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Degree classification and recent graduates' ability: Is there any signalling effect?

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Degree classification and recent graduates' ability: Is there any signalling effect?

Abstract

Research across several countries has shown that degree classification (i.e. the final grade awarded to students successfully completing university) is an important determinant of graduates' first destination outcome. Graduates leaving university with higher degree classifications have better employment opportunities and a higher likelihood of continuing education relative to those with lower degree classifications. This article investigates whether one of the reasons for this result is that employers and higher education institutions use degree classification as a signalling device for the ability that recent graduates may possess. Given the large number of applicants and the amount of time and resources typically required to assess their skills, employers and higher education institutions may decide to rely on this measure when forming beliefs about recent graduates' abilities. Using data on two cohorts of recent graduates from a UK university, results suggest that an Upper Second degree classification may have a signalling role.

Keywords: degree classification; graduates; post-university outcomes; signalling

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1. Introduction

Understanding what makes recent graduates successful is a topic of great interest throughout the world. The relationship between higher education and the world of work is a particularly relevant policy issue in light of the increasing pressure on universities to contribute to the 'employability' of graduates (Wilton 2008). Several studies from various countries (e.g. Smith, Naylor, and McKnight 2000; Bratti et al. 2004; Mason, Williams, and Cranmer 2009; Bruwer 1999; Saks and Ashforth 1999; Richards 1984; Dabalen, Oni, and Abekola 2001; Koda and Yuki 2013) have concluded that the first-destination outcome of graduates is likely to be influenced by a number of individual characteristics, including degree classification (i.e. the final grade awarded to students successfully completing university), subject studied, age at graduation and socio-economic background. Degree classification is consistently found to be positively correlated with the status of new graduates in the period following graduation. Students who leave university with higher degree classifications are more likely to find a job relative to their peers graduating with lower degree classifications. Similarly, recent graduates are more likely to secure a place on a postgraduate programme if they have ended their undergraduate studies with higher degree classifications.

Productivity-enhancing effects and signalling effects (Chevalier et al. 2004) may account for the positive association between degree classification and graduate first-destination outcomes. On the one hand, this association may reflect differences in underlying ability between the types of students who obtain different classes of degree. Not only do higher ability students have higher degree classifications, but they may also have a better CV, may receive better letters of recommendation and may perform better at interviews relative to those with lower ability and lower classifications. Therefore, degree classification may be correlated with additional ability indicators that are used by employers (higher education institutions offering postgraduate programmes) to assess the skills of applicants. On the other hand, degree classification may have an important signalling value. With more people graduating from university than ever, employers (higher education institutions) may distinguish among recent graduates on the basis of their degree classification regardless of their underlying ability because they assume that students with a higher degree classification have higher underlying ability than those with a lower degree classification (Ireland et al. 2009). That is because employers (higher education institutions) may be unable to observe the ability of applicants and there are high costs associated with methods to uncover such information.[1] Hence, they may prefer to rely on degree classification, on the assumption that it acts as a strong signal of underlying ability.[2]

Although many works have examined the signalling function of educational qualifications (see, among others, Martorell and Clark 2010; Tyler, Murname, and Willett 2000; Tyler 2004), much less attention has been given to the study of the signalling effect of degree classification. One exception is the work by Freier, Schumann, and Siedler (2014). These authors find that in Germany graduating with an honours degree positively affects future labour market outcomes. In an attempt to isolate the signalling value of receiving an honours degree relative to a degree without honours, they exploit the fact that while in some university programmes students can get an honours degree, this is not possible in other university programmes. Therefore, they compare the difference in returns to the labour market between law graduates with and without an honours degree relative to the same difference between students of medicine and pharmacy who have achieved high and low academic average scores. Graduates getting an honours degree enjoy a considerable earnings premium of about 14 percentage points. Additionally, they are more likely to find a job in the public sector and are more likely to do a Ph.D.

This article contributes to the scarce literature on the signalling effect of degree classification. It exploits the fact that many UK universities award different classes of degree based on the mean mark obtained by students in their last year at university. While graduates with a mean mark exceeding a known cut-off point are likely to get a higher degree classification, those with a mean mark below this cut-off point are likely to obtain a lower degree classification. A difference of one mark on one or more exam papers (e.g. a minor mistake, an extra sentence), though it does not reflect a considerable variation in students' academic ability, has the potential to have huge implications on the degree classification awarded. The probability of obtaining a given degree classification can be thought as a random event for those graduates whose mean mark is in the close neighbourhood of the corresponding cut-off. Therefore, the intuition behind this article is to compare the average first-destination outcome of graduates with a mean mark that just allowed them to get a given degree classification with the average first-destination outcome of those with a mean mark that made them just miss the chance of achieving the same degree classification. Even though these two groups of graduates are awarded a different degree classification, they are likely to display a similar level of academic ability (and are also likely to have similar demographic characteristics). Therefore, the difference in their average post-university outcomes can be considered as capturing the signalling effect of degree classification.

The remainder of the article is organized as follows. The following Section gives some information on the British undergraduate degree classification system. After that, the data set used in this paper is described and the methodology is outlined. Next, results are presented and discussed. Finally, concluding remarks are offered.

Institutional background

The British undergraduate degree classification system is a grading scheme for undergraduate degrees. This system, which has been applied (often with small changes) by several other Commonwealth countries around the world, divides a student's overall degree level achievement into the following four classes: First class (1st), Upper second class (2:1), Lower second class (2:2) and Third class (3rd).

While all UK higher education institutions adopt this classification system, each higher education institution has its own administrative rules used in the allocation of degree class (Simonite 2000). In this article, the attention is focused on a large UK university awarding different degree classifications based on the credit-weighted mean of all marks received by a student in his/her final year at university.[3] In order to be awarded a degree classification, students must successfully complete modules (i.e. courses) worth 120 credits in their last year at university. Each module is marked out of 100. Students whose mean mark is higher or equal to 40 but less than 50 are likely to obtain a Third class degree; students whose mean mark is higher or equal to 50 but less than 60 are likely to get a Lower Second class degree; students whose mean mark is higher or equal to 60 but less than 70 are likely to get an Upper Second class degree; and finally students whose mean mark is higher or equal to 70 are likely to obtain a First class degree.

The mean mark varies widely across students and, for the university considered in this study, it is reasonable to believe that module marks tend to reflect each student's absolute and not relative performance on the module. It is difficult for the academic staff to manipulate module marks as all pieces of assessment (especially end of year final examinations) are marked anonymously by two faculty members (and sent to a third marker, external to the university, in case of disagreement over the final mark). In this context, it is also important to note that there is no rule according to which marks ending with a “9” should be automatically raised.

Although the mean mark received by students in their final year at university is the primary determinant of the final degree classification, the Board of Examiners has a discretionary power to raise or to lower the student’s final degree classification resulting from the application of the mean mark rule. The Board of Examiners comprises internal academic staff involved in the teaching and examination processes as well as external examiners, whose views are particularly influential in borderline cases.

Data

This study uses data on two full cohorts of undergraduate students who graduated from a large UK university in 2009 and 2010. To construct the data set, data from the Destination of Leavers from Higher Education (DLHE) survey[4] are first matched with administrative records held by the Higher Education Statistical Agency (HESA). While the latter provide information on several demographic and academic student-level characteristics, the former keeps track of the student’s occupation approximately six months after graduation. Next, from each student’s academic history record, information on the credit-weighted mean mark received by each student in the last year at university are merged into the data set.

University student record data are quite rich in the quality of information they give on the personal and academic characteristics of individuals. There is information on gender, age, ethnicity, nationality, disability status, degree classification, academic skills prior to university as measured by UCAS tariff points[5] and mode of study (full or part- time). Graduates are drawn from nine main areas of degree study: 1) Business, 2) Social Studies, 3) Law, 4) Biology, 5) Computer Science, 6) Language and Humanities, 7) Architecture and the

Built Environment, 8) Media, Art and Design and 9) Health. The advantage of covering several disciplines is that graduates from these areas may have potentially different trajectories and motivations towards postgraduate study and the labour market. This is important in order to get an overall picture of what graduates do after graduation.

Following the approach of Smith, Naylor, and McKnight (2000) and Bratti et al. (2004), post-university outcomes of students six months after graduation are classified into the following two categories: 'positive' outcomes (EFS) and 'negative' outcomes (UOLF). While the former include being in employment (E) or further study[6] (FS), the latter comprise being unemployed and seeking work or further study (U) as well as being unavailable for employment or further study (OLF). One problem with this measure for recent graduates' success is that it does not provide any information about the quality of employment and further study destinations gained by graduates. For instance, although the DLHE survey includes a question asking those graduates who are in employment about their pay, this information is often missing and, if reported, it is likely to be inaccurate.[7] In light of this, although the aforementioned EFS/UOLF classification is a rather simple measure, it seems to be the best available option and this would explain why previous studies have employed it. Additionally, one should bear in mind that this indicator has great policy relevance in the UK where universities employ it to measure the labour market success of their graduates. The large majority of departments at UK universities clearly state in their website the proportion of their graduates who are in employment or further study six months after graduation. This figure is used as a marketing strategy to attract potential students.

Attention is restricted here to graduates who are UK nationals for two reasons. First, this is done in an attempt to compare first destinations across graduates who are likely to have faced similar market conditions. Given that unfortunately the DLHE survey does not report information on the individual's country of residence, it is assumed that UK students are significantly more likely to remain in the UK after graduation relative to their overseas peers. Second, given the focus of this article on the signalling value of degree classification, another advantage of this restriction is that UK and UK-based firms and higher education institutions are more familiar with the UK degree classification system than their foreign counterparts.

Of the UK national graduates who responded to the DLHE survey, those reporting to work for the same employer that they did while they were at university are removed from the sample. These graduates are excluded since the hiring decision was clearly taken before information on degree classification became available.[8] Additionally, the sample is further reduced by removing graduates that received a different degree classification than the one they would otherwise have been awarded on the basis of the mean mark rule (these graduates are called 'non-compliers' in the treatment evaluation literature- see Angrist et al. 1996). The non-complier group, which represents a small proportion of the sample (i.e. 5.02%), is mainly composed by graduates who have been elevated to the next degree classification in light of their borderline mean mark. The rationale for excluding non-compliers[9] is that they may differ from the compliers in a numbers of respects (particularly unobserved characteristics) that could affect post-university outcomes.[10]

The final sample consists of 2,386 graduates. Table 1 reports some descriptive statistics. These statistics have been broken down by degree classification. An Upper Second class degree was achieved by approximately half of the graduates included in the sample. In line with expectations, the EFS probability is higher among graduates with higher classes of degree. White graduates are more likely to gain a First or Upper Second class degree than those from other ethnic backgrounds. Qualifications on entry to higher education (as measured by UCAS tariff score) are a strong predictor of degree performance. Students entering university with a UCAS tariff score equal or higher than 350 have a high likelihood of getting a 1st or a 2:1.

Insert Table 1 here

Figure 1 examines the relationship between the EFS probability and the mean mark obtained in the last year at university. Graduates have been first divided into four groups according to their degree classification. Next, within each group, graduates have been sorted by their mean mark and the average EFS probability (denoted by a circle) is computed for sub-groups of 25 graduates. Although the EFS probability is an increasing function of the mean mark, no significant upward jump can be observed around 50 or 70. However, a small jump can be detected around 60.

Insert Figure 1 here

Methodology

The methodology employed in this study consists in comparing the average first-destination outcome of graduates with a mean mark just above the cut-off for a given degree classification with the average first-destination outcome of those with a mean mark just below this cut-off. Given that these graduates are awarded a different degree classification despite being broadly of the same academic standard, their average difference in post-university outcomes can be interpreted as the signalling value of the degree classification. There are three cut-offs (i.e. 50, 60 and 70) and, in this study, attention is focused on graduates whose mean mark is one/two marks either below or above one of these cut-offs. Ideally one would select graduates whose mean mark falls within an even closer interval around these cut-offs. However, by doing so a very small number of graduates would be considered and this would lead to very imprecise results (Lee and Lemieux 2010). More observations are needed to obtain less variation in the results. Therefore, the selected interval represents a good compromise.

It is assumed here that, not only do graduates whose mean mark in the last year at university is in the close neighbourhood of one of the cut-offs show a similar level of academic ability, but also that they have similar demographic characteristics. Therefore, following the sharp regression discontinuity design (RDD) framework, if graduates with a mean mark around each cut-off are similar in all respects, except for the degree classification awarded, there is no need to use any control variable in order to consistently detect the signalling role of degree classification. Some sort of random experiment is emulated at each cut-off (Lesik 2008). The validity of this assumption is tested in the next Section.

Although, as argued earlier, marking at the institution here considered is believed to be absolute and not relative, this issue is empirically investigated in Figure **2**. If module marks follow some prescribed distribution, this would probably translate into sharp breaks in the distribution of the mean mark around the cut-off points. Discontinuous changes around the cut-off points can in fact be an indication of mark manipulation. However, in Figure **2**, which shows the density of the mean mark (histogram bin width is 1), there are not great jumps around any of the cut-off points.

*Insert Figure **2** here*

Each cut-off is examined separately and this allows the identification of the signalling value of a First class degree (relative to an Upper Second class degree), of an Upper Second class degree (relative to a Lower Second class degree) and of a Lower Second class degree (relative to a Third class degree).

Results

Following what was argued in the previous Section, the analysis first checks whether graduates who are just below and just above the cut-offs have similar characteristics. If the award of a higher degree classification amongst graduates whose mean mark in their last year at university is close to one of the cut-offs is to be considered random, no differences in their observed characteristics should be seen. In other words, these graduates should have comparable characteristics and only differ with respect to the degree classification awarded.

Columns 1, 2, 4, 5, 7 and 8 of Tables 2 and 3 present the means and the standard deviations of the characteristics of graduates who barely obtained a given degree classification and those who instead barely failed to receive the same degree classification. Columns 3, 6 and 9 of Tables 2 and 3 report the *t*-test values for the differences in these means together with their corresponding standard error. As shown by Table 2, there are no statistically significant differences between the characteristics of graduates whose mean mark in their last year at university is in the range of [-1.00, 1.00] of each of the three cut-offs. For example, Table 2 reports that the difference in the proportion of males achieving a mean mark between 70 and 71 relative to those obtaining a mean mark between 69 and 69.99 is small (i.e. 0.111) and not statistically different from zero at conventional levels. Another example of the close similarity between these two groups is reflected by the composition of graduates by ethnic origin: the difference in the proportion of White graduates is 0.030 and the difference in the proportion of graduates of Bangladeshi**,** Indian and Pakistani origin is -0.017. Table 3 indicates that there are no relevant dissimilarities in terms of observed characteristics also between graduates whose mean mark in their last year at university is in the range of [-2.00, 2.00] of each of the three cut-offs. These differences are statistically significant at the 5 percent level only in 1 case (out of 36 cases).

Insert Tables 2 and 3 here

After having shown that graduates who are just below and just above the cut-offs have similar observed characteristics, Table 4 looks at whether their first-destination outcome differs. Specifically, a *t*-test is performed for the differences between means in the EFS probability across graduates whose mean mark is close to a classification boundary.[11] The findings indicate that are no statistically significant differences in post-university outcomes between graduates whose mean mark in their last year at university is in the close neighbourhood of 50 or 70. On the other hand, Table 4 shows that the difference between the average EFS probability of graduates achieving a mean mark between 60 and 62 and those with a mean mark between 58 and just under 60 is 0.079, and this figure is statistically significant at the 5 percent level (the *t*-statistic is 0.079/0.036 ~ 2.914, which is larger than the 5 percent critical value of 1.964 (degrees of freedom=529)). However, when the sample is limited to graduates whose mean mark is ±1.00 from 60, this difference remains positive (0.106) but is only statistically significant at the 10 percent level. This result may be driven by a reduction in the sample size (from 531 to 245), leading to a larger standard error of the estimated difference (from 0.036 to 0.058).

Insert Table 4 here

In an attempt to ensure the validity and robustness of the results of Table 4, **four** statistical checks are conducted. First, given that the *t*-test assumes that two groups of graduates being compared have similar variances, a series of tests of equal variance is performed. The results (available from the author upon request) show that all comparisons are made between groups that have equal variance, except for the comparison between graduates whose mean mark is between 60 and 62 and those with a mean mark between 58 and just under 60. To address this problem, a Welch *t*-test, adjusting for unequal variances, is run. This test confirms that the estimated difference between means in the EFS probability across these two groups is statistically significant at the 5 percent level. Second, a *z*-test instead of a *t*-test is used to test whether there are statistically significant differences in the first destination of graduates whose mean mark is close to a classification boundary. Estimates provided in Columns 3, 7 and 11 of Table 4 are replicated using a *z*-test. The results, which are shown in Table 5, are practically the same in terms of statistical significance as those from the *t*-test. Third, given that, as outlined in Table 3, graduates whose mean mark is ±2.00 from 60 are statistically dissimilar in terms of disability status, a new estimated difference between means in the EFS probability across these two groups is computed taking this into account. This estimated difference is the same as that reported in Table 4 (0.079) and is still statistically significant, with a *t*-statistic of 2.17. **Finally, as shown in Table 6, the results reported in Tables 4 and 5 hold even after controlling for differences in observable characteristics (i.e. gender, age, cohort, ethnicity, mode of study, disability status and UCAS tariff score).**

*Insert Table**s** 5 **and 6** here*

Though the estimates of Table 4 do not provide conclusive evidence of the signalling role of an Upper Second class degree (the estimated difference reported at the top of Column 7 of Table 4 is only marginally statistically significant), they are, however, suggestive that this may be the case. Despite being broadly of the same academic standard, graduates who are able to scrape a 2:1 appear to have better employment/postgraduate prospects relative to those who barely miss the chance of getting a 2:1. This means that a small difference in academic achievement may considerably affect the destination of recent graduates. Such a consideration is in line with the fact that a lot of (graduate) jobs require a 2:1 minimum and applicants without this are automatically rejected. Employers are progressively depending on the 2:1 to narrow the pool of applicants. Getting a 2:1 also significantly increases the chances of being accepted on a postgraduate programme. According to Professor Nigel Seaton, this happens because a lot of employers and higher education institutions tend to rely on the signalling effect of the degree classification system, which unfortunately does not capture a lot of the richness of what a student does at university.[12]

Additionally, the fact that only a borderline 2:1 degree seems to exert a signalling function is also consistent with a comment made by Professor Michael Worton, Vice-Provost of the University College London, who said: "We've got a classification system that essentially divides the world of undergraduates into two tribes – those with a 2:1 and above and those with a 2:2 and below ".[13] Just missing out on a 2.1 has far more implications on a graduate's first destination than barely failing to achieve a 1st or a 2:2.

Conclusions

Degree classification is found by many studies worldwide to be an important determinant of the status of new graduates in the period following graduation. Graduates leaving university with higher degree classifications are more likely to be successful relative to their peers with lower degree classifications. How does degree classification affect the first-destination outcome of graduates? This article has attempted to study whether degree classification acts as a signal that helps employers and higher education institutions sort able graduates from the less able ones. Given the large number of applicants, employers and higher education institutions may not have the time and/or the resources to assess their skills and hence may decide to rely on degree classification when forming beliefs about recent graduates' abilities. Thus, other things being equal, recent graduates with a higher degree classification are preferred to those with a lower degree classification on the assumption that the former are perceived to have a higher productivity than the latter.

Data on two cohorts of recent graduates from a large UK university are used to study the signalling effects of degree classification. The methodology employed in this study consists in comparing the average first-destination outcome of graduates with a mean mark that just allowed them to get a given degree classification with the average first-destination outcome of those with a mean mark that made them just miss the chance of achieving the same degree classification. Despite having broadly the same academic ability, these two groups of graduates display different credentials. Hence the difference in their average outcomes can be considered as the signalling effect exerted by the degree classification on the first destinations of graduates.

While the empirical results indicate that neither a First class degree nor a Lower Second class degree have a signalling function, there is evidence suggesting that an Upper Second class degree may act as a signalling device to employers and higher education institutions. The estimates indicate that graduates achieving a borderline 2.1 degree are between 10.6 and 7.9 percentage points more likely to be in employment or further study six months after graduation than those with a very high 2.2. This finding is consistent with the growing evidence about the great value placed by employers and higher education institutions on the 2:1. A lot of companies accept applications only from candidates with at least an Upper Second class degree. Similarly, the minimum requirement for a postgraduate programme is often a 2:1.

The above result provides some support for the statement made by Professor Nigel Seaton, noting that “a student's degree classification has a major effect on their life chances, yet the difference in academic achievement between a 2:1 and a 2:2 can be almost nothing”.[14] This may call for a review of the system used by UK universities to record student achievement. A more comprehensive measure of student achievement could be adopted. Following this consideration, a group of UK universities and colleges are issuing or are planning to issue the Higher Education Achievement Report (HEAR).[15] The HEAR gives details of the degree programme, including a transcript of the modules attended and the marks achieved. An alternative solution would be the adoption of the grade-point average (GPA) model. According to this scheme, which is employed by a lot of US higher education institutions, student performance is divided according to a 13 level classification typically ranging from A+ to F. The GPA model was piloted by a small number of UK universities between November 2013 and July 2014.[16]

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NOTES

[1]Firms spend a lot of resources in the graduate recruitment process (Branine 2008). The methods used (e.g. online tests, interviews, assessment centre) can be slow, time-consuming and expensive. Additionally, a recent report (CEB 2014) conclude that there are massive sunken costs against graduate recruitment programmes with employers paying more than necessary to initially attract graduates and then paying again to replace graduates moving on after 12 to 18 months.

[2]This hypothesis is consistent with the job market signalling model that was first developed by Spence (1973). In order to deal with the incompleteness of information about the quality of workers in the early stages of their careers, firms distinguish among workers on the basis of easily observable characteristics that are correlated with productivity. Hence, educational attainment, gender and race may all act as tools for workers to signal their unobserved ability. Arrow (1973) also developed a theoretical model where the academic background of job applicants provides firms with information about their productivity.

[3]However, in several UK universities degree classification is determined by the mean mark received by graduates in their last two years of study.

[4]The DLHE survey has previously been known as First Destination Survey (FDS). It is a national statutory survey requiring UK higher education institutions to collect data on behalf of HESA. Information on the status of the university leaver is collected using a standardized questionnaire designed and distributed by HESA.

[5]Tariff points are computed by UCAS (Universities and Colleges Admissions Service) to indicate academic equivalence across different academic qualifications (see

www.ucas.ac.uk). The system of UCAS tariff points is used by universities and colleges for making offers to applicants.

[6]One concern in considering post-tertiary education as a positive outcome is that some graduates may mask their inability to find employment by continuing to study. However, it is possible to argue that this may be a relatively minor problem here. While one would expect many graduates finding refuge in further education to have first attempted to enter the labour market, the data employed in this study provide information on the status of graduates very shortly after graduation.

[7]On the questionnaire there is an option for respondents who do not wish to give information on their earnings. Furthermore, graduates are asked to report their net annual pay, but there is no information about the number of hours they typically work during a week or a year.

[8]However, for the other graduates included in the EFS category, there is no information on whether their current employment (or their current place on a postgraduate course) came as a result of an offer received before or after graduation. Thus, one limitation of the analysis is the inability to exclude the former from the final sample.

[9]Several studies (see, for instance, Pellegrini et al. 2012) exclude non-compliers from the final sample.

[10]An alternative method would consist in keeping non-compliers in the final sample and use a fuzzy regression discontinuity design to estimate the signalling effect of degree classification. **Appendix 1 presents a detailed explanation of this method and the corresponding results.**

[11] **With a large sample size, the *t*-test is equivalent to the linear regression of the response variable (i.e. EFS probability) on the grouping variable (i.e. equal to 1 if the mean mark is above a classification boundary, and 0 if it is below). For instance, the *t*-test value for the difference in the average EFS probability between graduates with a First class degree and those with an Upper Second class degree is equal to estimated coefficient β in the following regression using graduate-level data: $y_i = \alpha + \beta X_i + \mu_i$ where y_i takes on the value 1 if the graduate i is in employment or further study six months after graduation, and 0 otherwise; X_i takes on the value 1 if the graduate i has a mean mark between 70 and 72, and 0 if he/she has a mean mark between 68 and just under 70; and μ_i is an error term.**

[12] See the Guardian, April 18th 2011 (available at http://www.theguardian.com/education/2011/apr/18/higher-education-degree-classification)

[13] See Times Higher Education, June 23th 2011 (available at https://www.timeshighereducation.co.uk/news/two-tribes-to-the-wall-elite-set-may-adopt-gpa/416582.article)

[14] See the Guardian, April 18th 2011 (available at http://www.theguardian.com/education/2011/apr/18/higher-education-degree-classification)

[15] See http://www.hear.ac.uk

[16] See http://blog.gsm.org.uk/new-grading-system-to-be-piloted-by-universities

References

Angrist, Joshua D., Guido W. Imbens, and Donald B. Rubin. 1996. "Identification of causal effects using instrumental variables." *Journal of the American Statistical Association* 91 (434): 444-455.

Arrow, Kenneth J. 1973. "Higher education as a filter." *Journal of Public Economics* 2 (3): 193-216.

Branine, Mohamed. 2008. "Graduate recruitment and selection in the UK: A study of the recent changes in methods and expectations." *Career Development International* 13 (6): 497-513.

Bratti, Massimiliano, Abigail McKnight, Robin Naylor, and Jeremy Smith. 2004. "Higher education outcomes, graduate employment and university performance indicators." *Journal of the Royal Statistical Society (Series A)* 167 (3): 475-496.

Bruwer, Johan. 1999. "First destination graduate employment as key performance indicator: Outcomes assessment perspectives." *Australasian Association for Institutional Research Journal* 8(2). Accessed October 20, 2015. http://www.aair.org.au/app/webroot/media/pdf/JIR/Journal%20of%20Institutional%20Research%20in%20Australasia%20and%20JIR/Volume%208,%20No.%202%20September%201999/Bruwer.pdf

CEB. 2014. *Driving new success strategies in graduate recruitment* https://www.cebglobal.com/shl/uk/campaign/hire-and-inspire-report

Chevalier. Arnaud, Colm Harmon, Ian Walker, and Yu Zhu. 2004. "Does education raise productivity, or just reflect it?" *Economic Journal* 114 (499): 499-517.

Dabalen, Andrew, Bankole Oni, and Olatunde A. Adekola. 2001. "Labor market prospects for university graduates in Nigeria." *Higher Education Policy* 14 (2): 141-159.

Freier, Ronny, Mathias Schumann, and Thomas Siedler 2014. *The economic returns to graduating with honors-Evidence from Law graduates*. Paper presented at the fifth international workshop on applied economics of education, Catanzaro (Italy), 22-24 June 2014.

Koda, Yoshiko, and Takako Yuki. 2013. "The labor market outcomes of two forms of cross-border higher education degree programs between Malaysia and Japan." *International Journal of Educational Development* 33 (4): 367-379.

Ireland, Norman, Robin Naylor, Jeremy Smith, and Shqiponja Telhaj. 2009. *Educational returns, ability composition and cohort effects: Theory and evidence for cohorts of early-career UK graduates*. CEP Discussion Paper 939. London: Centre for Economic Performance.

Lee, David S., and Thomas Lemieux. 2010. "Regression discontinuity designs in economics." *Journal of Economic Literature* 48 (2): 281-355.

Lesik, Sally A. 2008. *Evaluating developmental education programs in higher education.* ASHE/Lumina Policy Briefs and Critical Essays No. 4, Ames: Iowa State University. Department of Educational Leadership and Policy Studies.

Martorell, Paco, and Damon Clark 2010. *The signaling value of a high school diploma*. Working Paper no. 557, Industrial Relations Section, Princeton University.

Mason, Geoff, Gareth Williams, and Sue Cranmer. 2009. "Employability skills initiatives in higher education: what effects do they have on graduate labour market outcomes?" *Education Economics* 17 (1): 1-30.

Pellegrini, Guido, Flavia Terribile, Ornella Tarola, Teo Muccigrosso, and Federica Busillo. 2012. "Measuring the effect of European Regional Policy on economic growth: A regression discontinuity approach." *Papers in Regional Science* 92 (1): 217-233.

Richards, Ellen W. 1984. "Undergraduate preparation and early career outcomes: A study of recent college graduates." *Journal of Vocational Behavior* 54 (3): 279-304.

Saks, Alan M., and Blake E. Ashforth. 1999. "Effects of individual differences and job search behaviors on the employment status of recent university graduates." *Journal of Vocational Behavior* 24 (3): 335-349.

Simonite, Vanessa. 2000. "The effects of aggregation method and variation in the performance on individual students on degree classifications in modular degree courses." *Studies in Higher Education* 25 (2): 197-209.

Smith, Jeremy, Robin Naylor, and Abigail McKnight. 2000. "Graduate employment outcomes and university performance measures." *Economic Journal* 110 (464):82-411.

Spence, Michael. 1973. "Job market signaling." *Quarterly Journal of Economics* 83 (3): 355-379.

Tyler, John H. 2004. "What is the value of the GED to dropouts who pursue the credential?" *Industrial and Labor Relations Review* 57 (4): 587-598.

Tyler John H., Richard, J. Murnane and John B. Willett. 2000. "Estimating the labor market signaling value of the GED." *Quarterly Journal of Economics* 115 (2): 431-468.

Van Der Klaauw, Wilbert. 2002. "Estimating the effect of financial aid offers on college enrollment: a regression-discontinuity approach." ***International Economic Review*** **43 (4): 1249-1287.**

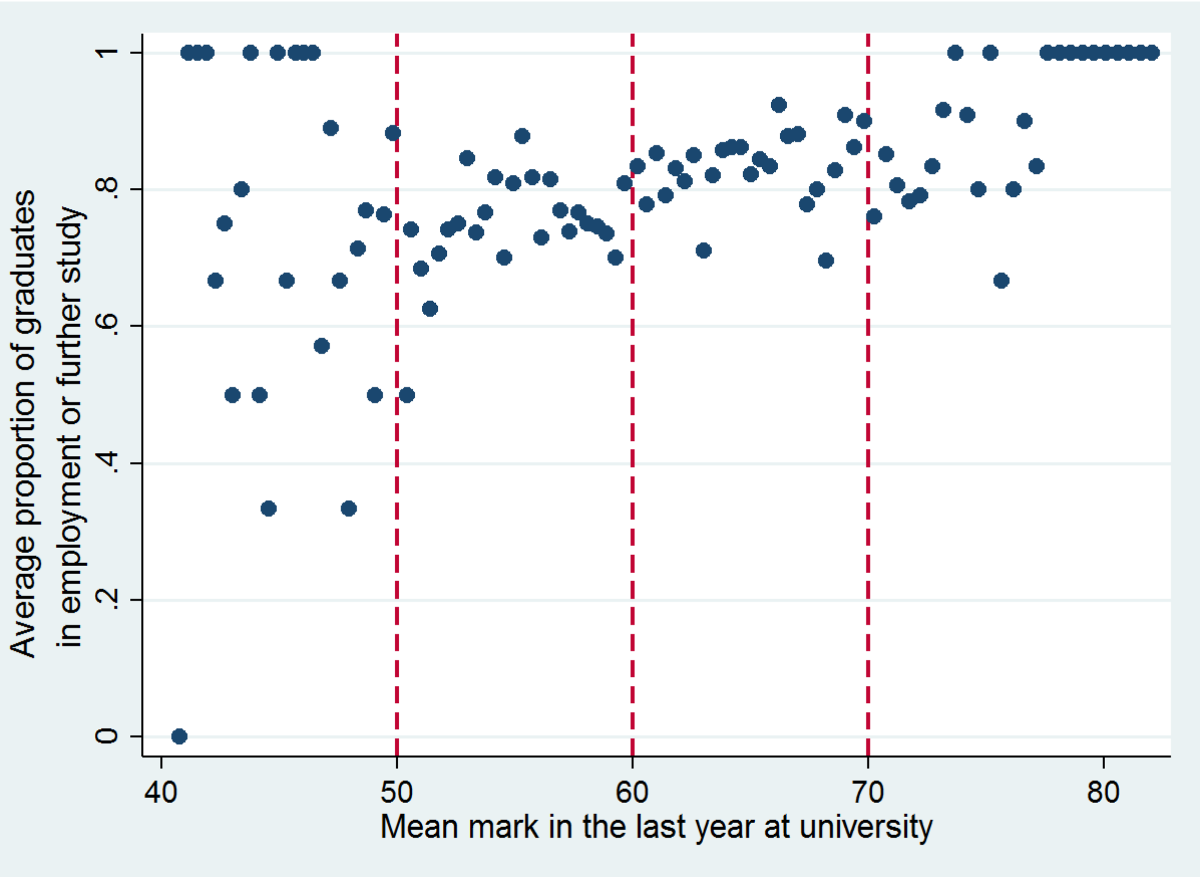
Wilton, Nick. 2008. "Business graduates and management jobs: an employability match made in heaven?" *Journal of Education and Work* 21 (2): 143-158.

Table 1: Descriptive statistics

	First class degree	Upper Second class degree	Lower Second class degree	Third class degree
In employment or further study	0.840 (0.368)	0.827 (0.378)	0.760 (0.427)	0.728 (0.447)
Male	0.498 (0.501)	0.407 (0.491)	0.398 (0.490)	0.500 (0.502)
Age	25.111 (5.864)	23.994 (5.166)	23.904 (4.647)	24.868 (4.271)
White	0.683 (0.466)	0.438 (0.496)	0.237 (0.425)	0.158 (0.366)
Bangladeshi/Indian/Pakistani	0.128 (0.334)	0.304 (0.460)	0.423 (0.494)	0.386 (0.489)
Other Asian	0.012 (0.111)	0.045 (0.208)	0.071 (0.257)	0.114 (0.319)
Black or other or Unknown	0.177 (0.382)	0.213 (0.409)	0.270 (0.444)	0.342 (0.477)
High Tariff score (≥350)	0.239 (0.427)	0.117 (0.322)	0.059 (0.235)	0.026 (0.161)
Medium Tariff score (> 200 but <350)	0.267 (0.444)	0.409 (0.492)	0.339 (0.474)	0.237 (0.427)
Low Tariff score (≤200)	0.111 (0.315)	0.167 (0.373)	0.233 (0.423)	0.281 (0.451)
Unknown Tariff score	0.383 (0.487)	0.307 (0.461)	0.370 (0.483)	0.456 (0.500)
Full-time	0.881 (0.325)	0.888 (0.316)	0.776 (0.417)	0.518 (0.502)
Disability status	0.095 (0.293)	0.046 (0.210)	0.040 (0.197)	0.053 (0.224)
Observations	243	1,209	820	114

Notes: All entries (except observations) indicate the percentage of graduates with a given characteristics or in a given situation six months after graduation. Standard deviations are in brackets.

Figure 1: Probability of being in employment or further study and the mean mark



Histogram-style conditional mean with 25 bins by mean mark obtained using the Stata command *cmogram*.

Figure **2**: Distribution of mean marks in the last year at university

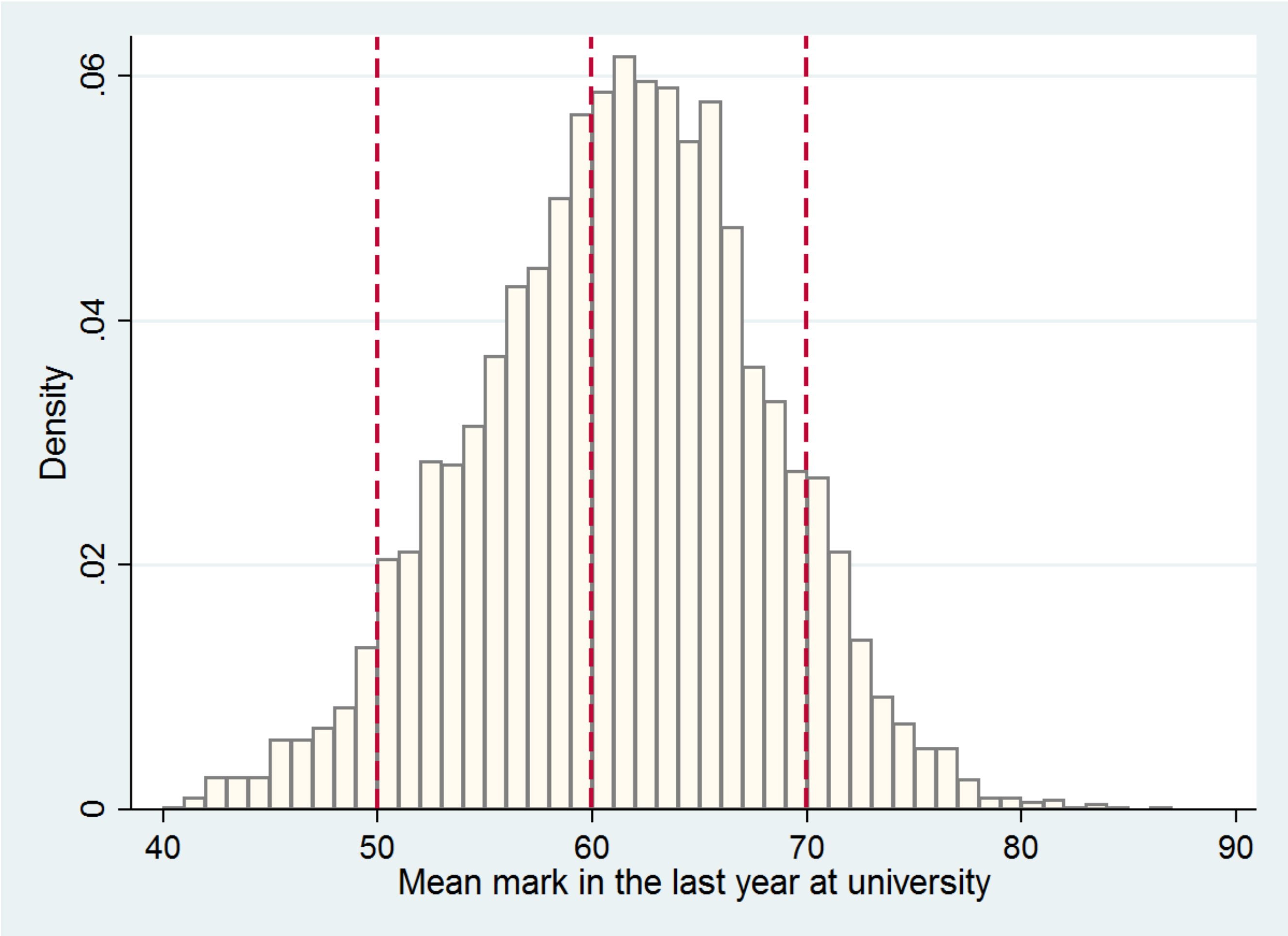


Table 2: Mean characteristics of graduates whose mean mark in their last year at university is ± 1 from one of the relevant cut-offs

	First Class/Upper Second Class			Upper Second Class /Lower Second Class			Lower Second Class/Third Class		
	(1) mean 70 ≤mean mark≤ 71	(2) mean 69 ≤mean mark<70	(3) Difference in means (1)-(2) (*t*-test)	(4) mean 60 ≤mean mark≤ 61	(5) mean 59 ≤mean mark<60	(6) Difference in means (4)- (5) (*t*-test)	(7) mean 50 ≤mean mark≤ 51	(8) mean 49 ≤mean mark<50	(9) Difference in means (7)-(8) (*t*-test)
Male	0.435 (0.499)	0.324 (0.475)	0.111 (0.100)	0.374 (0.485)	0.465 (0.502)	-0.091 (0.069)	0.429 (0.499)	0.579 (0.499)	-0.150 (0.133)
Age	25.000 (6.437)	23.459 (3.167)	1.541 (1.127)	23.609 (3.999)	23.493 (2.3600)	0.116 (0.502)	23.429(2.52)	23.737 (1.485)	-0.308 (0.613)
White	0.652 (0.492)	0.622 (0.492)	0.030 (0.099)	0.293 (0.456)	0.296 (0.460)	-0.003 (0.064)	0.125 (0.334)	0.158 (0.375)	-0.033 (0.091)
Bangladeshi/Indian/Pakistani	0.145 (0.355)	0.162 (0.374)	-0.017(0.074)	0.448 (0.499)	0.437 (0.499)	0.011 (0.070)	0.536 (0.503)	0.421 (0.507)	0.115 (0.134)
Other Asian	0.014 (0.120)	0.027 (0.164)	-0.013(0.028)	0.046 (0.210)	0.042 (0.203)	0.004 (0.029)	0.089 (0.288)	0.210 (0.288)	-0.121 (0.086)
Black or other or Unknown	0.188 (0.394)	0.189 (0.397)	-0.001(0.080)	0.213 (0.410)	0.225 (0.421)	-0.012 (0.058)	0.250 (0.437)	0.211 (0.419)	0.039 (0.115)
High Tariff score (≥350)	0.217 (0.415)	0.162 (0.374)	0.055 (0.082)	0.086 (0.281)	0.127 (0.335)	-0.041 (0.042)	0.053 (0.227)	0.000 (0.000)	0.053 (0.052)
Medium Tariff score(> 200 but <350)	0.304 (0.464)	0.378 (0.492)	-0.074(0.096)	0.437 (0.497)	0.338 (0.476)	0.099 (0.069)	0.286 (0.456)	0.263 (0.452)	0.023 (0.121)
Low Tariff score (≤200)	0.159 (0.369)	0.081 (0.449)	0.078 (0.080)	0.201 (0.402)	0.211 (0.411)	-0.010 (0.057)	0.232 (0.426)	0.369 (0.496)	-0.137 (0.118)
Unknown Tariff score	0.320 (0.469)	0.379 (0.492)	-0.059(0.097)	0.276 (0.448)	0.324 (0.471)	-0.048 (0.064)	0.429 (0.499)	0.368 (0.496)	0.061 (0.132)
Full-time	0.870 (0.339)	0.865 (0.347)	0.005 (0.070)	0.856 (0.352)	0.859 (0.350)	-0.003 (0.049)	0.589 (0.496)	0.632 (0.496)	-0.043 (0.132)
Disability status	0.130 (0.339)	0.108 (0.315)	0.022 (0.067)	0.057 (0.233)	0.042 (0.203)	0.015 (0.032)	0.071(0.260)	0.053 (0.229)	0.018 (0.067)

Notes: In columns (1), (2), (4), (5), (7) and (8) standard deviations are in brackets. In columns (3), (6) and (9) standard errors are in brackets.

Table 3: Mean characteristics of graduates whose mean mark in their last year at university is ± 2 from one of the relevant cut-offs

	First Class/Upper Second Class			Upper Second Class /Lower Second Class			Lower Second Class /Third Class		
	(1) mean 70≤mean mark≤72	(2) mean 68 ≤mean mark<70	(3) Difference in means (1) – (2) (*t*-test)	(4) mean 60 ≤mean mark≤ 62	(5) mean 58 ≤mean mark<60	(6) Difference in means (4) - (5) (*t*-test)	(7) mean 50 ≤mean mark<52	(8) mean 48 ≤mean mark<50	(9) Difference in means (7) - (8) (*t*-test)
Male	0.462 (0.500)	0.339 (0.475)	0.123 (0.061)	0.405 (0.492)	0.410 (0.493)	-0.005 (0.044)	0.433 (0.498)	0.488 (0.506)	-0.055 (0.092)
Age	24.909 (5.626)	25.234 (6.361)	-0.325 (0.750)	23.571 (4.158)	23.720 (3.757)	-0.149 (0.359)	23.702 (3.467)	24.024 (4.102)	-0.322 (0.674)
White	0.659 (0.476)	0.621 (0.487)	0.038 (0.060)	0.302 (0.460)	0.295 (0.457)	0.007 (0.041)	0.106 (0.309)	0.146 (0.309)	-0.040 (0.060)
Bangladeshi/Indian/Pakistani	0.136 (0.345)	0.137(0.345)	-0.001 (0.043)	0.426 (0.495)	0.390 (0.489)	0.036 (0.044)	0.510 (0.502)	0.537 (0.505)	-0.027 (0.093)
Other Asian	0.008 (0.087)	0.040 (0.198)	-0.032* (0.019)	0.048 (0.214)	0.045 (0.208)	0.003 (0.019)	0.087 (0.283)	0.171 (0.381)	-0.084 (0.058)
Black or other or Unknown	0.197 (0.399)	0.202 (0.403)	-0.005 (0.050)	0.224 (0.417)	0.270 (0.445)	-0.046 (0.038)	0.298 (0.460)	0.146 (0.358)	0.152* (0.080)
High Tariff score (≥350)	0.227 (0.421)	0.153 (0.362)	0.074 (0.049)	0.076 (0.265)	0.065 (0.247)	0.011 (0.023)	0.038 (0.193)	0.073 (0.264)	-0.035 (0.040)
Medium Tariff score(> 200 but <350)	0.280 (0.451)	0.298 (0.459)	-0.018 (0.057)	0.416 (0.494)	0.385 (0.488)	0.031 (0.044)	0.240 (0.429)	0.268 (0.449)	-0.028 (0.080)
Low Tariff score (≤200)	0.137 (0.345)	0.073 (0.260)	0.064 (0.038)	0.221 (0.416)	0.215 (0.412)	0.006 (0.037)	0.240 (0.429)	0.293 (0.461)	-0.053 (0.081)
Unknown Tariff score	0.356 (0.481)	0.476 (0.501)	-0.120* (0.061)	0.287 (0.453)	0.335 (0.473)	-0.048 (0.041)	0.481 (0.502)	0.366 (0.487)	0.115 (0.092)
Full-time	0.873 (0.333)	0.855 (0.353)	0.018 (0.031)	0.902 (0.299)	0.831 (0.377)	0.071* (0.042)	0.606 (0.491)	0.537 (0.505)	0.69 (0.091)
Disability status	0.136 (0.344)	0.056 (0.232)	0.080** (0.037)	0.045 (0.208)	0.030 (0.171)	0.015 (0.017)	0.048 (0.215)	0.073 (0.264)	-0.025 (0.042)

Notes: In columns (1), (2), (4), (5), (7) and (8) standard deviations are in brackets. In columns (3), (6) and (9) standard errors are in brackets.
** statistically significant at 5%; * statistically significant at 10%

Table 4: Differences in the probability of being in employment or further study between graduates who barely obtained a given degree classification and those who instead barely failed to receive it (*t*-test)

	First Class/Upper Second Class				Upper Second Class /Lower Second Class				Lower Second Class /Third Class			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	mean 70 ≤mean mark≤ 71	mean 69 ≤mean mark<70	Difference in means (*t*-test) (1)-(2)	obs	mean 60 ≤mean mark≤ 61	mean 59 ≤mean mark<60	Difference in means (*t*-test) (5)-(6)	obs	mean 50 ≤mean mark≤ 51	mean 49 ≤mean mark<50	Difference in means (*t*-test) (9)-(10)	obs
Proportion of graduates in employment or further study	0.826 (0.381)	0.865 (0.347)	-0.039 (0.075)	106	0.810 (0.393)	0.704 (0.460)	0.106* (0.058)	245	0.661 (0.478)	0.684 (0.476)	-0.023 (0.127)	75
	First Class/Upper Second Class				Upper Second Class /Lower Second Class				Lower Second Class /Third Class			
	mean 70≤mean mark≤ 72	mean 68 ≤mean mark<70	Difference in means (*t*-test) (1)-(2)	obs	mean 60 ≤mean mark≤ 62	mean 58 ≤mean mark<60	Difference in means (*t*-test) (5)-(6)	obs	mean 50 ≤mean mark≤ 52	mean 48 ≤mean mark<50	Difference in means (*t*-test) (9)-(10)	obs
Proportion of graduates in employment or further study	0.803 (0.399)	0.823 (0.384)	-0.020 (0.049)	256	0.819 (0.386)	0.740 (0.440)	0.079** (0.036)	531	0.683 (0.468)	0.708 (0.461)	-0.025 (0.086)	145

Notes: In columns (1), (2), (5), (6), (9) and (10) standard deviations are in brackets. In columns (3), (7) and (11) standard errors are in brackets. Degrees of freedom are two fewer than the total number of observations.
** statistically significant at 5%; * statistically significant at 10%

Table 5: Differences in the probability of being in employment or further study between graduates who barely obtained a given degree classification and those who instead barely failed to receive it (*z*-test)

	First Class/Upper Second Class (1)	Upper Second Class /Lower Second Class (2)	Lower Second Class /Third Class (3)
Interval around the mean mark	± 1 from 70	± 1 from 60	± 1 from 50
Difference in the mean proportion of graduates in employment or further study	-0.039 (0.075)	0.106* (0.058)	-0.023 (0.125)
Interval around the mean mark	± 2 from 70	± 2 from 60	± 2 from 50
Difference in the mean proportion of graduates in employment or further study	-0.020 (0.049)	0.079** (0.037)	-0.025 (0.085)

Notes: Standard errors are in brackets.
** statistically significant at 5%; * statistically significant at 10%

Table 6: Differences in the probability of being in employment or further study between graduates who barely obtained a given degree classification and those who instead barely failed to receive it (regression analysis)

	First Class/Upper Second Class (1)	Upper Second Class /Lower Second Class (2)	Lower Second Class /Third Class (3)
Interval around the mean mark	**± 1 from 70**	**± 1 from 60**	**± 1 from 50**
Difference in the proportion of graduates in employment or further study	**-0.006** **(0.075)**	**0.105*** **(0.059)**	**-0.046** **(0.128)**
Interval around the mean mark	**± 2 from 70**	**± 2 from 60**	**± 2 from 50**
Difference in the proportion of graduates in employment or further study	**-0.007** **(0.050)**	**0.083**** **(0.036)**	**-0.067** **(0.088)**

Notes: Standard errors are in brackets. In every regression controls include: gender, age, ethnicity, disability status, mode of study, UCAS tariff score and cohort.
**** statistically significant at 5%; * statistically significant at 10%**

Appendix 1: Fuzzy Regression Discontinuity Approach

Following the approach of Van Der Klaauw (2002), the mean mark rule can be employed as an instrument to predict degree classification in a two-stage procedure, where the second stage explains the EFS outcome.

The first-stage equation can be written as:

$$declass_i = \beta_0 + \beta_1 \cdot 1\{X_i \geq cutoff\} + \beta_2 (X_i - cutoff) + \beta_3 (X_i - cutoff) \cdot 1\{X_i \geq cutoff\} + K_i \beta_4 + v_i$$

where $declass_i$ **is First class degree, Upper Second class degree or Lower Second class degree;** X_i **is the mean mark;** $\cdot 1\{X_i \geq cutoff\}$ **is a dummy variable taking on the value 1 if the mean mark is above the relevant cut-off point (i.e. 70 for First class degree, 60 for Upper Second class degree and 50 for Lower Second class degree); and** K **is a vector of covariates including gender, age, cohort, ethnicity, mode of study, disability status and UCAS tariff score.**

Predicted degree classes from the first-stage regressions are used in the second-stage equation:

$$y_i = \alpha_0 + \alpha_1 declass_i + \alpha_2 (X_i - cutoff) + \alpha_3 (X_i - cutoff) \cdot 1\{X_i \geq cutoff\} + K_i \alpha_4 + \mu_i$$

where y_i **is the EFS outcome.**

The Table below presents coefficient estimates for the independent variables of interest from the second-stage regressions. All regression results report standard errors adjusted for clustering on mean mark and cohort. These estimates are in line with those shown in Tables 4, 5 and 6, as they suggest that only an Upper Second class degree may have a signalling role. Although first-stage estimates are not reported here, the Table below shows that the F-statistic on the excluded instrument in the first stage is always very high, suggesting that the mean mark strongly predicts degree classification.

IV Estimates (marginal effects) on the probability of being in employment or further study

Discontinuity	Independent variable	Coefficient	F-test of excluded instrument (first-stage)	Number of observations
First class/Upper Second Class	First class degree	-0.051 (0.042)	460.00	1,556
Upper Second Class /Lower Second Class	Upper Second Class degree	0.058* (0.031)	4,911.66	2,122
Lower Second Class/Third Class	Lower Second Class degree	-0.019 (0.064)	1,006.41	956

Notes: Standard errors adjusted for clustering on mean mark and cohort are in brackets. In every regression controls include: gender, age, ethnicity, disability status, mode of study, UCAS tariff score and cohort.
***statistically significant at 10%**