.050**	0.021	-0.093**	-0.035*	-0.054*	0.035*	-0.077*
	(0.008)	(0.007)	(0.009)	(0.002)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.007)
Vic	-0.039*	0.017**	-0.083*	0.039**	-0.033*	0.012**	-0.079*	0.040***	-0.020*	0.013***	-0.086*	0.034***
	(0.004)	(0.001)	(0.012)	(0.002)	(0.004)	(0.000)	(0.011)	(0.000)	(0.003)	(0.000)	(0.011)	(0.000)
VicxPost	**0.076****	**-0.004*****	**-0.011**	**0.045***	**0.071****	**0.003****	**0.009**	**0.046*****	**0.056***	**0.003*****	**-0.008**	**0.025****
	(0.002)	**(0.000)**	**(0.016)**	**(0.006)**	**(0.005)**	**(0.000)**	**(0.015)**	**(0.000)**	**(0.005)**	**(0.000)**	**(0.013)**	**(0.001)**
N	786714	1259673	786714	1259673	964868	1513402	964868	1513402	1156766	1793961	1156766	1793961
R-squared	0.038	0.067	0.038	0.068	0.038	0.059	0.039	0.06	0.034	0.048	0.035	0.048

Notes: "NSS": National Skill Shortage effects; "Earnings": expected earnings effects. All models are estimated with SLA unemployment rates, and dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Pre-treatment period from January 2006. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Standard errors are in round brackets.

Table B.4: Estimated marginal effects of the VTG on course choice outcomes for ages 25-54, difference-in-differences estimations with state-specific time trends

Controls:	Omitted		Included		Omitted		Included		Omitted		Included	
Pre-treatment to	Dec, 2009		Dec, 2009		Dec, 2008		Dec, 2008		Dec, 2010		Dec, 2010	
Effect	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings	NSS	Earnings
2006	-0.033***	0.061***	-0.032**	0.060***	-0.040***	0.063***	-0.039***	0.063***	-0.046***	0.060***	-0.043***	0.059***
	(0.009)	(0.004)	(0.011)	(0.004)	(0.008)	(0.003)	(0.010)	(0.003)	(0.007)	(0.005)	(0.008)	(0.005)
2007	-0.055***	-0.075***	-0.054***	-0.076***	-0.058***	-0.073***	-0.057***	-0.075***	-0.062**	-0.075***	-0.060**	-0.077***
	(0.014)	(0.008)	(0.014)	(0.008)	(0.014)	(0.008)	(0.014)	(0.008)	(0.018)	(0.008)	(0.017)	(0.008)
2009	0.024***	0.003	0.022***	0.004	-	-	-	-	0.030***	0.003	0.028***	0.004
	(0.005)	(0.003)	(0.005)	(0.004)	-	-	-	-	(0.004)	(0.004)	(0.004)	(0.004)
2010	-	-	-	-	-	-	-	-	-0.005	-0.01	-0.037**	-0.040***
	-	-	-	-	-	-	-	-	(0.017)	(0.011)	(0.014)	(0.003)
2011	-0.037	-0.01	-0.039	-0.008	-0.019	-0.02	-0.02	-0.017	0.019	-0.093***	-0.01	-0.006
	(0.031)	(0.007)	(0.029)	(0.008)	(0.035)	(0.011)	(0.033)	(0.012)	(0.015)	(0.008)	(0.016)	(0.010)
2012	-0.018	-0.091***	-0.024	-0.087***	0.003	-0.102***	-0.001	-0.096***	-0.080***	0.036***	0.01	-0.086***
	(0.030)	(0.006)	(0.028)	(0.008)	(0.034)	(0.008)	(0.031)	(0.008)	(0.004)	(0.004)	(0.013)	(0.009)
Vic	-0.059***	0.036***	-0.064***	0.036***	-0.071***	0.040***	-0.075***	0.040***	-0.033**	-0.044***	-0.081***	0.036***
	(0.011)	(0.004)	(0.006)	(0.004)	(0.011)	(0.003)	(0.007)	(0.004)	(0.014)	(0.004)	(0.003)	(0.004)
VicxPost	**0.044**	**0.037*** **	**0.049***	**0.038*** **	**0.018**	**0.049*** **	**0.022**	**0.050*** **	**0.003**	**0.037*** **	**0.011**	**0.035** **
	(0.026)	**(0.008)**	**(0.022)**	**(0.009)**	**(0.030)**	**(0.009)**	**(0.026)**	**(0.010)**	**(0.010)**	**(0.010)**	**(0.007)**	**(0.010)**
N	1696867	2631412	1687836	2617586	1380765	2174137	1373442	2162518	2038626	3135510	2027704	3119136
R-squared	0.018	0.044	0.042	0.061	0.015	0.049	0.038	0.069	0.017	0.033	0.038	0.05

Notes: "Controls" refer to descriptive variables for student and provider characteristics. "NSS": National Skill Shortage effects; "Earnings": expected earnings effects. All models are estimated with SLA unemployment rates, and dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, state-specific and linear time trends. Pre-treatment period from January 2006. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Standard errors are in round brackets.

Table B.5: Estimated marginal effects of the VTG on course choice outcomes across various student groups for ages 25-54, conditional difference-in-differences estimation without time trends and pre-treatment period to Dec 2009

group	members		non-members		difference		R-squared
Aged 25-34							
National skill shortage	0.067***	(0.010)	0.061***	(0.007)	0.006	(0.006)	0.045
Expected returns	0.002	(0.005)	-0.006	(0.004)	0.008***	(0.002)	0.062
Aged 35-44							
National skill shortage	0.063***	(0.007)	0.064***	(0.008)	-0.002	(0.003)	0.042
Expected returns	-0.006	(0.005)	-0.001	(0.005)	-0.004***	(0.001)	0.06
Aged 45-54							
National skill shortage	0.06***	(0.007)	0.065***	(0.008)	-0.004	(0.005)	0.043
Expected returns	-0.006	(0.003)	-0.001	(0.005)	-0.005**	(0.002)	0.062
Female							
National skill shortage	0.085***	(0.018)	0.048*	(0.021)	0.037	(0.035)	0.059
Expected returns	-0.005	(0.004)	-0.001	(0.006)	-0.004	(0.003)	0.065
Rural							
National skill shortage	0.072***	(0.014)	0.060***	(0.007)	0.013	(0.016)	0.045
Expected returns	-0.002	(0.005)	-0.004	(0.005)	0.002	(0.005)	0.062
Disadvantaged groups							
Unemployed							
National skill shortage	0.074***	(0.008)	0.054***	(0.008)	0.019*	(0.009)	0.047
Expected returns	-0.001	(0.005)	-0.008	(0.007)	0.006	(0.008)	0.065
Without secondary qualification or equivalent							
National skill shortage	0.039***	(0.011)	0.080***	(0.006)	-0.041***	(0.008)	0.044
Expected returns	-0.003	(0.005)	-0.001	(0.005)	-0.002	(0.004)	0.063
Aboriginal or Torres Strait Islander (indigenous)							
National skill shortage	0.075***	(0.017)	0.064***	(0.008)	0.011	(0.015)	0.043
Expected returns	0.010	(0.008)	-0.001	(0.004)	0.011	(0.007)	0.061
Has a disability							
National skill shortage	0.056***	(0.009)	0.064***	(0.008)	-0.008	(0.006)	0.042
Expected returns	0.001	(0.008)	-0.003	(0.005)	0.004	(0.010)	0.062
Live in a low SES area							
National skill shortage	0.063***	(0.013)	0.066***	(0.007)	-0.003	(0.012)	0.043
Expected returns	0.014***	(0.003)	-0.003	(0.005)	0.017***	(0.004)	0.061
Non-English speaking background							
National skill shortage	0.105***	(0.024)	0.055***	(0.009)	0.049	(0.028)	0.046
Expected returns	-0.007***	(0.002)	-0.004	(0.006)	-0.003	(0.005)	0.063

Notes: All models are estimated with SLA unemployment rates, dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 1687846 observations for "national skill shortage" regressions, and 2617586 for expected returns regressions

Table B.6: Estimated marginal effects of the VTG on course choice outcomes across various student groups for ages 25-54, conditional difference-in-differences estimation without time trends and pre-treatment period to Dec 2008

group	members		non-members		difference		R-squared
Aged 25-34							
National skill shortage	0.065***	(0.009)	0.061***	(0.007)	0.004	(0.005)	0.041
Expected returns	-0.001	(0.005)	-0.011**	(0.004)	0.010***	(0.001)	0.069
Aged 35-44							
National skill shortage	0.062***	(0.007)	0.063***	(0.007)	-0.001	(0.003)	0.038
Expected returns	-0.01*	(0.005)	-0.005	(0.004)	-0.005***	(0.001)	0.068
Aged 45-54							
National skill shortage	0.062***	(0.007)	0.063***	(0.007)	-0.001	(0.003)	0.039
Expected returns	-0.012**	(0.004)	-0.005	(0.005)	-0.007***	(0.001)	0.069
Female							
National skill shortage	0.087***	(0.017)	0.045**	(0.017)	0.042	(0.031)	0.057
Expected returns	-0.01**	(0.004)	-0.003	(0.005)	-0.007**	(0.002)	0.072
Rural							
National skill shortage	0.073***	(0.012)	0.058***	(0.009)	0.015	(0.017)	0.041
Expected returns	-0.004	(0.005)	-0.010*	(0.005)	0.006	(0.005)	0.069
Disadvantaged groups							
Unemployed							
National skill shortage	0.074***	(0.008)	0.053***	(0.008)	0.021**	(0.007)	0.043
Expected returns	-0.005	(0.007)	-0.012	(0.007)	0.007	(0.009)	0.073
Without secondary qualification or equivalent							
National skill shortage	0.037***	(0.009)	0.080***	(0.007)	-0.043***	(0.009)	0.040
Expected returns	-0.007	(0.004)	-0.006	(0.005)	-0.001	(0.004)	0.070
Aboriginal or Torres Strait Islander (indigenous)							
National skill shortage	0.075***	(0.016)	0.063***	(0.007)	0.012	(0.016)	0.038
Expected returns	0.009	(0.009)	-0.006	(0.004)	0.015*	(0.007)	0.068
Has a disability							
National skill shortage	0.055***	(0.009)	0.063***	(0.007)	-0.008	(0.006)	0.038
Expected returns	-0.005	(0.009)	-0.007	(0.005)	0.003	(0.009)	0.069
Live in a low SES area							
National skill shortage	0.066***	(0.013)	0.064***	(0.007)	0.002	(0.013)	0.038
Expected returns	0.009*	(0.004)	-0.007	(0.005)	0.016***	(0.004)	0.068
Non-English speaking background							
National skill shortage	0.103***	(0.026)	0.055***	(0.008)	0.047	(0.028)	0.043
Expected returns	-0.012***	(0.002)	-0.007	(0.006)	-0.005	(0.005)	0.071

Notes: All models are estimated with SLA unemployment rates, dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 1373442 observations for "national skill shortage" regressions, and 2162518 for expected returns regressions

Table B.7: Estimated marginal effects of the VTG on course choice outcomes across various student groups for ages 25-54, conditional difference-in-differences estimation without time trends and pre-treatment period to Dec 2010

group	members		non-members		difference		R-squared
Aged 25-34							
National skill shortage	0.054***	(0.007)	0.049***	(0.005)	0.005	(0.005)	0.039
Expected returns	0.005	(0.004)	0.001	(0.004)	0.004	(0.004)	0.051
Aged 35-44							
National skill shortage	0.050***	(0.005)	0.051***	(0.006)	-0.001	(0.003)	0.037
Expected returns	0.000	(0.004)	0.004	(0.003)	-0.004***	(0.001)	0.050
Aged 45-54							
National skill shortage	0.049***	(0.006)	0.051***	(0.006)	-0.001	(0.003)	0.037
Expected returns	0.001	(0.004)	0.004	(0.003)	-0.004***	(0.001)	0.050
Female							
National skill shortage	0.072***	(0.018)	0.034	(0.018)	0.037	(0.034)	0.054
Expected returns	0.002	(0.003)	0.003	(0.004)	-0.001	(0.003)	0.054
Rural							
National skill shortage	0.061***	(0.012)	0.044***	(0.007)	0.017	(0.015)	0.040
Expected returns	0.003	(0.003)	0.001	(0.004)	0.002	(0.004)	0.051
Disadvantaged groups							
Unemployed							
National skill shortage	0.063***	(0.007)	0.041***	(0.006)	0.022**	(0.008)	0.041
Expected returns	0.003	(0.004)	-0.002	(0.004)	0.005	(0.005)	0.054
Without secondary qualification or equivalent							
National skill shortage	0.028**	(0.009)	0.065***	(0.005)	-0.037***	(0.009)	0.039
Expected returns	0.000	(0.004)	0.005	(0.003)	-0.006**	(0.002)	0.052
Aboriginal or Torres Strait Islander (indigenous)							
National skill shortage	0.065***	(0.015)	0.051***	(0.005)	0.014	(0.015)	0.037
Expected returns	0.015*	(0.008)	0.004	(0.003)	0.012	(0.007)	0.050
Has a disability							
National skill shortage	0.044***	(0.008)	0.051***	(0.005)	-0.007	(0.005)	0.037
Expected returns	0.005	(0.008)	0.002	(0.003)	0.003	(0.007)	0.051
Live in a low SES area							
National skill shortage	0.056***	(0.012)	0.052***	(0.005)	0.004	(0.012)	0.037
Expected returns	0.012***	(0.003)	0.003	(0.004)	0.009**	(0.004)	0.050
Non-English speaking background							
National skill shortage	0.090***	(0.021)	0.042***	(0.007)	0.048*	(0.024)	0.040
Expected returns	-0.003	(0.002)	0.002	(0.004)	-0.005	(0.003)	0.052

Notes: All models are estimated with SLA unemployment rates, dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 2027704 observations for "national skill shortage" regressions, and 3119136 for expected returns regressions

Table B.8: Estimated marginal effects of the VTG on course choice outcomes across various student groups for ages 25-54, conditional difference-in-differences estimation with time trends and pre-treatment period to Dec 2008

group	members		non-members		difference		R-squared
Aged 25-34							
National skill shortage	0.063*	(0.030)	-0.005	(0.024)	0.068***	(0.011)	0.042
Expected returns	0.061***	(0.011)	0.043***	(0.010)	0.017***	(0.005)	0.070
Aged 35-44							
National skill shortage	0.000	(0.024)	0.034	(0.027)	-0.034***	(0.004)	0.039
Expected returns	0.046***	(0.010)	0.052***	(0.010)	-0.006***	(0.001)	0.069
Aged 45-54							
National skill shortage	-0.015	(0.026)	0.035	(0.027)	-0.049***	(0.013)	0.040
Expected returns	0.039***	(0.009)	0.054***	(0.011)	-0.015*	(0.007)	0.070
Female							
National skill shortage	-0.016	(0.023)	0.081**	(0.025)	-0.097***	(0.013)	0.060
Expected returns	0.052***	(0.009)	0.053***	(0.012)	-0.001	(0.006)	0.073
Rural							
National skill shortage	-0.049	(0.034)	0.061**	(0.025)	-0.110***	(0.023)	0.043
Expected returns	0.038*	(0.017)	0.056***	(0.009)	-0.018	(0.015)	0.071
Disadvantaged groups							
Unemployed							
National skill shortage	0.001	(0.010)	0.025	(0.026)	-0.023	(0.018)	0.044
Expected returns	0.088***	(0.017)	0.031**	(0.011)	0.057**	(0.022)	0.074
Without secondary qualification or equivalent							
National skill shortage	-0.029	(0.033)	0.061**	(0.025)	-0.090***	(0.014)	0.041
Expected returns	0.035**	(0.014)	0.059***	(0.009)	-0.023*	(0.012)	0.071
Aboriginal or Torres Strait Islander (indigenous)							
National skill shortage	0.041	(0.023)	0.022	(0.027)	0.019*	(0.010)	0.039
Expected returns	0.028	(0.018)	0.050***	(0.010)	-0.022	(0.016)	0.070
Has a disability							
National skill shortage	-0.013	(0.018)	0.025	(0.026)	-0.038**	(0.011)	0.039
Expected returns	0.048**	(0.016)	0.050***	(0.010)	-0.002	(0.012)	0.070
Live in a low SES area							
National skill shortage	0.050	(0.027)	0.023	(0.026)	0.026	(0.024)	0.039
Expected returns	0.024	(0.016)	0.052***	(0.011)	-0.028*	(0.012)	0.069
Non-English speaking background							
National skill shortage	0.106***	(0.030)	0.003	(0.029)	0.103**	(0.041)	0.044
Expected returns	0.066***	(0.012)	0.048***	(0.012)	0.019	(0.015)	0.072

Notes: All models are estimated with SLA unemployment rates, dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 1373442 observations for "national skill shortage" regressions, and 2162518 for expected returns regressions

Table B.9: Estimated marginal effects of the VTG on course choice outcomes across various student groups for ages 25-54, conditional difference-in-differences estimation with time trends and pre-treatment period to Dec 2010

group	members		non-members		difference		R-squared
Aged 25-34							
National skill shortage	0.037***	(0.007)	-0.005	(0.010)	0.042***	(0.011)	0.040
Expected returns	0.035***	(0.006)	0.034*	(0.015)	0.001	(0.012)	0.052
Aged 35-44							
National skill shortage	0.001	(0.009)	0.017**	(0.006)	-0.015***	(0.004)	0.038
Expected returns	0.034**	(0.012)	0.036***	(0.010)	-0.002	(0.002)	0.051
Aged 45-54							
National skill shortage	-0.014	(0.012)	0.020**	(0.007)	-0.034***	(0.010)	0.039
Expected returns	0.035	(0.019)	0.034***	(0.008)	0.000	(0.012)	0.052
Female							
National skill shortage	-0.016	(0.012)	0.036***	(0.005)	-0.052***	(0.013)	0.058
Expected returns	0.043**	(0.012)	0.026**	(0.009)	0.017**	(0.006)	0.055
Rural							
National skill shortage	-0.008	(0.019)	0.019*	(0.009)	-0.027	(0.026)	0.041
Expected returns	0.02	(0.012)	0.043***	(0.010)	-0.023***	(0.005)	0.052
Disadvantaged groups							
Unemployed							
National skill shortage	0.014	(0.010)	0.006	(0.006)	0.008	(0.006)	0.042
Expected returns	0.034***	(0.008)	0.034**	(0.012)	0.000	(0.010)	0.055
Without secondary qualification or equivalent							
National skill shortage	-0.007	(0.014)	0.022***	(0.005)	-0.029**	(0.010)	0.040
Expected returns	0.021*	(0.010)	0.043***	(0.011)	-0.021***	(0.006)	0.053
Aboriginal or Torres Strait Islander (indigenous)							
National skill shortage	0.037***	(0.010)	0.011	(0.007)	0.026***	(0.006)	0.038
Expected returns	0.022	(0.013)	0.036***	(0.010)	-0.014	(0.011)	0.051
Has a disability							
National skill shortage	-0.004	(0.010)	0.012	(0.007)	-0.017**	(0.006)	0.038
Expected returns	0.021	(0.012)	0.036***	(0.010)	-0.015**	(0.006)	0.052
Live in a low SES area							
National skill shortage	0.026***	(0.006)	0.011	(0.007)	0.016	(0.008)	0.038
Expected returns	0.017	(0.009)	0.037***	(0.010)	-0.020***	(0.005)	0.051
Non-English speaking background							
National skill shortage	0.065***	(0.015)	-0.004	(0.008)	0.069***	(0.017)	0.042
Expected returns	0.048***	(0.007)	0.031*	(0.013)	0.017	(0.015)	0.054

Notes: All models are estimated with SLA unemployment rates, dummies describing month and year of enrolment, indicators where the state of residence is different to the state of study, and controls for student and provider characteristics. Results conditional in sense that they include student and provider controls. Standard errors reported in parentheses. *** / ** / *: statistically different from zero at 99 / 95 / 90 % confidence intervals. Standard errors generated using cluster-robust standard errors from the T(G-1) distribution, as suggested by Cameron and Miller (2015) for estimation with small group sizes. Sample sizes are 2027704 observations for "national skill shortage" regressions, and 3119136 for expected returns regressions

Appendix C. Course Choice Supplementary Statistics

Table C.1: Unconditional difference-in-differences effects for course choice indicators, 2008 to 2011/12 (percentage points)

Course identifier	All	Aged 45-54	Female	Rural or remote	Unemployed
All English language courses	-1.0	-0.6	1.9	-0.3	1.5
Foundation course	7.2	7.5	8.7	6.4	13.1
English language	1.8	3.0	2.6	-0.2	5.3
Other	5.4	4.6	6.0	6.6	7.8
All basic skills	0.9	0.5	2.1	0.8	0.3
Upskilling	19.2	19.6	20.6	13.9	20.3
Apprentice/trainee	4.9	6.3	3.3	5.4	-0.2
Occupational classification of study					
Manager	0.2	0.2	0.2	0.3	0.0
Professional	1.9	1.8	1.7	4.4	-2.6
Technical and trades	-2.9	-3.0	-2.8	-3.0	1.6
Community and personal service	-1.3	-1.9	0.4	0.9	1.6
Clerical and administrative	1.0	-0.1	-1.4	-1.3	-3.9
Sales workers	1.5	1.8	1.3	-0.2	4.3
Machinery operators	-0.1	-0.9	-0.3	0.1	-1.0
Labourers	2.4	2.7	0.9	3.7	2.6
Missing (not related to an occupation)	-3.0	-1.6	-0.8	-7.1	-4.6
Field of education					
Natural and Physical Sciences	-0.4	-0.3	-0.4	-0.2	-0.1
Information Technology	-0.7	-0.6	-0.7	-0.6	-0.9
Engineering and Related Tech	1.3	2.9	1.5	4.0	1.1
Architecture and Building	0.2	-0.5	-0.1	0.1	-0.1
Agriculture, Environmental, etc.	-0.3	0.3	-0.2	0.4	-0.6
Health	-0.4	-0.6	-0.9	0.6	-1.4
Education	-2.7	-3.6	-2.9	-2.7	-0.2
Management and Commerce	1.7	1.4	2.0	-0.9	0.5
Society and Culture	1.5	-0.4	1.2	-1.8	3.0
Creative Arts	0.0	-0.1	0.0	0.0	0.6
Food, Hospitality and Personal services	1.6	2.1	2.4	-1.1	-0.4
Mixed Field Programs	-1.2	0.0	-1.1	2.3	-0.1

Table continued next page

Table C.1: Unconditional difference-in-differences effects for course choice indicators, 2008 to 2011/12 (percentage points, cont.)

Course identifier	No secondary school	ATSI	Has a disability	Low SES	NESB
All English language courses	3.3	1.6	-1.6	-8.4	1.3
Foundation course	5.9	9.0	10.7	4.0	13.7
English language	1.9	0.8	3.8	4.0	9.8
Other	4.0	8.2	6.9	0.0	3.9
All basic skill courses	-1.9	-4.9	-5.5	-3.6	-0.3
Upskilling	2.3	12.9	14.3	20.8	25.9
Apprentice/trainee	6.5	7.1	3.2	8.1	2.4
Occupational classification of study					
Manager	0.1	0.4	0.0	0.4	0.1
Professional	0.3	2.5	-0.5	-3.4	2.3
Technical and trades	-3.5	1.8	1.9	-0.6	-0.1
Community and personal service	-2.4	2.7	1.9	2.4	-0.2
Clerical and administrative	1.0	3.6	0.5	-1.7	1.0
Sales workers	3.6	-0.2	1.1	2.3	-1.5
Machinery operators	-0.2	-0.7	0.0	-1.6	-0.1
Labourers	5.9	0.1	2.8	-0.2	3.0
Missing (not related to an occupation)	-3.7	-8.7	-5.2	4.9	1.2
Field of education					
Natural and Physical Sciences	-0.2	0.2	-0.2	-0.2	-0.6
Information Technology	-0.6	0.8	-0.4	-0.8	-1.3
Engineering and Related Tech	3.2	-2.3	1.3	7.4	2.9
Architecture and Building	-0.8	-1.1	-0.5	-0.6	1.0
Agriculture, Environmental, etc.	-0.3	-0.3	-0.2	-0.4	0.0
Health	-1.8	-2.0	-0.6	-1.3	0.2
Education	-2.9	-3.7	-1.2	-0.6	-1.0
Management and Commerce	3.0	-2.0	1.3	2.6	-1.8
Society and Culture	2.8	4.6	2.6	1.1	9.4
Creative Arts	0.2	2.7	1.0	0.5	-0.2
Food, Hospitality and Personal	1.5	1.4	-0.2	2.9	1.6
Mixed Field Programs	-3.6	1.2	0.1	-9.4	-9.4

Source: Authors' calculations, evaluated from VETPC micro-data

Notes: All statistics report differences in Victorian enrolments reported from 2008 to 2011/2012, less differences in the rest of Australia reported for the same period. That is, the proportion of all VET course enrolments for the respective population subgroup corresponding to the respective course identifier, evaluated for Victoria in 2011/2012, less the associated statistic revaluated for Victoria in 2008, less the same difference evaluated for the rest of Australia. Disability identified in the VETPC by individual responses to the question "Do you consider yourself to have a disability, impairment or long-term condition?" English language courses identified as any course with “ENGLISH”, “ESL” (English as a Second Language), or “ESOL” (English for Speakers of Other Languages) in its title. Basic skills courses identified as any course with “PATHWAY”, “GENERAL EDUCATION”, “NUMERACY”, or “LITERACY” in its title. Occupational classification identified from 4-digit ANZSCO code; courses without an ANZSCO code identified as “general”. Upskilling identifier missing for 14% of sample in 2008, 11% of sample in 2011 and 9% of sample in 2012.

Appendix D. National Skill Shortage Lists, 2006 to 2012

Table D.1: Occupations on the National Skill Shortage List, 2006-2012[a]

	2006	2007	2008	2009	2010	2011	2012	Total
Construction Project Manager	0	0	0	0	0	1	1	2
Engineering Manager	0	0	1	1	0	1	1	4
Production Manager (Mining)	0	0	1	1	0	1	1	4
Child Care Centre Manager	1	1	1	1	1	1	1	7
Accountant (General)	1	1	1	1	0	0	0	4
Management Accountant	1	1	1	1	0	0	0	4
Taxation Accountant	1	1	1	1	0	0	0	4
External Auditor	0	1	1	1	0	0	0	3
Architect	0	1	1	1	0	0	0	3
Surveyor	0	1	1	1	1	1	1	6
Urban and Regional Planner	1	0	1	1	0	0	0	3
Chemical Engineer	1	1	1	1	1	0	0	5
Civil Engineer	1	1	1	1	1	1	1	7
Quantity Surveyor	0	1	1	1	1	1	1	6
Structural Engineer	1	1	1	1	1	1	1	7
Transport Engineer	1	1	1	1	1	1	1	7
Electrical Engineer	1	1	1	1	1	1	1	7
Electronics Engineer	0	0	1	1	0	0	0	2
Mechanical Engineer	0	1	1	1	0	1	1	5
Production or Plant Engineer	0	0	0	1	0	0	0	1
Mining Engineer (excluding Petroleum)	1	1	1	1	1	1	1	7
Petroleum Engineer	1	0	1	0	1	1	1	5
Agricultural Consultant	0	0	1	1	1	1	1	5
Agricultural Scientist	0	0	1	1	1	1	1	5
Forester (Aus) / Forest Scientist (NZ)	0	0	1	1	0	0	0	2
Geologist	1	1	1	1	0	1	1	6
Veterinarian	0	0	0	0	1	1	0	2
Metallurgist	1	0	0	0	0	0	0	1
Pre-primary School Teacher	0	0	0	0	1	1	1	3
Special Needs Teacher	0	0	0	0	1	0	0	1
Medical Diagnostic Radiographer	1	1	1	1	1	1	0	6
Medical Radiation Therapist	1	0	1	0	0	1	0	3
Nuclear Medicine Technologist	1	0	0	0	0	0	0	1
Sonographer	1	1	1	1	1	1	1	7
Optometrist	0	0	1	1	1	0	1	4
Hospital Pharmacist	1	1	1	1	0	0	0	4
Retail Pharmacist	1	1	1	1	0	0	0	4
Dental Specialist	1	1	1	1	1	0	0	5
Dentist	1	1	1	1	1	0	0	5
Occupational Therapist	1	1	1	1	1	0	0	5
Physiotherapist	1	1	1	1	1	1	1	7

Podiatrist	1	1	1	1	1	1	1	7
Audiologist	1	0	1	1	0	1	1	5
Speech Pathologist (Aus) / Speech Language Therapist (NZ)	1	1	1	1	1	0	1	6
Midwife	1	1	1	1	1	1	1	7
Nurse Educator	0	0	1	1	0	0	0	2
Nurse Researcher	0	0	0	0	0	0	0	0
Nurse Manager	0	0	1	1	0	0	0	2
Nurse Practitioner	1	1	1	1	1	1	1	7
Registered Nurse (Aged Care)	1	1	1	1	1	1	1	7
Registered Nurse (Child and Family Health)	1	1	1	1	1	1	1	7
Registered Nurse (Community Health)	1	1	1	1	1	1	1	7
Registered Nurse (Critical Care and Emergency)	1	1	1	1	1	1	1	7
Registered Nurse (Developmental Disability)	1	1	1	1	1	1	1	7
Registered Nurse (Disability and Rehabilitation)	1	1	1	1	1	1	1	7
Registered Nurse (Medical)	1	1	1	1	1	1	1	7
Registered Nurse (Medical Practice)	1	1	1	1	1	1	1	7
Registered Nurse (Mental Health)	1	1	1	1	1	1	1	7
Registered Nurse (Perioperative)	1	1	1	1	1	1	1	7
Registered Nurse (Surgical)	1	1	1	1	1	1	1	7
Registered Nurses nec	1	1	1	1	1	1	1	7
Clinical Psychologist	0	0	1	1	1	1	1	5
Social Worker	0	0	0	1	0	0	0	1
Welfare Worker	0	0	0	0	0	0	1	1
Agricultural Technician	0	0	0	0	1	0	0	1
Architectural Draftsperson	0	1	1	1	0	0	0	3
Building Associate	0	1	1	1	0	0	0	3
Construction Estimator	0	0	0	0	1	1	1	3
Surveying or Cartographic Technician	0	0	0	1	0	0	0	1
Civil Engineering Draftsperson	1	1	1	1	0	1	1	6
Civil Engineering Technician	1	1	1	1	0	1	1	6
Electrical Engineering Draftsperson	1	1	1	1	0	1	1	6
Electrical Engineering Technician	1	1	1	1	0	1	1	6
Electronic Engineering Draftsperson	1	1	1	1	0	1	1	6
Electronic Engineering Technician	1	1	1	1	0	1	1	6
Mechanical Engineering Draftsperson	1	1	1	1	0	1	1	6
Metallurgical or Materials Technician	1	1	1	1	0	1	1	6
Mine Deputy	1	1	1	1	0	1	1	6
Radiocommunications Technician	1	1	1	1	0	1	1	6
Automotive Electrician	1	1	1	1	0	1	1	6
Diesel Motor Mechanic	1	1	1	1	0	1	1	6
Motorcycle Mechanic	1	1	1	1	0	1	1	6
Small Engine Mechanic	1	1	1	1	0	1	1	6
Sheetmetal Trades Worker	1	1	1	1	0	1	1	6
Metal Fabricator	1	1	1	1	0	0	1	5

Welder (First Class) (Aus) / Welder (NZ)	1	1	1	1	0	0	0	4
Aircraft Maintenance Engineer (Avionics)	0	1	1	1	1	1	0	5
Aircraft Maintenance Engineer (Mechanical)	0	1	1	1	1	1	0	5
Fitter (General)	0	1	1	1	1	1	0	5
Fitter and Turner	0	1	1	1	1	1	0	5
Fitter-Welder	0	1	1	1	1	1	0	5
Metal Machinist (First Class)	1	1	1	1	0	1	1	6
Textile, Clothing and Footwear Mechanic	1	1	1	1	0	1	1	6
Metal Fitters and Machinists nec	1	1	1	1	0	1	1	6
Locksmith	1	1	1	1	1	1	1	7
Toolmaker	1	1	1	0	0	1	0	4
Panelbeater	1	1	1	1	1	1	1	7
Vehicle Body Builder	1	1	1	1	0	0	1	5
Vehicle Trimmer	0	1	1	1	1	1	1	6
Vehicle Painter	1	1	1	1	0	1	1	6
Bricklayer	1	1	1	1	0	1	0	5
Stonemason	1	1	1	1	0	0	0	4
Carpenter and Joiner	1	1	1	1	0	0	0	4
Carpenter	1	1	1	1	0	0	0	4
Joiner	1	1	1	1	0	0	0	4
Floor Finisher	1	1	1	1	1	0	0	5
Painting Trades Worker	0	1	1	1	0	0	0	3
Glazier	1	1	1	1	1	1	0	6
Fibrous Plasterer	1	1	1	1	0	1	1	6
Solid Plasterer	1	1	1	1	0	1	1	6
Roof Tiler	1	1	1	1	0	1	1	6
Wall and Floor Tiler	1	1	1	1	0	1	1	6
Plumber (General)	1	1	1	1	0	1	1	6
Airconditioning and Mechanical Services Plumber	1	1	1	1	0	1	1	6
Drainer (Aus) / Drainlayer (NZ)	1	1	1	1	0	1	1	6
Gasfitter	1	1	1	1	0	1	1	6
Roof Plumber	1	1	1	1	0	1	1	6
Electrician (General)	1	1	1	1	0	0	1	5
Electrician (Special Class)	1	0	0	0	0	0	0	1
Lift Mechanic	1	1	1	1	1	0	0	5
Airconditioning and Refrigeration Mechanic	1	1	1	1	1	1	1	7
Electrical Linesworker (Aus) / Electrical Line Mechanic (NZ)	1	1	1	1	1	1	1	7
Electronic Equipment Trades Worker	1	1	1	1	1	0	1	6
Electronic Instrument Trades Worker (General)	1	0	0	0	0	1	1	3
Cabler (Data and Telecommunications)	0	0	1	1	0	0	0	2
Telecommunications Cable Jointer	0	0	0	0	0	0	1	1
Telecommunications Linesworker (Aus) / Telecommunications Line Mechanic (NZ)	0	0	1	1	0	0	0	2
Telecommunications Technician	0	0	1	1	0	0	1	3

Baker	1	1	1	1	1	1	1	7
Pastrycook	1	1	1	1	1	1	0	6
Butcher or Smallgoods Maker	1	1	1	1	1	1	1	7
Chef	1	1	1	1	1	1	1	7
Cook	1	1	1	1	1	1	1	7
Shearer	0	0	1	1	0	0	1	3
Arborist	1	1	1	1	1	1	1	7
Landscape Gardener	0	0	1	1	1	0	1	4
Hairdresser	1	1	1	1	1	1	1	7
Binder and Finisher	1	1	1	1	1	1	0	6
Screen Printer	1	1	1	1	1	0	0	5
Graphic Pre-press Trades Worker	0	0	0	0	1	0	0	1
Printing Machinist	1	1	1	0	0	0	0	3
Small Offset Printer	1	0	0	0	0	0	0	1
Upholsterer	1	1	1	1	1	0	0	5
Cabinetmaker	1	1	1	1	1	1	0	6
Furniture Finisher	1	1	1	1	1	0	0	5
Picture Framer	0	1	1	1	1	0	0	4
Wood Machinist	0	1	1	1	0	0	0	3
Boat Builder and Repairer	1	1	1	1	0	0	1	5
Jeweller	0	0	0	0	1	0	1	2
Signwriter	0	1	1	1	1	0	0	4
Optical Dispenser (Aus) / Dispensing Optician (NZ)	0	1	1	1	1	0	0	4
Dental Technician	0	1	1	1	1	0	1	5
Enrolled Nurse	1	0	0	1	1	1	1	5
Child Care Worker	1	0	1	1	1	1	1	6
Miner	1	0	1	1	1	1	1	6
Total	107	114	135	135	77	94	94	756

Notes: Information on skill demand, including national shortage information used in the analysis is annual information from the year prior to enrolment (2005-2011). This is the best estimate of information available at the time course choice. Not on list does not necessarily mean that there is weak demand for course graduates trained for work in a given occupation. Occupations in the table (out of a total 998 occupations) are those that appear on the national skill shortage list at least once over the period of analysis. Occupations not on the national shortage list may be regionally, but not nationally, in shortage. In some cases, occupations may not be in the list because there is no evidence available on the extent of the skill shortage.

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