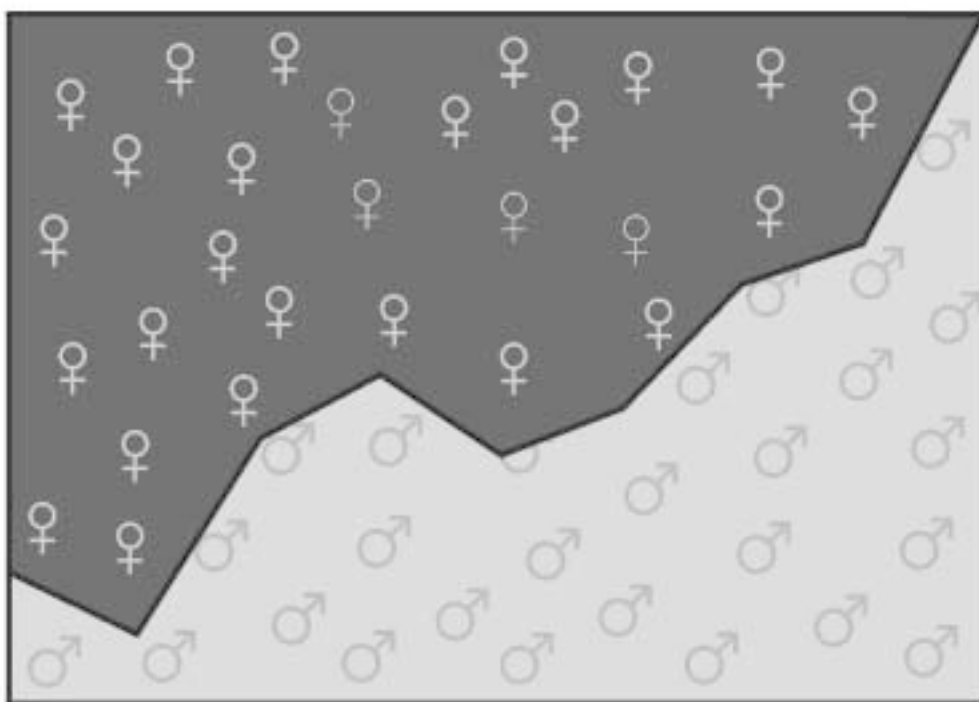


# Changing Populations and Changing Results:

Gender Differences in Senior Studies 1987-95



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Queensland  
Board of Senior Secondary School Studies

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## Preface

This study reports on trends in the overall results of female and male senior students in Queensland over the years 1987 to 1995.

That is, this paper shows in what ways outcomes were different by gender in the period 1987–95, how these outcomes changed over this period, and speculates on some of the possible causes.

In the process this report shows that broad generalisations are less useful than careful and sensitive examination of patterns of participation and outcomes. Accordingly, I commend this study to all those in the Queensland community who would like data on which to base an informed discussion of gendered differences in outcomes for senior secondary schooling.

This report was produced in the Evaluation, Research and Development Section of the Board, and written by Erica Bell using data analyses provided by Reg Allen, assisted by Chris Rollings. The Board is continuing to explore these and other issues in its research on differences in participation and outcomes.

For me, the most important question raised by this study is ‘In our desire for simple answers to simple questions like “Are girls doing better than boys?”, are we ignoring the possibility that analyses of data using the large categories of gender mask differences between subgroups within these categories?’.

John A Pitman  
**Director**

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# Changing populations and changing results: Gender differences in senior studies 1987–95

JR Allen

EJ Bell

## Introduction

This study reports on trends in the overall results of female and male senior students in Queensland over the years 1987 to 1995.

This paper addresses the question of whether and in what ways girls in Queensland senior schools are doing better than boys or vice versa. It shows in what ways outcomes were different by gender in the period 1987–95, how these outcomes changed over this period, and speculates on some of the possible causes. It does this by asking first who completes senior, second how different are their results, third are there changes in these differences over time, and fourth by speculating about what factors affect gendered differences in participation and outcomes. In the process this paper shows that it is not so much that broad generalisations about differences are wrong as that claims that girls are doing better than boys tend to disguise important differences in the population of girls and boys doing senior studies, as well as changes in these populations in recent years. Not only that, but global claims that girls are doing better than boys tend to distract attention from the subject specific detail of differences in participation, and the reality that in the population of students completing senior school, there are significant differences in the subjects girls take and the subjects boys take.

At the outset it should be clear that differences by gender and changes in these differences over time ought to be expected. These years were times when the economy changed through restructuring and through a serious recession. It would be surprising indeed if the broader social trends did not affect who chose to stay on at school and, correspondingly, that the exit achievements of senior students did not reflect changing patterns of participation in senior study.

It is already well known that female and male students experience school differently: their subject choices, subject combinations and results are not the same. Change is not of itself a cause for alarm or confusion or for cries that one or another group is being disadvantaged. Rather is it an occasion for careful and sensitive examination of patterns of participation and outcomes. Global statements that, for example, girls are now doing academically better than boys do not account for important patterns in the data in terms of participation. Such statements are also often based on the mistaken assumption that the groups of females and males doing senior study are broadly equivalent so their outcomes *ought* to be the same. In reality, different economic and cultural factors determine which females and males will continue on to senior studies so that these groups are different. If the groups of females and males are different in terms of achievement and expectations, it is of course likely that their outcomes will be different. Of course, it is also possible that some of the changes apparent in the data can be partly explained by changes in school-based assessment practices and changes in the Queensland Core Skills (QCS) Test used in statewide scaling. However, it is certain that larger cultural and economic forces have a much greater influence upon changes in participation and outcomes.

During the period covered by this study the Tertiary Entrance (TE) Score was replaced by the Student Education Profile (SEP). The Student Education Profile comprises two documents — the Senior Certificate showing levels of achievement as well as the QCS Test result, and the Tertiary

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Entrance Statement showing an Overall Position (OP) and Field Positions (FPs).

In this study, and for the purpose of making comparisons, the underlying numerical results have been reduced to percentile ranks of 5% so that, for example, those who came in the top 5% in their year are grouped together.\* A 'vigintile' is one of these 5%tile ranks — one twentieth of the data.

## **Background: the popular debate about participation and outcomes**

The category of gender, 'males versus females', offers only one way of looking at gender — socio-economic background is another, but is not so easy to report. Yet popular debate about differences in outcomes has often been dominated by this polemic.

In the period under study some commentators have argued that there has been a 'media backlash' against programs and policies that target girls in senior studies. This backlash has been underpinned by assumptions that in Australia and other western countries boys are 'losing out' to girls. For example, in *The Courier-Mail* on 26 November 1994 an article appeared under the title 'Girls are smarter — survey':

LONDON: Girls were more successful at school than boys, were more driven to succeed and would soon beat men to the best jobs, researchers told a British television survey yesterday. The BBC's Panorama programme said the findings shattered beliefs held widely in Britain that girls may mature faster than boys, but that boys soon catch up and overtake girls ... a study of 10,000 technology students showed boys trailed girls even in this traditionally male area. (p. 20)

The sense in the media has been that the learning needs of boys have been neglected through the drive for gender equity, and reading these media reports one could reasonably conclude that this is the position of some influential educationalists. An article titled 'Boys' schools join battle to shake off macho image' in *The Australian* (27 September 1994) offers an example of the call for a greater emphasis on the educational needs of boys in the classroom:

Ms Moulton said that while educational research had proved girls performed better academically in single sex classes, research on boys' learning had been scarce.

'There has been a lot of emphasis on how girls learn but we really should be looking at how boys learn and how learning patterns feed into the curriculum,' she said. (p. 6)

Early media reception of a major DEET-funded study, *Gender Equity in Senior Secondary School Assessment* by the Senior Secondary Assessment Board of South Australia, did not really focus on the detail and the qualifications of the data in the findings of this study. However, later media discussion of this study offered a more nuanced reading of the data:

Boys continue to outperform girls in high profile school subjects such as mathematics, a national study has found. The report shows that despite recent concerns that boys were being left behind in the education stakes, they are more likely to study maths and chemistry and maintain their hold on the top end of the achievement scale in these subjects. Girls continue to surpass boys in English while results between girls and boys are mixed in geography and economics classes and differ between states ... Dr Teese said research showed girls who outperformed boys in maths, chemistry and physics tended to be from higher socio-economic backgrounds while girls from blue collar families did not perform as well as their male counterparts. Researchers have suggested girls enrol in courses only if they are confident they can cope with them adequately. (*The Courier-Mail*, 18 June 1994, 'Boys still ahead in key subjects', p. 3.<sup>1</sup>)

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\* For the purposes of showing results across different years in figures in this report the 20th 5%tile includes the top 5% of students while the 1st 5%tile includes the bottom 5% of students.

<sup>1</sup> See also 'Who says girls are racing ahead at school?' in the *Canberra Times*, 16 June 1994, p. 1. However, this article was accompanied by an inset piece entitled 'Problems of the post-modern boy' which represented students of both genders at Ginninderra High School as believing 'boys were having a worse time than girls on many fronts'.

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The backlash in the media<sup>2</sup> has also represented the views of particular education lobby groups<sup>3</sup>, and has placed real pressure upon state governments in NSW and elsewhere to address the educational needs of boys and to consider boys as a target group for gender equity programs:

Mr Lucas said the change was necessary because recent studies had shown boys were more likely than girls to develop behavioural problems, be suspended or excluded from school, leave the school system earlier and also have lower levels of literacy ... yesterday's move follows the NSW Government's recent decision to review the education of boys and develop a statement of principles for the education of boys in that State. (Carolyn Jones, 'Ministers agree to address boys' education taskforce', *The Australian*, 30 April 1994.)

It needs to be noted that this pressure has come from those with a range of different perspectives. The media have also represented the view that attention to the education of boys is a necessary second step in a process that began with attention to the education of girls, a second step that has as its aim consolidation of the achievements of those who have worked to remove barriers to equal access and equity for girls.<sup>4</sup>

Media pressure to address the needs of boys seems to have been more acute in NSW<sup>5</sup> and South Australia. In Queensland, there has been relatively less debate, although the broad message has been that girls are doing better. An article published on 17 March 1994 in *The Courier-Mail* titled 'Girls outfigure the boys' offers an example:

Girls do better than boys in single sex schools, figures released by the Board of Senior Secondary School Studies this week show.

The results showed girls did better in high school mathematics and English, contradicting a popular view that girls found maths difficult. (p. 5)<sup>6</sup>

It is clear that how we interpret the data for gender differences in participation and outcomes has a real impact on how we view policies and priorities in the education of boys and girls, whether we are students, parents, teachers, education administrators, government policy advisers, or other members of the community. For these reasons alone, it is important that the data be available and be interpreted correctly, in ways that account for the complex nature of the data.

As this paper demonstrates, statements that girls are doing better than boys can be qualified in important ways when we examine the data during the period 1987–95, a period that has seen much spirited discussion of differences in outcomes, and speculation about why these differences exist.

The data analysis that follows is offered with the caution that gender is only one, somewhat simplistic, way of looking at outcomes. It may be easier to think in terms of large and simple categories, but studies which report differences in outcomes in terms of gender have the obvious

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<sup>2</sup> See also articles such as 'Is it the boys' turn for special help?' Colin Woodley, *The Sydney Morning Herald*, 19 April 1994, p. 15.

<sup>3</sup> See Bettina Arndt, 'Girls get the best of boys in class', *The Australian*, 19–20 February 1994.

<sup>4</sup> For a broad perspective on this see Peter West, 'Putting kids on the path to adulthood', *Canberra Times*, 9 November 1994, p. 17.

<sup>5</sup> See Kevin Donnelly, 'Backroom Boys', *The Courier-Mail*, 12 January 1996, p. 11.

Also: 'HSC results prompt sex bias probe', *Townsville Bulletin*, 10 January 1996, p. 14; 'HSC result worry for teen boys', *Gladstone Observer*, 10 January 1996, p. 7; 'The best and the brightest', *The Sydney Morning Herald*, 11 January 1996, p. 10; Peter West, 'Now it's time to help the boys', *The Sydney Morning Herald*, 11 January 1996, p. 11.

<sup>6</sup> For another example of Queensland media treatment of the debate see 'Sugar, Spice ... and brains', *The Courier-Mail*, 26 April 1994, p. 1.



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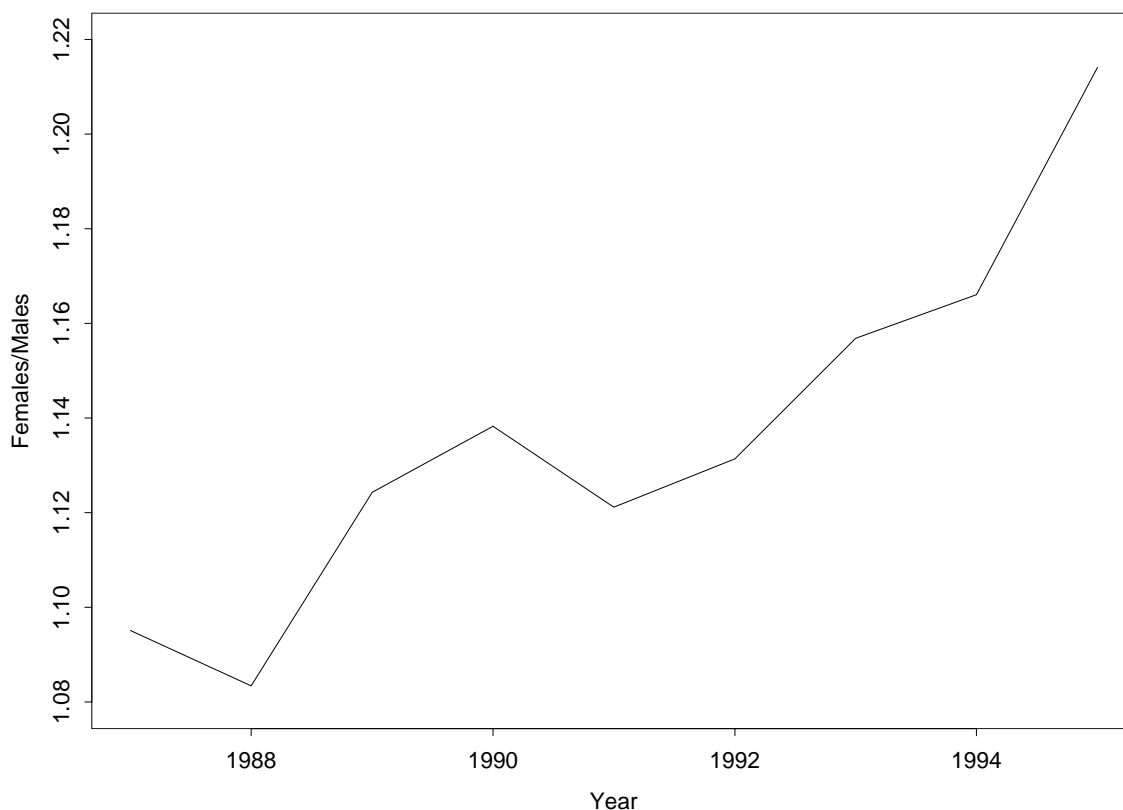
limitation of masking other differences between subgroups such as girls from geographically isolated areas and socio-economically disadvantaged backgrounds.

It is best to state this clearly, and acknowledge that gender is only one part of the story of differences in outcomes, than to proceed with the false assumption that what is a very complex situation can be reduced to two descriptors — ‘male’ and ‘female’.

## 1. Who completes Senior?

There have been, and currently are, more females than males in the population of students receiving a Tertiary Entrance Statement in Queensland. However, the imbalance of females and males has changed over the period 1987 to 1995 in some interesting ways. The graph below (Figure 1) shows the ratio of female to male senior students over the years 1987 to 1993 (a value of 1.0 indicates equal numbers of females and males, a value of 1.2 indicates 20% more females than males).

Figure 1: Ratio of females to males in OP-eligible population 1987-1995



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According to the Australian Bureau of Statistics, there are more males than females aged 17 — around 48% of the 17-year-old population is female. Yet we know that in every year since 1987 there have been more females than males completing Senior and receiving a tertiary entrance result. In 1995 nearly 55% of the OP-eligible population was female. That is, at the simplest level possible it is clear that females and males are not equally likely to complete Senior. This fact should inform claims that outcomes ought to be the same and inferences about the existence of a problem from the unequal outcomes that are observed.

Of course, overall trends tell one story while more detailed figures can tell another. How do the Queensland Year 12 completion rates of males versus females compare across different Board subjects? Figure 2 (over page) shows females as a proportion of students completing Board subjects by year. It seems that while boys are relatively under-represented in, for example, Speech and Drama, Music, Secretarial Studies, history and languages, girls are relatively under-represented in Health and Physical Education, Engineering Technology, Geometrical Drawing, Mathematics B and C, Chemistry, Physics, and Earth Science. The fact that these patterns of participation persist to 1995 might be interpreted as suggesting how enduring are the cultural factors that sort and sift students into different school subjects.<sup>7</sup>

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<sup>7</sup> A 1995 BSSSS study, *Language and Equity*, offers a point of departure for discussing how language use in assessment instruments may have a role in shaping student attitudes and self-image, which in turn influence students' motivation to study particular subjects.

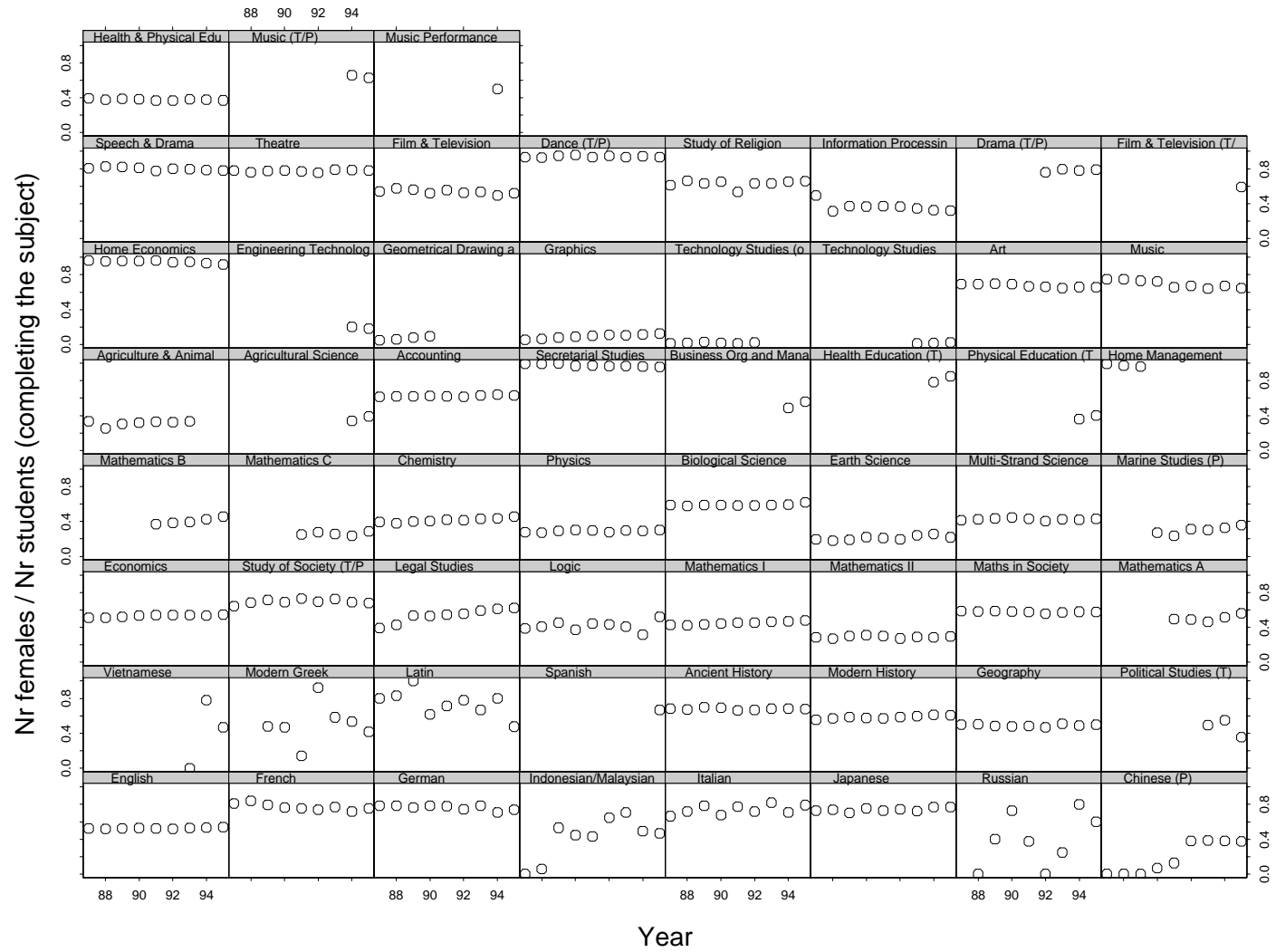


Figure 2: Females as a proportion of students completing each subject by year

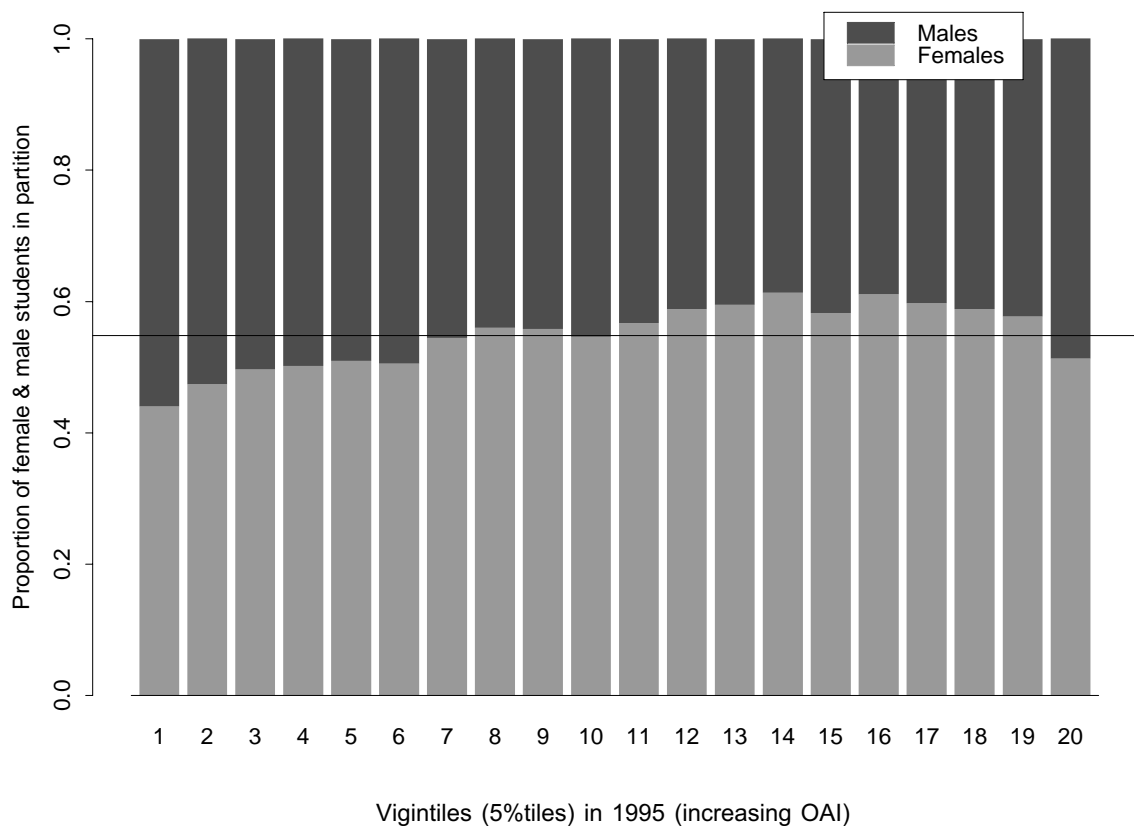
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## 2. How different are their results?

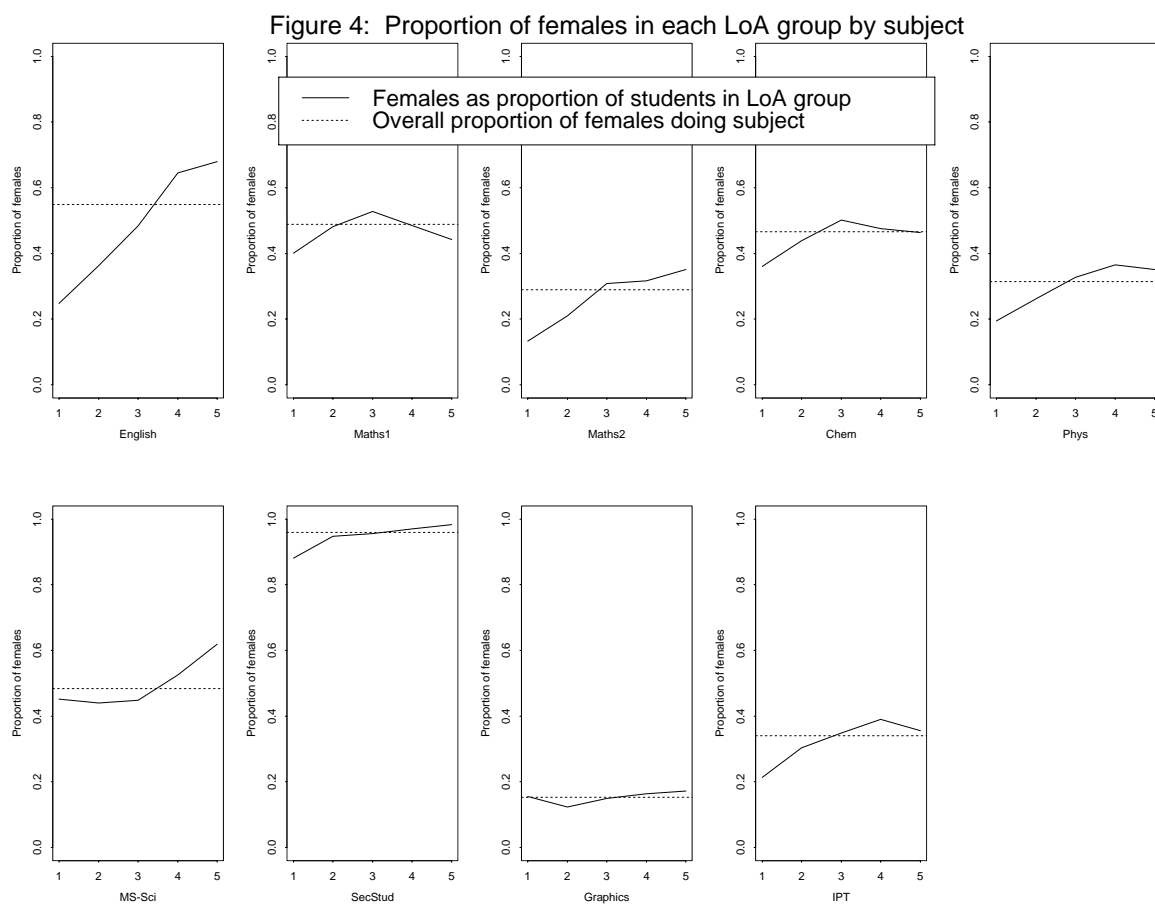
Media claims that girls are doing better than boys often focus on average scores. This has sometimes meant that important differences in the distributions of senior results are obscured. The graph below (Figure 3) shows the proportions of females and the proportions of males in each of twenty groups (each representing 5% — a vigintile) of the total eligible population in 1995. The line across the middle of the graph shows the expected value if females and males performed equally well. As noted earlier, such expectations do not seem logical when we consider that while females are less than half the total 17-year-old population, they are now well over half the OP-eligible student population.

The most marked feature of this graph is the fact that boys tend to be found at the extremes, both the top and lower end of the graph, while girls tend to displace the boys in the top half of the OP-eligible population. This demonstrates why in studies of outcomes by gender, averages may be a convenient basis for generalisations, but they hardly allow us to examine the data in a rigorous or nuanced way. A big change in the fact that boys are proportionately more likely to appear at the extremes, both top and bottom, which would be a change of great importance, could in theory occur without *any* change in average results.

Figure 3: Proportion of females & males in 20 equal partitions of OP-eligible population



Again, it may be interesting to examine this broad picture in more detail, that is, by subject. Figure 4 plots the proportion of females receiving each level of achievement<sup>8</sup> in a selection of Board subjects. The pattern observed in Figure 3, that of the boys being represented at the extremes, can be qualified when we look at the details for particular subjects. It is true that in quite a few subjects there is a higher proportion of girls receiving the higher levels of achievement than the overall proportion in these subjects might indicate. This is not the same as saying that more girls than boys get VHAs in these subjects; the small ratio of girls to boys in, for example Physics, means that there are more boys than girls receiving VHAs in these subjects. Yet those girls who do study Physics have a tendency to do well in this subject. Interestingly, there are lower proportions of females receiving the higher levels of achievement in Mathematics 1 than the proportions of females doing this subject might lead us to expect.



<sup>8</sup> A level of achievement is a broad teacher judgment of how well a student has met the criteria in the subject syllabus.

### 3. Are there changes in these differences over time?

While the big picture is about the same, a real change seems to have occurred over the years 1987–1995. The graphs below (Figure 5) show the ratio of females to males by vigintile of tertiary entrance result for each of these years. It should be emphasised that the graphs in Figure 5 show the corrected ratio of females to males; that is, the graphs take account of the different proportions of females and males in the overall OP-eligible population.

Figure 5: Ratio of females to males by vigintile of tertiary entrance result by year

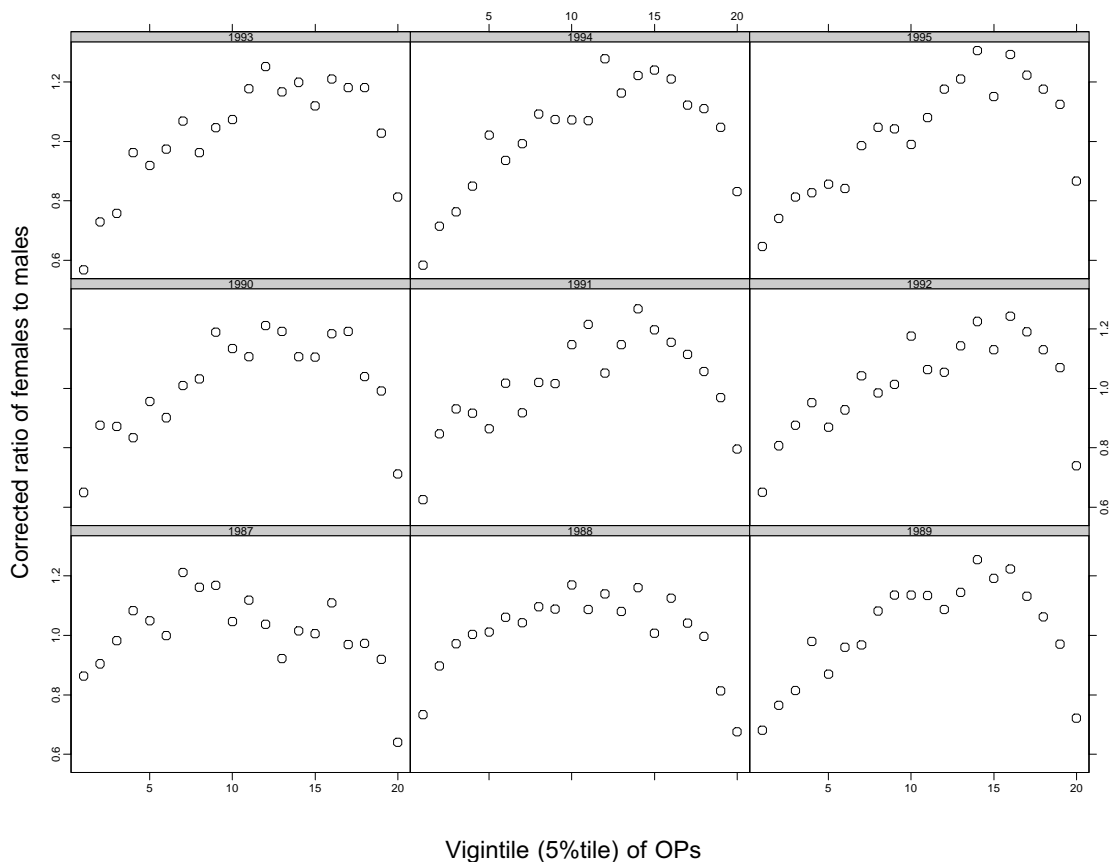
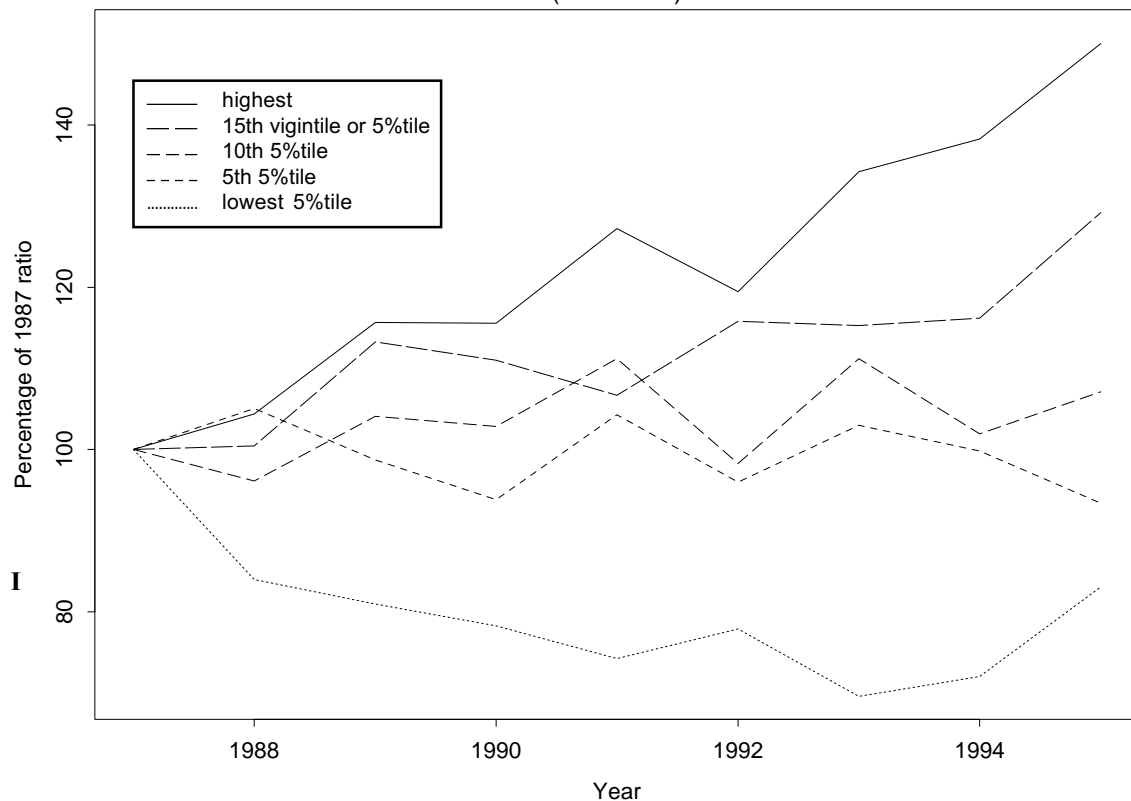


Figure 5 suggests that in the period 1987–95 there were more females than males in the middle and upper third of the range of senior results. One interpretation of the changes apparent in this figure, given the increasing female participation shown in Figure 1, is that recent years have seen an increase in the participation of female students with results in the middle and upper third of the range, effectively pushing the less successful male students down towards the lower end. This figure demonstrates an important point about exploring gender differences in outcomes; looking at the changing shape of distributions rather than means or averages is more meaningful. Means or averages disguise the fact that boys continue to outperform girls at the top end of overall achievement, or tertiary entrance results.

Figure 6 shows trends in the ratio of females to males at five places in the OP scale from 1987 to 1995 using 1987 as a base line. That is, the x axis represents 100 as a base value so that, for example, movement up the x axis to 120 is an increase of 20% in the ratio of females to males. Using this figure we can make the observation that, for example, the ratio of females to males in the highest five percentile has increased significantly since 1987, such that there has been an increase in the ratio of females to males of over 30% since 1987. However, this is not the same as saying that more girls than boys receive results in the top five percentile of tertiary entrance results; Figure 3 shows that the proportion of females in the top five percentile of results is actually substantially lower than we would expect if females and males performed equally well. On the other hand, Figure 6 (viewed with Figure 3) suggests there is some basis for concluding that, if the trend of the last eight years continues, girls will be equally well-represented in the top vigintile, or five percentile, of tertiary entrance results in the near future.

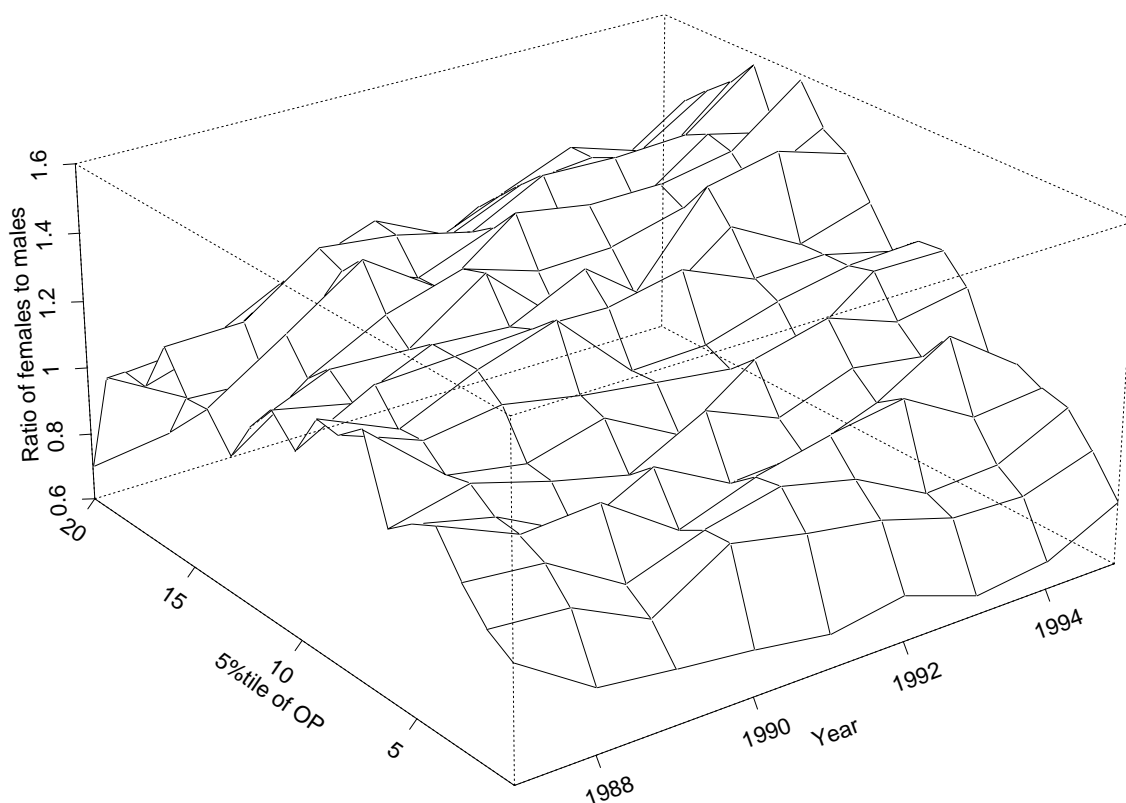
Figure 6: Trends in ratio of females to males at five places in the OP scale (1987=100)



The other striking trend shown in Figure 6 is the sharp decrease in the ratio of females to males in the lowest vigintile (five percentile) of tertiary entrance results.

Figure 7 summarises and integrates the data discussed so far in a three-dimensional picture. At a glance, the shape of this picture indicates that the increasing participation of females in senior secondary studies has been accompanied by an increase in the presence of girls in the top third of tertiary entrance results during the years 1987–95.

Figure 7: Trends in ratio of females to males by vigintile of OP



This striking feature of the data should make us wary of jumping to conclusions that the improvement in girls' academic performance in these years can be explained by pointing to a single factor. It is clear that, whatever the differences in means or average results indicate about the girls doing better than the boys, boys out-perform girls at the top end of tertiary entrance results. Discussion of gender differences in outcomes in senior schooling should account for these changes in the distribution of Tertiary Entrance results over time, and the complex issues involved in interpreting these changing distributions.

#### 4. Some factors that might affect gender differences in participation and outcomes

It appears that, in Queensland in the period 1987–95, not only have relatively more girls than boys been participating in senior studies, but the patterns of participation and outcomes are also different. That is, more girls than boys are found in the middle and upper third of academic achievement while more boys than girls can be found at the lower end of academic achievement and at the extremes. Patterns of participation in particular subjects also show gender differences.

Over the last twenty years there have been great increases in retention rates in senior studies. However, some significant changes in the years under study have also occurred. Since 1992

- the population of 17-year-olds in Queensland has been declining as a whole
- the OP-eligible population has been declining and



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- the population of OP-eligible males has been declining faster than the population of OP-eligible females

leading us to speculate whether

- higher proportions of boys in the mid-range of academic achievement have been leaving school before completing Year 12.

What other explanations are there for the fact that more girls than boys are participating in senior studies, as well as the fact that the period 1987–95 has seen an increase in girls in the middle and upper third of achievement, as well as an increase in boys at the lower end of achievement?

We might speculate that a larger group of academically high-achieving females are choosing to complete senior studies due to changes in the socialisation of girls and their expectations while, at the same time, patterns of access to post-school options are changing in particular ways for boys. Are more boys who would otherwise have left school for training and employment after Year 10 now enrolling in senior studies, and more of the boys who might have completed senior leaving to take up other post Year 10 options?

Changes in the population of boys staying on at school might well be accompanied by changes in the values and expectations of those staying on at school. Some researchers have emphasised the importance of cultural factors, such as the prevalence of a ‘macho’ culture of non-compliance with the ethos of academic achievement, in understanding differences in outcomes for girls and boys, specifically why relatively more boys are found at the lower end of academic achievement.

At the opposite end of the spectrum of explanations of gender differences in outcomes are arguments that such differences are the product of ‘innate’ differences between the sexes — the ‘nature’ argument.<sup>9</sup> However, the data presented in this report do not simply show that more boys than girls are found at the extremes — that is true of results on many educational measurements of achievement — but that the period 1987 to 1995 saw a shift in outcomes with more boys moving to the lower end and more girls moving to the middle and top third of school achievement. As noted in this report, these changes seem to be more about changing populations than anything else.

The factors affecting gender differences in participation and outcomes are many and varied. Yet we can be sure that they are not isolated or inert forces. This view might lead us to conclude that it is not so much that school environments have changed and this has influenced differences in participation and outcomes, but that broader social and economic forces have interacted with changes in schools.

There is considerable support for the view that examining differences in participation and attainment by gender is itself a somewhat misleading enterprise. In fact, it may well be that the most meaningful differences in outcomes are those produced by analysis of relationships of gender and socio-economic background, or gender and region.<sup>10</sup> The Board is continuing to explore these and other issues in its research on differences in participation and outcomes.

In our desire for simple answers — ‘the girls are doing better than boys’ and ‘boys are being neglected’ — we may well ignore the reality that analyses of data using the large categories of

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<sup>9</sup> See Andrew MacIntyre, ‘Sex Makes a Difference’, *Weekend Australian* 22–23 October 1994, p. 29, for a recent popular formulation of the nature explanation of why males are found at the extremes.

<sup>10</sup> See in particular the work of Richard Teese, ‘Gender equity in higher-level mathematics: a study of regional socio-economic influences on participation and attainment’, *Unicorn*, vol. 21, no. 4, November 1995, pp. 48–54.

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gender mask differences between sub-groups within these categories, for example, girls from economically disadvantaged backgrounds doing mathematics. For this and other studies it is important to temper any conclusions with a realisation of the limitations of the data. After all, analyses such as this study which rely on the broad distinction ‘males–females’ offer only *one* way of looking at differences in outcomes, and too easily lend themselves to misuse in crude polemical arguments. The current study reports differences in outcomes that, far from being simply about gender, involve a complex range of interacting factors that we need to address in a careful and nuanced manner.