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THE ACCESS IMPLICATIONS OF INCOME CONTINGENT CHARGES FOR HIGHER EDUCATION: LESSONS FROM AUSTRALIA

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CONTENTS

ABSTRACT

This paper describes the Higher Education Contribution Scheme (HECS), Australia's income contingent charge mechanism, and analyses its impact on the social composition of university participation. We analyse university participation data from three cohorts of young Australians. The first cohort completed their schooling prior to the introduction of HECS, the second following its introduction and the third after the scheme was amended substantially. We find that the social composition of participants was different in 1999 from that of 1988. However, the distribution was more equal than it was in the late 1980s. That outcome reflected the growth in participation in the middle of the wealth distribution, which was stronger than growth at either the top or the bottom of the distribution. Other aspects of university participation also changed: participation grew more strongly among females than males. We find no evidence that participation fell among 'marginal decision makers' – those who, while at school, said they did not intend to study at university. We conclude that HECS did not act to discourage university participation in general or among individuals from the lowest wealth groups.

1 Background

In 1989 the Australian government[1] introduced a higher education financing policy that has influenced the way higher education tuition is thought about in that and other countries. Its defining characteristic is that if students choose to so do, their tuition charge is paid depending on their future incomes. Since then several other countries[2] have introduced variants of (so-called) income contingent loans for the payment of fees, and some additional countries are in the process of considering the applicability of this type of approach.[3]

For Australia the Higher Education Contribution Scheme (HECS) replaced a no-fees approach to higher education financing. At the time - and since - the justification for the introduction of a student charge has been easy to understand, for the following reasons.

First, the government was faced with the prospect of a burgeoning demand for higher education services, services at the time financed almost solely from general taxation revenue. A demographic bulge and rapidly increasing high school retention rates meant the emergence of pressures for a considerable expansion of university places. Second was the widely held view – supported by available evidence - that having a higher education system financed almost completely from tax revenue was regressive in income distribution terms. Finally, the 1980s (and beyond) was a period of considerable fiscal parsimony that had lead and continues to lead to a questioning of the rationale for government spending in even the most well established areas of the public sector.

As noted, the defining characteristic of HECS is that the charge is collected depending on a former student's income, with no payments being required when former students' incomes fall below a given threshold. At the time the major rationale for income contingency was to have a charging system that would maximise the participation in higher education of the less advantaged. It was believed that having repayments depend on future income would have a minimal impact on both aggregate student demand and the participation of prospective students from relatively disadvantaged backgrounds. The point of the current paper is the provision of evidence relevant to this expectation.

The discussion following makes several contributions. First, from the perspective of economic theory, in Section 2 we present a taxonomy of student financing policies with respect to their likely implications for the access of the poor.

Second, we describe HECS with respect to both charge levels and repayment parameters. It is of considerable interest that in 1997 major changes occurred to both, and these are explained in Section 3. In this section estimates are presented of the

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1 Following the recommendation of the committee set up to consider financing options for higher education, chaired by Neville Wran. See Financing Higher Education, AGPS, 1988.

2 These include New Zealand in 1991, Chile in 1994, South Africa in 1996 and the UK in 1998 (with revisions in 2003).

3 The World Bank and other international agencies have recommended, or are considering, the viability of income related approaches to higher education financing in Malaysia, Hungary, Ethiopia, Rwanda and the Philippines. An important critique of the approach with respect to applications to developing countries is provided in Johnstone and Aemero (2001).

effects of both the original and the 1997 HECS arrangements on internal rates of return to higher education, for both men and women. It seems to be the case that neither the first nor the more recent versions of HECS had significant effects on the average returns to private investment in university training.

Third, and most importantly, in Section 5 we present new evidence on the effects of HECS for the access of disadvantaged prospective students, after we describe our data, methodology and the existing literature on this subject in Section 4. The new estimates are undertaken with respect to both the introduction of HECS, and the very significant changes introduced in 1997. The available panel data allow the adoption of two distinct approaches: estimation of the changing effect on enrolments of measures of family wealth; and the importance of the introduction and changes to HECS on young people's expectations of their likely future education experiences. The bottom line seems to be that the Australian income contingent charge has had no discernible effects on the access of the disadvantaged to higher education.

2 Economic Theory: What is the Correct Approach to Student Financing?

2 (a) Introduction

Several different policy approaches to student charges for higher education, currently in operation internationally, are now analysed with respect to their social and economic implications. It will be argued that a charge is justified, and that the best way for students to pay is via an income contingent arrangement, such as HECS[4].

2 (b) A No Charge System

Many, although increasingly fewer, countries do not charge for higher education. What this means can be understood through reference to standard economic principles, now explained briefly.

A role for government is to help ensure the production of optimal quantities of goods and services. In some circumstances this requires public subsidies equal to the marginal value of the externality associated with an activity. These externalities are considered to take the form of reduced criminal activity, more informed public debate and technological change and economic growth.

Within this framework all charging systems implicitly place a value on externalities. For example, having no charge suggests that societal benefits at least equal the size of the subsidy. While there is little agreement on the size of higher education externalities, it is certainly clear for Australia that the process delivers important private benefits to graduates[5].

The other issue related to not charging for higher education is that of equity. There is no doubt that university students are more likely to come from privileged

[4] For a related discussion, see Chapman and Ryan (2002).
[5] See Borland, Dawkins, Johnson and Williams (2000).

backgrounds, and it is also true that graduates do well in the labour market. A no charge system is unquestionably regressive[6].

2 (c) Up-front Fees with No Government Intervention

If there should be a charge, how should it be paid? One possibility would be to offer subsidies to universities to cover the assumed value of externalities, but beyond that allow the institutions to charge fees, with there being no other financing assistance provided. Such an arrangement would unambiguously be poor policy. In this context the critical issue relates to the major borrowing problem, often referred to as "capital market failure".

The issue is that some prospective students would not have the resources to pay the fees and would need to approach a bank for a loan. However, banks will be reluctant to loan to students because of problems associated with default. An education loan is risky for a bank since, in the event of default - and unlike a housing loan - the bank has no collateral to sell. This implies that, without assistance, banks will not be interested in the underwriting of human capital investments.

Thus prospective students without sufficient financial resources to cover fees will not be able to enrol. There will be three important effects: a loss of talent, and thus a cost to the whole society; a loss of opportunity to individuals; and a cementing of the nexus between family background and a person's lifetime income, meaning that such a system is regressive.

2 (d) Up-Front Fees with Government Subsidised Bank Assistance

A possible solution to the capital market problem described above is used in many countries and involves government-assisted bank loans to students with low family incomes. The most important form of public sector support is the guarantee of repayment of the debt to the bank in the event of default. While this seems to address the capital market failure, there are several problems.

The first is that students' access to loans is usually means-tested on the basis of family income. This then presumes equal access of individuals to family resources; however, those in charge of the distribution of household finances to household members may not have the prospective student's view of the value to the student of education. This implies that some not qualifying for bank loan assistance will not be able to pay fees. If so, outcomes will not be optimal with the associated costs of lack of access noted above.

The second problem is default. For the government this is costly since bank-financed student loans default rates are very high[7]. And if there is a guarantee that defaults will be paid for by the government banks will put little effort into debt recovery. Default is very expensive for taxpayers.

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[6] See Chapman (1997) and Chapman and Ryan (2002).

[7] Harrison (1995) notes that in US Propriety Colleges the default rate is as high as 50 per cent. The average default rate for student loans is around 15-30 per cent (Wran Committee Report, 1988).

Students also face an important default issue. This is that some may be reluctant to borrow for fear of not meeting future repayment obligations, with concomitant damage to a person's credit reputation (and thus access to future borrowing, for example, for a house). A consequence is that some eligible prospective students will not be prepared to take bank loans. This problem can be traced, in part, to the fact that bank loan repayments are insensitive to the borrower's financial circumstances and are thus associated with default risk for students.

2 (e) Income Contingent Charge Mechanisms

A final approach to student financing involves income contingent loans. There are several forms of an ICL, and in broad terms these can be described as ICL with risk-pooling, graduate taxes and ICL with risk-sharing. They have quite different implications.

A risk-pooling ICL involves a cohort of students being obligated to repay in total the debt of the group, and the best known example is that of the Yale Plan, described and critically analysed in Nerlove (1975) and Feldman (1976). Graduate taxes involve an on-going tax surcharge and there has been no practical experience of their effects. Barr (2000) provides a useful critique of the consequences of graduate taxes.

HECS is an ICL with risk-sharing, meaning that taxpayers share the risks of non-repayment in the sense that the government covers the costs. The attraction of risk-sharing income contingent schemes is that they might be able to be designed to avoid the problems associated with alternative financing policies outlined above[8,9]. The advantages of this type of application of an ICL are as follows.

First, there is no concern with intra-family sharing so long as the scheme is universal. That is, no students would be denied access through the imposition of means-testing arrangements that could exclude some potential students whose parents or partners are unwilling to pay an up-front fee.

Second, given an efficient collection mechanism, there should be no default issue for the government if, for example, the tax system is used to collect the debt, since it is extremely difficult for the vast majority of graduates to avoid repayment[10],[11]. There is arguably a trivial "default" issue in that some students will not pay back in full as risk-sharing income contingent systems are designed to excuse some former student's payments because their lifetime incomes are too low[12].

[8] For theoretical analysis see Chapman (1997).

[9] This requires an efficient collection mechanism, and it should be recognised that in many countries the collection of an income contingent loan might not be possible (Johnstone and Aemero, 2001)).

[10] At least for Australia, this is essential because the Australian Taxation Office is the only institution with reasonably good information on a former student's income.

[11] An additional concern relates to former students emigrating. A solution to this loss of revenue is offered in Barr (2001).

[12] Harding (1995) calculates that the total repayments remaining uncollected because of the nature of HECS would be of the order of 15-25 per cent for the original scheme (when the repayment conditions were much more generous for the student (before the 1997 changes)).

Third, because repayments depend on incomes, there should be no student default concerns related to an inability to pay. That is, once an individual's income circumstances determine repayment – and so long as the repayment parameters are sufficiently generous – it is almost impossible for a former student to default because of a lack of financial resources.

The above provides the conceptual basis and motivation for the current study. The essential issue concerns the effects of a risk-sharing ICL with respect to the potential of such an approach to deal with the capital market failure associated with financing higher education. That is, have the introduction of, and changes to, HECS affected the access of the disadvantaged to higher education? An obvious way to begin the exercise is a documentation of the scheme and a reporting of its likely aggregate effects.

3 HECS: Description and Estimates of Aggregate Likely Effects

3 (a) Introduction

An obvious empirical issue associated with the institution of and changes to HECS concerns its possible effects on aggregate demand for higher education. This is addressed indirectly in what follows by considering the implications of HECS for average internal rates of return by sex. This is now addressed with respect to the three phases explained above: before there was a charge, after 1989 when the scheme was introduced, and for post-1997, when the scheme was made significantly less generous for students and graduates.

Consequently we describe the policy setting in 1988 and for both 1993 and 1999; that is, for Australian students who completed their secondary schooling in 1987, 1992 and 1998. An important beginning is to document the nature and structure of HECS charges in these periods.

3 (b) HECS Charges: 1993 and 1999

When the Australian government instituted HECS in 1989 there was a uniform charge for each full-time year equivalent, and this was around $2,700 in 2003 dollars. The charge was indexed to the Consumer Price Index (CPI), as were the repayment thresholds (explained below).

In 1997 the new (Coalition) government introduced a three-tier structure with the charges reflecting both course costs and, in the case for Law and Nursing, an assessment of possible future earnings[13]. Thus students who enrolled in Australian universities in 1999 faced tuition charges that varied by course, and these are shown in Table 1. Since 1997, the HECS charges and repayment parameters described below have been indexed to the CPI, so the scheme in 2003 is identical in real terms to that implemented in 1997.

The differential course charges mean that an Arts graduate who completed their course in three years from 1999 would have incurred a HECS debt of between

[13] For an analysis of these changes see Chapman and Salvage (1997).

$10,000 and $11,000, a Science graduate a debt approaching $15,000, and a Law graduate (typically a four-year course) over $20,000. These debts are indexed to inflation (the Consumer Price Index), but beyond this there is no real rate of interest on the debt.

Table 1
HECS Costs by Band: 1989, 1993 and 1999 ($1999)

HECS Band	**HECS Cost for Each Full-time Year of Study**	Disciplines
1989	2,300	All disciplines
1993	2,600	All disciplines
1999		
Band 1	3,409	Arts, Humanities, Social Studies/ Behavioural Sciences, Education, Visual/Performing Arts, Nursing, Justice and Legal Studies
Band 2	4,855	Mathematics, Computing, other Health Sciences, Agriculture/Renewable Resources, Built Environment/ Architecture, Sciences, Engineering/ Processing, Administration, Business and Economics
Band 3	5,682	Law, Medicine, Medical Science, Dentistry, Dental Services and Veterinary Science

Source: Commonwealth Department of Employment, Education, Training and Youth Affairs, *HECS: Your Questions Answered*, *1993* and *1999*.

3 (c) HECS Repayment Parameters: 1993 and 1999

Students can choose to either pay their HECS charges at the time of enrolment or defer repayment. Those who choose to pay their HECS charges up-front receive a discount of 25 per cent, meaning that in effect HECS incorporates a blunt form of a real interest rate. However, those opting to repay the debt contingent on their future incomes receive interest rate subsidies equal to the real rate of interest for each year the debt remains unpaid. A consequence is that students who take the pay-later option will receive greater subsidies the longer repayment takes (that is, the lower their future incomes) to repay the debt[14].

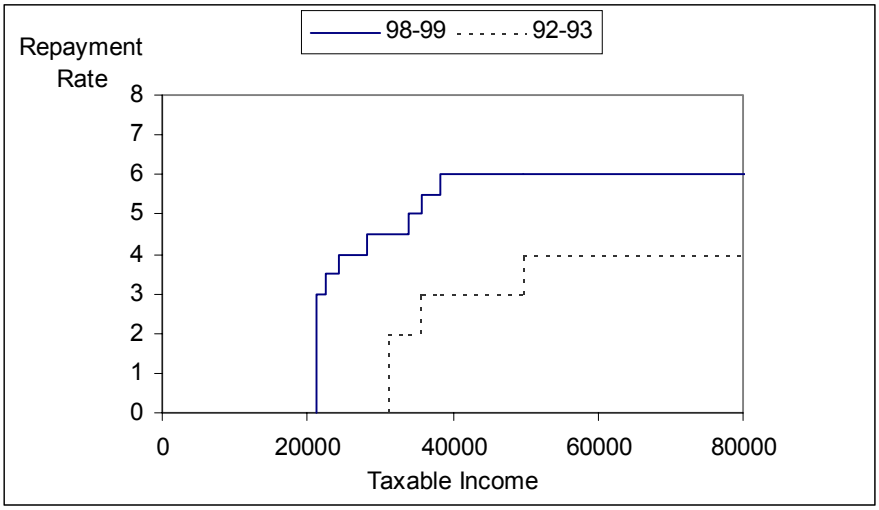
When HECS was introduced the repayment parameters were more generous for students than those currently in place[15]. The 1992/93 and 1998/99 thresholds and

[14] The extent of the subsidy is analysed in Edwards (1988) and Chapman and Salvage (1997).
[15] For example, the first threshold of repayment was equivalent to average earnings, or around $35,000 per year in 2003 dollars.

repayment rates are shown in Figure 1, and should be interpreted as follows. The lines show the percentage of a former student's annual income deducted to repay an HECS obligation, with the top and bottom lines applying respectively to the parameters for 1998/99 and 1992/93 respectively.

It is clear from the Figure that the changes introduced to HECS after 1997 were very significant. As examples, in 1999 the first income threshold of repayment was $21,334 per annum, or about 65 per cent of Australian average weekly earnings. But in 1993 this threshold was around $31,000. As another example, if a former student earned $40,000 per year, they repaid 3 per cent of income ($1,200) in 1993, but this had doubled by 1999.

Figure 1
HECS Repayment Parameters: 1992/93 and 1998/99 ($1999)



The importance of the threshold changes in 1997 requires some emphasis with respect to our empirical exercises. A major point is that for those choosing to repay the charge through the tax system, a decrease in the repayment thresholds must mean an increase in the present value of the debt because, once incurred, the charge has an interest rate which is zero in real terms. Thus if graduates are compelled to repay the charge earlier as a result of lower thresholds, this must mean a reduction in the extent of government subsidies. Chapman and Salvage (1997) suggest that from the threshold changes alone in 1997, the present value of typical HECS debt increased by around 10-15 per cent.

3 (d) Aggregate HECS Effects: Internal Rates of Return

An indirect way to approach the question of the possible effect of HECS on access to higher education is through the estimation of changes in aggregate internal rates of return to the investment. In the absence of indirect behavioural effects, such as associated changes in the relative supply of graduates, rates of return will necessarily fall with the imposition of a charge. In the HECS case this is the result of decreases in after-tax graduate incomes.

The estimates now presented are based on data from the Australian Bureau of Statistics 1997 Household and Income Distribution Survey. This is a large (around 30,000 households) random survey with unit record data cross-sectional information on the income, sex, age and educational qualifications of the sample. It is ideal for the purpose at hand.

It is possible and instructive to illustrate the effect of these charge levels and repayment parameters on the after-tax incomes of graduates by age[16]. In what follows the 1993 and 1999 HECS repayment parameters have been applied for male and female students. We impose the following assumptions: they begin a four year Science degree at age 18, graduating at age 22; and, after graduation they take a full-time job earning the average income by age of graduates of their sex. The age-earnings profiles have been constructed with the use of simple Mincer earnings functions for each sex, including level of education and with a concave treatment for experience, as approximated by the difference between age and the assumed age of leaving education. The results are standard for this type of exercise with the smoothed data shown in Appendix A.

The data allow an illustration of typical HECS repayments for the period between 1989 and 1997 and for post-1997[17]. Further, in combination with the earnings experience of individuals without a university education – to approximate earnings foregone whilst attending university – there is sufficient information available to calculate the internal rates of return to university education for the two periods of different HECS arrangements. The estimates are presented in Table 2.

The results suggest the following. First, in all periods and for both males and females, the after-tax rates of return are very healthy, and never below 12.5 per cent. Second, the introduction of HECS had a clear but very low impact on rates of return to higher education for males, of less than a percentage point. Third, there was a very small effect on the return to a university education for females. And four, there was another small effect on rates of return for both males and females after the significant changes to HECS after 1997, of about an additional 0.8 of a percentage point.

Table 2
Internal Rates of Return: Various HECS Scenarios

	Men (per cent)	Percentage Point Change from 1988	Women (per cent)	Percentage Point Change from 1988
1988 (No HECS)	14.6		13.9	
1993/94	13.8	-0.8	13.4	-0.5
1997/98	13.1	-1.5	12.6	-1.3

[16] Bruce Chapman and Tony Salvage prepared the estimates for this paper.
[17] The earnings information suggests the following. Male Science graduates earning average graduate full time incomes will repay their 1999 HECS debt in about 8 or 9 years. Equivalently qualified females will repay HECS after about 12 years.

Overall, these calculations suggest that neither the introduction of, nor radical changes to, HECS have had major effects on the average financial attractiveness of a university education, which remains high. It would be reasonable to conclude from this that, in aggregate, it is unlikely that HECS has had an important effect on the demand for higher education. However, this does not mean that the policy changes had no effect on the financial attractiveness of higher education for particular groups, an issue to which we now turn.

4 HECS Access Effects: The Literature and a New Approach

4 (a) Introduction

This section contains a summary of the previous literature concerning the effect of HECS on the social composition of participants in higher education in Australia. We then describe the data on three cohorts of young Australians we use to analyse university participation and the methods we adopt. Members of the first cohort completed their schooling prior to the introduction of HECS, the second when HECS operated with close to its original parameters and the third after it was changed substantially from 1997.

4 (b) Previous Estimates

As in other countries, both actual and intended university participation in Australia is higher among individuals from more advantaged backgrounds than those from disadvantaged ones (see Birrell, Calderon, Dobson, and Smith (2000), and James (2002), for example). Our interest is whether the introduction and amendment of HECS had any impact of the nature of the relationship between wealth or socioeconomic status and university participation. Therefore, the focus is not on the relationship between socioeconomic status and university participation at any point in time, but rather on whether the relationship has changed over time.

Australian studies have used two approaches to assess the impact of HECS on participation in higher education among low socioeconomic status groups. The first has been to ask people about the factors that shape their decisions to participate in higher education. These studies suggest that HECS has not been a dominant factor influencing individual decision-making, either in aggregate or for low socioeconomic status groups (Higher Education Council (1992), Robertson, Sloan and Bardsley (1990), and Ramsay, Tranter, Charlton and Sumner (1998)).

The second approach has been to test whether participation behaviour among low socioeconomic status groups changed in a way that was different from other groups after either the introduction of HECS or the changes to the scheme introduced from 1997.

One example is Andrews (1999), who traced the share of low socioeconomic status students among 17 to 24 year olds who commenced higher education from 1989 to 1998, including their share of disciplines included in the high cost Band 3 introduced in 1997. Individuals were assigned the socioeconomic status score of the region

where they or their family lived, based on the postcode of their home address.[18] Individuals from low socioeconomic status backgrounds were defined as those whose home postal address was in the lowest quartile of the population, as determined by the value of the relevant socioeconomic status index. Andrews found that neither the introduction of higher and differential HECS nor the lowering of the income repayment threshold after 1997 affected the share of low socioeconomic status individuals among total higher education students.[19]

The major uncertainty about Andrews' analysis relates to the attribution to individuals of the average socioeconomic status level of the postcode of their home address as their socioeconomic status background. Western, McMillan, and Durrington (1998) presents results based on a survey of 3000 university students in Queensland that suggest such an approach is not reliable. They found that the correlations between individually based socioeconomic status measures and the same postcode based index used by Andrews were quite low.[20]

The main implication of the Western *et al* (1998) assessment for the current paper is that it would be better to attempt to assess the impact of the introduction of HECS on the social composition of the university student body by using individually based measures of socioeconomic status.[21] Other studies have utilised individually based socioeconomic status measures in analysis of Australian higher education participation. Long, Carpenter, and Hayden (1999) and Marks, Fleming, Long and McMillan (2000) used four and five panels of longitudinal data[22] respectively to identify how education participation changed in Australia over the 1980s to the late 1990s. Long *et al* used parental education and occupation to identify differences in education participation by socioeconomic status, as well as an indirect wealth index constructed from responses by individuals to questions about the presence of material possessions in their houses.[23]

Long *et al* (1999) analysed participation in higher education by age 19, for two reasons. The first is that in Australia many school leavers defer university entrance for a year. The second is that their data are drawn from cohorts of individuals of the same age. Since the structure of schooling varies across Australian states, many

[18] The index used by Andrews was constructed by the Australian Bureau of Statistics.

[19] Andrews (1999) also analysed attitudes to debt by individuals in different socioeconomic status groups. Andrews concluded that observed patterns in Australia did not show any variation by socioeconomic status. Consequently, he argued there should be little or no aversion to acquiring HECS debt by low socioeconomic status groups.

[20] Among students aged less than 25, the highest correlation between the postcode-based index and any individual measure was 0.271 (with 'Father's occupational status'). The correlations were particularly low for individuals whose home address was in a rural or remote region.

[21] There also seems to be some level of 'official' acceptance of the value of individually based measures of socioeconomic status. The Australian Department of Education, Science and Technology commissioned Jones (2002) to provide advice on how to implement the Western *et al*. (1998) recommendations that parental education and occupation be collected from individuals for inclusion in the student administrative collections.

[22] Long *et al* (1999) analysed panels from the Youth in Transition Survey collected by the Australian Council for Educational Research. The additional panel used by Marks *et al.* (2000) is a school grade based panel of students who were in Year 9 in 1995. This panel is the 1995 cohort from the Longitudinal Surveys of Australian Youth programme.

[23] Individuals were asked about the number of telephones, dishwashers, bedrooms and bathrooms in their home when they were at school. Long *et al.* developed wealth scales based on these responses and compared participation in higher education by wealth quartile.

individuals would not have had the opportunity to attend university until the year they were aged 19 in the data used. Long *et al* analysed data for individuals aged 19 in 1980, 1984, 1989 and 1994, interpreting loosely their third and fourth cohorts as pre- and post-HECS introduction cohorts.

Long *et al* found that wealth has a strong positive effect on higher education participation. In addition, they found that differences between socioeconomic status groups widened somewhat in the last cohort compared to the third cohort. However, they acknowledged that such a trend was evident in the earlier cohorts, so that it may not have been a specific HECS-related effect.

Chapman (1997) analysed university participation among 18 year olds in the last two cohorts analysed by Long *et al* (1999) and concluded that the introduction of HECS had not affected university participation by students from disadvantaged backgrounds. Chapman's approach had the advantage of measuring university participation in 1988 for the third cohort, prior to the introduction of HECS. However, not everyone aged eighteen in these data had completed school when surveyed in the relevant years, so the estimates understated university participation among young Australians.

The measure of participation used by Marks *et al* (2000) for the additional cohort they analysed differed from that used for the earlier cohorts by Long *et al* (1999). It was the proportion of individuals in higher education in 1999 that had been in the Year 9 in 1995. The wealth measure used by Marks *et al* (2000) for the last panel also differed from the earlier ones.[24] This research confirmed the positive impact of wealth on higher education participation. However, in general, their results suggested that socioeconomic status was less important in determining higher education participation in the 1999 data than had been the case in the earlier panels.

Marks and Evans (2003) analyse university participation within ranges of the entrance scores used by universities to select students for undergraduate courses in 1999. They find that within these entrance score ranges, individuals whose parental occupational backgrounds are 'blue' collar are as likely to participate in university as those whose parental occupational backgrounds was professional. They conclude that since occupational origins have little influence on university participation once entrance scores are taken into account, HECS has not deterred students from less privileged backgrounds from attending university.

4 (c) The Data

Our analysis of the access effects of HECS utilises three of the longitudinal panels of data used in the Long *et al* (1999) and Marks *et al* (2000) studies. One of our contributions is to use a consistent definition of university participation across these three cohorts. In addition, our approach allows clearer tests of the potential role of policy change given the focus on the three distinct phases of HECS.

We analyse the participation in higher education of 18 year olds in the first year they could potentially attend university. This means that for the first two cohorts we estimate the participation in higher education in 1988 and 1993 of individuals who, in

[24] Individuals responded yes or no (rather than the number) to questions about whether their house contained a dishwasher, computer, piano and swimming pool, among other items.

the first year the cohort was surveyed, were in a grade cohort such that they should have reached Year 12 in 1987 and 1992 respectively.[25, 26] For the 1999 cohort analysed in Marks *et al* (2000), we limit our analysis to higher education participation among 18 year olds in 1999.

One problem with our approach is that it relies on progression rates through school to university being similar in 1988, 1993 and 1999. These may well vary over time, if either repetition of school grades or deferment rates for the first year of university vary between cohorts. Such variations may affect our assessment of the social composition of the university student body if grade repetition or university deferral rates are themselves associated with socioeconomic status. In the discussion of our results, we assess their fragility in the face of such varying progression rates, especially high year 12 repetition rates that affect our results for the 1993 cohort.

We use a similar measure of wealth to that adopted by Long *et al* (1999). That is, an indirect wealth index is constructed from responses by individuals to questions about the number of bedrooms, bathrooms, telephones and dishwashers in their houses for the first two cohorts.[27] For the 1999 cohort, we use the responses to the extended list of items (the presence of a dishwasher, colour television, video camera, computer, compact disc player, piano, telephone, mobile phone, microwave oven and swimming pool) as though it is identical to the earlier measures for the purposes of assigning individuals to wealth quartiles.[28] Evidence suggests that the separate wealth measures convey similar information about like individuals in the three cohorts.[29] In the analyses undertaken below, the individuals are assigned the value of their rank (between zero for the lowest ranked and unity for the highest ranked individual) according to the wealth variable for their specific cohort.

In some analyses described below we use a broader measure of individual SES than the wealth measure to assess the robustness of our main analyses. This measure is a weighted estimate of parental education and occupation variables, along with the wealth index. The weights were based on probit regression parameters of an equation explaining whether individuals completed year 12 or not. The equation contained the

[25] The approach avoids two problems with the Long *et al* (1999) and Marks *et al* (2000) studies. The age-based nature of their initial cohorts means that the observations were spread over three school grades, so the participation rate by age 19 includes individuals who potentially could have been at university for one, two or three years. Second, the 1989 cohort analysed in Long *et al* (1999) includes some individuals who commenced university after the introduction of HECS, invalidating any pre- and post- HECS implementation comparison between the 1989 and 1994 cohorts.

[26] Given the structure of schooling in Australian states, this lowers the contribution of students from New South Wales, Victoria, Tasmania and the Australian Capital Territory in all cohorts for our estimates below their true importance in the population.

[27] Individuals also indicated whether their family owned a boat or a holiday house. Alternative wealth measures that included these responses provided qualitatively similar results to those we present below.

[28] For all cohorts, the wealth scale is based on the first principal component of the responses to the questions about the material possessions. Other regression-based approaches to constructing the wealth rank indicated that the available variables influenced education participation (school completion and intentions to attend university), but that use of alternative scales did not lead to qualitatively different results to those we present below.

[29] For example, the mean values of the (standard normally distributed) wealth scale for individuals who attended an independent, private school in the three cohorts were: 0.686, 0.650 and 0.617. The values for those who attended Catholic schools were: 0.305, 0.301 and 0.215; and for those who attended government schools: -0.157, -0.148 and -0.213. The averages across cohorts are obviously similar, while at the same time reflecting the drift from government to private schools in Australia.

full set of variables that appear in Table A.3 of Appendix A. Once more, individuals were assigned their rank for the broader SES variable for the purposes of analysis. This broader measure can be interpreted as providing a SES measure that includes both financial and cultural elements that might influence university participation.

The first two cohorts of data we use were each of over 5000 individuals who were followed from about age 15 until their mid-twenties. The data contain detailed information about the family backgrounds of individuals, their schooling and subsequent activities (post-school education and labour market involvement). Similar data have been collected from the third cohort, which involved a sample of over 13000 Year 9 school students.

Individuals in the first two cohorts were surveyed by mail after an initial survey completed in their classroom, while participants in the third were interviewed by telephone after initial school-based contact and mail surveys. The series are described in more detail in ACER (1997). After we restrict analysis of the first two cohorts to those in the grade cohorts such that they should have reached Year 12 in 1987 and 1992 respectively, we utilise 1206 and 2245 observations respectively from those samples.[30] For the 1999 cohort, our analysis of 18 year olds only in 1999 means that we utilise 4856 observations.

The sample sizes and university participation rates by gender in each of the cohorts are presented in Table 3. The participation rates are higher after 1988, reflecting the expansion of the Australian higher education system after the late 1980s. Growth in university participation was much more pronounced for females than males.

Table 3
Number of Observations and University Participation Rates: 1988, 1993 and 1999

	Males	Females	Persons
Number of Observations			
1988	533	673	1206
1993	913	1332	2245
1999	2099	2757	4856
University Participation Rate			
1988	27.3	22.1	24.4
1993	28.7	30.9	29.9
1999	33.2	41.6	38.0

[30] Attrition also affects the number of observations available for analysis.

4 (d) Methodology

Our interest is in whether and how the relationship between university participation or student intentions to attend, denoted by p, and individual wealth or socioeconomic status, denoted by s, have changed with the introduction of HECS. That is, we are interested in testing whether the form of the relationship

(1) $p_t = f_t(s_t)$

changed over time. We address this issue through both non-parametric and parametric approaches. First, we estimate the shape the f relationship for the three cohorts of young people. Specifically, we estimate for each cohort the expected value of university participation at each value of the wealth or socioeconomic ranking, $E(p|s)$. This is essentially a way of describing the data and is undertaken using kernel regression techniques (see Chapter 3 of Pagan and Ullah (1999) for a description of these techniques).

These conditional mean functions can be graphed to provide a visual impression of how the relationship between university participation and individual wealth or SES may have changed over time. In addition, since they show how the proportion that participated at university varied by wealth or SES level, these functions can also be used to estimate 'Lorenz' curves of how concentrated the distribution of higher education participation is with wealth or SES. Inequality measures based on these 'Lorenz' curves, such as Gini coefficients can be used to assess whether the distribution has become more or less equal over time (see Cowell 2000 for a description of these measures and Barrett *et al.* 2000 for a recent application of these measures that uses Australian consumption and income data).

Our second approach to identifying changes in the relationship between university participation and individual wealth or SES is parametric. We assume that participation at university for individual i individual at time t can be described by

(2) $p_{it}^{*} = \boldsymbol{\beta}_t' \boldsymbol{X}_{it} + \varepsilon_{it}$, $\varepsilon_{it} \sim N(0,1)$, and

$p_{it} = 1$ if $p_{it}^{*} > 0$ and $p_{it} = 0$ if $p_{it}^{*} \leq 0$

where p_{it}^{*} is an unobserved variable reflecting an individual's eligibility, application and receipt of a university offer by a particular time, t, and p_{it} is the realisation of that entire process. The $\boldsymbol{X}_{it}$ are a set of explanatory variables and $\boldsymbol{\beta}_t$ is a parameter vector, with the parameter associated with each explanatory variable allowed to vary over time. A different set of individuals, i, are observed at each time period.

These assumptions involve estimation of the parameters of the model via probit estimation, where

(3) $\Pr(p_{it} = 1) = \Phi(\boldsymbol{\beta}_t' \boldsymbol{X}_{it})$

where $\Phi(.)$ is the cumulative distribution function of the normal distribution.

In the results for the simple model reported here, $\boldsymbol{X}$, has three main elements. The first is a constant that is allowed to vary by cohort, which will pick up the expansion of the Australian higher education system between 1988 and 1999. The second is the representation of the wealth or SES variable, the effect of which is also allowed to vary by cohort and is allowed to be non-linear via the inclusion of higher order terms or the specification of spline functions. The third element of $\boldsymbol{X}$ is a gender indicator, which is also allowed to vary in its effect by cohort.

Essentially, we treat the wealth variable as summarising all of the financial aspects of socioeconomic status that affect participation in higher education, such as family capacity and preparedness to finance participation. We focus on the effect of wealth as a descriptor of socioeconomic status because it is a composite measure that summarises the social phenomenon we are interested in. It captures the relevant dimension that much of the debate has taken over the composition of the higher education student body in Australia.

The additional family background variables in the broader socioeconomic measure described in the previous section capture other potential influences on university participation. These family background influences may affect university participation through family cultural 'capital' and individual preferences for and ability to undertake higher education. This broader measure is used to assess how robust our results that use the wealth measure only are to the use of broader measures of socioeconomic status.

5 Results

In this section we analyse changes in university participation by using our data to address the following questions:

- Did the relationship between family wealth (or socioeconomic status) and university participation change after 1988?
- Did any such change result in the distribution of university participation across wealth groups becoming less equal after 1988?
- Did the relationship between wealth and student intentions to attend university change after 1988?
- Among a group of 'marginal' decision-makers, i.e. those who indicated while at school that they did not intend to go to university, did the relationship between wealth and university participation change after 1988?, and
- Was HECS the cause of any measured change in these relationships?

Each of these questions is now addressed.

5 (a) Wealth and University Participation

We begin our analysis of university participation by wealth background by looking at the kernel estimates of the proportion of each wealth level that participated at university. These estimates are shown in Figures 3 through 5 for persons, males and females respectively. In all three figures, the lines represent the estimated proportion of 18 year olds by wealth enrolled at university in 1988, 1993 and 1999. These capture periods immediately before the introduction of HECS, when it operated with parameters close to those originally implemented and after the substantial changes introduced from 1997.

The Figures capture collectively a number of well-known features of the Australian higher education sector over the 1990s: the expansion of the system, with the 1999 participation proportions typically lying well above the 1988 ones at all wealth levels; and the increased relative participation of females, with the gap between the 1988 and 1993 and 1993 and 1999 curves much greater for females than males.

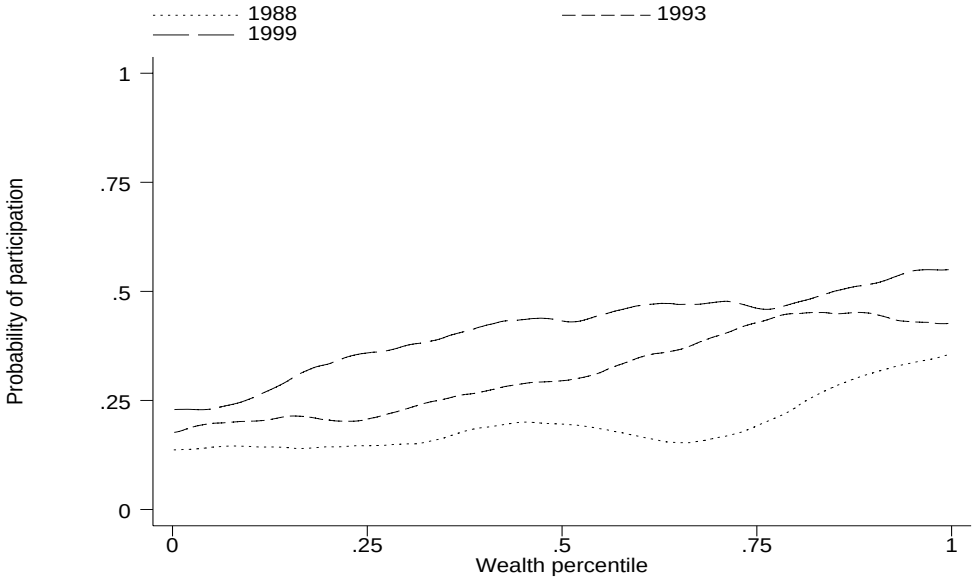
What is also clear from Figure 5 is that the change in female participation varied by wealth level, with the increase in participation more pronounced at middle levels of the wealth distribution than at either the top or bottom of the distribution. For males, the picture is less clear. While participation was generally higher in 1999 than 1988, it was lower over a number of wealth ranges in 1993 than it had been in 1988, especially in the lower half of the distribution. At the very bottom of the wealth range, participation may have been lower for males in 1999 than 1988, but the kernel estimates are too imprecise at the boundaries to be too conclusive on this point.

Figure 3
University Participation by Socioeconomic Status: 1988-99
Persons

Figure 4

University Participation by Socioeconomic Status: 1988-99
Males

Figure 5
University Participation by Socioeconomic Status: 1988-99
Females



Finally, the Figures are consistent with some change in the relationship between university participation and wealth over the period. Visually, the 1999 female curve in Figure 5 is steeper than the 1988 one, at least up to about the 75th wealth percentile. This change reflects the growth in participation from the middle of the wealth

distribution described earlier. Some modest steepening of the relationship for males is also apparent from Figure 4. [31]

We now turn to the parametric estimation of the relationship between university participation and wealth and whether that relationship changed after 1988. The Figures just described would lead us to anticipate that we should find some change – most notably that we would expect to the relationship after 1988 to reflect the faster growth in participation that occurred in the middle of the wealth distribution.

The results from the simple probit estimation of equation (3) are summarised in Table 4. The specifications originally estimated included (alternatively) higher order wealth terms and spline functions of the wealth variables in all years. The results presented in the Table are based on a final specification from which insignificant wealth-related variables were excluded. Essentially, the results indicate that linear terms in wealth capture the relationship between wealth and university participation satisfactorily in 1988 and 1993, but not in 1999 for females and persons.

A number of features of the results summarised in Table 4 are of note. First, participation increased with higher levels of wealth for persons, males and females in 1988. The parameter on the wealth variable in 1988 is positive and significant in all equations and corresponds to a difference in participation between the top and bottom of the wealth distribution of about 15 percentage points.

Second, the growth in participation in the middle of the wealth distribution by 1999 for persons and females was particularly marked. This is reflected in the 1999 quadratic wealth term in the relevant equations. The results suggest that participation among females grew more up to about the 70th percentile between 1988 and 1999 than it did at higher wealth levels.

[31] All of the features described above were evident when the broader measure of SES was used instead of the wealth-based one in Figures like the ones that appear in the text.

Table 4
Modelling the Proportion of University-eligible 18 years Enrolled: 1988, 1993 and 1999

	Persons		Males		Females	
	B	B/std error	B	B/std error	B	B/std error
Constant	-0.935	-11.155	-0.924	-12.858	-1.110	-9.366
1993	-0.054	-0.519	0.021	0.279	0.073	0.511
1999	0.091	0.896	0.155	2.346	0.300	2.139
Wealth rank	0.476	3.364	0.656	8.407	0.640	3.352
Wealth rank by 1993	0.423	2.429			0.413	1.768
Wealth rank by 1999	1.120	3.767			1.196	3.055
Wealth rank squared - 1999	-0.806	-3.208			-0.995	-3.020

Implied wealth effect of a move from the bottom to the top of the wealth distribution on the probability of university participation

	Effect	Effect/std error	Effect	Effect/std error	Effect	Effect/std error
1988	0.148	3.404	0.217	8.301	0.186	3.443
1993	0.303	9.303	0.219	8.503	0.356	8.370
1999	0.279	12.426	0.234	8.638	0.303	10.114
Change between periods						
1988 to 1993	0.155	2.845	0.003	0.278	0.171	2.485
1993 to 1999	-0.024	-0.596	0.015	2.347	-0.053	-1.021
1988 to 1999	0.131	2.676	0.017	2.137	0.118	1.906

(a) Derived from results in Table A.1.

Third, for males, the 1993 and 1999 wealth-year interaction variables are not significant, which suggest that there was no change in the relationship between wealth and university participation after 1988 for males. The 1993 year indicator variable was not significant in the male equation, while the 1999 one was. Taken together, however, the results suggest that male participation changed very little between 1988 and 1999.

Finally, and as a consequence of the previous points, there was a marked shift in participation patterns between the genders. In 1988, a higher proportion of males participated in university than females. By 1999, the reverse was true. This relative growth in participation among females took place across the entire wealth distribution.[32, 33, 34]

[32] Decomposition of this changed participation differential suggest that the incorporation of nurse and teacher education into the higher education system in Australia in the late 1980s made only modest contributions to the total effect reported here. Neither did different patterns of school completion between girls and boys. The major contributing factor was that girls were increasingly more likely to continue to university after completing school.

[33] These findings carried over to results where the broader SES variable was included. With that measure, university participation was more concentrated among high SES individuals in 1988 than

5(b) Equality of the Distribution of University Participation

Figures 3 through 5 show how the proportion that participated at university varied by wealth level in 1988, 1993 and 1999. These estimates can also be used to analyse changes in the distribution of higher education participation by wealth, using analytical tools from the income 'inequality' literature. These include 'Lorenz' curves, Gini coefficients and other inequality measures that can be used to assess whether the distribution has become more or less equal over time.

Figure 6 contains the 'persons' Lorenz curves for university participation for 1988, 1993 and 1999. These Lorenz curves show the cumulative share of university attendance going to the least wealthy specified proportion of the population. More unequal distributions lie further away from the 'complete equality' 45^0 line. Gini coefficients reflect the area between Lorenz curves and the 45^0 line. Therefore, larger Gini coefficients also reflect more unequal distributions.

The three Lorenz curves in Figure 6 are broadly similar. In general, the 1993 curve appears to lie further away from the 45^0 line than the curves for the other two years. This suggests that the distribution of university participation may have been less equal in 1993 than 1988, but not in 1999. However, all three Lorenz curves in Figure 6 intersect one another at various points of the wealth distribution.

Unfortunately, when Lorenz curves intersect, Gini coefficients do not provide an unambiguous comparison of the degree of inequality in two distributions. Other inequality measures, such as those proposed by Atkinson (1970), must be used in those circumstances. The Atkinson indexes vary according to the aversion to inequality they allow. In this context, this means that larger values of the 'inequality aversion' parameter place larger social weights on increased participation by individuals at the lowest end of the wealth distribution. Therefore, we report a range of inequality measures for the 'persons' distributions in Table 5. For all of the inequality measures in Table 5, an increase in the measure between cohorts indicates that inequality increased.

---

with the wealth-based measure, but once more the growth in participation to 1999 was strongest in the middle sections of the distribution. These results appear in Table A.2 of Appendix A.

[34] When the equation includes individual characteristics as additional regressors, the estimates suggest the relationship between wealth and university participation was different in 1993 from what it was in 1988, but not in 1999. These results appear in Table A.3 of Appendix A and may reflect problems with the 1993 data discussed in the next sub-section.

Figure 6
Generalised Lorenz Curves of University Participation by Socioeconomic Status: 1988-99
Persons

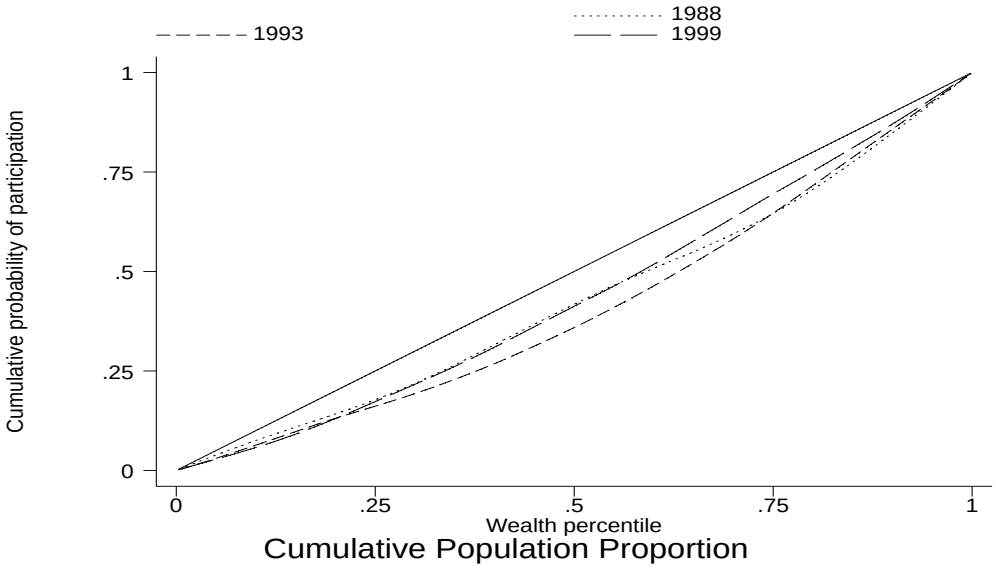


Table 5
Inequality Indexes of University Participation: 1988, 1993 and 1999

	1988	1993	1999
Inequality Index		**Persons**	
Gini coefficient	0.150	0.176	0.121
Atkinson index – inequality aversion parameter = 0.5	0.017	0.025	0.013
= 1.0	0.034	0.049	0.027
= 2.0	0.065	0.096	0.057
90/10 percentile ratio	2.161	2.267	1.980
90/50 percentile ratio	1.575	1.471	1.189
50/10 percentile ratio	1.372	1.541	1.664
75/25 percentile ratio	1.409	1.985	1.355
75/50 percentile ratio	1.174	1.392	1.146
50/25 percentile ratio	1.200	1.427	1.182

The inequality measures presented in Table 5 confirm a number of points already made. First, the distribution of university participation by wealth may have been more unequal in 1993 than 1988, but this was not permanent. Most of the inequality measures were lower by 1999 than they had been in 1988. Second, the growth in university participation between 1988 and 1999 was concentrated in the middle of the

wealth distribution – the 90/10 percentile ratio did not change while the 90/50-percentile ratio fell and the 50/10 percentile ratio increased. That is, participation in the middle of the wealth distribution increased relative to both the top and bottom of the wealth distribution.[35]

Taken together, these various inequality measures suggest that there may have been some change in the relationship between university participation and wealth after 1988. It was more unequally distributed in 1993 than it was in 1988. However, that apparent change did not persist, and by 1999 the distribution was no less equally distributed than it had been prior to the introduction of HECS. In fact, there are reasons to doubt the magnitude of the apparent increase in inequality in the 1993 distribution.

The early 1990s coincided with a sharp increase in repetition of the last year of school in Australia (Morgan 1996). The exact reasons behind this increase are unclear, but appear to have been related in part to students attempting to improve their university entrance rankings, which determine both their eligibility for entrance and the specific courses open to them. This increase in repetition in the data we use is shown in Table 6.[36]

Table 6
Year 12 Repetition and University Deferral Rates: 1988, 1993 and 1999
(per cent)[(a)]

	Year 12 Repetition Rate		University Deferral Rate	
	Male	Female	Male	Female
1988	0.6	1.0	3.6	5.3
1993	7.6	5.0	3.1	5.6
1999	3.3	2.6	3.5	4.2

(a) See footnotes 39 and 40 for definitions of these rates.

With our approach to measuring participation at age 18, this means there was a substantial group in 1993 in the denominator who had not left school. Moreover, this repetition also had a social dimension. It was more concentrated among individuals from the lower end of the wealth distribution in 1993 than it had been in 1988.

In addition, deferral of university commencement by one year also has a social dimension – deferral rates are positively associated with wealth.[37] However, the relationship was slightly less strong in 1993 and 1999 than it had been in 1988.

[35] The same patterns are evident when participation is analysed using the broad SES measure. The broad measure indicates university participation is more unequally distributed than the wealth measure. This is to be expected, since it is based on a weighted average of background factors estimated to affect educational attainment and is, therefore, more likely to capture differences in participation than any one of its constituent elements.

[36] The Year 12 repetition rate for year x shows the proportion of the total cohort who were Year 12 in both year x and year $x - 1$.

[37] The university deferral rate for year x shows the proportion of the total cohort who were Year 12 in year $x - 1$ (but not year x) and who were at university in year $x + 1$, but not year x.

Adjustment of the empirical proportion participating in university suggests that the 'true' curves in Figure 3 for 1988 should be somewhat steeper and the 1993 and 1999 curves flatter.[38] The consequent inequality measures for 1988 all suggest greater inequality than the measures in Table 3, while those for 1993 and 1999 are lower. For example, the Gini coefficients for 1988, 1993 and 1999 of 0.150, 0.176 and 0.121 change to 0.158, 0.167 and 0.115 respectively. Consequently, our view is that the apparent worsening in the equality of the distribution of university participation in 1993 is overstated in the data we use.[39]

5 (c) Wealth and Student Intentions

Individuals in each of the cohorts we analyse were asked at age fourteen or fifteen what they intended to do when they left school, including whether they intended to go to university. Such plans to attend to university will reflect a host of factors that also determine actual participation in university – wealth, family and individual attitudes to higher education, family preparedness to finance study and individual ability. In particular, it seems likely that family 'cultural' capital and values may impact substantially on individual answers to such questions.

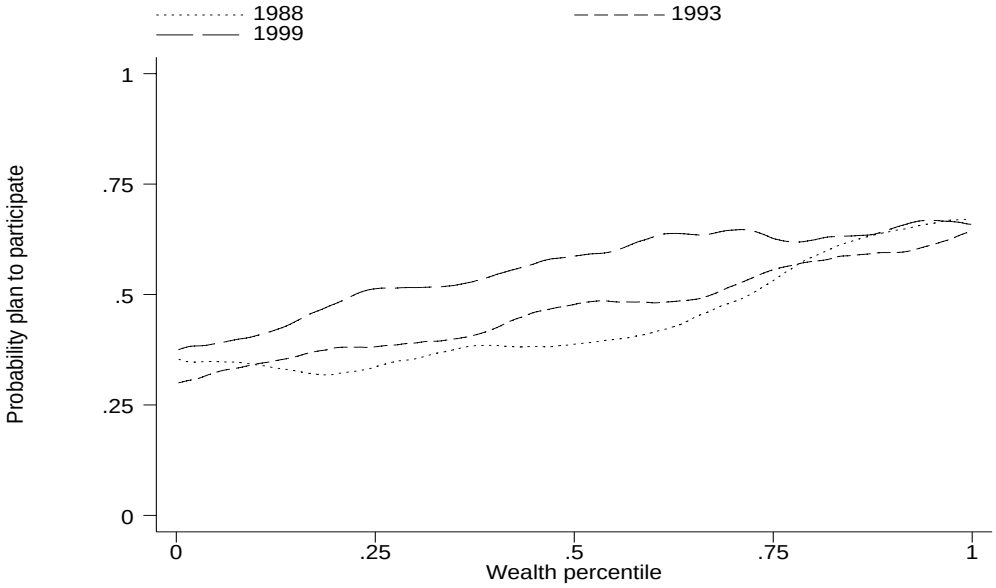
The likelihood that individuals answered that they planned to go to university is presented in Figure 7 and shows a similar wealth profile to actual participation – it was highest among those in the highest wealth groups in the 1988 cohort. The 1993 and 1999 cohorts reported their intentions in 1989 and 1995 respectively. Hence, they both reflect student intentions reported prior to the 1997 HECS changes.

What is notable in Figure 7 is that reported university enrolment intentions changed very little between the 1988 and 1999 cohorts for the lowest and highest wealth groups. These proportions even fell marginally in the 1993 cohort, who reported them in 1989, which may represent some kind of initial HECS announcement or implementation effect. However, the growth in those indicating they intended to go to university was substantial in the middle of the wealth distribution (about 20 percentage points). Earlier analyses indicate that it was this group whose actual university participation increased the most between 1988 and 1999. For the middle of the wealth distribution, the growth in university participation appears to have been driven by growth in educational aspirations, which the introduction of HECS did nothing to dampen. At the extremes of the wealth distribution, study aspirations changed very little. It seems more likely that social forces were at work in generating these changed relative aspirations between these groups than that the introduction of HECS affected the aspirations of both rich and poor over the period but not those of the middle of the distribution.

[38] The adjustment involved:
adjusted participation rate = (measured rate + University deferral rate)/(1- Year 12 repetition rate).

[39] The results in Long et al (1999) support this. Recall that they analyse university participation one year later, at age nineteen. They find a substantial increase in participation between the 1989 and 1994 cohorts, with little difference between the increase in participation of the lowest wealth quartile and that of the middle two quartiles.

Figure 7
Proportion of Students who Intended to Participate at University by Socioeconomic Status: 1988-99
Persons

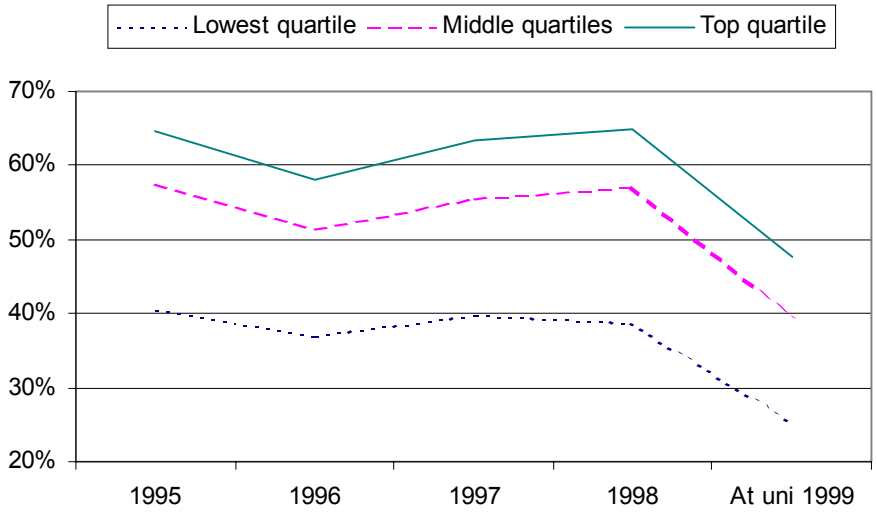


In the last cohort, individuals were asked in each year from 1995 to 1998 what they intended to do when they left school. This makes it possible to identify any announcement effect on university study intentions from the 1997 changes to HECS. These changes were announced as part of the Australian Government 1996-97 Budget in August 1996. The data on intentions were collected by mail from individuals in December of that year. The proportion of the lowest, middle two and highest wealth quartiles who indicated that they intended to go to university in each year from 1995 to 1998 is shown in Figure 8, along with the actual university participation in 1999.

Figure 8 has a number of noteworthy features. First, there is apparently a pronounced 'announcement' effect in 1996 associated with the 1997 changes to HECS. Second, that effect is evident for all wealth groups, though it appears least strong for the low wealth group.[40] Third, the announcement effect was temporary, with the proportion indicating they intended to go to university rebounding in the following year for all wealth groups. Fourth, far fewer individuals attend university than plan to, even among those who plan to do so in Year 12.

[40] The change in the proportion intending to go to university between 1995 and 1996 was significant at the 5 per cent level in aggregate and for all groups except the low wealth group, for whom it was significant at the 10 per cent level. The rebound between 1996 and 1997 was also significant at the 5 per cent level in aggregate and for the medium and high wealth groups, but not the low wealth group.

Figure 8
Proportion of Students Indicating Intentions to Participate at University 1995-99 by Socioeconomic Status: 1999 Cohort
Persons



5 (d) Participation Among a Group of 'Marginal' Decision-makers

The analysis of the entire grade cohorts described above may mask the effect of HECS on groups whose decisions to attend university might be particularly fragile in the face of such changes. One such group are individuals who, at least during their secondary school, showed no strong preferences towards attending university after they completed their schooling.

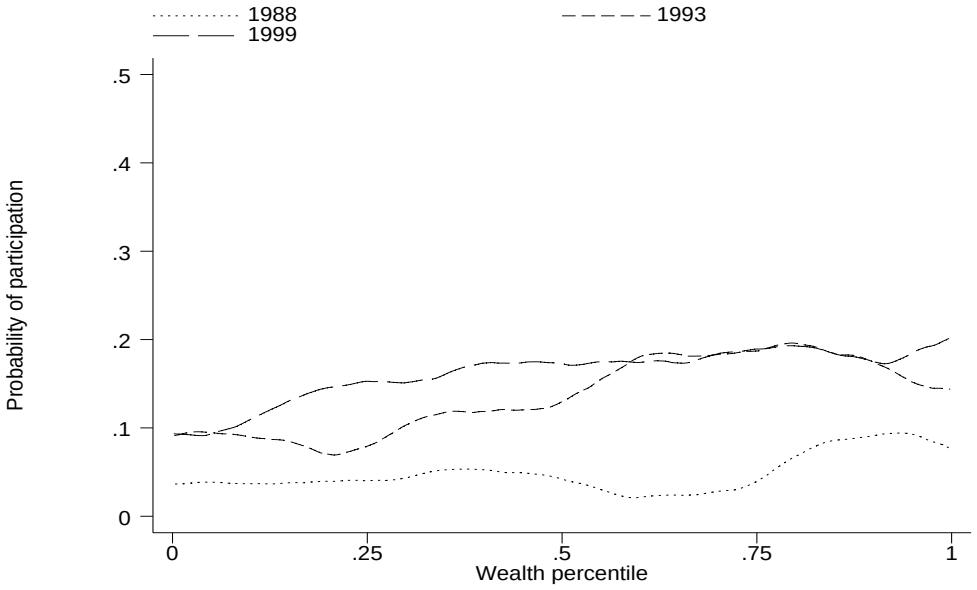
Since intentions do not necessarily translate into action, we now analyse the proportion of individuals who indicated that they did not plan to go to university, but who subsequently did. We view these individuals as able students who did not have strong preferences towards higher education. We are interested in whether there is any obvious wealth effect on participation among such individuals and whether it differed in the earliest cohort from that apparent in the later cohorts. Specifically, if HECS acted as a deterrent to bright students whose school performance led them to attend university when they had not planned to, it might have affected the low socioeconomic status group more than the higher socioeconomic status groups.

Therefore, we now analyse university participation only among the group who indicated that they did not plan to attend university. When analysed this way, there is no evidence of any wealth effect on university participation in any of the cohorts for persons. The probit regression results are summarised in Table A.4 for both genders and Figure 9 for persons. However, the pattern is somewhat different between males and females. Among this group in 1988, participation was positively associated with wealth for girls, but negatively associated for boys. In 1993 and 1999, there was no significant wealth effect on participation for either gender. Figure 9, however, does capture the increased participation among this group associated with the expansion of

the higher education system. The results lead us to conclude that HECS did not act to deter this group of 'marginal' decision-makers from attending university.

Figure 9

Proportion of Students Indicating Intentions to Not Participate at University Who Eventually Did by Socioeconomic Status: 1988-99 Persons



Additional information is available to us about the behaviour of individuals in the middle cohort, the one whose participants commenced their courses after the introduction of HECS. For that cohort, individuals were asked whether they applied to go to university, received an offer of a place, accepted it and actually eventually commenced the course. The proportion of individuals who did not plan to go to university but applied to go and eventually commenced a university course was similar across the wealth distribution at about 0.35.[41]

5 (e) University Access of the Disadvantaged in the Absence of HECS

The analysis in the preceding sub-sections compares the social composition of university participation before HECS operated in 1988 with that of 1993 and 1999. Unfortunately, this is not necessarily the same as analysing the social composition in 1993 and 1999 with and without HECS. In this sub-section, we address how much the absence of a 'true' counter-factual comparison diminishes our confidence about what the results suggest the impact of HECS was on the social composition of university participation.

[41] The proportions for the lowest wealth quartile, the middle two quartiles and the highest quartiles were 0.33, 0.36 and 0.38 respectively. The differences in these proportions were not significant.

Our analysis of changes in higher education participation suggests that the social composition of participants in Australian higher education was different in 1999 from 1988. Participation growth was strongest in the middle of the wealth distributions and more pronounced among females than males. While participation has grown somewhat less at the lower end of the wealth distribution than in the middle, the same is true of the higher end of the distribution. If anything, the distribution of higher education participation across the wealth distribution appeared to become more equal. For those who changed their mind about university participation, there was no evidence that low wealth individuals were any more discouraged from attending university in 1999 than they had been in 1988. Therefore, our conclusion is that those from less privileged backgrounds were no more discouraged from attending university in 1999 than they had been in 1988.

Do these conclusions alone tell us anything about the impact of HECS? After all, other economic and social forces not observed by us may have influenced the estimated relationship between wealth and university participation in 1993 and 1999 and may have masked the 'true' discouragement effect of HECS. An example of such a factor might the strength of the labour market, which might influence the relative availability of full-time employment for individuals from low wealth backgrounds.

If such forces existed, and HECS discouraged access by the poor, their effect must have been to increase university participation at the lower end of the wealth distribution. It seems reasonable to expect that such forces might affect participation in other forms of education in a similar manner. Therefore, some idea about the possible existence of such forces on education participation might be gleaned by looking at Year 12 completion by wealth over the same period.

The data exhibit the same pattern of Year 12 completion over the period as university participation. School completion increased most in the middle range of the wealth distribution, with the increase slightly less at the bottom of the distribution than it was at the top. If broad social and economic forces operated to mask the negative impact of HECS on university participation at the lower end of the wealth distribution, the same forces did not act to push up school completion among that same group relative to other groups.

A second approach to looking at the impact of HECS on the social composition of university participation is to analyse participation among the grade cohort that followed the 1988 cohort already used here. That grade cohort completed school in 1988 and its members were able to commence university in 1989. The data set contains observations on around 250 individuals from that grade cohort.

With a gap of just one year, it seems more reasonable to assume that broader social and economic factors might have little impact on the relative social composition of the university student body in the two periods. The major change affecting the student body between 1988 and 1989 was clearly the introduction of the HECS scheme.

When we replicate the probit regression analysis of Table 4 for the 1988/1989 cohorts, neither a 1989 year identifier nor specific wealth effect for that year were significant. The results are reported in Table A.5 of Appendix A. While we would

prefer to have more observations from 1989 to rely on, there is no evidence from these data that the social composition of university participation changed between two years where the main factor that might have induced such a change was the introduction of HECS.[42]

6 Conclusion

We have found that the socioeconomic composition of the higher education student body changed somewhat between 1988 and 1993 in Australia, with the main change being the relative increase in participation by individuals in the middle of the wealth distribution. In this period the observed change in the distribution and growth in participation for 'persons' seems to be largely driven by changed university participation among females across the entire socioeconomic distribution. In contrast, growth was stagnant for males at the low wealth end of the distribution, very modest for those at the top, but more pronounced for those from the middle of the distribution. Nevertheless, the growth achieved by the last group was still lower than that achieved by females from the low wealth end of the distribution.

In the period after the modifications to HECS, there are apparently no differences between the proportionate increases in the participation of all socioeconomic groups. Further, while there was a slight across-the-board decrease in the intentions of secondary students concerning university participation, in the next year enrolment intentions rebounded to their previous level for all socioeconomic groups. Finally, for a particular group, those who had not intended to participate in university, no differences associated with socioeconomic background were found in the proportion that eventually did participate.

The changes in overall university participation appear to reflect different behaviour across genders rather than across socioeconomic groups, with the exception that growth was highest among the middle of the wealth distribution. There are no strong grounds for arguing that the introduction of HECS has been a major deterrent for individuals from the low wealth group for one gender but not the other. This suggests that the introduction of income contingent charging systems for higher education has the potential to protect the access of the disadvantaged.

[42] Another approach to estimating the impact of the introduction of HECS on the social composition of university participants is to follow Andrews (1999) and analyse participation by HECS Band over the three cohorts (see Table 1 for the disciplines in each Band). Charges for courses in Band 3 more than doubled from 1997. Estimates from a probit equation like that reported in Table 4 indicate that the relationship between wealth and participation in Band 3 courses in 1993 and 1999 was no different from that evident in 1988. The shares of individuals from the lowest wealth quartile of Band 3 courses were 8.1, 11.0 and 8.0 per cent in 1988, 1993 and 1999 respectively. The changes in these shares between the cohorts were not statistically significant.

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APPENDIX A

Figure A.1
Male Age/Earnings Profile, 2002$

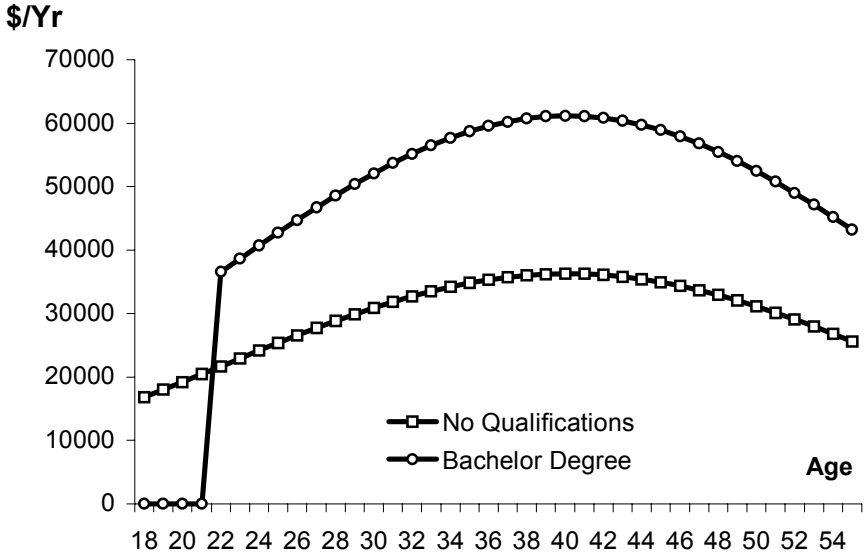

Figure A.2
Female Age/Earnings Profile, 2002$

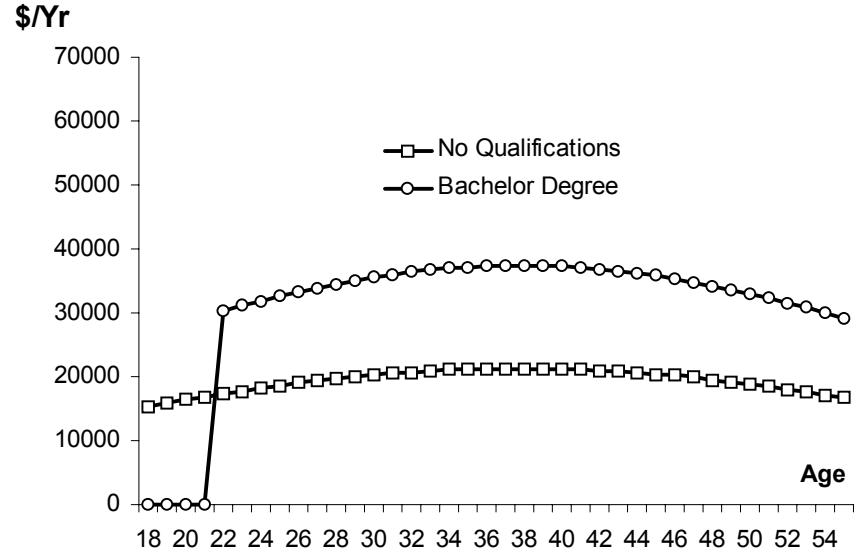

Table A.1
University Participation at age 18: Probit Results with Wealth Measures Only

	Persons		Males		Females	
	B	B/std error	B	B/std error	B	B/std error
Constant	-0.935	-11.155	-0.924	-12.858	-1.110	-9.366
1993	-0.054	-0.519	0.021	0.279	0.073	0.511
1999	0.091	0.896	0.155	2.346	0.300	2.139
Wealth rank	0.476	3.364	0.656	8.407	0.640	3.352
Wealth rank by 1993	0.423	2.429			0.413	1.768
Wealth rank by 1999	1.120	3.767			1.196	3.055
Wealth rank squared - 1999	-0.806	-3.208			-0.995	-3.020
Number of observations	8307		3545		4762	
Log likelihood function	-4957.5		-2102.8		-2833.6	
Restricted log likelihood	-5131.1		-2143.7		-2977.0	
Chi-squared	347.1		81.7		286.8	
Significance level	0		0		0	
Hosmer-Lemeshow	12.7		8.1		5.5	
P-value	0.12		0.42		0.70	
McFadden R^2	0.037		0.025		0.048	
Predictions (cutoff=0.4)						
% not studying correct	71.0		51.6		64.8	
% studying correct	45.7		65.7		57.1	
% correct	62.5		55.9		62.0	
LR test for inclusion of 1988 and 1993 quadratic terms	4.6				2.35	
P-value	0.10				0.31	
LR test for inclusion of 1988 and 1993 wealth and quadratic terms			7.58			
P-value			0.18			

Table A.2
University Participation at age 18: Probit Results with Broad Socioeconomic Status Measures

	Persons		Males		Females	
	B	B/std error	B	B/std error	B	B/std error
Constant	-0.724	-6.225	-0.453	-2.651	-0.961	-5.907
1993	-0.504	-3.253	-0.795	-3.274	-0.258	-1.247
1999	-0.075	-0.576	-0.485	-2.507	0.257	1.436
Wealth rank	-1.581	-2.928	-2.346	-2.853	-0.985	-1.350
Wealth rank squared	2.443	4.627	3.089	3.780	1.987	2.833
Wealth rank by 1993	2.447	3.499	3.230	2.943	1.861	2.017
Wealth rank squared - 1993	-1.740	-2.582	-2.508	-2.373	-1.205	-1.362
Wealth rank by 1999	1.828	3.047	2.376	2.586	1.365	1.694
Wealth rank squared - 1999	-1.362	-2.325	-1.703	-1.877	-1.082	-1.393
Number of observations	8307		3545		4762	
Log likelihood function	-4850.3		-1980.3		-2717.0	
Restricted log likelihood	-5295.1		-2143.7		-2977.0	
Chi-squared	813.6		326.8		519.9	
Significance level	0		0		0	
Hosmer-Lemeshow	31.8		17.0		23.9	
P-value	0.0003		0.030		0.002	
McFadden R^2	0.083		0.083		0.088	
Predictions (cutoff=0.4)						
% not studying correct	76.4		80.7		72.4	
% studying correct	51.0		46.5		54.4	
% correct	67.9		70.2		66.0	

Table A.3
University participation at age 18: Probit Results with Wealth Measures, Gender and Personal Background Variables

	B	B/std error	B	B/std error
Constant	-1.934	-24.493	-1.804	-16.684
1993	0.322	4.446	0.087	0.715
1999	0.674	10.071	0.555	5.038
Wealth rank	0.273	4.605	0.028	0.185
Wealth rank by 1993			0.444	2.450
Wealth rank by 1999			0.217	1.327
Male 1988	0.213	2.62	0.234	2.717
Male 1993	-0.081	-1.29	-0.077	-1.249
Male 1999	-0.288	-7.21	-0.310	-7.446
Father with degree	0.423	7.570	0.420	7.505
Mother with degree	0.357	5.511	0.358	5.520
Both parents with degrees	-0.227	-2.319	-0.225	-2.299
Father's occ - professional	0.342	7.117	0.347	7.201
Father's occ - manager	0.258	6.137	0.259	6.158
Father's occ - other white collar	0.237	4.609	0.241	4.687
Metropolitan region	0.031	0.896	0.032	0.911
Catholic school	0.274	6.832	0.274	6.838
Independent school	0.448	9.353	0.449	9.363
Self assessed ability - well above average	1.150	25.512	1.151	25.554
Self assessed ability - above average	0.667	18.801	0.667	18.793
Father born o/s, English-speaking	-0.032	-0.607	-0.032	-0.610
Father born o/s, non-English-speaking	0.368	8.502	0.366	8.469
VIC	0.106	2.448	0.107	2.483
QLD	-0.098	-2.079	-0.098	-2.078
SA	-0.143	-2.422	-0.142	-2.399
WA	-0.229	-4.116	-0.226	-4.069
TAS	-0.313	-2.912	-0.314	-2.918
NT	-0.255	-1.183	-0.252	-1.169
ACT	-0.056	-0.479	-0.057	-0.491
Number of observations		8307		8307
Log likelihood function		-4164.4		-4161.4
Restricted log likelihood		-5131.1		-5131.1
Chi-squared		1933.5		1939.5
Significance level		0		0
McFaddens' R^2		0.191		0.192
Predictions (cutoff=0.4)				
% not studying correct		79.5		79.5
% studying correct		60.3		60.5
% correct		73.1		73.1

Table A.4
University Participation at age 18: Probit Results for Students Not Planning to Attend University, by Sex

	Persons		Males		Females	
	B	B/std error	B	B/std error	B	B/std error
Constant	-1.688	-10.096	-1.092	-5.967	-3.511	-4.541
1993	0.307	1.614	-0.352	-1.536	2.167	2.768
1999	0.459	2.574	-0.137	-0.671	2.291	2.946
Wealth rank	0.148	0.469	-0.871	-2.136	2.549	2.555
Wealth rank by 1993	0.379	1.068	1.313	2.776	-1.918	-1.875
Wealth rank by 1999	0.280	0.839	1.000	2.268	-1.898	-1.882
Number of observations		4008		1911		2097
Log likelihood function		-1441.7		-644.3		-771.3
Restricted log likelihood		-1479.1		-650.7		-823.2
Chi-squared		74.8		12.9		103.9
Significance level		0		0.025		0
Hosmer-Lemeshow		16.9		12.1		30.6
P-value		0.03		0.15		0
McFadden R^2		0.031		0.012		0.054
Predictions (cutoff=0.4)						
% not studying correct		96.5		100		79.6
% studying correct		6.1		0		34.6
% correct		84.8		89.1		72.9

Table A.5
University Participation 1988 and 1989: Probit Results

	Persons	
	B	B/std error
Constant	-1.048	-11.204
1989	-0.247	-1.199
Wealth rank	0.531	3.720
Wealth rank by 1989	0.229	0.725
1988 Male	0.188	2.322
1989 Male	-0.121	-0.668
Number of observations	1462	
Log likelihood function	-797.3	
Restricted log likelihood	-812.0	
Chi-squared	29.5	
Significance level	0	
Hosmer-Lemeshow	7.49	
P-value	0.485	
McFadden R^2	0.028	
Predictions (cutoff=0.25)		
% not studying correct	62.8	
% studying correct	55.3	
% correct	61.1	