

Engineers Australia

Public Affairs Note



ENGINEERS
AUSTRALIA

ENTRY INTO UNIVERSITY ENGINEERING COURSES: 2018 UPDATE REPORT

August 2018

Key Points

The education process to become an engineer is a long and complex process that begins in high school and concludes with the satisfactory completion of professional formation in the years after completing the mandatory educational qualification in engineering. Engineers Australia monitors all stages of the process and this report reviews trends relating to the transition from school (and post school activities like gap years) to university engineering courses.

The majority of prospective engineering students are concluding year 12 at school and apply for university places through state based Tertiary Admission Centres (TACs). Over the past 15 or so years, an increasing number of prospective students have applied directly to universities for places. Typically, these are students who followed some other life course when they left school rather than move directly from school to university. There are pronounced differences between the two sources for engineering students which warrant separate analysis.

High demand for engineers during the first decade of the century attracted more year 12 students to engineering. This was reflected in strongly rising numbers of *applications* from year 12 students for places in engineering courses, similar strong responses from universities in the growth of *places offered* in response and the subsequent *acceptances* of places by students who received offers. The three trends' upwards movement came to an end in 2013. In every subsequent year, numbers have fallen.

In 2017, the latest year for which statistics are available, applications for places in engineering, offers of places from universities and acceptances of places were well below the 2013 peak and below the level achieved in 2010 when the present statistical series commenced.

Activity relating to engineering courses in the direct application process to universities grew more rapidly than activity in the TAC process. The growth was sufficiently strong to prolong an upwards trend in total acceptances of places in university engineering courses until 2015, two years beyond the peak in TAC acceptances. In the last two years, acceptances of places in engineering from the direct application process fell and then plateaued at the lower level with the result that total acceptances of places in university engineering courses are now trending downwards. In 2017, acceptances had fallen below the 2012 level.

The present level of acceptances is still comparatively high, but if present trends in interest in university engineering courses persist for several years, the circumstances in Australian engineering education during the early 2000s could re-emerge. The downwards trend in TAC acceptances is partially due to readjustment from boom conditions, but low participation in school mathematics and science is another important factor.

There has been a tendency for some students graduating high school to take time off before settling down to university study. This is a factor in the growth of acceptances from the direct application process as has been the attraction to engineering from boom conditions. It is difficult to say how these factors will play out in the future.

Objective

This paper reviews the latest trends relating to entry to university engineering courses, the first stage of a longer process that produces Australia's future engineers. The paper draws on unpublished statistics provided by the Department of Education and Training.

Introduction

The work performed by engineers is at the heart of technological progress and innovation. During the past 15 years, Australia has become dependent on engineers trained overseas, so much so that between 2011 and 2016 over three quarters of the increase in the supply of qualified engineers was from skilled migrants. To mitigate the risks associated with this imbalance, Australia needs to produce more of its own engineers and this process begins with new students committing to the study of engineering.

Historically, most new engineering students progress from year 12 at school into university engineering courses through Tertiary Admission Centres (TACs). The numbers of other entrants to engineering courses were so small as to make little difference to trends. However, this has changed and now substantial numbers of prospective students apply directly to universities for places in engineering courses. These individuals have varied backgrounds including participation in other university courses, participation in TAFE courses and individuals who deferred further study when they left school.

The paper uses statistics from the Department of Education and Training "Undergraduate Applications, Offers and Acceptances" collection¹. Although the official publication reporting on trends contains some statistics relating to engineering, most of the report relies on unpublished statistics extracted by Department staff for Engineers Australia².

The first section of the paper focuses on students who move from year 12 into engineering courses. We consider trends in applications for places from these students, trends in the responses of universities with offers of places and trends in the acceptances of places offered. Acceptances translate into actual commencements in university engineering courses with a delay of some weeks. Although some individuals accepting places do not go on to commence courses, the difference is small so that trends in acceptances provide a reliable guide to progression. There is substantial information available about students applying for places in the TAC process. We are able to examine these trends by gender and we can reflect on the quality of engineering students by comparing their ATAR ranks to students in general.

The second section of the paper examines trends relating to students who apply directly to universities for places in engineering courses. These trends can be examined by gender but at this stage other information about the backgrounds of these students is not available. The final section of the paper briefly consolidates the trends from the TAC and direct applications processes to establish an overall outcome.

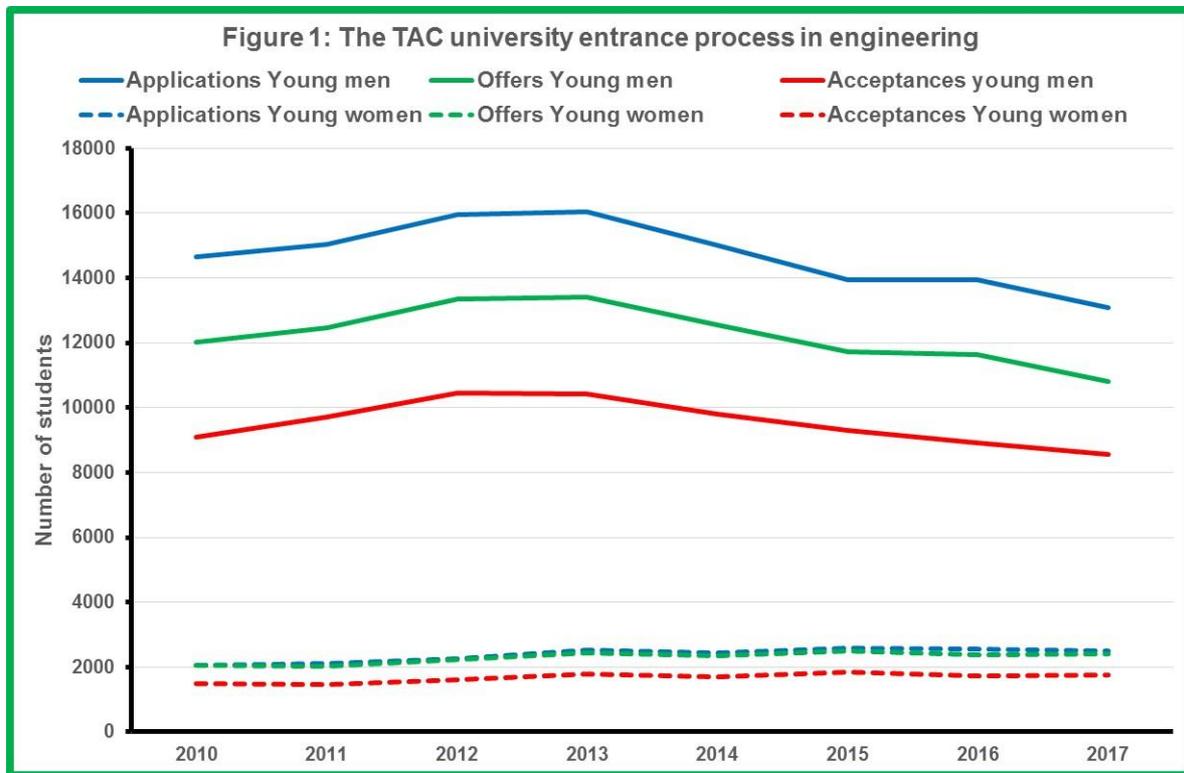
The TAC Process

Applications for university places in engineering courses through the TAC process peaked at 18,570 in 2013. Since then, applications have fallen each year. In 2017, there were 15,569 applications, some 5.8% lower than the year before and 16.2% below the peak and 7.3% below applications in 2010 when

¹ Department of Education and Training, Undergraduate Applications, Offers and Acceptances, various years, www.education.gov.au

² Engineers Australia thanks the Department and its staff for their cooperation in providing statistics requested.

the statistical series began. The main influence on this trend was applications from young men. These applications peaked at 16,046 in 2013 and fell by 18.5% to 13,077 in 2017. Although applications from young women fell between 2013 and 2014 they rebounded to peak at 2,584 in 2015, two years after the peak for men. Since then applications for places from young women have slowly fallen and in 2017 were 2,492, 3.6% below the peak.

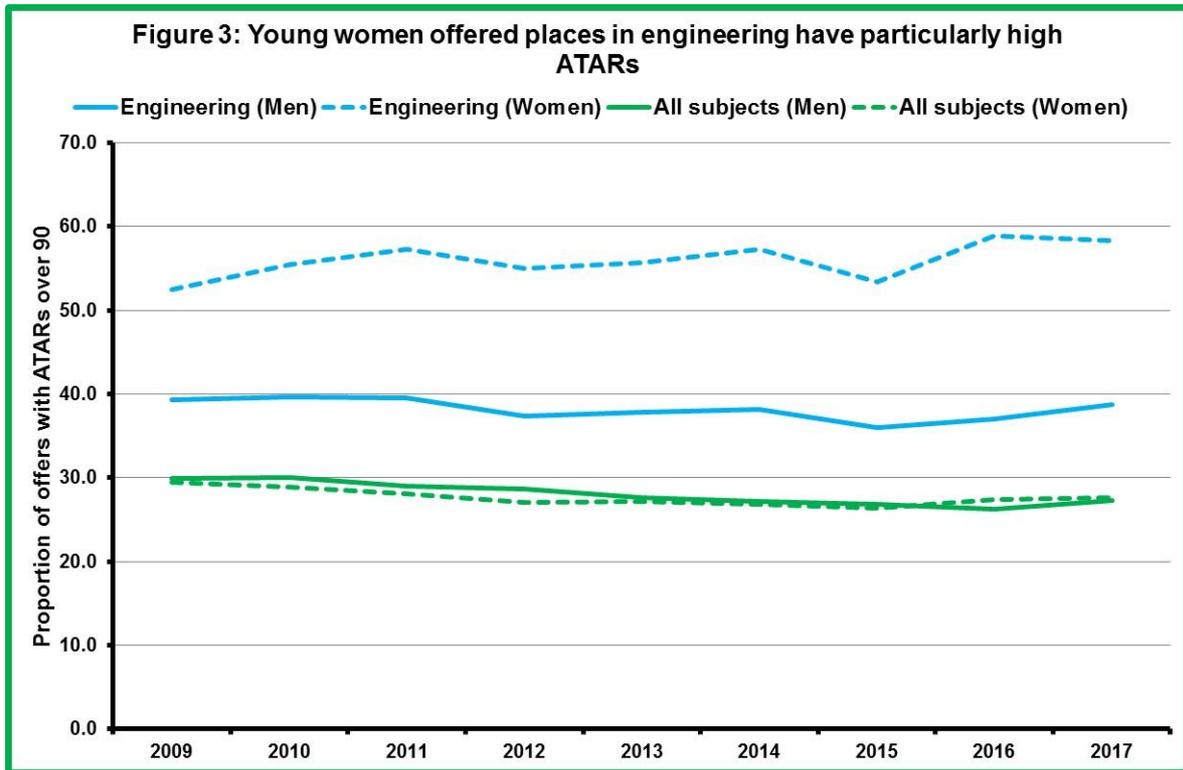
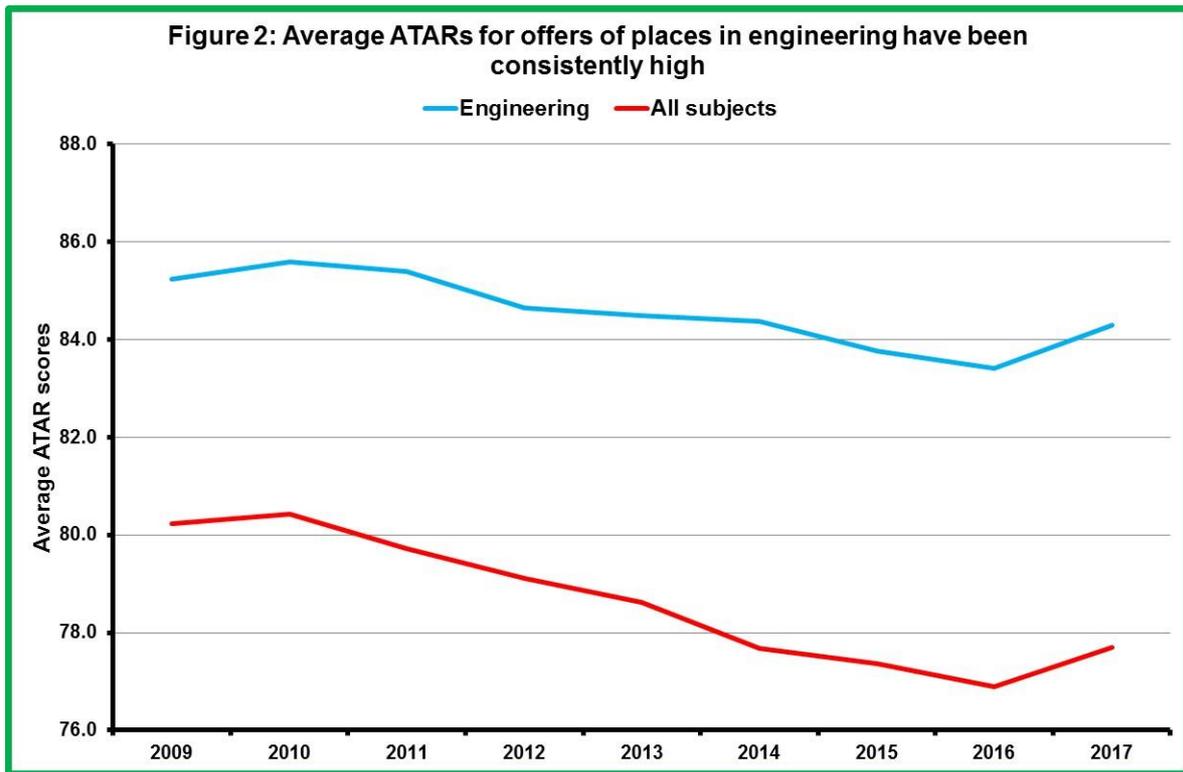


On average 83.3% of young men and 96.4% of young women who apply for places in engineering receive offers of places from the universities. In 2017, 82.6% or 10,801 of young men who applied for places were offered one. This was 19.5% below the peak in offers made of 13,424 in 2013. The pattern of offers to young women mirrored the trend in applications with the peak occurring two years after men. In 2017, 2,397 young women were offered places, 96.2% of those that applied. The higher offer rate for young women reflects the efforts being made by the universities to encourage more young women to study engineering. It is also reflected in the gender shares of applications and offers made. In 2017, 16.0% of applications were young women but their share of offers was higher at 18.2%. Overall, in 2017, 13,198 students who applied for places in engineering were offered a place. This was 6.3% fewer offers than were made in 2010 when the statistical series began.

On average 64.8% of young men and 70.4% of young women who originally applied for a place accept offers made by the universities. In 2017, 8,568 young men accepted an offer of a place in engineering. This was 17.9% fewer than the peak in acceptances of 10,438 in 2012 and 5.8% fewer than acceptances in 2010 when the statistical series began. Acceptances of offers by young women in 2017 were 1,754, 1.9% higher than in 2016 but 5.7% below the peak in acceptances in 2015. Over time the women's share of acceptances has increased from a low of 13.0% in 2011 to a record high of 17.0% in 2017. This trend has mitigated the fall in total acceptances of places in engineering courses but, despite this influence, total acceptances of places in 2017 fell to 10,322, 15.6% below the peak in 2013 and 2.5% lower than acceptances in 2010 when the statistical series commenced.

In summary, applications for places in engineering, offers made by universities in response and acceptances of places are all lower in 2017 than when the statistical series commenced in 2010. Most of the decline has been due to fewer young men. The number of young women accepting places is

lower than the peak in 2015, but has plateaued, mitigating the downwards share. As a result, the women's share of acceptances has increased to a record 17.0%.



Recently, the use of ATAR as a means of managing university entrance has been criticised for a number of reasons, particularly the notion that the system can be gamed by student choice of subjects. At this stage, no alternative arrangement has been proposed and ATAR rankings remain a useful gauge of student capacity, faults and all. Over time, average ATAR rankings for offers of places made in engineering have fallen from 85.2 in 2009 to 83.4 in 2016. The average ranking increased to 84.3 in 2017. Figure 2 shows that despite these changes the average rankings for offers in engineering where

about 6 points higher than the average for all subjects across the board. In 2017 the difference between the two trends illustrated was 6.6 points.

We noted above the particularly high offer rate of universities to women applicants for places in engineering courses. While altruistic notions of gender equity no doubt play a part in this decision, the more important reason is the high quality of women applicants. Figure 3 illustrates the proportion of men and women receiving offers of places in engineering who had ATAR rankings over 90. On average, 56% of women receiving offers of places had ATAR rankings over 90. Over time, this proportion has followed a slow upwards trend so that in 2017, it was 58.3%. In comparison, on average 38.2% of men who received offers of places in engineering had ATAR rankings over 90. The trend in this case experienced a dip between 2012 and 2016, but in 2017 was once more above average at 38.8%. Although less than one in five offers of places in engineering were to women, on average the proportion receiving offers who were in the highest ATAR bracket was substantially higher.

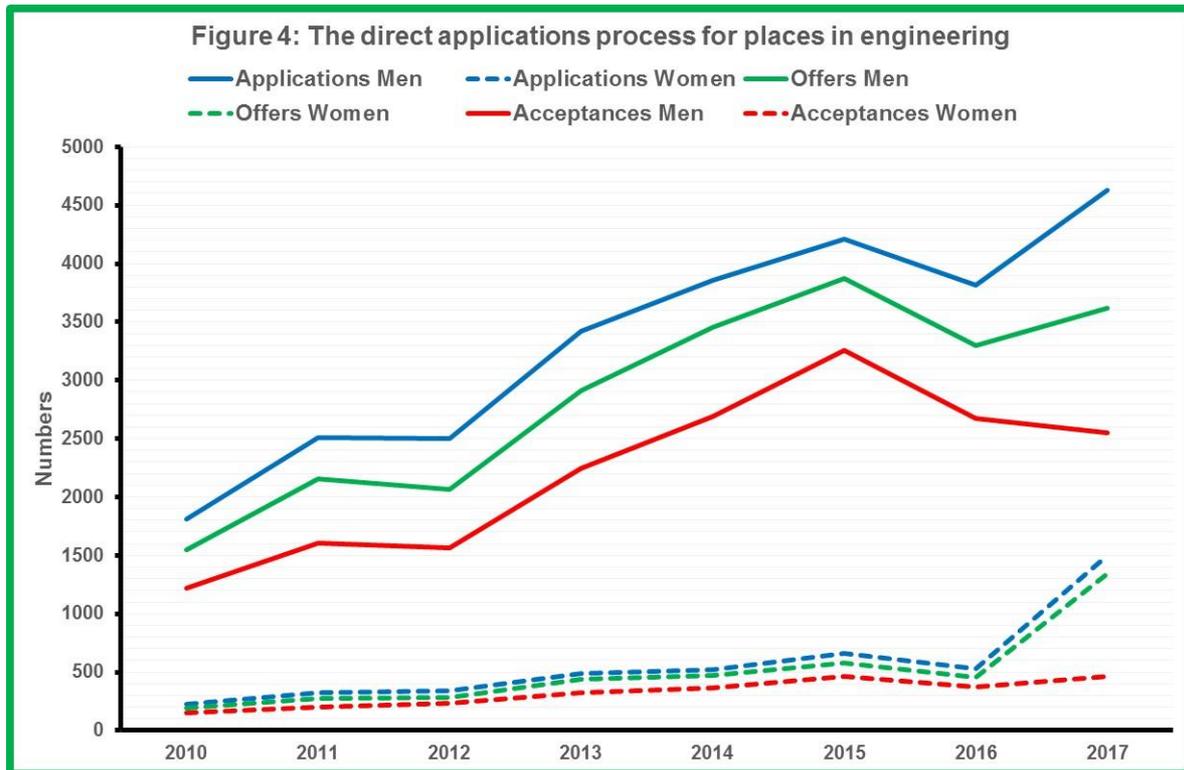
Included in Figure 3 are the corresponding trends for the proportion of men and women with ATAR rankings over 90 who received offers in all subjects. The proportion of offers in engineering with ATARs over 90 has been substantially higher than for offers across the board. In the case of men, the average difference has been 10 percentage points, that is, 38.2% of offers were to prospective engineering students with ATARs over 90 compared to 28.1% for offers in all subjects. The difference was even greater for women, on average 56% of offers to women in engineering had ATARs over 90 compared to 27.7% for all subjects.

The two issues covered in Figures 2 and 3 combine to indicate that during rising and falling trends in applications and offers, universities have maintained high standards among students receiving offers of places in engineering. It is encouraging to note that as the proportion of women accepting places in engineering increases, the standing of prospective women engineering students can only be regarded as a standout, something that employers should note.

Direct Application Process

Since 2010, direct applications to universities for places in engineering courses have increased rapidly from 2,038 to 6,122 in 2017. The separate trends for men and women are illustrated in Figure 4. Applications from men increased from 1,812 in 2010 to 4,209 in 2015, dipped to 3,819 in 2016 before increasing sharply to 4,626 in 2017. Progress in direct applications from women was much slower, increasing from just 226 in 2010 to 664 in 2015. Direct applications from women also regressed in 2016 but almost tripled in 2017 to 1,496.

Average offer rates for direct applicants are lower for women and higher for men than offer rates in the TAC process; 85.7% for men compared to 83.3% in the TAC process and 86.9% for women compared to 96.4% in the TAC process. However, the larger differential in favour of women suggests that universities view women direct applicants in a similar light to those in the TAC process, that is, a large proportion of them are high standard candidates. In 2017, the offer rate to direct applicant men was below average (78.2% received offers compared to average 85.7%) and the offer rate to women was above average (89.6% received offers compared to average 86.9%).

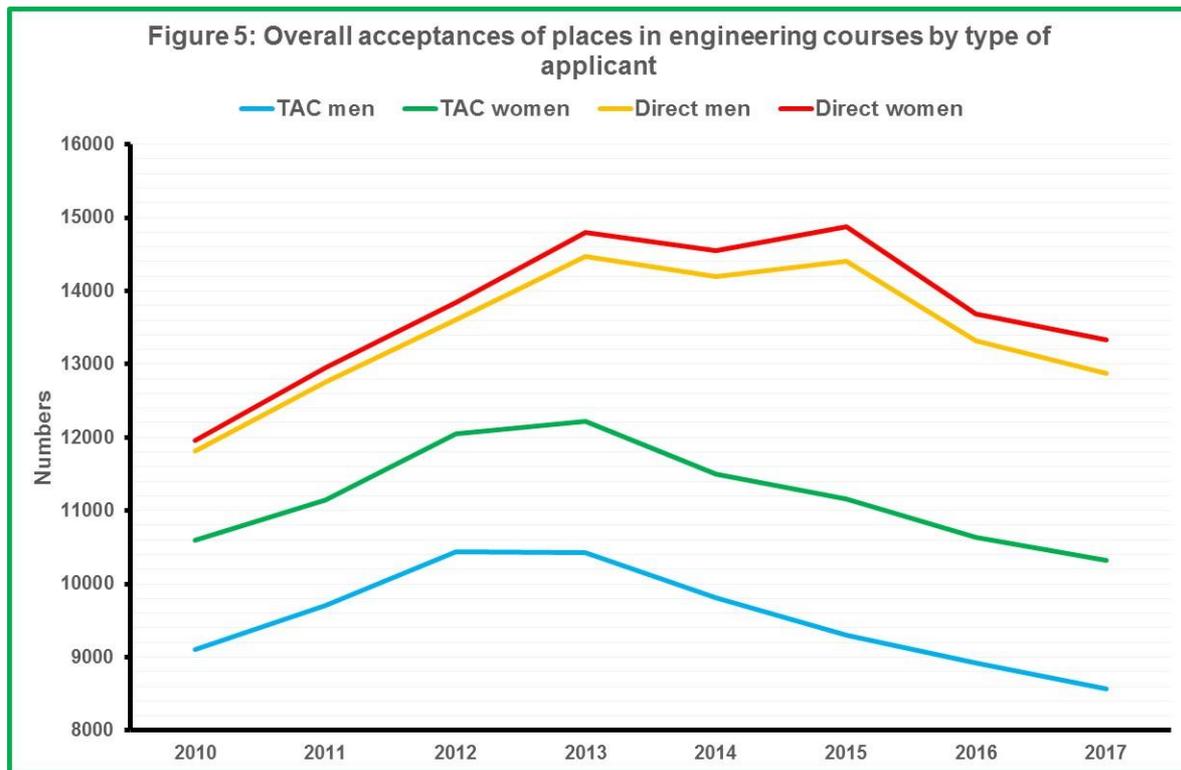


The positive picture in respect to offers is more mixed when it comes to acceptances. On average, acceptances of offers by direct applicant men was slightly higher than the average acceptance rate by TAC applicants, 66.5% compared to 64.8% in the TAC process. In the case of women, on average 62.9% of direct applicants accepted offers compared to 70.3% in the TAC process. In 2017, the large increase in direct applicants was accompanied by a substantial drop in the acceptance rate. Just 55.1% of direct applicant men accepted an offer of a place, over 11 percentage points less than average, and just 31.2% of direct applicant women accepted an offer of a place, about half the average.

The Combined Process

In Figure 5 we combine the acceptances outcomes from the TAC and direct application processes into a *stacked* illustration. The figures in this diagram can be considered in absolute terms or in more structural terms as the proportion of total acceptances contributed by the various sources. Numerically, we observe a rise and fall in acceptances of places in engineering from the TAC process. In 2010, there were 10,591 acceptances rising to a peak of 12,225 in 2013. Since then, acceptances from the TAC process have steadily fallen and were 10,322 in 2017. This outcome was lower than achieved in 2010. In contrast, acceptances from the direct application process have steadily increased from 1,369 in 2010 to a peak of 3,715 in 2015. In the last two years, acceptances have fallen by about 20% and have stabilised at a little over 3,000.

The rising trend in acceptances from direct applicants offset the decline in acceptances from the TAC process for several years so that the peak in total acceptances was in 2015 instead of 2013 as was the case for the TAC process. However, the fall from the peak and subsequent stabilisation of acceptances from the direct applications process could not continue to offset the sharper decline in acceptances from the TAC process. The result was that total acceptances in 2017, 13,338, were lower than total acceptances in 2012.



In 2010, direct applications from women resulted in 1.2% of place acceptance, direct applications from men resulted in 10.2% of acceptances, applications from women in the TAC process resulted in 12.5% of acceptances and applications from men in the TAC process resulted in 76.1% of acceptances.

The largest component of acceptances has been from men in the TAC process and that remains the case today. However, the share of acceptances from this source has fallen over time, reaching a low of 62.5% in 2015. In the last two years it has plateaued at about 64 to 65%. The proportion of acceptances from women in the TAC process has been more steady, varying between 11.2% and 12.5% during 2010 to 2015, but has shown signs of increasing in recent years, increasing to 13.2% in 2017. Acceptances from both genders combined have fallen from 88.6% of total acceptances in 2010 to 77.4% in 2017.

Acceptances from direct applicants have been mainly from men but there has been a steady rise in the share from women. This share was just 1.2% of total acceptances in 2010 but in 2017 had increased to 3.5% of total acceptances. Acceptances from direct applicant men have increased their share substantially from 10.2% in 2010 to a peak of 21.9% in 2015. There were lower shares in the last two years but still twice as high as the 2010 shares.

Various factors underpin these trends. There is no doubt that the hype that surrounded the demand for engineers during the resources and infrastructure booms encouraged more young people to become interested in engineering. In 2012, the strong demand for engineers collapsed and the engineering labour market has endured strenuous adjustment involving lower labour force participation, higher unemployment and fewer people with engineering qualifications working in engineering. The backwash from this adjustment no doubt has influenced reduced acceptances and it is impossible to know its extent. Of greater concern is the decline in acceptances from the TAC process against a background of falling participation in mathematics and science at school. The growth in direct applications is more complex still. The growing popularity of “gap years” after school may be one factor, but another could be people with qualifications or partial qualifications in another field attracted to switch to engineering due to the demand conditions already mentioned. This is the classic example where further research is essential.

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