If You Get What You Want, Do You Get What You Need? Course Choice and Achievement Effects of a Vocational Education and Training Voucher Scheme*

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March 24 2015

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Abstract

Outside of apprenticeships, allocations of public funds across vocational education and training (VET) courses are often made on the basis of government forecasts, with limited competition between (mostly public) colleges. This centralised model is often blamed for stifling responsiveness to skill demands and training quality. However, little is known about whether moving to alternative funding models improves outcomes. In this study, we exploit a natural experiment and population data to estimate the effects from the introduction of a broad-based voucher in VET in Australia. We show the voucher is associated with large increases in private college enrolments, improved match between course choice and employer demand, and higher student achievement, including in incumbent public colleges. Unlike studies in the school voucher literature, we find widespread benefits with no adverse impact on equity.

JEL classification: H44, H75, I21, I22, I28

1. Introduction

Policy makers allocating public funds to support post-secondary vocational education and training (VET) – often justified on the basis of externalities and capital market failures (Stevens 1999; McCall and Smith 2009) – face the twin challenges of ensuring students receive both high quality training and training that is relevant to the needs of the labour market (e.g. DBIS, 2009; European Commission, 2010; OECD, 2010; US Department of Education, 2012). This is most acute for 'classroom-based' VET programs where, instead of funding being linked to the attainment of employment (apprenticeships), allocations are often made on the basis of government skill forecasts, with little competition between (mostly public) colleges. In English-speaking countries, where classroom-based programs dominate, these characteristics of VET funding models have been implicated in measures showing persistent skill shortages and poor quality training (DBIS, 2009; US Department of Education, 2012).

In response, several countries have recently introduced reforms designed to make funding of these programs more responsive to skill needs. In the United States, under the *Educating Tomorrow's Workforce Act 2014*, community colleges will be required to annually evaluate and plan to meet local skill needs in order to receive federal funding.[1] In contrast, the approach in Australia and England has been to replace centralised funding models with voucher schemes that link public funding with student choice. Under the new Australian model, the voucher also covers VET courses offered by private colleges, further boosting competition between providers. It is these Australian reforms we examine here.

This paper is the first to estimate the effects of replacing a centrally administered funding model with a broad-based and untargeted voucher scheme in post-secondary VET against a defined counterfactual. Earlier VET voucher studies have been more limited in scale and

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[1] Under section 5 of the bill, this means both identifying the types of programs needed to meet local skill demands and appropriate program content. Recipients will be required to do this by annually assessing local skill needs and setting tailored training plans.

scope. For example, Schwerdt et al. (2012) examined the outcomes of increasing adult participation in classroom-based VET in Switzerland by randomly allocating vouchers to around 2500 individuals (20-60), but little can be drawn from this on the likely outcomes from wholesale switching of funding models. In this paper we examine the effects of the introduction of a broad-based voucher scheme known as the Victorian Training Guarantee (VTG) in the Australian state of Victoria. We study impacts on alignment of course choice with skill demand (*relevance*) and on educational achievement, a proxy for training quality. We restrict the analysis to 15 to 19 year-olds because this is the age when a large part of engagement in post-secondary VET occurs and because younger students are likely to have less information on labour market needs than their older counterparts, so this sets a higher bar.

Effects are estimated using a difference-in-differences approach, exploiting the fact that Victoria was the first Australian state to implement these reforms – agreed nationally but rolled-out state by state – in July 2009. Other states retained their supply-driven funding models until at least 2012, with the neighbouring state of New South Wales (NSW) delaying reforms until 2014, mainly for political reasons. Thus NSW, which has a similar population, economic and institutional structure to Victoria, but which administers and funds VET separately, provides the counterfactual.[2]

In thinking about both course choice and educational achievement we have in mind an underlying discrete-choice human capital framework in which potential students make enrolment decisions, and decisions to stay the course given initial enrolment, based on their perception of the expected course benefits and costs. Such a framework suggests several mechanisms through which the VTG might impact on course choice and achievement,

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[2] Australia has six states and two territories. Victoria and NSW are the two largest states, with populations of 5.8 million and 7.5 million respectively, out of a total Australian population of 24 million (Australian Bureau of Statistics 2014a). Populations of both states, physically separated by the Murray river, are concentrated in the capital cities of Melbourne (Victoria) and Sydney (NSW), which are 880km apart.

including compositional changes in the student body, compositional changes on the supply side (e.g. Friedman, 1962; Anderson, 2005; Blochliger, 2008; Demming et al., 2012; Rosenbaum and Rosenbaum, 2013), differences between students and government in the information used to assess labour market needs (e.g. Lavy, 2006; Jensen, 2010; OECD, 2010; Productivity Commission, 2012), excessive student weighting of consumption benefits of VET (e.g. Oreopoulos & Salvanes, 2011), competition impacts on quality and other aspects of provision (e.g. Friedman, 1962; Hoxby, 2003; Anderson, 2005), and, for achievement, knock-on effects of VTG-induced changes in course choices and match quality (e.g. Bound and Turner, 2011).

Together these potential mechanisms point to VTG impacts of uncertain sign on both outcomes, hence the importance of credible empirical evidence here. Under standard difference-in-difference assumptions of common trends and no relevant asymmetric change in the composition of the student and college body not itself caused by the VTG, we interpret unconditional difference-in-differences estimates at the mean as measures of the overall effect of the VTG on the outcomes in question. By sequentially introducing controls for student characteristics, provider characteristics and course choices, we are then able to partially relax these assumptions and to tentatively assess the degree to which the resulting conditional estimates are consistent with particular causal mechanisms, including increased competition, as outlined above.

Further, by estimating heterogeneous impacts across groups of students and providers, this study presents new evidence on the equity implications from the introduction of broad-based vouchers. Previous school voucher studies have identified two equity concerns. The first is that people from disadvantaged backgrounds may not benefit to the same extent from the greater choice afforded under broad-based vouchers because of an inability to access and utilise information (e.g. see Levin, 1991; Ladd, 2002; Hastings and Weinstein, 2008). In this

study, by examining whether students from different backgrounds make choices that are less in tune with employer demand signals, we provide evidence on whether such concerns should extend beyond the use of school vouchers. The second concern is that selection effects (by schools and families) may increase segregation and stifle achievement among disadvantaged groups, as occurred with the introduction of private school vouchers in Chile (Hsieh and Urquiola, 2006). Results presented in this study are estimated under conditions where there is limited scope for selection, due in part to college restrictions on cream skimming and fee caps. Therefore, our study may shed light on the use of regulatory safeguards to promote equitable outcomes from vouchers.

The remainder of the paper is set out as follows. Section 2 provides institutional details for the VET sectors of NSW and for Victoria pre and post-reform. Section 3 describes our data and defines our outcome measures. Section 4 discusses our empirical approach and related identification issues. Sections 5 and 6 discuss the findings relating to course choice and educational achievement, respectively. Section 7 discusses sensitivity analysis and Section 8 concludes. Additional data details and results are presented in an accompanying appendix.

2. VET in Australia and the Victorian Training Guarantee (VTG)

Post-secondary VET courses in Australia lead to nationally recognised qualifications at the International Standard of Education Classification (ISCED) 1997 level 2C, 3C, 4B and 5B. To attain qualifications, students must demonstrate minimum competency in performing general and job-specific tasks that are prescribed in national training packages. National training packages are assembled by national skills councils that comprise representatives from government and employer groups. Except for apprenticeships and traineeships (that require an employment contract) there is no requirement in training packages for competencies to be met through workplace learning. At present, there is no grading of students to gauge the level of skill proficiency attained. Although minimum training

standards are set at a national level, each of the six states and two territories is responsible for funding and administering their own VET sector.

Historically, states used a centrally-planned model for funding VET, one where fixed budget allocations were made at the course level across public providers (Technical and Further Education colleges (TAFEs), Adult and Community Education (ACE) centres and dual sector universities) based on historical enrolments and skill forecasts. As part of national reforms in 2008, all Australian states agreed to introduce demand-driven models where funding follows student choice. Victoria was the first state to implement such reforms from July 1 2009 for 15-19 year-olds by introducing the VTG. Until January 2012 when South Australia introduced its own reforms, all other states continued to operate their centrally-planned funding models.

In essence, the VTG triggered three changes: the uncapping of the number of publicly-funded places available to 15-19 year-olds, the linking of funding to student choice rather than government priorities, and the introduction of competition for funding from private colleges. The VTG did not affect public funding of the classroom component of *apprenticeships* and *traineeships*, which from 1998 had operated under a separate demand-driven system, including the freedom for employers to choose training with private colleges.[3] During the period of analysis (2008-2011), all other arrangements remained much the same for 15-19 year-olds in Victoria (and elsewhere), including the course subsidy levels.[4]

The outcomes of the VTG examined in this study are likely to be affected by regulatory safeguards in Australian VET that are aimed at ensuring equity of access. First, during the period of analysis, the ability of providers to raise prices in response to increased demand was limited by fee caps for publicly-funded VET courses that typically restrict fees charged direct

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[3] In 2008, 27% of Victorians aged 15-19 in publicly-funded courses were undertaking apprenticeships or traineeships (National VET Provider Collection).

[4] In July 2012, the Victorian government partially unwound the 2009 reforms by making course subsidies more targeted towards perceived employer demand for graduates.

to students, over and above the publicly-funded vouchers, to less than A$1000 per year for a full-time course.[5] A potential downside of the price caps is that they may have dampened the incentive for colleges to innovate in response to increased competition and instead encouraged cost cutting and reduced training quality, although not to a level below minimum training standards. Second, colleges have limited ability to cream skim because there is little personal information made available to providers on which to select students – open access is a defining feature of the Australian VET sector – which means that admission is typically made on a first-come first-served basis. Further, the incentive to cream skim is reduced by registration requirements that compel colleges, including private colleges, to comply with equity principles.[6] Depending on the circumstances of the student, extra subsidies are also available to colleges to meet the extra cost of catering for 'high needs learners', such as Indigenous students.

For students who miss out on a subsidised place in training there is the option of enrolling in an unregulated and unfunded 'fee-for-service' VET course, for which private colleges compete alongside public colleges, although few 15-19 year olds take this route.[7]

3. Data

The aim of this study is to examine the effects of introducing a broad-based voucher scheme in post-secondary VET on course choice and training quality, both on average and for various groups of students and providers. The main dataset used in the analysis is the VET Provider Collection (VETPC), an annual administrative dataset containing records of the population of

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[5] In practice, direct tuition fees were regulated according to course level in each state, with a prescribed hourly rate and a minimum and maximum total annual fee. In Victoria, hourly fees for lower-level courses (certificates I and II, equivalent to ISCED2) were up to $1.51 per hour in 2011, with a minimum total fee of $187.50 and a maximum total fee of $875. The highest fees were for Diploma level courses – up to $3.79 per hour, minimum total fee of $375 and a maximum total fee of $2000. Many students were also eligible for reduced fees, e.g. on the grounds of receiving Income Support (welfare).

[6] Relevant requirements for registration include to make reasonable adjustments to accommodate people with disability (under the Disability Discrimination Act 1992), and to adopt policies and approaches aimed at ensuring VET colleges respond to the individual needs of clients whose age, gender, cultural or ethnic background, disability, sexuality, language skills, literacy or numeracy level, unemployment, imprisonment or remote location may present a barrier to access, participation and the achievement of suitable outcomes.

[7] Currently, data on fee-for-service enrolments is only available for public providers. In Victoria in 2008, fee-for-service enrolments accounted for around 2% of all 15-19 enrolments with public providers (National VET Provider Collection).

publicly-funded VET students in Australia. The sample of analysis is all new enrolments among 15-19 year-olds (on January 1ˢᵗ in the year of enrolment, which determines VTG eligibility) who are no longer in secondary school and who commenced study in 2008 (pre-reform) or 2010 to 2011 (post-reform).[8] The VETPC contains detailed course, student and college information, and a unique student-course identifier that allows us to track enrolments across time and, in most cases, through to completion.

Table 1 summarises new enrolments in our sample. Note that some students enrol in more than one course, and in what follows, the unit of analysis is the course enrolment rather than the student. We see dramatic growth in enrolments in Victoria – a 29% increase between 2008 and 2010 and a 38% increase between 2008 and 2011 – due mainly to growth in enrolments with private colleges. In contrast, there was no enrolment growth in NSW over this period, and the share of enrolments with private colleges actually fell because of a decline in new apprenticeships in NSW related to the global financial crisis. These increases translate to an estimated 10 percentage point increase in the overall proportion of 15-19 year-olds not in school and participating in post-secondary VET in Victoria (from 26% in 2008 to 36% in 2011), with no proportional change in NSW.[9]

Table 2 presents sample means for student, college and course controls used in the analysis (see Appendix Table A1 for more information). Note there are only minor differences in student characteristics between Victoria and NSW in 2008. Also note that the huge increase in enrolment in Victoria over this period was not drawn disproportionately from any one group. The only asymmetric observable compositional change of note over the period is a small increase in prior education levels and socio-economic advantage of students in Victoria compared to NSW. The fact that expanding the accessibility of publicly-funded

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[8] Apprentices and trainees are initially included in the analysis despite operating under a user-choice system prior to the VTG, although we later test sensitivity to their exclusion. We exclude enrolments in foundation courses.
[9] Estimates based on the number of 15-19 year-olds not in school from the Australian Bureau of Statistics (2014b).

places under the VTG had little impact on the characteristics of students in training suggests that pre-reform rationing on a first-come first-served basis was not heavily biased against students from any particular group. A final point is that there were only minor changes in mean student characteristics in Victoria between the pre-announcement period (January to July) and post-announcement period (August to December) in 2008, suggesting no major compositional anticipation effects.[10] Any possible post-announcement but pre-VTG anticipation effects are tested in the sensitivity analysis.

Outcome variables

We examine the impact of the VTG reforms on two key outcomes: the alignment of course choice with skill demand and academic achievement, a proxy for training quality. For course choice, we derive two measures of 'fit' with labour market needs using external data sources that are linked to course choices in the VETPC. The first is a binary indicator for whether the occupation the course is designed to prepare students for is on a national skills shortage list.[11] Skill shortage lists are prepared annually by the federal government, based primarily on employer surveys and skill forecasts (see Table A2). When using this measure, we exclude around 10% of enrolments that are in general courses, such as numeracy and literacy and employment skills courses, that are not designed to prepare students for any particular occupation.

Our second course choice measure is a continuous variable constructed from estimated wage premia associated with each national qualification level and field of study combination.[12] These are estimated using earnings data from the *Student Outcomes Survey* (SOS), a large and nationally representative survey of VET graduates conducted in the year

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[10] These minor changes may also be due to differences in the characteristics of students who enrol in the first and second halves of the year in Victoria, rather than anticipation effects.

[11] These occupations are at the Australian and New Zealand Standard Classification of Occupation (ANZSCO) 6-digit level.

[12] Grogger and Eide (1995) and Avery and Turner (2012), for example, do something similar to estimate returns to different college majors in the US. Where there are sparse cells, we use results estimated with course level and 2-digit field of study combinations. Field of study is 4-digit Australian Standard Classification of Education (ASCED).

following course completion.[13] The sampling frame for the SOS is the population of VET completers in the preceding year drawn from the VETPC dataset described above, and includes updated information on student characteristics and current labour market outcomes, including weekly earnings for those employed.[14] Specifically, we use these data to estimate a log wage regression for completers aged 15-25 years at the time of survey on dummies for course-level and field-of-study combinations, with resulting coefficients interpreted as the average return for different course choices, conditional upon observed student controls and on finding employment in the year after study. Key results from this regression are presented in Table A3.

When linking these course measures to student choices in the VETPC data, we take course information available at the time of enrolment, i.e. wage-premia and national skill shortage lists from 2007, 2009 and 2010 for the enrolment years 2008, 2010 and 2011 respectively. In using information available at the time of enrolment, we implicitly assume that students make naïve forecasts of course outcomes based on current course information (see Ryoo and Rosen, 2004; Heckman et al., 2006).

Turning to achievement, we use the VETPC data to construct two measures of *completion* which, given VET qualifications in Australia are pass/fail, we interpret broadly as measures of educational achievement. Our first completion measure is a binary indicator equal to 1 if the student has passed the course by the end of the year following entry, and 0 otherwise.[15] For those who enrol in the first half of the year (around 70% of students in both states) they are tracked for 18-24 months, which is beyond the typical course duration of 12-18 months. For those who enter in the second half of the year, some will be tracked for less than 18

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[13] See http://www.ncver.edu.au/sos for further details on the SOS.

[14] Earnings data are reported in bands from which we use the midpoint.

[15] There are two reasons for restricting the measure in this way. First, we want completion for the pre and post-reform entry cohorts to be measured over the same duration. Second, as far as possible we want the pre-reform (2008) entry cohort to be unaffected by the reforms introduced from July 2009. In choosing the duration over which we measure course completion we are therefore trading off right censoring for some enrolments with the possibility that some 2008 entrants could be impacted by the reforms over the latter part of their course enrolment.

months, which raises the possibility of right censoring, which we can do little about given that the data do not distinguish between those who dropped out and those who are still enrolled but yet to complete (both types of enrolments are assigned a completion value of 0). In practice, right censoring is likely to affect enrolments in both states and, and if anything, the slightly greater growth in second semester enrolments in Victoria (from 23% in 2008 to 34% in 2011, compared to 29% to 33% in NSW over the same period), would tend to negatively bias any completion effect in Victoria.

Our second completion measure is module (or *subject*) completion, which for a given course enrolment is the proportion of module enrolments that a student passes from the time of enrolment to the end of the following year. This is designed to reduce the right censoring problems discussed above, given that most students enrol in multiple modules in a semester typically lasting less than 6 months. But this variable also helps to address the argument that some students enrol in a course only to learn a set of skills linked to a specific subset of modules, for example, to meet current job needs (see Mark and Karmel, 2010).

Table 3 presents sample means and difference-in-differences comparisons of means for all four course choice and completion measures. All measures are positive and highly statistically significant, whether we compare 2008 with 2010 or 2011.

4. Identification and estimation

In common with many previous school choice studies, we exploit differences across space to identify impacts. In particular, we use differences in the timing of national reform implementation between Victoria and NSW, which occurred for exogenous political reasons. We therefore treat the Victorian reforms as a natural experiment and estimate their impact using a standard difference-in-differences approach (see Blundell and Costa Dias, 2009). Specifically we estimate linear regressions of the following form:

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$$y_i = \alpha + \beta X_i + \gamma Vic_i + \lambda Post_i + \delta Vic * Post_i + u_i,$$ (1)

where y_i denotes the outcome of interest for individual *i*, Vic_i is a dummy variable taking the value 1 if the individual's enrolment was in Victoria and 0 in NSW, $Post_i$ is a dummy taking the value 1 if the individual entered VET post-reform and 0 otherwise (pooling the two post-reform cohorts), and X_i is a set of control variables. The parameter δ measures the impact of the reforms on outcomes. Estimation is by least squares (linear probability models (LPMs) for our two binary outcomes) with standard errors clustered at the local government area (LGA), college and individual level.[16] To analyse heterogeneous impacts, for each specific group, we estimate equation (1) with the binary group indicator interacted with the post-reform ($Post_i$), state (Vic_i) and the interaction term ($Vic * Post_i$) with a full set of controls.

Two standard assumptions underlying the application of the difference-in-differences method are common time trends in outcomes between Victoria and NSW and no relevant, asymmetric, unobserved changes in the composition of students between these states. How reasonable are these assumptions here? Consider the common time trends assumption first. Asymmetric shocks to either state, anticipation effects in Victoria, and pre-existing and potentially ongoing diverging trends, are all possible in principle but, we argue, unlikely in practice to adversely affect identification. Starting with the former, although NSW had previously committed to introducing national VET reforms, none were commenced before or during this period, neither were there any other major VET reforms. Neither are there any obvious candidates for asymmetric shocks to the NSW labour market over this period; the global financial crisis, for example, impacted similarly on the labour markets of both states.

Although anticipation effects between announcement (August 2008) and implementation (July 2009) seem unlikely on the supply side, they seem at least possible on the demand side.

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[16] LGAs are the jurisdictional boundaries of the smallest form of government in Australia, the municipal council, which is similar to a county in the United States.

For example, some Victorian 15-19 year olds may have waited for the VTG to get their course of choice rather than enrol in another publicly-funded or fee-for-service course. This could impact both course choice and completion, but there is little evidence for such an effect. If anything, enrolments in Victoria slightly increased in the first half of 2009 relative to NSW (see Appendix Figure A1). In any case, our main estimates omit 2009 enrolments, which would have been most affected by any such anticipation effects. We also estimate a version of the model that only includes enrolments between January and July of each year, which cannot be confounded by any anticipation effects, and to which our estimates are highly robust (see Table 9). We therefore proceed on the basis that any anticipation effects are negligible.

Following standard practice, we show that our four outcome measures have similar trends in the two states in consecutive periods prior to the VTG reforms (Figures A2-A5). In each case it is most constructive to concentrate on the figures for the first half of the year when the majority of enrolments take place. Only for the average expected wage premia measure is there any hint of diverging prior trends (Figure A3), with the position of Victoria *worsening* relative to NSW prior to the reforms. If this trend continued into the reform period then our difference-in-differences approach might *underestimate* VTG impacts on the wage premia measure of course choice. Note that for all four measures, changes in relative outcomes after 2010 are consistent with positive effects of the VTG.

Further evidence on prior trends, conditioned on observables, is presented in Table 4, which estimates (1) for enrolments taking place in the first half of 2008 (pre-VTG, pre-announcement) and the first half of 2009 (pre-VTG, post announcement). Results are consistent with our interpretation of the pre-trend data. While this is encouraging, the assumption of parallel trends during the treatment period is of course ultimately untestable. Having multiple measures, however, means that we do not put all our identification eggs in

the one parallel trends basket. We also present alternative estimates in a sensitivity analysis that focuses on two neighbouring towns either side of the Victoria-NSW border, for which confounding prior trends (and asymmetric shocks) are arguably less likely.

Now consider the assumption of no relevant, asymmetric, unobserved changes in the composition of each group, a necessary condition to estimate the impact of the VTG for a student body with given characteristics, i.e. the average treatment effect on the treated (ATT). We cannot test directly for this either, but we take some comfort from the stability of *observable* characteristics between 2008 and 2011 (Table 2), including stability between pre and post-announcement periods in 2008. One potential threat here is cross-border commuting from NSW to Victoria induced by the VTG. In practice, this is unlikely to be a major concern because, with the exception of the towns of Albury and Wodonga, so few people live anywhere near the NSW/Victoria border. Table 2 shows that less than 3 percent of people studying in Victoria between 2008 and 2011 have an interstate residential address, and this proportion falls over time. Nevertheless we include a control for this in (1).

5. Estimated impacts on course choice

While the popular media fixated on post-VTG enrolment increases in fitness instructor and other 'soft' courses with questionable career prospects[17] in reality there were enrolment increases across the board. Figures A6 and A7 show that Victorian enrolments increased by more in courses with higher expected returns, including large increases in engineering and related areas. But to what extent were these changing enrolment patterns driven by the VTG?

Table 5 presents estimates from three different versions of (1) (full results, including estimated parameters for controls, are in Table A4). The first set of results is unconditional estimates as in Table 3. They show that on average during 2010-11, the VTG is associated with a 3.3 percentage point increase in the proportion of enrolments in skills-shortage courses

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[17] Match Training to Needs: Business. The Australian Financial Review (3/7/2012).

and enrolments that have a 2.2 percentage point higher expected wage premia. Under the assumptions set out in the previous section these estimates can be interpreted as the overall impacts of the VTG – or possibly a lower bound for the measure based on expected wages, given diverging prior trends – and suggest an improvement in the responsiveness of VET enrolments to skill demands.

The second set of results contains controls for student characteristics and so can be interpreted as ATT. These are almost identical to the unconditional results, suggesting that the small compositional changes on the student side shown in Table 2 play only a minor role in explaining the overall VTG impact. This result lends support to the interpretation of the unconditional difference-in-differences estimates as overall VTG impacts, at least inasmuch as we can more confidently rule out observable changes in student composition as contributing substantially to the relevant coefficients.

For the third set of results we add controls for college characteristics. This has no impact on the estimated VTG effect of the expected returns measure, but increases the magnitude of the estimated VTG impact on skills shortage enrolments to 3.9 percentage points. In other words the ATT is not being driven primarily by the entry of private colleges, and would have been *bigger* in the absence of this compositional change. If the overall VTG impact on course choice is not being driven by compositional changes on the demand or the supply side, then we are left with differences in information accessed by students and government, differences in the weight placed on the consumptive benefits of education, and government inertia and political economy factors. Of these, government inertia and political economy factors seem the most likely mechanisms to explain a *positive* impact of the VTG reforms on our course choice measures. This is our tentative conclusion.

Now turn to the question of heterogeneous treatment effects. A key motivation for estimating such effects is a concern that students from disadvantaged groups may benefit less

than more advantaged students from the introduction of a voucher scheme, possibly because of difficulty accessing and utilising labour market information. In fact, with a full set of controls, we find positive VTG impacts on one or more of our course choice measures for all of the disadvantaged groups we identify in Table 6, implying that the benefits of moving to a voucher scheme for VET are widely shared.

The estimated VTG impact on course choice, however, does vary across groups, albeit not in a way that suggests a simple equity story linked to membership of socially disadvantaged groups. Impacts are significantly smaller for females than for males, suggesting that moving to a user-choice model for VET widens the existing gender gap in course choice. Estimated VTG impacts are mixed for Indigenous students and early school leavers: positive and statistically significant for the expected returns measure, but zero for the skills shortage measure. This may reflect the fact that these groups live disproportionately outside of major population centres, where thin markets and capacity constraints are more likely, and/or that priority access given under the supply-driven system may mitigate the extent to which the VTG boosted course choice. In contrast, students with a disability, those unemployed and students living in low-SES areas – three other groups we might think of as disadvantaged – benefit no less from the VTG than their more advantaged counterparts. It may be that informational deficits faced by disadvantaged school children and their families, as found by Hastings and Weinstein (2008), do not carry over to VET. The group that benefits the most from a voucher are those who speak a language other than English at home. This group may place more weight on the investment motive for post-compulsory education than native speakers (e.g. Reitz, Zhang and Hawkins 2011; Cobb-Clark and Nguyen, 2012) or may have missed-out disproportionately under the old system.

Table 6 also shows discrepancies in course choice by college type. These estimates provide further evidence that the VTG did not primarily impact course choice through

changes in the composition of the supply side; if anything such compositional changes attenuated the overall VTG impact. In particular, for public colleges, the VTG is associated with an increase in the proportion of enrolments in skill shortage courses, whereas for private providers, the association is large and negative. Only a small discrepancy in expected returns is found and the effect for both college types is positive. Divergent course choice effects by college type can be explained by differences in opportunities available to colleges under the VTG. Established public colleges exploited their competitive advantages in delivering training in areas of persistent skills shortage, established over time under the centrally-planned system. For private providers, the VTG opened up opportunities to capture public funding in fields outside of apprenticeships and traineeships, which although not linked to identified skill shortage areas in many cases, were still in areas linked with positive student returns.

6. Estimated impacts on achievement

Table 7 presents achievement results for four different versions of (1). The first set of estimates restate those presented in Table 3, and show that on average over 2010-11, the VTG is associated with a 6.4 percentage point increase in module completion rates and an 6.8 percentage point increase in course completion rates. Under the assumptions set out in Section 4, these estimates can be interpreted as overall VTG impacts.

The second set of estimates is conditional on student observables. These are only slightly smaller than the unconditional estimates, suggesting, as in the course choice case, that (observable) compositional changes on the student side are unimportant in explaining impacts on academic performance.[18] Compared to the estimated coefficients on the (binary) controls, the VTG impacts are large. On average across the two measures, the estimated impact of the

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[18] Across the board the signs of the estimated coefficients of the control variables conform to our priors and are consistent with Mark and Karmel (2010). Full results are given in Table A5.

VTG is roughly the same order of magnitude as the impact of Indigenous status (but with the opposite sign) or being employed at the time of enrolment.

In contrast to the course choice case, adding college controls more than halves the estimated effects of the VTG on our completion measures. The main explanation is that the completion rate for private colleges is around 20 percentage points higher than for public colleges – this is not unique to Australia (see Rosenbaun and Rosenbaum, 2013) – and the market share of private colleges more than doubles in the two years following the introduction of the VTG.

In the final set of results, we add 71 fields of study categories and 5 course level categories to (1), which make little further difference to the estimated VTG impacts on either completion measure. This is not because completion is orthogonal to course choice; many of the course choice controls are statistically significant. Rather, VTG-induced changes in course choice, at least as captured by the set of course level-field of study dummies included here, are not impacting on completion rates. So how do we interpret the remaining significant effect of the VTG? One possible explanation is that colleges are responding to the introduction of competition for funding by improving the quality of provision (or diverting effort towards increased completion rates and away from other aspects of quality). Our results are consistent with this explanation, although we cannot rule out other as yet unspecified mechanisms.

Now consider heterogeneous effects. A concern in the school vouchers literature is that any improvements in efficiency from the introduction of untargeted vouchers comes at the expense of equity because of rent-seeking responses by colleges (e.g. Levin, 1991; Ladd, 2002). Table 8 presents the estimated VTG effects for key groups and college types with a full set of controls. While results in Table 7 suggest that the VTG is associated with improved efficiency, measured by improvements in achievement (perhaps from the introduction of

competition), results presented in Table 8 suggest no clear trade-off with equity. Positive and statistically significant VTG impacts on one or both achievement measures are estimated for all groups except those with a disability, for whom we find no evidence of a VTG impact. There is also no evidence that the effects of the VTG on achievement are systematically different for disadvantaged groups. The apparent absence of an equity-efficiency trade-off associated with the VTG contrasts with findings in the school voucher literature. This could reflect general institutional differences between sectors: unlike school, VET colleges are open access, cater particularly for people who are not academic high fliers, and enrolment is voluntary. But there are other possible explanations specific to the design of the VET voucher, including tight constraints on fee increases and cream skimming, which may have allowed the Victorian government to reap achievement-related benefits from greater competition without widespread equity-related costs.

For both outcome measures, the VTG is associated with improvement in private provider and public college completion rates. If this is in part a competition effect, then the positive effect among existing public colleges suggests they are upping their game in response to the reforms. The parallel in the schools competition literature is the positive impacts on achievement in existing public schools reported by Hoxby (1994; 2000; 2003).

7. Sensitivity analyses

In this section we briefly discuss a number of sensitivity analyses that together help to reinforce the main conclusions from the preceding sections (see Table 9). Unless otherwise stated, all sensitivity results are estimated using a full set of controls, consistent with results presented in the right-hand columns of Tables 5 and 7.

First consider course choice. To examine sensitivity to possible post-announcement but pre-VTG anticipation effects in Victoria, we re-estimate (1) using only January-July enrolments in 2008, 2010 and 2011. This makes no difference to the estimated VTG impact

on the wage-based measure. However, it does slightly increase the estimated impact on the skills-shortage measure because students (in both states) who enter in the latter part of the year have somewhat different characteristics to those entering in the first half.

Despite encouraging signs we cannot entirely rule out the possibility of asymmetric shocks at the state level for any of our four outcome measures, nor prior diverging trends for the wage-based measure of course choice. Both potential identification problems are less likely to be an issue, however, for the twin towns of Albury and Wodonga, situated on opposite banks of the Murray River on the NSW-Victoria border. Both towns have populations of around 50,000 people and both have their own public and private VET colleges, but only colleges in Wodonga on the Victorian side were (directly) affected by the VTG. Using a similar difference-in-differences approach to estimate (1) for colleges operating in the local government areas of Albury-Wodonga we again find positive and statistically significant VTG impacts on both course choice measures, although the estimated magnitudes of these impacts (unsurprisingly) differ from those estimated at the full state level.

One possible candidate for an asymmetric state-level shock is the introduction of national requirements to be in study until age 17 in 2010, which may have had differing effects in NSW and Victoria because prior compulsory schooling ages were different – 15 in NSW and 16 in Victoria. However, results in Table 9 show that restricting the sample to those who enrolled at 18 and 19, and who were therefore unaffected by the national education requirement, makes little difference.

For conciseness, our main estimates pool the 2010 and 2011 entry cohorts, but if short term impacts of marketization reforms differ from longer term impacts (e.g. as suggested by Hoxby, 2003) we might see a difference between VTG impacts on the 2010 and 2011 cohorts. The resulting estimates do suggest a larger impact in 2011 than in 2010 for both measures. This is consistent with short run capacity constraints limiting the initial

responsiveness of the supply side, or a lack of suitable data being made available to potential students and their families until later in the reform process.

Estimates presented so far for our binary skills shortage measure of course choice are generated using LPM models in preference to non-linear alternatives. Our conclusions are robust to this too: results using a binary probit model, with treatment effects estimated using the Puhani (2011) method, are little different.

To examine whether controls for college type and other college characteristics adequately control for compositional changes on the supply-side, we re-estimate (1) adding college fixed effects. This makes little difference to the estimated VTG impacts for the expected wage measure of course choice, but it increases the estimated impact of the VTG on the skills shortage based measure. Growth in the private sector appears to have been disproportionately among colleges that specialise in courses that are unrelated to skill shortages. Our conclusions remain unchanged.

We also test the sensitivity of results presented in Tables 5 and 7 to a number of sample restrictions. One restriction is to omit general and mixed field courses that are not linked to any particular occupation when defining our skills shortage variable, which means that estimates for the two course choice measures are generated using different samples. To check whether this is an issue, we re-estimate (1) for the wage-based measure of course choice on the sample used in estimating (1) for the skills-shortage measure. Although the estimate is qualitatively robust to this sample restriction, the magnitude of the estimated impact is sensitive. This reflects two factors: that general and mixed field courses have above average returns, and that enrolments in these courses have grown more rapidly – by 90% between 2008 and 2011 – than enrolments overall.

In defining our sample we also make three somewhat *ad hoc* decisions. First we include apprentices and trainees in our standard sample despite being already funded under a user-

choice system. Second we include fee-for-service enrolments with public colleges that are not covered by the VTG, but which may be displaced by the VTG. Third, for the field of study/course level combinations for which we observe insufficient observations in the SOS to confidently estimate an average wage premium, we use estimates generated from more aggregate field of study/course level combinations. We might equally have dropped enrolments in these courses from our estimation of the wage-based measure of course choice. With the exception of an increase in the estimated VTG impact on the proportion of enrolments linked to skill shortage occupations from excluding apprentices and trainees, our results are insensitive to these decisions.

We repeat the sensitivity tests explained above for our completion measures, except for the scenarios where we exclude general and mixed course programs and exclude graduate wage values with missing cells. In addition, we also estimate a model with around 1000 course fixed effects to better control for changes in course choice that may not have been properly captured with course fields of study and level categories.[19]

As for course choice, estimated VTG impacts are highly robust to most of these variations. One exception is the large estimated positive effect for module completion becomes statistically insignificant when we restrict the analysis to Albury and Wodonga, reflecting the small number of observations. Another marked difference is the large increase in course completion effects when we include course fixed effects. This suggests that changes in course choice, not adequately controlled for using course fields of study and level categories (Table 7), tend to under-estimate the effects explained through the remaining potential causal mechanisms, including competition effects on the quality of provision.

8. Conclusions

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[19] There are around 1000 nationally accredited courses offered in Victoria out of a total of around 1500. They are not restricted to any one provider or provider type, but can be offered by any provider. Of the 1000 courses around 700 in Victoria had fewer than 100 enrolments.

This paper exploits a unique natural experiment in Australia to demonstrate for the first time how introducing a broad-based voucher scheme can improve the relevance and quality of post-secondary VET, at least in the short term. By varying controls, we draw tentative conclusions regarding possible causal mechanisms.

For course choice, the main driver appears to be that students make 'better' choices than state government when identifying courses associated with employer demand. For achievement, increased enrolments with colleges that have relatively high completion rates (mainly private colleges) and increased competition are the channels that are most consistent with our estimated impacts. This evidence is important for countries such as the United States where central funding allocations and lack of competition for public funding are often blamed for persistent skill shortages and poor quality training. Without credible evidence that broad-based vouchers in VET work, it is difficult for governments to find the impetus to make and sustain such wholesale changes, generally against the wishes of existing colleges. In Victoria, the narrative around these reforms turned rapidly negative in the absence of credible evidence on their impacts, which contributed to the partial roll-back of the reforms in July 2012.

A further contribution is to demonstrate for the first time that overall efficiency gains from the introduction of a broad-based voucher do not necessarily come at a cost to equity. In contrast to findings by Hsieh and Urquiola (2006), we find that under conditions where there is little student selection, academic achievement gains are widespread, including among disadvantaged groups and within public colleges. To the extent that this reflects regulations that constrain cream skimming and fee caps, then our results highlight the potential role of such safeguards in realising the competition benefits of broad-based vouchers.

Also related to equity, results in this study suggest that membership of a disadvantaged group does not affect one's ability to benefit from greater agency to select preferred post-secondary courses afforded under a voucher. This contrasts with literature that suggests

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people from disadvantaged groups benefit less from school choice policies because of an inability to access and assess school performance information (Levin, 1991; Ladd, 2002; Hastings and Weinstein, 2008). One explanation is that when choosing post-secondary VET courses, students from disadvantaged groups may be less encumbered by resource constraints and parental attitudes, and link course choice more closely to their future job prospects, than when choosing schools. It may also be that labour market information is more readily available and interpretable than information on school quality. Regardless, an implication of this finding is that in providing labour market information, either to improve outcomes of pro-choice policies or as part of career counselling, there is no apparent need to target labour market information directly at disadvantaged groups.

Of course there are numerous caveats to bear in mind when drawing these conclusions. It is possible that students make better course choices according to our measures, but would not do so according to some alternative measure forecasting ahead to future labour market needs, where governments plausibly have an informational advantage. Our conclusions regarding potential causal mechanisms are also unavoidably tentative. The main caveats here, however, arguably concern external validity. Our conclusions are based on just two post-reform cohorts, each followed for a maximum of two years, and there is reason to suspect from our own estimates and from the wider literature that the early impacts of such reforms may differ from longer run impacts. Further, the extent to which our results might generalise to other countries with rather different institutions and labour market contexts, even to other English-speaking countries with many shared VET sector characteristics, is unclear. Nevertheless, in attempting to isolate that part of the course choice effect that does not work through compositional changes, and that part of the achievement effect that potentially works through competition, we are homing in on relationships in the data that may be at least partly generalizable across educational contexts and across national borders.

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Table 1: New 15-19 year-old post-secondary VET enrolments

	Enrolments/Students			Change in enrolments relative to 2008		Unconditional difference-in-difference		
	2008	2010	2011	2010	2011	2010	2011	2010-11
	No.	No.	No.	%	%	%pt.	%pt.	%pt.
				Enrolments				
Victoria								
Private college	11,554	22,385	35,790	94	108	109	128	118
Public college	48,837	55,479	53,875	14	9	7	8	7
Total	60,391	77,864	89,665	29	38	25	39	32
NSW								
Private college	7,345	6,253	6,129	-15	-19	-	-	-
Public college	53,967	57,770	54,406	7	1	-	-	-
Total	61,312	64,023	60,535	4	-1	-	-	-
				Students				
Victoria								
Private college	10,399	19,164	30,637	84	106	99	125	112
Public college	38,460	42,316	37,701	10	-2	7	2	4
Total	48,859	61,480	68,338	26	32	25	37	31
NSW								
Private college	7,203	6,134	6,010	-15	-19	-	-	-
Public college	48,871	50,421	47,097	3	-4	-	-	-
Total	56,074	56,555	53,107	1	-5	-	-	-

[***]Significant at 1%, significant at 5% and significant at 10%.
Note: Public colleges include Technical and Further Education (TAFE) colleges, Adult and Community Education (ACE) colleges and Universities. Private colleges include professional/industry organisations, other non-government organisations and commercial training colleges. These estimates exclude enrolments among those who are still in secondary school.

Table 2: Mean characteristics of 15-19 year-old new post-secondary VET course enrolments, 2008-2011

	Victoria				NSW			
	2008	2009	2010	2011	2008	2009	2010	2011
Student characteristics								
Female	0.437	0.433	0.42	0.455	0.462	0.475	0.463	0.457
Age in years on January 1 in the year of enrolment								
15	0.077	0.066	0.054	0.048	0.076	0.073	0.066	0.059
16	0.129	0.122	0.115	0.108	0.164	0.157	0.156	0.152
17	0.218	0.202	0.206	0.206	0.237	0.232	0.24	0.236
18	0.346	0.367	0.355	0.375	0.309	0.322	0.312	0.325
19	0.23	0.242	0.27	0.262	0.214	0.216	0.225	0.228
Aboriginal or Torres Strait Islander	0.051	0.046	0.044	0.043	0.088	0.08	0.091	0.093
Language spoken at home and migrant status								
Doesn't speaks a language other than English at home, Australian born	0.532	0.562	0.592	0.594	0.739	0.756	0.777	0.775
Speaks a language other than English at home, Australian born	0.025	0.026	0.03	0.036	0.087	0.094	0.085	0.083
Doesn't speak a language other than English at home, foreign born	0.355	0.323	0.296	0.291	0.098	0.077	0.075	0.075
Speaks a language other than English at home, foreign born	0.088	0.089	0.082	0.079	0.075	0.073	0.064	0.067
Regional classification of residence								
Major city	0.558	0.551	0.561	0.567	0.432	0.442	0.408	0.413
Inner regional	0.346	0.355	0.351	0.352	0.368	0.355	0.374	0.376
Outer regional	0.089	0.086	0.081	0.076	0.182	0.186	0.201	0.193
Remote	0.007	0.007	0.006	0.005	0.014	0.013	0.013	0.014
Very remote	0.000	0.001	0.000	0.000	0.004	0.004	0.004	0.004
Employed at time of enrolment	0.585	0.578	0.581	0.548	0.613	0.559	0.553	0.557

Has a disability	0.074	0.063	0.073	0.079	0.064	0.064	0.072	0.081
Socio-economic status of region (SEIFA)								
1st quintile (most disadvantaged)	0.043	0.041	0.041	0.042	0.129	0.129	0.128	0.128
2nd quintile	0.146	0.139	0.133	0.128	0.214	0.215	0.224	0.227
3rd quintile	0.174	0.183	0.175	0.173	0.218	0.217	0.22	0.219
4th quintile	0.308	0.315	0.329	0.344	0.213	0.21	0.206	0.209
5th quintile (most advantaged)	0.328	0.322	0.323	0.313	0.226	0.229	0.22	0.217
Highest prior level of education completed								
Tertiary education (ISCED 4B and above)	0.003	0.004	0.007	0.009	0.009	0.01	0.011	0.009
Secondary school (ISCED 3A) or vocational equiv. (ISCED 3C)	0.507	0.526	0.522	0.542	0.473	0.503	0.482	0.493
Less than secondary qualification	0.49	0.47	0.472	0.449	0.518	0.487	0.507	0.498
Place of residence and place of study are in different states	0.028	0.027	0.025	0.019	0.011	0.011	0.013	0.013
College characteristics								
College size in 2008								
College didn't exist	0.000	0.009	0.07	0.176	0	0.008	0.016	0.026
<100 enrolments	0.092	0.098	0.124	0.151	0.084	0.064	0.072	0.064
100-999 enrolments	0.093	0.086	0.092	0.089	0.093	0.075	0.069	0.067
1000-3999 enrolments	0.448	0.444	0.369	0.353	0.269	0.28	0.302	0.295
4000-6999 enrolments	0.367	0.363	0.345	0.231	0.28	0.285	0.276	0.28
7000+ enrolments	0.000	0.000	0.000	0.000	0.274	0.288	0.265	0.269
Type of college								
Technical and Further Education (TAFE)	0.736	0.731	0.645	0.528	0.823	0.854	0.844	0.845
Adult Community Education (ACE)	0.072	0.074	0.069	0.073	0.057	0.058	0.059	0.054
University	0.079	0.076	0.07	0.055	0.000	0.000	0.000	0.000
Industry/professional association or Non-government Organisation	0.048	0.042	0.064	0.069	0.032	0.023	0.024	0.022
Private business	0.057	0.069	0.148	0.272	0.082	0.059	0.066	0.071
Other	0.008	0.008	0.005	0.003	0.006	0.005	0.007	0.007

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Course characteristics

Course qualification level

Certificate I (ISCED 2C)	0.091	0.065	0.078	0.096	0.042	0.047	0.043	0.042
Certificate II (ISCED 2C)	0.259	0.296	0.282	0.265	0.226	0.229	0.256	0.234
Certificate III (ISCED 3C)	0.358	0.333	0.386	0.36	0.498	0.462	0.473	0.495
Certificate IV (ISCED 4B)	0.116	0.122	0.113	0.153	0.129	0.155	0.137	0.144
Diploma/Advanced Diploma (ISCED 5B)	0.177	0.184	0.141	0.127	0.106	0.107	0.092	0.084

Field of study (ASCED 2-digit)[a]

Natural and physical science	0.006	0.004	0.003	0.002	0.003	0.003	0.003	0.003
Information technology	0.038	0.028	0.021	0.015	0.044	0.047	0.041	0.041
Engineering and related technology	0.161	0.17	0.171	0.13	0.176	0.151	0.158	0.169
Architecture and building	0.104	0.102	0.136	0.089	0.087	0.076	0.092	0.089
Agriculture, environment and related	0.035	0.032	0.034	0.03	0.036	0.037	0.038	0.038
Health	0.032	0.038	0.034	0.033	0.03	0.035	0.033	0.032
Education	0.002	0.002	0.002	0.002	0.000	0.000	0.001	0.001
Management and commerce	0.251	0.233	0.217	0.264	0.277	0.269	0.255	0.246
Society and culture	0.081	0.089	0.110	0.131	0.095	0.100	0.100	0.106
Creative arts	0.038	0.053	0.043	0.040	0.04	0.050	0.047	0.045
Food, hospitality and personal services	0.153	0.154	0.146	0.137	0.123	0.126	0.123	0.127
General courses[b]	0.098	0.094	0.083	0.127	0.088	0.105	0.108	0.103

Note: Estimates are based on the full set of information available for each variable. None of the variables have more than 5% missing. These estimates exclude enrolments among those who are still in secondary school. This data includes information on multiple enrolments by the same individuals within a given year.
[a]Information on field of study is presented in this table at a more aggregate level (2-digit Australian Standard Classification of Education (ASCED)) than is used in the analysis (4-digit ASCED) to save space. [b]General courses are ones that are not preparation for a specific occupation, such as numeracy and literacy courses and employment skills training.

Table 3: Unconditional difference-in-differences for course choice and completion

	Mean values			Change relative to 2008		Unconditional difference-in-difference		
	2008	2010	2011	2010	2011	2010	2011	2010-11
						%pt.	%pt.	%pt.
Victoria								
National skill shortage	0.278	0.134	0.169	-0.144	-0.109	0.036***	0.028***	0.033***
						(0.008)	(0.007)	(0.007)
Course graduate wage (log relative to Building 3C)	-0.128	-0.115	-0.057	0.012	0.071	0.007	0.032***	0.022***
						(0.004)	(0.007)	(0.005)
Module completion	0.737	0.760	0.788	0.023	0.051	0.050***	0.076***	0.064***
						(0.007)	(0.008)	(0.007)
Course completion	0.218	0.272	0.305	0.053	0.086	0.053***	0.081***	0.068***
						(0.008)	(0.008)	(0.007)
NSW								
Skill shortage enrolment	0.335	0.156	0.199	-0.180	-0.136			
Course graduate wage (log relative to Building 3C)	-0.119	-0.114	-0.080	0.006	0.039			
Module completion rate	0.735	0.708	0.710	-0.027	-0.025			
Course completion rate	0.329	0.329	0.334	0.000	0.005			

***Significant at 1%, **significant at 5% and *significant at 10%.

Note: Estimates are based on the full set of information available for each variable. All estimates exclude enrolments among those who are still in secondary school. This data includes information on multiple enrolments by the same individuals within a given year. Standard errors are clustered at the local government area, college and student level. None of the variables have more than 5% missing, except for Skill shortage enrolment, where we omit enrolments in general courses. For this variable, the number of observations for Victoria for 2008, 2010 and 2011 are 39 665, 53 812 and 56 011 respectively. The corresponding numbers for NSW are 45 769, 45 983 and 43 858.

Table 4: Diverging trends? Conditional difference-in-differences estimation for Jan-June enrolments 2008-2009

	National skill shortage[a]	Course graduate wage[a]	Module completion[b]	Course completion[b]
Victoria	-0.036***	-0.016***	-0.028***	-0.114***
	(0.009)	(0.004)	(0.008)	(0.007)
Jan-June 2009	-0.007	-0.026***	-0.007*	0.010*
	(0.004)	(0.003)	(0.003)	(0.004)
Jan-June 2009xVictoria	0.006	-0.014***	-0.012	0.008
	(0.009)	(0.004)	(0.009)	(0.006)
Observations	115233	165877	164129	166680

***Significant at 1%, **significant at 5% and *significant at 10%.

Note: Standard errors are clustered at the local government area, college and individual level.

[a]Results are estimated with student and college level controls. [b]Results are estimated with student, college and course level controls.

Table 5: Estimated VTG impacts on course choice, 2010-11, stepwise regression

	Unconditional		With student controls		With student & college controls	
	National skill shortage	Course graduate wage	National skill shortage	Course graduate wage	National skill shortage	Course graduate wage
Victoria	-0.058***	-0.009**	-0.040***	-0.007*	-0.042***	-0.016***
	(0.010)	(0.003)	(0.009)	(0.003)	(0.009)	(0.004)
Post reform	-0.158***	0.022***	-0.148***	0.025***	-0.152***	0.024***
	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Victoria x Post-reform	**0.033***	**0.022***	**0.027***	**0.024***	**0.039***	**0.023***
	(0.007)	**(0.005)**	**(0.007)**	**(0.005)**	**(0.007)**	**(0.005)**
Student characteristics controls	No	No	Yes	Yes	Yes	Yes
College characteristics controls	No	No	No	No	Yes	Yes
Observations	285005	410643	266809	386339	266697	386170

***Significant at 1%, **significant at 5% and *significant at 10%.

Note: Standard errors are clustered at the local government area, college and individual level. All models are estimated using all available information. The sample size for results using the National Skill Shortage measure are smaller because we exclude enrolments in general courses that do not prepare people for any specific course.

Table 6: Estimated VTG impacts on course choice, 2010-11, heterogeneous effects

Group	National skill shortage			Course graduate wage		
	Dummy=1	Dummy=0	Difference	Dummy=1	Dummy=0	Difference
Student characteristics						
Female	0.025***	0.062***	-0.037***	0.01**	0.033***	-0.022***
	(0.008)	(0.011)	(0.014)	(0.005)	(0.006)	(0.005)
Disability	0.060***	0.038***	0.022	0.034***	0.022***	0.012
	(0.015)	(0.007)	(0.015)	(0.010)	(0.005)	(0.009)
Aboriginal or Torres Strait Islander	-0.013	0.043***	-0.057***	0.022**	0.025***	-0.002
	(0.021)	(0.007)	(0.020)	(0.011)	(0.005)	(0.010)
Speaks a language other than English at home	0.104***	0.03***	0.074***	0.048***	0.020***	0.028***
	(0.010)	(0.008)	(0.013)	(0.008)	(0.005)	(0.008)
From lowest quintile of national SES measure (SEIFA)	0.071***	0.037***	0.033*	0.013	0.025***	-0.012
	(0.018)	(0.007)	(0.019)	(0.008)	(0.005)	(0.009)
Lives outside a capital city	-0.00	0.057***	-0.060***	0.008	0.030***	-0.023***
	(0.013)	(0.008)	(0.014)	(0.006)	(0.006)	(0.008)
Less than secondary school qualification	0.017	0.055***	-0.038***	0.026***	0.022***	0.004
	(0.012)	(0.006)	(0.012)	(0.006)	(0.005)	(0.006)
Unemployed	0.045***	0.025***	0.02*	0.022***	0.019***	0.003
	(0.010)	(0.008)	(0.012)	(0.007)	(0.005)	(0.006)
College characteristics						
Public college	0.069***	-0.18***	0.249***	0.025***	0.012**	0.012
	(0.007)	(0.016)	(0.018)	(0.006)	(0.005)	(0.008)
Private business	-0.284***	0.065***	-0.349***	0.014***	0.023***	-0.009
	(0.023)	(0.008)	(0.025)	(0.006)	(0.005)	(0.008)
Overall	0.039***			0.023***		
	(0.007)			(0.005)		

***Significant at 1%, **significant at 5% and *significant at 10%.

Notes: Dummy=1 is the treatment effect for those who are members of the group and Dummy=0 is the effect for those who are not a member of the group. Standard errors are clustered at the LGA, college and student level.

Table 7: Estimated VTG impacts on course completion, 2010-11, stepwise regression

	Unconditional		With student controls		With student & college controls		With student, college and course choice controls	
	Module completion	Course completion	Module completion	Course completion	Module completion	Course completion	Module completion	Course completion
Victoria	0.002	-0.111***	0.001	-0.121***	-0.006	-0.109***	-0.019**	-0.095***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)
Post reform	-0.026***	0.002	-0.019***	0.000	-0.016***	0.004	-0.020***	-0.001
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
Victoria x Post-reform	**0.064***	**0.068***	**0.058***	**0.063***	**0.024***	**0.022***	**0.027***	**0.025***
	(0.007)	**(0.007)**	**(0.007)**	**(0.007)**	**(0.007)**	**(0.006)**	**(0.007)**	**(0.006)**
			0.005	0.137***	-0.010**	0.122***	0.016***	0.048***
Student characteristics controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
College characteristics controls	No	No	No	No	Yes	Yes	Yes	Yes
Course choice controls	No	No	No	No	No	No	Yes	Yes
Observations	403901	413641	380057	389257	379891	389088	379891	389088

***Significant at 1%, **significant at 5% and *significant at 10%.

Note: standard errors are clustered at the local government area, college and individual level. All models are estimated using all available information.

Table 8: Estimated VTG impacts on course completion, 2010-11, heterogeneous effects

Binary variable	Module completion			Course completion		
	Dummy=1	Dummy=0	Difference	Dummy=1	Dummy=0	Difference
Student characteristics						
Female	0.018***	0.035***	-0.017*	0.043***	0.011*	0.032***
	(0.006)	(0.010)	(0.009)	(0.008)	(0.006)	(0.008)
Disability	0.01	0.029***	-0.019	0.014	0.026***	-0.012
	(0.019)	(0.007)	(0.015)	(0.013)	(0.006)	(0.014)
Aboriginal or Torres Strait Islander	0.001	0.029***	-0.028	0.055***	0.025***	0.030)
	(0.031)	(0.007)	(0.027)	(0.021)	(0.006)	(0.021
Speaks a language other than English at home	0.048***	0.025***	0.023**	0.016***	0.028***	-0.012
	(0.009)	(0.007)	(0.009)	(0.01)	(0.006)	(0.010)
From lowest quintile of national SES measure (SEIFA)	0.054***	0.026***	0.028***	0.039***	0.025***	0.014)
	(0.007)	(0.007)	(0.01)	(0.011)	(0.006)	(0.012)
Lives outside a capital city	0.024***	0.029***	-0.006	0.001	0.036***	-0.035***
	(0.008)	(0.009)	(0.011)	(0.009)	(0.006)	(0.011)
Less than secondary school qualification	0.032**	0.024***	0.007	0.027***	0.026***	0.000
	(0.013)	(0.004)	(0.012)	(0.007)	(0.008)	(0.009)
Unemployed	0.014	0.034***	-0.020	0.024***	0.025***	-0.002
	(0.014)	(0.005)	(0.014)	(0.008)	(0.006)	(0.008)
College characteristics						
Public college	0.026***	0.051***	-0.024*	0.014**	0.097***	-0.083***
	(0.008)	(0.010)	(0.013)	(0.006)	(0.015)	(0.017)
Private business	0.024*	0.031***	-0.007	0.140***	0.016***	0.124***
	(0.013)	(0.007)	(0.015)	(0.020)	(0.006)	(0.022)
Overall	0.027***			0.025***		
	(0.007)			(0.006)		

***Significant at 1%, **significant at 5% and *significant at 10%.

Notes: Dummy=1 is the treatment effect for those who are members of the group and Dummy=0 is the effect for those who are not a member of the group. Standard errors are clustered at the LGA, college and student level.

Table 9: Results for the sensitivity analysis, 2010-2011

	National skill shortage	Course graduate wage	Module completion	Course completion
Standard estimates (Table 8, columns 3-4)	0.039***	0.023***	0.027***	0.025***
	(0.007)	(0.005)	(0.007)	(0.006)
Jan-July enrolments only	0.047***	0.022***	0.028***	0.025***
	(0.008)	(0.005)	(0.007)	(0.006)
Enrolments restricted to Albury and Wodonga local government areas[a]	0.191***	0.048**	0.045	0.092**
	(0.044)	(0.019)	(0.034)	-0.042
Restricting sample to 18-19 year-olds	0.033***	0.020***	0.031***	0.041***
	0.006	0.005	(0.005)	(0.007)
Standard estimates, 2008 and 2010 cohorts only	0.033***	0.005	0.019***	0.038***
	0.008	0.004	(0.007)	(0.006)
Standard estimates, 2008 and 2011 cohorts only	0.054***	0.035***	0.034***	0.013*
	(0.007)	(0.008)	(0.007)	(0.006)
Standard specification estimated using a probit model	0.034***	-	-	0.018***
	(0.008)	-	-	(0.007)
Including college fixed effects	0.053***	0.021***	0.024***	0.018**
	(0.007)	(0.005)	(0.007)	(0.006)
Excluding general and mixed program courses	-	0.006**	-	-
	-	(0.003)	-	-
Excluding apprentices/trainees	0.051***	0.023***	0.020**	0.015*
	(0.007)	(0.007)	(0.009)	(0.008)
Excluding fee-for-service enrolments	0.030***	0.024***	0.030***	0.026***
	(0.008)	(0.005)	(0.007)	(0.006)
Excluding wages with missing 4-digit cells	-	0.026***	-	-
	-	(0.005)	-	-
Including course fixed effects	-	-	0.019**	0.046***
	-	-	(0.007)	(0.006)

***Significant at 1%, **significant at 5% and *significant at 10%.

[a]Local government areas (LGAs) is an Australian standard geographical classification that covers the administrative boundaries of local governments, similar to counties in the United States. The LGAs of Albury (in Victoria) and Wodonga (in NSW) are divided by the Murray River, which is the Victoria and NSW state border. This model is estimated on a sample size of 1962 and 3073 observations for national skill shortage and course graduate wage respectively.

Notes: estimates are the average treatment effects on the treated, or the coefficient on the interaction effect between state and post-reform dummies in the difference-in-difference regression equation. Results are generated with a full set of student and college controls. Results for academic achievement also include course controls. Standard errors are clustered at the local government area, college and student level.

Appendix: Supplementary Material for Online Publication

Here we present additional data details and results referred to in the main text but not included in full in the main text given space constraints and readability concerns. Table A1 defines the control variables included in (1). Table A2 provides further descriptive information on the national skills shortage lists behind one of our course choice measures. Table A3 gives the estimated wage premia associated with different qualifications that lie behind our second course choice measure. Table A4 gives the full estimates for our course choice models, including estimated parameters for controls, which are omitted from the relevant table in the main text. Table A5 does likewise for our completion models. Figures A1-A5 present evidence on prior trends and give an initial indication of changes in outcomes coinciding with the introduction of the VTG. Figures A6 and A7 present evidence on changes in course enrolments at the course level that coincide with the introduction of the VTG.

Table A1: Description of control variables

Variable	Description	Observations
Student characteristics		
Female	Dummy variable of gender	413,514
Age in years on January 1 in the year of enrolment	Dummy variable derived from the date of birth. To be eligible for the VTG, course applicants must provide evidence to verify their date of birth	413805
Aboriginal or Torres Strait Islander	Self-identified as being from Aboriginal or Torres Strait Island decent	413805
Migrant status and language other than English spoken at home	Migrant status is self-reported country of birth, which is collapsed into whether or not the student is born overseas. Language other than English spoken at home is the reported main language spoken at home other than English (if any). All languages other than English are bundled together as non-English speaking.	400477
Regional classification of residence	These are categories of remoteness, measured by distance to major services, produced by the Australian Bureau of Statistics (ABS) (2011a). These categories were assigned to the residential postcodes in the VETPC using correspondence between residential postcode and remoteness areas obtained from the ABS.	413642
Employed at time of enrolment	Students are asked which of a number of employment states *best* describes their current situation. Our binary measure of employed includes people who report being part-time employed, full-time employed and self-employed. All other states (unpaid worker, unemployed and looking for work and unemployed and not seeking work) are grouped together.	413805
Has a disability	Student self-reported belief about whether they have a disability, impairment or long-term health condition. This information is used by colleges to identify students who may need extra support to cater for any special learning needs.	402663
Socio-economic status of region of residence (SEIFA)	This is the relative disadvantage of the local government area (LGA) in which the student resides, measured using the Social Economic Index of Areas (SEIFA) produced by the Australian Bureau of Statistics (2011b). SEIFA is an ordinal index of regional disadvantage, combining measures such as percentage of people who are low income and percentage of people who have less than secondary school education from the Australian	412509

census. We break the national index into quintiles, where the lowest quintile contains the most disadvantaged postcodes in Australia. The SEIFA quintiles were assigned to students in the VETPC using concordance between postcode and LGA obtained from the Australian Bureau of Statistics.

Highest prior level of education completed	Highest prior education is a combination of information on the student reported highest year of school successfully completed and the reported Australian Standard Classification of Education (ASCED) post-school qualifications completed. The highest post-school qualification is determined according to the International Standard Classification of Education (ISCED) 1997 (United National Educational, Scientific and Cultural Organisation (UNESCO) 2006) qualification rankings and concordance between ASCED and ISCED (Australian Bureau of Statistics 2001).	413805
Place of residence and place of study are in different states	VETPC includes both the postcode of residence and postcode of college where the student is enrolled. Because postcodes do not over-lap state borders, this information was used to identify people travelling interstate to study.	413805

College characteristics

College size in 2008	Number of 15-19 year-old new enrolments in 2008 for each college identified in VETPC between 2008 and 2011. New colleges that entered the market after 2008 are treated as a separate category.	413805
Type of college	College type in the VETPC is classified according to the governance characteristics of the organisation providing the training. Technical and Further Education (TAFE) colleges are the main public colleges, which were created by Act of Parliament and have responsibilities specified in their establishing Acts, other legislation and Ministerial Directions. Adult and Community Education (ACE) colleges are also public colleges. They differ from TAFEs in that their primary focus is adult education and as well as providing nationally accredited courses for preparation for work, they also provide personal and recreational courses (that are not included in this study). The third type of public college is dual sector universities that offer both VET qualifications and bachelor degrees. In contrast to public colleges, private businesses (commercial colleges) are registered colleges that provide nationally recognised training on a for-profit basis. In between public and private businesses are enterprises, industry associations and other non-government organisations that are registered training organisations that provide nationally accredited training to meet the needs of their members or employees.	413621

Course characteristics

Course qualification level	Under the Australian Qualification Framework (AQF) (Australian Quality Framework Council 2013), nationally accredited VET courses are one of six ASCED levels from Certificate I through to Advanced Diploma. For the analysis, we combine Diploma level courses and Advanced Diploma level courses to produce five qualification categories. These are equivalent to ISCED (1997) 2C through to ISCED 5B (ABS 2001). There are also VET courses outside the AQF system that do not lead to a national qualification, such as foundation level courses for preparation for AQF courses, but these are omitted from our analysis.	413805
Field of study (4-digit ASCED)	The field of course study is at the 4-digit Australian Standard Classification of Education level (Australian Bureau of Statistics 2001). There are 71 categories in total.	413805

Note: the total number of observations for the analysis is 413805 new course enrolments. Among the control variables, migrant status and language other than English spoken at home has the largest number of missing variables with 13328 missing, or around 3 percent of all observations.

Table A2: Number of ASCO 6-digit occupations on the National Skill Shortage List[a]

	2007		2009		2010	
	On list	Not on list[b]	On list	Not on list[b]	On list	Not on list[b]
	No.	No.	No.	No.	No.	No.
ASCO 1-digit occupation						
Manager	3	92	1	94	4	91
Professional	51	259	38	272	35	275
Technical and trades	75	99	34	140	46	128
Community and personal services	2	99	3	98	2	99
Clerical and administrative	0	80	0	80	0	80
Sales	0	37	0	37	0	37
Machinery operators	1	75	0	76	0	76
Labourers	0	124	0	124	0	124
Total ASCO 6-digit occupations	132	865	76	921	87	910

[a] Information on skill demand, including national shortage information used in the analysis is annual information from the year prior to enrolment (2007, 2008 and 2010). This is the best estimate of information available at the time course choice. [b]Not on list does not necessarily meant that there is weak demand for course graduates trained for work in a given occupation. 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.

Table A3: Estimated log weekly wage coefficients ($A2013) by ISCED 4-digit field of study and qualification level

ISCED 4-digit field of study	Qualification level	2007		2008		2009		2010	
		coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Earth Sciences	Certificate I	0.354	0.202	-	-	-1.039	0.256	-	-
Earth Sciences	Certificate II	-	-	-	-	-2.122	0.571	0.636	0.570
Earth Sciences	Certificate III	-0.262	0.401	-	-	-	-	-	-
Earth Sciences	Certificate IV	-	-	-	-	-	-	-	-
Earth Sciences	Diploma	-	-	-	-	-	-	-	-
Biological Sciences	Certificate I	-0.186	0.136	0.025	0.278	0.123	0.330	-0.181	0.259
Biological Sciences	Certificate II	-0.147	0.402	-	-	0.461	0.404	-	-
Biological Sciences	Certificate III	-0.058	0.191	-	-	-	-	-	-
Biological Sciences	Certificate IV	-	-	-	-	-	-	-	-
Biological Sciences	Diploma	-	-	-	-	-	-	-	-
Other Natural and Physical Sciences	Certificate I	-0.229	0.166	-0.087	0.143	-0.123	0.109	0.091	0.183
Other Natural and Physical Sciences	Certificate II	-0.075	0.181	-0.303	0.278	-0.152	0.192	-0.031	0.235
Other Natural and Physical Sciences	Certificate III	0.068	0.132	-0.067	0.157	-0.058	0.110	0.005	0.143
Other Natural and Physical Sciences	Certificate IV	-0.913	0.328	-	-	-0.621	0.193	-0.280	0.333
Other Natural and Physical Sciences	Diploma	-	-	-	-	-	-	-	-
Computer Science	Certificate I	-0.107	0.084	-0.133	0.095	-0.127	0.064	-0.222	0.098
Computer Science	Certificate II	0.023	0.144	-0.479	0.151	-0.195	0.071	-0.140	0.096
Computer Science	Certificate III	-0.421	0.072	-0.598	0.126	-0.418	0.095	-0.066	0.162
Computer Science	Certificate IV	-0.220	0.089	-0.237	0.130	-0.483	0.098	0.175	0.258
Computer Science	Diploma	-	-	-	-	-	-	-	-
Information Systems	Certificate I	-0.071	0.074	-0.148	0.104	-0.071	0.098	-0.021	0.143
Information Systems	Certificate II	-0.189	0.078	-0.121	0.141	0.036	0.121	-0.067	0.183
Information Systems	Certificate III	-0.267	0.074	-0.260	0.076	-0.203	0.058	-0.236	0.076

Information Systems	Certificate IV	-0.235	0.058	-0.203	0.144	0.002	0.572	-	-
Information Systems	Diploma	-0.581	0.233	-0.311	0.250	-	-	-	-
Other Information Technology	Certificate I	0.143	0.401	0.081	0.551	-	-	-	-
Other Information Technology	Certificate II	0.099	0.191	-0.225	0.248	-0.340	0.145	-0.212	0.205
Other Information Technology	Certificate III	-	-	-	-	-	-	-	-
Other Information Technology	Certificate IV	-	-	-	-	-	-	-0.586	0.405
Other Information Technology	Diploma	-	-	-	-	-	-	-	-
Manufacturing Engineering and Technology	Certificate I	0.082	0.077	-0.131	0.084	-0.240	0.069	-0.086	0.119
Manufacturing Engineering and Technology	Certificate II	-0.172	0.099	-0.429	0.117	-0.043	0.095	0.127	0.205
Manufacturing Engineering and Technology	Certificate III	-0.201	0.052	-0.265	0.065	-0.168	0.047	-0.120	0.076
Manufacturing Engineering and Technology	Certificate IV	-0.198	0.072	-0.343	0.101	-0.510	0.072	-0.163	0.106
Manufacturing Engineering and Technology	Diploma	-0.082	0.112	-0.556	0.132	-0.021	0.101	-0.073	0.288
Process and Resources Engineering	Certificate I	0.233	0.285	-0.213	0.249	0.271	0.571	-0.070	0.570
Process and Resources Engineering	Certificate II	0.358	0.234	-	-	0.313	0.286	-0.109	0.331
Process and Resources Engineering	Certificate III	-0.006	0.057	-0.058	0.075	-0.061	0.058	0.119	0.088
Process and Resources Engineering	Certificate IV	0.091	0.096	0.083	0.169	0.181	0.087	0.095	0.142
Process and Resources Engineering	Diploma	0.138	0.165	-0.493	0.322	-0.095	0.404	0.080	0.332
Automotive Engineering and Technology	Certificate I	-	-	-0.184	0.390	-0.503	0.571	-	-
Automotive Engineering and Technology	Certificate II	-0.147	0.202	-	-	-0.137	0.203	0.301	0.287
Automotive Engineering and Technology	Certificate III	-0.075	0.034	-0.170	0.048	-0.120	0.032	-0.104	0.047
Automotive Engineering and Technology	Certificate IV	-0.131	0.042	-0.203	0.069	-0.213	0.047	-0.194	0.070
Automotive Engineering and Technology	Diploma	-0.160	0.051	-0.280	0.080	-0.185	0.069	-0.260	0.122
Mechanical and Industrial Engineering and Technology	Certificate I	-0.120	0.121	0.207	0.198	0.014	0.091	-0.117	0.142
Mechanical and Industrial Engineering and Technology	Certificate II	0.102	0.080	0.204	0.131	0.124	0.077	0.232	0.138
Mechanical and Industrial Engineering and Technology	Certificate III	0.028	0.035	0.063	0.049	0.034	0.032	0.014	0.045
Mechanical and Industrial Engineering and Technology	Certificate IV	-0.057	0.046	-0.247	0.065	-0.185	0.048	-0.164	0.075
Mechanical and Industrial Engineering and Technology	Diploma	-0.026	0.056	-0.161	0.103	-0.189	0.054	-0.104	0.097
Civil Engineering	Certificate I	0.156	0.132	-0.003	0.131	0.111	0.102	-0.067	0.135

Field	Level								
Civil Engineering	Certificate I I	-	-	-	-	-0.089	0.191	0.108	0.235
Civil Engineering	Certificate III	-0.057	0.254	0.044	0.156	-0.198	0.144	-0.291	0.183
Civil Engineering	Certificate IV	0.230	0.566	0.634	0.551	-	-	0.056	0.571
Civil Engineering	Diploma	0.000	-	0.138	0.551	-	-	-	-
Geomatic Engineering	Certificate I	0.435	0.255	-0.103	0.227	0.151	0.174	0.128	0.168
Geomatic Engineering	Certificate II	0.000	-	-	-	0.954	0.571	-0.800	0.570
Geomatic Engineering	Certificate III	0.263	0.401	-0.641	0.390	-0.271	0.203	-0.262	0.193
Geomatic Engineering	Certificate IV	-0.014	0.567	-1.612	0.550	-0.567	0.571	-0.552	0.571
Geomatic Engineering	Diploma	-	-	-	-	-	-	-	-
Electrical and Electronic Engineering and Technology	Certificate I	-0.067	0.110	-0.075	0.135	-0.010	0.076	0.037	0.114
Electrical and Electronic Engineering and Technology	Certificate II	0.325	0.172	0.561	0.550	0.226	0.234	0.383	0.235
Electrical and Electronic Engineering and Technology	Certificate III	0.139	0.039	0.116	0.050	0.078	0.032	0.087	0.043
Electrical and Electronic Engineering and Technology	Certificate IV	-0.277	0.083	-0.349	0.117	-0.135	0.068	-0.354	0.062
Electrical and Electronic Engineering and Technology	Diploma	-0.174	0.058	-0.441	0.079	-0.286	0.063	-0.126	0.138
Aerospace Engineering and Technology	Certificate I	0.123	0.181	0.155	0.320	-0.166	0.217	-0.276	0.257
Aerospace Engineering and Technology	Certificate II	0.068	0.109	-0.094	0.162	-0.009	0.114	-0.212	0.174
Aerospace Engineering and Technology	Certificate III	-	-	-	-	-	-	-	-
Aerospace Engineering and Technology	Certificate IV	-0.327	0.255	-0.515	0.319	-0.492	0.217	-0.272	0.331
Aerospace Engineering and Technology	Diploma	-0.551	0.255	-	-	-	-	-	-
Maritime Engineering and Technology	Certificate I	0.000	-	-	-	0.095	0.404	-	-
Maritime Engineering and Technology	Certificate II	0.080	0.401	-	-	0.317	0.404	0.415	0.571
Maritime Engineering and Technology	Certificate III	0.092	0.084	-0.189	0.163	-0.141	0.078	0.004	0.122
Maritime Engineering and Technology	Certificate IV	-0.044	0.095	0.039	0.187	0.019	0.093	-0.177	0.156
Maritime Engineering and Technology	Diploma	-0.135	0.133	-0.283	0.143	-0.404	0.133	-0.051	0.236
Other Engineering and Related Technologies	Certificate I	0.055	0.116	0.291	0.178	-0.117	0.256	-	-
Other Engineering and Related Technologies	Certificate II	0.130	0.284	0.372	0.551	0.132	0.572	0.249	0.331
Other Engineering and Related Technologies	Certificate III	-0.086	0.120	-0.389	0.227	-0.274	0.140	-0.150	0.114
Other Engineering and Related Technologies	Certificate IV	0.268	0.181	-0.276	0.390	-0.036	0.217	0.005	0.156
Other Engineering and Related Technologies	Diploma	-	-	-	-	-	-	-	-

Architecture and Urban Environment	Certificate I	-0.105	0.075	-0.116	0.093	-0.243	0.080	-0.133	0.106
Architecture and Urban Environment	Certificate II	-0.005	0.123	-0.433	0.228	-0.349	0.119	-0.110	0.162
Architecture and Urban Environment	Certificate III	-	-	-	-	-	-	-	-
Architecture and Urban Environment	Certificate IV	-	-	-	-	-	-	-	-
Architecture and Urban Environment	Diploma	-	-	-	-	-	-	-	-
Building	Certificate I	-0.031	0.082	-0.027	0.107	-0.085	0.085	0.056	0.106
Building	Certificate II	0.126	0.090	0.130	0.125	0.072	0.079	0.131	0.099
Building	Certificate III	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Building	Certificate IV	-0.255	0.051	-0.365	0.064	-0.267	0.050	-0.307	0.063
Building	Diploma	-0.143	0.061	-0.172	0.096	-0.183	0.061	-0.160	0.075
Agriculture	Certificate I	-0.204	0.093	-0.113	0.157	-0.080	0.101	-0.351	0.205
Agriculture	Certificate II	-0.310	0.098	-0.196	0.132	-0.207	0.124	-0.083	0.161
Agriculture	Certificate III	-0.193	0.053	-0.175	0.079	-0.201	0.056	-0.327	0.085
Agriculture	Certificate IV	-0.106	0.051	-0.068	0.076	-0.191	0.056	-0.176	0.089
Agriculture	Diploma	-0.269	0.173	-0.034	0.158	-0.254	0.122	-0.601	0.220
Horticulture and Viticulture	Certificate I	-0.140	0.165	-0.265	0.319	-0.010	0.203	-0.364	0.288
Horticulture and Viticulture	Certificate II	-0.416	0.284	0.113	0.320	-0.348	0.286	0.106	0.404
Horticulture and Viticulture	Certificate III	-0.152	0.053	-0.318	0.088	-0.147	0.061	-0.156	0.089
Horticulture and Viticulture	Certificate IV	-0.133	0.058	-0.253	0.085	-0.166	0.070	-0.251	0.104
Horticulture and Viticulture	Diploma	-0.489	0.149	-0.280	0.211	-0.520	0.174	0.294	0.332
Forestry Studies	Certificate I	-0.222	0.567	-	-	-	-	-	-
Forestry Studies	Certificate II	-	-	-	-	-	-	0.029	0.571
Forestry Studies	Certificate III	0.074	0.166	-0.157	0.320	-0.079	0.192	-0.098	0.204
Forestry Studies	Certificate IV	0.155	0.159	0.191	0.320	0.151	0.287	-0.139	0.405
Forestry Studies	Diploma	-	-	-	-	-	-	-	-
Fisheries Studies	Certificate I	-1.148	0.566	-	-	-0.144	0.286	-	-
Fisheries Studies	Certificate II	-	-	-0.328	0.551	-0.281	0.571	-	-
Fisheries Studies	Certificate III	-0.116	0.202	0.560	0.320	-0.382	0.182	-0.167	0.257
Fisheries Studies	Certificate IV	-0.333	0.159	-0.283	0.319	-0.297	0.182	-0.426	0.221
Fisheries Studies	Diploma	-0.478	0.155	0.054	0.250	0.211	0.183	0.340	0.570

Environmental Studies	Certificate I	-0.083	0.144	0.293	0.278	0.128	0.192	-0.163	0.287
Environmental Studies	Certificate II	-0.077	0.181	-0.188	0.277	-0.060	0.234	-0.077	0.570
Environmental Studies	Certificate III	-0.131	0.136	-0.017	0.157	0.006	0.140	-0.206	0.156
Environmental Studies	Certificate IV	-0.157	0.126	-0.646	0.156	-0.100	0.116	-0.157	0.176
Environmental Studies	Diploma	0.066	0.216	-0.701	0.391	-0.354	0.287	-	-
Other Agriculture and Environmental	Certificate I	-	-	-	-	-	-	-	-
Other Agriculture and Environmental	Certificate II	-	-	-	-	-	-	-	-
Other Agriculture and Environmental	Certificate III	0.060	0.232	-0.228	0.552	0.328	0.571	-0.495	0.571
Other Agriculture and Environmental	Certificate IV	-0.376	0.141	-0.304	0.140	-0.291	0.122	-0.088	0.158
Other Agriculture and Environmental	Diploma	-	-	-	-	-	-	-	-
Other Agriculture and Environmental	Certificate I	0.024	0.566	-	-	-0.247	0.404	0.113	0.090
Other Agriculture and Environmental	Certificate II	-	-	-	-	0.167	0.571	0.188	0.094
Other Agriculture and Environmental	Certificate III	-	-	-	-	-	-	-	-
Other Agriculture and Environmental	Certificate IV	-	-	-	-	-	-	-	-
Other Agriculture and Environmental	Diploma	-	-	-	-	-	-	-	-
Nursing	Certificate I	0.143	0.097	0.087	0.129	0.093	0.086	-0.136	0.218
Nursing	Certificate II	0.121	0.061	0.131	0.086	0.082	0.058	-0.038	0.162
Nursing	Certificate III	1.022	0.567	-	-	-	-	0.099	0.098
Nursing	Certificate IV	-0.317	0.285	-0.449	0.321	-0.513	0.404	-	-
Nursing	Diploma	-	-	-	-	-	-	-	-
Dental Studies	Certificate I	0.372	0.255	-0.108	0.163	0.168	0.256	-	-
Dental Studies	Certificate II	-0.128	0.109	-0.006	0.278	-0.008	0.122	0.148	0.287
Dental Studies	Certificate III	-0.055	0.066	-0.115	0.071	-0.131	0.068	-	-
Dental Studies	Certificate IV	-	-	-	-	-	-	-	-
Dental Studies	Diploma	-	-	-	-	-	-	-	-
Optical Science	Certificate I	-	-	-	-	-	-	0.510	0.331
Optical Science	Certificate II	-0.021	0.328	-0.011	0.248	0.292	0.234	-0.031	0.119
Optical Science	Certificate III	-	-	-	-	-0.465	0.571	-0.065	0.122
Optical Science	Certificate IV	-	-	-	-	-	-	-0.107	0.081
Optical Science	Diploma	-	-	-	-	-	-	-0.209	0.187

Veterinary Studies	Certificate I	0.203	0.140	-0.303	0.392	0.501	0.155	0.434	0.331
Veterinary Studies	Certificate II	0.139	0.107	-0.138	0.123	-0.034	0.090	-0.025	0.257
Veterinary Studies	Certificate III	-0.160	0.089	-0.102	0.132	-0.228	0.111	-0.079	0.405
Veterinary Studies	Certificate IV	-0.092	0.078	-0.097	0.103	-0.109	0.065	-0.204	0.101
Veterinary Studies	Diploma	-	-	-0.300	0.167	-0.120	0.156	-	-
Public Health	Certificate I	-0.317	0.328	-	-	0.276	0.234	-0.892	0.571
Public Health	Certificate II	0.090	0.233	0.092	0.552	0.089	0.166	-	-
Public Health	Certificate III	-0.103	0.285	-0.083	0.279	0.125	0.167	-	-
Public Health	Certificate IV	-0.080	0.284	-	-	0.267	0.130	-	-
Public Health	Diploma	-	-	-	-	-	-	-	-
Rehabilitation Therapies	Certificate I	-0.208	0.203	0.249	0.139	0.218	0.193	-0.177	0.168
Rehabilitation Therapies	Certificate II	-0.489	0.329	-	-	-	-	-0.171	0.157
Rehabilitation Therapies	Certificate III	-	-	-	-	-	-	-	-
Rehabilitation Therapies	Certificate IV	-	-	-	-	-	-	-	-
Rehabilitation Therapies	Diploma	-	-	-	-	-	-	-	-
Complementary Therapies	Certificate I	-0.211	0.100	-0.184	0.126	-0.073	0.098	-	-
Complementary Therapies	Certificate II	-0.239	0.133	-0.078	0.211	-0.211	0.119	-0.344	0.162
Complementary Therapies	Certificate III	-	-	-	-	-	-	0.041	0.109
Complementary Therapies	Certificate IV	-	-	-	-	-	-	-	-
Complementary Therapies	Diploma	-	-	-	-	-	-	-	-
Other Health	Certificate I	0.042	0.256	-0.306	0.550	-0.160	0.330	0.666	0.571
Other Health	Certificate II	0.213	0.328	-	-	-0.125	0.234	0.090	0.258
Other Health	Certificate III	0.056	0.129	0.192	0.227	-0.152	0.082	0.084	0.144
Other Health	Certificate IV	-	-	-	-	-	-	-	-
Other Health	Diploma	-	-	-	-	-	-	-0.533	0.293
Teacher Education	Certificate I	-0.114	0.568	-	-	-0.128	0.572	-	-
Teacher Education	Certificate II	0.084	0.191	-0.114	0.321	-0.101	0.128	-	-
Teacher Education	Certificate III	-0.061	0.096	-0.093	0.199	0.046	0.100	-0.821	0.404
Teacher Education	Certificate IV	0.779	0.568	-	-	-0.240	0.287	-	-
Teacher Education	Diploma	-	-	-	-	-0.065	0.122	-	-

Other Education	Certificate I	-	-	-	-	-	-	-	-
Other Education	Certificate II	0.114	0.091	-0.087	0.104	-	-	0.176	0.108
Other Education	Certificate III	0.137	0.140	-0.285	0.324	-0.141	0.404	-0.443	0.331
Other Education	Certificate IV	-	-	-	-	-	-	-	-
Other Education	Diploma	-0.297	0.255	-	-	-	-	-0.993	0.408
Accounting	Certificate I	-	-	0.461	0.552	-0.882	0.404	-	-
Accounting	Certificate II	-	-	0.000	(empty)	0.110	0.076	0.137	0.288
Accounting	Certificate III	-0.459	0.328	0.526	0.390	-0.330	0.137	-	-
Accounting	Certificate IV	-0.201	0.154	-0.145	0.212	-	-	-	-
Accounting	Diploma	-	-	-	-	0.034	0.155	-	-
Business and Management	Certificate I	0.052	0.034	-0.052	0.048	-	-	0.036	0.050
Business and Management	Certificate II	-0.064	0.044	-0.106	0.059	0.039	0.330	-0.089	0.056
Business and Management	Certificate III	-0.059	0.075	-0.213	0.098	0.111	0.404	-0.150	0.091
Business and Management	Certificate IV	-1.008	0.328	-0.472	0.391	-	-	-0.060	0.332
Business and Management	Diploma	0.143	0.329	-0.266	0.214	-	-	-	-
Sales and Marketing	Certificate I	0.002	0.061	-0.073	0.074	-0.005	0.033	-0.083	0.094
Sales and Marketing	Certificate II	-0.051	0.060	-0.068	0.082	-0.024	0.039	-0.050	0.072
Sales and Marketing	Certificate III	-0.136	0.036	-0.182	0.054	-0.122	0.073	-0.102	0.055
Sales and Marketing	Certificate IV	-0.121	0.032	-0.307	0.046	-0.585	0.217	-0.187	0.047
Sales and Marketing	Diploma	-0.403	0.103	-0.409	0.137	-	-	-0.165	0.187
Tourism	Certificate I	0.961	0.567	-	-	-0.001	0.067	-0.582	0.288
Tourism	Certificate II	-0.069	0.255	-0.827	0.553	-0.066	0.061	0.166	0.332
Tourism	Certificate III	-0.134	0.065	-0.133	0.100	-0.173	0.033	0.017	0.089
Tourism	Certificate IV	-0.078	0.086	-0.361	0.124	-0.207	0.032	-0.025	0.105
Tourism	Diploma	-	-	-	-	-0.288	0.106	-	-
Office Studies	Certificate I	-	-	-	-	-	-	-	-
Office Studies	Certificate II	-	-	-	-	-0.378	0.234	-	-
Office Studies	Certificate III	-0.115	0.032	-0.161	0.045	-0.141	0.059	-0.144	0.045
Office Studies	Certificate IV	-0.094	0.036	-0.234	0.049	-0.116	0.074	-0.191	0.050
Office Studies	Diploma	-0.224	0.062	-0.364	0.076	-	-	-0.351	0.116

Field	Qualification								
Banking, Finance and Related Fields	Certificate I	-0.009	0.062	-0.094	0.087	-	-	-0.080	0.092
Banking, Finance and Related Fields	Certificate II	0.005	0.067	0.043	0.108	-	-	-0.009	0.108
Banking, Finance and Related Fields	Certificate III	-0.069	0.061	-0.122	0.102	-0.171	0.030	0.066	0.087
Banking, Finance and Related Fields	Certificate IV	0.029	0.334	-	-	-0.189	0.032	0.170	0.407
Banking, Finance and Related Fields	Diploma	-	-	-	-	-0.283	0.056	-	-
Other Management and Commerce	Certificate I	-0.048	0.191	0.398	0.551	-0.115	0.057	0.013	0.405
Other Management and Commerce	Certificate II	-	-	-	-	0.020	0.074	-0.092	0.404
Other Management and Commerce	Certificate III	-0.061	0.076	-0.113	0.119	-0.124	0.054	-0.092	0.168
Other Management and Commerce	Certificate IV	-0.058	0.255	-0.026	0.393	-0.669	0.572	0.704	0.572
Other Management and Commerce	Diploma	-2.397	0.568	0.177	0.391	-	-	-0.446	0.572
Political Science and Policy Studies	Certificate I	0.499	0.567	-	-	0.061	0.331	-	-
Political Science and Policy Studies	Certificate II	0.206	0.285	0.286	0.553	-0.353	0.404	0.110	0.206
Political Science and Policy Studies	Certificate III	-0.126	0.165	-0.488	0.280	-0.094	0.073	-0.211	0.333
Political Science and Policy Studies	Certificate IV	-0.700	0.402	0.181	0.553	-0.297	0.330	-	-
Political Science and Policy Studies	Diploma	-	-	-	-	-	-	-	-
Human Welfare Studies and Services	Certificate I	-0.024	0.045	-0.179	0.062	-	-	-0.031	0.064
Human Welfare Studies and Services	Certificate II	0.008	0.063	-0.265	0.107	0.047	0.234	-0.054	0.085
Human Welfare Studies and Services	Certificate III	0.027	0.034	-0.072	0.049	-0.037	0.166	-0.014	0.048
Human Welfare Studies and Services	Certificate IV	-0.903	0.569	-	-	-	-	-	-
Human Welfare Studies and Services	Diploma	-	-	-	-	-	-	-	-
Law	Certificate I	0.021	0.130	-0.353	0.152	-0.019	0.044	0.094	0.193
Law	Certificate II	-0.172	0.401	-0.593	0.391	0.092	0.063	0.050	0.571
Law	Certificate III	-	-	-	-	-0.030	0.033	-	-
Law	Certificate IV	-	-	-	-	-0.283	0.573	-	-
Law	Diploma	-	-	-	-	-	-	-	-
Justice and Law Enforcement	Certificate I	0.037	0.081	-0.119	0.085	0.037	0.124	0.026	0.115
Justice and Law Enforcement	Certificate II	0.065	0.119	0.075	0.278	-0.193	0.234	0.053	0.332
Justice and Law Enforcement	Certificate III	0.020	0.103	0.033	0.169	-	-	-0.086	0.183
Justice and Law Enforcement	Certificate IV	0.374	0.401	0.740	0.391	-	-	-	-
Justice and Law Enforcement	Diploma	-	-	-	-	-	-	-	-

Librarianship	Certificate I	0.026	0.166	0.046	0.278	-0.093	0.085	0.007	0.288
Librarianship	Certificate II	-0.337	0.567	-	-	0.150	0.116	-	-
Librarianship	Certificate III	-0.540	0.159	-0.129	0.162	-0.220	0.097	0.232	0.331
Librarianship	Certificate IV	-0.215	0.401	-0.127	0.320	0.488	0.330	-0.535	0.571
Librarianship	Diploma	-	-	-	-	-	-	-	-
Language and Literature	Certificate I	0.171	0.173	-0.448	0.250	-0.095	0.167	0.179	0.405
Language and Literature	Certificate II	0.021	0.191	0.203	0.250	0.031	0.571	-0.026	0.289
Language and Literature	Certificate III	-0.108	0.111	-0.051	0.171	-0.247	0.234	0.197	0.258
Language and Literature	Certificate IV	-0.077	0.099	-0.095	0.122	0.091	0.330	0.259	0.163
Language and Literature	Diploma	0.029	0.110	-0.208	0.114	-	-	0.119	0.148
Sport and Recreation	Certificate I	-0.024	0.081	-0.100	0.104	-0.417	0.217	0.034	0.117
Sport and Recreation	Certificate II	-0.112	0.057	-0.271	0.095	-0.055	0.289	-0.035	0.080
Sport and Recreation	Certificate III	-0.112	0.052	-0.186	0.074	-0.084	0.124	-0.131	0.076
Sport and Recreation	Certificate IV	-0.230	0.060	-0.459	0.115	0.005	0.115	-0.120	0.101
Sport and Recreation	Diploma	-0.205	0.149	-0.788	0.281	-0.255	0.122	-1.092	0.405
Other Society and Culture	Certificate I	-	-	-	-	-0.116	0.090	-	-
Other Society and Culture	Certificate II	-	-	-	-	-0.113	0.059	-	-
Other Society and Culture	Certificate III	-0.227	0.255	0.017	0.187	-0.127	0.046	-	-
Other Society and Culture	Certificate IV	0.109	0.140	-0.097	0.197	-0.309	0.073	-	-
Other Society and Culture	Diploma	0.530	0.567	-	-	-0.553	0.167	-	-
Performing Arts	Certificate I	-0.082	0.074	-0.195	0.084	-0.226	0.072	-0.119	0.084
Performing Arts	Certificate II	-0.201	0.087	-0.141	0.109	-0.311	0.076	-0.314	0.093
Performing Arts	Certificate III	-0.162	0.093	-0.084	0.118	-0.241	0.104	-0.252	0.129
Performing Arts	Certificate IV	-0.235	0.096	-0.051	0.121	-0.250	0.094	-0.332	0.122
Performing Arts	Diploma	-0.020	0.287	-0.417	0.553	-	-	-0.457	0.332
Visual Arts and Crafts	Certificate I	-0.209	0.087	-0.369	0.111	-0.249	0.082	-0.421	0.104
Visual Arts and Crafts	Certificate II	-0.082	0.112	0.026	0.132	-0.286	0.087	-0.259	0.100
Visual Arts and Crafts	Certificate III	-0.274	0.104	-0.098	0.128	-0.311	0.094	-0.348	0.139
Visual Arts and Crafts	Certificate IV	-0.276	0.149	-0.013	0.127	-0.223	0.101	-0.130	0.236
Visual Arts and Crafts	Diploma	-0.412	0.401	-0.316	0.554	0.552	0.572	-2.062	0.571

Graphic and Design Studies	Certificate I	-0.096	0.062	-0.162	0.083	-0.229	0.062	-0.055	0.083
Graphic and Design Studies	Certificate II	-0.288	0.081	-0.199	0.106	-0.251	0.082	-0.292	0.085
Graphic and Design Studies	Certificate III	-0.305	0.129	-0.395	0.152	-0.390	0.101	0.009	0.120
Graphic and Design Studies	Certificate IV	-0.361	0.112	-0.230	0.248	-0.718	0.572	-	-
Graphic and Design Studies	Diploma	-	-	-	-	-	-	-	-
Communication and Media Studies	Certificate I	-0.069	0.083	-0.132	0.099	-0.226	0.076	-0.111	0.103
Communication and Media Studies	Certificate II	-0.289	0.093	-0.266	0.157	-0.355	0.105	-0.330	0.103
Communication and Media Studies	Certificate III	-0.353	0.154	-0.125	0.278	-0.184	0.149	-0.134	0.117
Communication and Media Studies	Certificate IV	-0.573	0.159	-0.146	0.188	-0.165	0.111	-0.403	0.137
Communication and Media Studies	Diploma	-	-	-	-	-	-	-	-
Other Creative Arts	Certificate I	-0.426	0.173	-	-	-	-	-	-
Other Creative Arts	Certificate II	-0.782	0.328	-	-	-1.582	0.571	-0.405	0.570
Other Creative Arts	Certificate III	-	-	-	-	-	-	-	-
Other Creative Arts	Certificate IV	-0.152	0.233	0.525	0.551	0.649	0.404	-0.695	0.405
Other Creative Arts	Diploma	-	-	-	-	-	-	-	-
Food and Hospitality	Certificate I	-0.120	0.256	-	-	-	-	-	-
Food and Hospitality	Certificate II	-0.075	0.065	-0.179	0.110	-0.023	0.073	-0.129	0.115
Food and Hospitality	Certificate III	-0.098	0.032	-0.112	0.044	-0.125	0.029	-0.093	0.041
Food and Hospitality	Certificate IV	-0.094	0.032	-0.230	0.045	-0.196	0.031	-0.105	0.048
Food and Hospitality	Diploma	-0.172	0.085	-0.105	0.115	-0.305	0.082	-0.002	0.142
Personal Services	Certificate I	-	-	0.177	0.119	0.010	0.082	0.274	0.120
Personal Services	Certificate II	0.020	0.088	-0.163	0.116	-0.171	0.077	-0.253	0.108
Personal Services	Certificate III	-0.196	0.041	-0.220	0.054	-0.195	0.039	-0.168	0.059
Personal Services	Certificate IV	-0.206	0.048	-0.304	0.063	-0.277	0.047	-0.180	0.067
Personal Services	Diploma	-0.502	0.328	-0.733	0.392	-0.025	0.193	-	-
General Education Programmes	Certificate I	-	-	-0.482	0.390	0.078	0.286	0.781	0.572
General Education Programmes	Certificate II	-0.326	0.084	-0.255	0.090	-0.287	0.078	-0.037	0.095
General Education Programmes	Certificate III	-0.133	0.138	-0.143	0.133	-0.146	0.086	-0.104	0.106
General Education Programmes	Certificate IV	-0.019	0.070	-0.133	0.085	-0.261	0.062	-0.084	0.096
General Education Programmes	Diploma	-0.196	0.109	-0.474	0.188	-0.225	0.111	-0.304	0.100

Social Skills Programmes	Certificate I	-	-	-	-	-	-	-	-
Social Skills Programmes	Certificate II	-0.019	0.403	-1.086	0.559	-	-	-	-
Social Skills Programmes	Certificate III	0.411	0.331	-0.127	0.557	-	-	-	-
Social Skills Programmes	Certificate IV	-0.144	0.569	-	-	0.040	0.407	-	-
Social Skills Programmes	Diploma	-0.626	0.328	-0.162	0.391	0.256	0.331	0.080	0.258
Employment Skills Programmes	Certificate I	-0.270	0.182	-0.473	0.551	-0.613	0.235	-0.109	0.406
Employment Skills Programmes	Certificate II	-0.530	0.567	0.137	0.391	0.531	0.571	0.085	0.405
Employment Skills Programmes	Certificate III	0.248	0.329	0.080	0.551	-0.382	0.287	-0.458	0.219
Employment Skills Programmes	Certificate IV	-0.239	0.064	-0.416	0.098	-0.153	0.059	-0.267	0.088
Employment Skills Programmes	Diploma	-0.532	0.068	-0.239	0.089	-0.265	0.069	-0.133	0.121
Other Mixed Field Programmes	Certificate I	-	-	-	-	-0.251	0.404	-	-
Other Mixed Field Programmes	Certificate II	-	-	-	-	-	-	0.769	0.573
Other Mixed Field Programmes	Certificate III	-0.302	0.328	-	-	-0.584	0.330	-	-
Other Mixed Field Programmes	Certificate IV	0.012	0.160	-	-	-0.110	0.234	0.460	0.289
Other Mixed Field Programmes	Diploma	-1.812	0.567	-	-	-0.421	0.404	-0.757	0.405
Observations		16262		7834		16874		7873	

Note: These estimates are from a log wage regression model estimated on those aged 15-25 at the time of survey (around six months after completing their VET course) and who are not in study at the time of survey (used to generate our measure for expected course returns, adjusted for student characteristics). The dependent variable is weekly wage in 2013 Australian dollar terms, adjusted using the 2007-2013 wage price index by state (Australian Bureau of Statistics 2013). All regression models are estimated with controls for age, gender, state and region of residence, full-time employment status, disability status, highest prior education status, indigenous status, whether from a non-English speaking background, English speaking proficiency, employment status prior to study, whether training is part of an apprenticeship/traineeship and whether first job after finishing training. The reference case is Building Certificate level III, which was chosen because of the large number of observations and because it is a qualification that is easily recognisable (the typical qualification attained to become a builder in Australia). The size of the sample doubles every two years.

- is insufficient number of observations in the Student Outcome Survey to estimate results at the ISCED 4-digit and course level and ref. is reference case in the estimation (Building, Certificate III).

Source: Student Outcome Survey 2007, 2008, 2009 and 2010.

Table A4: Estimated VTG impacts on course choice, 2010-11, stepwise regression, full results

	Unconditional National skill shortage	Course graduate wage	With student controls National skill shortage	Course graduate wage	With student & college controls National skill shortage	Course graduate wage
Victoria	-0.058***	-0.009**	-0.040***	-0.007*	-0.042***	-0.016***
	(0.010)	(0.003)	(0.009)	(0.003)	(0.009)	(0.004)
Post reform	-0.158***	0.022***	-0.148***	0.025***	-0.152***	0.024***
	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Victoria x Post-reform	**0.033***	**0.022***	**0.027***	**0.024***	**0.039***	**0.023***
	(0.007)	**(0.005)**	**(0.007)**	**(0.005)**	**(0.007)**	**(0.005)**
Student characteristics						
Female			0.004	-0.045***	0.009*	-0.048***
			(0.004)	(0.001)	(0.004)	(0.001)
Age in years on January 1 in the year of enrolment (ref. case: 15)						
16			0.030***	-0.002	0.031***	0.000
			(0.006)	(0.002)	(0.006)	(0.002)
17			0.024***	-0.007**	0.028***	-0.006*
			(0.006)	(0.003)	(0.006)	(0.003)
18			0.011*	-0.014***	0.015**	-0.013***
			(0.006)	(0.003)	(0.006)	(0.003)
19			-0.004	-0.022***	0.001	-0.022***
			(0.006)	(0.003)	(0.006)	(0.003)
Aboriginal or Torres Strait Islander			-0.057***	0.008**	-0.051***	0.005
			(0.005)	(0.002)	(0.005)	(0.002)

Language spoken at home and migrant status
(ref. case: Doesn't speak a language other than English at home,

Australian born)

Speaks a language other than English at home, Australian born	-0.018**	-0.016***	-0.023***	-0.012***
	(0.006)	(0.003)	(0.006)	(0.002)
Doesn't speak a language other than English at home, foreign born	-0.039***	0.003	-0.046***	0.004
	(0.007)	(0.003)	(0.007)	(0.002)
Speaks a language other than English at home, foreign born	-0.042***	-0.010**	-0.052***	-0.001
	(0.005)	(0.003)	(0.005)	(0.003)
Regional classification of residence (ref. case: Major city)				
Inner regional	0.013*	0.002	0.011*	-0.006*
	(0.005)	(0.002)	(0.005)	(0.002)
Outer regional	-0.003	0.012**	-0.004	-0.005
	(0.007)	(0.004)	(0.008)	(0.004)
Remote	-0.034*	0.008	-0.035*	-0.012*
	(0.014)	(0.006)	(0.015)	(0.006)
Very remote	-0.031	-0.016	-0.034	-0.037**
	(0.025)	(0.013)	(0.025)	(0.013)
Employed at time of enrolment	0.103***	0.009***	0.113***	0.010***
	(0.004)	(0.002)	(0.005)	(0.002)
Has a disability	-0.001	-0.007**	-0.003	-0.008**
	(0.005)	(0.002)	(0.005)	(0.002)
Socio-economic status of region (SEIFA) (ref. case: 1st quintile (most disadvantaged)				
2nd quintile	-0.003	0.002	0.001	0.000
	(0.010)	(0.006)	(0.009)	(0.004)
3rd quintile	0.001	0.004	0.006	0.001
	(0.009)	(0.006)	(0.008)	(0.004)
4th quintile	0.012	-0.003	0.017*	0.004
	(0.009)	(0.006)	(0.008)	(0.004)
5th quintile (most advantaged)	0.002	0.003	0.006	0.008*

	(0.009)	(0.006)	(0.008)	(0.004)
Highest prior level of education completed (ref. case: Tertiary (ISCED 4B or above))				
Secondary school (ISCED 3A) or vocational equiv. (ISCED 3C)	0.052***	0.121***	0.069***	0.116***
	(0.008)	(0.012)	(0.008)	(0.012)
Less than secondary qualification	0.112***	0.165***	0.132***	0.157***
	(0.009)	(0.013)	(0.009)	(0.012)
Place of residence and place of study are in different states	-0.026*	-0.002	-0.034**	-0.007
	(0.012)	(0.004)	(0.013)	(0.005)
College characteristics				
College size in 2008 (ref. case: Less than 100 enrolments)				
College didn't exist			0.021	0.017***
			(0.013)	(0.003)
100-999 enrolments			-0.042***	0.004
			(0.010)	(0.003)
1000-3999 enrolments			-0.145	-0.007
			(0.075)	(0.011)
4000-6999 enrolments			-0.152*	-0.048***
			(0.076)	(0.010)
7000+ enrolments			-0.139	-0.044***
			(0.076)	(0.010)
Type of college (ref. case: Technical and Further Education)				
Adult Community Education			-0.137	-0.003
			(0.075)	(0.011)
University			0.064***	-0.025
			(0.009)	(0.013)
Industry/professional association or Non-government organisation			-0.284***	-0.027*

	(1)	(2)	(3)	(4)	(5)	(6)
					(0.075)	(0.010)
Private business					-0.198**	-0.037***
					(0.075)	(0.010)
Other					-0.277***	-0.075***
					(0.075)	(0.012)
Constant	0.335***	-0.119***	0.170***	-0.240***	0.298***	-0.198***
	(0.005)	(0.002)	(0.014)	(0.014)	(0.077)	(0.017)
Observations	285005	410643	266809	386339	266697	386170

***Significant at 1%, **significant at 5% and *significant at 10%.

Note: Standard errors are clustered at the local government area, college and individual level. All models are estimated using all available information. The sample size for results using the National Skill Shortage measure are smaller because we exclude enrolments in general courses that do not prepare people for any specific course.

Table A5: Estimated VTG impacts on course completion, 2010-11, stepwise regression, full results

	Unconditional		With student controls		With student & college controls		With student, college and course choice controls	
	Module completion	Course completion	Module completion	Course completion	Module completion	Course completion	Module completion	Course completion
Victoria	0.002	-0.111***	0.001	-0.121***	-0.006	-0.109***	-0.019**	-0.095***
	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)
Post reform	-0.026***	0.002	-0.019***	0.000	-0.016***	0.004	-0.020***	-0.001
	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
Victoria x Post-reform	**0.064***	**0.068***	**0.058***	**0.063***	**0.024***	**0.022***	**0.027***	**0.025***
	(0.007)	**(0.007)**	**(0.007)**	**(0.007)**	**(0.007)**	**(0.006)**	**(0.007)**	**(0.006)**
Female			0.005	0.137***	-0.010**	0.122***	0.016***	0.048***
			(0.004)	(0.006)	(0.004)	(0.007)	(0.003)	(0.003)
Age in years on January 1 in the year of enrolment (ref. case: 15)								
16			-0.002	-0.015**	-0.002	-0.018***	-0.004	-0.017***
			(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
17			-0.002	-0.017**	-0.007	-0.026***	-0.004	-0.026***
			(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.005)
18			0.000	0.002	-0.006	-0.009	0.001	-0.012*
			(0.007)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
19			0.005	0.016*	-0.005	0.001	0.005	-0.003
			(0.008)	(0.006)	(0.008)	(0.006)	(0.007)	(0.006)
Aboriginal or Torres Strait Islander			-0.065***	-0.040***	-0.079***	-0.054***	-0.080***	-0.060***
			(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)
Language spoken at home and migrant status (ref. case: Doesn't speak a language other than English at home, Australian born)								

Speaks a language other than English at home, Australian born	-0.052***	0.002	-0.042***	0.006	-0.035***	-0.004
	(0.007)	(0.007)	(0.005)	(0.006)	(0.005)	(0.005)
Doesn't speak a language other than English at home, foreign born	0.005	0.004	0.004	0.021***	0.011	0.016*
	(0.009)	(0.007)	(0.006)	(0.006)	(0.006)	(0.006)
Speaks a language other than English at home, foreign born	-0.064***	-0.015**	-0.053***	0.003	-0.037***	0.002
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.006)
Regional classification of residence (ref. case: Major city)						
Inner regional	0.016**	-0.001	0.016**	0.013*	0.010*	0.019***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)
Outer regional	0.044***	-0.020*	0.041***	0.004	0.028***	0.013
	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)
Remote	0.026	-0.071**	0.021	-0.043	0.000	-0.032
	(0.017)	(0.026)	(0.017)	(0.024)	(0.017)	(0.023)
Very remote	0.025	-0.052*	0.028	-0.012	0.003	-0.01
	(0.030)	(0.026)	(0.028)	(0.021)	(0.026)	(0.023)
Employed at time of enrolment	0.096***	0.007	0.087***	-0.005	0.073***	0.026***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.004)
Has a disability	-0.050***	-0.019***	-0.045***	-0.011**	-0.044***	-0.018***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Socio-economic status of region (SEIFA) (ref. case: 1st quintile (most disadvantaged)						
2nd quintile	-0.002	-0.012	0.004	-0.011	0.001	-0.013
	(0.010)	(0.013)	(0.009)	(0.010)	(0.009)	(0.009)
3rd quintile	0.006	-0.01	0.012	-0.009	0.007	-0.008
	(0.008)	(0.012)	(0.008)	(0.011)	(0.008)	(0.010)
4th quintile	0.007	0.008	0.009	-0.004	0.01	-0.004
	(0.007)	(0.013)	(0.007)	(0.011)	(0.007)	(0.010)

5th quintile (most advantaged)	0.019**	0.007	0.026***	-0.003	0.028***	-0.003
	(0.007)	(0.013)	(0.007)	(0.010)	(0.007)	(0.010)
Highest prior level of education completed (ref. case: Tertiary (ISCED 4B or above))						
Secondary school (ISCED 3A) or vocational equivalent (ISCED 3C)	0.013	0.004	0.005	-0.015	-0.005	0.006
	(0.007)	(0.011)	(0.007)	(0.010)	(0.008)	(0.009)
Less than secondary qualification	-0.059***	-0.100***	-0.071***	-0.120***	-0.103***	-0.082***
	(0.007)	(0.014)	(0.008)	(0.013)	(0.008)	(0.012)
Place of residence and place of study are in different states	0.020*	-0.014	0.037***	0.01	0.033***	0.004
	(0.008)	(0.011)	(0.008)	(0.010)	(0.008)	(0.008)
College characteristics						
College size in 2008 (ref. case: Less than 100 enrolments)						
College didn't exist			0.054***	0.074***	0.063***	0.068***
			(0.006)	(0.011)	(0.006)	(0.010)
100-999 enrolments			0.014	-0.006	0.014	0.003
			(0.011)	(0.013)	(0.009)	(0.011)
1000-3999 enrolments			-0.145***	0.055	-0.142***	-0.004
			(0.022)	(0.099)	(0.024)	(0.085)
4000-6999 enrolments			-0.159***	0.1	-0.150***	0.042
			(0.022)	(0.099)	(0.024)	(0.085)
7000+ enrolments			-0.171***	0.08	-0.170***	0.03
			(0.022)	(0.098)	(0.024)	(0.084)
Type of college (ref. case: Technical and Further Education)			.	.	.	.
Adult Community Education			-0.086***	0.108	-0.093***	0.022
			-0.025	-0.098	-0.027	-0.084
University			0.045***	-0.067***	0.035***	-0.091***
			(0.008)	(0.009)	(0.008)	(0.009)

Industry/professional association or Non-government organisation					-0.037	0.262**	-0.055*	0.144
					(0.022)	(0.100)	(0.025)	(0.085)
Private business					-0.007	0.249*	-0.028	0.135
					(0.021)	(0.099)	(0.024)	(0.085)
Other					-0.082*	0.278**	-0.084*	0.176*
					(0.037)	(0.102)	(0.037)	(0.089)
Course characteristics							.	.
Course qualification level (ref. case: Certificate I (ISCED 2C))							.	.
Certificate II (ISCED 2C)							-0.043***	0.045***
							(0.008)	(0.009)
Certificate III (ISCED 3C)							-0.066***	-0.013
							(0.008)	(0.009)
Certificate IV (ISCED 4B)							-0.130***	-0.033***
							(0.008)	(0.009)
Diploma/Advanced Diploma (ISCED 5B)							-0.126***	-0.039***
							(0.009)	(0.010)
Field of study fixed effects (4-digit ASCED)	No	No	No	No	No	No	Yes	Yes
Constant	0.735***	0.329***	0.689***	0.327***	0.848***	0.259**	1.117***	0.585***
	-0.005	-0.004	-0.012	-0.019	-0.025	-0.098	-0.038	-0.121
Observations	403901	413641	380057	389257	379891	389088	379891	389088

***Significant at 1%, **significant at 5% and *significant at 10%.

Note: standard errors are clustered at the local government area, college and individual level. All models are estimated using all available information.

Figure A1: New 15-19 year-old post-secondary enrolments by commencement date, 2008-2011
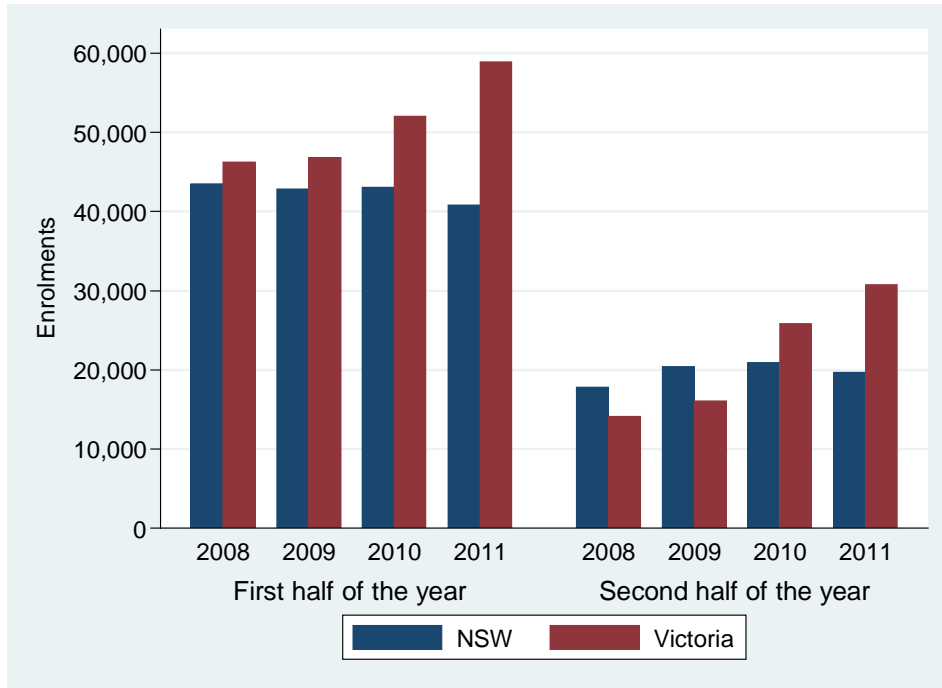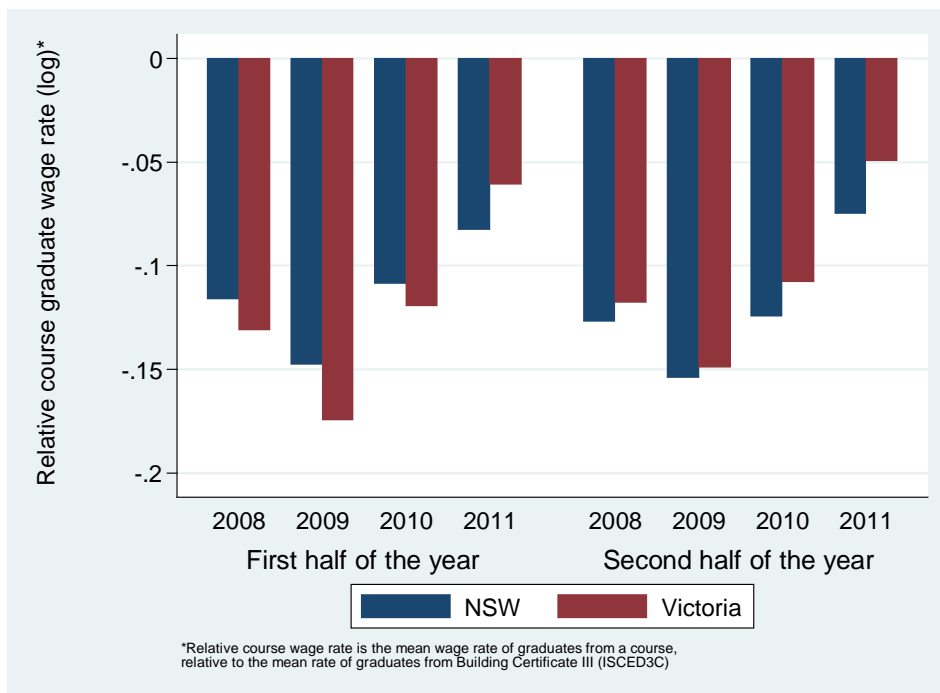

Source: National VET Provider Collection 2008-11.

Figure A2: New 15-19 year-old enrolments in national skill shortage areas by commencement date, 2008-2011
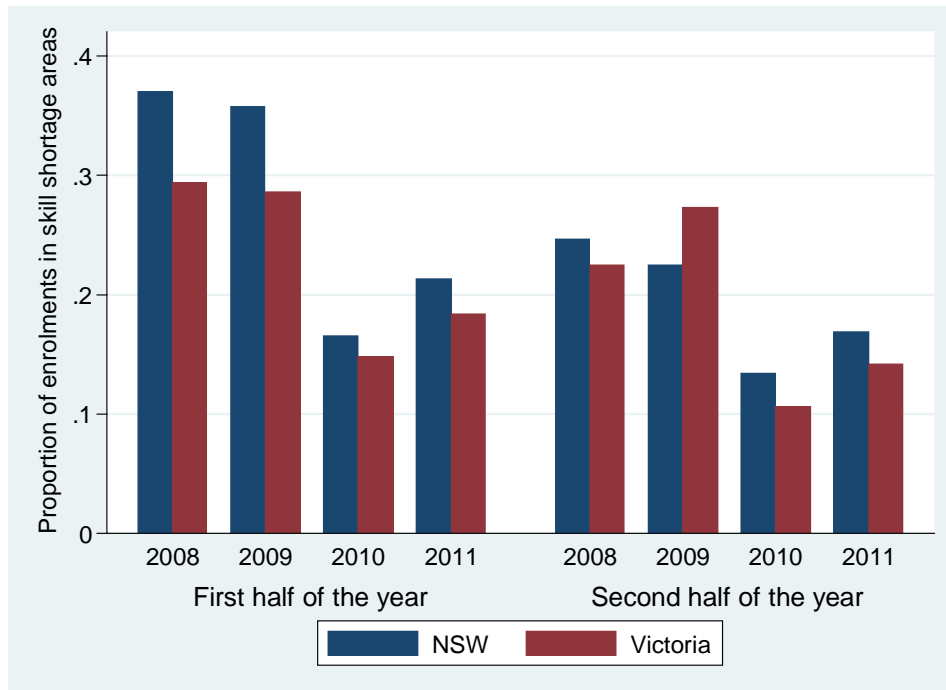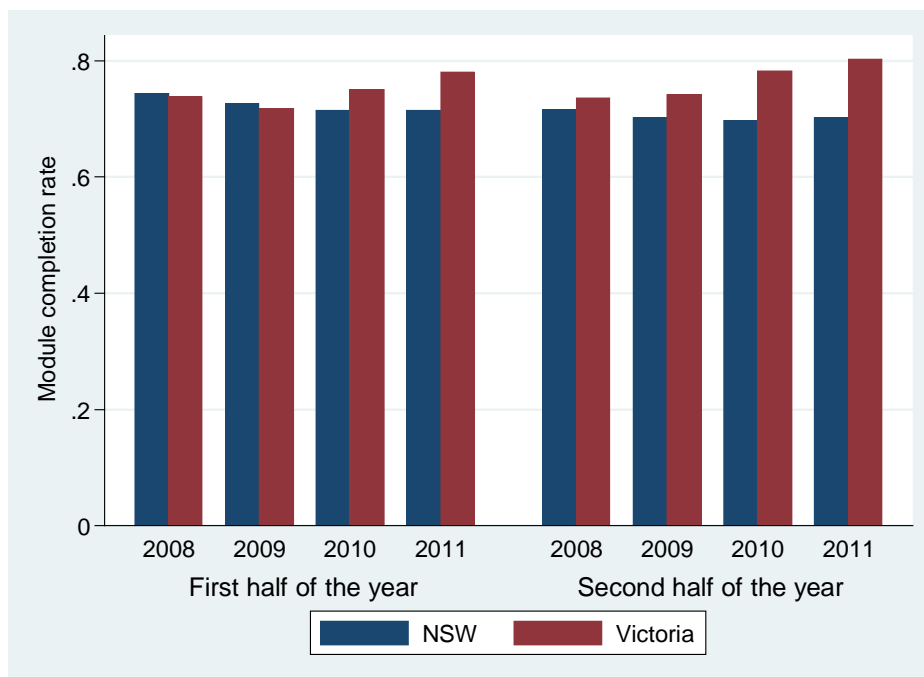

Source: National VET Provider Collection 2008-11 and National Skill Shortage Lists 2007-2010.

Figure A3: Average expected course graduate wage rate for new 15-19 year-old enrolments (relative to Building ISCED Certificate III), by commencement date, 2008-2011

*Relative course wage rate is the mean wage rate of graduates from a course, relative to the mean rate of graduates from Building Certificate III (ISCED3C)

Source: National VET Provider Collection 2008-11 and Student Outcome Survey 2007-2010.

Figure A4: Module completion rate of new 15-19 year-old enrolments by date of enrolment, 2008-2011

Source: National VET Provider Collection 2008-11.

Figure A5: Course completion rate of new 15-19 year-old enrolments by date of enrolment, 2008-2011
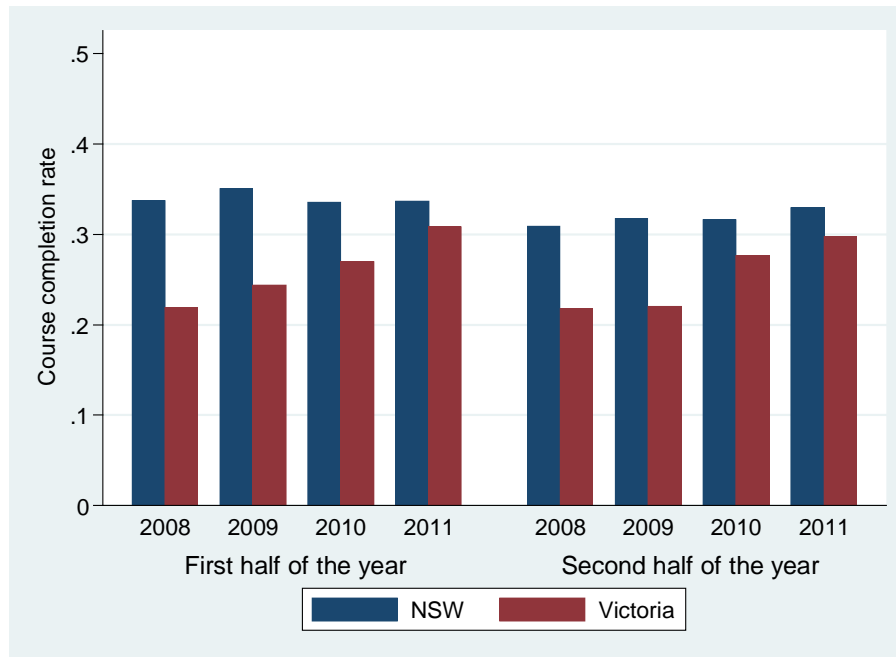

Source: National VET Provider Collection 2008-11.

Figure A6: Average annual change in new 15-19 year-old post-secondary VET course enrolments in 2010-2011 relative to 2008 in Victorian by expected course graduate wage

Note: Standardised course graduate wage is standardised course average log wage for 2010 and 2011, relative to average wages for graduates from Building Certificate III (ISCED 3C) for 2010 and 2011 respectively. Wage information for 2010 and 2011 is from the Student Outcome Surveys, which is information on 2009 and 2010 graduates 6 months after course completion. Enrolment data is from National VET Provider Collection 2008-11.

Figure A7: Average annual change in new 15-19 year-old post-secondary VET course enrolments in 2010-2011 relative to 2008 in Victorian by expected course graduate wage, select courses that changed enrolment by more than 500
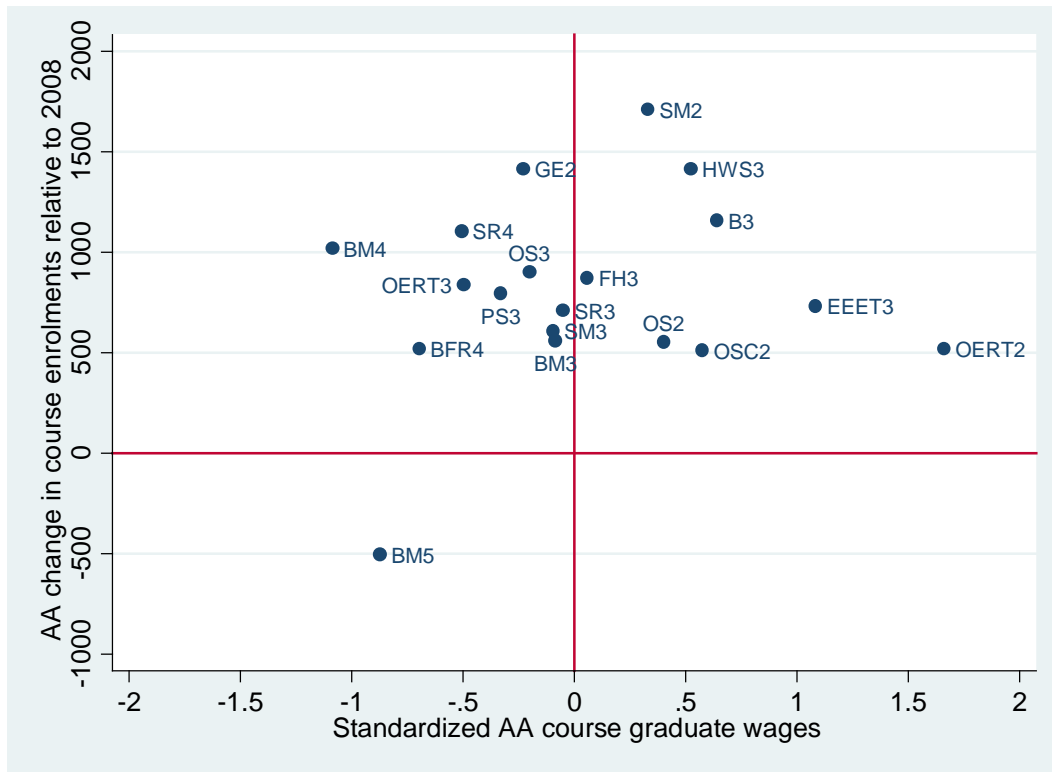
Note: Standardised course graduate wage is standardised course average log wage for 2010 and 2011, relative to average wages for graduates from Building Certificate III (ISCED 3C) for 2010 and 2011 respectively. Wage information for 2010 and 2011 is from the Student Outcome Surveys, which is information on 2009 and 2010 graduates 6 months after course completion. Enrolment data is from National VET Provider Collection 2008-11.

Key: B3 – Building Certificate III; BFR4 – Business, Finance and Related, Certificate IV; BM3 – Business and Management, Certificate III; BM4 – Business and Management, Certificate IV; BM5 – Business and Management, Diploma; EET3 – Electrical and Electronic Engineering and Technology, Certificate III; FH3 – Food and Hospitality, certificate III; GE2 – Geomatic Engineering, Certificate II; HWS3 – Human Welfare Studies and Services, Certificate III; OERT2 – Other Engineering and Related Technologies, Certificate II ; OERT3 – Other Engineering and Related Technologies, Certificate III; OS2 – Optical Science, Certificate II; OS3 – Optical Science, Certificate III; OSC2 – Other Society and Culture, Certificate II; PS3 – Personal Services, Certificate III; SM2 – Sales and Marketing, Certificate II; SM3 – Sales and Marketing, Certificate III; SR3 – Sports and Recreation, Certificate III; SR4 – Sports and Recreation, Certificate IV.