

Will they still pay up-front?
An analysis of the HECS changes in 1997

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Abstract

In the 1996-97 Federal Budget, the Government announced its intention to raise the annual Higher Education Contribution Scheme (HECS) contribution in 1997 by an average of \$2,000 per year per student commencing tertiary studies in 1997. Furthermore, the minimum repayment income threshold will be reduced for all students and ex-students by almost \$7,000 to speed up repayments. Given that the aim of the proposed HECS changes was to raise revenue to reduce the current budget deficit, it is important that these changes raise revenue quickly. On an ongoing basis, the best way to raise revenue is for the government to encourage up-front HECS payment by students.

This paper examines the profiles of those students who paid their HECS liabilities up-front in 1992-93 and evaluates the effects of the proposed policy change on the probability of households choosing to pay their HECS up-front. The regression analysis, using the ABS's 1993-94 Household Expenditure Survey (HES) data, indicates that any increase in the HECS liability is, in fact, likely to *reduce* the probability of up-front HECS payments by households, holding everything else constant. However, given the increased amount paid, it is likely to *increase* government revenue from up-front payment.

The effect of the reduction in the minimum repayment threshold is somewhat inconclusive from the model. Whilst the model shows that a household is more likely to pay its HECS liability up-front if the student in the household is earning above the minimum repayment threshold, it is conceivable that people with lower income are unlikely to be able to afford up-front payments. The model also shows that on average, single parent households are less likely to pay their HECS liabilities up-front compared to non-single parent households. The spouse's income, part-time tertiary studies and the student earning above the minimum HECS repayment income threshold were shown to increase significantly the probability of up-front HECS payment by the household.

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1. Introduction

In the 1996-97 Federal Budget, the government needed measures to increase its revenues and thus proposed to raise the base annual contribution of the Higher Education Contribution Scheme (HECS) by an average of \$2,000 per year per student for those commencing tertiary studies in 1997. Also proposed was a reduction in the minimum repayment income threshold by almost \$7,000 per annum for all current and ex-students to speed up repayments by those who choose or have chosen to defer payments. In 1995, out of the \$911 million in HECS liability incurred by students, \$167 million (18 per cent) were paid by students up-front. Unlike the revenue to be collected from deferred HECS payments, the revenue from up-front HECS payments not only has a higher net present value, it is received "now" when the government needs this money. This paper examines the policy question -- would students still choose to pay up-front when their HECS liabilities have almost doubled on average and their minimum repayment threshold has been reduced? In other words, are these changes likely to raise government revenue now, rather than eight to ten years from now?

These questions are answered by looking at the profile of the students who chose to pay their HECS up-front in 1992-93, what factors influence the students' decisions to pay HECS up-front, and (using regression models) what effects the recent HECS policy change may have on the probability of up-front payments by different types of households.

The results suggest that the increase in the HECS liability proposed in the 1996-97 Federal Budget is likely to reduce the probability of up-front HECS payments, holding everything else constant. However, this reduction in probability is unlikely to translate into a reduction in government revenue, if there is no significant reduction in the number of students resulting from the increased HECS charges. The effects of the reduction in the minimum repayment threshold is inconclusive from the model. Demonstration of aggregate gains in public revenue from the HECS policy changes require further research. On the evidence considered in this paper, the outcome is an open one.

2. The payment of HECS

HECS has been in place in Australia since 1989. In 1996, all undergraduate students (excluding overseas fee-paying students) are charged \$2,442 per year for HECS for a full-time year of tertiary study. Part-time students are charged on a pro-rata basis according to the proportion of a full-time load undertaken. Students can choose to pay their HECS liability "up-front" on enrolment and a discount of 25 per cent is offered, which brings the HECS charge to \$1831.50 per student per full-time year in 1996. Alternatively, students could choose to defer payments of that liability until their personal earnings are at the current average taxable income of working Australians (\$27,675 per annum in 1996). Although HECS is in the tradition of user-pays, the option of deferring payment is not means tested and there are no interest charges on the outstanding liability, ie, it is effectively an interest free loan from the government (although the balance of the loan is indexed each year to the rate of inflation). Furthermore, whether the student actually repays or how much is repaid are linked to the student's *personal* taxable income rather than *household* income. This is the main difference between HECS and other government benefits which typically assume equal resource sharing between members within a household. The rates of repayment in 1996 were:

3 per cent of taxable income when the student's personal taxable income is between \$27,675 p.a. and \$31,449 p.a.;

4 per cent of taxable incomes when the student's personal taxable income is between \$31,450 p.a. and \$44,029 p.a.; and

5 per cent of taxable incomes when the student's personal taxable income exceeds \$44,030 p.a.

From the government's point of view, because the repayment from the deferred option is income contingent, there is no guarantee that it would recover 100 per cent of the debt from each student and there is no knowing how long it would take to recover the debt either. Since HECS has only been in operation since 1989, it is still too early to know precisely the repayment patterns of former students who chose the deferred option. The micro-simulation work by Harding in 1993 found that on the basis of expected future graduate incomes, an average male student enrolling in a four year degree at the age of 18 repays his HECS debt in full by the age of 34, while an average female student enrolled in a

four year degree repays her HECS debt by the age of 40. The study also showed that while 96 per cent of male former students are expected to pay back their debt by the age of 65, only 77 per cent of female students are expected to do so. (Harding 1993)

In contrast, although the government has to offer discounts for up-front payments, it gets its money in advance and the amount received is certain. Thus, it is in the government's interest to encourage up-front payments. However, studies such as Chapman and Chia (1989) has shown that it may not be financially rational for full-time students to pay up-front, especially for those who have just begun their full-time degree. Their rates of return from attending higher education fall with the implementation of HECS compared to a no-charge system and fall even further if they choose to pay their HECS up-front. This is because the repayment of HECS is income contingent, there is a chance that one does not have to pay back the full amount in their lifetime. Moreover, since HECS is effectively a loan with a zero real interest rate, the net present value of the total amount repaid is the largest if it was paid as a lump sum up-front and then generally larger for larger instalments (ie. quicker repayment) under identical circumstances and discount rates. Therefore, there is no financial gain in paying their HECS off up-front (even with the 25 per cent discount) for most full-time students. Chapman and Chia noted that the findings of their study were consistent with the view expounded in the Wran Report that a 40 per cent discount was necessary to equate cost and benefit streams and hence concluded that very few students would pay up-front. However, as shown in the next section of the paper, over 25 per cent of the students paid HECS up-front in 1995. This brings us to the questions of who is paying their HECS up-front and why are they doing it? The answers to these questions are crucial if the government wants to encourage up-front HECS payments.

3. The data and assumptions made in this analysis

This analysis uses time series enrolment data collected by tertiary institutions as well as a sub-sample of the dataset from the Australian Bureau of Statistics' (ABS) 1993-94 Household Expenditure Survey (HES). The HES data are household based rather than person based. Therefore, while detailed statistics on the demographic, income and expenditure of the households are available, in most instances, an independent profile of the student is not available. The cross-section HES dataset

is split up into two groups: the *up-front group* contains 197 households in which at least one member within the household had made an up-front HECS payment in the financial year 1992-93. The *deferred group* consists of households that no member in the household who had made an up-front HECS payment in 1992-93 and contains 431 observations. The 1993-94 HES commenced field enumeration throughout Australia in July 1993 and field enumeration was completed in June 1994. Since the HECS questions referred to 1992-93, it has been assumed that the demographics of the households in the sample did not change between 1992-93 and 1993-94. All the analyses in this study have been done using the expansion factors or weights used in the 1993-94 HES to ensure that results from the analysis are representative of the characteristics of the specific group in the population.

4. Who are paying up-front?

4.1 Time series data

An analysis by the National Board of Employment, Education and Training (NBEET) of the profile of students paying up-front since the introduction of HECS in 1989 reveals that there has been a steady increase in the proportion of students electing this method of discharging their HECS debt. The proportion rose from 20.7 per cent in 1989 to 25.8 per cent in 1995. Although the analysis indicates that more female than male students paid their HECS up-front in each year since 1991, there have been more female than male students enrolled each year since 1991. The percentages of students paying up-front as a proportion of total students within the gender group was very close between male and female and have risen at similar rates since 1991. (See Chart 1 and Chart 2).

Source: 10th Report of the Higher Education Council on the Operation of the HECS Scheme, NBEET,
1996

Source: 10th Report of the Higher Education Council on the Operation of the HECS Scheme, NBEET, 1996

Table 1 shows that the under 19 years' group recorded the largest rise in the proportion of students paying up-front; the proportion rose consistently each year and went up by 7.1 percentage points between 1991 and 1995. The older age groups tend to have higher proportions of students paying their HECS up-front, although there has been little growth in the proportion over the last five years. In 1995, 21.3 per cent of the full-time students, 51.6 per cent of the part-time students and 64.6 per cent of the external students paid their HECS up-front, which represent rises of 5.7, 5.2 and 6.5 percentage points since 1991 respectively.

Table 1. Proportion of Students Paid HECS Up-front

Student Category	1991	1992	1993	1994	1995
Aged under 19	17.60%	18.59%	21.56%	24.28%	24.66%
Aged 20 to 24	14.27%	13.43%	14.28%	16.67%	17.23%
Aged 25 to 29	28.45%	26.55%	28.01%	29.26%	28.41%

Aged 30 to 39	32.02%	30.95%	32.86%	34.96%	34.92%
Aged 40 and over	35.22%	33.76%	34.50%	35.96%	35.48%
Full-time	15.53%	15.80%	15.79%	19.82%	21.25%
Part-time	46.38%	45.01%	44.33%	47.11%	51.61%
External	58.71%	55.83%	55.21%	60.34%	64.63%

Source: 10th Report of the Higher Education Council on the Operation of the HECS Scheme, NBEET, 1996

The reduction in fees associated with up-front HECS payment rose from 15 to 25 per cent in 1993. The proportion of up-front payment in the 15 to 19 age group rose almost 6 percentage points in 1993 and 1994 combined. However, there was no similar rate of increase in the other age groups in 1993 and 1994. Although the recession was officially over in the September quarter 1991, there is a common view that much of the effect of coming out of the recession was not felt in the economy until 1993 (for example, employment did not begin to rise until early 1993). Therefore, the rise in the proportion of students paying up-front in 1993 and 1994 may be due to the business cycle as well as the increase in the discount offered. However, the time series is too short to establish whether the proportion of student paying HECS up-front is correlated with the business cycle.

4.2 Cross section data

As noted above, this part of the analysis uses a sub-sample from the dataset from 1993-94 Household Expenditure Survey (HES) conducted by the ABS. This group was further split into two sub-groups: one which at least one of the household members had made an up-front HECS payment in 1992-93 (the up-front group) and one that no member in the household had made an up-front HECS payment in 1992-93 (the deferred group). The analyses below compare the household characteristics of the two groups.

4.2.1 Age Distribution

Table 2 shows that the up-front group had a much smaller proportion of households than the deferred group where the household head was under 25 years old. Moreover, over 80 per cent of the household heads in the up-front group were aged between 25 and 54 years (the relatively higher

income earning years in one's life time), compared to 74 per cent in the deferred group.

Table 2. Age distribution of the household head of households

	All households in the 1993-94 HES sample (national averages)	Households in the deferred group	Households in the up-front group
under 25 years	6.3%	16.6%	6.8%
25 to 34 years	20.7%	19.7%	25.7%
35 to 44 years	23.8%	20.9%	26.2%
45 to 54 years	18.7%	33.4%	29.4%
55 to 64 years	12.7%	7.1%	9.1%
65 years and over	17.8%	2.3%	2.8%
Total	100%	100%	100%

Source: 1993-94 HES, ABS Cat. no. 6537.0 and unpublished ABS data

4.2.2 Household Income

The average weekly gross household income in 1993-94 was estimated to be \$723.23 for all households in Australia (ABS Cat. No. 6537.0). The data showed that the corresponding figure was \$1132.05 for the deferred group and \$1330.84 for the up-front group. Table 3 shows that average weekly gross household income was higher in the up-front group than in the deferred group for every age category.

Table 3. Average Weekly Gross Household Income by the Age Distribution of the Household Head

	All households in the 1993-94 HES sample	Households in the deferred group	Households in the up-front group
under 25 years	\$628.70	\$651.53	\$896.58
25 to 34 years	\$790.03	\$1022.12	\$1176.76
35 to 44 years	\$881.40	\$1306.58	\$1328.47
45 to 54 years	\$956.60	\$1416.93	\$1665.40

55 to 64 years	\$609.80	\$834.23	\$1045.40
65 years and over	\$348.68	\$735.44	\$1230.24

Source: 1993-94 HES, ABS Cat. no. 6537.0 and unpublished data

The results above confirm the popular belief that members from households from higher income brackets are more likely to participate in higher education, and hence the indirect benefits derived from government outlays on the administration, inspection, operation and support of education programs at higher education institutions and colleges of technical and further education are highly regressive. However, it appears that the up-front group typically consists of households from the upper income groups, which suggests that the benefits associated with the deferred option may not be as regressive as the benefits from higher education in general. Two elements have been identified as possible reasons for the earning differences between the two groups: employment status of the household head and his/ her spouse as well as the occupation of the household head. (There are no data available on the occupation of the spouse of the household head.)

4.2.2 (a) Employment status of the household head and the spouse of the household head

The up-front group had a higher proportion of households where the household head or the spouse of the household head was engaged in full-time employment in 1993-94, as shown in Table 4. The up-front group also had a smaller proportion of households where the household head or spouse was unemployed. The differences in the employment status of the household heads and their spouses are also reflected in the differences in the source of income. 86.2 and 80.5 per cent of the households reported wages and salaries as the main source of their household income in the up-front and the deferred group respectively. Almost 10 per cent of the households in the deferred group reported direct government benefits as their main source of income, whilst only 3.7 per cent in the up-front group reported direct government benefits as their main source of income.

Although the numbers in Table 4 indicate that the up-front group has a higher proportion of households where the spouse of the household head was not employed, 57.5 per cent of the households in the up-front group were dual earner households, compared to only 39.1 per cent in the deferred group. Interestingly, while the average weekly gross household income of the dual earner

households in the deferred group was \$1485.82, it was only \$1406.14 on average for the up-front group. The picture was somewhat different amongst the single earner households, with the average weekly gross household income being \$904.90 and \$1229.01 for the deferred and up-front group respectively. The data indicate that there were more dual earner households amongst the household paying HECS up-front and suggest that the higher proportion of dual earner households in the up-front group was one of the contributing factors to the higher household income for the group. However, while higher household income may not increase the likelihood of the household paying its HECS up-front amongst dual earner households, it may be a more important factor in single earner households.

Table 4. Employment Status of Household Head and Spouse of Household head

Employment status	Household Head of the Deferred Group	Spouse of the H/H Head of the Deferred Group	Household Head of the Up-front Group	Spouse of the H/H Head of the Up-front Group
Full-time	65.4%	20.6%	78.3%	30.5%
Part-time	12.7%	10.9%	6.6%	16.4%
Self-employed	7.5%	8.1%	6.2%	10.6%
Unemployed	4.7%	3.4%	0.2%	0.6%
Not in the Labour Force	9.6%	14.8%	8.7%	19.8%
Total	100%	57.8%*	100%	77.9%*

Source: ABS HES 1993-94, unpublished data

* The results in these columns do not add to 100% because not all household head had spouses.

4.2.2 (b) Occupation of the household heads

The average weekly total gross incomes were \$790.83 and \$664.04 for the household heads in the up-front and the deferred group respectively. Apart from employment status, the level of income also depends on the occupation of the income earner. Table 5 shows that almost 64 per cent of the household heads in the up-front group were employed as professionals, more than 10 percentage points higher than the proportion of professionals in the deferred group. The up-front group also has a lower proportion of household heads not employed or in non-professional occupations. When

holding occupation and employment status constant, the data indicate that there was little earning difference between the household heads in the two groups.

Table 5. Occupation of the Household head

Occupation of the Household Head	Deferred Group	Up-front Group
No status (unemployed or not in the labour force)	13.5%	8.9%
Professionals	53.1%	63.9%
Non-Professionals	33.4%	27.2%
Total	100%	100%

Source: ABS HES 1993-94, unpublished data

4.2.3 Family Composition of the Households

Table 6 shows clear differences in the family composition between the two groups. Almost 18 per cent of the households in the in deferred group were *single parent* households, compared to just over 6 per cent in the up-front group. Almost 23 per cent of the households in the up-front group were *couple only* households, compared to just under 11 per cent in the deferred group. The proportion of *couple with dependent children only* households in the up-front group was about 8 percentage points higher than in the deferred group, while the proportion of *lone person* households was similar between the two groups. Table 7 shows that while almost half of the *couple only* households paid their HECS up front in 1992-93, only a little over 13 per cent of the *single parent* households paid their HECS up front.

Is it the family composition or the household income associated with the family composition that affects the household's HECS payment decision? Table 8 and 9 suggest that for *couple only* and *couple with dependent children only* households, the average gross household income or the gross income per household member may not be the major deciding factors in the households' HECS payment decisions. However, for *lone person* and *single parent* households, income may be a more important consideration when deciding whether to pay HECS up-front.

Table 6. Family Composition of Households in the Two Groups

Family Composition	Deferred Group	Up-front Group
Couple-only households	10.8%	22.9%
Couple with dependent children only households	20.8%	28.9%

Lone person households	7.8%	7.2%
Single parent households	17.8%	6.1%
Other household types	42.8%	34.9%
Total	100%	100%

Source: ABS HES 1993-94, unpublished data

Table 7. Family Composition of the Households and Their HECS payment decisions

Family composition	Deferred HECS	Paid HECS up-front	Total
Couple only households	51.3%	48.7%	100%
Couple with dependent children only households	61.7%	38.3%	100%
Lone person households	70.6%	29.4%	100%
Single parent households	86.8%	13.2%	100%

Source: ABS HES 1993-94, unpublished data

Table 8. Family Composition of Households by average weekly gross household income

Family Composition	Deferred Group	Up-front Group
Couple-only households	\$1155.95	\$1158.68
Couple with dependent children only households	\$1208.88	\$1346.90
Lone person households	\$447.19	\$824.54
Single parent households	\$976.91	\$1178.11

Source: ABS HES 1993-94, unpublished data

Table 9. Average weekly gross income per household member

Family composition	Deferred group	Up-front group
Couple only households	\$577.98	\$579.34
Couple with dependent children only households	\$537.28	\$500.70
Lone person households	\$447.19	\$824.54
Single parent households	\$328.93	\$525.94

Source: ABS HES 1993-94, unpublished data

4.2.4 Part-time Studies

As noted before, the time series data from universities indicate that roughly half of the part time tertiary students pay their HECS up front. The HES data also indicate that the up-front group had a much higher proportion of households with at least one household member undertaking part-time tertiary studies, as shown in Table 10.

Table 10. The proportion of households with at least one member undertaking part-time tertiary studies

Number of part-time tertiary students in the household	Deferred Group	Up-front Group
0	74.5%	54.6%
1	23.1%	34.8%
2	2.3%	9.7%
3	0.1%	0.9%
Total	100%	100%

Source: ABS HES 1993-94, unpublished data

4.2.5 Country of origin

There is a common view that people from different ethnic backgrounds have quite different attitudes towards debt and inter-generational provision. For example, it is fairly common for young people from the East-Asian background to have never engaged in paid employment until they graduate from university. Consequently, one might expect East Asian households to have less part-time students. The data shows that in 1993-94, 18.6 per cent of the East Asian households had at least one member undertaking part-time tertiary studies. The corresponding figure for households with non-East Asian-born household heads was 32.4 per cent. However, there was little difference in the proportion that paid their HECS up front between East Asian and non-East Asian households as shown in Table 11. Table 12 shows that the proportion of household heads born in Australia and Europe were higher in the up front group than in the deferred group, while the proportion of household heads born in the United Kingdom, New Zealand, the United States and in East Asia were lower in the up front group than in the deferred group.

Table 11. Birth country of the household head of the household by the proportion of households paid HECS up front

Birth place of the household head of the h/h	Proportion of households paid HECS up-front
Australia	32.1%
UK, New Zealand and the US	27.4%
Europe	32.0%
East Asia	28.0%

Source: ABS HES 1993-94, unpublished data

Table 12. Country of birth of the household head

Country of birth of the head of household	Deferred Group	Up-front Group
Australia	69.5%	73.5%
UK, New Zealand, the US	10.8%	9.1%
Europe	8.9%	9.5%
East Asia	6.3%	5.5%
Other countries	4.5%	2.4%
Total	100%	100%

Source: ABS HEC 1993-94, unpublished data

5. The Regression Analysis

So far the data have indicated unambiguous differences in the profile of the households in the up-front and deferred group. Although the basic profile statistics of who are paying HECS up-front are interesting in their own right, from a policy perspective, it is important to establish which of the profile statistics are significant in influencing people's decisions to defer or pay up-front and their quantitative impact. To achieve this, a logistic regression was run using data from the HES survey. A dummy variable was used as the dependent variable, 1 for the households that had made up-front HECS payments in 1992-93 and 0 when no up-front payment was made. Table 13 shows the parameter estimates from the logistic regression where no up-front payment was made, with asterisks against the statistically significant variables. *The country of birth of the household head and whether the household is a dual earner household* were found to be highly insignificant in the earlier iterations of the model and hence have not been included here.

Table 13. Logistic regression variables and results (for no up-front HECS payment)

Variable	Parameter Estimate	Standard Error	Wald Chi-Square
Intercept	3.3723	1.1222	30.4618
Age of the household head	-0.089	0.0555	2.6859
Age of the household head (squared)	0.000734	0.000656	1.576
Total income of the household head (p.a.)	3.546E-6	3.323E-6	0.9983
Total income of the spouse of the hh head (p.a.)	-0.00001	6.462E-6	2.3956

The household had 2 or more part-time tertiary students * (1=yes, 0=no)	-1.4661 *	0.4387	9.0805
The household had 1 part-time tertiary * students (1=yes, 0=no)	-0.4755 *	0.2052	5.1296
The household head was employed in a professional occupation (1=yes, 0=no)	-0.1672	0.2056	2.1710
Lone person household (1=yes, 0=no)	-0.3105	0.3344	1.6137
Couple only household (1=yes, 0=no)	-0.5397	0.2819	2.2151
Single parent household (1=yes, 0=no)	0.9265	0.3720	3.2628
Average income per income earner above the minimum repayment threshold of \$27,748 in 1992-93 * (1=yes, 0=no)	-0.5267 *	0.2388	6.082
The amount of HECS liability in the year 1992-93 *	0.000236 *	0.000065	8.2289

The nature of a logistic equation is that all the probabilities are compared to a *base case* and hence it is important that the *base case* is specified correctly. In this analysis, it took several iterations to identify out which of the household characteristics are worthwhile to be included in the model and which ones are appropriate to be used to represent a *base case*. The significance of the variables was used to determine the *base case*, as well as the *test cases*.

The data showed that the mean household head income was very close to the median, and this variable was found to be insignificant regardless of the model specification. Therefore, the average income of the household head is used in the *base case* and remained unvaried in the *test cases*. With family composition, *Couple with children* household was found to be the most common household type in this group (almost 50 per cent). *Group* and *multiple families* households were found to be highly insignificant in the early iterations of the estimation of the model and hence have

been included along with *couple with children* households to represent the family composition of the *base case*. The only family composition close to being significant in the logistic regression was *single parent* households, and this was used as one of the *test cases* to see how the probability of the household making an up-front HECS payment change relative to the *base case* when the household is a *single parent* household.

The age of the household head was shown to be insignificant, and the average age of 40 years was specified in the base case. Income of the spouse of household head was shown to be insignificant in the logit regression. However, as shown in Table 15, results from an Ordinary Least Squares regression indicate that this variable is significant. Consequently, along with the case of zero spouse income, 2 other levels of spouse's income have been included in the test cases: \$18,668 per annum and \$30,000 per annum. Rather unlike the picture of household head incomes, 41.6 per cent of the households have reported either zero or negative spouse income. These include households that the spouse of the household head was not working or had business losses, as well as *lone person* and *group* households where there was no "spouse". The distribution of those with income also tends to be heavily skewed to the left, and \$18,668 was the median income of those spouses with income, while the value of \$30,000 was chosen to represent a medium-high but realistic case. The amount of HECS liability was shown to be significant and a number of cases were tested to see the effects of the different HECS amount. Obviously, the amount of HECS liability is related to the number of part-time tertiary students in the household (if any) and it was assumed here that a part-time student has half of the full HECS liability. Hence these variables move together in some of the test cases. Then the test cases are based on the recent recommendation in the Federal Budget of increasing the amount of HECS liability of roughly \$2,000 per full-time student per year.

To test the effect of the minimum repayment threshold, a dummy variable representing the effect of the minimum repayment threshold was included in the regression. Since there were no data available on the personal income of the student, an average taxable income per income earner within the household was used as a proxy. This variable was shown to be significant and has been incorporated in some of the test cases.

The characteristic of the base case here is a *couple with children* household where the household head is aged 40, earning \$36,567 per annum, with one full-time student having a HECS debt of \$2,289 per annum. (The HECS debt amount used is the average of the HECS charges per year in 1992 and 1993.) Table 14 shows the probability of the household paying HECS up front from logistic regression based on different specifications, with the differences from the *base case* highlighted in bold.

Table 14. Probability of the household paying HECS up front based on Logistic regression

Test cases	Probability of the household paying HECS up-front based on Logistic regression
H/H head income \$36,567 p.a., aged 40 1 f/t student with H/H HECS liability \$2,289 p.a. (Base Case)	16.02%
H/H head income \$36,567 p.a., aged 40 Single parent household 1 f/t student with H/H HECS liability \$2,289 p.a.	7.02%
H/H head income \$36,567 p.a., aged 40 1 f/t student with H/H HECS liability \$4,289 p.a.	10.63%
H/H head income \$36,567 p.a., aged 40 1 p/t student with H/H HECS liability \$1144.5 p.a.	28.68%
H/H head income \$36,567 p.a., aged 40 2 p/t student with H/H HECS liability \$2289 p.a.	45.25%
H/H head income \$36,567 p.a., aged 40 1 p/t student with H/H HECS liability \$1144.5 p.a. H/H head is the student (ie. earning above minimum repayment threshold)	40.51%
H/H head income \$36,567 p.a., aged 40 H/H head is the student (ie. earning above minimum repayment threshold) 1 p/t student with H/H HECS liability \$2144.5 p.a.	34.97%
H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. 1 f/t student with H/H HECS liability \$2,289 p.a.	18.70%
H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. 1 f/t student with H/H HECS liability \$4,289 p.a.	12.54%
H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. 1 p/t student with H/H HECS liability \$1144.5 p.a.	32.64%

H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. 1 p/t student with H/H HECS liability \$1144.5 p.a. H/H head is the student (ie. earning above minimum repayment threshold)	45.97%
H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. H/H head is the student (ie. earning above minimum repayment threshold) 1 p/t student with H/H HECS liability \$2144.5 p.a.	40.19%
H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. H/H head is the student (ie. earning above minimum repayment threshold) 2 p/t student with H/H HECS liability \$2289 p.a.	62.78%
H/H head income \$36,567 p.a., aged 40 Spouse income \$18,668 p.a. H/H head is the student (ie. earning above minimum repayment threshold) 2 p/t student with H/H HECS liability \$4289 p.a.	51.27%
H/H head income \$36,567 p.a., aged 40 Spouse income \$30,000 p.a. 1 f/t student with H/H HECS liability \$2,289 p.a.	20.48%
H/H head income \$36,567 p.a., aged 40 Spouse income \$30,000 p.a. 1 f/t student with H/H HECS liability \$4,289 p.a.	13.84%
H/H head income \$36,567 p.a., aged 40 Spouse income \$30,000 p.a. 1 p/t student with H/H HECS liability \$1144.5 p.a. 1 student earning above minimum repayment threshold)	47.89%
H/H head income \$36,567 p.a., aged 40 Spouse income \$30,000 p.a. 1 p/t student with H/H HECS liability \$2144.5 p.a. 1 student earning above minimum repayment threshold)	32.06%
H/H head income \$36,567 p.a., aged 40 Spouse income \$30,000 p.a. 2 p/t student with H/H HECS liability \$2289 p.a. 2 student earning above minimum repayment threshold)	76.18%
H/H head income \$36,567 p.a., aged 40 Spouse income \$30,000 p.a. 2 p/t student with H/H HECS liability \$4289 p.a. 2 student earning above minimum repayment threshold)	66.62%

The results from a logistic regression refer to a specific base case but allow probabilities of specific cases (in reference to a base case) to be calculated as shown above. It is impossible to simulate every possible scenario to generate average probabilities, however, the result from an Ordinary Least Squares (OLS) regression is often a close approximation to the average result from the more complicated logistic regression. The result from an OLS regression is shown in Table 15, with asterisks against the significant variables.

Table 15. Results from the Ordinary Least Squares Regression

Variable	Parameter Estimate	Standard Error	T statistics
Intercept	-0.106264	0.1818	-0.585
Age of the household head	0.013531	0.0093	1.454
Age of the household head (squared)	-0.00018	0.0001	-0.970
Total income of the household head (p.a.)	-7.49E ⁻⁵	6.5E ⁻⁵	-1.157
Total income of the spouse of the hh head * (p.a.)	2.596E ⁻⁴ *	1.28E ⁻⁴	2.033
The household had 2 or more part-time tertiary students * (1=yes, 0=no)	0.311642 *	0.087	3.581
The household had 1 part-time tertiary students * (1=yes, 0=no)	0.099637 *	0.0409	2.433
The household head was employed in a professional occupation (1=yes, 0=no)	0.023613	0.0387	0.610
Lone person household (1=yes, 0=no)	0.068286	0.070	0.975
Couple only household (1=yes, 0=no)	0.105050	0.0558	1.884
Single parent household * (1=yes, 0=no)	-0.13998 *	0.0542	-2.582

Average income per income earner above the minimum repayment threshold of \$27,748 in 1992-93 * (1=yes, 0=no)	0.097829 *	0.0432	2.264
The amount of HECS liability in the year 1992-93 *	-2.8702E-3 *	8.92E-4	-3.219

The results from the two regressions indicate that being a *single parent* household decreases its probability of paying its HECS up-front. In the case of a *single-parent* household with the household head earning an average income, aged 40, and the household has one full-time tertiary student, the probability falls by 9 percentage points relative to a *non-single parent* household of otherwise a similar profile. On average (OLS result), the probability falls by 14.0 per cent, holding everything else equal. The regression results appear to suggest that being a *couple only* household does not increase significantly the probability of the household paying its HECS up-front. This reflects the result showed in Table 7, which indicated that proportion of *couple-only* household that made up-front HECS payment in 1992-93 was roughly the same as the proportion that deferred HECS payment.

While the demographic results are interesting information to policy makers, there is little policy makers can do to affect the family composition of the students' household or the age and the country of birth of the household head in attempt to encourage up-front HECS payment. The following results have stronger policy implications. Interestingly, the OLS regression results showed that it is the spouse's income, not the household head's income that has a significant and positive impact on the probability that the household pays its HECS up-front. The result suggests that on average, for every \$10,000 extra in the spouse's income per year, the probability of the household paying its HECS up-front increases by around 2.6 per cent. On other attempts, other income measures including gross household income, household taxable income, household disposable income, gross household income per income earner in the household, and gross household income per number of persons in the household were tried separately as independent variables instead of the household head's and the spouse's income but were all found to be insignificant. This result is plausible if we believe that

households often use the secondary income earned by the spouse of the household head to pay for the "luxuries or extras" in life. Since an up-front HECS payment is not compulsory, it can be considered as a "luxury". Results from the Logistic regression suggest that while spouses' income has a positive impact on the probability of up-front HECS payment, its effect is not statistically significant.

Not surprisingly, whether the household has any part-time tertiary student is highly significant in influencing the probability of the household making an up-front HECS payment. In order to make the *test cases* more realistic, the presence of a part-time tertiary student in a *test case* instead of a full-time one also means that the household's HECS liability is reduced to half. The amount of HECS liability is shown to have a negative effect on the probability of the household paying its HECS up-front. Compared to the 16 per cent chance of the household paying its HECS up-front for the base case, the probability rises to over 28 per cent if the household had a part-time student with half the full-time HECS liability. Even more interestingly, if a household has identical characteristics to the *base case*, except that it has two part-time tertiary students instead of one full-time one, the probability of it making an up-front HECS payment rises from 16 per cent to over 45 per cent, even though the amount of HECS liability is identical for the two households. Furthermore, if one of the two part-time students in this household was the household head, it means that one of the students is earning above the minimum repayment income threshold, the probability of this household making an up-front payment rises to over 58 per cent. This is because whether the student earns above the minimum repayment income threshold is another highly significant variable in determining up-front HECS payment by the household, as shown in Table 14 and 15. The OLS result indicates that on average, holding everything else equal, a household with one part-time tertiary student has an increased probability of about 10 percentage points in paying its HECS up-front, and this increase in probability rises by over 31 percentage points when the household has two or three part-time tertiary students. If the student is earning above the minimum repayment income threshold, the probability of the household paying its HECS up-front rises by almost 10 percentage points.

6. Policy Implications

The result discussed so far suggests that one way to maintain and perhaps increase up-front HECS payment is to encourage the participation in higher education by working students. This may be achieved by offering more post-graduate courses and by correspondence courses (targeted at mature age students wanting to update their professional knowledge) as well as offering under-graduate courses with a more flexible timetable to enable students to work while undertaking their under-graduate studies. Another possible direction is to promote the benefits of a more educated workforce and encourage employers to provide a "study-friendly" working environment for workers. More flexible working arrangements and the provision of study leave are two obvious solutions.

The HES data indicate that 72 per cent of the household heads in this dataset who had a spouse in 1993-94 were male. The income distribution of the spouses' income suggests that the spouse of the household head is more likely to be the secondary earner in the family. Since the income of the spouse of the household head is significant in determining the way households discharge their HECS liability, policies that assist women to get into higher income earning professions are likely to have some subsidiary effects on HECS up-front payment. School retention rates for girls, tertiary education and labour force participation rates for females have all been rising steadily in recent years. Moreover, child care facilities and more flexible working arrangements are both becoming more accessible to many workers. All these suggest that we can expect more and more women in higher income earning professions in the years to come. If the women continue to remain predominantly the spouse of the household head (rather than the household head) and the relationship between HECS payment and the income of the spouse of the household head continues in the future, the probability of up-front HECS payment is likely to keep rising, holding all else constant.

In the 1996-97 Federal Budget, the government proposed to raise the base annual contribution by \$813 per year for students doing Arts, Social Science, Education and Nursing, by \$2,213 per year for students in most other disciplines and by \$3,013 per year for students studying Medicine and Dentistry. On average, that is an increase of approximately \$2,000 per year per full-time student. Table 14 showed the different probabilities of the households paying their HECS up-front given the \$2,000 increase in the HECS liability (assuming a \$1,000 increase for part-time student). The results

suggest that the probabilities of up-front payment by the households would fall by around 5 to 10 per cent per student within the household with a \$2,000 increase holding everything else constant. This is consistent with the OLS result which indicates a fall of 2.9 percentage points per \$1,000 increase on average, or 5.8 percentage points for \$2,000 increase. This result is not at all surprising. Given that HECS is essentially an interest free loan with income contingent repayment, the net present value of the repayment decreases each year if the repayment rate and the inflation rate are held constant until the debt is paid off. Thus, the larger the size of the HECS liability, the larger the difference between the net present value of the total amount repaid through the deferred option and the up-front payment. Although the *base case* in Table 14 suggests that a household with those specified characteristics has a probability of 16 per cent paying its HECS up-front if it has one full-time tertiary student, an average probability of paying HECS up-front for the entire tertiary student group is likely to be higher. For instance, the NBEET report for 1995 indicates that of the total HECS liability of \$911 million incurred in 1995, \$167 million or 18.3 per cent was paid by students up-front. The same report also indicates that the proportion of students who paid their HECS up-front was 25.8 per cent in 1995. If it is assumed that the average probability of an up-front payment is the mean of the two, ie. 22.0 per cent, a reduction of 5.8 percentage points (which is the average amount of reduction for \$2,000 increase in the HECS liability per student from the OLS result) reduces the probability of up-front payment to 16.2 per cent. The nature of the HES data and the size of the dataset means that it was not possible to estimate separate equations for full-time and part-time students. Hence the estimates from here on have not taken into account the differences between full-time and part-time students, and provide only a rough illustration of the effects of the policy change. The average annual increase in the number of students between 1991 to 1995 were 3.2 per cent for total commencing students and 3.4 per cent for total continuing students (taken as the average of the annual increases). Assuming that these rates of increase continue in the next two years, in 1997, there will be roughly 360,000 continuing students and 236,000 commencing students. The government revenue from up-front HECS payment for 1997 without the HECS increase is estimated to be \$240 million. $(0.22 * (360,000+236,000) * 2442 * 0.75$, where 0.22 is the probability of an up-front payment, $(360,000+236,000)$ is the total number of students, \$2442 is the amount of HECS liability per student, and 0.75 reflects the 25 per cent discount offered to up-front payments.) This estimate may be

somewhat lower in reality because part-time students have smaller HECS liabilities. The HECS increase announced in the 1996-97 Budget affects only the *commencing students* in 1997, while the *continuing students* will still be charged at the old rate. The split charges resulted in split probabilities between *commencing* and *continuing* students. Therefore, the government revenue from up-front HECS payment in 1997 with the HECS increase using a similar formula is estimated to be \$272 million. $(0.22 * 360,000 * 2442 * 0.75) + (0.162 * 236,000 * 4442 * 0.75)$, where 0.22 is the probability of an up-front payment for *continuing students* and 0.16 reflects the reduced probability of an up-front payment because HECS liability has risen from \$2442 to \$4442 on average for a full-time *commencing* student.) Table 16 shows the effects of the \$2,000 increase as announced in the 1996-97 Budget on government revenue in 1997 from up-front HECS payment, along with other hypothetical amount of HECS increases, based on the simple linear relationship between the probability of up-front payment and the amount of HECS increase from the OLS model, ie. a reduction of 2.9 percentage points per \$1,000 increase. No data are yet available on the effects of the HECS increase on the number of commencing students. For simplicity it has been assumed here that there is no effect, hence these estimates are likely to be biased downwards.

Table 16. Government Revenue with HECS Increases

Amount of HECS increase for the average full-time student	No increase	\$1,000	\$2,000	\$3,000	\$4,000	\$5,000
Probability of an up-front HECS payment by Household with one full-time student	22%	19.1%	16.2%	13.3%	10.4%	7.5%
Revenue from up-front HECS payment	\$240 m	\$261 m	\$272 m	\$273 m	\$264 m	\$244 m

Apart from the increase in the annual HECS charges, the 1996-97 Budget also announced a reduction in the minimum repayment threshold from the \$27,675 per annum in 1996 to \$20,701 per annum in 1997 for all current and past students who still have outstanding HECS liabilities. The effect of this change has not been taken into account in calculating the figures for Table 16. The regression

result suggests that the probability of a household making an up-front payment increases by about 10 per cent if the average taxable income per income earner in the household is above the minimum repayment threshold. Therefore, although the overall effect of a reduction in the minimum repayment threshold along with the increase in HECS liability cannot be modelled here, intuitively, it is likely to further increase revenue from up-front HECS payment, if students can afford to pay their HECS up-front. As noted before, students who are already earning above the minimum repayment threshold do not have the option to defer payment, but have the option to pay by instalment or up-front by a lump sum. Lowering the threshold means that more working students would be earning above the minimum threshold. Moreover, full-time students (especially those in their final years) who foresee themselves earning above the minimum repayment threshold upon graduation in the near future may also be tempted to take advantage of the discount offered and pay their HECS up-front. One issue that has not been looked at in this analysis or in the literature is the effect HECS has on part-time students already earning above the threshold. It is conceivable that by lowering the minimum threshold from \$27,675 per annum to \$20,701 per annum, people on low income, or those previously earning just below the threshold, might find it difficult to cope with the HECS repayment and hence do not participate in tertiary studies.

One other method to speed up HECS repayment is to increase the repayment rate for those with outstanding HECS liability, but this was not used in the 1996-97 Budget. Holding everything else constant, this change would also raise the net present value of the total amount repaid, therefore making the up-front option relatively less expensive. Although the effects of a rise in the repayment rate cannot be modelled here, intuitively it is unlikely to have a major impact on the probability of up-front payment unless the repayment rate was raised to the extent that students would be clearly better off choosing the up-front option because of the discount offered. However, such a high repayment rate could effectively create a class of young working poor, especially for those who could not afford to pay up-front when they were attending university and then have to face a high repayment rate when they start working, which could severely lower their disposable income.

In summary, a rise in HECS liability is likely to reduce the probability of up-front payments.

However, since the amount paid would be higher, the overall effect is likely to be an increase in government revenue. A reduction in the minimum repayment threshold means that more current and past students would be repaying their HECS debt. It may also to increase the probability of up-front payment for those who can afford to do so. An increase in the repayment rates for those who are already repaying their debt is going to speed up the repayment of the outstanding liability, but may not have a significant effect on the probability of up-front payments.

7. Conclusion

This analysis has attempted to answer the question of who pay their HECS up-front by looking at the detailed data on the profile of the students who did pay their HECS up-front. Time series data from universities indicate that the proportion of up-front HECS paying students has been rising steadily since the introduction of HECS in 1989. The majority of those who paid up-front were aged 15 to 19 and the proportion paying up-front in that age group has been rising steadily. Roughly half of the part-time or older students pay their HECS up-front, but there has been little change to the proportion paying up-front. The cross section data from the most recent ABS Household Expenditure Survey indicate unambiguous profile differences between the households that paid HECS up-front and those which deferred. Apart from the fact that households which paid up-front typically had higher household income than those which deferred, there were also more couple only households and less single parent households, more professional households, more dual earner households, more Australian and European households and less non-Australian English speaking and East Asian households amongst those which paid up-front. Over 45 per cent of the households that paid HECS up-front had at least one member attending higher education on a part-time basis, compared to just over 25 per cent amongst those which deferred.

Results from the regression analysis indicate that a higher amount of HECS liability and being a single parent household are two factors that reduce the probability of a household paying its HECS up-front. Income of the spouse of the household head, if the income of the student is above the minimum repayment threshold, and the existence of part-time tertiary students in the household were found to have some significant positive impacts on the probability of the household paying its HECS up-front. The regression result implies that policies that encourage working students to participate in

higher education, or those which encourage women to enter into higher income professions are likely to have positive impacts on the probability of households paying their HECS up-front and hence upon the government's revenue from up-front HECS payment. In contrast, any increase in the amount of HECS liability per student, holding all else constant, is going to reduce the probability of households paying their HECS up-front. However, given that the actual amount paid is increased, the overall effect on government revenue is still likely to be positive. Although a household is more likely to pay its HECS up-front if the average income is above the minimum repayment threshold, it is unclear whether a reduction in the minimum repayment threshold really means that households are more likely to pay their HECS up-front. Some of those who can afford to do so may find it advantageous to pay up-front, while others may simply not be able to afford it.

Appendix

The cross-section data used in this analysis were from a sub-sample dataset from the Australian Bureau of Statistics' 1993-94 Household Expenditure Survey (HES), which basically includes only the households that answered yes to Question 11 in the survey (*Since the beginning of 1989, has anyone in this household been enrolled in Australia in a University, College of Advance Education or equivalent?*) Thus, the dataset included students who were enrolled but were exempt from HECS, ie some post graduate students and overseas fees paying students. Furthermore, the survey questions in relation to the households' HECS liabilities and payments refer specifically to the financial year 1992-93. In other words, this dataset would also have included households with members that had been enrolled in a university since 1989 but not in specifically 1992-93, ie, past under-graduates, continuing students who may have suspended their studies in 1992-93, and those who had discontinued their studies. Since the focus of this analysis is HECS payment, all of the observations with zero HECS liabilities in 1992-93 were taken out of the dataset, and this has reduced the overall sample size of the group was reduced from 1275 to 662.

Amongst those 662 households, 231 households had at least one member who had made an up-front HECS payment in the financial year 1992-93. However, 34 of them had reported that their HECS payments were wholly or partly paid by someone other than one of the members within the household. There is no further information as to who outside the households had made the payments (it could have been a grandparent, a separated parent, or an employer, etc). Thus, due to the lack of further information, I chose to omit those households that had their HECS paid by someone else and this reduces the size of the *up-front group* to 197 households. This reduction has reduced the "noise" in the data (due to having inappropriate households included) and was done at the expense of reducing sample size (which decreases the reliability of the estimates). The *deferred group* consists of households that no one in the household had made an up-front HECS payment in

1992-93 and contains 431 observations. The size of the final sample for this analysis came to 628 observations which was still relatively large compared to what a lot of other researchers use.

All of the analyses in this study have been weighted to ensure that results from the analysis reflect the profile of the particular group in Australia (not the population as a whole). These weights are values by which information for sample households are multiplied to produce estimates for the whole population. Initial weights were based on the sample design and were equal to the inverse of the probability of a household's dwelling being selected. The weights for each member of a household were the same as the weight for the household itself. Further adjustment factors were then calculated within post stratification to account for non-response. (See HES User Guide, ABS Cat. No. 6527.0 for more details on the survey design and estimation of the 1993-94 HES.)