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Determining student satisfaction: An economic analysis of the National Student Survey

Pamela Lenton*

Department of Economics, University of Sheffield, 9 Mappin Street, Sheffield, South Yorkshire, S1 4DT, UK

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ABSTRACT

The UK National Student Survey (NSS) represents a major resource, never previously used in the economics literature, for understanding how the market signal of quality in higher education works. In this study, we examine the determinants of the NSS overall student satisfaction score across eleven subject areas for 121 UK universities between 2007 and 2010. Using a unique panel data set and estimating random effects and fixed effects models, we find large differences in NSS scores across subjects and across different groups of universities, which implies that the raw scores should not be used as a method of ranking. Additionally, the student–staff ratio and student employability are strong influencers of student satisfaction; both of which suggest that a policy which places emphasis on student support, personal development and employability skills will yield an advantage in the higher education marketplace.

1. Introduction

The annual *National Student Survey* (NSS), introduced in the UK in 2005 and completed by the graduating student body of all publicly funded higher education institutions and by some private institutions, was intended to be a method by which universities could assess their own teaching quality and seek to improve student satisfaction with their courses. The survey is commissioned by the Higher Education Funding Council for England (HEFCE), administered by the social research company Ipsos Mori, and forms part of the quality assurance framework implemented by the Quality Assurance Agency (QAA) for higher education. The NSS has become one of the major instruments by which universities seek to compete in the market for student recruitment by sending a signal of teaching quality. Furthermore, these scores are not only used as a ranking device of student satisfaction across universities, they are incorporated into the major university league tables (HEFCE, 2008).

The administering of the survey itself, between January and April when students are in their final year, has been subject to many allegations of potential distortion including claims that students could be encouraged by their teachers to provide an excellent review (The Times Higher Education Supplement: May 2008). As noted by HEFCE, "Whether attempts to use the results to enhance quality have been successful is an unresolved issue" (HEFCE, 2010, p.11). However, since the announcement of the new higher student fee schedule that saw fees for many full-time courses increased to £9000 per annum from 2012, students possess more incentive than ever to search for the best value student experience they can find, hence the NSS is potentially a key weapon for universities to deploy in search of market share.

The economics literature, in measuring institutional performance, has followed one of two strategies: either it has focussed on the labour market outcomes of graduates or

* Tel.: +44 114 222 3418; fax: +44 114 222 3458.
E-mail address: p.lenton@sheffield.ac.uk

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average graduate wage returns as indicators of institutional performance (Blundell, Dearden, Goodman, & Reed, 1997; Bratti, Naylor, & Smith, 2005; Chevalier & Conlon, 2003; Smith, McKnight, & Naylor, 2000); or alternatively it has viewed the higher education institution as a multiproduct firm, assessing the determinants of the 'firm's' productivity (Johnes, Johnes, Lenton, Thanassoulis, & Emrouznejad, 2005; Johnes & Taylor, 1990; Lenton 2008). However, the various university 'quality rankings' can also be seen as an important performance indicator, particularly in determining student demand, and this has become an important area of research since the changes in funding regimes have led universities to actively seek highly qualified students as a means of sending a 'quality signal'. International students, in particular, have been found to rely heavily on university rankings (Chevalier & Jia, 2012; Soo & Elliott, 2010). Horstchraer (2012) finds that university rankings of student satisfaction play a more important role than research rankings for students making their choice of medical school in Germany.

In the UK the literature on the NSS is extremely sparse, consisting mainly of reports by HEFCE of the descriptive statistics along with trends in the scores across years. The education literature contains discussions surrounding the usefulness of NSS scores and rankings, concluding that they are a stable measure of teaching quality (Cheng & Marsh, 2010), and indeed they remain the method by which university teaching quality is measured in many ranking systems.[1] Vaughan and Yorke (2009) noted that arts programmes produce low NSS scores in their qualitative study. Latreille (2010) examined the NSS overall score across economics departments in the UK and notes differences in scores across universities, and more recently McCormack, Propper, and Smith (2014) include NSS scores in their examination of university management and performance. However, to-date there has been no statistical analysis, we believe, that examines determinants of the scores or which assesses their use as a ranking tool.

The major contribution of this paper is for the first time, to conduct an econometric analysis of the NSS which assesses the possible determinants of student satisfaction, and considers whether this survey is an adequate tool for ranking student satisfaction across subjects and universities. We do this by examining possible influences on the overall NSS scores for 11 subject areas within 121 UK universities over a four year period from 2007 to 2010, using a unique constructed panel dataset. The following section provides a description of the data and estimation technique. In Section 3 we discuss our results and in Section 4 we draw our conclusions and implications for policy.

2. Data and methodology

2.1. The National Student Survey data

The NSS questionnaire, administered to all graduating students, consists of 22 questions across six areas of university life: teaching; assessment and feedback; academic support; organisation; resources and personal development. A final question asks students for an overall rating of their satisfaction with the quality of their course which is answered on a five point Likert scale from 'definitely agree' to 'definitely disagree':

"Overall, I am satisfied with the quality of the course"

The NSS data is provided on the 'HEFCE' website[2] and available for subjects within the joint academic coding system (JACS) 4 digit code level, of which there are 142. The NSS data presents JACS subjects coded in three levels according to the level of aggregation, for example, Languages is given as level 1 which includes all programmes that are language related. A lesser level of aggregation is European languages at level 2, which as it name implies consists of all European languages. A further disaggregation is of single programmes i.e. French, German and Italian etc. which are classed at level 3. However, not all universities have recorded NSS results at level 3, either because the programme is not offered or because there are not enough observations to be able to report the NSS response in that year.[3] For this reason subjects were selected from levels of aggregation where we have sufficient NSS observations within one year. The subjects selected include Biological sciences at level 1 and Art and Design, Business, Computing, Economics, European languages, History, Mathematical sciences, Management, Psychology and Sociology at level 2. The choice of subjects in this paper was also made to reflect different faculties and different types of teaching, i.e. laboratory versus classroom taught subjects.

We match in data on finance resources, student numbers in higher education, student performance indicators and the destination of graduates for each of our subject areas within 121 UK universities; all this subject-related data is provided by arrangement by the UK Higher Education Statistics Agency (HESA).[4] The overall NSS score for each subject area is calculated as the average of the answer to the final score. Additionally, the percentage of students who agree or definitely agree with the statement above, that is they rate as a 4 or 5 on the Likert scale, is often cited in rankings of university performance. In the analysis presented here we use both these measures and focus upon eleven subjects within each university, namely; biological sciences, mathematical sciences, psychology, computer sciences, economics, sociology, business and administration, management, European languages, history and art and design. The choice of these eleven subjects was driven largely by the availability of matching data across our data sources and this provided a total sample of 3438 observations within 121 Universities across England, Scotland, Wales and Northern Ireland (see Supplementary Materials, Appendix Table A1 for a list of universities in this study along with their classification and Table A2 for an overview of degree classification and funding regimes within each country of the UK). The dataset is an unbalanced panel due to missing information at the subject level in particular years from some

[1] For example: the 'Times Higher' guide and the 'Guardian' university rankings.

[2] www.hefce.ac.uk/whatwedo/IT/publicinfo/unistats.

[3] The NSS response rate must be at least 50% or a minimum of 23 responses to be recorded.

[4] The publically available files of finance resources, students in Higher Education, performance indicators and destinations of leavers from higher education (DLHE) provide information either by subject or by institution only, not by subject within each institution.

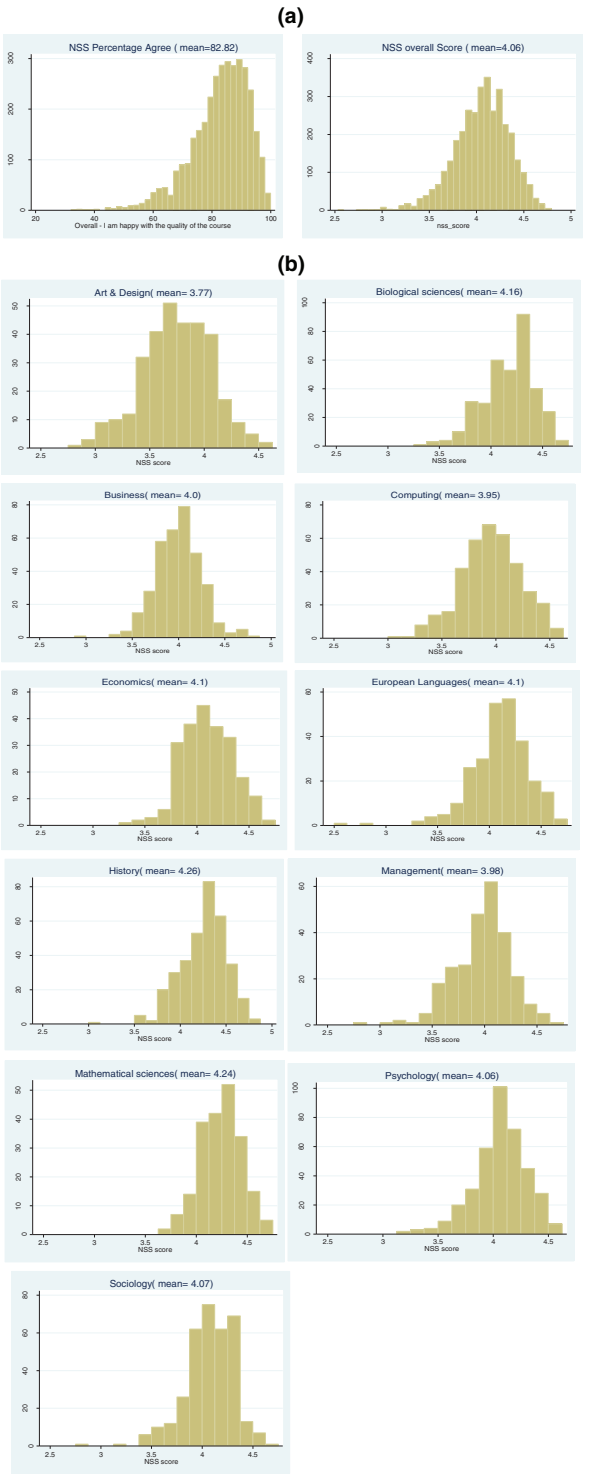

Fig. 1. (a). The distribution of NSS overall scores. (b) NSS overall scores by department.

of our data sources. In the estimations that follow we use as dependent variables, the overall NSS score for each subject in each university and the percentages recorded as satisfied with their course. The distribution of overall NSS scores across universities is shown in Fig. 1(a) and (b) shows the distribution of NSS scores separately for each of the subject areas under analysis.

The mean overall NSS score is 4.06 and ranges from 2.53 to 4.79, and the mean of the percentage of "satisfied" scores is quite high at 82.8, ranging from a minimum of 32 to a maximum of 100. Descriptive statistics are provided in Table 1 below for all our dependent and explanatory variables.

Table 1
Descriptive statistics.

Variable	Mean	Std dev
NSS overall score – dependent variable	82.82	9.93
NSS average score – dependent variable	4.06	0.29
Percentage of graduates employed or in further study	84.03	8.64
Percentage with a first class of degree	12.72	8.28
Percentage with an upper second or better class of degree	59.82	16.05
Student–staff ratio	21.17	4.01
Average UCAS entry points	302.10	89.19
Expenditure in subject department per student £000's	17.47	37.07
Expenditure academic staff per student £000's	11.17	22.58
Expenditure administrative staff per student £000's	2.64	5.66
Russell Group University	0.19	0.39
1994 Group University	0.16	0.37
Million Plus Group University	0.16	0.36
GuildHE Group University	0.06	0.23
University Alliance Group	0.21	0.41
Traditional university not in any group	0.13	0.33
Post 1992 university not in any group	0.06	0.23
Other university not in any group	0.04	0.20
Campus based University	0.47	0.50
Art and design	0.09	0.29
Biological sciences	0.10	0.30
Business and administration	0.10	0.31
Computing	0.11	0.31
Economics	0.06	0.25
European languages	0.08	0.27
History	0.10	0.30
Management	0.08	0.26
Mathematical sciences	0.06	0.24
Psychology	0.11	0.31
Sociology	0.10	0.30
East	0.06	0.23
East Midlands	0.07	0.26
Greater London	0.14	0.35
North East	0.05	0.22
North West	0.11	0.31
South East	0.14	0.34
South West	0.10	0.29
Yorkshire and Humber	0.09	0.29
West Midlands	0.08	0.27
Northern Ireland	0.02	0.15
Scotland	0.08	0.27
Wales	0.06	0.25
Local crime rate	10.69	3.86
Year 2007	0.24	0.42
Year 2008	0.24	0.43
Year 2009	0.26	0.44
Year 2010	0.26	0.44

2.2. The explanatory variables

The proportion of graduates who are in employment or postgraduate study six months after graduation may be

indicative of a good reported satisfaction score as these would have been the students who are most likely to have performed well and enjoyed their programme of study. However, students who have enjoyed their studies, and received excellent teaching in state-of-the-art lecture theatres, may still feel dissatisfied if they perceive themselves to lack the skills to secure graduate employment, or if they feel their probability of success in the labour market or in postgraduate study is below that of their contemporaries. This is a particularly important variable in our analysis in that it is a subjective measure which may be amenable to a university policy which encourages students to reflect on their progress and builds their confidence. HESA have provided us with information on the number of graduates in each subject within each institution who subsequently entered employment or postgraduate education within six months of graduation. The percentage of graduates who are reported as employed or in postgraduate study is fairly consistent across university types at around 84% and also consistent across most subjects apart from art and design where it is slightly lower (78%).

The percentages of students in each classification of degree, for each subject in each university, are recorded in the NSS data for universities in England, Wales and Northern Ireland only. We consider it vital to include this variable in our modelling because those students who obtain a good class of degree[5] may be more likely to report a high level of satisfaction on the NSS. We were able to obtain the relevant degree classification data, by subject within each of our Scottish universities, which was supplied by HESA. The average percentage of students who obtained a first class degree is higher in the traditional universities (15.9) compared to the average for all other types of university (9.8).

The student experience will also be influenced by the type of university and this also may have an impact on the student's subjective probability of finding good employment or a good postgraduate opportunity. We include dummy variables to denote the eight different university 'clusters': the Russell Group (traditional universities which represent the 20 leading UK research-intensive universities), the 1994 Group (a coalition of 12 top smaller research intensive universities); the Million Plus Group[6] (a consortium of post-1992 universities); the GuildHE Group[7] (formerly the SCOP universities); the University Alliance (post 1992 universities which are engaged in business research and knowledge transfer); traditional universities not in any group; post 1992 universities not in any group; and finally, other newer universities not in any group.

Student–staff ratios are highly likely to influence student perceptions of the quality of teaching quality and their learning environment, where we would expect a smaller student–staff ratio to provide a higher satisfaction score. This variable is calculated by dividing the number of students taking the subject by the number of academic staff in the subject. As previously mentioned a large concern for some time has been the effect of tuition fees on students' expectations of the value for money provided by their institution. The average student–staff ratio, at around 21 students per staff member, is consistent across universities but differs by subject. Typically, smaller ratios are encountered in mathematics (18.1), languages (18) and history (17.5) and larger ratios in economics (26.5), management (26) and business (24.7).

Universities are eagerly seeking ways of maximising student satisfaction as they spend their budget, whether on new buildings or increases in departmental expenditure on teaching. We include three measures of expenditure for each university at the subject level within each university; the total expenditure per student, which will capture the budget available for all student-related direct and indirect expenditures[8]; the per-student expenditure on the remuneration of academic staff and the per-student expenditure on the remuneration of administrative staff. Table 1 shows that expenditure on academic staff accounts for 60% of the total teaching budget spent; however, this varies by university type in a couple of ways. Firstly, the traditional universities (which include Russell group and 1994 group universities) have on average larger total teaching budgets than the other universities, and secondly, of the total budget a smaller proportion is spent on academic teaching staff (60% compared to 69%).

We have attempted to control for student ability which could bias the estimated quality of teaching across universities, which we discuss in detail in the methodology section below, by including the average UCAS points in each subject for each university, hence capturing the quality of the student body on entrance to higher education.[9] The average UCAS points score is 302, and does differ considerably across universities to reflect the quality of the student intake, from 410 for Russell group universities to 237 for the modern, non-traditional universities.

We include in our modelling dummy variables for each English region and for each country of the UK in order to explore if there are differences in NSS scores between countries with different fee regimes and additionally between regions, for example, it may be that the proximity to the city of London yields a higher likelihood of finding employment as the student studying there is more familiar with the city labour market making job search easier relative to a student elsewhere.

Our eleven subjects reflect teaching across faculties and are likely to differ in the way courses are taught and the resources required. For example, biological sciences need laboratory facilities whereas history and management among others are likely to be classroom based, and mathematical sciences, computing and economics need computing facilities. We include dummy variables for our 11 subjects to

[5] An upper second class or above is the standard required by many of the major graduate employers (see Supplementary Materials, Appendix Table A2 for an explanation of degree classification).

[6] Formed in 1997 as the Campaign for Modern Universities, it changed name to Million+ in 2004.

[7] Founded as the Standing Conference of Principals in 1967, many colleges gained university status in the early 2000s and the GuildHE was registered in 2006.

[8] Total expenditure per student includes academic staff, administration staff, other staff, non-contracted staff, equipment not capitalised, expenditure on maintenance contracts, rental not capitalised, expenditure on short courses and special courses not reimbursable by research councils but provided by the department; and academic services attributable to the department.

[9] We acknowledge that the average UCAS points measure cannot capture the distribution of points within each subject across universities.

examine whether there are noticeable differences in the reporting of scores across subjects, even within universities, and if there are, which subjects are likely to receive a high score: for example, do classroom-taught subjects yield a difference in score compared to those which are laboratory based?

Not all universities in the UK took part in the survey in the initial years: initially, Scottish universities did not take part at all and some English universities, perhaps assuming that this was a transitory poll, also abstained. However, as the results came to be incorporated in the major ranking systems and interpreted as a quality signal in the manner mentioned above, all universities in the UK now participate, and for this reason we take our starting point for this analysis as 2007.

Whilst we have controlled for factors which we believe influence the quality of teaching, there may be external factors which are difficult to capture and not directly within a university's control but nevertheless may influence overall satisfaction. Student safety and well-being, which determine the ability to concentrate on one's studies, is paramount to any student's sense of satisfaction with their choice of university and we include two measures in an attempt to capture this; firstly students collectively may feel more safe in an environment where all their needs are at hand, so a dummy variable is included which captures whether the university is situated on a campus rather than in buildings across a city; secondly, we have been able to map into the data local police authority total crime rates. [10] Finally, we include year dummies in order to capture any increase in scores over time as universities strive to put in place improvements to the student experience.

2.3. The estimation strategy

The NSS score achieved by each department in each year is assumed to reflect overall satisfaction with teaching and the student experience. This score, provided by a different cohort each year, reflects, we argue, not only the level of teaching but other internal and external factors including the level of confidence the student has regarding their employment prospects or their probability of being accepted onto a postgraduate course. Students will have had expectations of their educational outcome when they entered university. Following human capital theory, they will have assessed the return on their investment, which at time of making their investment decision would have included the choice of which university to attend. Therefore, students who have secured employment or feel their course has positively prepared them for entry into the labour market are likely to rate their overall satisfaction with their degree course most favourably. We hypothesise that university departments within which a high proportion of graduating students have secured an employment offer on graduation, will consider themselves as highly employable or eligible to enter a postgraduate course, and thus would realise a higher overall NSS score compared to universities with a lower proportion.

We begin our analysis by attempting to identify the factors that influence university overall student satisfaction scores, which includes time-invariant factors such as subject, type of university and region. As mentioned above, models with alternative dependent variables are compared, namely; the average NSS score and the NSS score as a proportion of respondents who state they are satisfied or very satisfied with their course. To accommodate the initial analysis a random-effects model is estimated where the dependent variable is the overall NSS score over a four-year period within eleven subjects in 121 universities across the UK; a list of the universities in the study, along with their classification is provided in the Supplementary Materials, Appendix Table A1.

This random-effects model is then estimated as:

$$\begin{aligned} Y_{ijt} = f(&\beta_0 + \beta_1 \text{ Percentage employed or postgraduate}_{ijt} \\ &+ \beta_2 \text{ Percentage first class}_{ijt} + \beta_3 \text{ Student-staff ratio}_{ijt} \\ &+ \beta_4 \text{ Subject}_{ijt} + \beta_5 \text{ University type}_{ijt} \\ &+ \beta_6 \text{ Region}_{ijt} + \beta_7 \text{ Cost academic staff}_{ijt} \\ &+ \beta_8 \text{ Cost administration staff}_{ijt} + \beta_9 \text{ Cost other teaching}_{ijt} \\ &+ \beta_{10}\text{Campus}_{ijt} + \beta_{11} \text{ Average UCAS points}_{ijt} \\ &+ \beta_{12} \text{ Crime rate}_{ijt} + \beta_{13} \text{ Year} + e_{ijt}) \end{aligned} \quad (1)$$

where Y_{it} is the overall NSS score and $_{ijt}$ indexes each subject in each university in each year. e_{ijt} is the error term, where we assume that:

$$e_{ijt} = u_{ij} + v_{ijt} \quad (2)$$

where u_{ij} captures group effects (and in the random effects model represent realisations from an underlying probability distribution) and v_{ijt} is the independent and identically distributed disturbance term. It is possible that there could be variation in the error structure in the random effects model (2) due to differences within groups, which can increase standard errors, making estimates inefficient therefore, we cluster standard errors by institution. To check the robustness of our estimates the model is built up with the initial specification of the overall university scores, then a second specification including the type of university and the third specification adding subjects.

Whilst we have attempted in our random effects specification to highlight differences across university types and subject areas there is likely to be heterogeneity within these groups. At the university level for example, there are likely to be differences in teaching policies, the quality of buildings, and the location of halls of residences to teaching spaces. At the subject level, there may be differences in class sizes, teaching methods, whether the subject is technical in nature or whether students are more likely take a subject because they have a natural ability in that field, making them more likely to be successful leading to higher NSS scores. In an attempt to take into account this heterogeneity and to check for robustness we estimate a fixed effects model:

$$Y_{it} = x'_{it}\beta + \alpha_i + \varepsilon_{it} \quad (3)$$

This estimation is undertaken once again for both our dependent variables. In essence, the difference between these models is that the NSS score considers the effect of the explanatory variables on the proportion of students agreeing with the statement of satisfaction i.e. category 4 or 5, whereas the average NSS score considers the average score which may be increased at any point along the Likert scale i.e. a higher proportion of students reporting 2 or 3 rather than 1.

[10] Local police crime rates are available from the Office for National Statistics (ONS). Here we use the figures for total crimes in the locality.

The fixed effects specification allows for year dummies to be included along with our time varying factors. To ascertain if there are any major differences in the effect of explanatory variables across subjects we also use the fixed effects estimator to examine separately all our eleven subjects.

Finally we explored the possibility of endogeneity within our specification because we considered that the proportion of students most likely to gain employment may be correlated with the proportion of students with a degree classification of an upper second or above. However, this has proved this not to be the case[11] as a test for endogeneity indicates that we cannot reject the null of exogeneity. [12] A simple correlation between these two variables revealed that, counter to our initial intuition, there is no significant correlation between the proportion of first class degrees and the proportion in employment/further study[13]; we consider this may be due to our HESA employment measure reflecting all types of employment rather than only graduate jobs.

3. Results

3.1. Random effects estimation

The results from our two different estimators, (random-effects and fixed-effects) reveal similar results. We now discuss and compare the estimates for the random-effects models of the overall NSS score (as a percentage of those answering categories 4 and 5) and of the average score, which are provided in Tables 2 and 3, respectively. A sensitivity analysis was undertaken by estimating a base model and adding explanatory variables to provide three specifications. The results show that the estimates are robust.

The positive and significant coefficients on the year dummies in both models reveal that NSS scores have increased since 2007, most probably due to the fact that departments and universities have increasingly realised their importance as quality signals, and have actively sought to increase their scores as acknowledged in the literature (HEFCE, 2008, 2011). We note that whilst all coefficients are positive, showing an increase of one percentage point on the NSS score from 2007 to 2008, there have been no significant increases in the scores over the following two years under study. Our interpretation of the stagnation in NSS scores after 2008 is that this may be due to a heightened concern with 'value for money' that pervaded the higher education system after the increase in tuition fees in England,[14] that occurred in 2006 which directly affected students entering this year and whom would have been filling in their NSS in 2009.

The estimate on our 'employed or in postgraduate study' measure lends support to our hypothesis that students are concerned about their future employability as they prepare to confront the labour market and are more likely to report a high level of satisfaction with their degree programme if they consider themselves likely to have a positive outcome. This is evident as on average a two percentage-point increase in the proportion of students classed as in employment or postgraduate study leads to a one percentage point increase in NSS score and a small but significant increase in the average NSS score.[15] These students may well have secured their employment or their place on a postgraduate programme before completing the NSS, converting their expected high level of employability into achievement, and thus are more likely to provide a positive review of their experience as they perceive that the institution and the department helped them to secure employment or their place on a postgraduate programme. This implies that the capacity of the careers service within the university, the efficacy of the link between employers and the department, and the ability to enhance their students' employability are of the utmost importance in the quest for high student satisfaction scores. Given the increases in tuition fees imposed on the 2012 cohort of new students, we may speculate that the influence of employability on NSS scores will increase significantly.

The coefficient on the percentage of students gaining a first class degree reveals that approximately a 10 percentage point increase in the percentage of students with a first class degree will lead to a one point increase in the NSS score and a small but significant increase in the average NSS score, which lends support to our argument that students' sense of self-development and employability is more important as they prepare to enter the labour market.[16]

Our results from both models strongly suggest that a smaller student–staff ratio increases a favourable response to the NSS from students. However, none of our expenditure per student measures have a significant influence on either the NSS score or average score. Whilst the remuneration of academic staff is a statistically insignificant influence, we believe this could be because expenditure on academic staff does not necessarily signal the quality of teaching as these costs may vary according to the grade structure of academic staff; for example, a department with many students could have a smaller expenditure on academic staff, if they have a large proportion of staff in the lecturer grade, than a department with fewer students but a larger proportion of professorial staff. There may also be lags in the system, for example, expenditure on new teaching software technology in one year may require time for academic staff to learn how to use the technology and incorporate it into their teaching material. Nevertheless, it is notable that the amount of

[11] Instrumental variable models were estimated where the estimates did not alter and the endogeneity tests showed that both the employability and percentage with first class variables could be treated as exogenous. Results are available from the author on request.

[12] The endogeneity test of employability gave a test statistic of 0.193, *p*-value 0.6602. The two stage model was also estimated with first class degree instrumented; the endogeneity test for first class of degree also failed to reject the null of exogeneity with a test statistic of 1.650, *p*-value 0.189.

[13] The correlation coefficient between the percentage of students in employment or further study and the percentage of students who gained a first is -0.016 and insignificant (*p* value 0.3577).

[14] Fees increased from £1125 up to a maximum of £3000 for UK students entering English universities in 2006 (see Supplementary Materials, Appendix Table A2).

[15] We included both HESA measures of employment and further study in our modelling – the first as a percentage of graduates considered in the labour market or in further study (includes those actively seeking work) and secondly, as a percentage of all who responded to the survey (as above and those who stated they were not seeking work). Both measures produced significant positive effects.

[16] We estimated models replacing the first class dummy variable with one for an upper-second class or above which gave a smaller but significantly positive effect and all other coefficients remained the same. Results are available from the author upon request.

Table 2
Random effects model of the determinants of NSS scores.

Dependent variable – NSS overall score $N = 3438$	Coefficient	Robust Standard errors	Coefficient	Robust Standard errors	Coefficient	Robust Standard errors
Percentage employed or further study	0.496***	0.033	0.508***	0.032	0.469***	0.032
Percentage first class	0.072***	0.019	0.051***	0.019	0.096***	0.021
Average UCAS points	0.015***	0.003	−0.004	0.004	−0.005	0.005
Student–staff ratio	−0.321***	0.051	−0.312***	0.047	−0.191***	0.056
Expenditure academic per student	0.011	0.019	−0.003	0.016	−0.021	0.017
Expenditure administrative per student	0.083	0.062	0.068	0.062	0.070	0.069
Total expenditure per student	−0.005	0.011	0.002	0.009	0.008	0.010
Campus University	2.173***	0.646	0.785	0.616	0.757	0.599
Local crime rate	−0.099	0.090	−0.105	0.096	−0.116	0.093
Scotland	3.003***	1.229	3.197***	1.214	3.374***	1.219
Wales	2.175	1.377	1.296	1.175	1.643	1.120
Northern Ireland	2.487	2.600	−0.757	2.128	−0.617	1.132
Russell Group University			4.165***	1.619	3.115**	1.566
1994 Group University			4.135***	1.550	3.085**	1.466
Million Plus Group University			−2.212	1.871	−2.409	1.775
Guild HE Group University			−2.154	2.135	−1.301	1.990
University Alliance University			−0.602	1.570	−0.858	1.472
Traditional University not in any group			4.229***	1.530	3.589**	1.464
Other University not in any group			−1.225	1.989	−1.302	1.835
Biological sciences					10.029***	0.996
Business and administration					7.688***	0.924
Computing					5.119***	0.829
Economics					8.893***	1.057
European languages					8.015***	1.058
History					11.791***	1.022
Management					7.228***	0.945
Mathematical sciences					9.802***	1.078
Psychology					7.753***	0.920
Sociology					8.650***	1.032
East	0.294	1.884	0.707	1.603	0.870	1.614
East Midlands	2.694**	1.330	3.432***	1.242	3.860***	1.194
North East	0.721	1.539	1.212	1.460	1.458	1.435
North West	0.300	1.436	1.400	1.396	1.704	1.323
South East	2.056	1.357	2.651*	1.412	2.894**	1.337
South West	0.983	1.356	1.771	1.426	2.062	1.376
West Midlands	−0.051	1.319	1.081	1.423	1.035	1.325
Yorkshire and Humber	−0.559	2.020	−0.333	1.729	−0.053	1.682
Year 2008	1.526***	0.364	1.584***	0.360	1.502***	0.357
Year 2009	1.082***	0.427	1.167***	0.439	1.008**	0.435
Year 2010	1.122**	0.531	1.240**	0.552	0.945*	0.545
Constant	40.268***	3.740	44.074***	4.141	37.658***	4.048
R-squared	0.4525		0.4852		0.5926	
Wald chi^2	765.90		923.32		1663.26	

Note: ***, ** and * represent significance at 1%, 5% and 10% levels respectively.

expenditure per student, which varies greatly across universities, does not appear to increase student satisfaction.

Interestingly, traditional universities (whether in the Russell group or not) and the universities in the 1994 Group all have higher overall NSS scores, of around 3 NSS points and increasing the average score by 0.1, compared to the base category of post-1992 universities that are not in any group. Thus, it could be that the traditional universities provide better teaching quality, or alternatively that the reputation of these universities serves, rightly or wrongly, to signal a better quality student to employers, a so-called 'sheepskin effect', making the students perceive themselves as more employable in the labour market and hence more satisfied with their university programme quality.

The regional dummies reveal a large and statistically significant increase of over three NSS points for the Scottish universities considered here compared to the base category of universities in London. [17] This is an interesting finding which may reflect in part the different funding system in Scotland, where Scottish students were not faced with the fees that English students were and therefore this may have influenced their sense of satisfaction whereas students in other universities may have had higher expectations of value for their money. We consider this warrants further research. The Welsh universities also reveal a significant positive difference of up to 1.6 NSS points compared to London universities; and within the group of English universities, those in

[17] We estimated the model without the first class degree dummy variable in order to examine whether or not the classification system in Scotland was influencing this result. This statistically significant and positive effect was still apparent.

Table 3
Random effects model of the determinants of average NSS scores.

Dependent variable – average NSS score $N = 3438$	Coefficient	Robust standard errors	Coefficient	Robust standard errors	Coefficient	Robust standard errors
Percentage employed or further study	0.013***	0.001	0.013***	0.001	0.012***	0.001
Percentage first class	0.002***	0.001	0.002***	0.001	0.003***	0.001
Average UCAS points	0.001***	0.000	−0.000	0.000	−0.000	0.000
Student–staff ratio	−0.010***	0.002	−0.010***	0.001	−0.005***	0.002
Expenditure academic per student	0.000	0.001	−0.000	0.000	−0.001	0.001
Expenditure administrative per student	0.003	0.002	0.003	0.002	0.003	0.002
Total expenditure per student	−0.000	0.000	−0.000	0.000	0.000	0.000
Campus University	0.051**	0.023	0.009	0.022	0.008	0.022
Local crime rate	−0.003	0.003	−0.003	0.003	−0.003	0.003
Scotland	0.079**	0.040	0.085**	0.043	0.090**	0.044
Wales	0.064*	0.039	0.043	0.033	0.049	0.032
Northern Ireland	0.021	0.077	−0.064	0.059	−0.063	0.067
Russell Group University			0.114**	0.050	0.091*	0.050
1994 Group University			0.139***	0.051	0.116**	0.050
Million Plus Group University			−0.048	0.058	−0.054	0.056
Guild HE Group University			−0.052	0.064	−0.032	0.061
University Alliance University			−0.014	0.048	−0.020	0.047
Traditional University not in any group			0.131***	0.049	0.117**	0.049
Other University not in any group			−0.021	0.056	−0.022	0.053
Biological sciences					0.266***	0.029
Business and administration					0.167***	0.027
Computing					0.107***	0.025
Economics					0.217***	0.031
European languages					0.183***	0.031
History					0.341***	0.031
Management					0.157***	0.027
Mathematical sciences					0.260***	0.035
Psychology					0.178***	0.026
Sociology					0.200***	0.029
East	0.037	0.064	0.046	0.058	0.047	0.059
East Midlands	0.088**	0.043	0.106***	0.039	0.117***	0.039
North East	0.032	0.045	0.047	0.044	0.053	0.043
North West	−0.013	0.041	0.019	0.042	0.027	0.040
South East	0.055	0.041	0.071*	0.043	0.079**	0.041
South West	0.029	0.042	0.048	0.045	0.056	0.043
West Midlands	0.007	0.036	0.042	0.038	0.043	0.036
Yorkshire and Humber	−0.027	0.062	−0.020	0.055	−0.013	0.054
Year 2008	0.061***	0.011	0.063***	0.011	0.061***	0.011
Year 2009	0.046***	0.013	0.050***	0.013	0.047***	0.013
Year 2010	0.050***	0.016	0.056***	0.016	0.049***	0.016
Constant	2.967***	0.101	3.052***	0.117	2.864***	0.118
R-squared	0.4450		0.4691		0.5643	
Wald chi^2	566.97		835.28		1503.54	

Note: ***, ** and * represent significance at 1%, 5% and 10% levels respectively.

the South, the East and the East Midlands have a significantly higher NSS score than other regions compared to the base category.

All subjects are significantly more likely to have higher NSS scores than art and design, which agrees with the qualitative research in the arts (Vaughan & Yorke, 2009). The incremental effects reveal the high average scores for biology and mathematical sciences which are recognised as subjects that yield a high return in the labour market (Bratti et al., 2005), although history has the highest incremental effect on the NSS score even though it is not recognised as providing the highest return.

3.2. Fixed effects estimation

The results of the fixed effects estimation are revealed in Tables 4 and 5. We clearly see that these results are remarkably similar to those obtained from the random effects estimation. The effect of each department within each university is fixed. The year dummy variables show that NSS scores have increased in all years compared to the base year of 2007. The percentage of graduates subsequently employed, the percentage gaining a good degree and the student–staff ratio are the three key influencers of university NSS scores. Again we see no significance from the expenditure variables and given the current concern with how to spend university budgets to maximise student satisfaction; we strongly suggest that this is an area for further research.

Finally, we turn to the results of the fixed effects models by subject (see Supplementary Materials, Appendix Tables A3 and A4). In these estimates we attempt to identify if there are any significant differences or similarities in the determinants of NSS scores, accounting for the possible differences in teaching methods i.e. whether they classroom or laboratory

Table 4
Fixed effects model of the determinants of NSS scores.

Dependent variable – NSS overall score $N = 3438$	Coefficient	Robust standard error
Percentage of graduates employed or in further study	0.471***	0.038
Percentage of students gaining a first class	0.076***	0.025
Expenditure academic staff per student	−0.015	0.037
Expenditure administrative staff per student	0.122	0.154
Total expenditure per student	−0.009	0.010
Student–staff ratio	−0.221***	0.090
Year 2008	1.624***	0.324
Year 2009	1.205***	0.346
Year 2010	1.283***	0.414
R-squared between = 0.3501; overall = 0.2937 $F(9, 120) = 28.27$		

Note: Errors clustered by institution.

Table 5
Fixed effects model of the determinants of average NSS scores.

Dependent variable – NSS overall score $N = 3438$	Coefficient	Robust standard error
Percentage of graduates employed or in further study	0.011***	0.001
Percentage of students gaining a first class	0.002***	0.001
Expenditure academic staff per student	0.000	0.001
Expenditure administrative staff per student	0.002	0.005
Total expenditure per student	−0.001*	0.000
Student–staff ratio	−0.006**	0.003
Year 2008	0.064***	0.010
Year 2009	0.052***	0.010
Year 2010	0.057***	0.013
R-squared between = 0.3437; overall = 0.2757 $F(9, 120) = 26.51$		

Note: Errors clustered by institution.

based. We see that for all subjects and for both measures of NSS scores, the influence from employability is positive and significant, indicating that a sense of preparedness for the world of work ahead is a major factor in student satisfaction. Whilst the percentage of first class degrees awarded is significant for Art, Computing, Management and Psychology, these estimates are not statistically different across subjects. We also find no significant difference from the student–staff ratio estimates across subjects. Finally, despite the insignificance of the expenditure variables when considered together, separately we see that expenditure on academic staff has a significantly positive effect for two subjects (Management and Sociology) and a significantly negative effect for Psychology. The large difference in NSS scores across subjects suggests that this also is an area for further study.

4. Conclusion

The NSS is a major instrument by which teaching quality in higher education is measured today, and is an important mechanism by which universities' teaching quality is signalled to the market. Hence, all universities are interested in possible strategies by which they may maximise their NSS scores and attract more good students. In this paper, we have examined the possible influences on overall NSS scores in eleven subject areas within and across 121 UK universities between 2007 and 2010. This is the first econometric study of the NSS that we are aware of, thus filling a large gap in the economics literature. The analysis has been undertaken using a unique panel dataset that has been constructed from data available from several sources including, HEFCE, HESA and the ONS. A limitation of the present study however, is that even after taking account of the fixed effects of university, subject and time in some specifications we cannot assume that endogeneity bias is not present and therefore interpretation of the results, particularly with respect to causality, should be treated with caution.

The findings show that there is a significant difference in scores across different types of university, which calls into question the use of these scores of student satisfaction in university rankings. The traditional universities, regardless of research group, all elicit a more favourable score than the modern universities, which we speculate may be due to better quality teaching, perhaps more research-led teaching or possibly because the graduating body is aware of the reputational element of the university that is attached to their degree; the empirical literature has shown there is an advantage in the labour market associated with attending a traditional university (Chevalier & Conlon, 2003). The evidence from our 'employed or in postgraduate study' variable supports this latter supposition as students' satisfaction scores appear to reflect their readiness and confidence to face the

labour market. This result is highly robust, being significant for all eleven subjects when estimated separately.

Another major influence on NSS scores is the student–staff ratio, which may be picking up the need of many students for some more intensive, personalised teaching time or pastoral care when they can discuss their needs, problems or misunderstandings away from the large classroom or lecture hall environment that has been the norm in the UK since the expansion of higher education in the late 1990s. Universities have had to adapt to large increases in student numbers over a short period of time and there is a need to ensure that all students receive personal attention and development and that their needs are met. Student expectations of their university experience are important for the future, especially since the raising of the fees cap up to £9000, implying that students expect a higher level of teaching quality which includes more personal tuition and smaller class sizes. The evidence found here that average NSS scores are higher in Scottish universities, where they do not charge home students a fee, supports the view that students' expectations of teaching quality are higher where they are aware of paying fees; we suggest that this is an important area for further study in the future.

At a time of huge financial uncertainty, universities have an obvious interest in understanding the factors on which their competitive position is based. In this paper we have sought to make a contribution towards understanding these factors. Not all of the independent variables emerging from this paper as significant influences on the NSS score are policy variables, in the sense that decision makers within universities are capable of influencing them, but some (notably expenditure on particular subjects, student–staff ratio and especially measures to enhance employability) are. It would seem rational for universities, as they seek to respond to the signals which emerge from this analysis, to concentrate on these policy variables.

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Supplementary Materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.econedurev.2015.05.001.

References

Blundell, R., Dearden, L., Goodman, A., & Reed, H. (1997). *Higher education, employment and earnings in Britain*. London: Institute for Fiscal Studies.

Bratti, M., Naylor, R. & Smith, J. (2005). *Variations in the wage returns to a first degree: Evidence from the British Cohort Study 1970* (IZA Discussion Paper 1631).

Cheng, J. H. S., & Marsh, H. W. (2010). National Student Survey: Are differences between universities and courses reliable and meaningful? *Oxford Review of Education, 36*(6), 693–712.

Chevalier, A. & Conlon, G. (2003). *Does it pay to attend a prestigious university?* (Discussion Paper 33). Centre for the Economics of Education, London School of Economics and Political Science.

Chevalier, A. & Jia, X. (2012). *Subject specific league tables and students' application decisions*. Paper presented at The Work and Pensions Economic Group Conference (WPEG), Sheffield.

Higher Education Funding Council for England (HEFCE) (2008). *Counting what is measured or measuring what counts?* (HEFCE Report April 2008/14).

Higher Education Funding Council (HEFCE) (2010). *Enhancing and developing the National Student Survey* (HEFCE Report August 2010).

Higher Education Funding Council for England (HEFCE) (2011). *National Student Survey: Findings and trends 2006 to 2010* (Report April 2011/11).

Horstchraer, J. (2012). University rankings in action? The importance of rankings and an excellence competition for university choice of high-ability students. *Economics of Education Review, 31*, 1162–1176.

Johnes, G., Johnes, J., Lenton, P., Thanassoulis, E., & Emrouznejad, A. (2005). *An exploratory analysis of the cost structure of higher education in England* (Research Report 641). Department for Education and Skills.

Johnes, J., & Taylor, J. (1990). *Performance indicators in higher education*. Oxford: SRHE/Oxford University Press.

Lattreille, P. (2010). *NSS scores for Economics 2010: A preliminary analysis*. Economics Network of The Higher Education Academy.

Lenton, P. (2008). The cost structure of higher education in FE colleges in England. *The Economics of Education Review, 27*(4), 471–482.

McCormack, J., Propper, C., & Smith, S. (2014). Herding cats? Management and university performance. *The Economic Journal, 124*(578), F534–564.

Smith, J., McKnight, A., & Naylor, R. (2000). Graduate employability: Policy and performance in higher education in the UK. *The Economic Journal, 110*(464), F382–F411.

Soo, K., & Elliott, C. (2010). Does price matter? Overseas students in UK higher education. *Economics of Education Review, 29*, 553–565.

The Times Higher Education (2008, May) Students urged to inflate national survey marks to improve job options.

Vaughan, D., & Yorke, M. (2009). *'I can't believe it's not better': The paradox of NSS scores for art & design*. Report for the Higher Education Academy and HEAD Trust.