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**The University Gender Gap in Australia:
A Long-run Perspective**

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Abstract

According to the 1911 Census, the proportion female of those receiving university education was around 22%, growing to 29% in 1921. By 1952 it had dropped to under 20%, due to easy access into universities for returning war-veterans. From the early 1950s, the university-educated gender gap began to reduce in response to women's changing expectations of labour-force participation, fertility and age at first marriage. By 1987, Australian women were more likely than men to be enrolled at university. However, these aggregate figures disguise considerable heterogeneity across fields of study.

JEL Codes: I23, J1, N3

Keywords: higher education, gender, Australia

I. Introduction

Women's higher education rates have now caught up with those of men, and in 15 out of 17 OECD countries women now have higher enrolment rates (OECD, 2008a). At the same time there has been a secular increase in female labour market participation rates in all but one OECD country. There are many potential explanations for the recent increase in female educational enrolments and labour market participation rates. One is the decline in discrimination against women in the labour market. As women experience improved career opportunities, they benefit from a higher return to tertiary education and so invest more. A second is that divorce rates have grown over the last two decades, and investing in a career provides a woman with insurance against marital breakdown and the concomitant income uncertainty. Moreover social custom has evolved dramatically over the last half century, and technological breakthroughs in household production have released female time from domestic labour. These trends, coupled with contraception innovations and the wider availability of abortion, have made it easier for women to delay family formation and enjoy the returns to university education. In this paper our goal is to describe the changes in the gender gap in higher education in Australia over the past century and to offer some speculation as to the various causes.

II. The Early Years

We begin by looking at a crude measure of educational attainment – whether or not marriage signatures were signed with a mark – as a measure of illiteracy. We have data for this for Australia from 1861 to 1921, as shown in Table 1. Of the total 1861 population that was married, the proportion signing with a mark was around 31% of women as compared with 19% of men. This compares with an adult illiteracy rate in 1861 England, using the same measure, of 35% for women and 25% for men, lending weight to the argument that nineteenth century immigration was selective. The comparable figure for Scotland in 1861 was 20-25% female illiterates and 10-12% male.¹ In Australia by 1871, illiteracy rates of those married had dropped to 16% for women and 11% for men. By the time of Federation in 1901, illiteracy of those married was under 1% for both men and women, indicating an improvement in education both within Australia and abroad. The proportion illiterate among those married remained under 1% for the entire data series up to 1921.

¹ The illiteracy figures for England and Scotland were obtained from Graff (1979).

**Table 1: Education as shown by marriage signature (Commonwealth), 1861-1921
Proportion signing with marks of total population married**

	Males	Females	Total
	%		
1861	18.5	30.69	24.60
1871	10.58	16.4	13.49
1881	4.34	6.78	5.56
1891	2.27	2.4	2.34
1901	1.35	1.29	1.32
1902	1.21	1.11	1.16
1903	1.17	1.02	1.10
1904	0.95	0.91	0.93
1905	0.91	0.93	0.92
1906	0.92	0.86	0.89
1907	0.81	0.7	0.76
1908	0.71	0.73	0.72
1909	0.65	0.62	0.64
1910	0.56	0.59	0.58
1911	0.56	0.54	0.55
1912	0.43	0.45	0.44
1913	0.36	0.38	0.37
1914	0.41	0.38	0.40
1915	0.27	0.27	0.27
1916	0.37	0.32	0.35
1917	0.37	0.31	0.34
1918	0.33	0.29	0.31
1919	0.27	0.27	0.27
1920	0.18	0.14	0.16
1921	0.16	0.18	0.17

Source: Australian Bureau of Statistics (ABS) 1901-1923.

By the time the colonies federated in 1901, Australia's population numbered around 3.788 million people, of whom 77.2% were Australian-born and 18% were born in the UK or Ireland (ABS 2006). While the Australian colonies were among the first in the world to introduce compulsory schooling for primary-school age children in the second half of the nineteenth century, it was still the case that, by 1901, 7.1% of the population aged over 5 years could not read (ABS 2006).² And by 1911, in spite of the fact that primary school education was mandatory, participation in education was only 92.5% for children aged 6-11, 85.2% of children aged 12-13 and 31.2% of children aged 14-15.

Moreover in 1911 only 2,465 Australians - around 0.055% of the total population of 4.455 million - were receiving educational instruction at a university, as shown in the top panel

² Victoria introduced compulsory secular and free education in 1872, Queensland in 1875 (6-12 year olds) and NSW in 1880 (6-14). See Austin (1977).

of Table 2. Of the total population of 4.45 million people, around 775,390 (17.4%) were recorded as receiving educational instruction. Of the 2,465 people attending a university, some 539 (21.9%) were women.

Table 2: Place of Education, Census 1911 and 1921

	State School	Private School	Technical School	University	At home	Scholar but school not stated	Total Number receiving education (a)	Total Population (million)
Census 1911								
Male - Person	298,386	70,145	N/A	1,926	10,450	10,293	391,200	2.31
- %	51.7	46.4	N/A	78.1	45.3	47.7	50.5	
Female - Person	278,819	80,960	N/A	539	12,593	11,279	384,190	2.14
- %	48.3	53.6	N/A	21.9	54.7	52.3	49.5	
Total	577,205	151,105	N/A	2,465	23,043	21,572	775,390	4.45
Census 1921								
Male - Person	395,268	88,800	17,868	5,129	14,141	42,346	563,552	2.77
- %	51.5	45.8	71.5	70.7	46.0	50.3	50.9	
Female - Person	371,573	104,974	7,116	2,123	16,571	41,781	544,138	2.68
- %	48.5	54.2	28.5	29.3	54.0	49.7	49.1	
Total	766,841	193,774	24,984	7,252	30,712	84,127	1,107,690	5.45

Note: (a) Number calculated by adding total number of persons receiving education instructions from state school, private school, technical school, university, at home and scholar but not stated.

Source: ABS 1911, 1921.

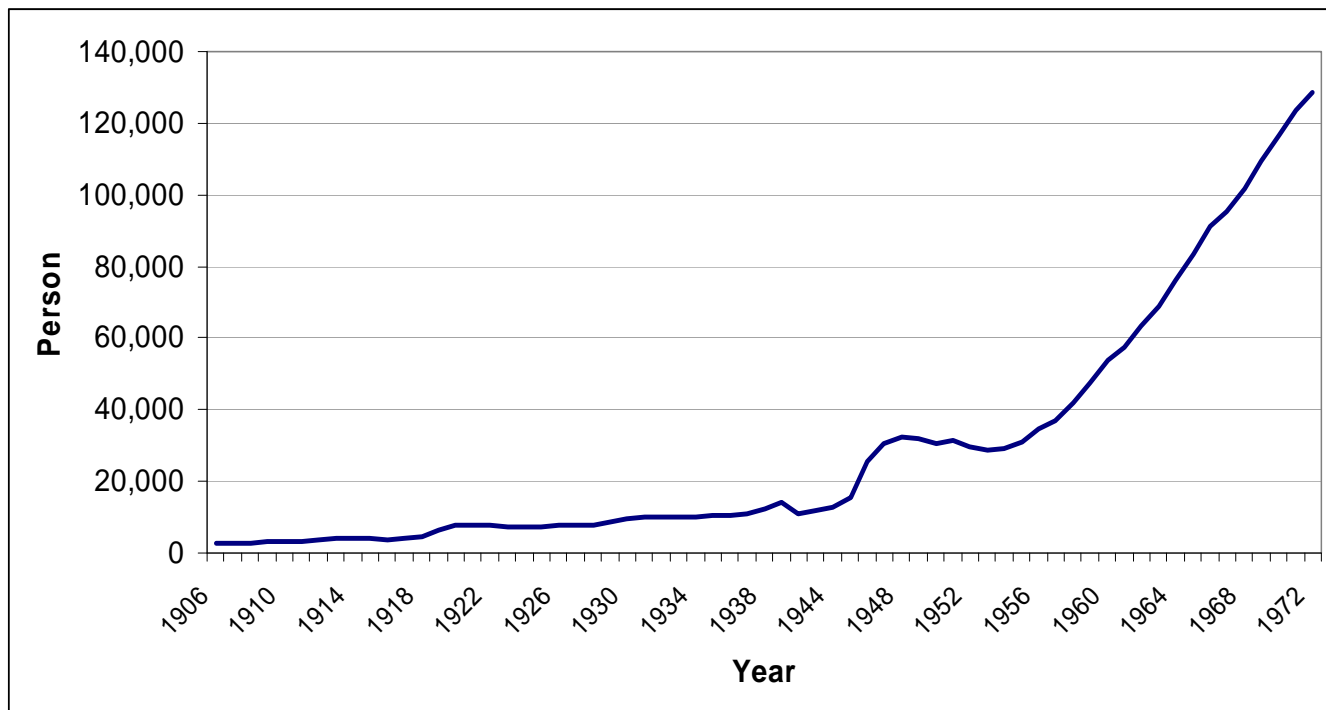
But by 1921, as the bottom panel of Table 2 shows, university attendance and the female proportion had increased. Of the total population of 5.435 million people, 20.4% (1,107,690) were recorded as receiving educational instruction. There were now 7,252 students attending university and of these 2,123 (29.3%) were women. In the next section we will consider in more detail total enrolments in universities disaggregated by gender.

III. Total University Enrolments 1906 to 1972

Figure 1 shows the trend in the total numbers of students enrolled at universities from 1906 to 1972. The post-war jump in enrolments is clearly visible. After this there was a plateau until the late 1950s, probably reflecting changes in financing arrangements for higher education. These included the postwar veterans' schemes, principally the Commonwealth Reconstruction

Training Scheme (CRTS). This was more likely to boost enrolments of men than women because the gender composition of the services in World War II was more male.³

Figure 1: Total university enrolments, 1906-1972



Source: ABS 1906-1974.

The Commonwealth Scholarship Scheme also began not long after the war. A referendum in 1949 approved amending the constitution to allow the Commonwealth in peacetime formal powers to provide direct financial support to students. At the end of 1949, the Chifley Government approved three thousand competitively allocated university scholarships. The Menzies Government legislated this as the Commonwealth Scholarship Scheme, which began operation in 1951 (Hastings, 2008). The Commonwealth Scholarships scheme and the

³ The Commonwealth Reconstruction Training Scheme (CRTS), introduced in March 1944, provided educational and vocational training to those who had served in Australia's armed services during World War II (National Archives). Since the gender composition of the services was overwhelmingly male, this would have boosted enrolments of men more than women. The last date for acceptance of applications was 30 June 1950 and by the middle of 1951 over 300,000 people had been accepted by the Scheme. Eligibility was a minimum of six months' service and an honourable discharge. Full-time participants had tuition and other fees paid, and they also received living allowances. See National Archives of Australia, Fact Sheet 178. CRTS Administrative Records, <http://www.naa.gov.au/about-us/publications/fact-sheets/fs178.aspx>.

associated bursary or living allowances would in principle have reduced the cost of acquiring higher education for men and women alike.

IV. University Enrolments by Gender 1939 to 1972

The data used in this section were obtained from various ABS year books, as will be explained below. Table 3 shows numbers of students enrolled at universities over the period 1939-1972. The earliest gender breakdown of students enrolled at universities is for 1939 when fewer than 28% (3,942) of those enrolled at universities were female. (This proportion is less than in the 1921 Census data. Note that the data in Table 3 come from figures released by the statistical officers of the Australian Universities and subsequently published in the ABS Year Books.) While it was impossible to obtain the gender breakdown for the entire period for which published enrolment statistics are available, we were able to obtain these data for latter part of the enrolment data series, from 1939 onwards.

From Table 3 it can be seen that the absolute number of male enrolments dropped from around 10,000 at the outbreak of the Second World War, to around 7,000 during the war years. The number of women enrolled at universities – nearly 4,000 in 1939 - fell in 1942 but grew from 1943. The net result of these changes was that the female proportion of university enrolments increased to 39% by 1944. After this, the female proportion dipped as men returned from war. The 1944 Commonwealth Reconstruction Training Scheme would have boosted post-war enrolments of men more than women. After the end of the war, the female proportion of university enrolments fell to 24% in 1946 and declined steadily thereafter until 1952, when just under one fifth of university enrolments were female. It can be seen that enrolments remained at around one fifth female until the early 1960s when they began to become more female.⁴ Figure 2 illustrates graphically the same data.

⁴ We were unable to find published statistics showing the proportion of the total population in particular age groups enrolled at university. Thus we do not know the extent to which the trend growth in numbers enrolled is due to increasing population or to increasing proportion of relevant cohort enrolling at university. The earliest enrolment information with an age breakdown is since 1980.

Table 3: Students enrolled at the universities, 1939-1972

	Male Person	%	Female Person	%	Total Person
1939	10,294	72.3	3,942	27.7	14,236
1942	7,025	65.3	3,736	34.7	10,761
1943	7,201	61.7	4,474	38.3	11,675
1944	7,876	60.7	5,090	39.3	12,966
1945	8,910	57.2	5,555	35.6	15,586
1946	19,346	75.6	6,239	24.4	25,585
1947	23,939	78.5	6,538	21.5	30,477
1948	25,540	78.7	6,913	21.3	32,453
1949	24,591	77.4	6,802	21.4	31,753
1950	24,023	78.4	6,607	21.6	30,630
1951	25,349	80.0	6,322	20.0	31,671
1952	23,798	80.3	5,843	19.7	29,641
1953	22,794	79.2	5,998	20.8	28,792
1954	23,113	78.7	6,261	21.3	29,374
1955	24,042	78.1	6,750	21.9	30,792
1956	26,872	77.9	7,608	22.1	34,480
1957	28,816	78.1	8,087	21.9	36,903
1958	32,642	78.0	9,223	22.0	41,865
1959	36,830	77.4	10,735	22.6	47,565
1960	41,385	77.0	12,395	23.0	53,780
1961	44,264	76.8	13,408	23.2	57,672
1962	48,007	75.8	15,310	24.2	63,317
1963	51,894	75.1	17,180	24.9	69,074
1964	56,424	74.1	19,764	25.9	76,188
1965	61,285	73.6	22,035	26.4	83,320
1966	66,303	72.6	24,969	27.4	91,272
1967	68,979	72.3	26,401	27.7	95,380
1968	72,470	71.4	29,067	28.6	101,537
1969	77,822	71.0	31,840	29.0	109,662
1970	81,847	70.1	34,931	29.9	116,778
1971	84,800	68.5	38,976	31.5	123,776
1972	86,540	67.3	42,128	32.7	128,668

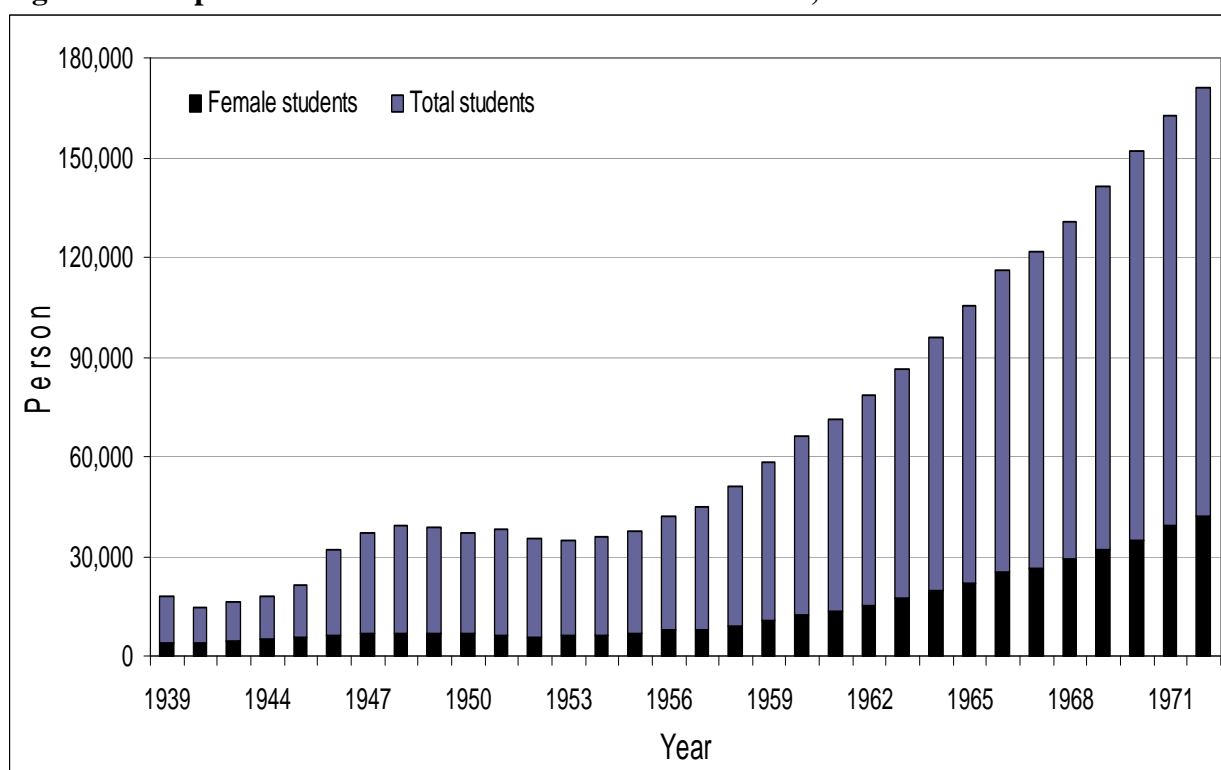
Source: ABS 1941-1974.

Australia's involvement in the Vietnam War was also likely to have affected enrolments, although the mechanism was very different to that described above. The Vietnam War was unpopular, especially amongst the young and, in order to increase personnel in the army, conscription was introduced. For the generation of men keen to defer service during Australia's involvement in the Vietnam War, higher education offered a way out.⁵ After call-up it was

⁵ The Vietnam National Service Scheme, based on a birthday ballot of 20-year-old men, ran from November 1964 to December 1972 (see Australian War Memorial web-based encyclopedia). Those young men chosen by this ballot were called up for two years' continuous full-time service in the Regular Army Supplement, followed by three years' part-time service in the Regular Army Reserve. The scheme was designed to create army strength of 40,000 full-time soldiers.

possible for young men to defer service if they were enrolled in higher education courses. In 1963 just under 52,000 men enrolled at university. By 1972, the end of the ballot procedure, around 86,000 men were enrolled. However, for women over the same period, the increase was from just over 17,000 to around 42,000. The proportion female grew from around 25% in 1963 to around 33% in 1972. It is impossible, with our data, to establish if there might have been a larger increase in the female proportion had there not been male conscription for the Vietnam War coupled with the educational ‘op-out’.

Figure 2: Proportion of females enrolled at the universities, 1939-1971



Source: ABS 1941-1974.

A Note on Data Issues

The Census data are available from 1981 to 2006 in the format of Confidentialised Unit Record File (CURF) from the ABS. To compare the historical movements in education attainment between males and females, we would ideally want to use the various Census CURF files to calculate average higher educational attainment by gender for each birth cohort. Our analysis of these data showed that the proportion of people with a university education increased from 1981 to 2006 for all birth cohorts observed in the data. There are a number of possible reasons for this

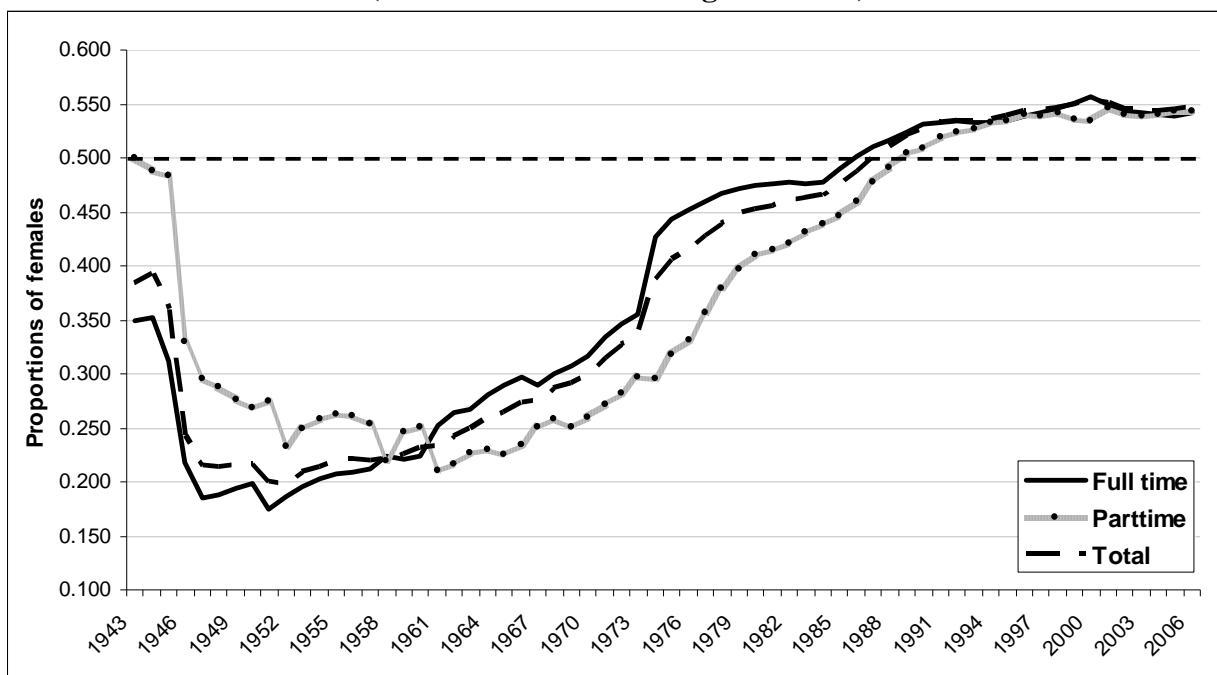
and it proved impossible to distinguish amongst them. First there were classification changes and second, there was a general trend towards mature-age university education. The classification of “undergraduate degree” has changed several times over the period of 1981 to 2006. For example, nursing qualification moved from being hospital-based to university-based for registered nurses. Individuals (mainly females) were classified as having a certificate under the old system and this is inconsistent with the new classification. Another profession affected by the change in classification was teaching. Moreover, over time, there has been a significant increase in the proportion of the population obtaining higher educational qualifications at a later stage of their life cycle and it proved impossible to distinguish this from classificational changes. Mature age students are especially common among females. However, Appendix Table A.1 shows that, for both men and women, numbers enrolled in courses are greater for those 35-64 years than for the 25-34 age-group. Given that the educational attainment of any birth-cohort – even those aged 35 plus - is changing over time, we preferred to use enrolment data from the universities to construct our time-series diagrams throughout this section.⁶

V. A Longer Window: University Enrolments by Gender 1939 to 2007

Next we present a longer data series obtained from a different data source, selected series published in Higher Education Students Time Series Tables, Department of Education, Training and Youth Affairs (2000). As this series does not match precisely with the ABS data in Table 3, we do not attempt to splice the two data series. Figure 4a shows the proportion of females in university enrolment from 1939 to 2007. It includes both overseas and non-overseas students over the entire period. Statistics prior to 1943 were extracted from ABS University Bulletins and are for universities only. Statistics from 1974 to 1989 include University and Colleges of Advanced Education (CAEs) and are based on figures from the Commonwealth Bureau of Census and Statistics (CBCS), Commonwealth Tertiary Education Commission (CTEC), Department of Employment, Education and Training (DEET) statistics. Comparable data for CAEs for years prior to 1974 are not publicly available.

⁶ We were unable to consistently isolate nurses and teachers for all the censuses. While we experimented with using the variable "field of study", this was problematic as the ABS changes its coding for this variable almost every census year. We also tried using occupation but the census data is coded into broad groups making it impossible to isolate teachers and nurses, who are grouped with different professionals depending on which census we are looking at. Hence we chose not to construct an historical time series using census birth cohorts.

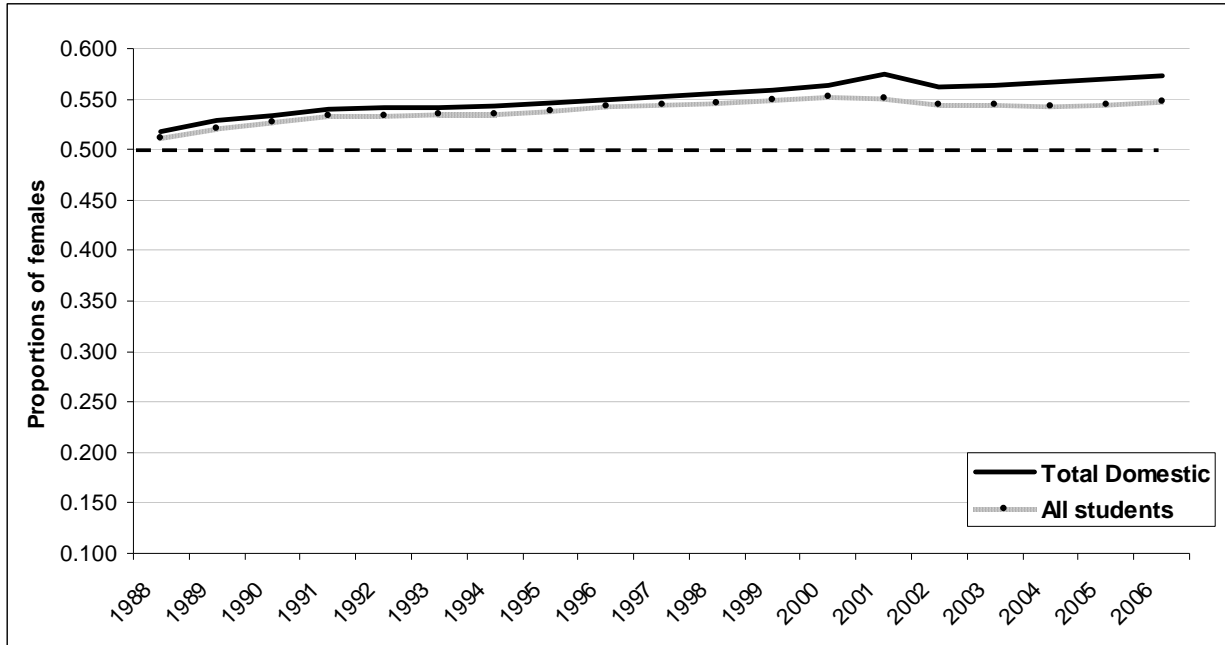
Figure 4a: University Attendance by Gender, 1939-2007
(both domestic and foreign students)



Source: Figures prior to 1943 were extracted from ABS University Bulletins and are for universities only. The rest of this graph is derived using selected series published in DETYA (2000). Figures after 2000 were obtained using online published data from DEEWR (2001-2007).

Using these different data, Figure 4a supports the trends shown in Table 3. (There is no overseas/non-overseas student breakdown prior to 1988.) Notice again the steady increase from a low of one-fifth female in 1952 up to the mid-1970s when there was a big jump, no doubt due at least in part to the inclusion from that time of CAE enrolments, as well as to the abolition of fees in 1974 by the Whitlam government. However unemployment could also have played a role, since it grew steadily from about this time up to around 10% by the early 1980s (see Appendix Figure A.1), a peak it was to exceed in the early 1990s. Second, Figure 4 reveals that by 1987 – two years before the removal of the binary divide and the introduction of the Higher Education Contribution Scheme (HECS) – there was gender parity. By 2007 the gender gap in favour of women had grown to around 55%.

Figure 4b: Proportion of females enrolled in an undergraduate course, all students or domestic students, 1989-2006

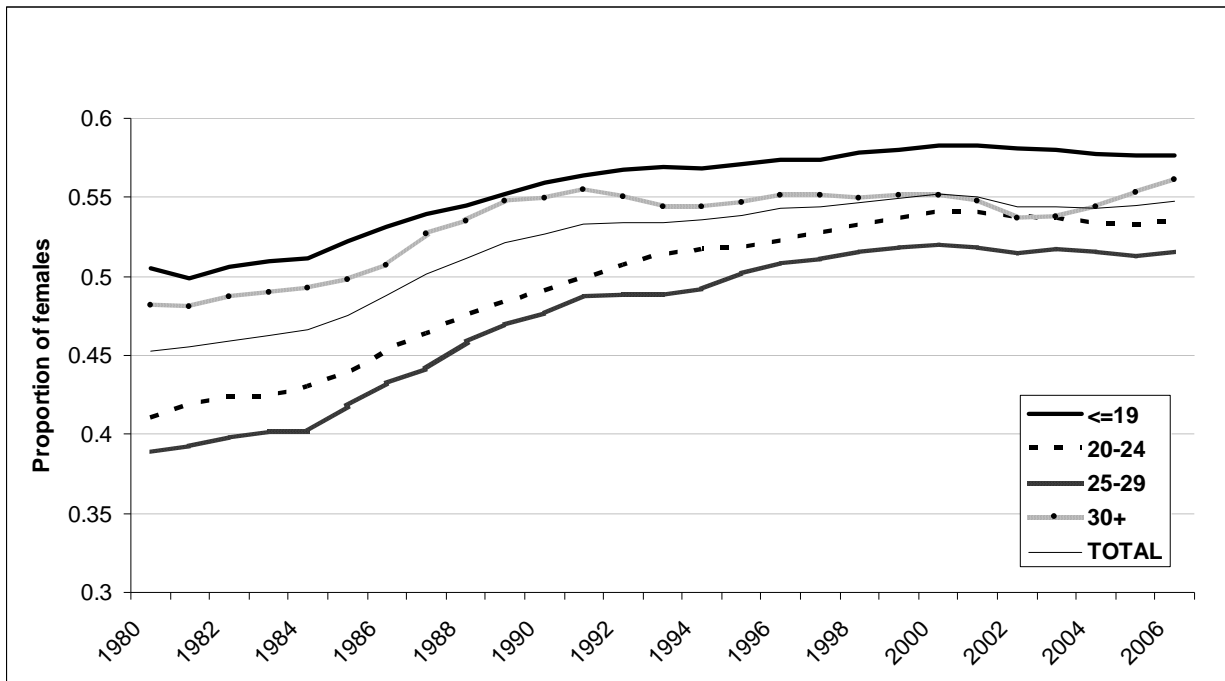


Source: This graph is derived using selected series published in DETYA (2000). Figures after 2000 were obtained using online published data from DEEWR (2001-2007).

It is possible that the inflow of overseas students into the Australian universities alters the pattern of gender gaps in university enrolments. The earliest publicly available university enrolment data, disaggregating by both gender and domestic/overseas status, date from 1988, and are from DETYA (2000) and DEEWR (2001-2007). In Figure 4b we plotted university enrolment by domestic and overseas student status and gender. We found that the gender gaps in university attendance are broadly comparable between domestic and overseas students over the period from 1988 to 2007. However, among domestic students, the gender gap favouring women seems to grow slightly faster from 2001.

Figure 5 illustrates the university gender gap for various age groups. Amongst the more mature students, those at least 30 years of age, gender parity occurred in the mid-1980s, perhaps reflecting women being more likely than men to return to education or to prolong it. Not long after HECS was introduced in 1989, this trend flattened out for this age group. In contrast, gender parity for the relatively young - those aged less than 20 years - occurred far earlier than 1987 (the gender parity date for all age groups), suggesting perhaps that men are more likely to take gap years or that women are more likely to drop out after 20.

Figure 5: University students by gender and age groups (both domestic and foreign students)



Source: This graph is derived using selected series published in DETYA (2000). Figures after 2000 were obtained using online published data from DEEWR (2001-2007).

VI. What Explains the Gender Gap in University Enrolments?

i. Deviations around trends; the role of war

An event such as war is likely to affect men's university enrolments differently to women's. We have seen that, while the female proportion of university enrolments increased to 38% by 1943, after the war enrolments of men were boosted by the Commonwealth Reconstruction Training Scheme. The female proportion of university enrolments fell to 24% in 1946 and declined steadily thereafter until 1952, when just under one fifth of university enrolments were female, and enrolments remained at around one fifth female until the early 1960s when they began to become more female.

Did the Vietnam war have a similar effect? Australia sent far fewer personnel to this war than to the two world wars, and the mechanisms affecting educational choices were different. While higher education was clearly a means for conscripted young men of avoiding service, the statistics do not allow us to establish if the effect on enrolments was large. Moreover other

factors were also propelling the nation forward and affecting the behaviour of young women and men.

ii. Long-run trends

Potential explanations abound for the trend increase in female-to-male higher education enrolment rates since the early 1960s. While we cannot hope to distinguish correlation from causation, we briefly outline some of the factors likely to have contributed to trend growth.

As a country gets richer, it educates males and females more. Twentieth century technological breakthroughs in household technology and in contraception remove constraints to female and male choice. At the same time technical innovations in market production lead to substitution from unskilled brawn to skilled brain, thereby increasing the demand for skilled labour and raising relative skilled wages. Women are now more easily able to postpone family formation and thus find it worthwhile to invest in higher education. Gender stereotypes become eroded. The civil rights movement of the 1960s demands – and succeeds in obtaining – equal rights for women and blacks, raising awareness of discrimination. In the labour market explicit discrimination against women is slowly reduced.⁷ As women experience improved career opportunities, they enjoy a higher return to tertiary education and so invest more. At the same time successive governments, reflecting the evolving preferences of the electorate, pass legalisation allowing abortion on demand and divorce without blame. Innovations in the funding of higher education widen access to children from lower income families, which may have assisted women more than men. Nonetheless, in countries with different funding mechanisms for higher education, the same trend growth in the female proportion in universities is observed

We now discuss some of those factors in more detail.

Labour market opportunities

Women born and raised in an era when female workforce participation rates were relatively low might have expected that they would not themselves be participating in the workforce for long and therefore that investment in higher education would bring insufficient returns to cover the

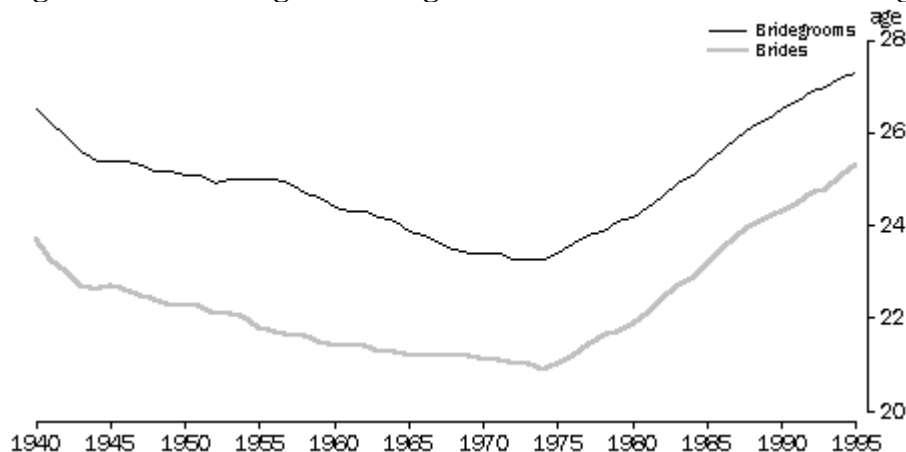
⁷ In 1969 the Commonwealth Conciliation and Arbitration Commission's equal pay for equal work decision established an important principle affecting 18% of women workers, mostly teachers and nurses. A second Federal case in 1972 established the principle of equal pay for work of equal value. This was extended through all awards from 1972 and eventually put an end to separate male and female rates in awards. The gender gap was reduced by 19% between 1972 and 1977. It was not until 1984 that the Sex Discrimination Act 1984 was passed by the Federal Parliament. See the Equal Opportunities website of the Australian government for more details.

costs (Appendix Figures A.2 and A.3 show male and female participation rates and real wages plotted over the period 1978 to 2008). For example, those women born in 1962 would – when making the staying-on-at school decision at age 15 or 16 – have expected participation rates of around 50%. Those born two decades later would have expected much higher participation probabilities, heading towards 70%, and therefore would have wanted to invest more.⁸

Demographic changes

While the median age at first marriage declined in the 30 years after World War II, it increased thereafter, as Figure 6 shows. From 1974, the median age at first marriage of bridegrooms and brides began to increase, and by 1995 it was four years above that for 1974. This may have been caused by more opportunities to enter higher education and delay family formation, as well as the greater availability of abortion, the widespread use of the oral contraceptive from 1961 and the rising unemployment levels of the 1970s (Carmichael, 1995). Later first marriage and family formation raises the anticipated period during which the returns to any educational investment could be amortised, further encouraging investment.

Figure 6: Median Age of Bridegrooms and Brides at First Marriage



Source: ABS 1997.

The new oral contraception of 1961 and the feminist revolution, together with the wider availability of abortion, made it much easier for women to make choices about their own lives

⁸ We are of course considering only averages here. Some women would have wanted to go to university regardless of average participation probabilities; for example those women who did not wish to marry, those who were very bright, and those who viewed – or whose families might have viewed - university as a place to meet potential marriage partners.

unconstrained by gender stereotyping and to delay formation of families until after they had established careers if that was their choice. Thus median age at first birth (only for first nuptial confinement) increased from 23 years in 1966 to 30.5 years in 2006 – see Appendix Figures A.4 and A.5.⁹

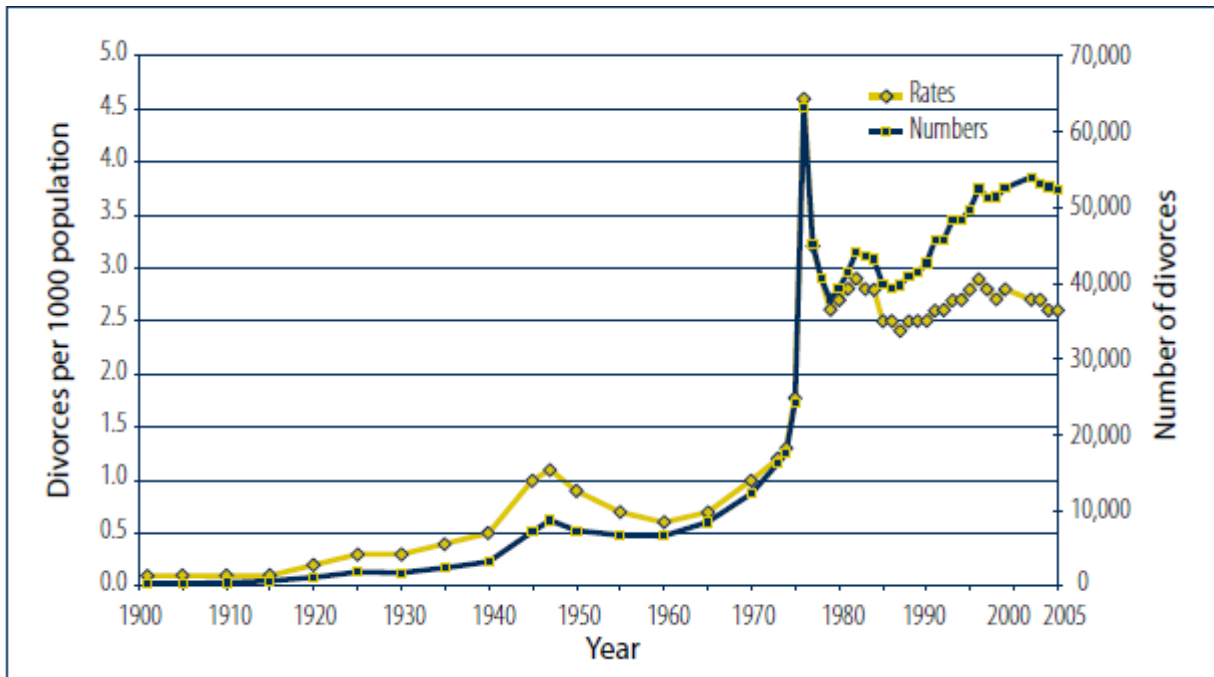
At the same time, cohabitation was becoming more widely accepted, affiliation to a religion was reducing,¹⁰ and people were becoming more willing to stay unpartnered. Moreover, “it is not simply the case that people were marrying later because they were cohabiting as an alternative to marriage: people were also avoiding unions of either type more than they previously had done.” (Carmichael, 1990)

Divorce rates were also increasing over the latter half of the twentieth century. Women and men could no longer expect their first marriage to last and therefore women might consider making educational investments to insure against the risk of income loss. In other words, forward-looking women might have invested in higher education as a means of hedging against the risk of potentially losing their partner’s income and being themselves responsible for the maintenance of their children. Of course education and divorce might be endogenous – highly educated women have greater outside opportunities – educated salary – and hence may be less likely to put up with recalcitrant spouses. The *crude divorce rate* provides a measure of divorce in relation to the total population, and is calculated as the number of divorces granted during a calendar year per 1,000 estimated resident population at 30 June. It is charted in Figure 7 (see left-hand vertical axis), while the number of divorces is also indicated (see right-hand vertical axis).

⁹ The proportion of first marriages involving women marrying younger men increased from 11% in 1974 to 20% by 1995, which may have happened due to “relaxation of pressures to conform to previous patterns” (ABS, 1997). Coles and Francesconi (2007) document evidence of changing matching behavior in the U.S.. They find a growing proportion of marriages where successful women marry substantially younger men. Such matches are typically characterised by the woman not only being university educated and professionally qualified, but also better educated and in a better occupational class than her male partner.

¹⁰ The proportion of Australians reporting an affiliation to a religion remained relatively stable from 1933 until 1971, at slightly less than 90%. This fell to 80% in 1976, then slowly declined to 73% in 2001. See ABS 4102.0 Australian Social Trends, 2004

Figure 7: Crude divorce rate and number of divorces, 1901-2005



Source: Weston and Qu, 2006.

Figure 7 shows that divorce in Australia was relatively rare until the second half of the twentieth century. While 1947 saw a number of divorces, probably reflecting “hasty wartime marriages and the disruptive effects of the war on marriage” (Weston and Qu, 2006), it was not until the 1960s that the divorce rate began to rise again, peaking with the introduction of the 1975 Family Law Act (4.6 divorces per 1,000 resident population), when easier divorce meant that long-term separations could be legalised.¹¹ Since then the crude divorce rate has ranged between 2.3 and 3.0, with a trough occurring in the mid-1980s and a recent decline from 2.7 in 2003 to 2.3 in 2007 (ABS 2007b).

Changes in financing arrangements.

In many households, for much of the twentieth century, gender-stereotyping was likely to operate. Hence the introduction of financing inducements might have been particularly attractive

¹¹ The Family Law Act 1975 stipulated only one ground for divorce - “irretrievable breakdown” –measured by a minimum of 12 months separation.

for women whose families were unsupportive of investment in higher education. Moreover, their foregone uneducated earnings were lower (female unskilled wages lower than male).¹²

Table 5 shows that, even in 2005, low income households exhibit significantly more gender stereotyping than high income households. For example, the third row of the table indicates that low income householders are much more likely than high income householders to agree with the statement: ‘It is better for everyone involved if the man earns the money and the woman takes care of the home and children.’ This difference is highly statistically significant, as the last column of the table indicates.

Table 5: Attitudinal variables by household income level, 2005 (a)

	Low income household (b)	High income household (c)	Difference	t-stat
Many working mothers seem to care more about being successful at work than meeting the needs of their children.	4.00	3.18	0.82	13.10
Mothers who don't really need the money shouldn't work.	4.44	3.02	1.42	19.54
It is better for everyone involved if the man earns the money and the woman takes care of the home and children.	4.65	3.00	1.65	23.00
A working mother can establish just as good a relationship with her children as a mother who does not work for pay.	4.24	4.49	-0.25	-3.48
It is not good for a relationship if the woman earns more than the man.	3.36	2.25	1.11	17.44
On the whole, men make better political leaders than women do.	3.29	2.60	0.69	9.40
A pre-school child is likely to suffer if his/her mother works full-time.	4.57	3.64	0.93	12.90

Source: Household, Income and Labour Dynamics in Australia (HILDA) Survey, Wave 5 (2005).

Note: (a) Only included respondents aged at least 21 years old and above. Answer ranges from 1 to 7, 1 being strongly disagree, 7 being strongly agree. (b) Having gross household income that is at the bottom 10 percentile over the previous financial year. (c) Having gross household income that is at the top 10 percentile over the previous financial year.

¹² Dougherty (2005) found that the college wage premium is higher for women than men in the US, and it has been higher for some time. However, this is generally not the case in Australia. Results from Kee (2006) suggested that females obtained higher returns from lower qualifications. The only exception is observed in the private sector, where returns to higher education were larger for women at the top of the conditional wage distribution.

One can speculate that this gender stereotyping would have been more pronounced in earlier times before the feminist revolution. Given such gender stereotyping we might expect the Higher Education Contributions Scheme (HECS) - introduced in 1989 as a means of financing a large-scale expansion of the higher education system (see for example Chapman, 1988) - to boost female enrolments relative to male, *ceteris paribus*. HECS aimed to make higher education more accessible for individuals from poorer backgrounds and these poorer students were more likely to come from families with gender stereotyping as well as poor access to credit. However Figures 4 and 5 do not support this hypothesis. There was no jump in 1989 in the proportion of females enrolled.

Opening up new opportunities

The feminist revolution also meant that careers that had once seemed the purlieu of men were now socially acceptable for women. There was a general reduction in pressure to conform to social norms of suitable gender behaviour. Consequently a better matching of abilities to degree subject of career could now occur. Once upon a time a woman with a talent for physics or engineering would find it hard socially to follow her abilities, but this was all changing. At the same time, the erosion of stereotyping also affected men, although the number of occupations from which they had been effectively disbarred (nursing and childcare) was far smaller.

Table 6 gives female proportions by field of study in Australian universities over the period 1984 to 2007. It is striking that, in 2007, there are still some subject areas that have low or very high female proportions. For example, engineering and surveying are only 15.5% female and architecture is 40.9%. In contrast education is 74% female, health is 72.9% female and science 52%.

Table 6: Proportion female by field of study, 1984-2007 (overseas & non-overseas)

	Agricul ture	Archite cture	Arts	Econom ics	Educati on	Enginee ring	Health	Law	Science	Vet
1984	0.279	0.207	0.637	0.295	0.659	0.046	0.535	0.401	0.355	0.436
1985	0.289	0.214	0.640	0.305	0.657	0.049	0.552	0.412	0.359	0.464
1986	0.305	0.231	0.647	0.321	0.656	0.052	0.594	0.424	0.362	0.492
1987	0.308	0.249	0.651	0.338	0.668	0.056	0.629	0.433	0.369	0.491
1988	0.305	0.303	0.664	0.347	0.692	0.067	0.663	0.411	0.364	0.484
1989	0.311	0.306	0.668	0.365	0.704	0.078	0.687	0.416	0.366	0.493
1990	0.321	0.322	0.678	0.391	0.720	0.089	0.707	0.437	0.378	0.512
1991	0.330	0.334	0.680	0.407	0.724	0.101	0.722	0.452	0.388	0.525
1992	0.327	0.337	0.679	0.418	0.727	0.108	0.739	0.463	0.394	0.529
1993	0.341	0.343	0.679	0.426	0.727	0.118	0.745	0.465	0.400	0.540
1994	0.353	0.339	0.677	0.432	0.727	0.125	0.745	0.478	0.402	0.559
1995	0.360	0.342	0.680	0.437	0.728	0.131	0.744	0.481	0.407	0.567
1996	0.376	0.345	0.682	0.448	0.729	0.134	0.740	0.487	0.415	0.588
1997	0.386	0.346	0.685	0.461	0.736	0.138	0.740	0.502	0.419	0.607
1998	0.392	0.362	0.684	0.469	0.740	0.141	0.735	0.517	0.410	0.622
1999	0.403	0.363	0.686	0.478	0.743	0.144	0.736	0.527	0.409	0.634
2000	0.411	0.365	0.688	0.486	0.749	0.148	0.741	0.545	0.408	0.656
2001	0.458	0.388	0.658	0.499	0.754	0.161	0.726		0.523	
2002	0.460	0.394	0.652	0.500	0.741	0.159	0.729		0.523	
2003	0.466	0.399	0.651	0.497	0.742	0.157	0.730		0.527	
2004	0.476	0.408	0.651	0.493	0.737	0.155	0.730		0.527	
2005	0.492	0.407	0.648	0.488	0.736	0.154	0.730		0.528	
2006	0.500	0.411	0.644	0.486	0.733	0.154	0.729		0.524	
2007	0.505	0.409	0.641	0.485	0.740	0.155	0.729		0.520	

Source: DETYA (2000) and DEEWR (2001-2007).

(a) Full names of the field of study are: Agriculture- Agriculture and Animal Husbandry; Architecture- Architecture and Building; Arts- Arts, Humanities and Social Sciences; Economics- Business, Administration and Economics; Engineering- Engineering and Surveying; Law- Law and Legal studies; Vet- Veterinary Science. (b) Figures for years from 1985 to 1993 progressively include State-funded basic nursing students transferred from hospitals. (c) The field of study classification changed in 1987. The main effects were to transfer certain courses from Science to Health and from Business to Law, and hence to reduce Science and Business enrolments and to increase Health and Law enrolments. (d) Data from 1997 onwards were compiled in a different way to data for prior years to take into account the coding of Combined Courses to two fields of study. As a consequence, the total for some broad fields of study show larger increases than would be the case if data for only one field were to be counted. Counting both fields of study for Combined Courses means that the totals for each year may be less than the sum of all Broad Fields of Study. (e) Figures for 2000 to 2007 are extracted from the aggregated student datasets. These datasets are from the Department of Education, Employer and Workplace Relations (DEEWR) website. http://www.dest.gov.au/sectors/higher_education/publications_resources/statistics/higher_education_statistics_collection.htm (f) Note that from 2001 onwards, a new Field of education classification (Australian Standard Classification of Education-ASCED) was introduced, replacing the less detailed field of study classification. Hence data before and after 2000 might not be directly comparable. (g) Prior to 2001 annual enrolments only counted students undertaking units of study at 31 March, whereas from 2001 onwards, all students undertaking study at any time of the year were counted. This means that there is a break between series before and after 2001.

Gender differences in secondary school achievement

Finally we examine gender differences in secondary school achievement. In particular, we look at the score differences in reading, numeracy and science between boys and girls from 1975 to 2006. The data presented in this section were extracted from multiple data sources. Data from 1975 to 1998 were obtained from Rothman (2002), whereas data from 2000 to 2006 were taken directly from various publications in the OECD Programme for International Student Assessment (PISA). We acknowledge that these data are not strictly comparable statistically. Rather, we use them as a basic platform from which to compare the evolution of gender differences in school achievement over time in Australia.

Table 7 summarises sample size of each data source and shows the age of students interviewed. Details of each of the dataset and their methodologies are described in Appendix B.

Table 7: Sample size of each data sources

Cohort	Number of student	Indicative age range	Indicative grade range
ASSP 1975	6246	14	5-11
ASSP 1980	5103	14	7-10
YIT 1989	5653	14	7-10
LSAY 1995	13613	13-17	9
LSAY 1998	14118	11-20	9
PISA 2000	5176	15	10-11
PISA 2003	12500	15	10-11
PISA 2006	14170	15	10-11

Table 8 presents the results of mean scores in reading, numeracy and sciences by gender from 1975-2006. Girls outperformed boys in performance of reading literacy at all times. In fact, indicative results from various surveys suggest that the gender gap in reading seems to have widened over time. Moreover, significant gender differences favouring girls were also found in all participating countries, according to the results published in PISA 2006. In Australia, the gender difference was 37 score points, which was very similar to the OECD average.

Table 8: Mean Score in reading, numeracy and sciences by gender, 1975-2006

	Reading		Numeracy		Science	
	Boys	Girls	Boys	Girls	Boys	Girls
ASSP 1975	50.2	51.1	50.7	49.6	NA	NA
ASSP 1980	50	51.1	51.8	50.5	NA	NA
YIT 1989	50.1	50.9	49.6	48.8	NA	NA
LSAY 1995	48.8	50.7	51.2	49.5	NA	NA
LSAY 1998	49	51.3	50.7	49.6	NA	NA
PISA 2000	513	546	539	527	526	529
PISA 2003	506	545	527	522	525	525
PISA 2006	495	532	527	513	527	527

In terms of numeracy performance, indicative results over the sample period of 1975 to 1998 show that boys performed better than girls and the results are statistically significant. There has been little change in the gender differences in this time frame. In contrast, international assessments painted a somewhat different picture. Results from PISA 2000 and 2003 show that, although boys achieved a mean score higher than girls, the difference was not statistically significant. In 2006, Australian boys achieved a mean score of 527 points and performed significantly higher than Australian females, who achieved a mean score of 513 points. The contradictory results in terms of numeracy performances domestically and internationally may be a result of differences in the assessments used.

Finally we look at performance in science.¹³ Boys and girls performed fairly evenly over the time period and any differences between them are not statistically significant. This is compared to the OECD overall average, where there is a small but statistically significant difference favouring boys.¹⁴

In summary, these results indicate that in Australia girls are doing better than boys at reading, as well as boys at science, and slightly worse than boys at numeracy. There is no compelling reason to think that, on average, poor performance by either gender at secondary school should feed into lower university enrolment rates.

VI. Conclusion

According to the 1911 Census, the proportion of females receiving educational instruction at university was around 22%, growing to 29% in 1921. While the data series are not strictly comparable owing to changes in educational definition over time, the proportion of female

¹³ There is no science score for the period between 1975-1998.

¹⁴ See also OECD (2008b) pp110-113 for a summary of the PISA results across OECD countries.

university enrolments in 1939 was just 28%. By 1952 it had dropped further to under 20%, due in part to the easy access into universities for the returning war-veterans. From the early 1950s, the university-educated gender gap began to reduce, probably due to the moving on of the cohort of returned servicemen, and then later in response to women's changing expectations of future labour-force participation, fertility and age at first marriage. Technological breakthroughs in household technology and in contraception began to remove constraints to female choice. At the same time innovations in market production led to substitution from unskilled brawn to more skilled brain, thereby increasing the demand for skilled labour and raising relative skilled wages. Women, now more easily able to postpone family formation, began to find it worthwhile to invest in higher education. Simultaneously gender stereotypes became eroded. The civil rights movement demanded equal rights for women and blacks, raising awareness of discrimination and equal pay cases codified this. As women experienced improved career opportunities, they enjoyed a higher return to tertiary education and so invested more. At around the same time abortion on demand and divorce without blame were legalised. Women and men could no longer expect their first marriage to last and therefore some women were likely to make educational investments to insure against the risk of income loss. Innovations in the funding of higher education in 1989 widen access to children from lower income families, although the evidence does not suggest that this assisted women more than men. By 1987, less than a century after Federation, Australian women were more likely than men to be enrolled at university. However, these aggregate figures disguise considerable heterogeneity across fields of study. There are significant fields – such as engineering and surveying - where women remain in the minority, and other fields – education and health – where they are in the overwhelming majority. That girls are now performing as well as boys in secondary education suggests the overall trend is likely to continue.

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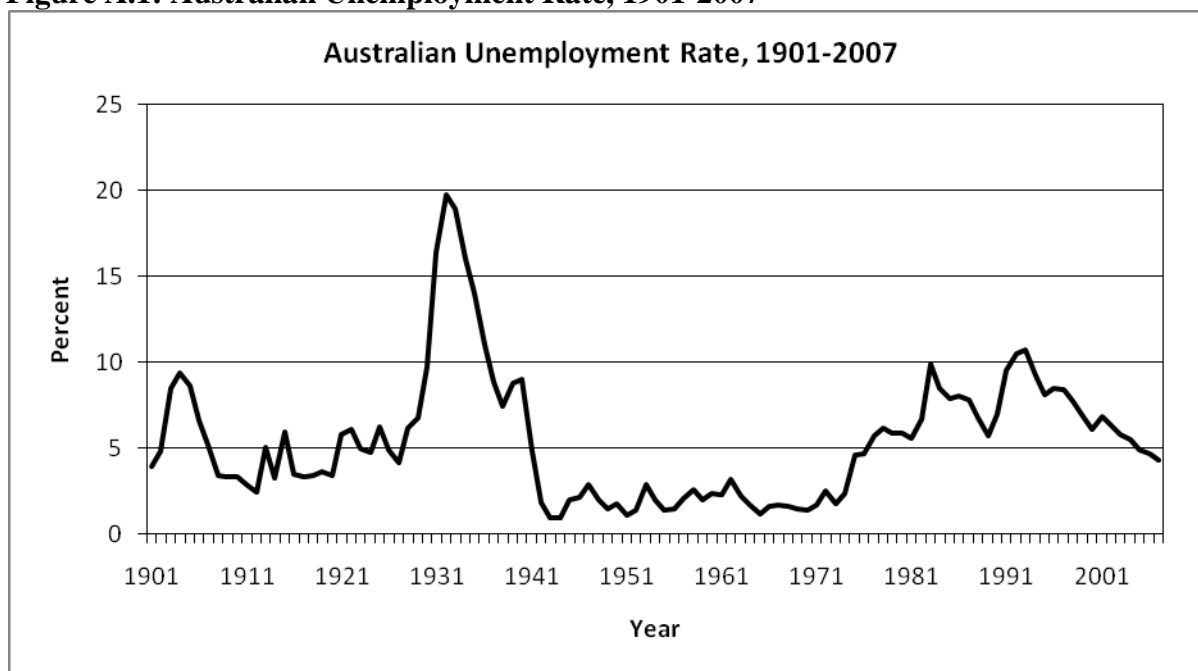
Appendix A Tables and Graphs

Table A.1: Enrolled in a course of study, by age by gender, 1998-2008 ('000s)

	Males				Females			
	25-34	35-44	45-54	55-64	25-34	35-44	45-54	55-64
1998	151.2	90.2	38.3	9.8	158.3	109.6	60.8	10.8
2000	157.5	84.2	42.6	8.3	170.3	120.4	63.3	12.4
2002	186.2	96	46.9	9.4	182.8	128.1	76.5	15.4
2004	174.6	92.8	46.9	18.6	200.8	144	85.4	17.6
2006	158.3	81.9	41.3	14.8	183.1	134.9	84.6	21.9
2007	161.7	93.5	50.6	14.7	210.9	133.4	87.3	25.4
2008	184.2	97	53.1	17.1	194.4	131.4	91.1	26.7

Source: ABS 2008b.

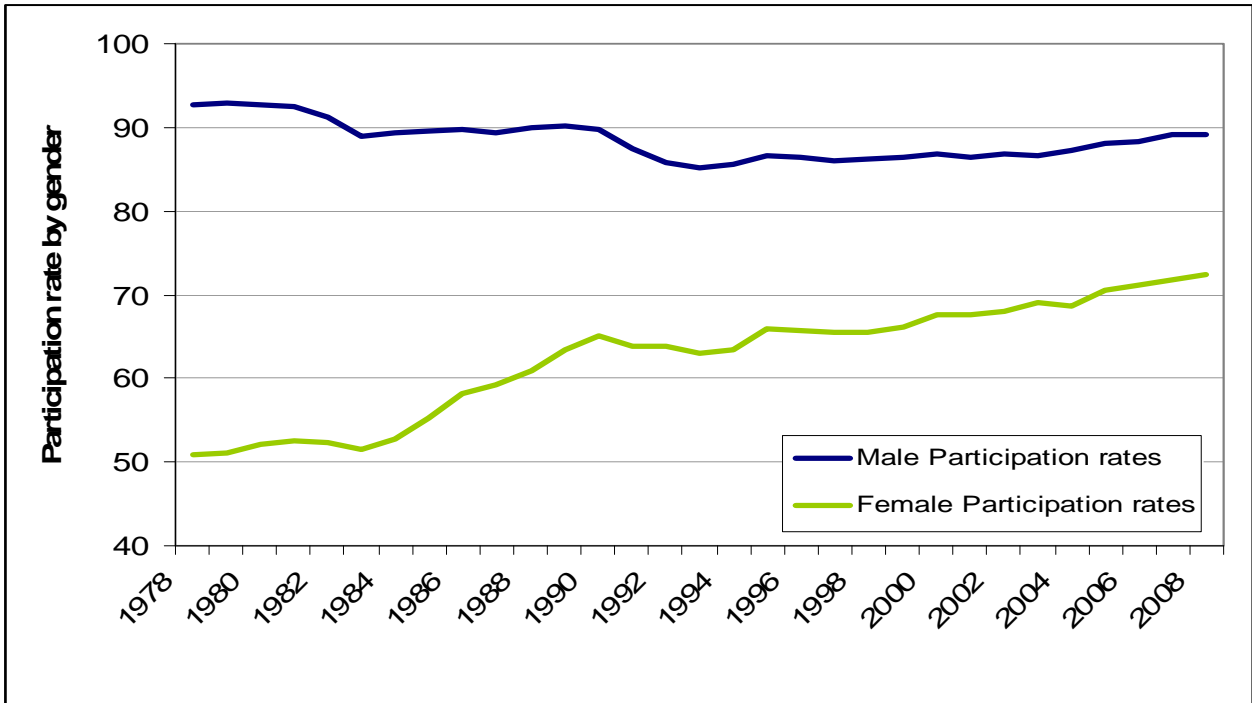
Figure A.1: Australian Unemployment Rate, 1901-2007



Average unemployed per year as a percentage of total workforce.

Source: a) 1901 to 1964 is from Vamplew (1987), Table: LAB 86-97, column 97, p. 152. The original source of this series is Butlin, M. (1977). "A Preliminary Annual Database 1900/01 to 1973/74," RBA Research Discussion Paper No. 7701, May. b) 1965 to 1996 is from RBA historical statistics, Table 4.15, column under "Total rate(c)". Originally Data are from the ABS Labour Force Survey, August data, Web link: (<http://www.rba.gov.au/Statistics/OP8ExcelFiles/4-15.xls>). c) 1997 to 2007 is from RBA Bulletin Statistics (monthly data), Table G07, Title: Labour Force, column under 'Unemployment rate'. For consistency data for August is used, Web link: (<http://www.rba.gov.au/Statistics/Bulletin/G07hist.xls>).

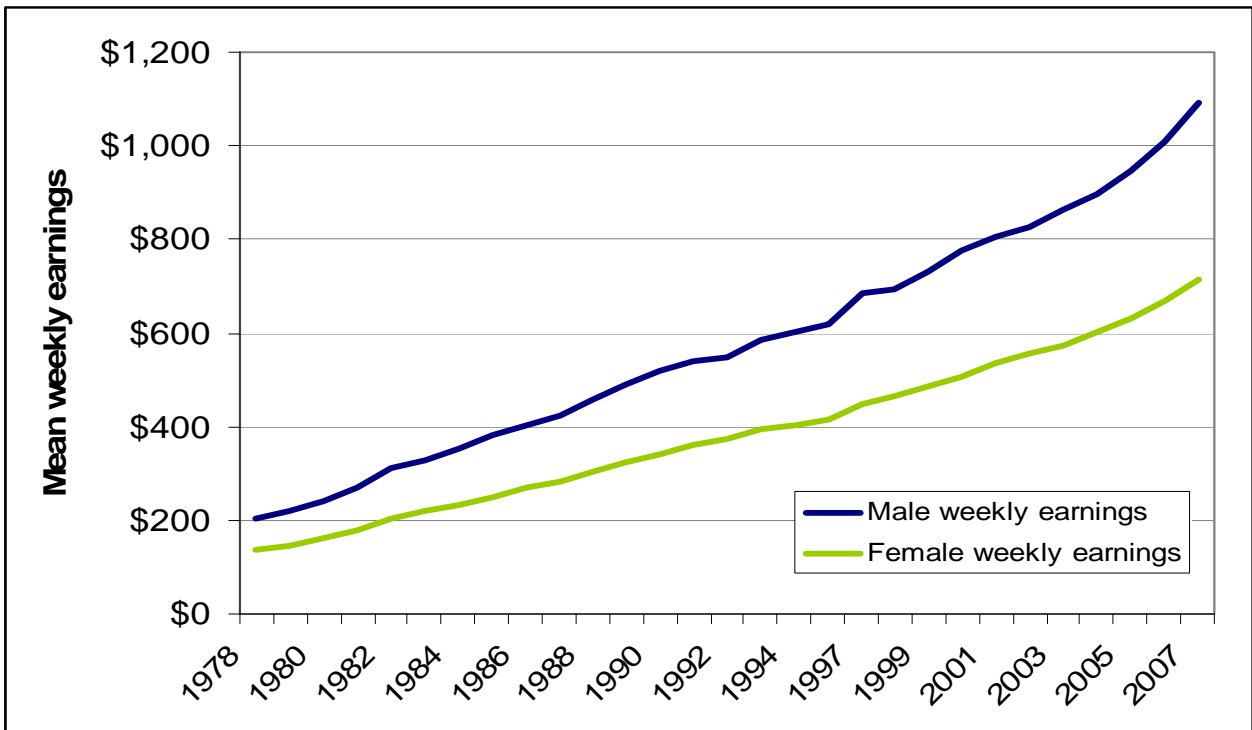
Figure A.2: Labour force participation rates by gender, 1978-2008.



Source: ABS 2009.

Note: Included only males and females between 30 and 50 years old.

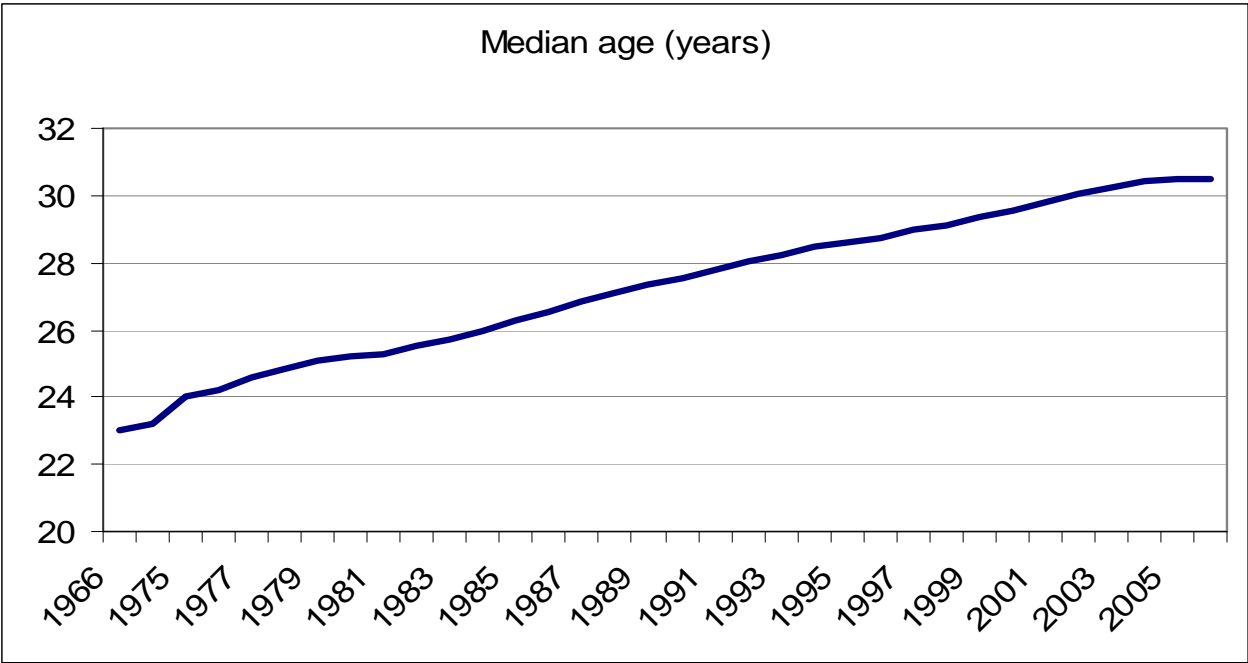
Figure A.3: Mean weekly earnings by gender, 1978-2007.



Source: ABS 2008a.

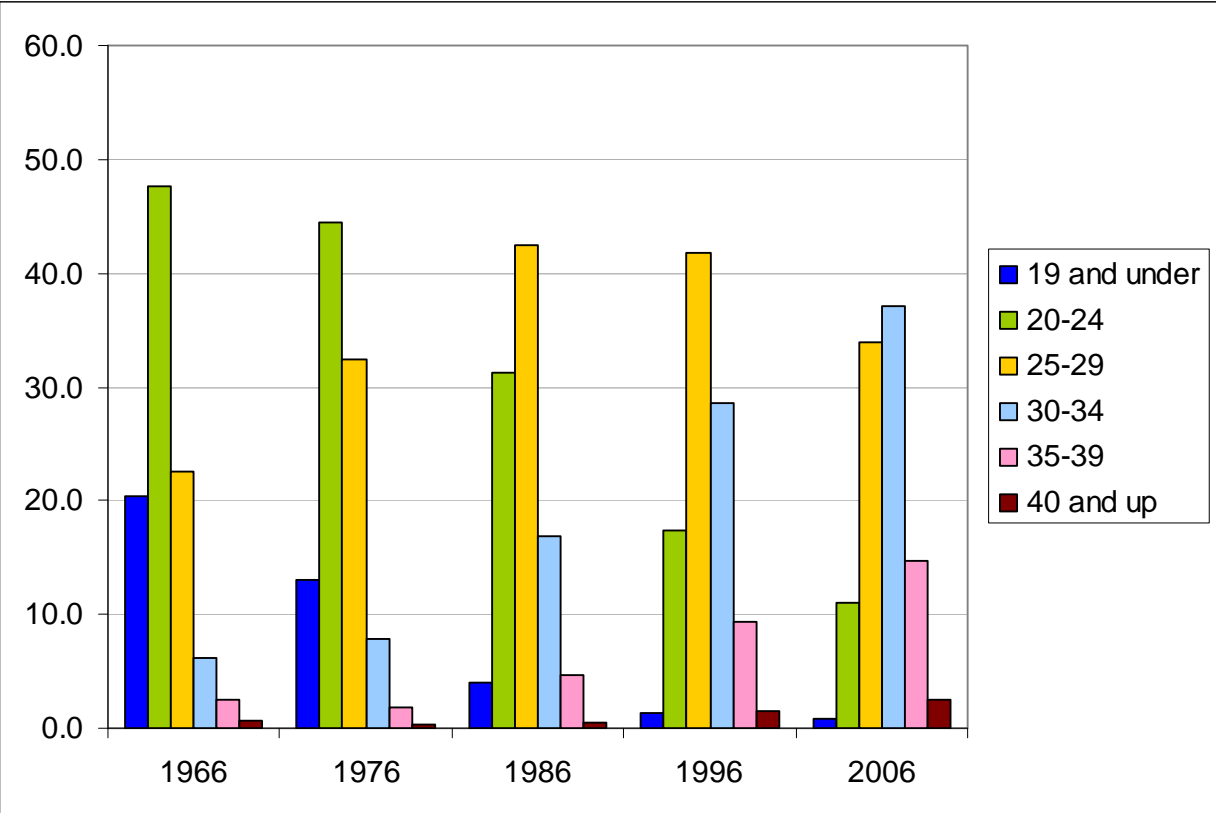
Note: (i) The survey was not run in 1996. (ii) From 2007, employees were asked to include salary sacrifice in their estimates of earnings. (iii) All data are original series.

Figure A.4: Median age of mother, first nuptial confinement, 1966-2006



Source: ABS 2006 and ABS 2007a.

Figure A.5: First nuptial confinement by age groups, 1966-2006



Source: ABS 2007a.

Appendix B

Score Data

Data from 1975-1998 were extracted from Rothman (2002). PISA 2000-2006 data were obtained directly from the OECD PISA website.

Descriptions of each data source are provided as follows:

- **ASSP (Australian Studies in School Performance) 1975, 1980**

The Australian Studies in School Performance (ASSP 1975), conducted in October 1975, comprised representative samples of 10- and 14-year-old students tested in all States and Territories. This was the first time that all Australian jurisdictions participated in a national assessment of student achievement (Keeves & Bourke, 1976). In 1980, representative national testing was repeated as part of the Australian Studies of Student Performance (ASSP 1980) (Bourke, et al., 1981).

- ***YIT (Youth in Transition) 1989, LSAY (Longitudinal Surveys of Australian Youth) 1995, 1998***

The 1989 Youth in Transition (YIT 1989) study, the 1989-1992 Australian Youth Survey (AYS), and the 1995 and 1998 Longitudinal Surveys of Australian Youth (LSAY) used tests of reading comprehension and mathematics achievement to obtain measures of student literacy and numeracy to act as controls in their analyses of the transitions from school made by young people. These tests were developed by the Australian Council for Educational Research (ACER), using some of the items used in the ASSP 1975 and ASSP 1980 studies.

- ***PISA (Programme for International Student Assessment) 2000, 2003 and 2006***

The Programme for International Student Assessment (PISA) is an initiative of the Organisation for Economic Cooperation and Development (OECD) in Paris. The primary focus of PISA is on public policy issues related to education provision, with the aim of helping the governments of OECD member countries (and others) to have the best possible education systems. The student population chosen for PISA is students aged 15 years, who are thus assessed as they approach the end of their secondary schooling. National random samples of at least 4,500 15-year-old students are chosen from 150 or more schools in each country to participate in the assessment. In 2006, 57 countries participated; all OECD countries and 27 partner countries in regions spanning all inhabited continents. In total, almost 400,000 students worldwide participated in PISA 2006. In Australia, 356 schools and 14,170 students participated in PISA.

Methodology

Data from 1975-1998

The score of the first five datasets (1975-1998) have been standardised by Rothman (2002), with a mean score of 50 and standard deviation of 10. Each test was developed by the Australian Council for Educational Research (ACER) and contains a number of items common to at least one other test. The inclusion of these common items allows scores on all tests to be set on a single scale. Test scores for four of the studies (ASSP 1975, ASSP 1980, YIT 1989 and LSAY 1995) plus four Australian Youth Study (AYS) samples (1989, 1990, 1991, 1992) had been equated for a previous report on trends in literacy and numeracy in the LSAY series (Marks & Ainley, 1997). Using the same equating procedures, results from the 1998 study were linked to the 1995 results and placed on the underlying common scale.

Data from 2000-2006

The PISA assesses student's ability for scientific, reading and mathematical literacy. The goal of PISA is to measure competencies that will equip students to participate productively and adaptively in their life beyond school education. For each of the major domains, a scale was defined that had a mean of 500 and a standard deviation of 100. It tests young people's skills in applying their knowledge and to real-life problems and situations.