Institute of Education

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Working Paper No. 16-12
September 2016

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Abstract

Higher education is increasingly competitive and international in its recruitment of both students and faculty, and international 'league tables' are increasingly publicised and discussed. In many jurisdictions, universities also now have freedom to set fees for at least some students, and those with a high reputation are well placed to charge large amounts. England has a university sector which is highly differentiated in reputational terms, and a fee regime which allows universities to set fees for a large proportion of their students. It is therefore possible, using administrative and income data, to examine how far commonly recognised measures of reputation explain universities' teaching income per student, after controlling for a wide range of other factors. The results confirm that reputation, or 'brand', appears to have a very large impact on fee and teaching income, and that it is therefore entirely rational for English universities to prioritise activities which raise their international visibility and reputation.

JEL codes: I22, I23
Keywords: Fees, Teaching income, Brand, University reputation, University revenue

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Introduction

Across most of the world, university enrolments have soared in recent decades, in total numbers and as a percentage of the age cohort. There has been a corresponding increase in both the number of universities and other tertiary institutions, and in their average enrolments. A very large number of students now study outside their countries of origin. (UNESCO, OECD 2015; Altbach and Knight 2007)

Many countries, including those which traditionally made all higher education free at the point of use, now charge fees to some or all overseas students. In many, though not all, countries, there is also marked and growing internal heterogeneity, with respect to institutional status (Wolf 2002, de Burgh *et al* 2007).

In this environment, there is increasing competition for high-quality and for fee-paying students. We hypothesise that individual universities can signal quality to the world both individually and through a shared brand; and that the impact of reputation on fee income is potentially very large. Recent developments in the UK, and specifically in England make it possible to test these hypotheses, and we offer what we believe to be a first direct estimate of the impact of reputation and 'brand' on university finances, and specifically on the fee income an institution attracts.

Globally, status differences between national systems and status hierarchies within them are both reflected in and reinforced by the growing visibility of international 'league tables' such as those of Times Higher Education and Shanghai Jiao Tong University. Country-specific tables and rankings (such as US News in the USA) have existed in a number of countries for many decades, but the visibility and publicity accorded to international tables reflects the enormous increase in the numbers of students enrolled in universities outside their home country. This in turn has affected

organisational incentives and behaviour across the university sector (Hazelkorn, 2015; Marginson 2014).

For a university, being highly ranked compared to other national or international institutions is obviously highly attractive. A university or college education has always been a 'positional good', enhancing someone's position compared to that of others, not just a source of concrete skills and knowledge (Frank and Cook 1995; Brown and Hesketh 2004). A growing body of research on wage returns – the extent to which degrees are associated with higher lifetime earnings – shows that in many countries returns vary significantly by institution, as well as by degree subject (See eg Britton et al 2016; https://collegescorecard.ed.gov/). A high ranking should thus make it easier for a university to attract good and high-fee-paying students(Wolf 2010; Fumasoli & Huisman 2013). It also offers *prima facie* evidence to prospective funders that they will be buying high-quality research or consultancy.

Universities' reputations and fortunes do rise and fall (Stone ed 1974): but compared to, for example, private companies, they are highly stable. The 'top' universities in a 2016 league table would, to an overwhelming degree, be the same as those which were recognised as 'top' in 1996, 1946, or, indeed, 1886. This partly reflects the self-perpetuating nature of national elites, who tend to be educated in a few easily identified institutions (Bourdieu 1977;Wolf 2002) but it is reinforced by the nature of modern research. Most government research funding in modern developed countries goes to universities and university- affiliated institutes. Much of it is allocated through anonymised peer-reviewed proposals: but the allocation of resources across institutions is nonetheless likely to be highly stable year on year. The same is true for allocation of 'block' research funding to institutions on the basis of performance: 'quality' funding of this type is allocated in the UK but also in, for example, Sweden, and again the stability of funding allocations is striking. Institutions with excellent researchers attract research funds, and are also best known to the academics whose judgements feed into global league tables: this in turn makes it easier for them to attract more top researchers and funding. To those who have it shall be given.

Top-rated institutions also, therefore, tend to have high levels of total income in absolute and per-student terms. (Dearden et al 2012) However, the use of research funds is often highly restricted, with expenditures confined to specific activities. Moreover, pure and applied science research tends to require cross-subsidy in the short term, even if it pays dividends in the long-term through its reputational effects (Norton 2015). Internationally renowned 'research-intensive' universities are therefore concerned to maintain or increase other sources of revenue, just as much as other institutions in the sector.

The growing importance of fees

Globally, the bulk of funding for universities comes from one of two sources: first, government grants (direct allocations or direct payment of student fees) and second, student fees paid from private income. Consultancy and development work is small in volume as a proportion of higher education budgets: in the UK it accounts for well under 2%.[3] Only in a very few institutions, mostly the top US private not-for-profits, do endowments account for a major proportion of annual income. (Wolf 2010) Moreover, for the last quarter-century, governments under budgetary pressure have also sought ways to increase private contributions to an expanding higher education system (Carpentier, 2012). Today there is a general, though uneven, move away from full state funding of students' studies and towards more of universities' income coming from student fees.

In countries where fees were already standard, notably the US, their real level has risen faster than overall spending, so that they play an increasing role in higher education budgets. (College Board 2014) In some countries (eg Brazil, Poland, Mexico) there has been active encouragement for new private institutions to open to absorb student demand. The number of countries subsidising university education for non-nationals (or, in EU countries, non-EU citizens) has shrunk progressively. In more and more countries, while some fee levels are strictly controlled, others are not.

[3] According to HEFCE (2015) consultancy income for the UK university sector in 2013/14 amounted to £441m. This is approximately1.5% of total income for UK universities in that year. HESA data show that total endowment and investment income for UK universities in 2014/15 was £360m, or 1.1% of total income.

Overall, therefore, universities in many countries now have a strong incentive to increase the number and proportion of students in groups for which fees are not set by government, and to charge them fees that are as high as possible. The money raised in this way will affect, directly and indirectly, the teaching programmes that students receive: but it is also, unlike most research grants, highly fungible, and available for use as the institution wishes – including to subsidise research.

Given the importance of resourcing to universities, there is surprisingly little comparative or longitudinal research on the factors which tend to increase, or decrease, the fees charged to students – or, indeed, the level of direct government grants. The largest body of empirical work relates to the USA, where provision of higher education (and indeed all education) is a state rather than a federal responsibility. Funding levels here are 'pro-cyclical': that is, total and per-student appropriations for higher education institutions rise faster than other budget categories when the economy is strong and tax receipts high, and are more likely to be cut than other budget categories during recessionary periods. (Hovey 1999, Humphreys 2004.)

Appropriation levels are also affected by which party is in power, with Republican legislatures and governors associated with lower spending than Democratic-controlled ones. (McLendon *et al*, 2009; Delaney and Doyle 2011). Capital expenditures, which are again a state concern, are also heavily affected by levels of racial heterogeneity within the state, and by other political factors: notably levels of higher education lobbying and the extent to which legislators are 'professionalised', i.e. typically serving long terms, with professional office staff and a dense web of contacts with constituents and interest groups (Tandberg and Ness, 2011).

In the highly centralised UK, education spending decisions rest with central government, although spending on higher education is a devolved function, with the Scottish, Welsh and Northern Irish governments taking their own spending decisions within a devolved

education budget[4] (Dearden et al 2012). Analysis of budgetary allocations demonstrates that health spending is consistently protected (and real growth maintained), and that higher education spending is, in contrast, much more volatile (Uberoi et al 2009). Spending levels do not follow the same symmetrical 'balance-wheel' pattern found in US State legislatures.

How do students decide which institutions to attend, and where it is worth paying more? Although governments in some countries are trying to provide more information to potential students, notably through satisfaction surveys and information on wage returns (inevitably highly lagged), students are in a situation where information is highly imperfect. Universities consequently strive to signal that they are highly desirable destinations – and have an especially strong incentive to reach and resonate with candidates for high-fee options. Observers of contemporary higher education frequently draw a distinction between 'recruiting' and 'selective' institutions. The former are keen to accept any applicant who meets the basic entry criteria, their major concern being to fill courses. The latter face substantial numbers of applicants for each place. If 'selective' universities are permitted, by their governments, to set their own fee levels, they are also, therefore, in a good position to charge higher fees in the confident expectation that they will maintain their desirability if they do (Bowl and Hughes, 2016).

The strategies which are available to university leaders can be analysed clearly using a resource-based perspective (the "Resource Based View", or RBV: see Wernerfelt 1984, Bryson et al 2007). The institution highlights and tries to build on its competitive advantages compared to other HEIs. Among these advantages, reputation (national and international) is a crucial consideration.

Contemporary university leaders are highly pre-occupied with acquiring prestige for their institution as best they can. The dynamic relationship between research excellence, research income, prestige and desirability is well understood and

[4] Decisions for England and English higher education have been taken by the UK Parliament, including MPs from the devolved nations, although legislation pertaining entirely to England is in principle now decided by MPs with English seats.

expressed (Blackmore 2016a, 2016b) but the relationship between reputation and fee income is less often discussed. However, not only is a 'selective' university in a very good position to charge high fees. We also have evidence that a higher price is recognised and treated as an (imperfect) indicator of quality in itself. A number of institutions (notably George Washington University in the US) are well known in the sector for using price increases as a way of driving up their reputation successfully (Calvert 2015). US-wide data confirm that this strategy, while not universally successful, often is effective (Askin and Bothner 2016).

In this paper, we look at the impact on English universities' fee income of a number of factors, including indicators of reputation. We hypothesise that the impact of reputation on fee income is potentially very large. Recent developments in the UK, and specifically in England, make it possible to test this hypothesis, providing what we believe to be a first estimate of the direct impact of reputation and 'brand' on university finances.

Higher education in contemporary England

The English university sector , like all higher education systems, is highly regulated, with a number of price controls in place. But over the last few decades, controls have been raised or removed in a number of key respects (most fees, most recruitment numbers): and lifted differently for English universities than for those of Scotland, Wales and Northern Ireland.[5]

Between the end of the Second World War and the early 1990s, the UK had a largely unified university sector. Total student numbers grew, at accelerating speed, over that period as did the number of universities: at the same time the polytechnic sector was created and expanded, offering degrees validated through a central body, the CNAA (Council for National Academic Awards.) In 1992, the UK became one of the few countries to abolish any distinction between universities and higher technical institutions, with polytechnics gaining full university status in 1992, and greatly increasing institutional numbers. (In most other developed countries, the tertiary system

[5] This often involved a process of first becoming a university college.

remains segmented). Since then, other institutions – notably colleges of further and higher education, and specialist institutes – have also received degree awarding powers and in many cases moved to full university status.[6]

Until the late 1990s, degree study remained free at the point of use, and there were also generous maintenance grants linked to family income (Harrison and Hatt, 2012). Student numbers were capped at institutional level: a university received a fixed allocation of undergraduate places for which the government paid, and was severely penalised if it offered additional places to fee-paying home applicants. (Aldrich ed 2002) Postgraduate places for home students were also strictly controlled and generously funded. (Home students, in a higher education context, covers all EU citizens, who must all, under EU law, be treated the same as a EU member's nationals.)

Until 1981, all overseas students who received a university place were funded in the same way (and so received free higher education tuition) as home students. Today, universities can not only recruit as many 'international' (non EU) students as they wish at all levels, but also decide what to charge them. This led to a rapid increase in overseas students and overseas fee income. By 2007-8, 16% of overall teaching and tuition revenue in both England and Scotland derived from international (non-EU) students (Dearden et al 2012). By 2013/14 this had risen to 24% in England and 27% in Scotland.

Continued rapid expansion of places for home students was secured, for many years, by reducing spending per student. However, by the end of the 1990s, there was cross-party consensus that some form of fee or charge for home students was necessary to supplement government spending: Lord Dearing duly delivered a report recommending a form of flat-rate 'contribution' on the eve of the 1997 election. Fees were then

[6] While many countries have allowed or encouraged the development of a sizeable private sector alongside the pre-existing public one, this has not yet happened in England, although the current government (2016) is promoting such a development (BIS 2016).

introduced by the incoming Labour government, albeit initially at the very low level of £1,000 a year (Dearing 1997, Aldrich op cit).[7]

Over the next two decades, the UK, and, in an increasingly devolved UK, the English government specifically, moved to increase student fees absolutely and as a proportion of universities' overall income. English fees for home (ie all EU) undergraduates were increased (though their level was controlled): the maximum annual fee rose to £3000 for those enrolling in 2006-7 and to £9000 a year in 2012-13. (Scottish, Welsh and Northern Irish charging policies now diverge markedly from England's.)

Students are not required to pay these fees upfront, but instead are eligible for an income-contingent loan from the government-backed Student Loan Company, repayable as and when their earnings exceed a certain amount. And at present (2015/16) only 7 out of all the 120 universities in England and Wales offer any undergraduate courses at less than £9000 a year (Complete University Guide 2016). Recent budget announcements extend this system to include loans for masters and doctoral degrees.

Until fees moved to £9000 a year, the government had also contributed directly to all full-time home undergraduate provision, but from that time onwards governmental contributions were retained only for a limited sub-set of degrees. [8]In an additional major change, England also recently abolished the caps on 'home' undergraduate student numbers which had been applied to individual institutions and to the system overall. [9]

[7] What was actually implemented differed from what had originally been recommended by Dearing – see e.g. Palfreyman and Tapper, (2014) for details.
[8] Lab sciences, engineering and other technical degrees, and specific 'Strategically Important and Vulnerable Subjects', as identified by the Funding Council
[9] This involved an early stage, in which caps were lifted only for the most academically qualified students, but is now universal.

Any ‘home’ undergraduate accepted by an English university is now eligible for an income-contingent student loan.

System differentiation

Global league tables show the UK, and England, to be very strongly represented at the top. In addition to those found in ‘top 20’ or ‘top 50’ lists, other UK institutions are found scattered throughout the top 200 or top 500 lists: conversely, many others do not appear at all. There is also a high level of variability in universities’ income from research council and other research funding; and also in the judgements of research quality produced by the formal evaluations run every few years (known as the Research Selectivity Exercise in 1986 and 1989, the Research Assessment Exercise in 1992, 1996, 2001 and 2008, and the Research Excellence Framework in 2015), and which determine the allocation of government block grants for the support of research and related infrastructure.Overall,

there are marked differences in research funding patterns between all the ‘pre-1992’ universities (Russell Group and non-Russell Group) and both the ex-polytechnics and the most recent universities.

In recent years, there has been a number of attempts by universities of similar types to group together to promote their common interests. By far the most visible of these groupings, indeed the only one recognised by the general public, is that of the ‘Russell Group’. This is a grouping of 24 large research-intensive universities, a sub-set of the ‘pre-1992’ universities, including two in Scotland, and one each in Wales and Northern Ireland . There are also five in London: four are, and one was till recently, a member of the federated University of London (a grouping recently joined by another of the capital’s universities (City University), which saw and sought University of London membership as a signal of quality). It is increasingly common in the press, as well as in schools’ own reporting, to refer to numbers of school-leavers progressing to a ‘Russell Group’ university as a sign of academic success. The emergence of this grouping

allows one to examine whether or not group membership or brand affects a UK university's fortunes over and above its individual characteristics.

When the English government lifted the cap on home undergraduate numbers, there was considerable uncertainty about whether over-subscribed 'selective' universities would increase their numbers substantially. In fact, many have, with very rapid 'home' undergraduate growth in a number of institutions belonging to the Russell Group. While recent changes do not allow different universities to charge different amounts for such students – the £9000 cap remains – the combination of unrestricted admissions and a much-increased fee level introduce new options for English universities' income-generation strategies.

Measuring success in generating fee income

In an environment where fee income is very important to universities, we have suggested that an institution's leaders will attempt to increase it by highlighting and building on its competitive advantages. What is the best measure of their success or failure?

For most conventional businesses, a number of well-recognised measures of performance are preferred (eg gross profit margin, return on invested capital, market share), but these are inappropriate for the vast bulk of English universities, which are not profit-making, but rather charities, and which are also aiming to maximise a number of outcomes simultaneously (Labib *et al*, 2014). One possibly appropriate measure is total financial resource, total income, or alternatively, in this context, total teaching income. Total income is not normally seen as an appropriate measure of success by business analysts, regardless of costs/expenditures. But in the distinctive competitive global environment we have described, size – of institution and of income - has arguably become increasingly important because it allows for a wide range of large research undertakings.

However, although there has been a general increase in the size of higher education institutions, they remain highly variable. Internationally, some very small institutions (eg Caltech) are also highly successful and respected. Amongst all HE institutions in England FTE student numbers in 2014/15 ranged from 177 at the Institute of Cancer Research to 67,361 at the Open University. For the sample of 97 universities which are the main focus of our analysis, the range was from 1,547 (Buckingham) to 35,370 (Manchester).

Income-per-student is therefore a preferable measure to total income, and is used in this paper. In the following sections we explore the determinants of teaching-income-per-student across the English university sector and examine whether they support our hypothesis that reputation and brand have a major impact on teaching income.

Explaining teaching income per student

We use data on HE institutions from the Higher Education Statistics Agency (HESA), the official source of quantitative information about higher education in the UK. We therefore exclude so-called 'alternative providers,' who are not universities but provide higher education, due to a lack of data. There are around 200 HE institutions in the HESA data base. Our focus is on (a) generalist universities which (b) faced the same strategic opportunities and limitations as the large majority of the sector during the period 2007-14. In order to investigate the impact of a range of factors on a university's teaching income per student, we needed to exclude both individually distinctive institutions which faced a recruiting environment quite different from that of the sector at large, and those for whom the reputational influences important to most institutions (eg international research and league table rankings) were not applicable.

We therefore excluded a number of specialist providers such as agricultural colleges, the Royal College of Art, the Royal College of Music, the Royal Conservatoire of Scotland, and University of London Institutes (such as the Warburg Institute). Further, to create a sample made up of generalist universities, we determined that institutions should be eligible for Student Loan Company funding; they should not be exclusively

postgraduate; they should be sizeable institutions having at least 1,000 undergraduates; at least 75% of those undergraduates should be doing full degrees, and at least 60% of undergraduates should be studying full-time. These criteria exclude a few additional and unusual institutions such as the Open University (part-time distance learners), Birkbeck (part-time students), LSHTM, London Business School and Cranfield (graduate only). Following these exclusions, a large sample of 120 UK HE institutions with full HESA data remains.

At present, teaching income per student varies very markedly. This is shown in Figure 1 for the UK and for England separately. (The shaded boxes indicating the spread between the first and third quartiles.) In both 2007-8 and 2013-14 (the most recent complete data), a very wide spread is evident, even excluding outliers. In the more recent data a spread of over 2:1 (UK) and almost 2:1 (England) for the main population underlines the major differences in per-student resource that obtain in the sector; overall, the spread was almost threefold - from almost £12,000 per full--time equivalent student to just over (England) or just under £4000 (UK) - in 2007-8. By 2013-14, English figures were a little more bunched but still ranged from a teaching income per student of just over £6000 to one of well over £16000 per student.

To explain these differences, we looked to identify structural variables, which in varying degrees might be (a) beyond individual institutions' control, and/or (b) affected directly by strategic decisions made by management, and also (c) a number of 'reputational' indicators.

The most important structural variable during the period in question was the fee regime for undergraduates. All parts of the UK treat all higher education institutions (other than 'alternative providers') in their jurisdiction alike with respect to the support they receive for 'Home' (EU) students. (Wales and Scotland treat Welsh and Scottish-domiciled students different from other UK ones, but they do so consistently across Wales and Scotland.) From 2000 onwards, and even more markedly from 2010, this resulted in a large difference in the teaching income received per Home undergraduate in the UK's

different devolved administrations , and most especially in English as opposed to Scottish universities.

Historically, Scottish universities enjoyed higher funding-per-student than English ones, largely because they enrolled proportionately more science and medical students (Dearden et al 2012), but this is no longer the case. As a result of diverging fee policies, in every one of our models which included nation, being in England was a highly significant and substantively important explanatory variable. We provide some results in the Appendix for the UK which illustrate the impact of nationality. However, since our focus here is on institutional strategy and prestige, and universities cannot simply move country within the UK, *the rest of the analysis in the main body of the paper is for English institutions alone*, of which 97 meet our criteria for inclusion.

We hypothesise that the following might affect levels of teaching income per student:

The academic composition of the student body. More financial support is received from government for STEM students, and for medical students, than for students of other subjects, so the larger the proportion of such students, the higher the average teaching income per student.

The size of the university. Larger institutions may find it easier to respond quickly and easily to changes in student demand and in government policy, and so increase their income per student.

Rate of growth of the university. It is easier to expand course enrolments and add new ones than it is to shrink existing ones, especially if overall demand is high across all subjects (as is likely in 'selective' institutions). Institutions with effective senior management teams which respond to and take advantage of changes in demand and policy may thus opt for increasing overall size . Such institutions will be identified by student growth at undergraduate level, postgraduate level, or both.

Location Some regions of the country may be more or less attractive to high-fee students because of housing costs (reducing the pull of high-cost areas) or labour market factors (increasing the pull of high-cost areas) or by other regionally-related factors (eg access to airports).

Undergraduate/postgraduate mix While home undergraduate fees are highly regulated, most home postgraduate fees are not. Moreover, substantial numbers of international students are found at postgraduate level. Institutions which have made a strategic decision to move into increasing the proportion of postgraduates may therefore find this associated with higher per-student teaching income.

Internationalisation of the student body All fees for non-EU students are unregulated. Data show that, across the whole sector, the average level of funding received per non-EU student is well above the average teaching income per EU student. (Dearden et al op cit: 85) Institutions that have higher proportions of international students in their student body may therefore have higher per-student teaching income than those with lower proportions.

Governmental measures of student satisfaction Since 2004 the National Student Survey (run for the Funding Councils) has collected responses from final-year undergraduate students, asking them to rate their experiences on a number of dimensions, including specific questions about teaching and assessment, and an overall rating of their course. The results are available on line, on an institutional basis, and also used by external commentators.

UK university rankings

A number of publications rank UK universities, of which the best known and most visible *The Guardian* newspaper. It weights NSS scores heavily and concentrates on indicators other than research.

UK government research rankings

The UK government operates a system of 'dual funding' for universities: teaching payments are run by the devolved governments, and there is a 'block grant' for research based on quality, and allocated on the basis of a UK-wide assessment. The 2008 assessment was called the 'Research Assessment Exercise' and the 2014 one was the 'Research Excellence Framework'. University rankings on these are widely reported and likely to be strongly associated with reputation and we hypothesise that this will translate into higher fees.

UK university type or brand

There are three important and generally recognised categories with which an institution can be associated, and which may have clear reputational consequences: 'Russell Group', other 'pre-1992' institution, and 'post-1992'. We hypothesise that the group to which a university belongs functions as a brand, with Russell Group institutions able to charge the highest fees by dint of their membership, and other pre-92 institutions able to charge more than post-92, but significantly less than Russell Group members.

Global reputation rankings

A number of global league tables exist, as noted above. One of the best-known is the Times Higher, which also uses a wider set of criteria than the Jiao Tong or QS rankings (also frequently cited), and is therefore less likely to be very highly correlated with UK governmental research rankings. The THE World Rankings list 800 institutions, but we look separately at the impact of being in a number of different positions in the ranks. We hypothesise that, because 'brand-related' ability to charge can only apply in a limited number of cases, where the institution appears to have global name recognition, the positive impact of global rankings on fee levels (and teaching-income-per student) will be limited to universities in the top 200 places.

As noted above, we divided the sample into three groups, using a classification which is widely used and recognised in the UK university community: Russell Group, other pre-92, and post-92 (new universities). Figure 2 shows that there is, as we expect, a

marked difference between these three groups in teaching income per student, and almost no overlap at all between Russell Group and post-92 institutions.

Data

HESA collects a wide range of data including financial information such as the income and expenditure of higher education institutions, as well as data on numbers and types of staff and students. Our data were obtained via HEIDI, the Higher Education Information Database for Institutions, which is HESA's web-based management information service.

The variable we are principally interested in explaining is teaching income per student (for the year 2013/14). The teaching income variable was constructed from HESA financial data and it was constructed by adding together the recurrent teaching grant distributed by the Higher Education Funding Council for England (HEFCE) and total tuition fee income. The teaching grant figure is the amount distributed to each institution by HEFCE as shown in the annual grant letter. Tuition fee income includes all income received in respect of fees for students on all courses for which fees are charged, including sources such as the Student Loans Company (SLC), Local Education Authorities (LEA), the Department of Health and other sources, as well as from individual students. The two sources of income were added together to yield total teaching income for each university. Teaching income per student was then constructed by dividing teaching income in 2013/14 by the number of FTE students in 2013/14.

As for explanatory predictors, a number of derived variables were created from the student data in the HEIDI database including the proportion of non-EU international students, the percentage of postgraduate students in total FTE student numbers, the growth of overall student numbers from 2007/08 to 2013/14, the growth of undergraduate numbers from 2007/08 to 2013/14 and the growth of postgraduate numbers over the same period. To measure the student mix at an institution we used the proportion of STEM students. Several definitions were experimented with here,

including a narrow definition, the proportion of all students doing physics or maths degree, and a much broader definition - the proportion studying for degrees in biology, physics, maths, computing or engineering). In addition, a binary variable for the presence of a medical school was created drawing on information from the UK Medical Schools Council. It takes the value 1 if a university has a medical school and 0 if the university does not have a medical school. We constructed a binary variable for whether or not the university is in the Greater London area, and a categorical variable for type of university distinguishing three types of university – Russell Group, other pre-92 universities, post-92 universities.

Our dataset was augmented with further data from a range of sources. As a measure of student satisfaction we used information from the National Student Survey (NSS). Specifically the percentage of respondents who 'definitely' or 'mostly' agreed with the statement 'Overall, I am satisfied with the quality of my course' was used. Rather than contemporaneous data, we used data from the 2011 survey since (we presume) high satisfaction scores would impact on demand a few years hence. We also utilised data from the 2012 Guardian ranking of universities. The Guardian rankings focus on teaching (both inputs such as the staff/student ratio and outputs such as satisfaction scores and job prospects) but do not include any measures of research. On research, we used the 2008 RAE results aggregated to university level with an overall ranking based on grade-point average. For the variable using *Times Higher* world rankings of universities, English universities were classified according to whether they were in the top 50 in these rankings, 51 to 100 etc down to 601 to 800 and unranked. The most recent data (2015/16) were preferred because earlier years have far fewer observations (for example in 2012/13 only rankings for the top 400 were given).

Method

Our interest is in the relationships between teaching income per student on the one hand and a set of explanatory variables on the other. However, prior to analysis we spent some time examining the data via univariate summary statistics including measures of central tendency and dispersion; and then bivariate correlations, scatter plots and box plots to explore the relationships between the variables in our dataset.

Such exploratory analysis can provide useful insights and informed decisions on whether or not to retain all variables.

The method used in this paper is multiple linear regression analysis. This is a standard way of examining how a set of explanatory variables are related to a quantitative response variable: in this case, teaching income per student. Multiple regression enables the researcher to control for a range of variables when examining the key relationship of interest. After controlling for lots of other factors which might influence teaching income per student, is there a statistically significant relationship with a particular variable of interest: in this case, measures of reputation or brand, such as type of university? There are various types of regression analysis and their appropriateness depends on the form of the outcome variable. With outcomes measured on a continuous scale, such as teaching income per student, multiple linear regression is appropriate.

In all of our regression models the response variable is teaching income per student in 2013/14, as defined previously (see Data section). We start with models containing few explanatory variables, and add further variables in stages. The modelling process was sequential, dropping variables which were not statistically significant at each stage in order to arrive at a relatively simple model containing key predictor variables. An assumption underlying basic forms of linear regression analysis is that the variance of the residuals is constant across all observation points. Our exploratory plots suggested that this assumption did not hold, in other words that the variance of residuals may be heteroscedastic. To allow for this, heteroscedasticity-consistent standard errors can be used to allow for non-constant variance (Fox, 2016) and that is what we did for all our models.

Results

Bivariate correlations

As a first step in the analysis, we examined bivariate correlations to look at whether there was a correlation between each of the possible explanatory variables, taken separately, and the dependent variable (teaching-income per student). Pearson correlation coefficients were used for the continuous and categorical explanatory variables, and point-biserial correlations for dichotomous explanatory variables.

There were high Pearson correlation coefficients between teaching-income per student and the student and subject mix variables. The correlation with the dependent variable was 0.84 for the proportion of international students and 0.63 for the percentage of STEM students. Both of the dichotomous variables had moderate point-biserial correlations with the dependent variable; r = 0.38 for the London variable, and r = 0.57 for the presence of a medical school. The size and growth of universities had low correlations with teaching income per student. The number of FTE students had a correlation of 0.22 with teaching income per student, while for each of overall growth, the growth of undergraduates and of postgraduates the correlation coefficients with teaching income per student were less than 0.2. The correlation of UK satisfaction and quality scores with teaching income per student were r = 0.75 for the *Guardian* score and 0.39 for the NSS score. The correlations with teaching income per student for measures of UK research strength and global prestige were r = -0.75 for 2008 RAE ranking, and r = -0.72 for the categorical *THE* world ranking (where 1 is the top rank). All these variables were retained. However percentage of postgraduates was dropped as a separate explanatory variable because of its high correlation with the proportion of international students (r = 0.78)]

Regression analysis of teaching income per student

In Table 1 we report a first set of regression results. The dependent variable throughout is teaching income per student in 2013/14 for our sample of 96 English universities. The results in this table focus on type of university and measures of student mix and subject mix as explanatory variables. Model 1 in Table 1 just has type of university as the sole explanatory variable. The reference category is the ‘other pre-

92' type of university and, relative to them, Russell Group universities had, on average, more than £2,000 of additional teaching income per student in 2013/14 while the post-92 universities had almost £1,500 less than the other pre-92 universities on average. It is worth noting that the R^2 in this regression is 0.58, suggesting that 58% of the variation can be accounted for by the categorical variable for type of university. The remaining models in Table 1 add the proportion of STEM students and the proportion of international (non-EU) students to the regression analysis. The proportion of international students was highly significant ($p < 0.001$) but the STEM variable was not statistically significant . This was surprising, since it was the major factor explaining differences between English and Scottish universities' teaching income in the period 1995-2007 – i.e. immediately before the period we are examining (Dearden et al, 2012). We retain the STEM variable in the model in order to check whether or not it will become significant as further variables are added to the model.

In further regression analyses (Table 2) we added binary variables for whether the university has a medical school and whether the university is in London. Results showed that being in London was strongly and positively associated with teaching income per student even after controlling for other factors such as type of university, student and subject mix ($p < 0.001$). Other things equal, universities in London had approximately £900 per student more teaching income after allowing for other variables in the regression model. However, the presence of a medical school was not statistically significant in any of our regression models, most likely because most of the medical schools are in certain types of university and that is already included as a control in our models. So we retained the binary variable for London in further models but omitted the medical school variable.

We also considered whether the size and growth of universities – measured in terms of FTE students numbers and with growth measured over the period 2007/08 to 2013/14 – were associated with teaching income per student (Table 3). We explored several growth variables, including overall student numbers, and the growth of undergraduate and postgraduate student numbers, but none of them were statistically significant in models which controlled for other factors. However, the size of the university was

significantly associated with teaching income per student even in models which controlled for other factors. The predicted impact of size of university on teaching income per student was quite small but the association was a strong one ($p < 0.01$).

The main new feature of Table 4 is that we have now included each university's 2008 RAE rank as an explanatory variable. (Note that the highest-ranking institution will score 1 on this variable, so we expect a negative correlation.) The first specification in Table 4 has this as the sole explanatory variable and then in Models 2-5 we add further variables to the model. While Model 1 shows a positive relationship between RAE ranking and teaching income per student, the effect size is small, and as we added type of university, dummy variable for London and variables reflecting student mix, subject mix and size of university to the model the effect size of the RAE variable became progressively smaller and in Models 4 and 5 it was no longer statistically significant. That is, we could no longer reject the null hypothesis of no association between teaching income per student in 2013/14 and RAE 2008 ranking.

We investigated the impact of NSS scores and *Guardian* scores on teaching income per student. As can be seen in Table 5, each of these variables was significantly associated with teaching income per student when no controls were in the model, although the effect sizes were small; but became insignificant once we controlled for other factors which may influence teaching income per student. Being a Russell Group member and being in London both have a very large effect on teaching income per student in these specifications.

Finally, we explored the association between the *Times Higher* world rankings and teaching income per student (Table 6). In the absence of any other explanatory variables an English university being in the top 50 of these rankings predicted approximately an additional £5,600 of teaching income per student. Being inside the top 200 was also significant and worth nearly £2,200 per student in this initial model. Adding further explanatory variables reduced the size and significance of the ranking variable. However, it was correlated with other explanatory variables, especially university type: Russell Group members, for example, are very likely indeed to achieve high rankings. This makes it difficult to tease out any effects independently of each

other and to know how much, for example, the Group 'brand' adds to the impact of world rankings.

As discussed above, we have focused on English universities in our analyses here. We also ran some models for the UK as a whole, with a sample of 127 universities, and these results, which were broadly very similar, are included for interest in the Appendix.

Conclusion

The implications of the models which we have displayed in this paper are that universities in the Russell Group are able to generate substantively higher levels of teaching income per student than other English universities partly due to a more favourable student mix but also, and to a highly significant degree, as a result of their status as established, elite, research-intensive universities which figure large in international rankings. While it is generally accepted that reputation is important to individual institutions as well as to English higher education overall, our analysis indicates that it is worth a very large amount of money indeed – and also that other 'reputational' and non-reputational factors, such as National Student Survey scores, or undergraduate/postgraduate mix, are not important.

As shown in Table 7, England's Russell Group universities differ markedly from other pre-92 universities in both their proportion of STEM students and in the proportion of international (non-EU) students they enrol. Both these factors in themselves will tend to raise teaching income-per-student: the former because of direct government funding for home STEM students, the latter because international students are almost invariably charged more than home students. However, what our models indicate is that a large part of the Russell Group advantage cannot be explained by these factors.

In our final regression models, for example, being a highly-ranked university internationally (as most Russell Group institutions are), and being a member of the group, are associated with increases in per-student teaching income of several thousand pounds even when we control for STEM and international student representation. Given that home (EU) undergraduate fees are controlled, what this

means in effect is that highly-ranked and ‘top-branded’ universities are able to charge very high fees for that proportion of their student body where fees are uncontrolled.

What are the implications of these findings for university leaders making strategic decisions about the future direction of their institution? Specifically, what might the leader of a university outside of the Russell Group do to boost teaching income per student? What are the strategic options available, and how effective would they be? Let us assume that the actual state of the world to be faced by this university is represented by the relatively simple model of Table 1, Model 4. Here, each extra percentage point of STEM students among the student body boosts teaching income per student by £34, each additional percentage point of non-EU students among the total boosts teaching income per student by about £128. There is a substantial premium of almost £1,400 for being in the Russell Group. This represents either the power of the Russell Group brand as such or, perhaps more plausibly, is also proxying for some combination of prestige, reputation, research-intensity etc.

Some predictions from this model are shown in Figure 3. Here, we are assuming that there are three hypothetical universities, one of each type, each of which has the mean proportions of international and STEM students for their sector, as listed in Table 5. The model then predicts that teaching income per student will be £11,609 for the Russell Group university, £9,565 for the other pre-92 university and £8,069 for the post-92 university.

Now, we explore some hypothetical scenarios and their predicted outcomes – via altering student mix or subject mix, or somehow gaining prestige to the level of the Russell Group sector – as listed in Table 8. Under Scenario 1, boosting the proportion of STEM students to the Russell Group average, the other pre-92 university would realise a rather slight gain in teaching income per student of some £175 (£9,740 - £9,565), taking it to almost 84 per cent of the Russell Group average (as shown in Table 9). As its starting point for the proportion of STEM students is much further away from the Russell Group average, the increment for the post-92 university would be larger at £375 (£8,444 minus £8,069), but this is still a fairly modest gain. The reason

of course is that each extra STEM student delivers only a small addition to income in the underlying statistical model.

Scenario 2, in which the universities attain the Russell Group average on the proportion of international (non-EU) students delivers more substantial gains in teaching income per student. This is especially true for the post-92 university which, starting as it does with a much lower base of these financially valuable international students, would see its teaching income per student rise by almost a quarter. And under Scenario 3, in which the proportions of both STEM and non-EU students are boosted to the Russell Group average, teaching income per student would be 29 per cent higher in the post-92 university.

The gains in teaching income per student achieved under these scenarios by the pre-92 university are predicted to be much more modest – an increase of some 5 per cent under Scenario 2 and about 7 per cent for Scenario 3. The pre-92 university starts out much closer to its Russell Group counterpart on student and subject mix and therefore gains relatively little extra income from being boosted to the Russell Group average. The pre-92 university gains far more from being able to hypothetically 'join' the Russell Group, in Scenario 4. Even if its student and subject mix were entirely unaffected by this transition – as, in the interest of simplicity, the model predicts- it would still be on 94 per cent of the average level of teaching income per student of the Russell Group, or a gain of almost £1,400 per student. The post-92 university would also gain substantially, by over £1,000 per student but would still, on this scenario, be well below (in fact at about 80 per cent) of the level of teaching income per student in true Russell Group universities due to its much less favourable mix of subjects and the relative scarcity of high-fee-paying international students on its campus.

Of course, joining the Group would, in the real world, also in all likelihood lead to more international students as well. But even within the simplifying constraints introduced by our scenario assumptions, the results underline the value of prestige, which is itself inherently unequal in its distribution. They also confirm that the incentive for universities to prioritise those activities which feed into reputation and brand is extremely strong.

For the foreseeable future, prioritising research and other internationally visible activities is likely to pay far greater dividends than any other available strategy.

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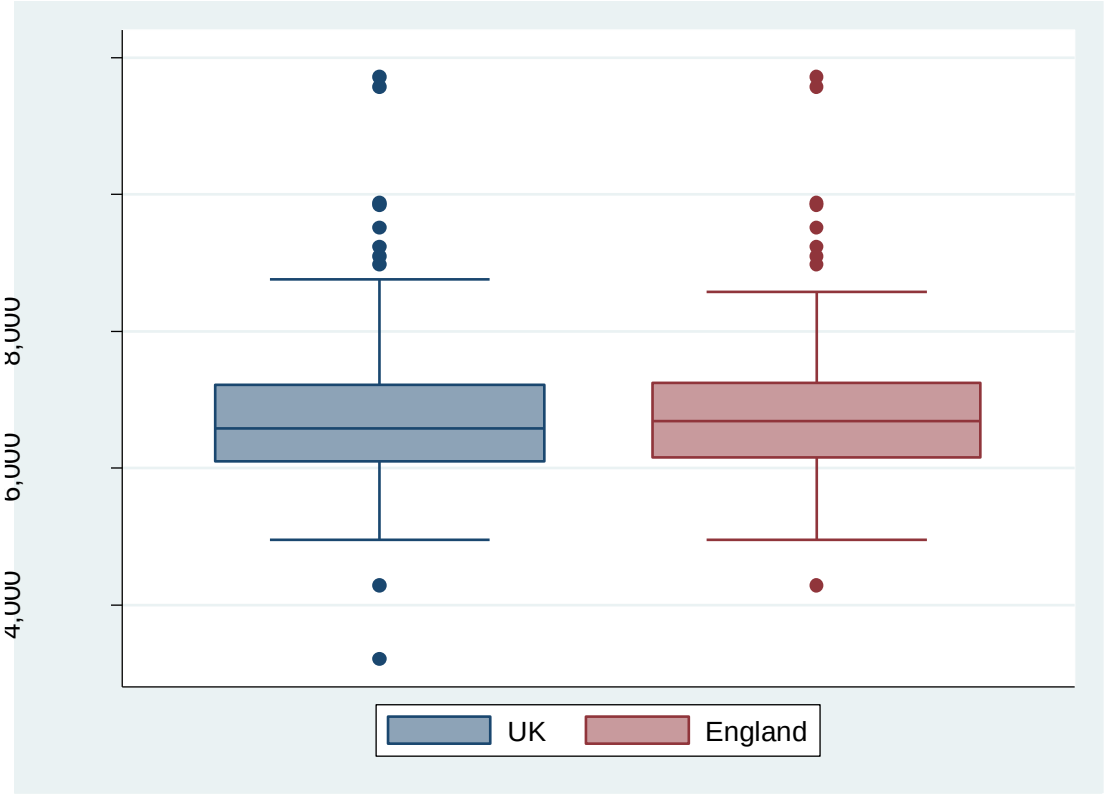

Figure 1a: teaching income per student 2007-8

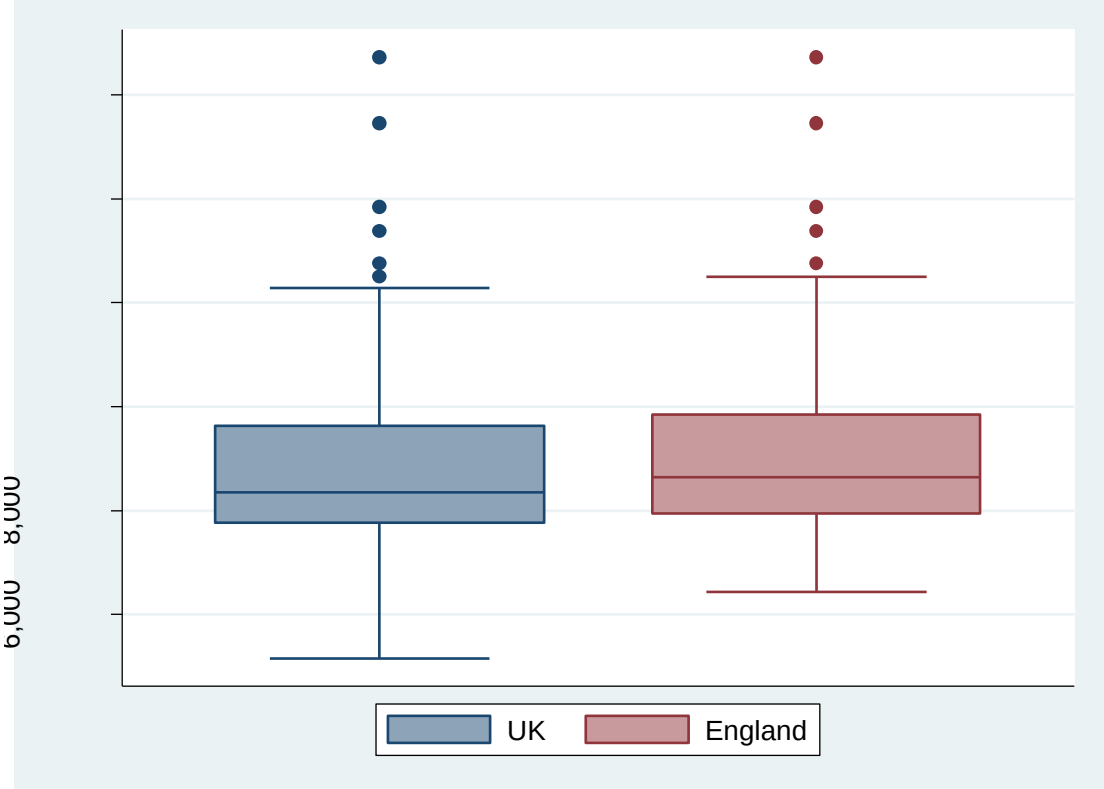

Figure 1b Teaching income per student 2013-14

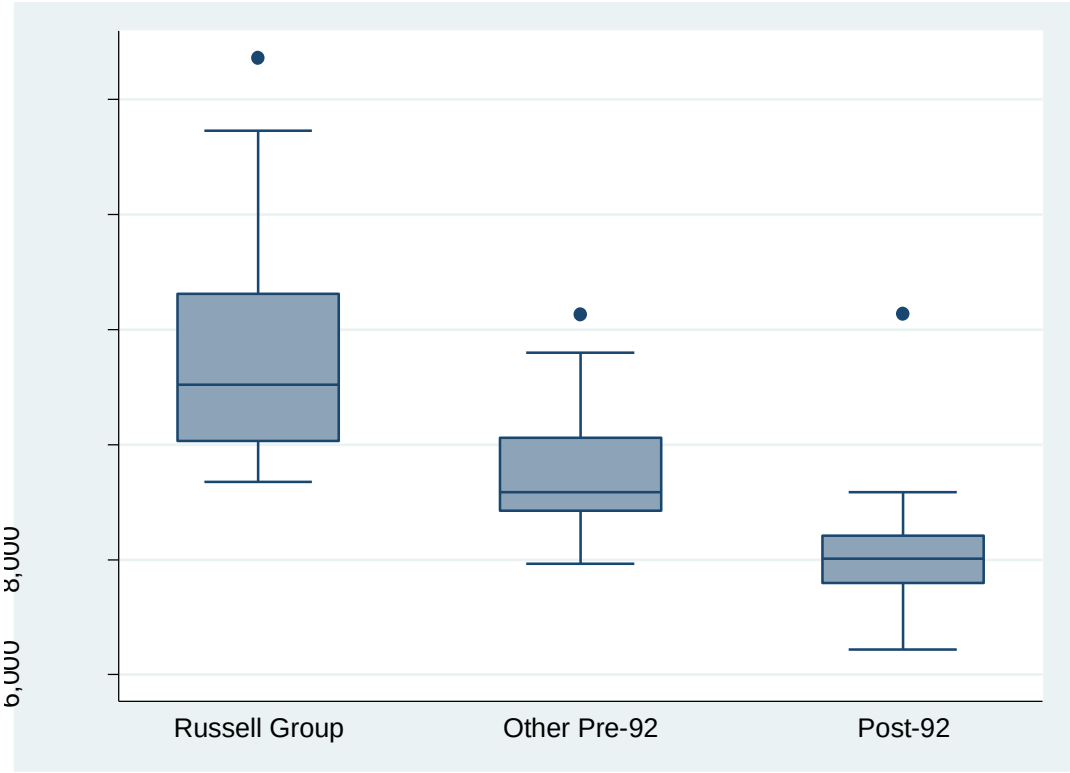

Figure 2: Teaching income (recurrent + fees) per student 2013/14, English universities

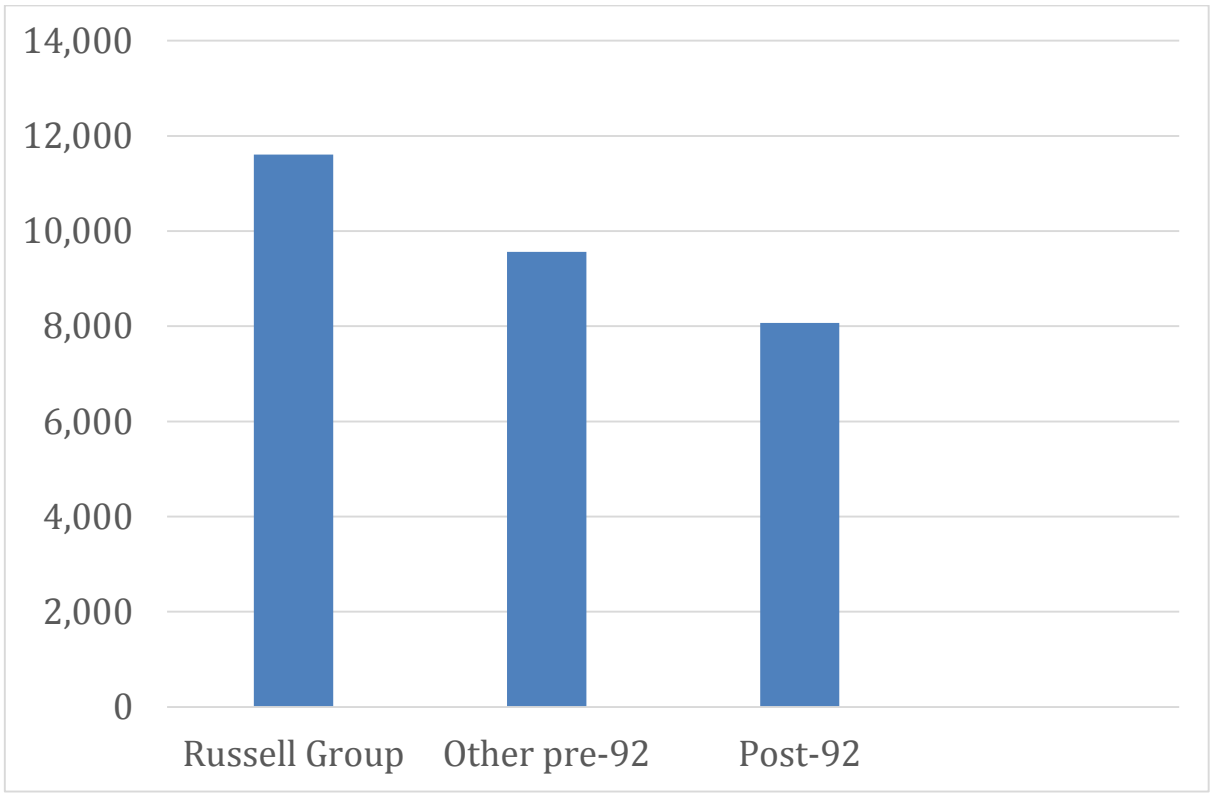

Figure 3: Model predictions

Table 1: Regression models for teaching income per student in 2013/14, English universities

	(1)	(2)	(3)	(4)
Type of university (reference: other pre-92 university)				
Russell Group	2044.136***	1783.492***	1564.603***	1394.198***
	(3.99)	(3.59)	(4.55)	(4.44)
Post-92 university	-1495.483***	-1197.219**	19.692	205.195
	(-5.50)	(-2.95)	(0.06)	(0.54)
percentage of STEM in total FTE students (narrow defn)		50.452		33.897
		(1.16)		(0.99)
proportion international (non-EU) students			129.293***	128.022***
			(6.52)	(6.23)
Constant	9564.837***	9115.999***	6956.678***	6680.752***
	(38.26)	(17.80)	(16.56)	(12.68)
Observations	96	96	96	96
R^2	0.581	0.590	0.790	0.794

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Regression models for teaching income per student in 2013/14, English universities

	(1)	(2)	(3)	(4)	(5)
Russell Group university	2059.941**	2044.136***	1400.844***	1391.264***	1288.663***
	(2.70)	(4.65)	(3.75)	(4.74)	(3.50)
Post-92 university	-1500.281***	-1359.885***	203.930	126.237	143.481
	(-4.91)	(-5.41)	(0.54)	(0.39)	(0.44)
Medical school	-26.341		-13.022		200.877
	(-0.04)		(-0.03)		(0.55)
London		1518.707***		901.611***	927.503***
		(3.88)		(3.62)	(3.70)
percentage of STEM in total FTE students (narrow defn)			34.145	50.102	46.743
			(0.97)	(1.60)	(1.48)
proportion international (non-EU) students			127.991***	106.240***	106.087***
			(6.27)	(5.91)	(5.70)
Constant	9570.105***	9185.160***	6681.768***	6750.578***	6736.908***
	(32.66)	(38.94)	(12.74)	(14.98)	(14.80)
Observations	96	96	96	96	96
R^2	0.581	0.688	0.794	0.825	0.826

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Regression models for teaching income per student in 2013/14, English universities

	(1)	(2)	(3)	(4)	(5)
Russell Group university	1391.264***	1676.520***	1426.260***	1420.975***	1416.632***
	(4.74)	(5.25)	(4.77)	(4.87)	(4.76)
Post-92 university	126.237	401.006	113.451	111.751	115.220
	(0.39)	(1.17)	(0.35)	(0.35)	(0.36)
percentage of STEM in total FTE students (narrow defn)	50.102	70.730*	46.697	46.089	47.570
	(1.60)	(2.30)	(1.43)	(1.46)	(1.46)
proportion international (non-EU) students	106.240***	114.395***	108.039***	107.562***	107.880***
	(5.91)	(6.87)	(5.89)	(5.96)	(6.00)
London	901.611***	814.585***	854.868**	840.307**	873.883***
	(3.62)	(3.45)	(3.16)	(3.10)	(3.42)
Size of university, 2013/14		-0.048**			
		(-3.20)			
growth of overall student numbers 2007/08 to 2013/14			-3.678		
			(-0.50)		
growth of undergrad numbers 2007/08 to 2013/14				-4.438	
				(-0.60)	
growth of postgrad numbers 2007/08 to 2013/14					-1.570
					(-0.71)
Constant	6750.578***	6998.914***	6793.458***	6814.056***	6773.407***
	(14.98)	(18.39)	(15.00)	(15.16)	(15.03)
Observations	96	96	96	96	96
R^2	0.825	0.844	0.826	0.826	0.826

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Regression models for teaching income per student, English universities

	(1)	(2)	(3)	(4)	(5)
2008 RAE rank	-35.533***	-14.618**	-9.239*	-3.265	-1.042
	(-8.41)	(-3.26)	(-2.27)	(-0.65)	(-0.22)
Type of university (reference: other pre-92 university)					
Russell Group		1685.261***	1817.316***		1603.159***
		(3.42)	(4.15)		(5.06)
Post-92 university		-796.568*	-966.214**		340.962
		(-2.37)	(-3.02)		(0.81)
London			1282.076***	870.097**	820.363**
			(3.51)	(2.96)	(3.38)
percentage of STEM				108.600**	76.815*
				(3.16)	(2.52)
proportion international				107.942***	107.349***
				(5.01)	(5.84)
University size				-0.017	-0.043*
				(-1.12)	(-2.49)
Constant	11425.520***	10142.984***	9609.724***	7143.178***	7068.833***
	(30.22)	(30.71)	(33.41)	(10.61)	(13.34)
Observations	93	93	93	93	93
R^2	0.560	0.650	0.721	0.794	0.852

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Further regressions for teaching income per student in 2013/14, English universities

	(1)	(2)	(3)	(4)
NSS score	131.330***	-45.637		
	(3.49)	(-1.92)		
Guardian score			97.861***	21.611
			(8.17)	(1.72)
Type of university (reference: other pre-92 university)				
Russell Group		1684.077***		1546.818***
		(5.36)		(4.95)
Post-92 university		171.351		447.224
		(0.52)		(1.26)
percentage of STEM		83.434**		56.043
		(2.79)		(1.69)
proportion international		114.867***		97.087***
		(7.58)		(5.23)
London		682.205**		978.525***
		(2.98)		(4.20)
University size		-0.053***		-0.039*
		(-3.79)		(-2.47)
Constant	-1753.359	10921.015***	3550.603***	5931.387***
	(-0.56)	(5.22)	(5.61)	(8.77)
Observations	96	96	92	92
R^2	0.135	0.852	0.556	0.853

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Further regression models for teaching income per student in 2013/14, English universities

	(1)	(2)	(3)	(4)	(5)
Ranking: reference outside top 200, incl unranked					
Ranked in the top 50	5608.528***	4233.352***	2968.793***	3243.441***	2404.989***
	(7.60)	(4.84)	(4.76)	(6.27)	(3.83)
Ranked top 200 (but outside top 50)	2184.784***	930.222*	460.659	890.493**	366.822
	(9.27)	(2.38)	(1.38)	(3.36)	(0.99)
Type of university (reference: other pre-92 university)					
Russell Group university		402.042	567.745		869.792*
		(1.15)	(1.92)		(2.32)
Post-92 university		-1216.417***	-88.704		159.759
		(-3.62)	(-0.31)		(0.50)
Proportion international (non-EU) students			108.250***	97.124***	102.525***
			(6.24)	(6.99)	(6.23)
Percentage of STEM in total FTE students (narrow defn)				36.554	42.235
				(1.72)	(1.78)
London				552.770*	548.754*
				(2.43)	(2.60)
University size				-0.021	-0.033*
				(-1.75)	(-2.60)
Constant	8312.637***	9285.770***	7242.957***	7317.909***	7271.662***
	(68.35)	(29.16)	(20.58)	(39.00)	(19.83)
Observations	96	96	96	96	96
R^2	0.680	0.733	0.868	0.881	0.890

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Mean proportions of international and STEM students, in 2013/14, English universities

Type of university	Mean percentage of international (non-EU) students	Mean percentage of STEM students (narrow definition)
	%	%
Russell Group	23.88	14.06
Other pre-92	20.17	8.90
Post-92	8.45	2.98

Table 8: Some scenarios for 2 hypothetical English universities (one pre-92 and one post-92) not in the Russell Group

Starting point	Our hypothetical universities have the average of STEM and non-EU students typical for their sector
Scenario 1	Boost proportion of STEM students to match Russell Group average
Scenario 2	Boost proportion of non-EU students to match Russell Group average
Scenario 3	Boost proportion of STEM and non-EU students so that each is at the Russell Group average
Scenario 4	'Join' the Russell Group i.e. gain prestige and reputation on a par with the Russell Group premium [but proportions of STEM and non-EU students as at starting point].

Table 9: Gains for the 2 hypothetical English universities (one pre-92 and one post-92) under the various scenarios

	Starting point	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	£	£	£	£	£
Russell Group	11,609	11,609	11,609	11,609	11,609
Other pre-92	9,565	9,740	10,040	10,215	10,959
Post-92	8,069	8,444	10,044	10,420	9,258
As % RG	%	%	%	%	%
Other pre-92	82.4	83.9	86.5	88.0	94.4
Post-92	69.5	72.7	86.5	89.8	79.7
Gain on starting point	%	%	%	%	%
Other pre-92	0.0	1.8	5.0	6.8	14.6
Post-92	0.0	4.7	24.5	29.1	14.7

Appendix: Regression results for UK universities

Table A1: Regression models for teaching income per student in 2013/14, UK universities

	(1)	(2)	(3)	(4)	(5)
Type of university: reference is other pre-92					
Russell Group university	2096.305***	1786.126***	1403.671**	1371.717***	1123.285***
	(4.12)	(3.95)	(3.21)	(4.25)	(3.64)
Post-92 university	-1239.482***	-1596.154***	-932.597**	-646.328	-228.510
	(-4.23)	(-6.28)	(-2.67)	(-1.71)	(-0.62)
England		1648.380***	1561.161***	1450.887***	1400.125***
		(5.50)	(5.75)	(4.24)	(4.38)
percentage of STEM in total FTE students (narrow defn)			99.417*		70.744*
			(2.56)		(2.15)
proportion international (non-EU) students				99.797***	94.085***
				(4.02)	(3.68)
Constant	9092.404***	8028.933***	7160.153***	6350.650***	5828.490***
	(34.03)	(22.91)	(17.85)	(15.92)	(14.89)
Observations	120	120	120	120	120
R^2	0.461	0.576	0.614	0.722	0.741

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A2: Regression models for teaching income per student in 2013/14, UK universities

	(1)	(2)	(3)	(4)	(5)
Type of university: reference is other pre-92					
Russell Group university	1713.209**	1775.243***	1154.458**	1126.634***	1044.747**
	(2.75)	(4.43)	(3.04)	(3.85)	(2.92)
Post-92 university	-1568.774***	-1491.818***	-235.769	-215.614	-196.296
	(-5.19)	(-6.15)	(-0.65)	(-0.66)	(-0.62)
England	1659.810***	1326.451***	1394.016***	1183.441***	1195.512***
	(5.47)	(4.59)	(4.23)	(4.22)	(4.11)
Medical school	123.014		-58.380		153.472
	(0.21)		(-0.14)		(0.40)
London		1519.050***		1129.094***	1149.878***
		(3.82)		(4.02)	(4.08)
percentage of STEM in total FTE students (narrow defn)			71.738*	88.683**	86.400**
			(2.08)	(2.91)	(2.71)
proportion international (non-EU) students			93.991***	74.711**	74.603**
			(3.70)	(3.27)	(3.22)
Constant	7989.814***	7991.621***	5839.957***	5969.797***	5942.252***
	(19.46)	(22.89)	(15.57)	(17.52)	(18.19)
Observations	120	120	120	120	120
R^2	0.576	0.657	0.741	0.780	0.780

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3: Regression models for teaching income per student in 2013/14, UK universities

	(1)	(2)	(3)	(4)	(5)
Russell Group university	1126.634***	1391.182***	1154.682***	1133.972***	1175.742***
	(3.85)	(4.21)	(3.79)	(3.82)	(3.97)
Post-92 university	-215.614	-104.318	-211.960	-218.911	-176.665
	(-0.66)	(-0.30)	(-0.66)	(-0.67)	(-0.58)
England	1183.441***	1221.293***	1185.774***	1188.345***	1171.756***
	(4.22)	(4.34)	(4.22)	(4.18)	(4.39)
percentage of STEM in total FTE students (narrow defn)	88.683**	98.833**	85.647**	86.945**	82.718**
	(2.91)	(3.29)	(2.71)	(2.78)	(2.68)
proportion international (non-EU) students	74.711**	76.373**	78.522***	76.110**	83.813***
	(3.27)	(3.26)	(3.50)	(3.35)	(3.88)
London	1129.094***	1085.221***	1057.224***	1081.850***	1028.397***
	(4.02)	(3.91)	(3.75)	(3.75)	(3.77)
University size		-0.034*			
		(-2.14)			
growth of overall student numbers 2007/08 to 2013/14			-5.187		
			(-0.66)		
growth of undergrad numbers 2007/08 to 2013/14				-3.328	
				(-0.45)	
growth of postgrad numbers 2007/08 to 2013/14					-4.030
					(-1.23)
Constant	5969.797***	6228.722***	5991.408***	5997.392***	5937.519***
	(17.52)	(20.68)	(17.71)	(17.56)	(17.62)
Observations	120	120	120	120	120

R^2	0.780	0.789	0.781	0.780	0.787

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A4: Regression models for teaching income per student in 2013/14, UK universities

	(1)	(2)	(3)	(4)	(5)
RAE 2008 ranking	-35.106***	-23.891***	-13.497**	-8.538	0.800
	(-8.96)	(-4.42)	(-3.00)	(-1.74)	(0.17)
Type of university: reference is other pre-92					
Russell Group university		1426.544**	1430.089***		1178.760***
		(3.01)	(3.50)		(3.87)
Post-92 university		-117.402	-864.102**		-343.328
		(-0.30)	(-2.73)		(-1.11)
England			1165.021***	1144.985***	1127.470***
			(4.14)	(4.57)	(4.24)
London			1245.774**	957.184**	965.867***
			(3.35)	(3.02)	(3.43)
percentage of STEM in total FTE students (narrow defn)				112.457***	90.565**
				(3.46)	(2.74)
proportion international (non-EU) students				77.992**	77.854**
				(3.13)	(3.27)
growth of overall student numbers 2007/08 to 2013/14				-6.530	-10.851
				(-1.00)	(-1.60)
Constant	11133.286***	10166.319***	8756.559***	6526.324***	6061.013***
	(32.49)	(30.60)	(21.37)	(11.87)	(11.70)
Observations	116	116	116	116	116
R^2	0.505	0.559	0.692	0.761	0.796

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A5: Further regression models for teaching income per student in 2013/14, UK universities

	(1)	(2)	(3)	(4)
Student satisfaction, taught, 2011	130.480***	-21.759		
	(3.58)	(-0.77)		
Type of university: reference is other pre-92				
Russell Group university		1136.943***		979.472**
		(3.67)		(3.28)
Post-92 university		-315.239		-22.134
		(-0.96)		(-0.08)
England		1197.610***		1025.328***
		(4.06)		(4.11)
percentage of STEM in total FTE students (narrow defn)		92.051**		61.111
		(2.77)		(1.83)
proportion international (non-EU) students		78.446***		52.832*
		(3.53)		(2.41)
london		1007.550***		1307.615***
		(3.77)		(4.67)
growth of overall student numbers 2007/08 to 2013/14		-4.304		-3.898
		(-0.52)		(-0.55)
Guardian score 2012/13			100.532***	39.761***
			(9.08)	(3.44)
Constant	-1983.917	7805.116**	3135.921***	4248.884***
	(-0.65)	(3.30)	(5.25)	(7.67)
Observations	119	119	116	116

R^2	0.117	0.779	0.535	0.810

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A6: Further regression models for teaching income per student in 2013/14, UK universities

	(1)	(2)	(3)	(4)
Ranking: reference outside top 200, incl unranked				
Ranked in the top 50	5347.669***	4148.853***	2827.898***	2935.724***
	(6.88)	(4.35)	(4.30)	(5.86)
Ranked top 200 (but outside top 50)	1998.050***	966.199*	620.084	774.751*
	(7.44)	(2.07)	(1.75)	(2.49)
Type of university: reference is other pre-92				
Russell Group university		482.341	403.572	
		(1.08)	(1.45)	
New university		-958.973**	-678.058*	
		(-2.67)	(-2.04)	
proportion international (non-EU) students			71.910**	69.490***
			(3.20)	(3.47)
England			1331.571***	1252.585***
			(4.51)	(5.30)
London			696.781**	820.492**
			(2.81)	(3.02)
percentage of STEM in total FTE students (narrow defn)				89.926**
				(3.01)
University size				-0.019
				(-1.53)
Constant	8095.421***	8811.895***	6639.803***	6069.750***

	(61.59)	(26.09)	(19.01)	(27.07)
Observations	120	120	120	120
R^2	0.553	0.592	0.806	0.824

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$