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**Completion Rates of
International Students Entering
the Actuarial Program**

by

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Completion Rates of International Students Entering the Actuarial Program

Abstract

This paper investigates the probability that international students in an actuarial degree will complete their studies in the normal time for that degree. In particular, it investigates whether this probability differs depending on whether a student satisfied the entry criteria for domestic students or whether the student only satisfied the weaker entry criteria for international students.

Entry Criteria

Students successfully completing the New South Wales (NSW) Higher School Certificate (HSC) are awarded a Universities Admission Index (UAI). The UAI is a number from 0 to 100 which ranks the student's performance relative to all students in their year 10 cohort. Since not all year 10 students complete high school studies to the year 12 level, and those who don't tend to be the less able students, the average UAI awarded is well above 50.

Most states and territories of Australia award a similar ranking, though its name varies. The name UAI is also used in the ACT. South Australia, Northern Territory, Tasmania and Western Australia call it a Tertiary Entrance Rank, while Victoria calls it an Equivalent National Tertiary Entrance Rank (ENTER). Queensland has adopted a different ranking system.

To gain entry to an undergraduate degree program at Macquarie University a student must attain a UAI – or interstate equivalent – not less than the relevant “UAI cut-off” for that degree. Many degrees have two different UAI cut-offs: one for domestic (Australian) students who are predominantly funded by the government and a usually lower cut-off for international (non-Australian) students who are charged tuition fees.

There has been discussion as to whether having a lower UAI cut-off for international students than for domestic students is appropriate. Some arguments on this issue assume that the international students who only satisfy the lower international student UAI cut-off are less likely to satisfactorily complete their degree than are the international students who also satisfy the higher domestic student cut-off. This paper investigates whether this assumption is valid for students gaining entry to the actuarial studies program at Macquarie University.

Data

Most international students have non-Australian secondary qualifications. The process of assessing applicants involves converting their high school marks into an estimated equivalent UAI. This process has to cope with students with secondary qualifications from a large range of countries, many using ranking systems very different from the NSW HSC, so it is inevitable that the conversion process is imperfect.

However some international students completed the last few years of their secondary qualifications in New South Wales. These students have a true UAI directly comparable to domestic students. This study only investigates these students. If we are unable to detect any significant result for international students who have a true UAI, then there is little point investigating the students with overseas secondary qualifications, where the process of determining an estimated equivalent UAI introduces approximations into the process.

This decision was also influenced by the availability of data. For students who have studied the NSW HSC the UAI is relatively easily extracted from a computerised system, whereas for students who completed their secondary studies overseas the estimated equivalent UAI could not be easily obtained without resorting to individual searches of paper-based files.

This limitation must be remembered when interpreting the conclusions. Almost all international students entering the actuarial program are from countries where English is not the predominant language. International students who have studied the NSW HSC typically have at least two years schooling in an English-speaking environment. By contrast, some international students who completed secondary schooling outside Australia may have little if any schooling in an English-speaking environment. The patterns identified in this paper for the former group of students may not apply to the latter.

The data spans three years, being students who sat the NSW HSC in 1998-2000, and who thus commenced their actuarial degree in 1999-2001.

This is the natural period for the investigation since UAIs for these three years were determined in a consistent manner. Extending the investigation to earlier or later years may introduce inconsistencies.

- Prior to 1998 the HSC employed a different ranking method. Just to confuse things, the single figure summary statistic used in that method was called the Tertiary Entrance Rank (TER), which is the name that several other states now use for their version of the UAI.
- The 2001 HSC saw the introduction of “performance bands” which have potentially altered the mark distributions in subjects, possibly with some flow on effect to the ranking of students by the UAI.

Unfortunately this 3 year span gives a small sample size: 18 students. This rather weakens the force of any conclusions which may be drawn. Also the small sample size seriously restricts the level of data subdivision which may be carried out without endangering the privacy of the students concerned. Hence this paper tends to only state conclusions in very broad terms.

All 18 students listed their home language as being something other than English, the most common being Mandarin, Cantonese and Indonesian.

Single and double degrees

The analysis is complicated by the presence of double degrees.

Actuarial students may complete a Bachelor of Commerce majoring in actuarial studies in three years. They may also complete a double degree which combines a Bachelor of Commerce in actuarial studies with another degree selected from:

- Bachelor of Applied Finance
- Bachelor of Economics majoring in economics or econometrics
- Bachelor of Science majoring in mathematics, statistics or computing.

These double degrees all normally take 4 years to complete.

There is also a double degree with law which takes longer to complete but it may be ignored in this analysis. This double degree is not popular with international students and none of the students in this investigation attempted it.

Categorising the sample

The students in the investigation have been divided into two categories. Category A contains those students whose UAI equalled or exceeded the cut-off for domestic students. Category B contains those whose UAI was below the cut-off for domestic students and who thus only gained entry to their degree because the cut-off for international students was lower than that for domestic students.

However, this classification is complicated by the fact that the various four year double degrees and the three year single degree have different UAI cut-offs. The cut-offs for the double degrees are all higher than the cut-off for the single degree. Which cut-off should be used?

The first reaction is probably to use the cut-off for whichever degree the student commenced. However, transfers between the various degrees are common. Some students who commence the three year actuarial degree subsequently transfer to a double degree. Once a student has gained entry to the actuarial program, this transfer is easily achieved under the University's internal transfer rules provided the student is performing adequately. Some students in an actuarial double degree have a change of interest and switch to a different actuarial double degree. After three years of study some students enrolled in a double degree decide they've had enough of university and graduate with the basic three year actuarial degree. Given the high level of mobility between the various actuarial degrees, it seems more appropriate to simply base the categorisation on whether the student met the domestic UAI cut-off for the basic actuarial degree.

There is also a pragmatic reason for adopting this classification. A student's completed degree (or the degree they were enrolled in when they abandoned their studies) is easily extracted from existing computerised reports. The degree into which the student was originally accepted is not so easily determined.

The UAI cut-offs also vary from year to year, though for the three years of this investigation they were very stable. The 1998-2000 UAIs which domestic students required to gain entry into the basic three year actuarial degree commencing in 1999-2001 were 96.10, 96.15 and 96.05 respectively.

This results in the 18 students being classified as 13 in Category A and 5 in category B.

Of the students in Category B, the lowest UAI was 93.05.

Defining "normal completion"

A number of measures of success are possible. The measure used in this paper is "Completing any actuarial degree in the normal time for that degree". For brevity, this will be called "normal completion". That is, in this investigation, normal completion means completing the basic actuarial degree in three years or completing one of the double degrees in actuarial studies in four years.

As noted previously many students change their plans over the course of their degree, so the degree they complete is not necessarily the degree they commenced. The measure of the success does not penalise this, provided they do complete some form of actuarial degree. For example, the student in a double degree involving actuarial studies who subsequently decides to graduate with the basic single actuarial degree after three years is still classified as a normal completion.

The perhaps contentious point here is whether a student should be classified as a normal completion if they transfer to a non-actuarial degree and still complete that degree in the normal time. This investigation takes the view that the student's primary purpose in enrolling in any actuarial degree is completion of an actuarial qualification and thus the success criterion is based on completing an actuarial degree. This is a subjective decision. However, it should also be noted that broadening the criteria to include successful completion of a non-actuarial degree in the normal time would alter the classification of only one student, so the effect is minimal.

In addition to the normal 2 semesters per year, some units are offered in "Summer Courses" held over January and February. The basic three year degree can be completed in 6 normal semesters without resorting to summer courses. Similarly the four year double degrees can be completed in 8 normal semesters without resorting to summer courses. Due to the prerequisite structure and the limited choice of units being offered in summer courses, it appears that summer courses do not allow the normal length of these degrees to be reduced below 6 or 8 normal semesters.

So, if a student studies the standard number of “normal” semesters but also takes one or more summer courses, should that student be classified as successfully completing their degree in the normal time?

This investigation does classify such students as normal completions. It does this because students’ motives in studying summer courses are varied and do not necessarily imply that a student is failing to keep up with the normal progression of their degree. Some students take a summer course in order to lower their workload in one of the following normal semesters. Some students take a summer course in order to widen their choice of elective units in the following semesters and also take full workloads in each of the normal semesters. Many students who complete an actuarial degree in the normal time successfully complete significantly more units than required to satisfy the degree requirements, so the presence of summer course units in a program does not automatically imply that the student would have failed to complete the degree in the normal time if the summer course had not been taken.

After completing their degree, many international students are returning to countries where actuaries are in extremely short supply. Hence these students’ employment prospects may remain strong even if they do take longer than the normal time to complete an actuarial degree. Hence it might be argued that perhaps we should be investigating the proportion of students who complete an actuarial degree within say one year of the normal time. Currently this issue is academic, since the required data will not be available for another year.

Results

The following table summarises the results.

	No of students	Normal completions	Normal completion rate
Category A	13	6	46%
Category B	5	2	40%
Total	18	8	44%

Two observations can be made.

1. The proportions of students completing their degree in the normal time do not differ significantly by category. In fact, given that the category A normal completion rate has to be a multiple of $\frac{1}{13}$ and the category B rate has to be a multiple of $\frac{1}{5}$, it isn’t possible for either rate to be nearer the average success rate of 44% than they currently are. Hence there is no need to carry out a formal statistical test of significance.
2. The proportion of students in this investigation who successfully complete an actuarial degree in the normal time is disappointingly low.

Commentary and speculation

The normal completion rate is low, and is lower than rates suggested by previous informal and unpublished investigations of earlier cohorts of domestic students. However, this can possibly be explained by the distributions of the UAIs.

While the students in Category A all have UAIs of 96.15 or higher, they are strongly clumped in the 96.5 to 98.5 range, with very few above 99. By comparison, the domestic students entering the actuarial program have a much higher prevalence of UAIs above 99.

On the other hand the lack of significant difference in performance between Category A and Category B students suggests that for international students the UAI alone may not be a good indicator of the chance of success in the actuarial program.

Commentary on the results of international students usually mentions that some of these students' exam answers exhibit severe difficulties with the English language. Some people suggest that the selection process for international students should give more weight to English language skills.

For the students in this investigation, the only readily available proxy measure of English language skills is the mark in HSC English. All 18 students in the investigation studied some variety of 2 units of English in their HSC. The mean HSC English mark of those successfully completing an actuarial degree in the normal time (75.1) is significantly higher than the mean mark of those who didn't (65.5), though some caution is required in this statement since the mean of the first group was strongly influenced by two high outliers.

However, there is still significant overlap between the English marks of the two groups. For example, those who complete in normal time include an English mark of 56 while those who don't complete in normal time include a high of 76. One might ask: Could the selection process have been improved by adding a requirement that the student also needs an HSC English mark of at least x to gain entry to the actuarial degree? However, if x is set sufficiently high to exclude most of the students who failed to complete an actuarial degree if the normal time, it also excludes a significant number of students who did complete in the normal time.

Unfortunately, due to the small sample size, it does not appear to be viable to analyse this issue separately for each HSC English subject.

Directions for further research

The sample size for this investigation was small. It will be useful to repeat the investigation when more recent data becomes available. The number of international students in the actuarial program has been growing strongly. If the number of these who studied the NSW HSC is also growing, the more recent cohorts should provide larger samples and allow more robust conclusions.

In the interests of providing informative data to potential students, it would be useful to determine the equivalent normal completion rate for international students with overseas secondary qualifications and that for domestic students.

An investigation of domestic students would have a much larger sample size. For that group, it might be possible to carry out a more thorough investigation of the correlation between UAI and the probability of completing an actuarial degree in the normal time.