Expansion in higher education during the 1990s: effects on access and student quality

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Australia's higher education sector has grown rapidly over the last decade or more, particularly since the higher education reforms of 1987, resulting in a major expansion in the number of student places and increased opportunities for participation in higher education.

This paper analyses a number of key issues arising from this increase in the number of students undertaking studies at university in the 1990s. The paper first sets out the characteristics of this increase and then seeks to address the following key questions:

- has access to university increased?
- has there been any significant change in the length of study? and
- has the academic quality of students enrolling changed over this period?

The paper has two main parts. The first looks at the issues of access to university and the length of periods of study. It does this by taking a 'life-table' approach that exploits age-specific participation rates. The second part is concerned with whether the expansion of the system over the 1990s has affected the academic quality of students. A number of approaches are taken:

- an examination of the relationship between tertiary entrance ranks and participation rates of various groups (the hypothesis being that high participation groups would have more students of lower ability; acceptance of that hypothesis would support the notion that academic standards decline as participation increases);
- an analysis of changes in the distribution of characteristics of students, and whether the balance has moved toward or away from groups more likely to succeed academically; and
- a comparison of the academic ability of higher education students from three cohorts from the Longitudinal Survey of Australian Youth.

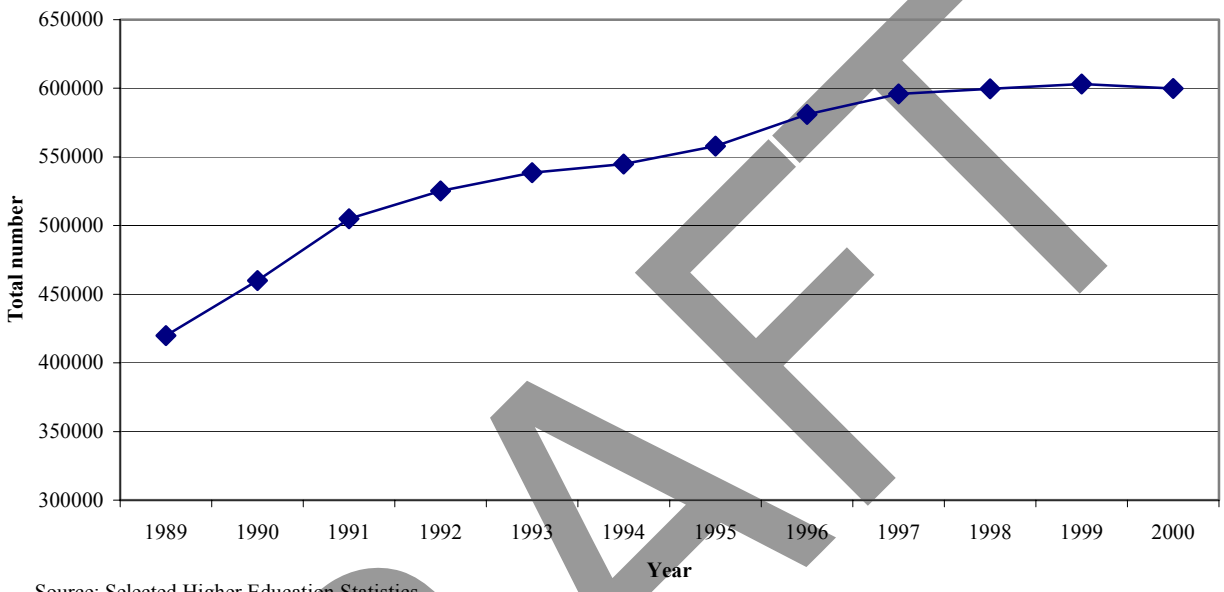
The main findings are:

- for the period 1989 to 1997, the number of students (non-overseas) grew rapidly, but has subsequently levelled off;
- access to university in terms of the proportion of a cohort going to university peaked in 1996;
- there has been a significant increase in the duration of study over the decade; and
- the evidence that the academic quality of students has declined over the decade is very weak.

1. Access to Higher Education

During the 1990s, there was a significant expansion in the number of students studying at Australian tertiary institutions arising from increased student targets funded by the Commonwealth government. The number of non-overseas students increased substantially over the period of 1989 to 1997 but remained relatively stable thereafter to 2000. Between 1989 and 2000, the total number of non-overseas students increased by 42.8 per cent to around 600,000.

Figure 1: Total non-overseas students, 1989 to 2000



Source: Selected Higher Education Statistics.

There are two interesting policy-related issues arising from this large increase. First, the extent to which the increase is a real increase (i.e. greater than population increase), and second, the extent to which the increased numbers reflect increased access or lengthened periods of study.

The methodological approach adopted is that of life table analysis, based on summing age-specific participation rates.[1] Here, the life table approach includes expected lifetime consumption as well as access of age cohorts to higher education. Expected lifetime consumption can be decomposed into changes in access and changes in the length of study.

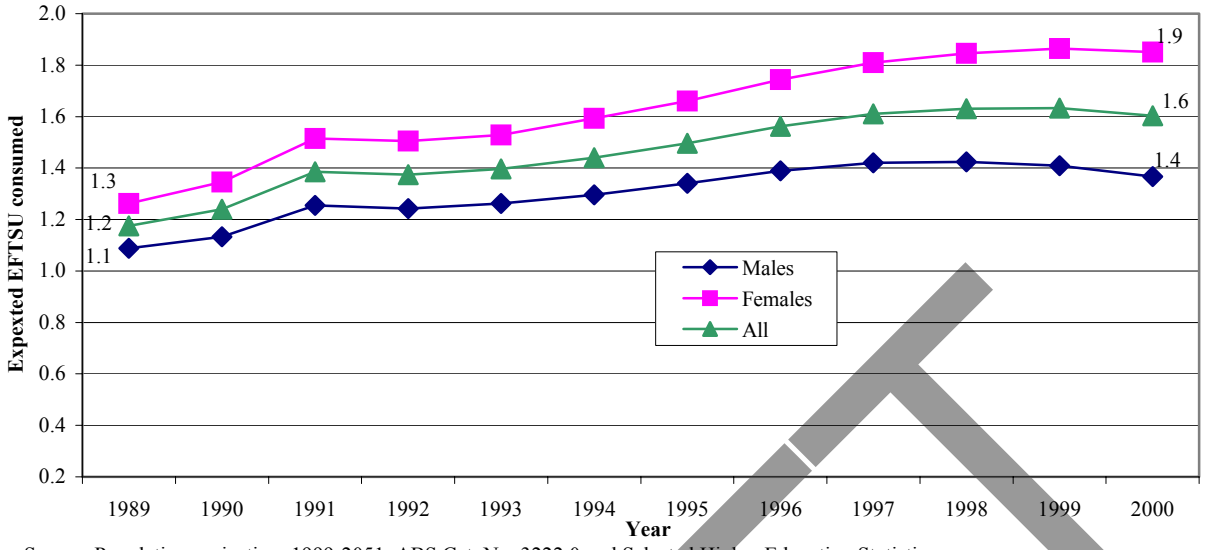
The expected lifetime consumption of equivalent full-time study units (EFTSU) of a student is obtained by summing average consumption for each year of life. That is:

$$\sum_i \frac{E_i}{P_i}$$

where i, is the age group; E_i, the EFTSU consumed for the i age group and P_i, the population of the i age group. That is, the number of EFTSU consumed by a single year of age is divided by the respective population.

[1] By summing these age-specific participation rates, we derive an estimate of the likelihood of a person entering higher education during his/her lifetime.

Figure 2: Expected lifetime EFTSU consumption, 1989 to 2000



Source: Population projection, 1999-2051, ABS Cat. No. 3222.0 and Selected Higher Education Statistics.

Figure 2 presents the measured trends of expected lifetime EFTSU consumption between 1989 and 2000.[2] Expected lifetime EFTSU consumed by a student increased over the period from 1989 to 2000. In 1989, an individual was expected to consume, on average, just over one EFTSU over his/her life span. By 2000, this number has increased to around 1.6 EFTSU, an increase of 36 per cent over and above population growth. Females, in particular, consume more than males, and this difference has increased over time. The sharp increase in the consumption between 1989 and 1991 was due to the sharp increase in enrolment of students for that period.

As mentioned earlier, the expected lifetime EFTSU consumption can be conveniently decomposed into two elements, the expected length of study, and the level of lifetime access to higher education. The link is expressed as:

Expected length of study = expected lifetime EFTSU consumption / lifetime access

where lifetime access is the sum of access rates across all age groups.[3]

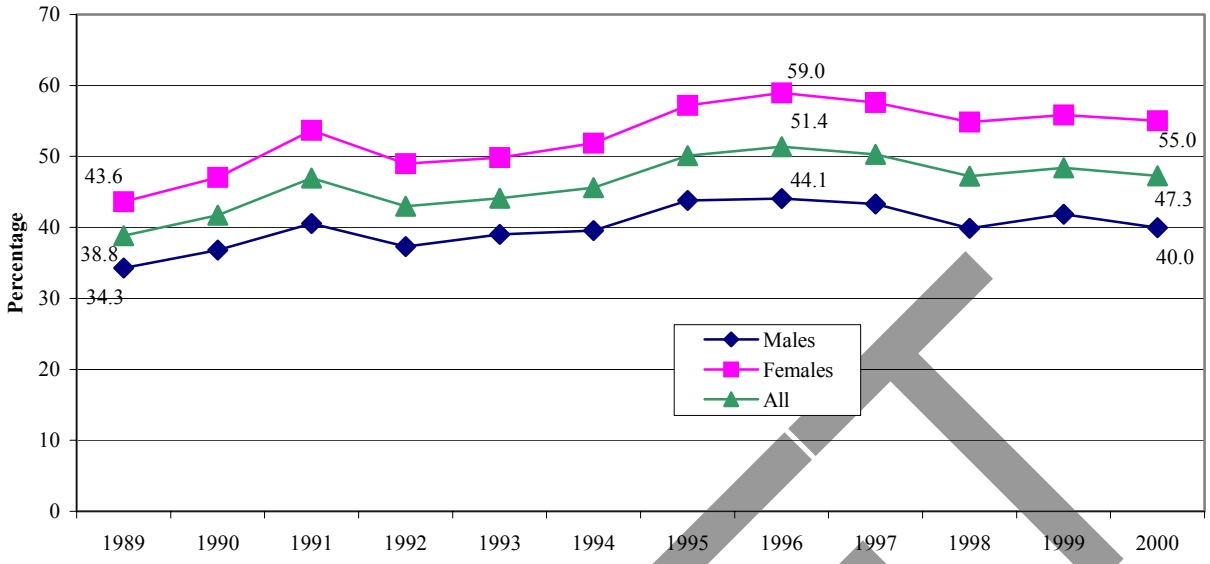
Figure 3 depicts the trend in lifetime access to higher education for the period 1989 to 2000. The likelihood of someone attending university in their lifetime has increased over the past decade. In 1989, approximately 39 per cent of the people were expected to attend a university at some stage in their lives. This proportion increased to around 51 per cent in 1996, before falling to 47.3 percentage points in 2000. Consistent with the increase in consumption, there was a sharp increase in access between 1989 and 1991.

Females are clearly more likely to participate in higher education than males. As can be seen from Figure 3, the differential has remained very constant.

[2] EFTSU consumed by all students, including undergraduate as well as postgraduate students.

[3] Access to higher education here refers to the probability of persons entering higher education for the first time, that is, with no prior experience of university study. The estimates presented here include persons who failed to provide information about their prior education experience and, therefore, represent an upper bound to lifetime university attendance.

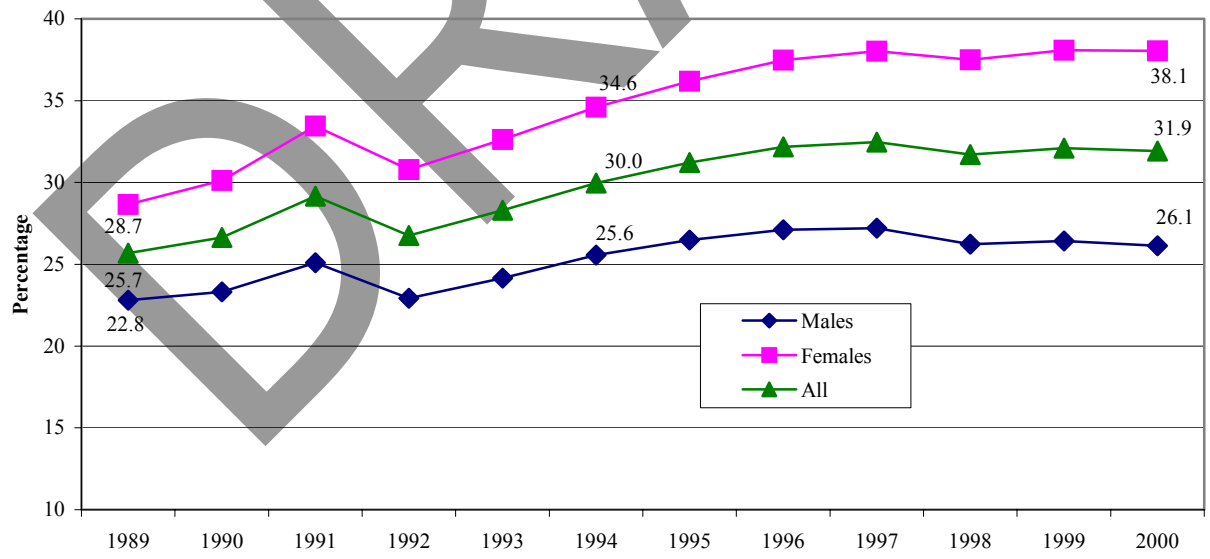
Figure 3: Lifetime Probability of attending higher education, 1989 to 2000



Source: Population projection, 1999-2051, ABS Cat. No. 3222.0 and Selected Higher Education Statistics.

In addition to analysing the lifetime probability of attending university, it is possible to estimate the probability of attending at various ages. Access to higher education for female students up to the age of 20 years, in particular, jumped from 29 per cent in 1989 to 38 per cent by 2000. Access for male students has remained lower than females, and only increasing slightly from 23 per cent to 26 per cent over the same period (Figure 4).

Figure 4: Access to Higher Education (aged 20 and under), 1989 to 2000



Source: Population projection, 1999-2051, ABS Cat. No. 3222.0 and Selected Higher Education Statistics.

Most people attend university at a relatively young age. An increase in lifetime access for young people is evident over the last decade, with the biggest increase coming from young women (Table 1).

Table 1: Increment in lifetime access (percentage of population)

	Male			Female		
	1989	2000	Change	1989	2000	Change
<=20	22.8	26.1	3.3	28.7	38.1	9.4
20+	11.5	13.9	2.4	14.9	16.9	2.0
Total	34.3	40	5.7	43.6	55	11.4

Source: Figures 3 and 4.

The lifetime probability of attending university now appears to have reached a higher level than it was in the late 1980s and early 1990s. It is clear that an increasing number of students was able to gain access to tertiary education over the last decade, which has contributed to increasing participation in higher education over the 1990s.

Average length of study

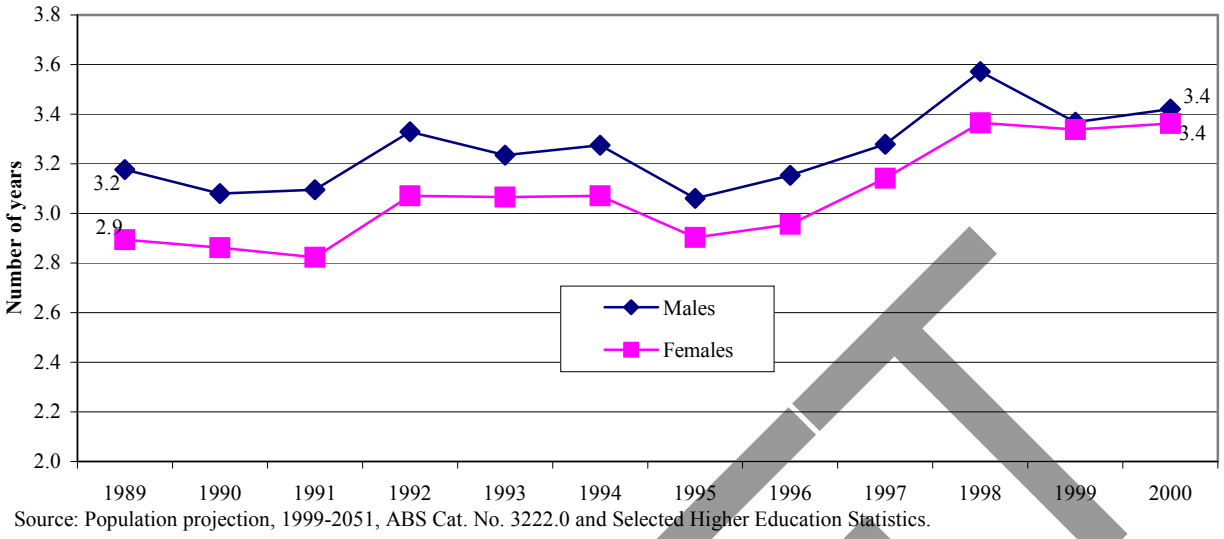
Participation in higher education depends on both access to and duration of study. In this section, changes in the duration of study are examined over the period under investigation. Whilst duration may be influenced by short run cyclical factors, there are also likely to be structural factors at work such as the trend towards double degrees,[4] and students returning to university to undertake a second undergraduate degree or postgraduate degree.

Figure 5 indicates that the average number of years that a cohort of students can expect to attend university has increased from around 3 years in 1989 to 3.4 years in 2000. This increase has arisen as a result of both the lengthening of undergraduate study, as illustrated in Figure 6, as well as extending the period of postgraduate study.

Males still tend to study for a longer period than females, but the gap is closing. For female students, the average length of study increased substantially from 2.9 years in 1989 to around 3.4 in 2000, an increase of about 16 per cent (Figure 5). The pattern for undergraduate students is almost identical, with male students studying longer than female students. However, by 1999, this trend had reversed, so that female undergraduate students are now seen to study longer than male undergraduate students (Figure 6).

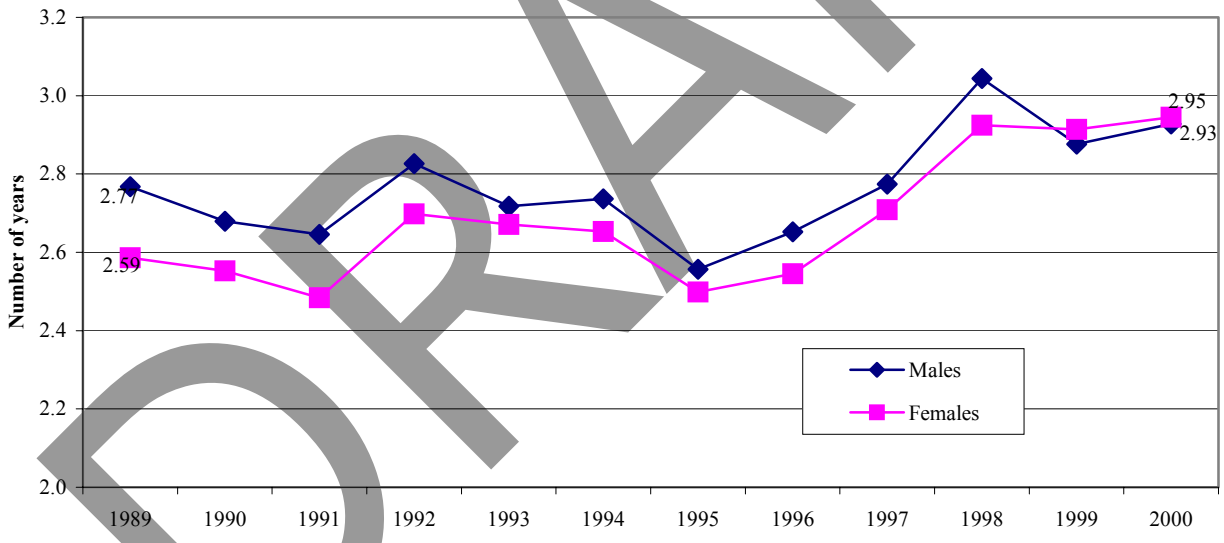
[4] The growing popularity of double degree courses had resulted in about 5 per cent of the student population enrolled in a double degree in 1997. See Aungles et al, 2000 for more details.

Figure 5: Expected length of study, 1989 to 2000



Source: Population projection, 1999-2051, ABS Cat. No. 3222.0 and Selected Higher Education Statistics.

Figure 6: Expected length of study for undergraduates, 1989 to 2000



Source: Population projection, 1999-2051, ABS Cat. No. 3222.0 and Selected Higher Education Statistics.

Compared with students in the late 1980s and early 1990s, students are now more likely to attend university over a longer period during their lifetime. The combination of an increase in access to higher education and an increase in the duration of study in the past decade has clearly led to the increase in enrolments over the 1990s.

2. Changes in academic ability

The previous section clearly established that there has been a substantial increase in the proportion of a cohort going to university during the 1990s. A possible concern over such an expansion is whether the overall quality of the students with access to higher education has declined. One of the difficulties is that data on Tertiary Entrance Ranks (TER) are not reliable before 1998.

Consequently, there is no clear data on how academic ability of commencing students has changed.[5] Whilst it is difficult to answer the question directly, it is possible to approach it in a number of ways to throw some light on it. First, indirect evidence can be obtained by comparing the entrance scores of males and females, noting that the female cohort is much larger than the male cohort. Everything else being equal, therefore, one would expect the smaller male cohort to be skewed toward better students than the larger female cohort. It is argued that if the size of the cohort affects the number of marginal students, then it is possible to get some idea of the likely change over the 1990s in the size of the student cohort by looking at the difference in academic ability between males and females.

Another possible way to find out whether academic ability of commencing students has changed is to look at the characteristics of students and how they change over time. The approach is to relate academic ability, measured by the propensity to complete, to students' 'background characteristics', and then examine how the distribution of 'background characteristics' has changed.

Finally, three cohorts from surveys conducted by the Australian Council for Education Research (ACER) were selected to examine the academic ability (measured at age 14) of those who attend university at age 19. The comparison of the three cohorts is, however, complicated by a change in the survey methodology.

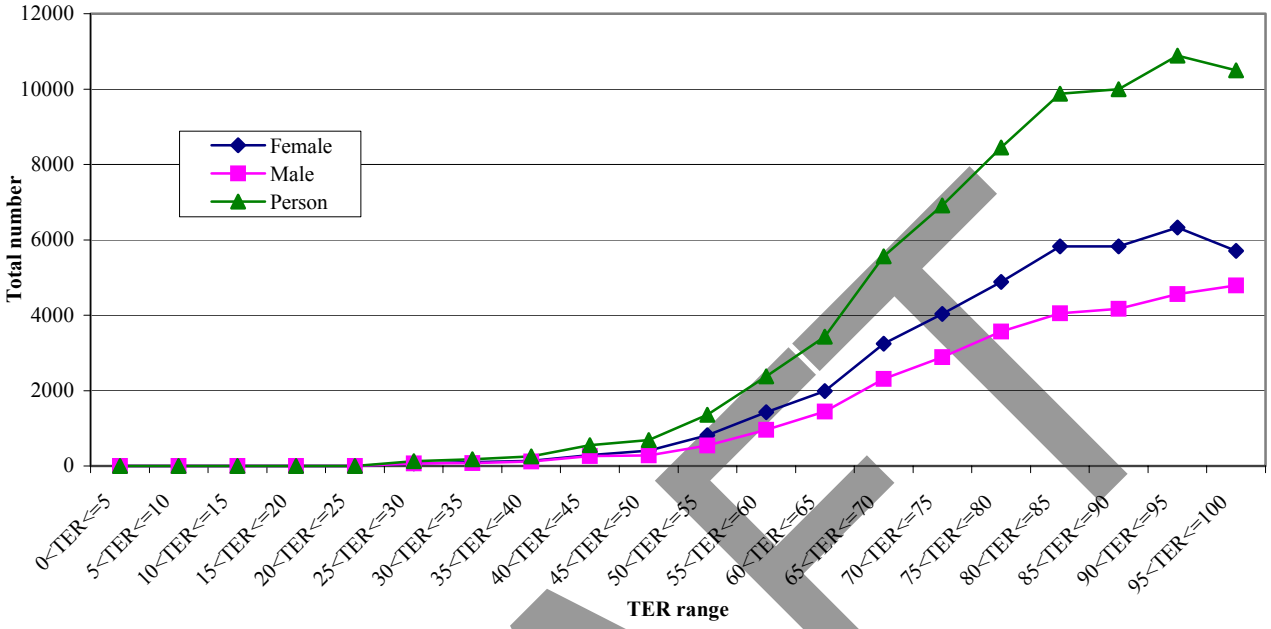
Tertiary Entrance Ranking Score

When people talk about the quality of the student declining, they usually have in mind a lowering of academic ability. The obvious measure of such ability is the Tertiary Entrance Ranking (TER) score, obtained at year 12. Certainly, TER does have an important impact on completion rates (Urban et al, 1998; Martin et al, 2001). However, the quality of the TER data recorded by universities before 1999 is very poor and it is not possible to make meaningful comparisons, even within States, over time. Fortunately, the quality of the data greatly improved in 1999, with the adoption of the Interstate Transfer Index (ITI).[6] Whilst a comparison of 1999 and 2000 data is not particularly illuminating (because the data show that the proportion of a cohort attending university did not change appreciably between these years), the data for 1999 and 2000 are, however, worth looking at from a different perspective. The differences between the male and female TER distributions are examined, noting that they represent quite different proportions of their respective cohorts. In 1999, around 38 per cent of the female cohort had attended university by age 20, compared to 26 per cent of the male cohort. It can be argued that a higher access rate leads to more 'marginal students', then one would expect to see a higher proportion of marginal students among the female students. Figures 7 and 8 plot the numbers, and show clearly the relatively large numbers of female students. The distributions in Figures 9 and 10, however, tell a more interesting story.

[5] However, with the introduction of the Interstate Transfer Index (ITI) since 1999, it is now possible to compare the TERs of all commencing students in Australia.

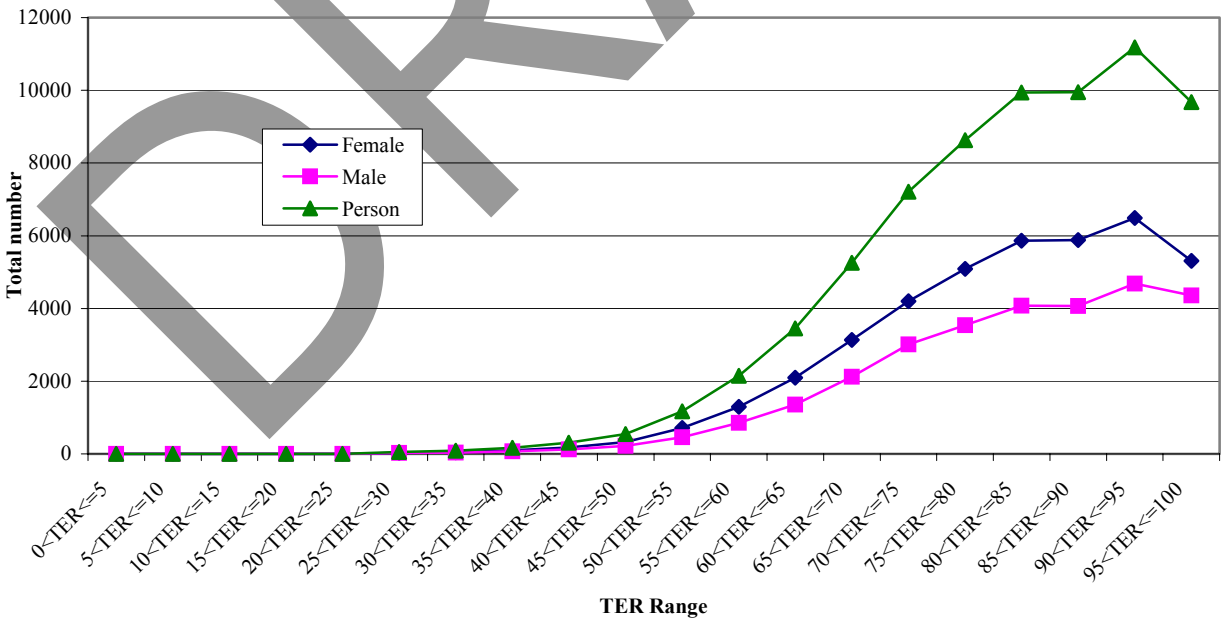
[6] Interstate Transfer Index (ITI) was adopted in 1999 following recommendations provided by the Taskforce on the Australian Tertiary Admissions System conducted by the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA), to ensure that interstate applications for tertiary courses are treated in an equitable manner in the late 1990s. It is used as a means to convert 'home State' TERs to the TERs applicable in any other States and Territories.

Figure 7: 1999 non-overseas commencing undergraduates aged 20 and under with TER scores



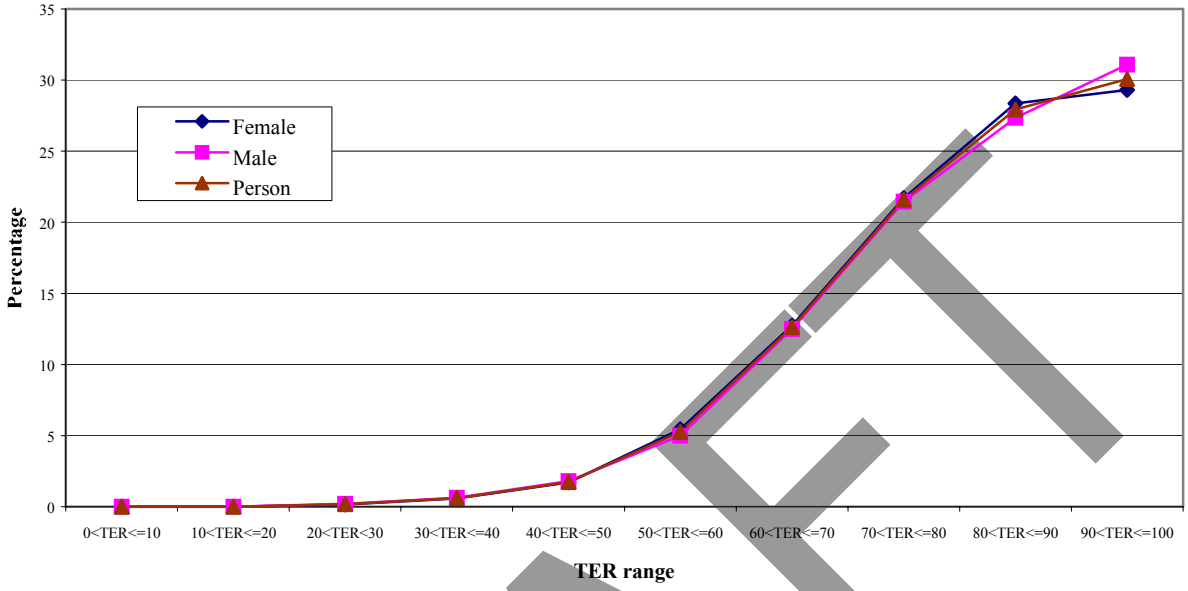
Source: Selected Higher Education Statistics.

Figure 8: 2000 non-overseas commencing undergraduates aged 20 and under with TER scores



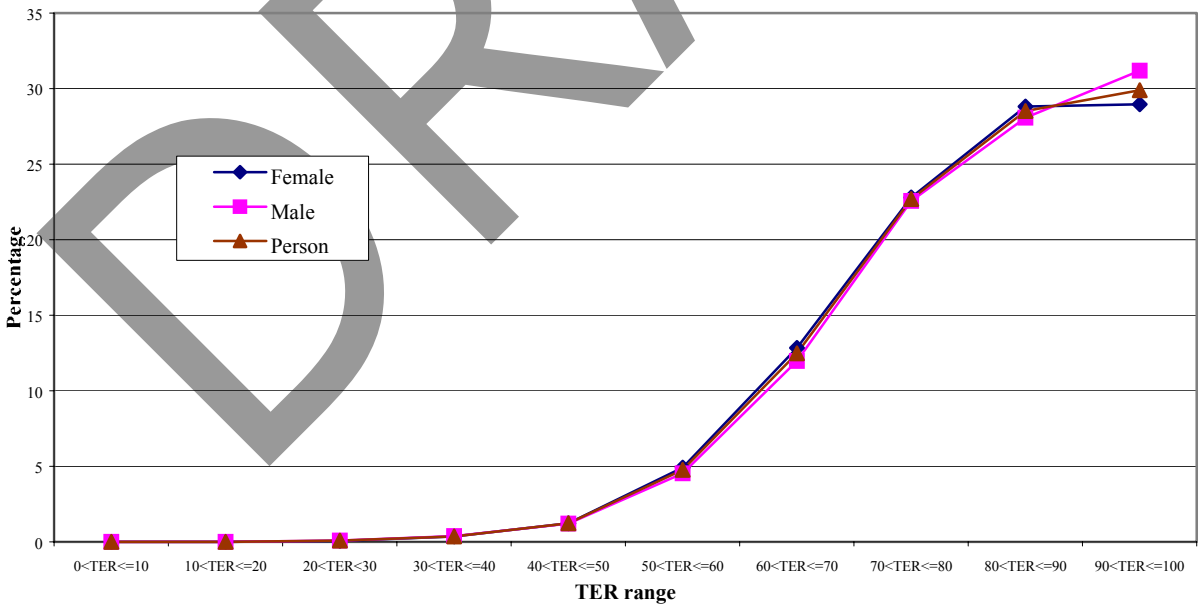
Source: Selected Higher Education Statistics.

Figure 9: TER Distribution for 1999 commencing undergraduates aged 20 and under



Source: Selected Higher Education Statistics.

Figure 10: TER Distribution for 2000 commencing undergraduates aged 20 and under



Source: Selected Higher Education Statistics.

The results are somewhat surprising. Despite a very much higher number for female students, identical patterns are found in the TER distributions for both male and female undergraduates for both 1999 and 2000 (Figure 9 and 10). So, if male participation were to increase to that of females, there is no reason to believe that this would result in a change in the proportion of students of lower

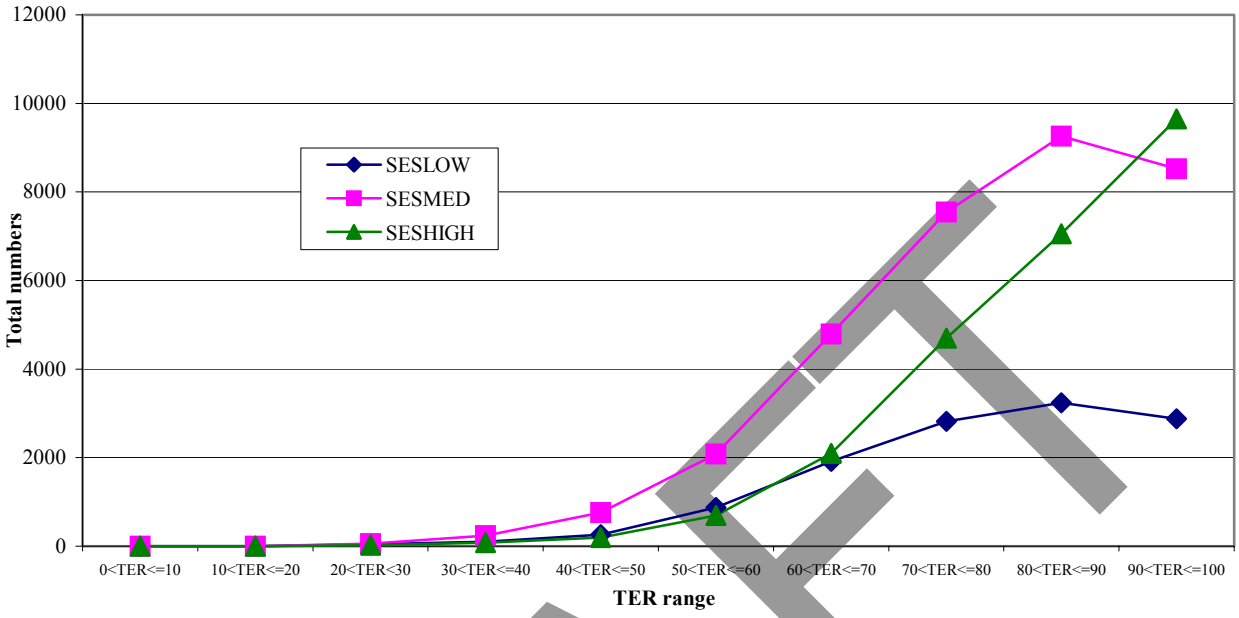
academic ability. The implicit assumptions in this argument are that there is no difference in innate academic ability between the sexes and that TER is measuring that ability. However, the argument is weaker if it were the case that TER is a measure of academic ability that is biased against boys (and, indeed, boys do perform worse than girls at school, see Marks et al, 2001). On the other hand, the very shape of the distributions in Figures 9 and 10 indicate that considerable numbers of high ability students do not go to university. The point is, it can be argued that there is no reason to believe that there have been significant changes in the quality of students over the period as student body expanded.

To test the robustness of the results an alternative approach is also adopted. In this approach, the entrance scores of students based on their socio-economic status (SES) are compared. Noting that participation rates are positively correlated with socio-economic background one would expect that the TER distribution of low socio-economic background students would be skewed toward high TER scores. The correlation between background and participation is marked. The population is notionally split into 25% high socio-economic, 50% medium and 25% low socio-economic background. The corresponding distribution of students (for year 2000) is 36 : 47 : 17. Figures 11 and 12 plot the resulting numbers with Figures 13 and 14 showing their TER distributions.

The results are striking. Despite much higher participation among high SES students, close to 70 per cent of all high SES students have TER scores of more than 80 for both 1999 and 2000 (Figures 13 and 14). For medium SES students, just over half of them (about 53 per cent) have TER scores of more than 80. So, using the same kind of argument as for male and female students, there is no reason to believe that if participation of low SES students were to increase to that of the medium SES group then that would result in a higher proportion of students of lesser academic ability. In fact, the results suggest that the TER is biased toward high SES students. If this is the case, there is ample scope to increase participation levels (of low and medium SES students) without lowering the overall quality of students.

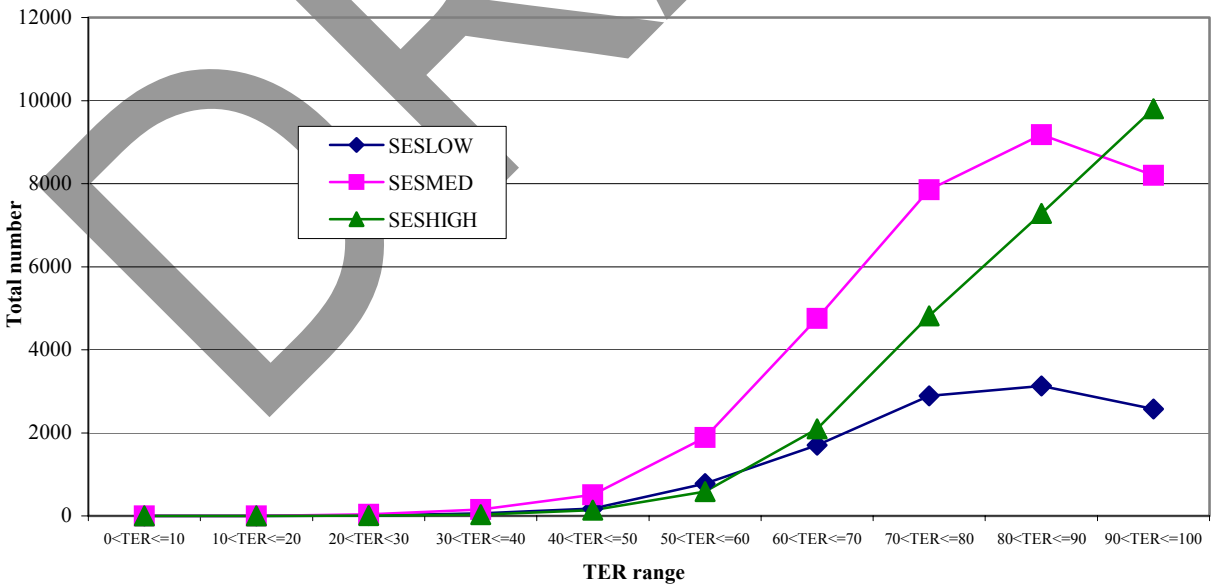
While neither of these mind experiments is totally convincing it remains that there is nothing to suggest that an expansion of the sector (of the order we observed) must have resulted in lower quality students.

Figure 11: 1999 non-overseas commencing undergraduates aged 20 and under with TER scores by socio-economic status



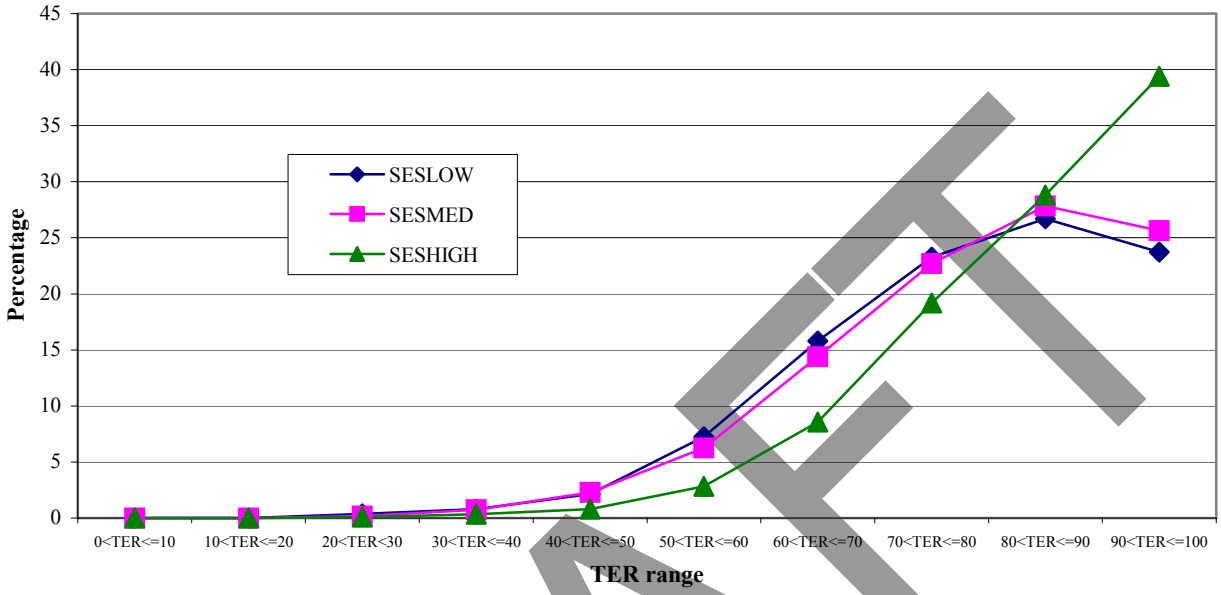
Source: Selected Higher Education Statistics.

Figure 12: 2000 non-overseas commencing undergraduates aged 20 and under with TER scores by socio-economic status



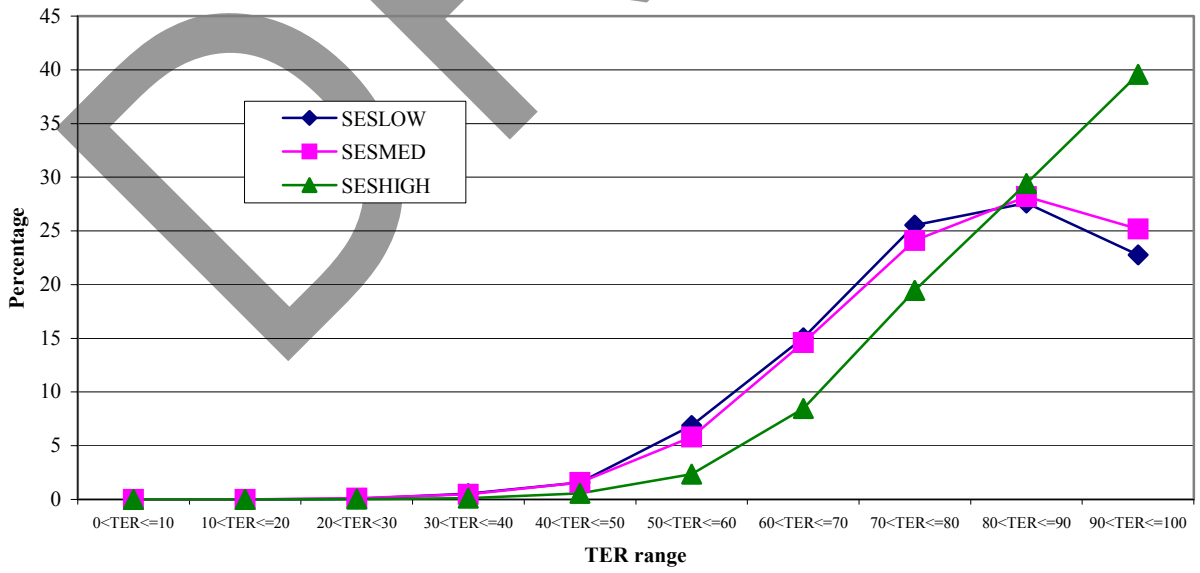
Source: Selected Higher Education Statistics.

Figure 13: TER Distribution for 1999 commencing undergraduates aged 20 and under by socio-economic status



Source: Selected Higher Education Statistics.

Figure 14: TER Distribution for 2000 commencing undergraduates aged 20 and under by socio-economic status



Source: Selected Higher Education Statistics.

Background Characteristics, 1992 to 2000

It is generally accepted that student characteristics are important in determining higher education outcomes. It is, therefore, possible to look at how these characteristics have changed over time to determine whether outcomes are likely to have changed.

Tables 2 and 3 summarise major background characteristics of all non-overseas commencing undergraduates for the period 1992 to 2000.[7] Distribution by major characteristics reveals:

- a reduction in the proportion of male commencing undergraduates between 1992 and 2000;
- a decrease in the age of commencing undergraduates;
- an increase in the proportion of those studying full-time or externally;
- other increasing segments of the student population include: the proportion of commencing students with a Tertiary Entrance Ranking score, students from Non-English speaking background[8] and Aboriginal and Torres Traits Islanders descent, students from urban areas and students who are admitted on the basis of higher education and TAFE experience, through an examination or assessment by or on behalf of the institution or other means; and
- a fall in the proportion of students studying part-time, coming from rural or isolated areas or admitted to universities on the basis of mature age/special entry provision or satisfactory completion of final year of secondary education undertaken at school, TAFE or other institutions.

Table 3 shows changes in the proportion of commencements in major fields of study for non-overseas commencing undergraduates over the same period, 1992 to 2000. Growth in the proportion of commencements is seen in a number of fields of study including agriculture, architecture/building, arts humanities & social science, business, health and legal studies. In relative terms, the proportion of commencing students declined in education, engineering, nursing and veterinary science. The 'chalk and talk' fields of study continued to predominate, with commencement in arts/humanities/social science, business/administration/economics, education and science comprising nearly three quarters of the total.

[7] Please note that 1992 and 1993 are non-overseas commencing undergraduate cohort data, which are derived from the Higher Education Statistics Collection. As well, New Zealand citizen or diplomatic or consular representative of New Zealand are also excluded from our non-overseas commencing undergraduates.

[8] A person who has a Non-English speaking background is one who meets the following criteria: a non-overseas student and speaks a language other than English at home. This is different from the old ten years' rule definition.

Table 2: Key Background Characteristics of Non-overseas Commencing Undergraduates, 1992 to 2000

	1992	1993	1994	1995	1996	1997	1998	1999	2000	% change 1992-2000
All commencing students										
Total number	127327	132777	145466	156566	165987	165599	165165	167122	167575	31.6
Gender										
Female	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.58	0.58	3.0
Male	0.43	0.43	0.43	0.43	0.43	0.43	0.43	0.42	0.42	-3.9
Mode of study										
External	0.10	0.10	0.10	0.12	0.12	0.11	0.12	0.11	0.11	10.9
Full time	0.74	0.75	0.74	0.73	0.73	0.75	0.74	0.75	0.75	1.9
Part time	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14	0.13	-15.9
Age										
Age in year	22.67	22.47	22.48	22.81	23.01	22.76	22.72	22.63	22.47	-0.9
Tertiary Entrance Ranking score										
Non-Ter	0.59	0.57	0.58	0.54	0.57	0.49	0.53	0.43	0.56	-4.6
Ter	0.41	0.43	0.42	0.46	0.43	0.51	0.47	0.57	0.44	6.6
Language background										
ESB	0.874	0.866	0.860	0.856	0.868	0.861	0.862	0.864	0.869	-0.5
NESB	0.126	0.134	0.140	0.144	0.132	0.139	0.138	0.136	0.131	3.8
Aboriginal or Torres Strait Islander										
Non-ATSI	0.988	0.987	0.986	0.985	0.987	0.985	0.985	0.983	0.986	-0.2
ATSI	0.012	0.013	0.014	0.015	0.013	0.015	0.015	0.017	0.014	19.4
Region										
Urban	0.74	0.75	0.74	0.75	0.74	0.75	0.75	0.75	0.74	0.6
Rural	0.21	0.21	0.21	0.20	0.20	0.20	0.20	0.20	0.21	-1.1
Isolated	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-16.4
Basis of entry										
Higher education	0.23	0.22	0.22	0.23	0.22	0.23	0.24	0.24	0.24	5.5
TAFE	0.03	0.04	0.06	0.07	0.06	0.07	0.06	0.07	0.07	98.3
Secondary school	0.54	0.52	0.53	0.52	0.51	0.51	0.48	0.48	0.49	-9.9
Special	0.10	0.08	0.08	0.09	0.09	0.08	0.07	0.07	0.06	-36.5
Examination	0.02	0.03	0.02	0.03	0.04	0.05	0.06	0.06	0.06	166.8
Prof Qual	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.02	0.02	-5.5
Other	0.05	0.09	0.05	0.04	0.03	0.03	0.05	0.05	0.06	14.5
New to higher education										
Total number	87180	92507	100572	107034	112119	110902	110678	112835	112810	29.4
Gender										
Female	0.56	0.56	0.56	0.57	0.57	0.57	0.57	0.57	0.58	2.5
Male	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43	0.42	-3.3
Mode of study										
External	0.06	0.06	0.07	0.08	0.09	0.08	0.08	0.08	0.08	25.6
Full time	0.84	0.84	0.84	0.82	0.81	0.82	0.82	0.82	0.82	-1.7
Part time	0.10	0.10	0.10	0.10	0.11	0.10	0.10	0.10	0.10	-2.2
Age										
Age in year	20.88	20.78	20.77	21.09	21.32	21.05	21.01	20.94	20.83	-0.2
Tertiary Entrance Ranking score										
Non-Ter	0.43	0.41	0.41	0.36	0.40	0.31	0.36	0.28	0.39	-8.5

Ter	0.57	0.59	0.59	0.64	0.60	0.69	0.64	0.72	0.61	6.4
Language background										
ESB	0.869	0.860	0.855	0.851	0.868	0.859	0.859	0.857	0.863	-0.7
NESB	0.131	0.140	0.145	0.149	0.132	0.141	0.141	0.143	0.137	4.8
Aboriginal or Torres Strait Islander										
Non-ATSI	0.987	0.987	0.986	0.985	0.986	0.985	0.985	0.983	0.985	-0.3
ATSI	0.013	0.013	0.014	0.015	0.014	0.015	0.015	0.017	0.015	19.8
Region										
Urban	0.74	0.75	0.74	0.75	0.73	0.75	0.74	0.74	0.74	-0.1
Rural	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.22	0.4
Isolated	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-10.1
Basis of entry										
TAFE	0.04	0.05	0.07	0.08	0.07	0.08	0.08	0.09	0.09	100.9
Secondary school	0.74	0.70	0.73	0.72	0.70	0.71	0.67	0.67	0.67	-9.9
Special	0.12	0.10	0.10	0.10	0.11	0.09	0.08	0.09	0.08	-33.0
Examination	0.03	0.03	0.03	0.03	0.05	0.05	0.07	0.07	0.07	173.5
Prof Qual	0.022	0.027	0.027	0.032	0.038	0.039	0.039	0.023	0.024	9.1
Other	0.05	0.09	0.05	0.03	0.03	0.03	0.54	0.06	0.07	43.3

Note: All numbers are in proportion unless otherwise stated. The number in the last column is percentage increase from 1992.
Source: Non-overseas commencing undergraduates, 1992 to 2000, Higher Education Statistical Collection.

Table 3: Fields of Study of Non-overseas Commencing Undergraduates, 1992 to 2000

	1992	1993	1994	1995	1996	1997	1998	1999	2000	% change 1992-2000
All commencing students										
Total number	127327	132777	145466	156566	165987	165599	165165	167122	167575	31.6
Agriculture	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	12.0
Architecture & Building	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	5.2
Arts, Hum & S Science	0.25	0.25	0.26	0.26	0.27	0.27	0.27	0.27	0.27	7.2
Business, Admin & Eco	0.18	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.19	6.3
Education	0.13	0.13	0.12	0.11	0.11	0.11	0.10	0.11	0.11	-16.1
Engineering & Survey	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	-19.5
Health	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	39.4
Nursing	0.09	0.08	0.08	0.07	0.06	0.05	0.05	0.05	0.05	-43.0
Law & Legal Studies	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	72.7
Science	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.6
Veterinary Science	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	-22.6
New to higher education										
Total number	87180	92507	100572	107034	112119	110902	110678	112835	112810	29.4
Agriculture	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-1.8
Architecture & Building	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-0.7
Arts, Hum & S Science	0.25	0.25	0.26	0.27	0.27	0.27	0.27	0.27	0.27	5.7
Business, Admin & Eco	0.19	0.20	0.20	0.21	0.21	0.21	0.21	0.21	0.20	5.6
Education	0.10	0.10	0.09	0.09	0.09	0.09	0.08	0.09	0.09	-5.2
Engineering & Survey	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.07	-17.6
Health	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	26.3
Nursing	0.09	0.08	0.08	0.07	0.06	0.06	0.06	0.06	0.05	-40.3
Law & Legal Studies	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	95.1
Science	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.17	-0.4
Veterinary Science	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-17.1

Note: All numbers are in proportion unless otherwise stated. The number in the last column is percentage increase from 1992.

Source: All non-overseas commencing undergraduates, 1992 to 2000, Higher Education Statistical Collection.

Linking background characteristics to academic ability

Methodology

From the previous section, it is clear that there have been significant increases in the numbers of students. Moreover, the composition of the student body has changed somewhat. One issue of interest is to determine whether these composition shifts have impacted on the quality of students. The approach adopted here is to relate these student characteristics to the probability of completion, making use of Martin et al (2001). Using the 1992 commencing undergraduate logistic regression results, the predicted probability of completion is calculated for all commencing undergraduates for the period of 1992 to 2000.[9] The distribution of these probabilities provides a measure of academic diversity of the students.

Considerable variability in completion rates has been found across fields as indicated in (Martin et al, 2001). To abstract from changes to the distribution of students across fields of study, predictions were carried out holding 'fields of study' constant as of the 1992 level. Holding the fields of study constant allows one to isolate the impact of other background characteristics on the academic ability, measured by the propensity to complete, over time.

Having previous higher education experience may also be seen as reflecting an individual's maturity or possessing certain ability (perhaps obtained through work experience) that may affect or facilitate completion. Two simulations were separately carried out for the period 1992 to 2000: one for commencing undergraduates and the other, new to higher education commencing undergraduates.[10] The regression result shows that 'higher education' does improve completion. It is, therefore, of interest to see whether the pool of commencement students as a whole has improved and whether the new to higher education students have changed.

The results are presented in Figure 15. For presentation purposes, the horizontal axis has been transformed to represent the 10 groups of the predicted probability of completion distribution by year. A number of patterns emerge from Figure 15:

- an improvement in the performance of all commencing students over the period 1992 to 2000 as indicated in the rising trend of those in the 70 to 80 per cent predicted probability range; and

[9] Formally, the logistic regression model for the 1992 commencing undergraduates is defined as follows:

$$Logit \quad P_i = \log\left(\frac{P_i}{(1-P_i)}\right) = bX_i + \varepsilon_i$$

where P_i is the probability of the outcome occurring (having completed), b is a coefficient vector, X_i, the variable vector and ε_i, the error term. The coefficients from the 1992 logistic regression results are then fitted to all commencing undergraduates for the years 1992 to 2000 before converting into estimated probability values using the following formula:

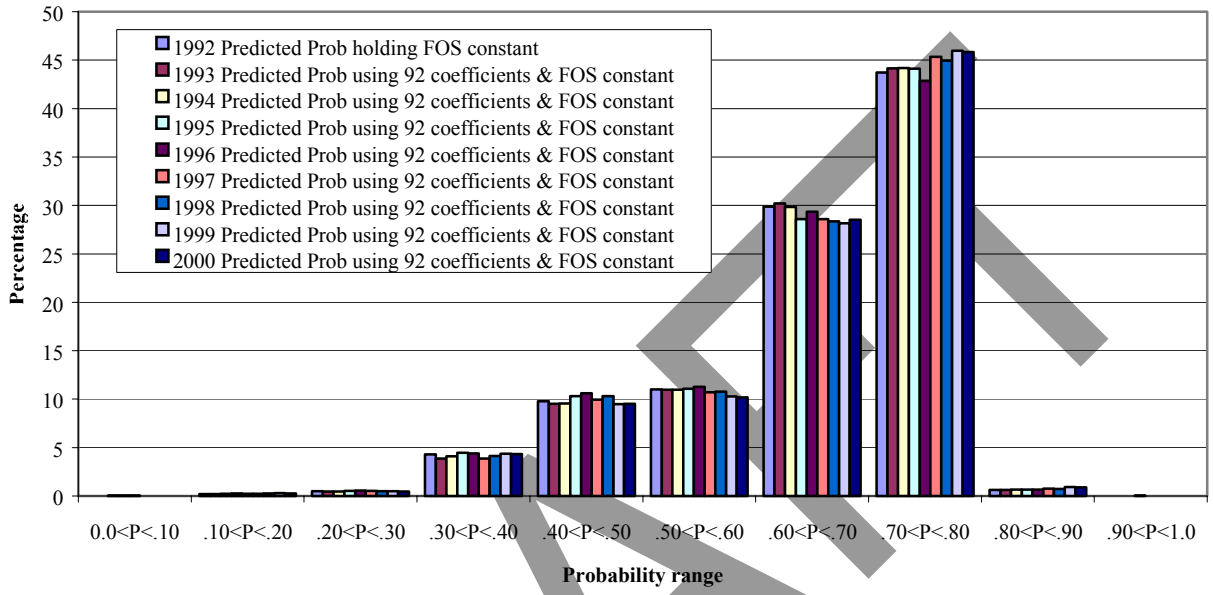
$$P_i = \frac{\exp(\alpha + \sum_{i=1}^{n} \beta_i x_i)}{1 + \exp(\alpha + \sum_{i=1}^{n} \beta_i x_i)}$$

The Logistic regression results are presented in Table A1, Appendix A.

[10] New to higher education includes only students who never commenced a higher education course previously. All commencing students include students who are new to higher education, students who commence with a previous completed higher education award and students who commence with an incomplete prior award.

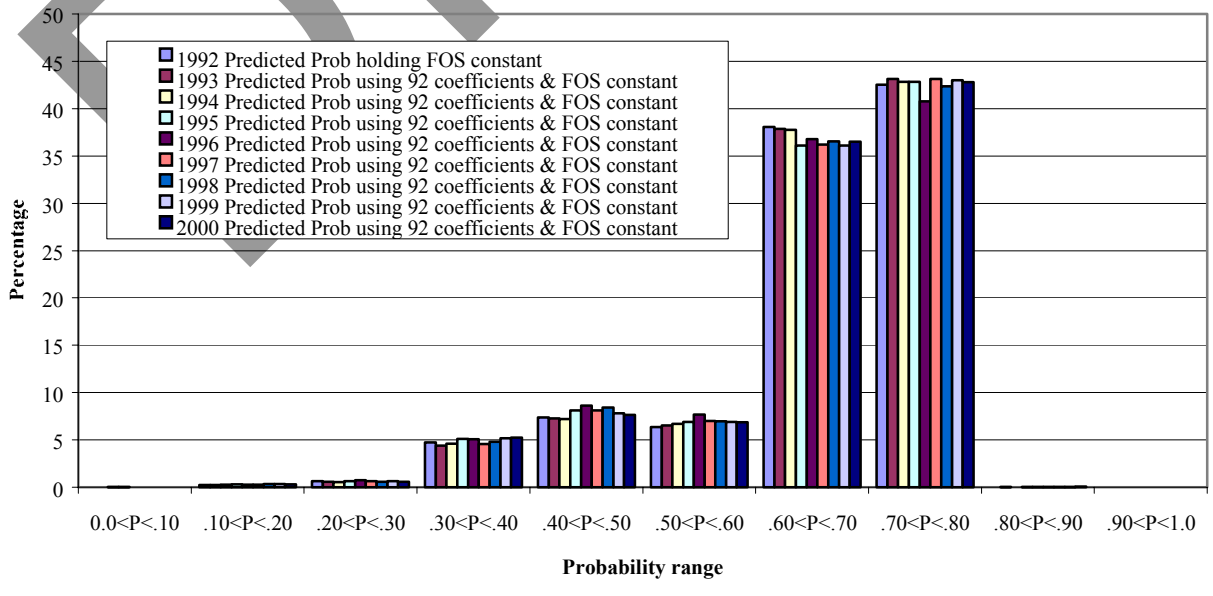
- a fall in the trend of those in the lower predicted probability range, in particular, in the 50 to 60 per cent range.

Figure 15: Predicted probability of completion for all commencing undergraduates (using 1992 regression coefficients and holding fields of study (FOS) constant), 1992 to 2000



Source: Appendix A and Selected Higher Education Statistics.

Figure 16: Predicted probability of completion for all new to higher education commencing undergraduates (using 1992 regression coefficients and holding FOS constant), 1992 to 2000



Source: Appendix A and Selected Higher Education Statistics.

For commencing students who are new to higher education, however, there are clearly no observable trends in the performance indicators over the period 1992 to 2000 as indicated in Figure 16.

Putting it together

Figures 15 and 16 looked at the effect of changing characteristics on the distribution of the probabilities of completion. However, it is difficult to work out the impact of the individual characteristics. This is made easier if the focus is on the change in the average probability of completion, following the decomposition method of Even and Macpherson (1990, 1993). The difference in the average predicted probability of completion between 1992 and 2000 can be decomposed into two parts: explained (EXP) and unexplained (UNEXP). The explained component is viewed as the change in the probability of completion that can be attributed to the change in the observed characteristics of the individuals (i.e. the change in the X's). The unexplained portion represents the change that results from the change in the coefficients $\beta's$.

In this analysis, the unexplained portion of the difference becomes redundant as the coefficients are fixed at the 1992 level; as focus is on the impact of changes in the characteristics.

When field of study is held constant over time, the only variables considered to have a bearing on the completion rates are summarised in Table 4. Column 5 in Table 4 highlights the impact each individual characteristic has on the difference in the average predicted probability of completion between 1992 and 2000. Overall, the change in the mean due to the change in characteristics is 0.0146. This translates into an improvement in the probability of completion from 64.0% to 64.34%. While this is an increase, it is not large enough to be of any substantive interest. Nevertheless, it is clear that the balance of student characteristics has not moved in a way to impinge on overall student quality.

Table 4: Explanatory power of observed characteristics

	1992 Coefficient (1)	mean (2000 - 1992) (2)	(1)*(2) (3)	((3)/Total)*100 (4)	Explanatory* power of observed Characteristics (5)
All commencing students					
Gender					
Female	REFERENCE CATEGORY				
Male	-0.2631	-0.02	0.004417	30.29	30.3
Mode of study					
External	REFERENCE CATEGORY				
Full time	1.1339	0.01	0.015696	107.64	41.7
Part time	0.3835	-0.03	-0.009617	-65.95	
Age					
Age	-0.248	-0.20	0.050269	344.72	-10.0
Age squared	0.00705	-9.32	-0.065708	-450.60	
Age cubed	-0.00006	-233.00	0.013980	95.87	
Language background					
English speaking background	REFERENCE CATEGORY				
NESB	0.1243	0.005	0.000591	4.05	4.1
Aboriginal or Torres Strait Islander					
Non-ATSI	REFERENCE CATEGORY				
ATSI	-1.0931	0.002	-0.002542	-17.43	-17.4
Tertiary Entrance Ranking Score					
Non-Ter	REFERENCE CATEGORY				
Ter	0.0579	0.03	0.001573	10.78	10.8
Region					
Urban	REFERENCE CATEGORY				
Rural	0.036	-0.002	-0.000085	-0.58	4.2
Isolated	-0.1982	-0.004	0.000696	4.78	
Socio-economic background					
Most advantage	REFERENCE CATEGORY				
More advantage	-0.1097	0.0000	0.00000005	0.0004	
More disadvantage	-0.1512	0.0000	0.00000008	0.001	
Most disadvantage	-0.2199	0.0000	-0.00000031	-0.002	-0.001
Basis of entry					
Other	REFERENCE CATEGORY				
Higher education	0.4107	0.01	0.005095	34.94	36.4
TAFE	0.0247	0.03	0.000840	5.76	
Secondary school	0.047	-0.05	-0.002508	-17.20	
Special	-0.1229	-0.04	0.004548	31.19	
Examination	-0.059	0.04	-0.002081	-14.27	
Prof Qual	0.4635	0.00	-0.000583	-4.00	
Total observed characteristics			0.014582		100.0

Source: All commencing undergraduates, 1992 to 2000, Higher Education Statistical Collection and Table A1, Appendix A.

Note: *These are the explanatory powers of observed characteristics obtained using decomposition method analogous to that of Evan and Macpherson's.

Note also that the disadvantage variables used here are different from the conventional definition of low, medium And high.

Academic aptitudes from ACER data

The final piece of evidence is based on academic aptitude data obtained from the Australian Council for Education Research's (ACER) longitudinal Survey of Australian Youth (LSAY). This survey captures achievement in Literacy and Numeracy at the age of 14. Three cohorts are available over the relevant time period. They represent the birth cohorts of 1970 and 1975 and Year 9 cohort of 1995. The analysis is focused on university participation year in 1989, 1994 and 1999/2000. The ACER has provided higher education participation rates for four academic achievement quartiles (Table 5).

Table 5: Higher education participation rates for LSAY cohorts

Cohort definition	**Born in 1970**	**Born in 1975**	**Year 9 in 1995**	**Year 9 in 1995**
Year participation measured	**1989**	**1994**	**1999**	**2000**
Of total cohort (weighted)	28	38	31	38
Unweighted				
Achievement in Literacy & Numeracy				
Highest Quartile	57.7	70.3	55.7	65.2
Third Quartile	34.7	40.9	37.9	45.4
Second Quartile	22.6	23.6	20.6	28.8
Lowest Quartile	7.0	7.5	9.1	13.4

Source: ACER.

There are, however, a number of limitations with these data. An obvious difficulty is that the surveys suffer from attrition. By using the unweighted data it is assuming that the pattern of attrition does not change across the cohorts.[11] An additional concern is that a proportion of the 'low achieving' students are in fact high achieving students who deliberately 'stuff-up' the tests.

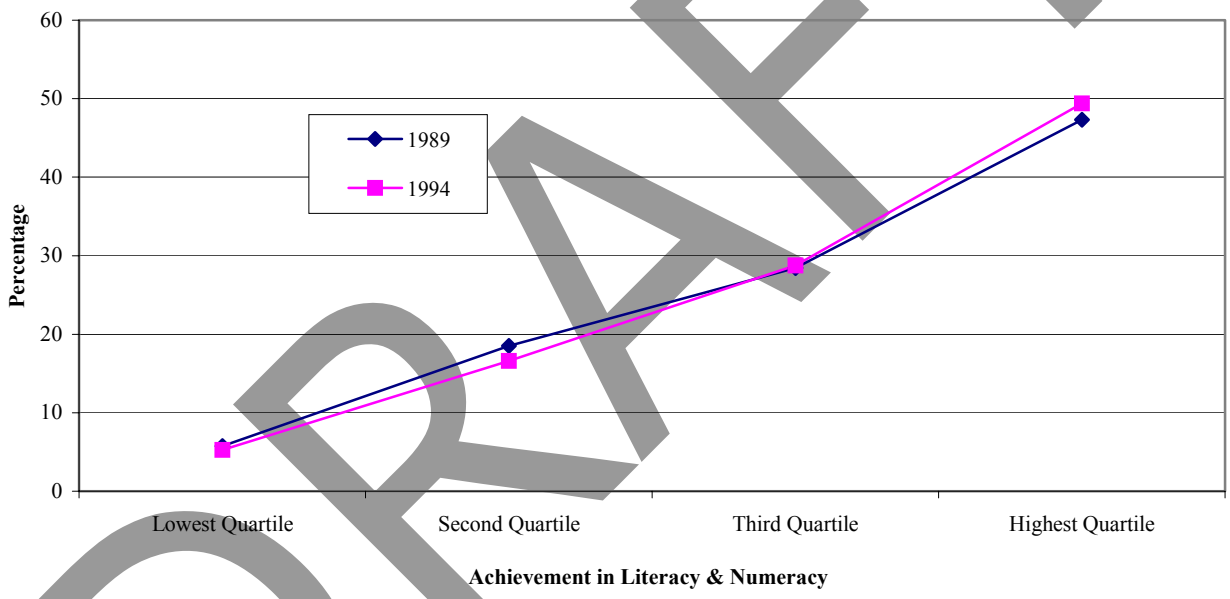
However, the major concern is with consistency in cohort definition. Entry cohorts for 1989 and 1994 are birth cohorts while that for 2000 is year cohort. There are considerable variations between these two definitions. As it is pointed out in the ACER cohort report that about 65 per cent of the 1995 Year 9 cohort were aged 14 years, 25 per cent 15 years and the remainder either 13 or 16 years. In a steady state, one would expect the distribution of achievement in literacy and numeracy for this cohort to be the same as the earlier two birth cohorts. However, the difference in selection method has clearly caused a phase shift in the proportion attending university. That is, one is looking at the proportion of 19 years olds at university for the first two cohorts. By contrast, for the last cohort, one is looking at a linear combination of 18, 19, 20 and 21 year olds. The size of this phase shift can be seen from the overall participation rate in Table 5. From Figure 4, it shows the access rate (up to 20 years) increased from 30 percentage points in 1994 to 32 percentage points in 1999, but the LSAY cohorts' participation appeared to decline over this period. However, if comparison is made with participation in 2000 instead, the LSAY cohorts' participation would appear to have remained steady over the 1994 to 2000 period.

[11] Since the method of weighting for attrition has changed somewhat across cohorts, the comparisons between cohort participation are made using unweighted data.

As a result of this last caveat, more emphasis is put on the comparison between the 1970 cohort's participation in 1989 and the 1975 cohort's participation in 1994. The overall participation went up markedly over this five year period, but it is clear that the increase was in fact concentrated among the better students. Figure 17 looks at the distribution of achievement of university students from these two cohorts. It is apparent that the academic quality improved rather than declined.

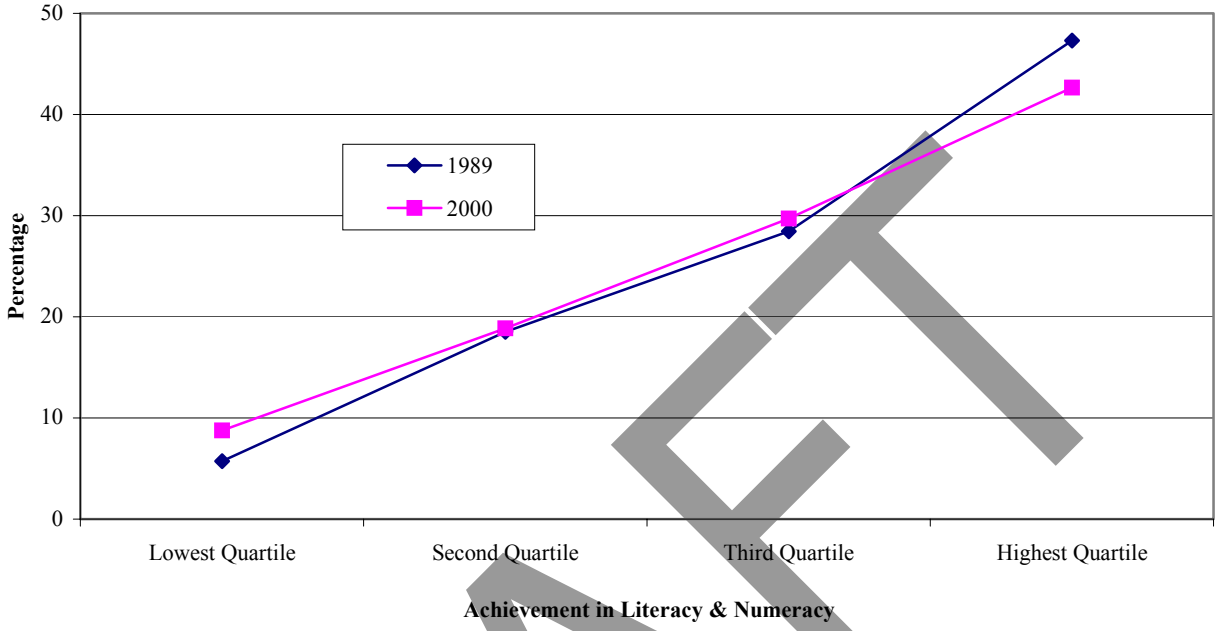
This is not to say such an improvement is inevitable, but more to say that an increase in participation of the order it was seen in the 1990s does not necessarily imply higher proportion of poorer quality students.

Figure 17: Achievement in literacy and numeracy distribution for university entry cohorts, 1989 and 1994



Source: ACER.

Figure 18: Achievement in literacy and numeracy distribution for university entry cohorts, 1989 and 2000



Source: ACER.

Indeed, a comparison of the 1970 cohort participation in 1989, with the 'year 9 in 1995' cohort in 2000 does show a higher proportion of lower ability students (Figure 18). So, the conclusion is that the findings from the ACER data are ambiguous, but certainly do not enable one to conclude that an increase in participation at the margin automatically leads to a decline in the academic quality of students. What one can be sure of is that there are still very large numbers of academically able students who currently do not go on to university. Of course, a very large increase in participation must lead to a decline in student quality because completion of year 12 and participation at university are related academic ability.[12]

[12] Long et al (1999) showed that growth in Year 12 completion rates has been the least for students in the top ability quartile over the period 1980 to 1994.

Appendix A

Table A1: Binomial Logistic Regression of Completion/non-completion, 1992 commencing undergraduate cohort

Parameter	1992 cohort (N = 127327)		
	Estimate	Pr > ChiSq	Standard Error
Intercept	2.3307	<.0001	0.2119
Gender			
Female		REFERENCE CATEGORY	
Male	-0.2631	<.0001	0.0133
Mode of study			
External		REFERENCE CATEGORY	
Full-time	1.1339	<.0001	0.0242
Part-time	0.3835	<.0001	0.0242
Field of study			
Business, Administration, Economics		REFERENCE CATEGORY	
Agriculture, Animal husbandry	-0.0824	0.076	0.0464
Architecture, Building	0.1236	0.0057	0.0447
Arts, Humanity and Social Science	-0.1567	<.0001	0.019
Education	0.5183	<.0001	0.0237
Engineering, surveying	-0.1302	<.0001	0.0262
Health	0.8338	<.0001	0.0374
Nursing	0.6264	<.0001	0.0284
Law, Legal studies	0.3609	<.0001	0.039
Science	-0.2149	<.0001	0.0204
Veterinary Science	1.709	<.0001	0.2065
Age			
Age	-0.248	<.0001	0.0201
Age squared	0.00705	<.0001	0.000609
Age cubed	-0.00006	<.0001	5.85E-06
Language background			
English speaking background		REFERENCE CATEGORY	
Non-English speaking background	0.1243	<.0001	0.0193
Aboriginal or Torres Strait Islander			
Non-ATSI background		REFERENCE CATEGORY	
ATSI background	-1.0931	<.0001	0.0569
Tertiary Entrance Ranking Score			
Non-TER		REFERENCE CATEGORY	
TER	0.0579	0.004	0.0201
Region			
Urban		REFERENCE CATEGORY	
Rural	0.036	0.0334	0.0169
Isolated	-0.1982	<.0001	0.0422
Socio-economic background			
Most advantage		REFERENCE CATEGORY	
Most disadvantage	-0.2199	<.0001	0.0185
More disadvantage	-0.1512	<.0001	0.0188
More advantage	-0.1097	<.0001	0.0175
Basis for admission			
Other		REFERENCE CATEGORY	

Higher education experience	0.4107	<.0001	0.0293
TAFE experience	0.0247	0.5484	0.0412
Finished secondary education	0.047	0.141	0.0319
Special entry	-0.1229	<.0001	0.0322
Examination	-0.059	0.2268	0.0488
Prof qual/employment experience	0.4635	<.0001	0.0499
Restricted log-likelihood	165833.31		
Log-likelihood function	155698.52		
Likelihood ratio	10134.78		
Degree of freedom	30		
Max-rescaled R-squared	0.1051		

Source: 1992 Student Cohorts.

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