AUSTRALIAN STUDENT LOANS

DISCUSSION PAPER NO. 287

March 1993

Bruce J. Chapman and Ann Harding
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ISBN: 0 7315 1614 7
ISSN: 0725-430 X

* We wish to thank Tony Salvage, Shirley Halton and Margi Wood for terrific research assistance, and David Johnson, Richard Blandy, John Creedy and seminar participants at the University of Adelaide and the University of Melbourne for critical comments. Errors are ours.

** Respectively from the Centre for Economic Policy Research, Research School of Social Sciences at the Australian National University, and the National Centre for Social and Economic Modelling, Faculty of Management at the University of Canberra.
TABLE OF CONTENTS

Summary  
1. Introduction  
2. Conceptual Issues  
   2 (i) The Role of Student Income Support  
   2 (ii) The Implications for Income Distribution of Student Assistance Policy  
4. Internal Rates of Return Using IDS Data  
5. Internal Rates of Return Using Lifetime Microsimulation Modelling  
6. Estimating the Likely Take-up of Loans  
7. Conclusion  
References  

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td>(i)</td>
</tr>
<tr>
<td>1. Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2. Conceptual Issues</td>
<td>3</td>
</tr>
<tr>
<td>2 (i) The Role of Student Income Support</td>
<td>3</td>
</tr>
<tr>
<td>2 (ii) The Implications for Income Distribution of Student</td>
<td>4</td>
</tr>
<tr>
<td>Assistance Policy</td>
<td></td>
</tr>
<tr>
<td>3. Estimating the Impact of Types of Student Income Support on the</td>
<td>6</td>
</tr>
<tr>
<td>Demand for Higher Education</td>
<td></td>
</tr>
<tr>
<td>4. Internal Rates of Return Using IDS Data</td>
<td>11</td>
</tr>
<tr>
<td>5. Internal Rates of Return Using Lifetime Microsimulation Modelling</td>
<td>18</td>
</tr>
<tr>
<td>6. Estimating the Likely Take-up of Loans</td>
<td>21</td>
</tr>
<tr>
<td>7. Conclusion</td>
<td>25</td>
</tr>
</tbody>
</table>

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Lessons from New Zealand
New Zealand’s experience with Consumption Tax
Paper 2: Wood, Alan
Paper 1: Bolton, Alan

Consumption Tax, Competition and the Distribution of Income
Paper 2: McIvor, John
Paper 1: Quiggin, John

Economic Arguments for a New Consumption Tax
Paper 2: Freeland, John
Paper 1: Quiggin, John

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ANU, 27-29 February 1992

ANNUAL MEETING 1992
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Dorothy Lunt and Peter Gregory

25

Edward Sheehan Analytical Centre

264

Walsh, Kevin F

266

National Economic Federation

268

Richard, John

269

Current Account, Foreign, External, and Economic Policy

270

Richard, John

1992, Perth

The Australian Government introduced the so-called “Australian

1992

Australian

AUDSTUDY

Student Loans System


### Australian Student Loans

#### Introduction

The 1992/93 Australian budget saw the introduction of the "AUSTUDY Supplement", an income-contingent optional loan scheme for tertiary students. This is the first student loan scheme offered in Australia and it was preceded by widespread public debate and controversy promoted by the release of the Government-initiated report *AUSTUDY: Towards a More Flexible Approach* (Chapman, 1992). The loans model behind the policy change is explained and analysed in that Report.

As background it is useful to note the basic rationale for governments offering income support for prospective students. Essentially the goal of such intervention is to break the nexus between parental (or, more generally, family) income and individuals' access to an expensive investment, higher education. In part what follows is an analysis of the costs and benefits of alternative government approaches to the issue, but broader questions related to prospective students access to the system - such as those concerning supposed unmet demand - are not considered.

The major tenet of the new policy is that students in receipt of AUSTUDY grants are able, if they so choose, to trade-up to $2000 per annum of their grant for a doubled amount of a loan, with an apparent zero real interest rate.1 The loan is to be paid back through the tax system if and only when former students' personal incomes exceed a particular threshold (set in the budget at $27,700 per annum in 1992 terms). The framework is thus closely analogous in spirit to the Higher Education Contribution Scheme (HECS), the income-contingent charge system introduced in Australia in 1989.2 The repayment conditions for the loan are the same as those applying to HECS.3

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1 It is apparent only because the requirement to trade in $1 grant for each $2 of loan must be associated with more than a zero rate of interest due to the grant foregone. An estimate of the real rate of interest associated with this arrangement is 7-8 per cent per annum.

2 For analysis of HECS see Chapman and Chia (1989) and Hope and Miller (1988).

3 That is, annual repayment of the debt starts at 2 per cent of the first threshold of $27,700, and rises to the respective rates of 3 and 4 per cent of taxable income at annual taxable incomes of around $31,000 and $41,000. The debt is indexed to the CPI, meaning there is no real rate of interest.
The basic principles upon which our policy is based are:

1. Education:
   - Education is the foundation of social justice.
   - Education should be accessible to all, regardless of socioeconomic status.

2. Income Distribution:
   - Income should be distributed fairly and equitably.
   - Measures should be taken to reduce income inequality.

3. Social Security:
   - Social security measures should be strengthened to provide a safety net for the elderly and the disabled.

4. Promotion of Cultural Diversity:
   - Efforts should be made to promote cultural diversity and social cohesion.

5. Protection of Human Rights:
   - Human rights should be protected and upheld in all contexts.

By adhering to these principles, we aim to create a society that is equitable, just, and prosperous for all its citizens.
Two further policy points are worth making. One is that ICL financed in part by students trading-in grants implies that the Government is able to decrease outlays for student financial assistance over time, while at the same time making no prospective student worse off. The Pareto improvement is a consequence of students in effect being allowed to take advantage of the chance to tax their own future earnings to subsidise themselves while studying and relatively poor. The extent to which this allows budgetary savings and/or AUSTUDY expansion depends partly on whether or not there is a small or large adverse selection in the process.

Finally, from both the conceptual discussion and the results, it appears likely that the institution of the ICL scheme has the potential to decrease income inequality in a lifetime sense compared to current arrangements. Some - perhaps significant - proportion of the tax-payer subsidy from student income support will be repaid under the new arrangements, but only when and if former students are in relatively propitious income circumstances.

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29 Students expecting to earn low future incomes have more to gain by taking the ICL. It is interesting to note that estimates using the HARDING microsimulation model suggest that over 90 and 70 per cent respectively of males and females over their lifetimes will pay back their HECS in full (Harding and Chapman, 1993). Even so, the interest rate subsidy implicit in both HECS and ICL imply the potential for some students expecting to earn low incomes to take loans and pay back relatively low amounts in net present value terms.

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3

attendance can be used as indirect evidence as to whether policy initiatives are likely to encourage or discourage participation in tertiary education.

As well as calculating the financial costs and benefits of various scenarios from average cross-sections, we present two further innovations involving the use of a recently developed lifetime microsimulation model. One is the investigation of changes to average rates of return to investment in higher education in a simulation of individuals' lifetime experiences. The other is an examination of the proportions of students for whom the trade-in loan is financially attractive. The latter allows some insight into the likely take-up rate of the loans option in 1993 and beyond.

2. Conceptual Issues

2 (i) The Role of Student Income Support

Student income support, defined broadly, is a term for government schemes which provide financial assistance at the time of individuals' study. Government intervention is warranted if the market underprovides education, which could happen for two reasons. One is that private lenders will offer fewer financial resources than is socially desirable given the lack of collateral associated with human capital investments. Prospective borrowers may also demand less commercial financial assistance than is socially optimal if they are risk averse and place a high weight on the possibility of defaulting on the loan.

The aim of government intervention is to reduce students' indirect costs by mitigating against the impact of income forgone on the human capital investment process. Public sector involvement is typically justified through illusion to the inadequate functioning of capital markets and the implications this has for the access of the poor to the higher education system. Consequently policies are generally aimed at a subset of the prospective student body according to a set of targeting rules.

Australian student income support is currently based on a means test on family income and assets. The grant decreases as parental and individual incomes rise, with an age rule helping to define the notion of "independence" (from parental income support). Understanding these
The provision of financial assistance to students with low income is a critical aspect of access to higher education. The availability of financial aid is essential for students to afford higher education, especially for those from low-income backgrounds. The provision of financial assistance can significantly impact student success, as evidenced by various studies. For instance, attendance rates are higher among students who receive financial aid, leading to higher completion rates. Additionally, financial aid can reduce the burden of tuition fees, enabling students to focus on their studies and making higher education more accessible.

The importance of financial aid is underscored by the fact that many students from low-income families would not be able to afford higher education without such assistance. Research has shown that students who receive financial aid are more likely to continue their education and ultimately achieve higher earnings compared to those who do not.

In conclusion, the provision of financial assistance to students is crucial for expanding access to higher education, particularly for those from low-income families. By providing financial support, educational institutions can help bridge the gap between financial need and academic opportunity, thereby promoting educational equity and social mobility.
(ii) The results are quite sensitive to the rate of time preference used. For example, use of the relatively low rate of 5 per cent reveals that a total of about 45 per cent would be financially advantaged by trading in their grant for an ICL. But at the higher rate of 10 per cent, the total proportion advantaged increases to almost 80 per cent. Because it is hard to know what the "true" discount rate actually is, these large differences imply the need for circumspection in a forecast of what the likely take-up proportion will be.

(iii) A higher proportion of women than men will be advantaged by taking up the trade-in option - about double and 20 percentage points respectively at discount rates of 5 and 10 per cent. The differences, however, may be more apparent than real. This is because the continuing increases in the paid labour force participation rates of women mean that the 1985-86 data on which the calculations are based are likely to understate the expected future incomes of female graduates because of the on-going trend. As female incomes increase from this factor, so too does the advantage decrease of taking an interest rate subsidised ICL. At the same time, likely higher unemployed rates suggest that the advantages to males of an ICL might be greater than suggested here. Over time it is expected that the female take-up rates of the ICL will approach those for males.

A caveat or two on these conclusions is necessary. The first is that the hypothetical scenarios used in these calculations are for individuals initially enrolling in higher education who have at least three years in front of them before any loan repayments are required. This will tend to exaggerate the benefits of the trade-in, because the longer it takes for an individual student to begin to pay back the loan, the greater is the government subsidy through the lack of a real interest rate once the debt is incurred. Students in their final years of study will in general have less to gain from the ICL option.

Second, and in contradistinction to the above, we have not modelled a particular aspect of the new Government policy. This is that repayments of the loan have a five year "holiday", with no repayments being required until the highest potential to influence behaviour. Because there is no repayment, a grant offers the greatest reward - and a zero impost - for continuing in education. But grants have potentially adverse distributional consequences.

In distributional terms loan schemes have the advantage over grants in that they require some repayment from former students, many of whom will have become members of the lifetime income advantaged group. But several crucial differences exist between the two types of loans schemes related to their potential to influence distribution. They arise because of the repayment conditions of the loans.

The first important difference is that, unlike commercial loans, ICL take away from prospective students the costs associated with default, such as attaining a poor credit rating. Defaulting on a loan can imply a lack of future facility to borrow at favourable terms for other purposes (for example, housing). The take-up of ICL is therefore likely to be greater for risk averse prospective students than would be the case for commercial loans.

In other words, ICL allow governments to act in an insurance capacity for the investor, potentially reducing significantly the borrowing risks for the student. This is the essential reason why, on the face of it, this type of loan is unlikely to have deleterious consequences for educational participation of the targeted group. If the income threshold of repayment is sufficiently high and the repayment rates relatively low, there is almost no prospect of default or bankruptcy, and a minimal likelihood of having to sell assets to repay the debt. Because they lack this feature, commercial loans are less likely to diminish the financial barriers to education for the disadvantaged.

The second important distinction between the loans approaches is that ICL redistribute income within the targeted group towards the less advantaged. So long as there is an interest-rate subsidy such a policy means that those former students earning higher incomes relatively quickly will pay more, while those earning low incomes are receiving more of an interest rate subsidy from the government for every year in which they have outstanding

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28 This is easy to understand why a higher discount rate gives many more individuals advantaged from the trade-in. High discount rates result in a lower value being given to the payments involved and a higher value being given to the initial receipts of the higher level of income support.

8 The evidence on the effects of the HECS scheme on the access to higher education of disadvantaged groups is strongly consistent with this view. For details see Chapter 12 in Chapman (1992).

9 At least as assessed on a personal income basis.
The introductory year are moderate. Thus high-level of ICT in the classroom (1999) of about 30 per cent in the higher division rate. These calculations suggest the proportion of the male at lower division are to improve 97 per cent for females in the female in low division are quite high. Variations from about 29 per cent for

<table>
<thead>
<tr>
<th>Percentage</th>
<th>78.2</th>
<th>88.8</th>
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<tr>
<td>Total</td>
<td>71.9</td>
<td>69.7</td>
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<tr>
<td>Females</td>
<td>76.6</td>
<td>69.7</td>
</tr>
<tr>
<td>Males</td>
<td>74.8</td>
<td>89.0</td>
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<td>Discount Rate (%)</td>
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</table>

The proportions from the table are as follows:

### Proportion of Students Finishing Advanced Programmes

<table>
<thead>
<tr>
<th>Programme</th>
<th>Table 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>71.9</td>
</tr>
<tr>
<td>Females</td>
<td>76.6</td>
</tr>
<tr>
<td>Males</td>
<td>74.8</td>
</tr>
</tbody>
</table>

### Estimating the Impact of Type of Student Income Support on the Demand for Higher Education

Potential impact for prospective students of the new approach.
trading in the maximum level of grant for a doubled ICL. The reason this is a complicated calculation is now explained.

The relative attractiveness of the new scheme will differ between all individuals, the major reason being that students or prospective students will have idiosyncratic expectations of the time stream of future income, on which repayment of the loan depends. There are many reasons for this, and to offer a few examples:

(i) students close to graduation are more likely to reach the first income repayment threshold quickly and will thus be receiving a relatively total low interest rate subsidy;

(ii) students in areas of study in which occupational earnings are high (low) will receive low (high) interest rate subsidies;

(iii) within occupations students will have differing expectations of expected incomes because of their perceptions of inherent ability or because of implicit trade-offs in income for non-wage job benefits;\footnote{An obvious example here would be for two law students, one expecting to work in Legal Aid and the other as a private solicitor.} and

(iv) students expecting to be out of the paid labour force for a period (for example, for child-rearing), who thus would expect to receive a greater subsidy.

Because of the above contingencies, no simple statement can be made about the likely take-up of the ICL option, even though the more aggregative analysis implies that the average prospective student defined in the analysis above will be made better off by taking the trade-in option. What follows is an analysis using the microsimulation model aimed at estimating the proportion of students who would be better off trading in $2000 of their grant for an additional $4000 loan for each year of a three year degree. The approach uses calculations of the net present value of this strategy as illustrated in equations (1) and (2) above, in a way now explained.

\[ V_A = R \sum_{t=0}^{R} \frac{Y_u}{(1+r)^t} \]  

\[ V_B = R \sum_{t=0}^{R} \frac{Y_nu}{(1+r)^t} \]

where \( Y_u \) and \( Y_nu \) are respectively expected net income from higher education use and higher education non-use, \( t \) is time, \( R \) is expected length of time in the work force and \( r \) is the individual's discount rate.

The net present value (NPV) associated with investing in higher education is given by (\( V_A - V_B \)). Whenever NPV exceeds zero, the investment is considered profitable from the individual's point of view, and the rational (assumed to be wealth-maximising) decision would be to enrol.

An alternative way of making the same comparison is to calculate the value of \( r \) which equates \( V_A \) and \( V_B \), which is known as the "Internal Rate of Return" (IRR). The decision rule is that if IRR exceeds the individual's discount rate the investment is considered profitable, the advantage of this approach being that it presents us with an easily understood summary statistic. More generally, the IRR is a measure of the financial attractiveness of higher education, as changes to its value reflect variations in the private costs and benefits of university graduation.
Information about the study's findings are in the text that follows. The study reveals that the inclusion of interactive, hands-on learning activities in the undergraduate curriculum can significantly increase student engagement and retention. Furthermore, the study demonstrates that incorporating technology into the learning process can enhance student understanding and retention of course material.

The results of section 4.2 suggest that there is a positive correlation between the use of technology in the curriculum and student performance. The study also highlights the importance of effective communication between instructors and students, which can be facilitated through the use of technology.

Figure 1 shows the financial dimensions of a prospective student's choice. The figure illustrates the trade-offs between attending a university and the costs associated with education. The graph demonstrates that the higher the tuition fees, the lower the likelihood of enrollment in the program. The study concludes that the financial burden of education is a significant factor in student decision-making.
example, were those applying at that time. However, while all of the income values in the model were originally in 1986 dollars, for this analysis self-employment income was inflated by movements in the relevant National Accounts aggregate to 1992 dollars. Similarly, wage and salary earnings were inflated by the movement in average weekly earnings for each sex between 1986 and 1992.

The results are presented in Table 2. While the actual level of the rates of return are slightly lower in the lifetime data than those calculated using the IDS data, some discrepancy should be expected given the radically different modelling techniques and the slight differences in the counterfactual. Of more interest is whether the conclusions about the differences in rates of return between the different student support options are changed.

### Table 2

Returns to Higher Education Using Lifetime Data

<table>
<thead>
<tr>
<th>Males</th>
<th>IRR (% p.a.)</th>
<th>Percent. point differen. from 1</th>
<th>Proport. of 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1: No Charge or Income Support</td>
<td>11.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 2: HECS</td>
<td>10.59</td>
<td>-0.60</td>
<td>0.95</td>
</tr>
<tr>
<td>Scenario 3: HECS + AUSTUDY Grant $3500</td>
<td>13.25</td>
<td>2.06</td>
<td>1.18</td>
</tr>
<tr>
<td>Scenario 4: HECS + AUSTUDY Grant $1500 and ICL $4000</td>
<td>14.18</td>
<td>2.99</td>
<td>1.27</td>
</tr>
<tr>
<td>Scenario 5: HECS + Commercial Loan $2000 + AUSTUDY Grant $3500</td>
<td>13.69</td>
<td>2.50</td>
<td>1.22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Females</th>
<th>IRR (% p.a.)</th>
<th>Percent. point differen. from 1</th>
<th>Proport. of 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1: No Charge or Income Support</td>
<td>18.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scenario 2: HECS</td>
<td>17.68</td>
<td>-0.56</td>
<td>-0.97</td>
</tr>
<tr>
<td>Scenario 3: HECS + AUSTUDY Grant $3500</td>
<td>25.73</td>
<td>7.53</td>
<td>1.41</td>
</tr>
<tr>
<td>Scenario 4: HECS + AUSTUDY Grant $1500 and ICL $4000</td>
<td>34.63</td>
<td>17.67</td>
<td>1.97</td>
</tr>
<tr>
<td>Scenario 5: HECS + Commercial Loan $2000 and AUSTUDY Grant $3500</td>
<td>31.44</td>
<td>13.22</td>
<td>1.73</td>
</tr>
</tbody>
</table>

In both the IDS and lifetime microsimulation modelling cases, as expected, HECS reduces the rate of return apparent in a non-HECS world, by a similar amount for both males and females. In addition, for males, the addition of a through a comparison of the post-graduate income decrease associated with contemporary repayment conditions from commercial loans with those associated with an ICL with current HECS rules. This is illustrated in Figure 2.

#### Figure 2

The Effect of Loans on the Financial Attractiveness of Full-time University Study

For students aged 18 to 21 the unbroken line shows student income assumed to be $5500 per annum, which can come from either (the average) $3500 AUSTUDY grant plus $2000 commercial loan, or from the trade-in of $2000 of the AUSTUDY grant for $4000 of an ICL (added to the remaining $1500 of the grant after the trade-in). In this example, the student receives around $16000 per annum in the first year after graduation, rising to a peak of about $38000. The dashed line shows the income of the graduate repaying the commercial loan, and the dotted line shows the income of the graduate repaying the ICL.  

From the figure, individuals taking different options have the same income as students, with the commercial loan requiring repayment of a smaller

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10 For clarity, the illustration ignores the effect of the HECS obligation. It affects both hypothetical cases identically.
The world simulated was that of 1986, so their early education worked fine and there was no worry about low performance scores.  In the real world, the experience was quite different, and parents feared for their children's future.  They wanted to make sure their children were successful, and they worried about their children's education.  The teachers, too, were concerned about the students, and they wanted to make sure they were successful.  An attempt was made to make the two communities see the situation from a different perspective, so that future generations would be better prepared.

The higher education of the real-world TAP, and did not become students there in the same way between the ages of 19 and 21.  There were more children than in the real world, and those who remained were more dedicated to learning.  In the real world, education was more important than in the virtual world.  Those who wanted to continue their education were more dedicated to learning.  The result was a higher percentage of students who remained in school.

It is thus possible to identify those individuals who learned from early on.

Different results can be used to explore changes in the association between variables.  For example, the correlation between the frequency of reading and the frequency of reading aloud may be stronger in the real world, IC, and commercial jobs.

The question of how the IC can be used to study the development of reading is important.  The frequency of reading aloud may be a better indicator of reading comprehension than the frequency of reading alone.  This is true because reading aloud involves more discussion and interaction, and this may help students to better understand the material.

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the potential advantage to prospective students of the ICL has been understated by the above results.

5 Internal Rates of Return Using Lifetime Microsimulation Modelling

The above approach is commonly used in assessing rates of return. However, there are some questions about its robustness as a tool for analysing the impact upon rates of return of student loans and grants. For example, because there are differences in the labour force participation patterns of female graduates and non-graduates, it is likely that only using the earnings of females working full-time to analyse rates of return could produce inaccurate results. Similarly, using the earnings of graduates working full-time only could overstate how quickly these individuals repay income contingent loans, thus understating the advantages of ICL relative to the alternatives. Consequently, an alternative modelling approach is now reported.

The data source is the HARDING lifetime microsimulation model, which tracks 4000 simulated Australians year by year from their birth to their death. This model potentially provides a much richer tool for examining these issues than those models and data sources traditionally used by economists, as it employs the relatively recently developed techniques of dynamic microsimulation to allow the characteristics of all individuals within the model to change every year (so that, for example, individuals may enter or leave the labour force, get married or divorced, and so on). This means that the model allows for the constant changes in the circumstances of individuals which longitudinal data reveal in the real world (Elder, 1985; Duncan, 1984), albeit being based on cross-sectional information.

The processes simulated in the model for each individual for each year of life, described in more detail in Harding (1990, 1992), include: mortality, marriage, divorce and fertility; disability; pre-school usage and attendance at a range of different primary, secondary and tertiary sectors; and paid labour force participation, including hours in employment or unemployment each year.25

4 Internal Rates of Return Using IDS Data

The income information now used is drawn from the sample file of the IDS. The survey has extremely good quality data and the number of observations is adequate for a useful analysis. The income profiles are for both males and females and have been inflated to 1992 dollars (using increases in average weekly earnings by sex)12 and adjusted for single person tax rates.

The 1985-86 survey contains data about age, sex, school-leaving age, and details of post-school qualifications. The amount the individual received in 1985/86 from many different sources is known, including: wages and salary; own business or farm; own partnership; and unemployment benefits. Only earned income for those working full-time was used in the analysis.13

For the hypothetical individuals described below a degree-holder is defined as anyone with a Bachelor or higher degree or post-graduate diploma, and a high-school leaver is defined as anyone who finishes school at age seventeen or above and does not possess any post-school qualifications. The data do not permit us the luxury of more disaggregated analysis.

The net income received whilst studying has the potential to have a major impact on calculations of the IRR to higher education. The Commonwealth Department of Employment, Education, and Training (1987) estimated that in 1984 the average course-related expenses (union and general service fees, cost of books, stationary equipment, materials, etc.) for a university undergraduate amounted to $595. Also, the data reveal that university students not on student assistance schemes averaged $1,483 in income from employment during the year.14 Converting these figures into 1992 annual dollars and rounding off, it is assumed that the direct cost to the individual of studying amounts to $900, earnings are $2270, leaving adjusted student income at $1370.

25In this approach the hypothetical students analysed are implicitly considered to expect future incomes calculated on the basis of a comprehensive range of sources. This provides a more accurate estimate of the consequences of the repayment of the ICL.

12 Under the assumption that the average male and female graduate incomes increased by the same percentage as did the respective average weekly earnings for males and females.
13 This is defined as the sum of the pre-tax incomes from wages and salaries, and from own business, trade or profession. No adjustments have been incorporated for investment income or superannuation. This is likely to mean an understatement in calculated rates of return to higher education.
14 Those on TEAS, on the other hand, received an average of $2,565 in assistance during the year (1984 dollars) and earned an average of $665 during the year.
The percent change in female graduates was higher than the percent change in male graduates from 1990 to 2010. This increase in female graduates was due to a combination of factors, including increased access to higher education and changes in societal attitudes towards women's education. The overall trend shows a growing number of female graduates compared to male graduates in recent years.

In Figure 1, the graph illustrates the trend in the percent change of graduates compared to the baseline year 1990. The x-axis represents the years from 1990 to 2010, while the y-axis shows the percent change. The data points indicate a steady increase in the percent change of female graduates over the years, with some fluctuations along the way. The graph highlights the significant progress made in increasing female participation in higher education.

The data suggests that policies and initiatives aimed at promoting gender equality in education might have contributed to this trend. Further analysis could explore the specific factors driving this change and the impact of these factors on educational outcomes and career opportunities for women.

Educational policies and a culture of support in the higher education sector have played a crucial role in empowering women to pursue higher education. These efforts have not only increased the number of female graduates but have also helped in creating a more inclusive and diverse educational environment.
qualitative sense the results are similar to those revealed in a host of other Australian studies\textsuperscript{21}.

The second major point is that the imposition of HECS (necessarily) reduces the financial attractiveness of higher education (comparing scenario 1 with scenario 2), but the extent of the decline is low, of the order of around .75 of a percentage point for the average of males and females. The small difference helps explain why the imposition of HECS has had no obvious effects on the demand for higher education places (Chapman, 1992)\textsuperscript{22}. This is consistent with there being a considerable average subsidy from HECS given the lack of a real interest rate and the pay-later provisions of the scheme.

Third, the IRR increases associated with the AUSTUDY grant (comparing scenario 2 with scenario 3) are large: of the order of 3 and 6 percentage points for males and females respectively. This implies that removal of the grants and offering no alternative assistance would have a discernible effect on the overall demand for higher education. Since AUSTUDY is targeted on the basis of family income this suggests also that removal of the scheme would have significant consequences for the socio-economic composition of higher education applicants.

Fourth, and of most interest for the recent policy change, is that trading-in $2000 of the grant for a $4000 ICL repayable according to HECS parameters (comparing scenario 3 with scenario 4) results in an increase in the average financial attractiveness of higher education. The orders of magnitude for males and females respectively are around .85 and 6 percentage points, or about a 7 and 25 percent increase in the IRR compared to the current grant scheme. This implies that the average AUSTUDY recipient in circumstances similar to those of the hypothetical individuals will be financially better off in net present value terms by taking up the Government’s option of trading in part of their grant for an ICL\textsuperscript{23}.

Analysing the effects of particular changes to student income support can be clarified by considering (hypothetical) men and women in 1992, whose potential average lifetime earnings are implicitly reflected in Figures 3 and 4. The individuals have finished year 12 at age 18 and have the options of: joining the workforce without any further formal education and receiving for the rest of their lives the average after-tax income of the group of their sex working full-time with this level of education or, alternatively, of attending university full-time for three years after which they receive the average measured income of graduates of their sex.\textsuperscript{15}

The question for university attendance is whether or not to incur the discounted cost of the forgone earnings - illustrated by the first shaded area in Figure 1 - in order to derive the investment return in the form of higher future earnings given by the second shaded area. The approach allows useful comparisons between the various student income support possibilities. As well, it is possible to gain some insights into the likely effects of HECS on the returns to higher education investments\textsuperscript{16} and the relative attractiveness of commercial loans.

An important qualification relates to the possibility of there being a supply response to changes in the IRR associated with different loan scenarios, which would imply that the initial differences are not sustained. But in this context it is pertinent to note that even with the extraordinary expansion in the number of graduates over the past twenty years or so, Chia (1990) found that the calculated IRRs were very robust; for example, his research suggested that the returns to males from higher education actually increased between 1976 and 1986. This implies that any short-term variations in the IRR from policy are not likely to disappear quickly.

Further by way of qualification is that there are several factors at work here which imply biased upwards estimates of the return to higher education. One

\textsuperscript{21}See, for example, Blandy and Goldsworthy (1975), Miller (1982) and Chapman and Chia (1989).

\textsuperscript{22}The story is a bit more complicated than this, however, because at the same time as the Government introduced HECS it abolished the Higher Education Administration Charge, a relatively small up-front fee. This action which by itself would have increased the internal rate of return to education.

\textsuperscript{23}A complication here is that this result is essentially driven by the fact that the effective interest rate on the loan is less than the original average IRR. For some - perhaps many - students this will not be the case since the foregone earnings will be lower than that assumed; this is particularly true for university students.

\textsuperscript{15}The income profiles are for those recognised in the sample as working full-time at the time of the survey. The most important implication of this is a relative high income of female non-graduates, compared to the average, because female non-graduates are relatively more likely to have worked part-time in the past implying greater work experience and thus higher incomes for female graduates. The sensitivity of results is explained in Section 5 through the use of lifetime micro-simulation modelling.

\textsuperscript{16}These particular calculations can be compared to those made with cross-sectional data for the initial parameters of the Higher Education Contribution Scheme, analysed in Chapman and Chia (1989).
The table below shows the projected impacts of increased investment in higher education by year, with a focus on subsidies and student support. The data is presented in Table 1:

<table>
<thead>
<tr>
<th>Year</th>
<th>Subsidies for Education</th>
<th>Student Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>2023</td>
<td>$500 million</td>
<td>$1 billion</td>
</tr>
<tr>
<td>2024</td>
<td>$600 million</td>
<td>$1.5 billion</td>
</tr>
<tr>
<td>2025</td>
<td>$700 million</td>
<td>$2 billion</td>
</tr>
</tbody>
</table>

The results are projected in Table 1.