Bursaries negate effect of social class on probability of dropout

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1 Introduction

There is a general perception that bursaries, as opposed to fee-waivers, are ineffective as a mechanism for promoting wider access to Higher Education. For example, national data show that the award of bursaries to students from relatively disadvantaged backgrounds does not affect their choice of institution (OFFA, 2010). However, in internal discussions conducted at Lancaster University, the majority of both students and staff believed that bursaries helped students to remain in study. Since 2006 Lancaster University has tracked dropout rates of students from NS-SEC(4-7) given bursaries in order to gather evidence of this hypothesis. Lancaster's policy since 2006 has been to award bursaries to students who have provided evidence of low income. Using the Lancaster data, we have analysed the combined effects of bursary and social class on retention rate, adjusted for entry qualification. We find that the probability of dropout is significantly lower for students in NS-SEC(1-3), and for students who receive a bursary. We also find a significant interaction between social class and bursary that approximately eliminates the social class effect, i.e. students from NS-SEC(4-7) and NS-SEC(1-3) who receive a bursary have almost identical dropout rates.

2 Material and methods

2.1 Data

In our analysis we have used A-level tariff points as a simple and unambiguous measure of prior qualifications. Students who were admitted on other qualifications were excluded from the study. All students who entered Lancaster in the academic years 2006/7 to 2010/11, with A-level tariff points of at least 200 as their entry qualification, were eligible for inclusion in the study. Students with less than 200 points at A-level were excluded as they would have had a range of other prior qualifications and their tariff was unlikely to have been a true reflection of their ability. As our social class measure we used a binary classification, NS-SEC(1-3) versus NS-SEC(4-7) as defined by the UK National Statistics Socio-Economic Classification. Students for whom this information was missing were excluded from the analysis.

The data showed that the majority of non-completing students dropped out within two years of starting their course (Table 1). In order to include the most recent entry cohorts in our

Table 1: Numbers of dropouts by year of entry and year of dropout

Year of entry	Dropout in year 1	2	3	4
2006/07	123	74	35	10
2007/08	125	64	36	8
2008/09	138	62	27	11
2009/10	93	44	35	-
2010/11	93	30	-	-

analysis we therefore defined our binary outcome as dropout before the end of the second year of study.

2.2 Statistical analysis

We analysed the data using a logistic regression model (McCullagh and Nelder, 1989) with dropout as the response, and A-level tariff , social class and receipt of a bursary (yes/no) as explanatory variables. All models were adjusted for A-level tariff, as this is known to be associated with dropout probability. Our baseline model adjusted only for A-level tariff. We then used likelihood ratio (deviance) tests to check for significance of social class, bursary and their interaction. In our final model, we estimated parameters and associated standard errors by the method of maximum likelihood. Diagnostic checking of the final model used standard methods of residual analysis, as described below.

All computations used the open-source `R` software environment (`www.r-project.org`).

3 Results

Table 3 shows the maximised log-likeliihoods for each of the fitted models. The p-values for the likelihood ratio tests between successive models used the standard chi-squared approximation to the null sampling distribution of the likelihood ratio (deviance) test statistic, $D = 2(L_1 - L_0)$, where L_0 and L_1 are the maximised log-likelihoods in successive rows of Table 3. Each comparison (model 0 vs 1, 1 vs 2, 2 vs 3) shows the more complex model to give a signifciantly better fit to the data than its predecessor. We therefore adopt model 3.

Adding year of entry to the model gave a significantly better fit ($p = 0.001$), but did not materially change the results concerning the effects of tariff, social class or bursary.

A plot of residuals against fitted values, grouped in batches of 50 according to the modelled probabilities of dropout and standardised to have modelled variance 1, shows no obvious pattern (Figure 1).

Table 2: Maximised log-likelihoods for models with some or all of A-level tariff (T), social class (S) and award of a bursary (B) included as explanatory variables, together with likelihood ratio test statistics (D) and p-values (p) to compare successive models.

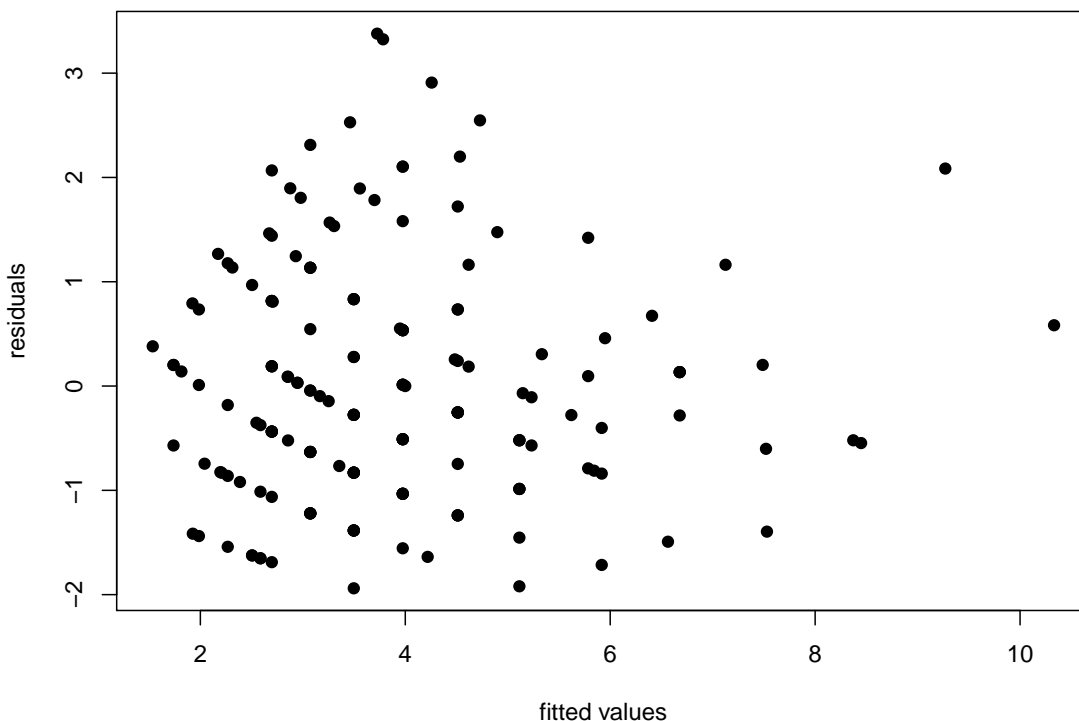| Model	variables included	log-likelihood	D	p
0	T	-2890.35		
1	T, S	-2346.19	1088.32	< 0.001
2	T, S, B	-2326.96	38.46	< 0.001
3	T, S, B, T-by-B interaction	-2324.76	4.41	0.036

Figure 1: Residuals against fitted values, grouped in batches of 50 according to the modelled probabilities of dropout and standardised to have modelled variance 1.

Table 3 shows parameter estimates and standard errors for the fitted logistic regression model 3. The award of a bursary lowers the dropout rate for students in either social class group, but the beneficial effect of the award of a bursary is greater for students in the lower social class group than for those in the higher social class group, to the extent that students in the two social class groups who are awarded bursaries are almost equally likely to drop out. The relationship between the estimated dropout probabilities and A-level tariff in each of the four

Table 3: Fitted logistic regression models for probability of dropout

Parameter	Estimate	Standard error
Intercept	-2.4491	0.0505
UCAS tariff	-0.0069	0.0011
Low SEG	0.5793	0.1034
Bursary	-0.4596	0.1419
Interaction	-0.4745	0.2266

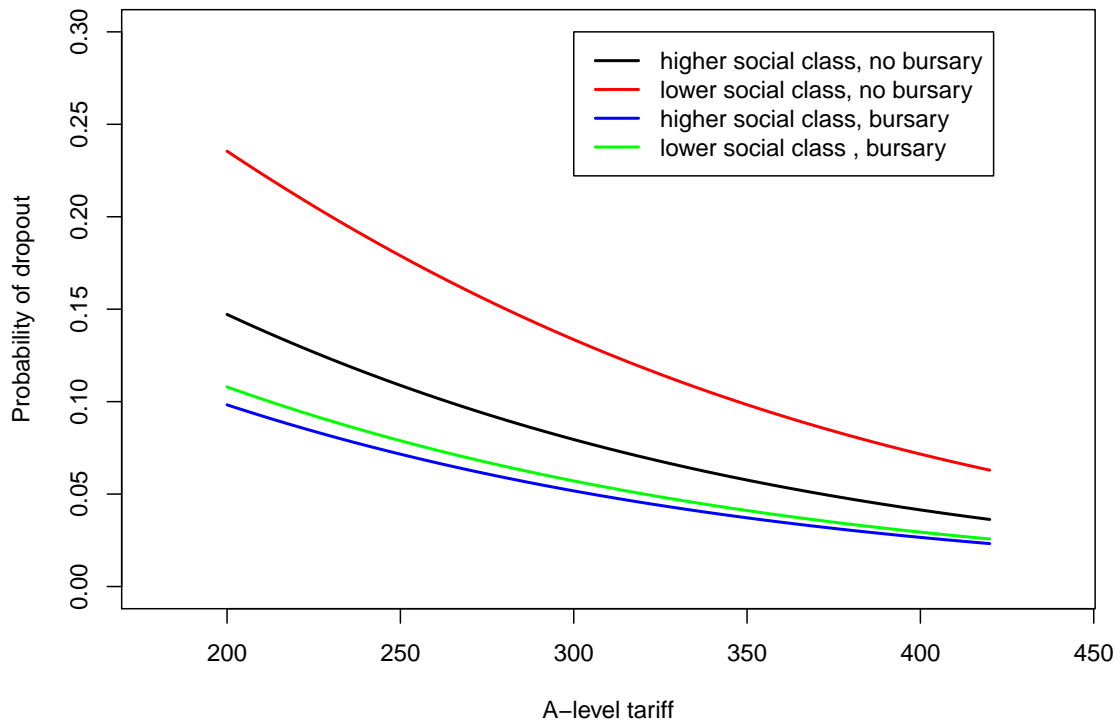groups of students (higher/lower SEG, with/without bursary) are displayed in Figure 2

Figure 2: Estimated probability of dropout according to whether student is in high or low socio-economic group, and whether student does or does not receive a bursary.

4   Discussion

As in any analysis of observational data, we cannot rule out the possibility that our findings are confounded with unobserved factors affecting the probability that a student will not complete their studies. It would also be desirable to repeat the analysis using data from other institutions, but these were not available to us.

With these qualifications, our conclusions are the following.

1. The association between entry grade (tariff) and proportion of dropouts is as expected: students with higher entry tariff points have a higher retention rate.

2. After adjusting for entry tariff points, students from NS-SEC(1-3) have a higher retention rate than students from NS-SEC(4-7).

3. After adjusting for entry tariff points and NS-SEC classification, students awarded a bursary had higher retention rates.

4. There was also an interaction between the effects of and bursary and NS-SEC : bursaries provided a greater retention effect on students from NS-SEC(4-7) than from NS-SEC(1-3).

5. In particular, amongst students without a bursary, NS-SEC(4-7) students without a bursary have lower retention rate than NS-SEC(1-3) students, but amongst students with a bursary, the retention rate for NS-SEC(4-7) and NS-SEC(1-3) students are almost identical.

References

McCullagh, P. and Nelder, J.A. (1989). *Generalized Linear Models* (second edition). London : Chapman and Hall.

OFFA (2010). *Have bursaries influenced choices between universities?*. OFFA Publication 2010/06. Available at `www.offa.org.uk/publications`