A Cohort Analysis of the Private Rate of Return to Higher Education in Australia*

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Abstract
There have been substantial changes in the costs and benefits of investment in tertiary education in Australia in the past twenty years. This paper compares the ex ante private rate of return to investment in a university education based on cross section data, for cohorts studying at the time of the 1986 and 1991 Population Censuses, with the ex post results estimated from tracking a synthetic cohort over time between Censuses. Private rates of return have been estimated for both males and females. These two cohorts have achieved rates of return that are at least as high and often better than those predicted on the basis of ex ante calculations using cross-section data. This is an interesting result for individuals and policy makers evaluating past investment in higher education. The higher ex post return reflects the increasing returns to skill in the Australian labour market over the 1990s that have been documented in other studies. The paper also presents hypothetical results to illustrate the effects of the introduction of HECS and breaks in work history on the private rate of return.

1. Introduction
In the last twenty years there have been significant changes in the costs and benefits associated with higher education. The direct private costs of undertaking higher education have increased, first with the introduction of the Higher Education Contribution Scheme (HECS) in 1989 and then with the raising of the HECS rate in 1996. There have also been changes in the earnings differentials between those with university degrees and those without. In 1986 the median income reported in the Census for a male degree holder was 80 per cent higher than that of a male who had only completed year 12. By 2001, this has risen to 98 per cent (see table 1). Similar relative growth in median incomes occurred for female graduates, rising from a 30 per cent advantage over a female who had only completed year 12 in 1986 to an 80 per cent advantage in 2001.

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These changes on both the cost and benefit side of the calculation have important implications for individual decisions about undertaking investment in higher education and for the ex post evaluation of these investment decisions.¹

The expected private rate of return to an investment in higher education is the relevant calculation for an individual deciding whether or not to undertake study for a degree. The best information an individual is likely to have for making this decision will come from observations of current incomes of people with varying levels of education. This information is available in cross-section data. Calculations of the private rate of return to higher education in Australia based on cross-sectional data on earnings profiles for selected educational groups show that the rate of return has remained high since the mid 1970s and has increased in recent years (Miller, 1982; Maglan, 1994; Daly and Jin, 1997; Chapman and Salvage, 1997; Borland, Dawkins, Johnson and Williams, 2000; Borland, 2001; Larkins, 2001; Daly, Fleming and Lewis, 2003; Lewis, Daly and Fleming, 2004).²

The focus of this paper is another question; what has been the ex post rate of return to undertaking a university degree? The estimated private rate of return to higher education using cross-section data may differ from the ex-post returns for a number of reasons (Heckman, Lochner and Todd, 2005). These include changes in labour demand and supply altering the earnings relativities between education groups and any cohort effects on earnings. For example one cohort may receive higher quality education or on-the-job training than other cohorts and therefore receive higher earnings at any particular age than other cohorts (Chia, 1991). The results presented here are of interest to individuals and policy makers evaluating past private investment in higher education. They show that investment in a university degree over the late 1980s and 1990s has been worthwhile from a private viewpoint and, for some groups, of greater value than expected ex ante.

Unfortunately there are insufficient Australian time series data to try to undertake a full evaluation by tracing the earnings profiles of the same individuals over time for their full working lives. The approach here has therefore been to follow age cohorts between each of the last four Censuses collected in 1986, 1991, 1996 and 2001. Those beginning their study in 1986 or 1991 are likely to still be in the workforce and in mid-career so the calculations reported are conservative estimates of what the ex post private rate of return will be once this group has completed their working lives.

The following section describes the data. The remaining sections set out the methodology used in the calculations, present the results and compare them with estimates for an ex ante private rate of return. Hypothetical results are also presented for the effect of HECS and breaks in work history on the rate of return. The final section summarises the results and presents a conclusion.

¹ Schultz (1967) and Becker (1975), developed the framework for analysing university education as an investment in human capital likely to increase earnings in the future by raising the productivity of the individual completing a university degree.

² It is difficult to precisely compare rates of return estimated by different authors because of the variety of assumptions necessary to make these calculations. One important assumption of the cross-section methodology is that the earnings of those embarking on higher education will be the same at each subsequent age as those observed in the year under study. See, Heckman, Lochner ad Todd (2005), for a recent discussion of methodological issues in rate of return analysis. This paper advocates a greater use of time series data in rate of return calculations.
2. The Labour Market for Graduates

As figure 1 shows, the number of people completing university degrees grew by over 50 per cent in the decade 1989/99. The growth was particularly strong in two areas that have been the focus of our wider research project on the labour market for professionals; law and legal studies, and business administration/commerce. In these two discipline areas the number graduating in 1999 was two and a half times higher than in 1989. This growth in the number of graduates is also reflected in the population figures from the Census. In 1986 5.6 per cent of the Australian population over 15 years of age had a bachelors degree or post-graduate qualification but by 2001 this had grown to 14.6 per cent (see, table 1).

*Ceteris paribus*, such a large increase in the number of graduates in the population might be expected to reduce the relative incomes of university graduates but, as table 1 shows, the raw data do not suggest this. The median income for both male and female graduates relative to those with a year 12 qualification grew over the period 1986-2001. The labour market for skilled workers in Australia was strong over this period. This has been documented in the literature describing and explaining the widening earnings differentials in Australia over the 1980s and 1990s (see, for example, Borland, 1999; Norris and Maclean, 1999; Wooden, 2000; Keating, 2003; Saunders, 2004).

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3 More detailed results from this continuing study are presented in Daly, Fleming and Lewis (2003) and Lewis, Daly and Fleming (2004), Daly, Fleming and Lewis (2005). The category Law and Legal Studies includes graduates in Law and in the related field of Legal Studies. Not all graduates from these programs are eligible for admission to practice law. Business administration and commerce includes all degree programs in these areas one of which is economics.
Table 1 - Summary Statistics on the Graduate Labour Market in Australia, 1986-2001.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Graduates/1000 pop’n</td>
<td>5.6</td>
<td>8.7</td>
<td>10.3</td>
<td>14.6</td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Income - grads</td>
<td>$30,586</td>
<td>$41,317</td>
<td>$46,461</td>
<td>$59,195</td>
</tr>
<tr>
<td>Median Income - year 12</td>
<td>$17,385</td>
<td>$22,705</td>
<td>$24,995</td>
<td>$29,845</td>
</tr>
<tr>
<td>Ratio Grad/Year 12</td>
<td>1.76</td>
<td>1.82</td>
<td>1.86</td>
<td>1.98</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Income - grads</td>
<td>$16,247</td>
<td>$29,818</td>
<td>$32,890</td>
<td>$40,298</td>
</tr>
<tr>
<td>Median Income - year 12</td>
<td>$12,819</td>
<td>$16,090</td>
<td>$19,135</td>
<td>$22,519</td>
</tr>
<tr>
<td>Ratio Grad/Year 12</td>
<td>1.27</td>
<td>1.85</td>
<td>1.72</td>
<td>1.79</td>
</tr>
</tbody>
</table>


Norris and Maclean (1999) and Wooden (2000), using data on employment by broad occupational categories have shown that the largest increases in employment over the late 1980s and 1990s were in the skilled occupations of managers and professionals. Kelly and Lewis (2003, 2004), link this growth to an increasing demand for more cognitive and interactive skills. The unemployment rate reported in the Census for graduates relative to less qualified people also supports the conclusion of strong demand for graduates.

3. Estimates of the Private Rate of Return

The results reported here are based on special tabulations of Census data from 1986, 1991, 1996 and 2001 prepared for the authors by the Australian Bureau of Statistics (ABS). Income data from each Census were presented for five-yearly age groups of males and females for selected educational groups; those whose highest qualification held was a year 12 certificate, and bachelor and higher university degree holders. Specific information was also presented for law and commerce graduates. Unfortunately the Census data do not differentiate between employment and other sources of income so it was not possible to distinguish earnings from employment from other income. It has therefore been necessary to assume that income is closely correlated with earnings and appropriate as a measure of the returns to investment in human capital. A simple income regression of income on age and age squared was used to interpolate the income data for individual ages for each education category. These results are available on request from the authors. The tax scales relevant to each year were used to calculate post-tax income on the assumption of no additional tax deductions. As synthetic cohorts are constructed from the 1986 and 1991 Censuses, complete information on the ex post incomes of these groups is not available to estimate the full ex post rate of return they will achieve over their working lives. Thus, the estimates are necessarily truncated.

Separate regressions have been estimated for each of the education groups; those completing high school, all university graduates and the subcategories of law and commerce/business graduates, to take account of the fact that the extent of potential labour market experience will vary between them at any given age. Potential experience is often used as a proxy for on-the-job training but the use of age allows us to capture additional lifecycle effects on income beyond those captured by potential experience.
The base case reported assumes that students did not earn any income while studying and faced direct costs in terms of books and materials of $1200 in 1986 prices during each year of study. In addition, for each cohort, there were charges for attendance at university. In 1986 students were required to pay the Higher Education Administration Charge (HEAC) of $250 per year. The HECS charge that applied in 1991 has been included as a cost of education for the 1991 cohort. It was assumed that HECS was paid up-front during each year of study. The important cost of foregone earnings while studying is measured by the incomes of year 12 graduates of the same age. No adjustment has been made to the data to account for the fact that university graduates may earn higher incomes without their education if they have greater natural ability and motivation than those who left the education system at the end of year 12. It is assumed, to be conservative and to allow for double degrees, that a law degree takes five years to complete and other degrees take on average four years to complete.

The internal rate of return (ρ) is calculated as the rate of return that equates the benefits as measured by the additional income a university graduate earns compared with a person who has completed year 12 with the costs incurred in undertaking the additional education. It is assumed that these costs are incurred over four years for the average degree and five years for a law degree. The internal rate of return for a four year degree is calculated as

$$\sum_{i=22}^{26} \Delta \frac{\text{Income}}{(1+\rho)^{i-22}} = \sum_{j=18}^{21} \frac{\text{Costs}}{(1+\rho)^{j-18}}$$

In this exercise two age cohorts, those who were aged 18-21 years in 1986 and those aged 18-21 years in 1991, have been followed over time. The effect of a university education on income for the 18-21 year olds in 1986 is measured by the discounted value of

$$\sum_{i=22}^{26} (\text{Ig} - \text{Ih})_{1991} + \sum_{i=27}^{31} (\text{Ig} - \text{Ih})_{1996} + \sum_{i=32}^{36} (\text{Ig} - \text{Ih})_{2001}$$

where Ig is the income of university graduates and Ih the income of high school graduates in 1991, 1996, and 2001 respectively. Incomes in these years have been calculated in constant 1986 prices using the Consumer Price Index (CPI). A similar calculation was undertaken for the 1991 cohort.

Table 2 presents the estimated private rates of return for the two age cohorts using longitudinal data and compares them with the ex ante estimates based on cross section data from the 1986 and 1991 Censuses. The estimate of the private rate of return taken from cross section data uses the same assumptions as described above. As the longitudinal calculations include increases in income due to economic growth, a growth rate of 2 per cent per annum has been applied to the incomes from the cross-sections derived from the 1986 and 1991 censuses. In order to make the calculations

The assumption of no alternative income is to simplify the calculation and the resulting estimates of the rate of return will therefore be conservative. Survey evidence shows that the proportion of full-time students holding part-time jobs during the semester was relatively small in the 1980s and increased substantially over the 1990s (McInnes and Hartley, 2002).

For law and legal studies graduates costs are incurred over a five year period from the age of 18 to 22 years and benefits over the ages of 23-37 years.
comparable, the ex ante rate of return has been calculated to the age of 36 years for the 1986 cohort and 31 years for the 1991 cohort. The average member of each of these cohorts is likely to continue working and reap further benefits from their investment in higher education so these calculations only represent part of their private rate of return to investment. Full estimates of the private rate of return including some sensitivity analysis of the results using cross section data are presented in Daly, Lewis and Fleming (2003) and Lewis, Daly and Fleming (2004), Daly, Fleming and Lewis (2005).

Table 2 - Private Rates of Return to a University Degree for Student Cohorts of 1986 and 1991 Compared with Ex-ante Estimates for Those Years, males and females.

<table>
<thead>
<tr>
<th></th>
<th>1986 cohort</th>
<th>1991 cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ex-post</td>
<td>Ex-ante</td>
</tr>
<tr>
<td></td>
<td>Per cent</td>
<td>Per cent</td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td>8.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Commerce/business</td>
<td>6.0</td>
<td>4.0</td>
</tr>
<tr>
<td>All graduates</td>
<td>7.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td>9.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Commerce/business</td>
<td>4.0</td>
<td>4.0</td>
</tr>
<tr>
<td>All graduates</td>
<td>7.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>


The first part of table 2 relates to the private rates of return to males. The estimated ex post rate of return for law and legal studies graduates was considerably higher than the expected rate of return for both the 1986 and 1991 cohorts. The ex post and ex ante estimates were very similar for commerce and all graduates from the 1986 cohort. Male graduates in the 1991 cohort had achieved higher ex post private rates of return than predicted based on cross-section estimates.

The second part of the table presents some results for females. These calculations are based on the assumption of continuous employment and will therefore over-estimate the private rate of return to a university degree for those women who take time out of the labour force. The estimates show that female law and all graduates did better than expected based on cross section data from 1986. The ex post and ex ante estimates were the same for commerce graduates for that cohort. The ex post and ex ante estimates for the 1991 cohort of female graduates in law and all graduates were identical but the ex post rate of return to a commerce degree was greater than the expected return although it was still not positive.

In summary, the results show that members of the 18-21 year old cohort in 1986 who undertook a university education have received a private rate of return to that investment that was similar to or better than that which they could have expected on the basis of calculations using cross-sectional data for that period. The Census data only enable a limited calculation of the private rate of return to higher education for each of the cohorts as the available data only cover the first years of their working lives. Individuals working to retirement age could expect a higher rate of return as their earlier investment in education continues to reap rewards.
The Effect of the Introduction of HECS on the Private Rate of Return to Higher Education.

In the last twenty years, there have been substantial changes in the tuition costs of higher education to students. In 1986, all students were required to pay the HEAC of $(1986) 250 per year. The introduction of HECS increased tuition for all courses to $(1986) 1,428 in 1991. By 2005, the system was considerably more complex with different rates charged for different types of courses and the universities having the option to charge up to 25 per cent above the base rate agreed by the government and adjusted annually according to changes in the CPI. In 2005, students in the top HECS band; dentistry, law, medicine and veterinary science, were paying $(1986) 4,078 per year, over sixteen times the cost in 1986.

This raises the question of the effects of the increasing tuition costs on the private rate of return to a university education. Table 3 summarizes hypothetical results for the 1986 cohort using two assumptions: firstly that they paid the HECS rates applicable in 1991 and secondly that they paid the HECS rates applicable in 2005 (each converted into 1986 dollars).

Table 3 shows that if the cohort aged 18-21 in 1986 had faced the HECS charges of 1991 or 2005, the private rate of return to their investment in higher education would have been substantially lower than the average returns they achieved. The ex post returns for males and females with a law degrees would have fallen one percentage point if they had been required to pay 2005 HECS rates. The rate of return for male and female Commerce and Business graduates would have halved if 2005 HECS rates had been applied.

Table 3 - Hypothetical Private Rates of Return to a University Degree for 1986 Student Cohort

<table>
<thead>
<tr>
<th></th>
<th>Assuming students paid the 1991 HECS Fees Per cent</th>
<th>Assuming students paid 2005 HECS Fees in the appropriate band(^a) Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law(^c)</td>
<td>7.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Commerce/Business</td>
<td>5.0</td>
<td>3.0</td>
</tr>
<tr>
<td>All graduates</td>
<td>6.0</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Law(^c)</td>
<td>8.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Commerce/Business</td>
<td>2.0</td>
<td>1.0</td>
</tr>
<tr>
<td>All graduates</td>
<td>6.0</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Source: Authors calculations.

Notes: \(^a\) Band 3 for Law, Band 2 for Commerce/business and an average of all bands for all graduates. \(^b\) Using the assumptions listed earlier; additional direct costs of $(1986) 1200 per year, no additional income while studying, no adjustment for ability, gross income are adjusted for tax but assume no additional tax deductions. \(^c\) Includes graduates in Law and Legal Studies.

These hypothetical calculations suggest that the introduction of HECS has had a substantial negative effect on the private rate of return to higher education. However, this is not to argue against a ‘user pays’ principle in higher education.
The Effect of Breaks in Work History on the Private Rate of Return to a Degree

An important assumption in the results presented above is that graduates maintain a continuous attachment to the labour force and have the average income of their cohort of graduates. This assumption may be particularly questionable for females who may withdraw from the labour force during their childbearing years or reduce the number of hours they work. The results presented in table 4 are illustrative of the potential effects of breaks in work history on the ex post private rate of return to university for the 1986 cohort. The results have been calculated using the assumptions described earlier but a number of hypothetical assumptions about attachment to the labour force have been introduced. It is assumed that a female aged thirty takes either one or two years completely out of the labour force and has a zero income and then returns to work on either a full-time or part-time basis. Part-time workers are assumed to have an income that is two-thirds of the average income of their graduate cohort at each age. The comparison group, those who have completed high school but have no higher education, are assumed to have identical breaks in their work history.

Comparing the results in column 1 of table 2 and the hypothetical results in table 4 shows that leaving the labour force for one or even two years, reduces the private rate of return but if the female returns to full-time employment, the effects are not large, in the order of one percentage point. However, if the female only returns to part-time work, this substantially reduces the private rate of return for all degree categories. As labour force participation rates for females have changed substantially between cohorts, ex ante estimates of the private rate of return based on cross section data may be unreliable estimates of the ex post returns each cohort, with increasing levels of labour force attachment, can expect to earn. In order to make more reliable estimates of the rate of return to higher education for females, it is important to develop more accurate measures of actual labour force experience.

Table 4 - Hypothetical Private Rates of Return to a University Degree for 1986 Student Cohort of Females Assuming Breaks in their Work History

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Law Degree Per cent</th>
<th>Commerce/ Business Degree Per cent</th>
<th>All Degrees Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work until 30, 2 years off and return to full-time employment</td>
<td>8.0</td>
<td>2.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Work until 30, 2 years off and return to part-time employment</td>
<td>6.0</td>
<td>1.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Work until 30, 1 year off and return to full-time employment</td>
<td>9.0</td>
<td>3.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Work until 30, 1 year off and return to part-time employment</td>
<td>7.0</td>
<td>1.0</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Source: Authors calculations
Notes: a Using the assumptions listed earlier; additional direct costs of $(1986) 1200 per year, no additional income while studying, no adjustment for ability, gross income are adjusted for tax but assume no additional tax deductions. b Assumes income is two-thirds of the total average income for female graduates for each of the graduate categories at each age.
4. Conclusion

These results show that university graduates from the 1986 and 1991 cohorts of 18-21 year olds have, in the first part of their working lives, achieved private rates of return to their investment in education that were at least as good and often better than they could have expected ex ante by looking at cross-sectional calculations of the private rate of return. The results therefore support earlier studies that show that cross-sectional results cannot be taken as too accurate a guide to the experiences of individuals over time (Chia 1991).

The hypothetical estimates of the private rate of return show that the introduction of HECS, especially at the higher rates currently applied, would have reduced the private rate of return to university attendance. It may partially explain the growth in the number of full-time students holding part-time jobs as a way of reducing the opportunity cost of foregone earnings while studying (McInnis and Hartley 2002, Applegate and Daly 2006).

Our second set of hypothetical estimates looks at the effect of breaks in work history on the private rate of return. These show that the largest effect comes from returning to part-time rather than full-time employment after a break of one or two years from the labour force. As females now account for more than half of university undergraduates in Australia, this has important implications for estimates of the rate of return to this investment. Results relying solely on the rate of return for males assumed to work full-time until retirement after completing their degrees, may overestimate the private rate of return to higher education for the population as a whole.

There are a number of possible explanations for the findings of higher ex post than ex ante returns over this period. Both the cross-section and time series calculations presented here assume the same costs, so the difference between the ex ante and ex post private rates of return reflect differences in the benefits of education as measured by income.

There have been a number of hypotheses put forward to explain the rapid growth of incomes at the upper end of the Australian income distribution and the widening inequality associated with these changes. These have included the reduced centralisation of the industrial relations system and the growth of enterprise bargaining; the increased openness of the economy and closer integration into the international trading system; technological change and the widespread introduction of computers and the internet; and changes in the demand for skilled workers resulting from structural change in the economy and microeconomic reform. These factors have also been used to explain the rising demand for skilled workers.

Studies such as those by Norris and Maclean (1999), Wooden (2000) and Keating (2003), document the growth in the number of employees in skilled occupations. Kelly and Lewis (2003 and 2004), have used a scale of the complexity of skills used in occupations designed by the US Department of Labor to test whether there has been a shift in demand in Australia toward more skilled labour over the 1990s. They find that there has been a growth in demand for labour with high interactive and cognitive skills and a decline in the demand for motor skills. They conclude that this has taken place at the same time as there has been an increase in the use of
communication and information technologies and an increasing share of these technologies in the capital stock.

It has proved difficult to fully explain the increasing demand for skilled labour in terms of technical change factors. In his survey of earnings inequality in Australia, Borland (1999:193) argued –

‘Overall, there is mixed and as yet inconclusive evidence on the determinants of changes in labour demand by skill category in Australia. Effects of changes in international trade on labour demand appear to have been largely confined to a subset of manufacturing sectors. And while there is some evidence of more general effects of technical change, it is important to note that much of this evidence is indirect, identifying technical change as a ‘residual’ explanatory factor for changes in labour demand’.

It has also proved difficult to document any direct causal impact of the changes in the institutional environment of industrial relations in Australia on the returns to skilled workers. It was always possible for highly skilled workers to be paid more than the minimums set out under the awards as the arbitration system focused on setting minimum wages and conditions. Borland (1999), reports rises in earnings dispersion between 1986 and 1994 that are correlated with reductions in union density. It is possible that recent changes in the industrial relations environment have increased the returns to skill by reducing the compression of earnings differentials identified in international comparisons in the 1970s and 1980s between Australia and the United States (U.S.) and Great Britain (Borland and Woodbridge 1999). However, this has not been tested directly.

Another possible explanation of the higher ex post estimates of the private rate of return to a university degree is that the quality of the skills embodied in the younger cohorts of university graduates is greater than that of the older cohorts whose incomes are used to estimate the cross-sectional private rate of return. A number of U.S. studies have emphasised the role of the quality of schooling in determining the rate of return to education. For example, Card and Krueger (1992) using U.S. data from 1920-1949 show that males educated in states with higher quality schooling had higher rates of return to additional years of schooling.

It is not the aim of this paper to assess the relative merits of these competing explanations. However, the results presented here show that ex post, the two cohorts for whom there are data have achieved at least as good or higher private rates of return on their investment in a university education than they might have expected at the time of embarking on that education. These results are specific to the cohorts and the time period used in this estimation. Over other time periods, university graduates may achieve lower private rates of return to their investment ex post than predicted on the basis of ex ante calculations. It will depend on conditions in the labour market for skill over the working lives of graduates. Heckman, Lochner and Todd (2005) argue that the increased volatility of earnings in the U.S. in recent times has made estimates of the rate of return to education that are based on cross section data less reliable predictors of the rewards to further education. This argument for the greater use of time series
data to estimate the rate of return to education may equally apply in a more deregulated Australian labour market.

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