Factors affecting the probability of first-year medical student dropout in the UK: a logistic analysis for the intake cohorts of 1980-1992.

Short Title: First year medical school dropouts in the UK

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Abstract

Background In the context of the 1997 Report of the Medical Workforce Standing Advisory Committee, an understanding of the factors influencing medical school retention rates has been identified as important.

Aims To analyse the determinants of the probability that an individual medical student will drop out of medical school during their first year of study.

Method Binomial and multinomial logistic regression analysis of individual-level administrative data on 51,810 students in 21 medical schools in the UK for the intake cohorts of 1980 to 1992.

Results The overall average first-year drop-out rate over the period 1980-1992 is calculated to be 3.8%. We find that the probability that a student will drop out of medical school during their first year of study is influenced significantly by both the subjects studied at A-level and by the scores achieved. For example, one grade higher in either Biology, Chemistry or Physics reduces the drop-out probability by 0.38 percentage points – that is, a fall of 10%. We also find that males are about 8% more likely to drop out than females. Medical school attended also has a significant effect on the estimated drop-out probability. Indicators of both the social class and the previous school background of the student were largely insignificant.

Conclusions Policies aimed at increasing the size of the medical student intake in the UK and of widening access to students from non-traditional backgrounds should be informed by evidence that student drop-out probabilities are sensitive to measures of A-level attainment such as subject studied and scores achieved. If traditional entry requirements or standards are relaxed, then this is likely to have detrimental effects on medical schools' retention rates unless accompanied by appropriate measures such as focussed student support.

Keywords Prior qualifications; Widening access; Medical Education, Undergraduates; United Kingdom.

Box of Key learning points

- We show that the drop-out rates of first year students are influenced by the subjects studied and by the scores achieved. For example, one grade higher in either Biology, Chemistry or Physics reduces the drop-out probability by 10%.
- The results show that students who scored well in subjects other than Biology, Chemistry and Physics are more likely to transfer out of medicine.
- Gender effects are also important determinants of drop-out rates, with males being about 8% more likely to drop out than females.
- Social class and school background have little effect on the drop-out rate.
- We argue that relaxing of traditional entry requirements or standards should be accompanied by appropriate measures such as focussed student support.

Introduction

The primary motivation for the analysis presented in this paper derives from key recommendations of the UK's Medical Workforce Standing Advisory Committee (MWSAC) report to the Secretary of State for Health.[1] In the context of what the Report described as a significant imbalance between demand and the domestic supply of doctors, a main recommendation of the Report was a substantial increase in the UK medical student intake – of about 1,000 per annum – together with policies to minimise student non-completion. Following the Report, the UK Government has charged the Higher Education Funding Council for England and the Department of Health to implement a strategy of expanding medical student intake. The annual intake in England will increase by 57% between 1997 and 2005 to a total of 5,894 students per year. The expansion will be managed by the Joint Implementation Group, which has set out various criteria by which the expansion programme will be evaluated. These include the cost-effectiveness of the programme, attracting students from a broader range of social backgrounds and admitting onto medical school programmes more mature students, including graduates from other subjects.

The MWSAC report also called for research into the determinants of medical student dropout behaviour – likely to be a crucial determinant of cost-effectiveness – whilst acknowledging obstacles to research in this area stemming from a lack of reliable data. Indeed, different studies have produced very different estimates of the magnitude of the problem of medical school dropouts: with estimates varying from an average UK drop-out rate of about 13%[2] to a figure of around 7% or 8% over the full period of the medical degree programme.[3] Previous data have typically relied either on highly aggregated data or on surveys of particular sub-groups of medical students. Recently, however, detailed student-level information on entire cohorts of

medical students has become available. Arulampalam *et. al.* analyse the data for the cohorts of students starting a medical degree in the UK in either 1985 or 1986.[4] They report an average drop-out rate of 10%, with about half of all dropouts in those cohorts leaving within the first year of study. In the current paper, we extend our previous analysis to cover all medical students in the UK beginning their studies between 1980 and 1992 and focus on first-year dropouts.[4] Combining 13 cohorts gives a total population of 51,810 students in 21 medical schools with detailed information from the rich administrative data held on each of these students. We use the term 'dropout' to capture any case of a student failing to continue their studies into their second year. We acknowledge that the term is somewhat unsatisfactory as it includes both voluntary and involuntary reasons for non-progression. However, it is the standard term in the literature and we adhere to it for that reason.

The aim of the analysis is to increase our understanding of the factors associated with the probability that medical students will drop out of their studies. More specifically, we focus on the extent to which prior qualifications influence the drop-out probability. This is in part because one of the methods for increasing medical student intake would be to relax the requirements on applicants to have studied specific subjects or to have attained particular standards at A-level. A second reason for focussing on the sensitivity of the drop-out probability to prior qualifications and attainment concerns the recent discussions on the desirability of widening access to medical school to students from more diverse backgrounds.[1,5,6] Policies of widening access are likely to involve targeted relaxing of traditional admissions offers: with medical schools giving less demanding offers to students whose characteristics (relating to social or school background, for example) might indicate that their true potential is greater than that indicated by their pre-university educational attainment.

Given the relevance of the analysis to the issue of widening access, we also focus specifically on any role of school or family background on medical students' drop-out probabilities.

It is appropriate to emphasise that the nature of our approach is a positive rather than a normative one. We do not take any view on what would be an optimal drop-out rate for any medical school. We do not imply, for example, that it would be socially or individually efficient if there were no medical school dropouts, or even that the drop-out rate should necessarily be minimised. Matching between the higher educational places and student preferences necessarily entails uncertainty and learning on both sides.

Methods

In this paper, we analyse administrative data on all students beginning a medical degree in the UK between 1980 and 1992. The data come from the Universities' Statistical Record (USR), which was the central depository for individual student-level data collected from the administrative records of all UK universities – and their associated medical schools – over this period. The data contain information on the students' personal characteristics, prior qualifications, previous schooling, family background, and university record, *inter alia*.

The data refer to students enrolling on a medical degree over a long period of time prior to the expansion in the intake following the 1997 Report of the MWSAC. As yet, equivalent data for more recent cohorts are not available. The motivation of our analysis is therefore two-fold. First, it is to draw lessons from the period prior to expansion. Second, it is to provide a benchmark against which one could compare the

behaviour and outcomes for post-expansion cohorts if and when the appropriate data become available.

We focus on first-year dropouts for two reasons. Our previous analysis of the 1985 and 1986 entry cohorts reveals both that half of all medical dropouts are first-year dropouts and that the factors influencing first-year dropout differ in their effects on later dropout.[4] Hence, it follows that it is appropriate to analyse first-year dropout behaviour separately, as in the current paper. Second, as the individual student-level USR data are not available beyond 1993, the 1985 and 1986 are the latest complete cohorts that can be followed and hence their progression – completion, transfer, withdrawal, deferral *et cetera* – observed over an appropriate time frame.[4] In the current paper, because we choose to analyse the determinants of drop-out probabilities during the first year only, we are able to exploit information for all those cohorts on whom we have first-year information prior to 1993.

Although the data refer to the most recent cohorts for whom this quality of information is currently available, we acknowledge that a number of changes over the last decade in the characteristics of medical students and medical schools require that we are cautious in the inferences we draw from the results of our analysis. For example, in the early period under our analysis, very few A-level students were admitted without at least three of the standard subjects of Chemistry, Biology, Physics and Mathematics. The A-level subject background of students is now substantially more diverse with the consequence that any 'penalty' on a student with fewer than three of the traditionally standard subjects is likely to be much reduced. Similarly, changes in both curriculum and pedagogy will have affected the impact of A-level subject choices on a student's medical school progression. Nonetheless, we believe that it is valuable to examine the sensitivity of medical school progression to students'

prior qualifications. At the very least, this provides a benchmark against which to judge results for more recent cohorts when data become available.

Analysis of student dropout behaviour has received much attention in the US, where one of the most influential theoretical explanations of student attrition is the path analyses model of Tinto.[7,8]. This model and related analyses suggest that the major determinants of completion are likely to be the student's (i) academic preparedness, and (ii) social and academic integration into the educational institution. The analysis identifies a number of key influences on the withdrawal probability, including: the student's previous schooling, prior academic performance, family background and personal characteristics, as well as institutional characteristics. In our model of student drop-out probabilities, we therefore include control variables reflecting the student's prior academic preparedness, their social background and personal characteristics. Previous schooling includes both prior qualifications of students and the type of school attended prior to university. Part of the motivation for the latter comes from the general issue of the impact of school quality and school type on later outcomes.[9] To account for various medical school characteristics, we also include binary indicator variable for each medical school. The effects of these variables are allowed to be time dependent to enable us to pick up various medical school-specific changes that have taken place over the time period under study. Individual year-specific effects are picked up in the models via binary cohort variables.

Summary statistics The USR data used in our analysis were provided by the UK Data Archive at the University of Essex and have been analysed on Stata 7.0. Syntax files are available form the authors on request. Table 1 presents summary statistics on

various characteristics of the students across all 13 cohorts as well as for the start year (1980) and the end year (1992). Additionally in Table 1, the second column for each set of data reports the average percentage drop-out rate of students by different characteristics. In total across the 13 cohorts we have 51,810 students, with the number of students entering the first year of their study growing from 3802 in 1980 to 4227 in 1992. Over the 13 cohorts the average first year drop-out rate was 3.8%, in 1980 this figure was 3.9%, but had fallen to 3.5% by 1992. Figure 1 shows more precisely how the number of medical students, and the average drop-out rate have varied over time, with the first-year drop-out rate peaking at 4.8% in 1985.

From Table 1, we see that 54% of all students were male, the proportion of males in the sample having fallen markedly over the period from approximately 60% in 1980 to less than 50% by 1992. These figures compare with an average of 57% for the proportion male across all (non-medical) students over the same period. Overall, the male drop-out rate in the first year of study is fractionally higher than that for females: at 3.9% compared to 3.7%. We emphasise that the data do not contain information on unsuccessful applicants to medical school. Consequently, we cannot comment on the extent to which the medical student population is representative of the population of applicants. In the UK, the usual age of entry into a university medical school is 18. Of all students, 85% were aged 19 or less at entry, with the drop-out rate tending to fall with age for all but the most mature group of students. About 5% of all students were overseas fee-paying students who, on average, had a lower drop-out rate than the non-fee-paying students. We note that almost 80% of students lived in on-campus accommodation and that these students have markedly lower drop-out rates, on average. This is consistent with the hypotheses of Tinto[7,8]

who emphasised social integration as an important determinant of student progression.

Of all medical students, 36% came from a Social Class I (SC I-managerial or professional – including those students who have a parent as a doctor) background and almost three-quarters came form either Social Class I or Social Class II (SC II - intermediate professional) backgrounds. More than one in seven medical students came from a family in which a parent was a medical doctor. In the total (non-medical) student population in the UK over the same period, 19% were from Social Class I and 59% from either Social Class I or II and only one in 50 came from a family with a medical doctor. The drop-out rate of medical students varies by family background. Those from Social Class I (other than those with a parent as a doctor) have an average drop-out rate of 3.6%. For those with a medical doctor parent the rate is 3.1%. In contrast, the drop-out rate is 4.3% for those from Social Class IIIM (skilled manual), IV (semi-skilled) or V (unskilled) (referred to as SC IIIM+IV+V in the table).

Prior to entering university, most UK students study in secondary school towards qualifications, which will determine the success of their applications to higher education. Broadly, we can distinguish between two types of school: those, which are in the private sector (henceforth, 'Independent' schools) and those that are in the broadly-defined state sector. The latter consists of various sub-categories of school, including local education authority (LEA) comprehensive schools, grammar schools (to which admission is selective and subject to educational tests) and colleges of further education. From Table 1, we also see that 32% of the medical students had previously attended an Independent school. This compares with a figure of 22% for all (non-medical) students. There is variation across school background in the average drop-out rate of medical students. The lowest rate is for those from Grammar schools.

The pre-university secondary school qualifications that form the basis for offers of places at medical schools are, typically, 'A-levels' for English and Welsh school pupils, and 'Highers' for school pupils from Scotland. Offers of university places are typically conditional on the candidate's performance in their best three A-levels (or best five Highers). A-levels are classified as A through to E. These grades can be converted into a points score: A=10 points, B=8 points, C=6 points, D=4 points, and E=2 points. Highers are classified as A through to C: A=3 points, B=2 points and C=1 point. Table 1 also reveals the extent to which the drop-out rate varies by the students' A-level (or Higher) subjects and grades. Almost half the students had A-levels or Higher qualifications in all three of Biology, Chemistry and Physics, although over time this proportion has fallen from 60% in 1980 to something just below 40% in 1992. On average, the drop-out rate of these students is 3.1%. Most of the rest of the students had two of these three A-levels: their average drop-out rate being 4.4%. For the minority of students with just one A-level in these three subjects, the drop-out rate is 7%. It is also clear from the Table that there is a strong relationship between A-level (or Higher) performance and the medical school drop-out rate. About 47% of A-level students had scored 28 points or more (equivalent to AAB or better) and the drop-out rate for these students is 2.9%. This contrasts, for example, with a drop-out rate of 4.9% for students who had scored either 22 (BBC) or 23 points at A-level. Over time, an increasing proportion of students come with very high grades: in 1980 only around 41% had grades of AAB or better, whereas of 1992 entrants the proportion was around 53%.

Methodology Our statistical approach combines the 13 separate entry cohorts for 1980-1992. For each of our 51,810 students entering a medical school over the period from 1980 through to 1992, we define our binary dependent variable as taking

the value of one if the student drops out during their first year and zero otherwise. In order to deal with the fact that our dependent variable has only two possible outcomes, we use a binomial logistic model from which we obtain the individual's probability of dropping out from the medical degree programme during the first year of study. We include as explanatory variables all of those variables listed in Table 1. This multivariate analysis enables us to identify the effect of, for example, gender on the drop-out probability, by comparing two individuals identical in terms of their prior qualifications and schooling, their personal characteristics and their social class background, with the exception that one individual is male and the other is female.

Later, we identify students according to the reason for withdrawal from their medical degree program. In particular, we distinguish between (i) those students who continued into the second year of study of a medical degree, (ii) those students who dropped out from their medical degree program due to course transfer (either within the same university or to a new university), and (iii) those students who withdrew from university. Our dependent variable now has three possible outcomes, and we use a multinomial logistic model from which we obtain the individual's probability of changing (transferring) course and of leaving (withdrawing) from the university. We use the same set of explanatory variables as those, which are used in determining the simple drop-out probability.

We also note that there is a further distinction in the data between those students who leave for reasons of academic failure and those who leave for 'other reasons'. Potentially, this is an important distinction, which one would like to exploit in the modelling process. However, we are not satisfied that the administrative coding successfully identifies academic failure. Firstly, students who voluntarily leave at the time of examinations might be wrongly coded as academic failures. Secondly,

students who appear to have left voluntarily, and are reported as having done so, might well have formed a rational expectation that they will subsequently fail academically. Consequently, we do not draw the additional distinction between academic failure and other reasons for non-progression.

Results

Binomial logistic model of the first-year drop-out probability Table 2 summarises the results of the logistic analysis of the determinants of the probability of dropping out of medical school during the first year of study for all 13 cohorts. The Table reports both the odds ratio and the marginal effect on the drop-out probability associated with three sets of explanatory variables: personal characteristics, social class background, and prior qualifications and schooling. Odds ratios reflect the change in the probability of dropping out relative to the probability of continuing into the second year of study associated with each of our variables. Marginal effects represent the change in the probability of dropping out associated with changes in each of our variables.

We control for the effect of the individual medical school by including binary indicator variables for each of the medical schools. To allow for a non-constant effect of the role of the institution over time on the drop-out probability, we allow the medical school effect to vary over the period. We allowed for a change in the medical school effect in one of the years 1985, 1986 or 1987. Having allowed for a change in the medical school effect in any one of the specified years, there is no evidence of a significant change in the coefficient estimates on any of the other explanatory variables. Binary indicator variables for the cohort year were also included in the logistic regression. Table 2 reports the results when the medical school effects were allowed to change from 1980-1986 compared to 1987-1992, although the results are

qualitatively similar for a change in the school effects in any of the three years. Information on the extent of the change in these medical school effects will be discussed later.

Personal characteristics The estimated coefficient on the binary indicator variable for male medical students is significant at the 5% level and implies that, for two students with identical prior qualifications and schooling, personal characteristics and social class background, the male student has a higher probability of dropping out by about 0.3 percentage points, relative to the female student. Given an average drop-out rate of 3.8 (see Table 1) a 0.3 percentage point increase in drop-out probability for males represents an 8% increase.

Compared to students aged 19 or less at entry, those aged 21 at entry are 1.2 percentage points less likely to drop out (a reduction of around 31% from the average drop-out rate of 3.8%). Fees status does not appear to have significant effects on the drop-out probability. The drop-out probability for students living off campus is around 40% higher (at 1.5 percentage points) than that for students in on-campus accommodation.

Social Class background Unlike the results reported for students on three or four-year degrees, the evidence reported here shows that, typically, family background of medical students is not a significant determinant of the probability of dropping out of the medical school programme, at least in the first year.[10] However, students with a parent employed as a medical doctor were significantly less likely to drop out of medical school: by about three-quarters of a percentage point (that is, by about 20%). This might reflect a greater commitment to the programme among these students or a better preparation and information prior to commencement. These results may seem at odds with the picture painted based on Table 1, which showed a strong

relationship between social class and drop-out rates in the raw data. However, the results in Table 2 state that for two individuals with identical prior qualification and schooling, and personal characteristics, the effect of being from a SC IIIM+IV+V compared to SC II is small. In Table 1, we simply compare the average drop-out rate of individuals from SC IIIMN+IV+V with the drop-out rate of individuals from SC II, irrespective of their prior qualifications, schooling and personal characteristics. For social class this is potentially very misleading given that A-level (Higher) scores are, on average, higher for students from SC II compared to those from SC IIINM+IV+V.

Prior qualifications and school background As shown in Table 2, students who had already obtained a degree prior to registering for a medical degree were significantly less likely to drop out of medical school, by about two percentage points (or 53%) relative to students with just A-level (or Higher) qualifications.

Table 2 also shows that among those students who had taken A-levels in Biology, Chemistry and Physics, each extra A-level grade translates into an approximate 10% reduction (that is, of 0.39 percentage points) in the probability of dropping out. Thus a good performance in Biology, Chemistry and Physics is associated with a relatively low probability of dropping out. This is consistent with results which showed that students with A-level Biology do better in their pre-clinical years.[11, 12] We find no significant and separate English A-level effect.[13] Over and above this A-level effect, the drop-out probability is significantly lower – by 0.82 percentage points – for students who achieved the maximum score (AAA) in their best three A-level subjects, identified through the Topscore binary indicator variable. A good performance in other A-level subjects is associated with a slightly higher probability of dropping out. Due to the presence of trends in the prior qualification variables over the period 1980 to 1992 reported in Table 1, we tested for changes in

the effect of these variables over time on the drop-out probability; however, we found no evidence to suggest that the effect of the qualification variables had changed over time.

The results presented in Table 2 suggest that students' drop-out probabilities do not vary by school type. In other words, taking two individuals with the same personal characteristics, social class and prior qualifications there is no evidence that the school, which these students attended prior to university, had an effect on their drop-out probability. In alternative specifications, we also tested the hypothesis that the effects of prior qualifications on the probability of dropping out might vary by school type. This hypothesis stems from evidence that performance at university varies by school background.[14] However, no significant interaction effects between school type and prior qualifications were found.

Medical school The logistic regressions contain binary indicator variables for the particular medical school attended, interacted with binary indicators for each of the two time periods 1980-1986 and 1987-1992 to allow the medical school effects to vary over time. Our results indicate that there are significant differences across medical schools in the probability of first-year dropout, all other things constant. We note, however, that the rank positions of the medical schools vary according to the time period. This is demonstrated in Figure 2, which plots the average rank position of each medical school over the period 1980-1986 against its rank position averaged over the period 1987-1992. If no medical school changes its average rank position over these two periods, then all plots will lie on the 45^{o} line. In contrast, it can be seen that there is substantial change in rank position over time. Although two of the top four and all of the lowest ranked three are common to both periods, the rank

correlation coefficient is just 0.59 and the average absolute change in rank position is 4.1 places.

Multinomial logistic analysis of the first-year drop-out probability In the analysis reported above, we have distinguished between dropping out and progression, where the former category comprises all those dropping out of the medical degree programme during their first year of study, for whatever reason. It is interesting to consider the further distinction between different possible reasons for dropping out in the first year and examine whether these are subject to similar influences. We are able to distinguish between two types of first-year medical school dropout: those (1.5% of students) withdrawing from university altogether (leaving) and those (2.4%) switching into non-medical degree programmes (transferring course). In this piece of analysis, we use a multinomial logistic model distinguishing between (i) successful progression, (ii) course transfer and (iii) university withdrawal.

Table 3 presents the results of the multinomial logistic analysis, using odds ratios and marginal effects. With respect to personal characteristics, gender affects the probability of withdrawal but not that of course transfer, relative to progression. In particular, for two individuals with the same personal characteristics, social class, prior qualifications and schooling, the male is only 0.4% (that is, 0.01 percentage points) more likely to change course than the female, but is 17% (or 0.26 percentage points) more likely to drop out due to leaving the university system. Older students are less likely to transfer course, but are more likely to withdraw from university. Students paying non-UK fees are less likely to transfer than other students, but have the same probability of withdrawal. Interestingly, the positive effect on the drop-out probability associated with living off campus estimated in the simple logistic model

appears to result from a strong positive effect on the probability of withdrawal. Again this is consistent with the social integration model of student dropout behaviour.

As in the binomial logistic results, there are no significant effects of either school or social class background, with the notable exception of the effect of coming from a medical background: the multinomial logistic results imply that students from such backgrounds are no more or less likely to withdraw from university, but are significantly less likely to transfer course. The result is consistent with the idea that such students have a greater commitment not to university generally, but to their chosen course of medical study.

With respect to prior qualifications, the multinomial logistic results imply that students with a previous degree are less likely to withdraw from university: their probability of course transfer is no different from other students. We noted previously that the better the grades at A-level in Biology, Chemistry and Physics, the less likely is a student to drop out. The multinomial results show that this effect operates on both the transfer and the withdrawal probabilities in approximately equal measure. In contrast, we note that the added effect of having the maximum A-level score (Topscore) operates to reduce the probability of withdrawal but not that of transferring course. Having better grades in A-levels other than the specified three is associated with an increased probability of transferring out of the medical programme: as these students are likely to have more opportunity to move onto other degree courses either within the same university or at another university.

Conclusion

From our analysis, we draw the following conclusions. First, for the cohorts of students entering a UK university medical school between 1980 and 1992, the probability of dropping out in the first year of study was influenced strongly by the

level of prior educational attainment and the prior subjects studied. Students who had scored high grades in Biology, Chemistry and Physics were less likely to drop out of medical school. Specifically, we find that one grade higher in either Biology, Chemistry or Physics reduces the drop-out probability by 0.38 percentage points – that is, a fall of 10% compared to the overall average medical student drop-out rate of 3.8%. Additionally, students who had achieved the maximum A-level score of 30 points were considerably less likely to drop out. Students who scored well in subjects other than Biology, Chemistry and Physics were *more* likely to drop out of medical school: the multinomial logistic results revealing that these students were more likely to transfer degree course. We also find that males are about 8% more likely to drop out than females and that the particular medical school attended also has a significant effect on the estimated drop-out probability.

An implication of our results is that any policy of reducing or relaxing the entry requirements for medical school entrants – along either dimension (grades achieved or subjects studied) – risks raising the drop-out rate from medical degree programmes. This is not to say that policies of widening participation are inherently problematic. Instead, we suggest that if admissions policies do involve relaxing entry requirements they are not imposed blanket-fashion, but are targeted at schools and/or individuals for whom prior achievement is likely to be a downwardly biased indicator of future potential.[14] It may also be appropriate to design support for students to minimise the risk that wider access policies might have on student retention.[15]

Second, we note that – with the exception of students with a parent who is a doctor – social class background is not a significant influence on a student's likelihood of dropping put of medical school. This suggests that an appropriate support framework for students at-risk of non-completion should focus more on

academic support than on aspects associated with students' social class background. This does not imply that policies of social integration at university are irrelevant. We note, for example, the evidence that the nature of the medical student's accommodation is a significant influence on the probability of progression.

Third, our results suggest that there were significant differences in the probability of first-year dropout across university medical schools in the UK, even after controlling for observable differences in student characteristics. However, we would be cautious about the value of league tables of medical schools against the criterion of the drop-out rate. This is because while other estimated coefficients were stable over time, our results show variation in the rankings of medical schools on the basis of the drop-out probability over the two sub-periods 1980-1986 and 1987-1992.

We also identify the limitations of the analysis and suggest directions for further work. The data are for the cohorts of students who would have been expected to complete their medical studies successfully between the years 1985 and 1997 (or 1998 in the case of students on 6-year programmes). We cannot necessarily infer that more recent entry cohorts will possess the same characteristics and exhibit the same behaviour. Data for more recent cohorts are not currently available, however. If equally detailed but more contemporaneous data become available from the Higher Education Statistics Agency, it will be possible to replicate our work for more recent medical student cohorts. This study, then, also provides a benchmark against which results for more recent cohorts can be evaluated, when data become available.

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Table 1: Summary statistics for 1980-1992 medical school entry cohorts

	1980-1992		1980		1992	
Variable	%	1st year	%	1st year	%	1st year
ALL		3.8		3.9		3.5
Personal characteristics						
Age groups						
≤19	84.96	3.9	90.58	4.0	87.01	3.5
20	8.13	3.4	4.23	5.0	5.61	3.0
21	1.96	2.5	1.47	0.0	1.89	2.5
>21	4.95	4.4	3.71	0.7	5.49	3.9
Gender						
Females	45.92	3.7	40.48	3.8	52.14	3.5
Males	54.08	3.9	59.52	3.9	47.86	3.5
Fee status						
UK no-fees	94.35	3.8	94.71	3.9	93.04	3.3
Non-UK fees	5.65	3.6	5.29	3.6	6.96	5.4
Accommodation						
Campus	79.91	3.6	72.80	3.7	86.09	3.2
Non-campus	20.09	4.7	27.20	4.3	13.91	4.9
Social class background						
Professional (SC I) (excluding Parental doctor)	21.75	3.6	20.86	3.2	23.54	3.2
Parental doctor	14.39	3.1	13.39	2.4	15.19	3.4
Intermediate (SC II)	37.84	3.9	38.24	3.7	34.04	2.8
Skilled non-manual (SC IIINM)	7.18	4.2	8.39	7.5	8.09	4.0
Other (SC IIIM+SC IV+ SC V)	10.58	4.3	13.07	3.8	12.68	4.0
Prior qualifications and schooling						
A-levels/Highers in Biology, Chemistry and Physics	49.06	3.1	60.42	3.0	38.47	2.0
A-levels/Highers in 2 of Biology, Chemistry and Physics	45.79	4.4	35.67	5.4	54.91	4.1
A-levels/Highers in 1 of Biology, Chemistry and Physics	1.48	7.0	1.53	1.7	1.77	8.0
A-level/Higher points*						
28-30	47.40	2.9	41.50	3.0	52.92	2.7
26-27	20.30	3.7	20.88	3.5	18.50	4.4
24-25	14.88	4.6	15.86	4.6	12.92	4.6
20-23	12.35	4.9	16.25	4.7	9.98	3.1
16-19	2.25	4.6	3.76	9.8	1.87	5.1
<16	2.17	5.2	2.10	1.3	1.96	3.6
School type						
Local Education Authority (LEA)	36.92	3.9	40.01	4.3	31.94	3.6
Grammar	16.91	3.3	18.91	3.3	13.93	2.6
Independent	32.35	3.8	30.51	3.1	39.44	3.2
Further Education College (FE)	7.59	4.1	4.26	6.8	6.84	6.6
Other	6.22	4.6	6.21	4.7	7.85	3.0
Number of students	51810		3802		4227	

Notes:

*A-levels are classified as A through to E.: A=10 points, B=8 points, C=6 points, D=4 points, and E=2 points. Highers are classified as A through to C: A=3 points, B=2 points and C=1 point. The score relates to the best 3 A-levels (or 5 Highers, this score having been multiplied by 2 to score out of 30 points for this table). AS-levels count as one half of an A-level.

The second column for each set of data reports the average percentage drop-out rate of students with that characteristic.

Table 2: Logit model for first year medical school dropouts (1980-1992)

Variable	Odds ratio	Marginal Effects (×100)
Personal characteristics		
Age groups		
≤19 (default)	1.00	-
20	0.89	-0.33
21	0.62 *	-1.17
>21	1.10	0.29
Males	1.12 *	0.33
Non-UK fees	0.92	-0.25
Non-campus	1.45 **	1.25
Social class background		
Professional (SC I) (excluding Parental doctor)	0.93	-0.24
Parental doctor	0.77 **	-0.76
Intermediate (SC II) (default)	1.00	-
Skilled non-manual (SC IIINM)	1.04	0.14
Other (SC IIIM+SC IV+ SC V)	1.08	0.27
Unemployed	1.06	0.19
Prior qualifications and schooling		
Degree already	0.38 **	-2.03
A-levels/Highers		
Topscore (best 3 subjects)	0.70 **	-0.82
A-level score in Biology + Chemistry + Physics	0.94 **	-0.38
Other A-level scores	1.01 *	0.06
Higher score in Biology + Chemistry + Physics	1.01	0.09
Other Higher scores	0.97	-0.18
School type		
Local Education Authority (LEA) (default)	1.00	-
Grammar	1.00	-0.01
Independent	1.09	0.26
FE	1.07	0.22
Other	1.15	0.43

Notes:
The odds ratio is calculated as exp(coefficient estimate). The marginal effects are calculated as the difference in probabilities when the binary indicator changes from 0 to 1 for the binary variables. For the two A-level score variables and the two Higher score variables the marginal effects relate to the change in the probability for a unit grade increase.
** indicates significance at the 1% level, * indicates significance at the 5% level.

Table 3: Multinomial logit model for first year medical school dropouts (1980-1992)

	Changed course		Leavers	
Variable	Odds ratio	Marginal Effect (×100)	Odds ratio	Marginal Effect (×100)
Personal characteristics				
Age groups				
≤19 (default)	1.00	-	1.00	-
20	0.63 *	-0.37	1.03	0.05
21	0.18 *	-0.82	0.81	-0.26
>21	0.20 **	-0.80	1.46 **	0.69
Males	1.01	0.01	1.19 **	0.26
Non-UK fees	0.42 **	-0.52	1.28	0.42
Non-campus	0.81	-0.18	1.77 **	1.02
Social class background				
Professional (SC I) (excluding Parental doctor)	0.94	-0.05	0.91	-0.13
Parental doctor	0.60 **	-0.38	0.87	-0.20
Intermediate (SC II) (default)	1.00	-	1.00	-
Skilled non-manual (SC IIINM)	0.93	-0.07	1.13	0.20
Other (SC IIIM+SC IV+ SC V)	1.07	0.07	1.10	0.15
Unemployed	1.07	0.06	0.99	-0.02
Prior qualifications and schooling				
Degree already	0.28	-0.63	0.39 **	-1.02
A-levels/Highers				
Topscore (best 3 subjects)	0.90	-0.12	0.54 **	-0.59
A-level score in Biology + Chemistry + Physics	0.94 **	-0.11	0.94 **	-0.20
Other A-level scores	1.02 **	0.03	1.01	0.02
Higher score in Biology + Chemistry + Physics	1.02	0.03	1.02	0.06
Other Higher scores	0.97	-0.05	0.97	-0.10
School type				
Local Education Authority (LEA) (default)	1.00	-	1.00	-
Grammar	1.01	0.01	0.99	-0.01
Independent	1.10	0.08	1.09	0.13
FE	1.16	0.13	1.01	0.02
Other	1.26	0.21	1.09	0.13

Notes:
The odds ratio is calculated as exp(coefficient estimate). The marginal effects are calculated as the difference in probabilities when the binary indicator changes from 0 to 1 for the binary variables. For the two A-level score variables and the two Higher score variables the marginal effects relate to the change in the probability for a unit grade increase.
** indicates significance at the 1% level, * indicates significance at the 5% level.

Figure 1: The size of the entry cohorts and the first year dropout rates from medical degrees

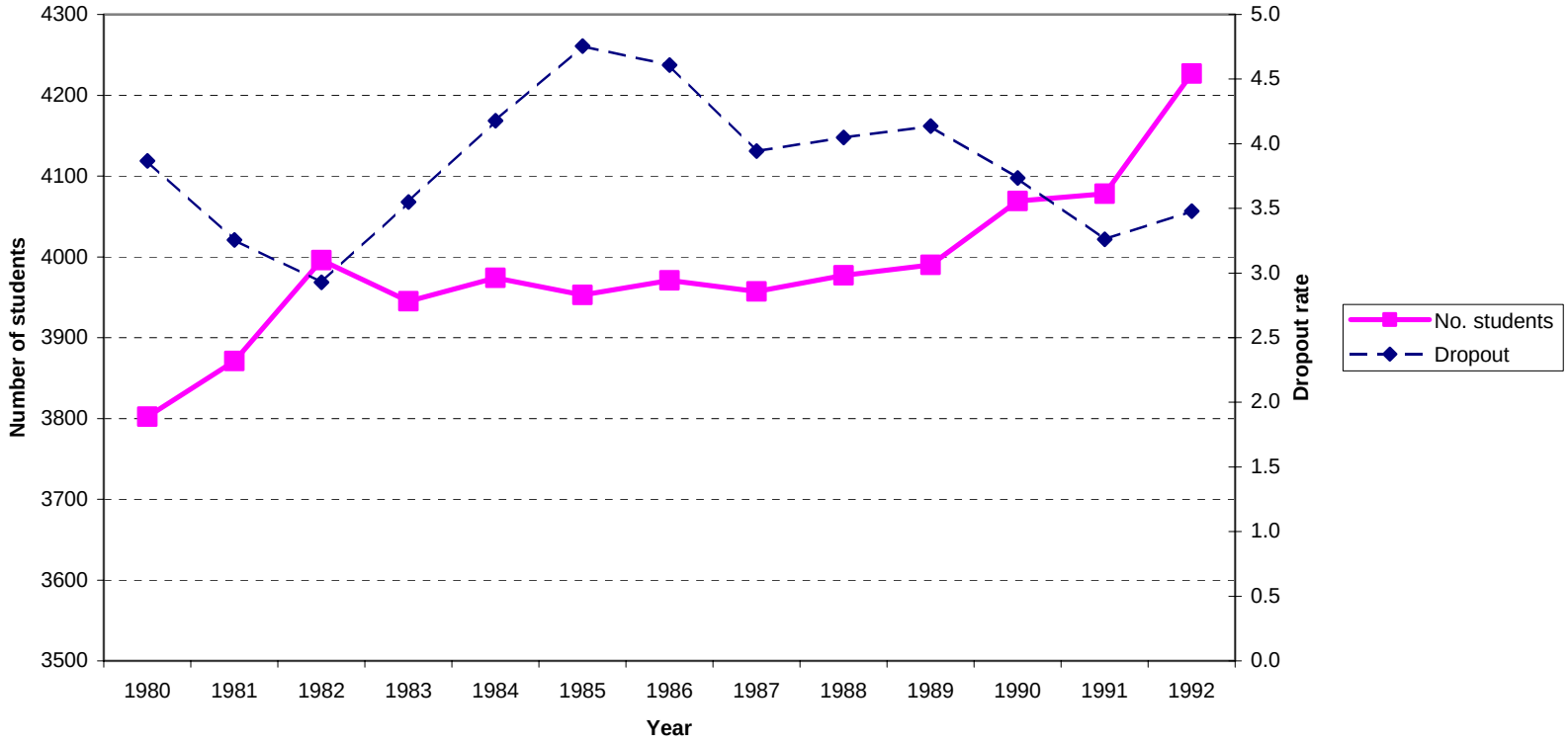

Figure 2: University rankings based on dropout probabilities over the two sub-periods