THE PERFORMANCE OF THE STUDENT POPULATION AT VICTORIA UNIVERSITY

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LIST OF ACRONYMS

CALD	Cultural and Linguistic Diversity
DFP	Davidson-Fletcher-Powell
EFTSL	Equivalent Full-Time Student Load
GLS	Generalised Least Squares
HED	Higher Education
LOTE	Language other than English
MLCR	Modular Load Completion Rate
NES	Non-English Speaking
NESB	Non-English Speaking Background
SCH	Student Contact Hours
SEIFA	Socio-economic Indexes for Areas
SES	Socio-economic Status

EXECUTIVE SUMMARY

This report examines the academic performance and the factors that impact on student outcomes, as measured by progression rates, at Victoria University in 2007. The data cover unit records of student enrolments, involving 130,000 different students. The report extends work by Messinis, Sheehan and Miholcic (2008) who investigate the diversity of Victoria University's student population and, via cluster analysis, identified four significant segments.

The first three segments classify Australian students while the fourth describes overseas students. The first segment consists of *young, full-time Australian degree students*. Students in the second cluster are the *disadvantaged*: they associate with relatively lower scores on the Australian Bureau of Statistics SEIFA index of economic resources; they tend to have lower labour force attachment; they study part-time in non-degree courses; they are older than the student mean; their fathers tend to be born in Asia or Africa; and they speak a language other than English. The third cluster is that of *working, third-generation Australian students* who undertake primarily part-time studies and full-time work. Their fathers are born in Australia and Europe, speak English at home, and show the highest mean value of the SEIFA index.

An Analysis of Progression Rates

The analysis of student progression rates for 2007 provided in the report both reinforces and adds to the findings of the existing literature, including previous studies of retention rates at Victoria University.

For all Australian higher education students in 2007, five groups of variables showed a statistically significant impact on progression rates, after controlling for all other factors:

- *age and gender*: student age was positively associated with progression rates, and females had significantly higher rates than males;
- *level of engagement in employment*: students engaged in employment or full-time studies were higher progression rates;
- *level of engagement in study:* full-time students tended to perform moderately better;
- *socio-economic status (SES)*: the SEIFA relative index of economic resources (i.e., a proxy for SES) was positively linked to progression;
- *membership of segments 2 and 3*: members of segment 2 (i.e., the disadvantaged) and, especially members of segment 3 (i.e., working students) performed worse than those in segment 1 (i.e., full-time, degree students), but students in segments 2 and 3 catch-up fast as their parental socio-economic status improves.
- *cultural and linguistic diversity* (*CALD)*: 1st generation students with a language other than English spoken at home (LOTE) and, to a less extend, 2nd generation students who report speaking only English at home were less likely to progress in their academic studies, although 1st generation of Australian students with LOTE were likely to perform better than others as their parents' socio-economic status improved, and
- *study area*: students in the fields of health and medical sciences exhibited higher chances of progress, while students in the areas of engineering or science were linked to lower progression rates.

For Australian TAFE students, many of the results for higher education students remain, but there are some variations. For the *demographic* variables, progression rates are again positively, albeit weakly, influenced by age, but there is no gender effect. The *employment engagement effect* is even more pronounced, with positive links between progression rates and

employment. The *full-time study effect* is also positive but not as strong as in higher education. Further, students with a recorded home address based in the western region of Melbourne associate positively with progression.

Socio-economic status (SES) again impacts positively on progression but the effect is much larger than that observed in higher education. By contrast with the higher education sector, being a member of segment 2 (i.e., the disadvantaged) or segment 3 (i.e., the working) has a strong positive effect on progression for TAFE students. In fact, these two groups of TAFE students seem to perform better than any other group. This suggests that factors to do with the characteristics or motivation of these students (such as their determination to succeed) and/or some features of the University's TAFE programs were positive influences on progression rates.

Another difference with higher education students is that students in segments 2 and 3 perform worse than others with respect to their parents' socio-economic status. This is somewhat difficult to interpret but the result for segment 2 may be due to the lack of engagement with employment that deprives the group of disadvantaged students of job-related application of skills acquired at TAFE. Alternatively, it may be due to a measurement error of the SES variable for these two groups, for the SEIFA scores may overestimate SES for disadvantaged and working students at Victoria University. Similar to the higher education, engineering studies were also associated negatively with progression rates while studying in any other area was positively linked with higher progress.

Progression amongst TAFE students is also driven by CALD effects but these are also different than for higher education students. First generation Australian students (i.e., persons who were born overseas) and second generation Australians (i.e., persons born in Australia with a parent born overseas) who report a LOTE are less likely to make progress in their academic studies. Moreover, in contrast to higher education, TAFE students who were born overseas and with LOTE fail to catch-up to other students when their socio-economic status (i.e., the SEIFA index) improves. On the other hand, Australia-born students with parents born overseas and with LOTE perform better than others as their parents SES improves, all other things being constant.

1 INTRODUCTION

In an earlier paper, Messinis, Sheehan and Miholcic (2008) examined the diversity of the student body at Victoria University where it identified three main clusters or segments for Australian students at Victoria University. The first segment consists of *young, full-time degree students* with a much higher than average share of females and of students working part-time who are heavily focused on full-time study for an undergraduate degree. The second cluster describes the *disadvantaged students*, for they live in Census Collectors Districts (CCDs) that associate with relatively lower scores on the Australian Bureau of Statistics SEIFA index of relative economic resources (2006 Census), they have lower labour force participation; they study part-time in non-degree courses (but are well represented at the postgraduate level); they are older than the student mean; they have a higher proportion fathers born in Asia or Africa; and they speak a language other than English. The third cluster is the *working, third-generation Australian students* who tend to be heavily involved in part-time study and full-time work. They also have an above-average share in diplomas or TAFE courses, their fathers are born in Australia and Europe, they speak English at home, and are concentrated in other campuses in the West other than Footscray Park and at the City campus. They show the highest mean value of the SEIFA index. Messinis, Sheehan and Miholcic (2008) also presented an analysis of student performance outcomes.

This study extends Messinis, Sheehan and Miholcic (2008) to a more comprehensive analysis of academic performance by Australia students at the Victoria University. The study utilises data from the Victoria University Student Information Service (VUSIS), accessed in February 2008. VUSIS is an operational database in regular use, updated on a daily basis, so that the information used is specific to the date of access. The database contains unit records of student enrolments in 2007. In VUSIS, different types of enrolments are treated differently, but for higher education students the basic unit of record is the enrolment for a given course for a semester. The key measure used in this analysis is unique student enrolments in 2007, where the enrolment activity of a given student in a particular year is the unit of analysis. Unique student enrolments are close to but differ in some respects from reportable enrolments, a measure commonly used for reporting purposes, and are quite different from student load, as no attempt has been made to adjust to a full-time equivalents basis. Of the 130,000 students, 108,000 have provided an Australian home address, and some 92,000 of these have been successfully geocoded to CCDs for the 2006 Census year. This facilitates the use of economic and social information on individual CCDs available from the Census.

This paper draws on previous literature to study the academic performance of Australian students at Victoria University in 2007. In particular, it utilises the conventional measure of progression rate to examine the factors that contribute or inhibit progression at higher education and TAFE sectors. Next section summarises the literature and outlines the methodology adopted. Section three presents the results and section four concludes.

2 BACKGROUND AND METHODOLOGY

2.1 RECENT LITERATURE ON PROGRESSION AND ATTRITION

There is an extensive literature on the determinants of student progression and attrition. Cao and Gabb (2006) have undertaken an important study of the determinants of attrition among higher education students at Victoria University for the years 2002-04. These authors provide a review of the literature on determinants of attrition, and an extract from the review is reproduced in Excerpt 1.

Excerpt 1: Factors Influencing Student Attrition

> Socio-demographic variables related to student attrition include gender, age, language, geographic location, socio-economic status and country of birth. For example, there are reports that females are more likely than males to complete a course (e.g. Martin, Maclachlan and Karmel 2001) but a recent study of Australian first year university students (Long, Ferrier and Heagney, 2006) indicated that gender differences in first year attrition rate were tiny. A number of studies (DEST 2004; Martin, Maclachlan and Karmel 2001) suggest that students aged between 17 and 20 have much lower attrition rates than older students. Language background has also been studied, with a study that was part of the Longitudinal Surveys of Australian Youth (LSAY), concluding that students from a language background other than English had a much lower attrition rate than that of English background students (McMillan 2005). With respect to geographic location, it has been reported that students from urban areas had a higher completion rate than students from isolated areas (James et al. 2004) and students from capital cities had a lower attrition rate than students from provincial cities (McMillan 2005). James et al. (2004) concluded that higher SES students had lower attrition rates than lower SES students (James et al. 2004), although another study suggested that the association between completion rate and family wealth was not consistent across different groups of students (Carpenter, Hayden and Long 1998). In terms of the country of birth, a UK study (Johnes and McNabb 2004) concluded that domestic students were more likely to withdraw than international students, while Australian data suggests a different pattern (DEST 2004).
>
> Australian studies have shown that prior academic achievement, as measured by Equivalent National Tertiary Entry Ranking (ENTER) scores and other standard indexes, is negatively related to attrition. For example, the LSAY study discussed above found an attrition rate from higher education of 5% for those with ENTER scores of 90 or more compared with a rate of 23% for those with ENTER scores of less than 70 (McMillan 2005). Similarly, a US study suggested that a one standard unit increase in high school GPA was associated with a 2% increase in student persistence (Titus 2004). A UK study (Johnes and McNabb 2004) found that school type also contributed significantly to student attrition, although this was not the case in the LSAY study (McMillan 2005).
>
> Variables associated with institutional experience, such as broad field of study, basis for admission, type of attendance and employment status were all found to be related to student attrition. For example, Martin et al. (2001) found that veterinary science and health students had higher completion rates than students from other fields, while adult students across fields of study had an attrition rate of 21%.
>
> The effect of type of attendance (full-time versus part-time) has also been studied, with most reports concluding that those who study part-time are more likely to leave their courses than those who study full-time (Krause et al. 2005; Hillman 2005). However, the LSAY study based on the 1995 Year 9 cohort found no significant difference in attrition rate between full-time and part-time students (McMillan 2005).
>
> Academic performance has consistently been identified as a predictor of attrition. For example, a US study indicated that the probability of persistence increased by 8% with an increase in of one unit in first year GPA (Titus 2004). Employment while studying has also been explored with mixed results. McMillan's (2005) LSAY study concluded that students who worked 21 or more hours a week were much more likely to leave than students who were not working. However, a recent study (Bradley 2006) reported that students who did not work and students who worked over 21 hours a week were both more likely than other groups of students to continue their studies.
>
> Source: Extract from Cao and Gabb (2006, pp. 2-3).

Cao and Gabb (2006) point out that the literature cites a wide range of factors influencing student attrition, such as gender, age, language, location, socio-economic status and country of birth. They also note that different studies find quite different effects, and in some cases the findings are counter-intuitive. Some studies show that prior academic, and institutional experience are important factors in attrition, and that the type of attendance and the nature of engagement with education and work can also be important.

2.2 DATA, MEASURES AND METHODOLOGY

This section describes the methodology employed in the empirical analysis, the results of which are reported below. We use the *progress rate* as a measure of academic performance, for it permits multivariate regression analysis at the individual student level. For students in higher education, the progress rate is defined as the proportion of assessed student load passed by the student and is calculated as passed load over assessed load (both in Equivalent Full-Time Student Load, EFTSL). For TAFE or VET students, the equivalent to the progress rate is the Modular Load Completion Rate (MLCR) based on student contact hours (SCH). More precisely, we calculated MLCR for TAFE students as the ratio of completed SCH to counted SCH. We use this as a proxy for the progress rate, although analysis of progress rates is undertaken separately for higher education and TAFE students.

Of the 38904 valid observations in 2007, the progress rate was zero in 6059 (15.6%) cases, one in 32811 (84.3%) cases, with only 34 cases having an intermediate value, i.e. between 0 and 1. Given the bimodal distribution of the variable, we create an indicator variable, ProgRate, that takes the value of one if progress rate is one and the value of zero if progress rate is smaller than one. Hence, our analysis estimates the probability of 100% success rate in academic progress.

To reveal the probability of success in academic progress we employ a Generalised Least Squares (GLS) Probit Maximum Likelihood Estimator. The model allows the dependent variable to have a non-normal distribution and standard errors are robust to heteroskedasticity and intra-group correlation with the three segments being the cluster variable. The Davidon-Fletcher-Powell (DFP) algorithm was used to maximise the likelihood function and estimate the parameters in STATA 10.

The measure of progression used here is related to that of attrition. As explanatory variables, we examine the following factors cited above as potential determinants of student progression: age and age squared (the latter is for non-linear effects); gender; full-time employment; not in employment (i.e., unemployed or not in the labour force); living in the Western region; SEIFA to capture the effect of socio-economic status (SES); SEIFA and CALD interactions with segments 2 and 3 (i.e., the product of SEIFA with segment 2 and segment 3); SEIFA and CALD interactions with 1st and 2nd generation LOTE groups (i.e., the product of SEIFA with the 1st and 2nd generation CALD groups who speak LOTE); segments 2 and 3 (i.e., the disadvantaged and working students); four study areas (i.e., engineering, health, business, and science); and four cultural and linguistic diversity (CALD) cohorts defined on the basis of LOTE and birth place. The latter consist of the binary indicator variables. The first is *CALD: 1st generation LOTE* and takes the value of one when the student was born overseas in a non-English-speaking (NES) country *and* the student speaks a language other than English (LOTE) at home, and equals zero otherwise. The second, *CALD: 2nd generation LOTE*, takes the value of one if the student was born in Australia, at least one of the parents was born overseas in a NES country *and* the student had a LOTE at home, and equals zero otherwise. The third, *CALD: 1st generation ES*, is the English-speaking equivalent of the first measure while the fourth, *CALD: 2nd generation ES*, is the English-speaking equivalent of the second measure.

3 EMPIRICAL RESULTS

3.1 STUDENTS CHARACTERISTICS BY SECTOR: AN INTRODUCTION

Victoria University is a dual-sector educational institution. Table 1 summarises the profile of higher education (HED) and TAFE sector Australian students by demographics, level of enrolment, segments, socio-economic status (SES), and cultural and linguistic diversity (CALD) cohorts. With respect to SES, we report the percentage of students from 'low SES'. We follow the Bradley Report (2008) to define the latter as those students with a SEIFA relative index score of less than 9.63 (i.e., the lowest 25% in the Greater Melbourne region) in the 2006 ABS Census. However, in contrast to the Bradley Report (2008) that utilises the postcode average of the SEIFA index, this study uses the Census Collectors Districts (CCDs). This provides much more disaggregation and is less susceptible to the criticism raised by James *et al.* (2008) that the postcode index of SEIFA may under-estimate the representation of low SES groups in tertiary education. This is because the SEIFA index at the CCD level is more likely to summarise the SES background of students than the postcode index.[1]

Table 1 suggests that females constitute 53.5% and 50.1% of the HED and TAFE student population at Victoria University. Also, 31.1% of HED and 45% of TAFE students are mature aged students (i.e., 26 years old or older). With respect to segmentation, Table 1 shows that Victoria University provides substantial access to the disadvantaged students; 19% in HED and 56.7% in TAFE. In higher education, there were also 3278 (20.7%) students in the '*1st generation LOTE'* group of CALD, 3033 (19.2%) students in the '2nd *generation LOTE'* group, 437 (2.8%) students in the '*1st generation ES'* category, and 3280 (20.7) students in the fourth group of '*2nd generation ES'* Australians. In the TAFE sector, the corresponding figures were 6124 (24.6%), 4760 (19.1%), 729 (2.9%) and 5028 (20.2%), respectively.

Columns 2 and 6 of Table 1 indicate that the low SES group is evenly distributed by gender, age and year of study. However, as expected, it is over-represented in the disadvantaged group and the CALD group of 1st generation with LOTE. These findings are even more conspicuous in the TAFE sector with 35.9% of disadvantaged students and 50.7% of *1st generation LOTE* Australian students being of low SES.

Columns 3-4 and 7-8 of Table 1 present summaries of the two first CALD groups that focus on the presence of LOTE. Although, having a LOTE does not necessarily imply a lack of English speaking, the 1st generation LOTE group is overrepresented amongst the (females) males in (TAFE) HED and the disadvantaged segment.

[1] Of course, other issues such as differences between stated or parental address and current address remain.

Table 1. VU Students by Sector, Segment, SES and CALD

GROUP	HIGH EDUCATION SECTOR				TAFE SECTOR			
	All (%)	Low SES (%)	CALD with LOTE (%)		All (%)	Low SES (%)	CALD with LOTE (%)	
			1st Gen.	2nd Gen.			1st Gen.	2nd Gen.
GENDER								
Males	46.5	19.9	44.6	13.3	49.9	26.9	34.0	16.3
Females	53.5	19.3	36.4	14.6	50.1	30.1	43.2	14.8
AGE								
16-20	35.9	17.2	12.9	23.2	39.9	24.0	11.3	22.2
21-25	33.0	20.3	21.3	19.8	15.1	30.5	26.1	18.9
26-36	18.1	23.3	29.8	15.1	18.5	34.4	35.0	19.3
37+	13.0	18.9	28.4	12.3	26.5	29.9	36.4	14.5
LEVEL								
1st Year	31.5	19.4	41.2	13.3	99.2	31.1	38.4	22.0
Other Years	68.5	19.8	38.0	15.5	0.8	28.4	38.6	15.5
SEGMENT								
Young, degree students	66.0	19.2	16.6	19.8	1.2	19.2	2.0	9.8
Disadvantaged students	19.0	25.9	42.9	30.6	56.7	35.9	43.1	31.8
Working students	15.0	12.8	0.1	2.1	42.1	18.4	0.1	1.6
CALD Cohort								
CALD: 1st generation LOTE	20.7	35.4			24.6	50.7		
CALD: 2nd generation LOTE	19.2	22.7			19.1	26.2		
CALD: 1st generation ES	2.8	24.2			2.9	36.6		
CALD: 2nd generation ES	20.7	14.5			20.2	17.9		

Excerpt 2: A guide to interpreting Tables and Figures

The tables in this report show the effect of the selected explanatory variables on the student progress, ProgRate. The PROBIT regression model includes five continuous explanatory variables (Age, Age^2, SEIFA, SEIFA-CALD interactions with 1st generation LOTE and CALD 2nd generation LOTE). All other explanatory variables are indicator variables, and indicate groups within VU student population, with regards to demographic characteristics, student segments, study area and cultural and linguistic diversity. We provide symbol indicators, to assist in determining the size and significance of the explanatory variables coefficient estimates, as displayed in the guide below:

Visual guide to interpret explanatory variable coefficient (b) by symbol and meaning

BINARY VARIABLE								
Symbol	▲	▲▲	▲▲▲	▼	▼▼	▼▼▼	►	◄
Range	0<b<0.2	0.2≤b<0.4	b≥0.4	-0.2<b<0	-0.4≤b<-0.2	b≤-0.4	>0 NSS	<0 NSS
Effect	Positive	Positive	Positive	Negative	Negative	Negative		
Magnitude	Small	Medium	Large	Small	Medium	Large		
CONTINUOUS VARIABLE								
Symbol	↑	↑↑	↑↑↑	↓	↓↓	↓↓↓	→	←
Range	0<b<0.04	0.04≤b<0.08	b≥0.08	-0.04<b<0	-0.08≤b<-0.04	b≤-0.08	>0 NSS	<0 NSS
Effect	Positive	Positive	Positive	Negative	Negative	Negative		
Magnitude	Small	Medium	Large	Small	Medium	Large		

NSS stands for 'not statistically significant' due to substantial variation amongst students for that variable.

In Tables, the 'constant' is the estimate of the value of ProgRate when all explanatory variables coefficients take the value of zero. The first set of values in each regression are coefficient estimates of the average impact a particular explanatory variable has on the explained variable, ProgRate, keeping all other explanatory variables constant. In two-dimensional charts as in section 3.4 below, the constant or the 'intercept' is the value of ProgRate when the variable on the x-axis (horizontal axis) is equal to zero; this is average value ProgRate takes due to all other explanatory variables.

Coefficient values for binary variable signify the group effect, i.e., they show by how much better or worse the students in a particular group with the particular attributes are likely to perform, relative to the rest of the student HED or TAFE populations. A positive coefficient value indicates that students with that attribute were more likely to progress, with the possible coefficient values in the range of $0 < b \leq 1$. A negative coefficient value indicates that people with that attribute were less likely to progress, with the possible coefficient values in range $-1 < b \leq 0$. The coefficients in Tables that fall outside of these ranges could not be estimated precisely, as indicated by large respective standard errors; that is, they are not significantly different form zero. In parentheses are standard errors that indicate how much variation exists in ProgRate for individual students. The lower the standard error estimate, relative to the coefficient estimate, the less dispersed the observed values are and, thus, the greater the confidence that the coefficient estimate is not zero. Symbols * and ** indicate 5% and 1% statistical significance and represent the respective levels of probability that a coefficient estimate is not different to zero, i.e., 95% and 99% levels of confidence that a coefficient estimate is different to zero.

Coefficient values for continuous variables, Age, Age^2, SEIFA, SEIFA-CALD interactions show the effect of a unit of change in these factors on the probability of 100% success rate in student progress. Note, however, that the coefficients of the SES-CALD interaction variables represent the *difference* in the probability of progression from that of the SEIFA coefficient. For instance, if the coefficient of the SEIFA (SES) variable is 0.09 and that of the SEIFA-CALD variable for the 1st generation LOTE group is 0.05 and both are statistically significant, these can be interpreted as follows: SES adds to the probability of progression by 0.09 for students who do not belong in the CALD: 1st generation LOTE group. For the latter group, however, SES adds to the probability of progression by 0.14 (i.e., 0.09 + 0.05). In two-dimensional charts below, the coefficient or the 'slope' summarises the change in the probability of ProgRate when the variable on the x-axis changes by one unit. For example, say we examine ProgRate against SEIFA. If the SEIFA or SES coefficient estimate takes the value of 0.08 it means that the probability of success (i.e., ProgRate) increases by 0.08 when the SEIFA index increases by one unit. In other words, the slope of the regression line is 0.08. Furthermore, when a CALD group is compared to the reference group, the regression line of the former group would be 0.17 if the SES-CALD interaction coefficient is 0.09.

3.2 HIGHER EDUCATION STUDENTS

Table 2 presents the estimation results for higher education Australian students in 2007.[2] For all students the following factors showed a statistically significant impact on progress rates:

- *age*: there is a significant positive but diminishing influence of age on progression;
- *gender*: female students tended to have higher progress rates than male students;
- *full-time employment:* there was a positive effect of full-time employment on progress rate for students in 'Information and Infrastructure' domain of studies and commencing students (these findings are reported in Tables 3 and 4);
- *not in employment:* there was a negative association between not being in employment and the progress rate;
- *coming from a family based in the western region of Melbourne:* an adverse effect on progression was observed amongst young and low SES students (these findings are reported in Tables 5 and 6);
- *full-time study*: full-time students had higher progress rates than part-time students;
- *socio-economic status*: there was a strong positive link between socio-economic status (as measured by the SEIFA Economic Resources Index) and progress rates;
- *membership of segments 2 and 3*: students in segments 2 and 3 had lower progress rates than those in segment 1 (i.e., young, full-time degree students), however, the progress of both segments 2 and 3 tended to improve greatly with increase in SEIFA;

[2] For an interpretation of empirical results reported in Tables and Figures below, see Excerpt 2.

- *differences between major course types*: progress rates in health are higher than in the student population as a whole, and substantially lower in engineering and science studies; and
- *cultural and linguistic diversity* (CALD)*:* 1st generation LOTE students and, surprisingly, 2nd generation ES students tended to have lower progress rates as a group than other students; 1st generation of LOTE students improved on progress with increases in SES.

Table 2. VU Progress Rates 2007, Higher Education Students

VARIABLE	AUSTRALIAN STUDENTS			INTERNATIONAL STUDENTS		
Constant		-0.395	(0.184)		0.447	(0.195)
DEMOGRAPHICS						
Age	↑↑	0.057**	(0.011)	↑	0.020**	(0.006)
(Age²)/100	↓↓	-0.073**	(0.020)			
Male	▼	-0.151**	(0.012)	▼▼	-0.373**	(0.049)
Full-time Employee	►	0.067	(0.110)			
Not in Employment	▼	-0.043*	(0.021)			
Full-time Studies	▲▲	0.368**	(0.064)	▲▲	0.210**	(0.068)
Western Region	◄	-0.009	(0.021)			
SES AND INTERACTIONS						
SEIFA	↑	0.029**	(0.004)			
SEIFA-Segment 2	↑↑	0.077**	(0.008)			
SEIFA-Segment 3	↑↑↑	0.108**	(0.006)			
SEIFA-CALD 1st generation LOTE	↑	0.036**	(0.003)			
SEIFA-CALD 2nd generation LOTE	←	-0.005	(0.012)			
SEGMENTS						
Segment 2: Disadvantaged	▼▼▼	-0.520**	(0.088)			
Segment 3: Working	▼▼▼	-0.923**	(0.055)			
STUDY AREA						
Engineering Studies	▼▼	-0.329**	(0.116)	▲▲▲	0.416**	(0.152)
Health Studies	▲▲▲	0.478**	(0.026)	▲▲▲	1.241**	(0.289)
Business Studies	◄	-0.059	(0.192)	▲▲	0.364**	(0.085)
Science Studies	▼▼	-0.279**	(0.046)	►	0.134	(0.119)
CALD						
CALD: 1st generation LOTE	▼▼▼	-0.623**	(0.041)			
CALD: 2nd generation LOTE	◄	-0.132	(0.147)			
CALD: 1st generation ES	◄	-0.049	(0.040)			
CALD: 2nd generation ES	▼	-0.046**	(0.016)			
OBSERVATIONS		11730			252	

* and ** significance at 5% and 1% levels respectively. Standard errors are in parentheses.

Surprisingly, a number of other reviewed variables had no significant effect. For example, two of the variables relating to the cultural and linguistic diversity had no significant effect on progression, and neither did the full-time employee variable or the western region variable. The negative coefficients on the course type variables suggest that there are continuing problems in Australian students' performance in science and engineering. The four course type variables here are not exhaustive, and all other courses are treated as the reference group.

It is notable that, for higher education students, membership of segment 2, the most disadvantaged group of students, as well as membership of segment 3, had a negative positive effect. The results for international students (Table 2, Column 2), are similar to those for

Australian students with respect to age, gender, full-time studies and health studies. However, international engineering and business students also seem to perform relatively better.

3.3 HIGHER EDUCATION STUDENTS BY DOMAIN

The Australian students were allocated into three domains and analysis was carried out for each of the domains. The results are presented, for higher education and TAFE students separately, in Table 3 and in Table 8. It should be noted that relationships in the entire student population may not hold at the domain level, given the systematic differences between students in the different domains.

As shown in Table 3, there are some important differences across the three higher education domains, in particular for students in the 'Information and Infrastructure' domain relative to other students. A small role of gender is evident in all three domains. In 'Business and Enterprise' and in 'Community Wellbeing' there is a strong positive effect from studying full-time. A small coefficient estimate is observed for full-time employees in 'Information and Infrastructure' while age and regional effects had an impact only in 'Community Wellbeing'.

The effect of socio-economic status is most pronounced in 'Community Wellbeing'. The effect is much smaller in 'Business and Enterprise', and is absent in 'Information and Enterprise'. The effect of membership in segment 2 is positive in 'Information and Infrastructure' and in 'Community Wellbeing' but negative in the 'Business and Enterprise' domain. However, the positive effect of higher SES on progression is smaller for segment 2 in 'Information and Infrastructure' and larger in 'Business and Enterprise' than for other students. Also, membership in segment 3 has a strong negative effect in 'Information and Infrastructure' and 'Community Wellbeing', and a moderate positive effect in 'Business and Enterprise'. Yet, students in segment 3 perform twice as well as others when SES improves; for example, the probability of progression for students in segment 1 (i.e., full-time, degree students) in the 'Community Wellbeing' domain is 0.056 but the corresponding probability for students in segment 3 is 0.12 = (0.064 + 0.056).

Very strong negative effects are observed for first generation students with a language other than English spoken at home in 'Information and Infrastructure' and 'Business and Enterprise'. Being in the '2nd generation LOTE' group also had a moderate negative effect on progression in 'Business and Enterprise', but a strong positive effect in 'Community Wellbeing'.

Considerable positive effects of improvement in SES were evident for students in 1st generation LOTE in 'Information and Infrastructure' and 'Community Wellbeing'. The interaction of 2nd generation LOTE students and SES produced a negative effect in 'Community Wellbeing'.

In all three domains, the differences between major course types were exhibited in 'Community Wellbeing', where doing 'Health Studies' was strongly associated with higher progression, and doing either 'Business Studies' or 'Science Studies' had a moderate negative impact, compared to the student population as a whole. It is to be expected that the determinants of progression would vary across domains and course types, as different courses make different demands (e.g. access to English language literature as opposed to technical material) and will be best supported by different family backgrounds.

Table 3. VU Progress Rates 2007, Australian Higher Education Students by Domain

VARIABLE	INFORMATION & INFRASTRUCTURE	COMMUNITY WELLBEING	BUSINESS & ENTERPRISE
Constant	-1.192 (1.379)	-0.447 (0.440)	-0.565 (0.352)
DEMOGRAPHICS			
Age	0.091 (0.072)	0.043* (0.022)	0.044 (0.035)
(Age^2)/100	-0.110 (0.104)	-0.056 (0.037)	-0.051 (0.054)
Male	-0.170** (0.041)	-0.083** (0.017)	-0.189** (0.011)
Full-time Employee	0.116* (0.052)	-0.021 (0.116)	0.087 (0.163)
Not in Employment	-0.048 (0.117)	-0.072 (0.041)	0.008 (0.043)
Full-time Studies	0.771 (0.527)	0.431** (0.121)	0.305** (0.020)
Western Region	-0.169 (0.090)	0.061** (0.003)	-0.022 (0.040)
SES AND INTERACTIONS			
SEIFA	-0.016 (0.027)	0.056** (0.004)	0.024** (0.008)
SEIFA-Segment 2	-0.028** (0.007)	-0.015 (0.011)	0.162** (0.010)
SEIFA-Segment 3	0.515** (0.046)	0.064** (0.007)	0.032** (0.008)
SEIFA-CALD 1st generation LOTE	0.075** (0.008)	0.062** (0.024)	-0.002 (0.017)
SEIFA-CALD 2nd generation LOTE	0.064 (0.089)	-0.049** (0.016)	0.009 (0.011)
SEGMENTS			
Segment 2: Disadvantaged	0.861* (0.371)	0.182** (0.049)	-1.277** (0.048)
Segment 3: Working	-4.807** (0.123)	-0.649** (0.202)	0.204** (0.020)
STUDY AREA			
Engineering Studies	0.098 (0.212)		
Health Studies		0.451** (0.021)	
Business Studies	0.349 (0.244)	-0.384** (0.059)	0.267 (0.177)
Science Studies	0.064 (0.223)	-0.305** (0.017)	
CALD			
CALD: 1st generation LOTE	-1.092** (0.134)	-0.853** (0.204)	-0.132 (0.086)
CALD: 2nd generation LOTE	-0.778 (0.819)	0.446* (0.192)	-0.272* (0.109)
CALD: 1st generation ES	-0.088 (0.076)	-0.171 (0.094)	0.142 (0.135)
CALD: 2nd generation ES	-0.081 (0.111)	-0.064 (0.037)	0.074 (0.043)
OBSERVATIONS	1349	6183	4125

* and ** significance at 5% and 1% levels respectively. Standard errors are in parentheses.

3.4 HIGHER EDUCATION STUDENTS BY ACADEMIC EXPERIENCE

Gabb, Milne and Cao (2006) emphasised the role of first year of academic experience as key to student attrition and progress. Here, we have also decompose the higher education student body for 2007 into those in the first year at the University and those in later years, and undertake Probit analysis for these two groups. The results are reported in Table 4.

As expected, there are significant differences between the factors influencing progression for first-year students and for those who have been at the University longer. In particular, while age and females positively contribute to progression after the first year, only the gender effect is significant in the first year. Full-time study remains important in later years, and being a full-time employee is conducive to improved progression in the first year.

Table 4. VU Progress Rates 2007, Australian Higher Education Students by Experience

VARIABLE	IN FIRST YEAR			AFTER FIRST YEAR		
Constant		0.580	(0.513)		-0.373	(0.225)
DEMOGRAPHICS						
Age	→	0.004	(0.010)	↑	0.038**	(0.011)
(Age^2)/100	→	0.009	(0.022)	↓↓	-0.050*	(0.020)
Male	▼	-0.142**	(0.012)	▼	-0.147**	(0.035)
Full-time Employee	▲	0.083*	(0.041)	▶	0.075	(0.118)
Not in Employment	◀	-0.011	(0.030)	◀	-0.033	(0.050)
Full-time Studies	▶	0.337	(0.272)	▲▲▲	0.421**	(0.070)
Western Region	▶	0.022	(0.019)	◀	-0.020	(0.032)
SES AND INTERACTIONS						
SEIFA	→	0.001	(0.013)	↑↑↑	0.059**	(0.014)
SEIFA-Segment 2	↑↑	0.055**	(0.017)	↑↑	0.052**	(0.017)
SEIFA-Segment 3	↑↑↑	0.124**	(0.013)	↑↑	0.074**	(0.010)
SEIFA-CALD 1st generation LOTE	→	0.026	(0.063)	→	0.031	(0.031)
SEIFA-CALD 2nd generation LOTE	←	-0.063	(0.037)	↑	0.036**	(0.009)
SEGMENTS						
Segment 2: Disadvantaged	▼▼	-0.350*	(0.168)	▼▼	-0.306**	(0.065)
Segment 3: Working	▼▼▼	-1.230**	(0.289)	▼▼▼	-0.556*	(0.220)
STUDY AREA						
Engineering Studies	▼▼▼	-0.567**	(0.141)	▼▼	-0.209*	(0.087)
Health Studies	▲▲▲	0.635**	(0.161)	▲▲▲	0.405**	(0.075)
Business Studies	▼▼	-0.281**	(0.105)	▶	0.081	(0.173)
Science Studies	▼▼	-0.345*	(0.156)	▼▼	-0.240**	(0.046)
CALD						
CALD: 1st generation LOTE	◀	-0.570	(0.594)	◀	-0.555	(0.306)
CALD: 2nd generation LOTE	▶	0.463	(0.403)	▼▼▼	-0.543**	(0.102)
CALD: 1st generation ES	▼▼	-0.211**	(0.069)	▶	0.024	(0.131)
CALD: 2nd generation ES	◀	-0.053	(0.051)	◀	-0.046	(0.049)
OBSERVATIONS		3842			7888	

* and ** significance at 5% and 1% levels respectively. Standard errors are in parentheses.

The positive SES effect on progression observed earlier is only evident after the first year. The results in Table 4 are very similar to those in Table 2 with respect to segments: segments 2 and 3 are inversely associated to progression but higher SES helps reverse the negative effects to some extent.

In contrast to results in Table 2, here 1st generation LOTE effects are absent, probably due to these effects being subsumed in segments 2 and 3. First generation Australians with English speaking at home are negatively associated with progression only for early students, while 2nd generation with LOTE are negatively linked to progression in later years. However, higher SES helps increase the chances of progression for 2nd generation LOTE students after first year.

Further, undertaking health studies is positively associated with progression in all years, while all other study areas, with the exception of business studies after first year, being associated with lower progression for both groups.

3.5 HIGHER EDUCATION STUDENTS BY AGE GROUP

Table 5 presents empirical results for higher education students by two age groups using the age of 26 years old as the threshold for 'young' versus 'mature' students. We find that age and gender effects are important for both groups.

Table 5. VU Progress Rates 2007, Australian Higher Education Students by Age Group

VARIABLE	YOUNG GROUP			MATURE GROUP		
Constant		-5.945	(0.955)		-1.130	(0.595)
DEMOGRAPHICS						
Age	↑↑↑	0.604**	(0.111)	↑↑↑	0.097**	(0.029)
(Age²)/100	↓↓↓	-1.392**	(0.277)	↓↓↓	-0.119**	(0.039)
Male	▼	-0.134**	(0.023)	▼▼	-0.213**	(0.069)
Full-time Employee	◄	-0.049	(0.102)	►	0.198	(0.108)
Not in Employment	◄	-0.025	(0.014)	◄	-0.056	(0.066)
Full-time Studies	►	0.302	(0.171)	▲▲	0.380**	(0.064)
Western Region	▼	-0.028*	(0.011)	►	0.043	(0.116)
SES AND INTERACTIONS						
SEIFA	↑	0.034**	(0.006)	→	0.009	(0.039)
SEIFA-Segment 2	↑↑	0.069**	(0.004)	↑↑	0.061**	(0.008)
SEIFA-Segment 3	↑↑↑	0.157**	(0.002)	→	0.062	(0.041)
SEIFA-CALD 1st generation LOTE	↑	0.026**	(0.005)	↑↑	0.078*	(0.035)
SEIFA-CALD 2nd generation LOTE	↓	-0.026*	(0.013)	→	0.113	(0.065)
SEGMENTS						
Segment 2: Disadvantaged	▼▼▼	-0.501**	(0.094)	▼▼▼	-0.501**	(0.094)
Segment 3: Working	▼▼▼	-1.388**	(0.105)	▼▼▼	-1.388**	(0.105)
STUDY AREA						
Engineering Studies	▼▼	-0.388**	(0.050)	◄	-0.102	(0.311)
Health Studies	▲▲▲	0.533**	(0.056)	▲▲▲	0.418**	(0.058)
Business Studies	◄	-0.144	(0.149)	►	0.206	(0.146)
Science Studies	▼▼	-0.317**	(0.058)	◄	-0.194	(0.137)
CALD						
CALD: 1st generation LOTE	▼▼▼	-0.565**	(0.041)	▼▼▼	-0.892*	(0.402)
CALD: 2nd generation LOTE	►	0.118	(0.146)	◄	-1.366	(0.743)
CALD: 1st generation ES	▼	-0.064**	(0.003)	◄	-0.014	(0.120)
CALD: 2nd generation ES	▼	-0.051*	(0.024)	►	0.028	(0.038)
OBSERVATIONS		8552			3178	

* and ** significance at 5% and 1% levels respectively. Standard errors are in parentheses.

Amongst the young, coming from a family based in the western region of Melbourne is negatively associated with the chances of progress, and full-time students tend to have higher

progress rates in older students. Again in this group, an increase in SES is positively associated with progress rates. Membership in segments 2 or 3 represents a distinct disadvantage, which is reversed with the improvement in SES, with the exception of segment 2 in mature students.

Students of 1st generation with LOTE tend to perform remarkably worse than others, both young and mature. Surprisingly, even young English-speaking students are also disadvantaged. For 1st generation LOTE students, improvement in SES leads to greater chances of academic progress, but the SES interaction effect for 2nd generation young LOTE students was negative. Again, students in health studies progress better than the overall student population while the reverse is true for young students in engineering and science.

3.6 HIGHER EDUCATION STUDENTS BY SES GROUP

Table 6 splits the Australian higher education sample by high and low SES groups. We find that in both groups age, females and full-time studies contribute positively to progression. Amongst students of low SES, not being in employment and living in the western region of Melbourne impact negatively on progression while full-time employment has a positive effect.

Table 6. VU Progress Rates 2007, Australian Higher Education Students by SES Group

VARIABLE	LOW SES GROUP			HIGHER SES GROUP		
Constant		-0.669	(0.852)		-1.139	(0.337)
DEMOGRAPHICS						
Age	↑↑	0.053**	(0.019)	↑↑	0.061**	(0.010)
(Age²)/100	↓↓	-0.066*	(0.033)	↓↓↓	-0.080**	(0.018)
Male	▼▼	-0.212**	(0.035)	▼	-0.129**	(0.023)
Full-time Employee	▲	0.101*	(0.043)	►	0.054	(0.139)
Not in Employment	▼	-0.061**	(0.015)	◄	-0.032	(0.041)
Full-time Studies	▲▲	0.316**	(0.095)	▲▲	0.396**	(0.058)
Western Region	▼	-0.099**	(0.028)	►	0.026	(0.022)
SES AND INTERACTIONS						
SEIFA	→	0.089	(0.053)	↑↑↑	0.087**	(0.034)
SEIFA-Segment 2	↑↑	0.057**	(0.004)	↑↑↑	0.272**	(0.022)
SEIFA-Segment 3	↓↓↓	-0.160**	(0.035)	→	0.020	(0.023)
SEIFA-CALD 1st generation LOTE	→	0.011	(0.045)	↓↓↓	-0.208**	(0.019)
SEIFA-CALD 2nd generation LOTE	←	-0.078	(0.099)	←	-0.127	(0.104)
SEGMENTS						
Segment 2: Disadvantaged	▼▼	-0.357**	(0.062)	▼▼▼	-2.538**	(0.211)
Segment 3: Working	▲▲▲	1.334**	(0.373)	►	0.062	(0.262)
STUDY AREA						
Engineering Studies	◄	-0.264	(0.152)	▼▼	-0.375**	(0.098)
Health Studies	▲▲▲	0.554**	(0.031)	▲▲▲	0.448**	(0.026)
Business Studies	◄	-0.114	(0.160)	◄	-0.037	(0.207)
Science Studies	◄	-0.352	(0.198)	▼▼	-0.241**	(0.088)
CALD						
CALD: 1st generation LOTE	◄	-0.436	(0.407)	▲▲▲	1.920**	(0.217)
CALD: 2nd generation LOTE	►	0.472	(0.896)	►	1.167	(1.107)
CALD: 1st generation ES	◄	-0.068	(0.143)	◄	-0.033	(0.042)
CALD: 2nd generation ES	◄	-0.064	(0.075)	◄	-0.040	(0.038)
OBSERVATIONS		3554			8176	

* and ** significance at 5% and 1% levels respectively. Standard errors are in parentheses.

Socio-economic status was positively associated to progression in the 'higher SES' group. Segment 2 had a negative impact in both SES groups while segment 3 positively associated with progression amongst low SES students. When combined with SES, segment 2 exhibited a large improvement in progression in both SES groups, but the opposite effect was observed for segment 3 amongst students of low SES.

Interestingly, progression in the low SES group does not significantly associate with CALD. However, CALD effects are important in the 'higher SES' group; being a 1st generation LOTE student has a positive effect on progress, but its interaction with higher SES results in adverse progression outcomes. Note, study areas impact on progression as reported earlier in Table 2.

4 TAFE STUDENTS

For Australian TAFE students, many of the results for higher education students remain, but there are some variations (see Table 7). For the Australian students, progression rates are again positively influenced by age but there is no gender effect. The *engagement effect* is even more pronounced, with strong positive links between progression rates and both full-time study and full-time work, but also a significant negative association with not being in employment.

Table 7. VU Progress Rates 2007, TAFE Students

VARIABLE	AUSTRALIAN STUDENTS			INTERNATIONAL STUDENTS		
Constant		-2.189	(0.088)		2.204	(0.244)
DEMOGRAPHICS						
Age	↑	0.020**	(0.001)	←	-0.001	(0.009)
(Age²)/100	↓	-0.018**	(0.006)			
Male	►	0.038	(0.080)	▼▼▼	-0.685**	(0.109)
Full-time Employee	▲	0.165**	(0.012)			
Not in Employment	▼	-0.134**	(0.007)			
Full-time Studies	▲	0.129**	(0.017)	◄	-0.140	(0.165)
Western Region	▲	0.133**	(0.042)			
SES AND INTERACTIONS						
SEIFA	↑↑↑	0.278**	(0.005)			
SEIFA-Segment 2	↓↓↓	-0.203**	(0.001)			
SEIFA-Segment 3	↓↓↓	-0.144**	(0.004)			
SEIFA-CALD 1st generation LOTE	↓	-0.008**	(0.001)			
SEIFA-CALD 2nd generation LOTE	↑↑	0.075**	(0.003)			
SEGMENTS						
Segment 2: Disadvantaged	▲▲▲	1.885**	(0.010)			
Segment 3: Working	▲▲▲	1.276**	(0.037)			
STUDY AREA						
Engineering Studies	▼	-0.158**	(0.039)			
Health Studies	▲▲	0.303**	(0.014)	▲▲▲	0.614*	(0.293)
Business Studies	▲	0.108**	(0.001)	▼▼▼	-1.477*	(0.699)
Science Studies	▲▲▲	0.756**	(0.042)	►	0.039	(0.113)
CALD						
CALD: 1st generation LOTE	▼	-0.126**	(0.023)			
CALD: 2nd generation LOTE	▼▼▼	-0.697**	(0.045)			
CALD: 1st generation ES	▼	-0.104**	(0.028)			
CALD: 2nd generation ES	►	0.008	(0.008)			
OBSERVATIONS		14503			92	

* and ** significance at 5% and 1% levels respectively. Standard errors are in parentheses.

By contrast with the higher education case, being a member of segment 2 or segment 3 has a strong positive effect on progression for TAFE students and there is a positive effect associated with parental residence in the western region of Melbourne. An increase in SES for students in these two segments, however, is not as beneficial to progression as is the case for other students.

A strong positive effect of socio-economic status (SEIFA) remains significant at the 1% level. Also, the negative effects of LOTE for 1st and 2nd generations observed in higher education are also present in the TAFE sector. In contrast, here it is English-speaking students born overseas that under-perform. Another difference with higher education is that progress of 2nd generation LOTE students improves more than others with SES but that of 1st generation LOTE students is marginally worse than others.

4.1 TAFE STUDENTS BY DOMAIN

Again there are differences between results for the different domains and the aggregate results (see Table 8), with a number of factors influencing progression rates for all TAFE students, and some factors having an effect in only one or two domains.

The positive impact of age, full-time employment and full-time study on progression is evident in all domains, except that age effect is negative in 'Business and Enterprise'. Not being in employment had an adverse effect in all domains. The spatial negative effect associated with the west is manifest only in 'Business and Enterprise'. Improvements in SES have a large positive effect in 'Community wellbeing' and ''Business and Enterprise', and an unexpected large negative impact in 'Information and Infrastructure'.

Being a member of segment 2 or segment 3 was conducive to better performance in 'Community Wellbeing' and in 'Business and Enterprise', but it was negatively correlated in 'Information and Infrastructure'. Interestingly, an improvement in SEIFA for both segments resulted in 'Information and Infrastructure' increased chances of progression in, while in 'Community Wellbeing' and 'Business and Enterprise' the chances of progression actually diminished. The respective coefficients in 'Information & Infrastructure' are even more difficult to interpret, as improvement in SEIFA would result in lower progression for segment 2, and higher progression for segment 3.

All four CALD variable coefficients in each TAFE study domain were significant, and quite sizeable for LOTE students. While being a LOTE student in 'Community Wellbeing' correlated negatively with progression, in 'Business and Enterprise' such students tended to progress better. 1st generation LOTE students in 'Information & Infrastructure' also had a better progress rate, and 2nd generation worse. Being an English-speaking student in 'Information and Infrastructure' was weakly associated with greater rates of progress, in 'Community Wellbeing' such students tended to perform worse, and in 'Business & Enterprise' 1st generation progressed at higher rate, and 2nd generation's progression was worse than the overall TAFE student population. With an improvement in SES, the chances of progression for LOTE students greatly improved in 'Community Wellbeing', and strongly decreased in 'Information and Infrastructure' and 'Business and Enterprise'.

With regard to the study area, students doing health and science studies in 'Community Wellbeing' tended to perform better, and students doing engineering and science in 'Information and Infrastructure' tended to progress at lower rates, when compared to overall TAFE student population.

Table 8. VU Progress Rates 2007, Australian TAFE Students by Domain

VARIABLE	INFORMATION & INFRASTRUCTURE	COMMUNITY WELLBEING	BUSINESS & ENTERPRISE
Constant	5.725 (0.129)	-3.791 (0.033)	-7.656 (0.566)
DEMOGRAPHICS			
Age	0.026** (0.004)	0.026** (0.003)	-0.059** (0.012)
(Age^2)/100	-0.034** (0.011)	-0.019** (0.001)	0.121** (0.021)
Male	0.021 (0.016)	-0.066 (0.046)	0.016 (0.236)
Full-time Employee	0.052** (0.010)	0.263** (0.020)	0.222** (0.015)
Not in Employment	-0.146* (0.061)	-0.141** (0.005)	-0.144** (0.055)
Full-time Studies	0.213** (0.009)	0.117** (0.013)	0.557** (0.035)
Western Region	0.242 (0.270)	0.128 (0.076)	-0.377** (0.130)
SES AND INTERACTIONS			
SEIFA	-0.577** (0.013)	0.450** (0.005)	1.019** (0.039)
SEIFA-Segment 2	0.731** (0.044)	-0.469** (0.023)	-0.951** (0.008)
SEIFA-Segment 3	0.762** (0.015)	-0.396** (0.015)	-0.809** (0.011)
SEIFA-CALD 1st generation LOTE	-0.083** (0.022)	0.104** (0.023)	-0.163** (0.034)
SEIFA-CALD 2nd generation LOTE	0.080** (0.017)	0.185** (0.016)	-0.120** (0.046)
SEGMENTS			
Segment 2: Disadvantaged	-6.893** (0.438)	4.286** (0.292)	8.989** (0.124)
Segment 3: Working	-7.118** (0.145)	3.456** (0.171)	7.565** (0.077)
STUDY AREA			
Engineering Studies	-0.193** (0.034)		
Health Studies		0.343** (0.038)	
Business Studies		0.348 (0.559)	
Science Studies	-0.951** (0.197)	1.022** (0.047)	
CALD			
CALD: 1st generation LOTE	0.596** (0.206)	-1.216** (0.231)	1.362** (0.316)
CALD: 2nd generation LOTE	-0.728** (0.165)	-1.792** (0.214)	1.264** (0.436)
CALD: 1st generation ES	0.056** (0.019)	-0.283** (0.036)	0.176** (0.068)
CALD: 2nd generation ES	0.102** (0.020)	-0.054** (0.002)	-0.090** (0.006)
OBSERVATIONS	5663	6976	1959

* Coefficients significant at 5% level. ** Coefficients significant at 1% level. Notes: Standard errors in parentheses.

4.2 TAFE STUDENTS BY AGE GROUP

Table 9 presents estimation results for TAFE students grouped by age. It shows that age effects are important but not gender. Amongst the young, coming from a family based in the western region of Melbourne was slightly positively associated with progression. Full-time students tended to have higher progress rates in both age groups, and not being in employment was linked to worse outcomes. Also, being a full-time employee had a positive impact on progression for young students.

In both groups an increase in SES was positively associated with progress rates. Being in either segment 2 or segment 3 represented a distinct advantage. However, in interaction of segments with SES, such advantage turned into a large disadvantage

Table 9. VU Progress Rates 2007, Australian TAFE Students by Age Group

VARIABLE	YOUNG GROUP			MATURE GROUP		
Constant		1.723	(0.152)		-219.667	(0.100)
DEMOGRAPHICS						
Age	↓↓↓	-0.322**	(0.031)	↑	0.012**	(0.001)
(Age^2)/100	↑↑↑	0.803**	(0.109)	↓	-0.011*	(0.005)
Male	▶	0.066	(0.093)	▶	0.020	(0.055)
Full-time Employee	▲▲	0.269**	(0.018)	▶	0.028	(0.043)
Not in Employment	▼	-0.128**	(0.024)	▼▼	-0.237**	(0.035)
Full-time Studies	▲	0.037**	(0.009)	▲▲▲	0.425**	(0.083)
Western Region	▲	0.155**	(0.020)	▶	0.090	(0.093)
SES AND INTERACTIONS						
SEIFA	↑↑↑	0.248**	(0.001)	↑↑↑	24.202**	(0.032)
SEIFA-Segment 2	↓↓↓	-0.235**	(0.004)	↓↓↓	-24.091**	(0.035)
SEIFA-Segment 3	↓↓↓	-0.129**	(0.003)	↓↓↓	-24.041**	(0.034)
SEIFA-CALD 1st generation LOTE	↑	0.035**	(0.006)	↓	-0.033**	(0.002)
SEIFA-CALD 2nd generation LOTE	↑↑↑	0.109**	(0.009)	↑↑↑	0.083**	(0.008)
SEGMENTS						
Segment 2: Disadvantaged	▲▲▲	2.007**	(0.043)	▲▲▲	219.249**	(0.054)
Segment 3: Working	▲▲▲	0.985**	(0.041)	▲▲▲	218.694	(0.001)
STUDY AREA						
Engineering Studies	▼	-0.146**	(0.001)	▼▼	-0.216**	(0.054)
Health Studies	▲▲▲	0.414**	(0.025)	▲▲	0.251**	(0.013)
Business Studies	▲	0.074**	(0.005)	▲	0.186**	(0.026)
Science Studies	▲▲▲	0.766**	(0.030)	◀	-0.010	(0.182)
CALD						
CALD: 1st generation LOTE	▼▼▼	-0.585**	(0.058)	▲	0.184**	(0.069)
CALD: 2nd generation LOTE	▼▼▼	-1.083**	(0.087)	▼▼▼	-0.589**	(0.127)
CALD: 1st generation ES	▼	-0.121*	(0.049)	◀	-0.043	(0.028)
CALD: 2nd generation ES	▼	-0.050**	(0.004)	▲	0.137**	(0.010)
OBSERVATIONS		8251			6252	

* and ** significance at 5% level and 1% levels respectively. Standard errors are in parentheses

All CALD groups seem to have performed remarkably worse than the reference group of 3rd generation ES students. In the mature group, 1st generation LOTE students and 2nd generation ES students progressed slightly better, while 2nd generation LOTE students tended to progress remarkably worse. The progress of all LOTE students benefited from higher SES. The only exception was 1st generation mature students, whose progress tended to decrease. This is very important for public policy since it suggests that mature-aged students born overseas and

with LOTE do not benefit from policies that focus exclusively on low SES. In addition, the results here raise questions about equity and access to vocational education and re-training.

Table 9 also shows that engineering students tended to progress worse than the overall TAFE student population, and all other study areas tended to perform better, except for science mature-aged students who did not seem to have any significant effect.

4.3 TAFE STUDENTS BY SES

Table 10 presents the results for the Australian TAFE sample by SES. We find that the effects of all demographic characteristics, except for gender, are important for both groups. Not being in employment has a negative effect on progress, while age, full-time employment and full-time studies have positive effect.

Increase in SES is positively correlated with progression rates in both groups. Belonging to either segment 2 or segment 3 had again a strong positive impact on progression. However, both of these segments did not benefit much from higher SES, a result that requires further investigation.

Table 10. VU Progress Rates 2007, Australian TAFE Students by SES Group

VARIABLE	LOW SES GROUP			HIGHER SES GROUP		
Constant		-7.638	(0.136)		-3.813	(0.046)
DEMOGRAPHICS						
Age	↑	0.020**	(0.002)	↑	0.018**	(0.002)
(Age^2)/100	↓	-0.021**	(0.002)	←	-0.012	(0.009)
Male	◄	-0.036	(0.019)	►	0.098	(0.116)
Full-time Employee	▲	0.114**	(0.016)	▲	0.193**	(0.034)
Not in Employment	▼	-0.154**	(0.045)	▼	-0.125**	(0.026)
Full-time Studies	▲	0.054*	(0.021)	▲	0.196*	(0.083)
Western Region	▲▲	0.223**	(0.085)	▲	0.088**	(0.012)
SES AND INTERACTIONS						
SEIFA	↑↑↑	0.908**	(0.008)	↑↑↑	0.422**	(0.007)
SEIFA-Segment 2	↓↓↓	-0.790**	(0.004)	↓↓↓	-0.368**	(0.055)
SEIFA-Segment 3	↓↓↓	-0.742**	(0.014)	↓↓↓	-0.291**	(0.011)
SEIFA-CALD 1st generation LOTE	↓↓↓	-0.096**	(0.007)	→	0.046	(0.048)
SEIFA-CALD 2nd generation LOTE	←	-0.004	(0.010)	→	0.146	(0.122)
SEGMENTS						
Segment 2: Disadvantaged	▲▲▲	6.995**	(0.037)	▲▲▲	3.691**	(0.556)
Segment 3: Working	▲▲▲	6.492**	(0.149)	▲▲▲	2.908**	(0.063)
STUDY AREA						
Engineering Studies	◄	-0.150	(0.116)	▼	-0.174**	(0.015)
Health Studies	▲	0.191**	(0.056)	▲▲	0.373**	(0.059)
Business Studies	►	0.085	(0.094)	►	0.114	(0.067)
Science Studies	▲▲▲	0.681**	(0.187)	▲▲▲	0.799**	(0.065)
CALD						
CALD: 1st generation LOTE	▲▲▲	0.628**	(0.085)	◄	-0.631	(0.491)
CALD: 2nd generation LOTE	►	0.004	(0.100)	◄	-1.404	(1.301)
CALD: 1st generation ES	◄	-0.111	(0.068)	▼	-0.100**	(0.012)
CALD: 2nd generation ES	►	0.012	(0.010)	►	0.011	(0.008)
OBSERVATIONS		5662			8841	

* and ** significance at 5% level and 1% levels respectively. Standard errors are in parentheses

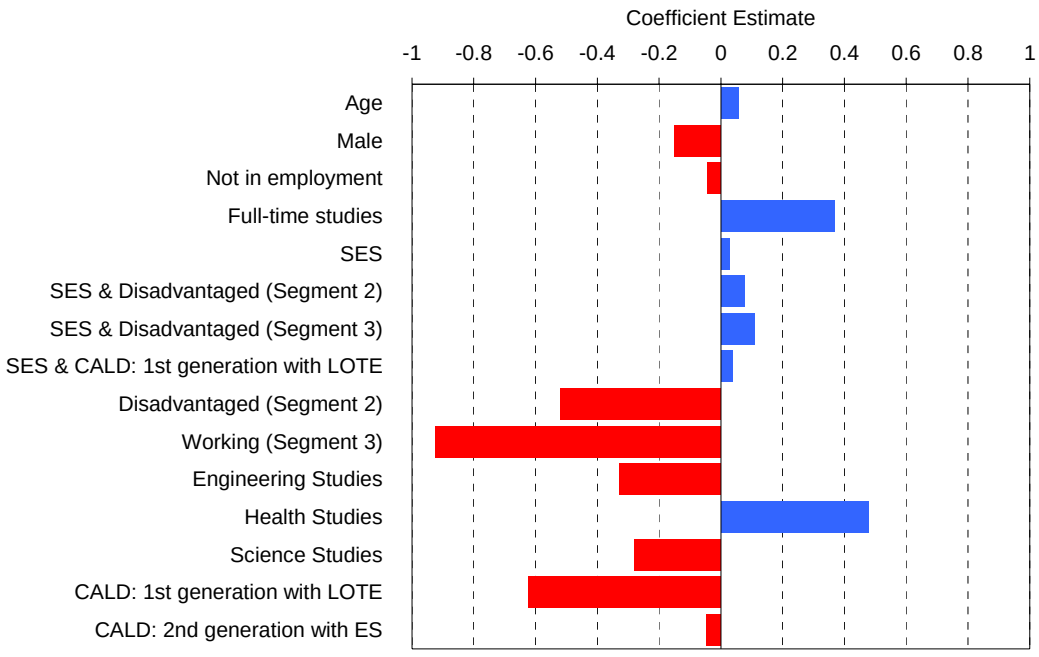
Being a 1st generation LOTE student of low SES background was positively associated with progression while membership in the 1st generation ES group in the high SES group had an adverse effect on progression. Increases in SES, on the other hand, seemed to result in a less positive effect on progression for the 1st generation LOTE students than other low SES students. Finally, in both SES groups, science students performed better than the overall student population, as did students in health in the higher SES group'.

5 SUMMARY OF RESULTS

For clarity, we seek to illuminate on the meaning of results presented in the previous tables. As shown in Figure 1, more mature students and those studying full-time had greater chances of progress. Male students tended to perform worse than female students. Students who were not in employment were also disadvantaged with regard to academic progress. Significant effects on progress rates were also evident with respect to study area. Students in health studies had much larger chances of academic progress, while science and engineering students tended to perform worse.

The greatest negative impact on progression was experienced by students in segment 3 and, to a less extend, students in segment 2. In contrast with the reference group of 3rd generation ES students, 1st generation LOTE students performed far worse, as did the 2nd generation ES students. Improvement in SES had a small positive impact on progression of the overall higher education population, and a much larger positive effect for students in segments 2 and 3 as well as the 1st generation LOTE group.

Figure 1. Summary of results: Higher Education, 2007

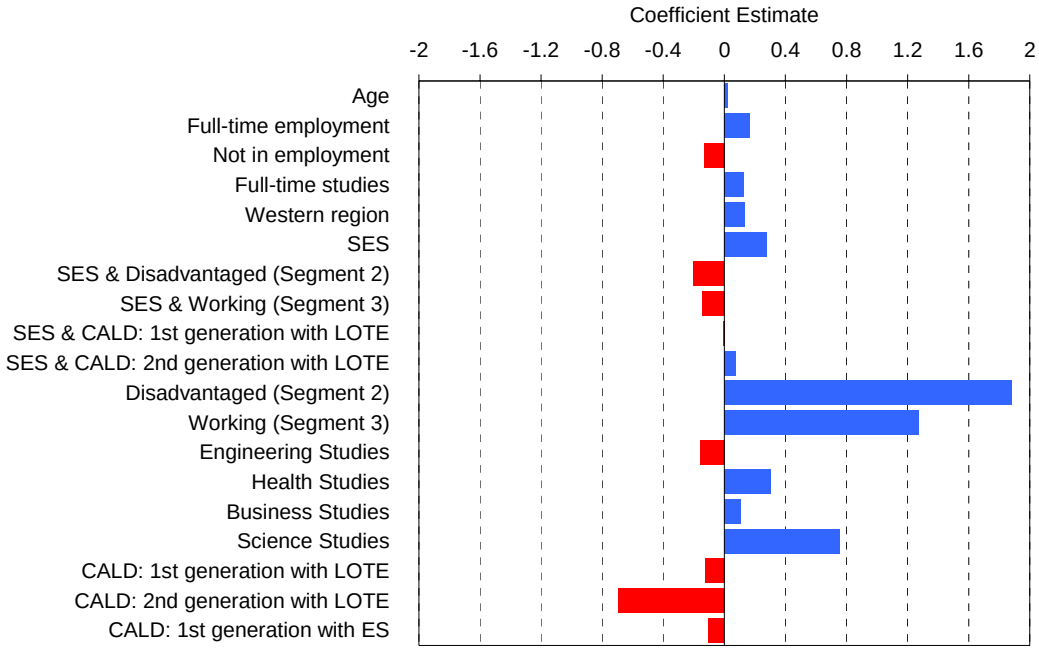


Similar to higher education, age and full-time studies also had a positive impact on progress rates of TAFE students, and not being in employment had a negative impact, as illustrated in Figure 2. In addition, the chances of progress in TAFE sector were larger for students in full-time employment and for those with families in the Western region of Melbourne. Students in

Science had largest chances of academic progress, followed by health and science, while doing engineering studies had a weak adverse impact.

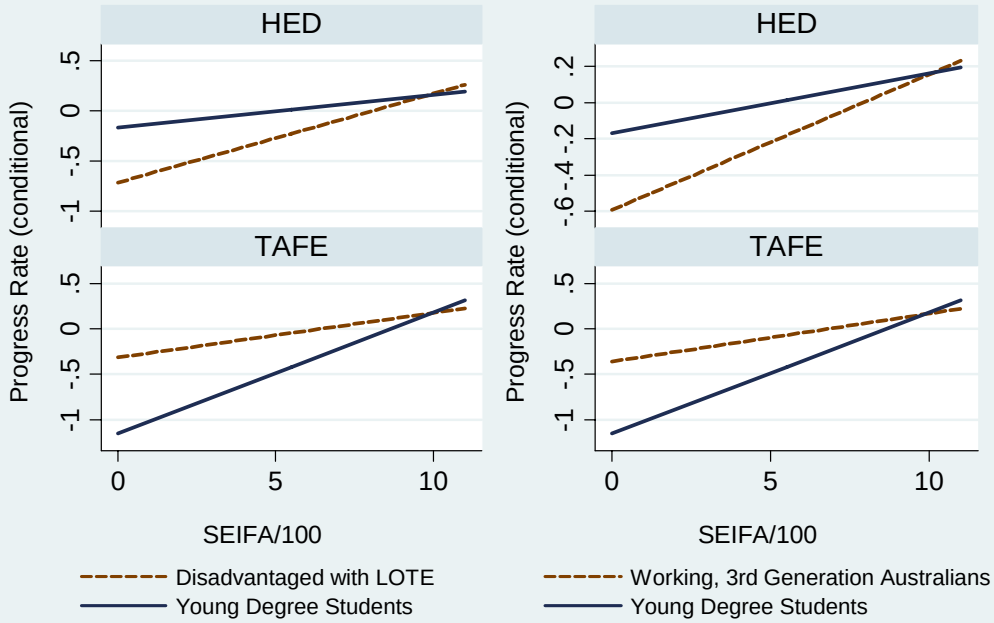
In contrast to higher education, students in segments 2 and 3 had remarkably greater chances of progress and the positive SES effect on progression was much larger in magnitude. However, the effect of SES for segments 2 and 3 was uniformly substantially lower than the SES effect for other students. Cultural and linguistic diversity (CALD) was also found to be negatively associated with progression. The chances of progress for 1st generation LOTE students were further decreased with an increase in SES but were improved for 2nd generation LOTE students. Overall, SES tends to reinforce the group effects of 1st generation LOTE students in the TAFE sector rather than ameliorate the disadvantage as observed in higher education (see Table 2).

Figure 2. Summary of results: TAFE, 2007



The key findings regarding segments 2 and 3 and CALD effects are also depicted in Figures 3 and 4. Segments 2 and 3 are summarised by the indicator variables '*Segment 2: Disadvantaged with LOTE'* and '*Segment 3: Working, 3rd generation Australians'* and the interaction effects are summarised by the three CALD indicator variables. Figures 3 and 4 present the regression lines of SEIFA scores against the predicted progress rate for three Australian students segments. The conditional progress rate series is the Anscombe residual scores from regressions that include all covariates except SEIFA, SEIFA-CALD interactions and CALD groups. We have abstracted from individual scatter points to highlight the predicted regression line and focus on the intercept and slope of the line.

Figure 3. Conditional Progress Rate and SEIFA by Segment, 2007



Note: The conditional progress rate series is the Anscombe residuals from regressions that include all covariates except SEIFA, SEIFA-CALD interactions and CALD groups.
Source: Victoria University VUSIS Database

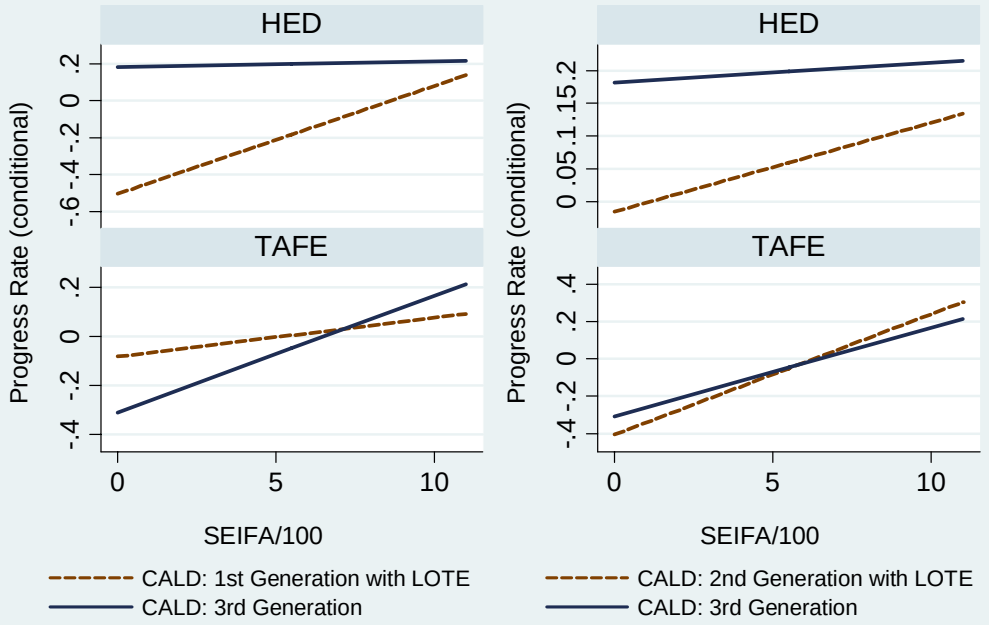
The top panel in Figure 3 shows that progression for higher education is consistently higher for students in the reference group (i.e., segment 1: 'young, full-time degree students'), compared to the 'disadvantaged with LOTE' and 'working, 3rd generation Australians'. This is the pure group effect and is summarised in a higher intercept (i.e., where the regression line intersects the vertical y-axis). However, for the students in the latter two segments, the probability of progression increases much more when SES or SEIFA increases by one unit. That is, the regression line for the disadvantaged and working students[3] has a larger slope (i.e., it is steeper) than that corresponding to segment 1 students.

In contrast to higher education, the group (intercept) and interaction (slope) effects are reversed for the TAFE sector (lower panel of Figure 3). Disadvantaged and working students, outperform the reference group (i.e., young, degree students) but the latter group progress at much faster rate when SES improves (i.e., a steeper regression line).

Plots in Figure 4 depict CALD and SEIFA-CALD interaction effects. As can be seen in the first row, the reference group (i.e., 3rd generation ES), consistently outperforms both 1st and 2nd generation with LOTE, but the latter two groups progress much faster with higher SES in higher education. However, in the TAFE sector the relationships between the reference group and the LOTE students were not as uniform. Here, students of 1st generation with LOTE progressed at much smaller rate, and were outperformed by the 3rd generation at higher levels of SES. In contrast, 2nd generation students with LOTE and 3rd generation had similar rates of progress, with '2nd generation with LOTE' being slightly more successful with higher SEIFA scores.

[3] In Messinis, Sheehan and Miholcic (2008), we show that students with LOTE are heaving over-represented in segment 2 (i.e., the disadvantaged students) and 3rd generation ES (i.e., those whose parents were born in Australia) were over-represented in segment 3 (i.e., working students).

Figure 4. Conditional Progress Rate and SEIFA by CALD: Higher Education, 2007



Note: The conditional progress rate series is the Anscombe residuals from regressions that include all covariates except SEIFA, SEIFA-CALD interactions and CALD groups.
Source: Victoria University VUSIS Database

6 CONCLUSION

This paper examines the academic performance of Australian students at Victoria University in 2007. It exploits unit record student enrolment data and Australian Bureau of Statistics Census 2006 data at the level of Census Collectors Districts (CCDs) in order to explore the key drivers of students' progress rate in both higher education and TAFE sectors. In search for key factors, the study draws on previous research and builds on Messinis, Sheehan and Miholcic (2008) who map the profile of Victoria University students in terms of three main segments: full-time degree students; disadvantaged; and part-time working students.

This study has identified several key determinants of student progression. In higher education, females, mature students, full-time students, English speaking at home, and higher socio-economic status (SES) all contribute to student performance. Studies in health sciences also associated with improved student performance, while being a member in either the segments of disadvantaged and working students is associated with lower performance.

In the TAFE sector, there is no evidence of a gender effect, but the labour market *engagement effect* of outcomes is pronounced. Also, there are significant negative effects associated with non-English-speaking at home, while living in the western region of Melbourne had positive effect. Surprisingly, being a member of segment 2 or segment 3 had a favourable impact on student performance.

Finally, the study explores the role of cultural and linguistic diversity (CALD) and its interaction with migration cohorts and SES. This analysis shows that important generational effects are in operation. In higher education, 1st generation students with LOTE face serious challenges but an improvement in their socio-economic status results in superior performance. In the TAFE sector, on the other hand, it is students of 2nd generation with LOTE that overcome the disadvantage associated with membership in this group when the SES improves. However,

students born overseas who speak a language other than English at home (LOTE) fail to benefit from higher socio-economic status (SES).

The evidence summarised in the top panel of Figure 2 and Figure 3 has important implications for public policy. These plots clearly show that the disadvantaged, working and 1st generation LOTE students face substantial hurdles to progression as groups, and these hurdles are quite separate to those facing students of low SES. Moreover, the figures show that these three groups can overcome these hurdles only at very high levels of SES that seem unlikely to be attainable. This finding alludes to the possibility that public policy targeted towards stronger access to tertiary education for low SES students are likely to be ineffective and, perhaps, inequitable with respect to the amelioration of the disadvantage confronting working Australians who seek to augment their skills, and Australians of non-English-speaking background.

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APPENDIX

SEIFA INDEX OF RELATIVE ECONOMIC RESOURCES

Included Variables:

- % people with stated annual household equivalised income between $13,000 and $20,799 (approximately 2nd and 3rd deciles)
- % one parent families with dependent offspring only
- % occupied private dwellings with no car
- % households renting from Government or Community organisation
- % households paying rent less than $120 per week (excluding $0 per week)
- % people aged 15 years and over who are unemployed
- % households who are lone person households
- % occupied private dwellings requiring one or more extra bedrooms (based on Canadian National Occupancy Standard)
- % households owning dwelling they occupy (without a mortgage)
- % dwellings with at least one person who is an owner of an unincorporated enterprise
- % households paying mortgage greater than $2,120 per month
- % households owning dwelling (with a mortgage)
- % households paying rent greater than $290 per week
- % people with stated annual household equivalised income greater than $52,000 (approximately 9th and 10th deciles)
- % occupied private dwellings with four or more bedrooms