

A break-even analysis of UK universities

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by

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Abstract

The enormous growth in the number of students attending UK universities has coincided with claims of a crisis in the higher education sector due to sharply declining per capita funding and a large reduction in academic salaries relative to those of other professions. Controversially, the UK government plans to resource further expansion of the higher education system by allowing universities to charge their European Union students a graduate tax of up to £3,000 per annum. Although these proposals will have far reaching implications for students, parents and higher education, there has been little quantitative analysis of university finances. This study contributes to the literature by conducting a break-even analysis of universities' finances and by developing a model of financial performance of the higher education sector.

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Introduction

The rapid expansion in higher education student numbers over the last forty years has coincided with a significant real terms reduction in contributions from the public purse. The resulting £8B to £10B funding gap has stretched university finances and many academics have chosen to move overseas or leave the university sector. A continuation of this ‘brain drain’ would be to the detriment of the economy and the Government’s aim to raise the rate of higher education participation of 18-30 year olds in England to 50% by 2010. The UK government responded to calls from universities for increased funding by proposing to replace tuition fees with a graduate tax of up to £3,000 per annum. Students have attacked these proposals because the legislation introduces a two-tier market in which degrees might be chosen on the basis of cost rather than quality and students might be dissuaded from studying by their fear of debt. However, vice-chancellors contend that modern universities need higher fees to attract and retain able staff and to provide high-class facilities for students. Universities have also promised to offer bursaries to students from poorer backgrounds to encourage them to enter the higher education system. These controversial proposals were passed in the House of Commons by a majority of only five votes at the second reading of the bill.

Despite the lengthy political debate, little is known about the state of university finances. The aim of this study is to analyse the financial performance of UK universities between 2000 and 2002. Standard break-even analysis is used to assess the state of universities’ finances and a model of financial performance is developed and tested. The findings have implications for the Government, university management, parents and students. The remainder of this paper is structured as follows. Section 2 describes the developments within the institutional background. The methodology is presented in section 3. Section 4 presents a commentary on the empirical results and section 5 provides a summary of this work.

Institutional Background

There have been significant improvements in O’ level, GCSE and A’ level examination results over the last twenty years. Between 1987 and 2002, the A’ level pass rate increased from 72% to 98% and the papers that receive a grade A rose from 10% to 20%. The O’ level and GCSE results have followed a similar pattern. This upturn in exam results has driven the increase in higher education students from 621,000 in 1970 to 2,086,075 in 2002 (BBC and

Higher Education Statistics Association websites)¹ and prompted the Higher Education Funding Council for England (HEFCE) to create a target of 50% higher education participation by 18-30 year olds in England by 2010. Expansion at such a rate would stretch the budgets of any industry without a substantial injection of resources.

The growth in student numbers has coincided with radical changes in the funding of UK higher education (HE). Lord Dearing was commissioned to report on teaching and research in higher education institutions. The Dearing Report examined whether higher education is most fairly and efficiently funded through general taxation or through maintenance grants, loans and/or tuition fees². Dearing's case for the abolition of the free education principle was that graduates earn more on average over their whole working life than they would have done if they had not entered university (paragraphs 6.16-6.26). Graduates are therefore the main beneficiaries of higher education (paragraph 18.24) and should be charged for it. Following the report, the Government passed legislation that allowed English universities to charge their European Union students an inflation adjusted tuition fee of £1,000 per annum³. The replacement of means tested grants with inflation indexed tuition fees and student loans undoubtedly raised the level of student debt. The average level of debt on graduation is estimated to be £10,000 (The Guardian, 20 May 2003) to £13,000 (The Push Guide, 2001) and may rise to £30,000 by 2010 (The Times Higher Education Supplement 15 August 2003, 2). Students facing large levels of debt are increasingly searching for degrees that offer value for money.

Tuition fees did not compensate universities for the enormous expansion in undergraduate student numbers for a number of reasons. Dearing concluded that the long-term funding requirements of a high quality internationally competitive higher education system would *not* be satisfied because any option that comes close to releasing the necessary public funds would

¹ Mr Blair has also noted the mass expansion: "Universities now educate 43 percent of all under-30 year-olds – six times the proportion when Harold Wilson came to power 40 years ago, with most professions now graduate-only," (Institute for Public Policy Research, 14 January 2004).

² UK students used to receive a means tested grant from their local education authority that paid all of the tuition fees and made a contribution towards living costs. The Dearing Report (paragraphs 20.42-20.45) considered restructuring student finances using 100% maintenance loans; 50% means tested grant, 50% maintenance loans and 25% tuition fees (with loan); 100% maintenance loans and 25% means tested tuition fees (without loan); and 100% means tested grant and 25% rate tuition fees (with loan). Dearing (paragraph 20.2) argued that the student support system "*should be equitable and encourage broadly based participation, requires those with the means to do so to make a fair contribution to the costs of their higher education, supports lifelong learning and is easy to understand, administratively efficient and cost-effective*".

³ These proposals were contentious at the time because they ended the meritocratic admission procedure and students felt that higher education was being priced beyond their means. Universities in Scotland were not

produce either an unacceptable burden on graduates and on families of modest means, or would lead to a level of graduate commitment, regardless of income contingent payments, such that demand for higher education and participation would be seriously affected. Professor Howard Glennerster of the London School of Economics argued that to circumvent the political costs associated with the abolition of the free-education principle, tuition fees were introduced at a low level (£1,000 per annum) and two thirds of students were exempted from the requirement to pay full fees (on the grounds that their parents earn less than £31,230 per annum). As a result, their introduction delivered small sums relative to the needs of universities. Furthermore universities have been forced to cut costs by 1% per annum at a time of increasing student numbers. Also, the public purse's HE contribution fell from £8,000M to £5,000M in 2001-2002 prices between 1989 and 2000⁴. Mass expansion and real term cuts in public funding contributed to a funding backlog estimated to be between £8B (Mr Blair, Institute for Public Policy Research, 14 January 2004) and £9.94B (UniversitiesUK, The Guardian, 9 July 2002)⁵. UK universities face particular financial difficulties because the UK government invests less in Higher Education than many of their counterparts in other countries (Department for Education and Skills, 2003; Mr Blair, 14 January 2004). For example, the public funding of universities is greater in France, Germany and the Netherlands (1% of the GDP) than the UK (0.8%) and public and private investment in the US higher education system (2.7%) is three times that of the UK.

The funding backlog has caused a number of problems for UK universities. Building, maintenance, library and computer budgets have been cut and academic salaries have fallen far behind those of competing and comparative professions⁶. UK academic salaries have declined 37% compared with the rest of the nation's workforce since 1981 (The Association of University Teachers (AUT)) and are significantly lower than the average academic salary

sympathetic to the Government's proposals and did not introduce up-front tuition fees because they fell under a different jurisdiction (the Scottish Parliament).

⁴ Dearing's belief (paragraph 20.68) that the proceeds from tuition fees would be spent on universities was unfounded because the Department of Education and Employment reduced its own funding of university tuition to cover the administrative costs of setting up the new student loans system (see THES, 22/8/97).

⁵ Mr. Blair summarized the financial position during Prime Minister's question time on 27 November 2002: "Our universities have a serious funding problem. Provided that everyone agrees that the status quo – the huge backlog of repairs to infrastructure and university lecturers' pay increasing by only 5 per cent in the past 20 years, when the figure for the rest of the economy is 45 per cent – is not an option, we should work out the right basis on which to change matters. That is fully consistent with the need to get more people into our universities."

⁶ Mr Blair (2003) notes, "The shortfall of teaching funding has badly hit the salaries of academic staff, which have shown practically no increase in real terms over two decades... An estimated 1,000 UK academics have left jobs here for universities abroad, a quarter alone going to the US". The Times Higher Educational Supplement (7 November 2003) reports that the average starting salary of a lecturer (£22,191 per annum) compares poorly with the average remuneration of fire-fighters (£23,533 per annum), police officers (£30,344 per annum), train drivers (£32,394 per annum), solicitors and lawyers (£49,338 per annum) and medical practitioners (£66,454 per annum).

at a university in the US or Republic or Ireland (Table 1). These sources provide a clear indication of the extent of the worsening recruitment and retention problems that prompted several UK universities to consider privatisation as a route to increase funding⁷.

- Insert Table 1 about here-

The gradual tightening of HE budgets and real term reductions in salaries have made the profession much less attractive to graduates. The rate of academic recruitment has been much lower than the growth in student numbers. These recruitment and retention problems, combined with the reductions in per capita funding have increased the number of students in classes to the point where the ratio of staff to students has increased from 1:9 in the 1970's to 1:17 today. The ratio of staff to students is expected to grow to 1:23 by 2010 (Association of University Teachers, 2002). Recruitment and retention problems are most severe in the medical and business disciplines that attract large numbers of applications from students and have close ties to the private sector (see Table 2)⁸. Staffing issues in these areas are exasperated by staff – student ratios that are well above institutional norms. Furthermore, the salaries and career prospects are much better in the private sector than in academia⁹.

-Insert Table 2 about here-

The Department for Education and Skills (2003), hereinafter The White Paper, recognized that UK universities were seriously underfunded. The White Paper proposed to allow universities to replace the up-front tuition fee with a graduate tax of up to £3,000 per annum that is repayable when the graduate earns in excess of £15,000 per annum. This tax will be introduced for students entering a degree programme in 2006. Universities can choose to charge less than £3,000 per annum but universities would only be allowed to raise fees if the conditions of the access agreement issued by the new regulatory body (the Office for Fair Access) are satisfied.

⁷ For example, Imperial College made public their plans to charge tuition fees of £10,500 per annum, University College London £7,000 per annum, Warwick £6,000 per annum and Oxford £7,000 to £8,000 per annum.

⁸ Business Studies attracts the greatest number of applications from UK students (39,758). Physiotherapy has the highest ratio of UK applications to acceptances (12.43:1) and total applications to acceptances (13.26:1). Electrical and Electronic Engineering (2,880), Accounting (2,312) and Business Studies (2,296) attract the greatest number of applications and accept the most premium fee students (513, 282 and 293 respectively).

⁹ Croner Reward notes that the average starting salary of a finance director (£75,000 per annum) is more than three times greater than that of a university lecturer (£22,191 per annum). A partner of a large accounting firm (£400,000 per annum) or a FTSE100 finance director (£609,600 per annum) can expect to earn a salary that is ten times greater than the mean professorial salary (£51,378 per annum).

The proposals to raise tuition fees have been the focus of significant political debate. Many commentators argue that an increase in tuition fees may force able students from poor backgrounds to turn their back on a university degree because of the fear of debt. Others argue that variable tuition fees will create a two-tier education system in which students may choose their degree on the basis of cost rather than quality. Critics contend that raising fees to £3,000 will only solve the short-term problem because higher education will still face a massive deficit. The Liberal Democrats have long argued that those earning in excess of £100,000 per annum should be taxed at 50% to fund greater investment in education. The Conservative Party recently pledged to fund the abolition of fees by eliminating the 50% participation target and scrapping the access regulator and grants (The Guardian, 13 May 2003; The Times Higher Educational Supplement, 14 November 2003). Proposals to abolish fees might mean a return to the principle of meritocratic access to higher education (HE). Eliminating fees may be a vote winner if the electorate chooses to reduce the HE contribution expected from students and/or their parents. Fee elimination would also reduce the likelihood of graduates accepting a low paid job (below the £15,000 per annum threshold) to avoid repaying the tuition fee. Furthermore, the abolition of fees would reduce the increasing number of graduates that leave the country where fees are charged to avoid debt repayment (Chapman, 2003). However, the abolition of tuition fees, given no other changes in general taxation, would imply a reduction in the monies available for already overstretched universities, weaker students missing out on a chance of HE and an increased risk that the UK knowledge economy would fall behind other countries. Hames (2004) summarises, “The decline of higher education in this country over the last 15 years has been so stark that the loss of top-up fees would be little short of apocalyptic. The salaries offered at every level of academia, but especially to those entering the profession as lecturers, have slumped from insufficient to embarrassing. To work in higher education today one either has to have some form of private income, be devoted to it in such a missionary manner as to forgo any hint of materialism, or be incapable of securing employment elsewhere”. The UK Government offered a number of guarantees, concessions and increased bursaries for poorer students to convince wavering politicians of the validity of their case. These last minute measures ensured that the controversial second reading of the White Paper was passed through Parliament. However, the Government’s majority was reduced from 161 to 5 votes. These concessions and the reduced majority provided a clear indication of the controversial nature of this Bill (see also The Times Higher Education Supplement, 12 September 2003; 19 September 2003; 3 October 2003; 7 November 2003 and 14 November 2003).

It is clear that the education and training of high quality graduates is vital to the knowledge economy and the future of the UK¹⁰. However, without significant additional funding, participation levels cannot be increased without severely compromising HE quality. Many academics would like the public purse to finance growth to the 50% target but this would require a resource reallocation back to the pre-Lawson rates (BBC News, 10 January, 2003; The Guardian, 31 October, 2002). The issues of how much money universities need to ensure their long term viability, who should pay and how these payments should be made are questions that have brought university finances to the forefront of the political debate. The prior literature focuses on moral discussions about HE funding (e.g. Wagner, 1998; Curtin, 2000; Turner et al., 2000; Weiler, 2000; Di Pietro, 2003). However, quantitative analysis of the importance of tuition fees to universities' financial performance has been scant. This study examines the determinants of financial performance and the level of European Union (EU) tuition fees needed to ensure that UK universities break-even. The paper also estimates the break-even fee if academic salaries are brought into line with those of comparable professions. The next section generates the hypotheses, specifies the accounting models and explains the data collection procedures used in this study.

Methodology

The first part of this study examines the effect of tuition fees on the financial performance of HE institutions. Universities are not for profit public sector organizations and therefore do not seek to maximize their financial surplus. However, universities are expected to balance their revenues with expenditures and a positive return on investment is sought by most business entities. Therefore, this study uses break-even analysis as a minimum justification cut-off point. The university's surplus or deficit is used as the dependent variable to measure the financial performance in all of the following hypotheses¹¹. The first hypothesis estimates the level of EU tuition fees that are needed for universities to break-even. This hypothesis assumes that the revenues received (other than tuition fees), costs incurred and number of EU and premium fee students remain unchanged. The Dearing Report and White Paper motivate the first hypothesis that estimates the level of the EU tuition fee as the independent variable:

¹⁰ Mr Blair states that universities "employ more than 300,000 people – and for every 100 jobs in universities themselves, it is estimated that 89 are generated through knock-on effects elsewhere in the economy. They generate over £35 billion in output, and it is estimated that for each £1 billion they generate, a further £1.5 billion is generated in other sectors of the economy. Higher education is not incidental, but central, to Britain's future, and responsible political leaders have a duty to see that it thrives."

¹¹ Universities choose accounting policies and make a number of critical assumptions that can materially affect the state of their financial statements. Financial performance was also examined using a standard set of assumptions to try to control for the effects of discretionary accruals accounting. Some of the financial statements changed significantly but the findings of this paper were not materially affected.

H1: *Ceteris paribus*, EU tuition fees must be charged because the revenues received by universities excluding fees, fall short of the costs incurred.

The White Paper notes that university salaries have fallen substantially relative to those of competing professions. The second hypothesis examines the effect on break-even tuition fees of adjusting universities' cost structures to bring academic salaries into line with those paid in comparable professions. The independent variable is the level of the EU tuition fee. The motivation is to estimate the level of EU tuition fees needed to cover the incremental staffing costs necessary to move academic salaries into line with those in competing professions. The financial statements are re-estimated to account for any additional staffing costs assuming that the revenues received (other than tuition fees), costs incurred and numbers of EU and premium fee students remain unchanged. Motivated by the White Paper, the second hypothesis estimates the level of the EU tuition fee needed to ensure that a university breaks-even after adjusting for any incremental salary expenditure:

H2: *Ceteris paribus*, EU tuition fees must be significantly increased because the revenues received by universities excluding fees fall short of the costs incurred and because academic salaries are lower than those of similar professions.

The second part of this study tests the relationship between financial performance and institution proxies. Many firms are motivated by product differentiation theory to offer a quality-differentiated product (Simunic and Stein, 1987)¹². This study examines whether universities use their size and name to signal credibility and gain market share by “word of mouth” advertising (Mercer, 1992; Rogerson, 1983). Reputable universities might choose to produce high quality programmes and research if these investments are recognised. However, rewards will not be paid if the investment costs are the same for high-quality and low-quality universities because of the “market for lemons” problem (Akerlof, 1970). The Russell Group might be considered to be a set of high-quality universities. The Russell Group is an informal self-selected set of research-led universities that are often portrayed by the media as the state-funded British equivalent to the US Ivy League. Anecdotal (1998-1999) evidence indicates that the Russell Group occupied the top 17 positions and over 60% of the total research income of HE institutions. The sheer scale of these research incomes represents a significant investment in high quality staff and serves as a costly signal that might prevent the aforementioned pooling equilibrium. Motivated by product differentiation theory, the third

¹² For example, the international accounting firms earn premium audit fees due their investment in the creation of brand name reputations (Craswell et al, 1995).

hypothesis assesses the relationship between financial performance and the institution's brand name reputation. The independent variable is a dichotomous dummy that takes the value of 1 if the university is a member of the Russell Group and 0 otherwise. This hypothesis asserts that a university will only be willing to invest resources in the creation of a brand name reputation if there are significant returns on this investment:

H3: *Ceteris paribus*, there is a significant positive association between operating surplus and the Russell Group dummy.

All of the remaining quality proxies are used by The Times to evaluate the quality of a university in their university league table publication. Hypothesis four examines the association between financial performance and the teaching quality assessment grade. The motivation for this hypothesis is to assess the financial implications of an excellent teaching quality reputation. Students from all backgrounds are more likely to apply to a university with high TQAs. The UK government uses a quota system to fix the number of EU students that a university can admit and will penalize institutions that exceed their quota by more than a small amount. Therefore universities with high TQAs that regularly fill all of their EU allocation are likely to attract better quality rather than more EU students. However, high TQAs might influence financial performance if they attract more 'premium fee' students that do not count against quota. The fourth hypothesis follows this line of thought using the average of the departments' official teaching quality assessment (TQA) marks across the institution as the independent variable. This hypothesis maintains that a university will only be willing to invest resources in the creation of an excellent reputation for the quality of its teaching if there are sufficient returns on this investment:

H4: *Ceteris paribus*, there is a significant positive association between financial performance and the results of the teaching quality assessment.

Hypothesis five tests the relationship between financial performance and the research assessment exercise (RAE) grade. The motivation for this hypothesis is to assess the monetary consequences of the development and maintenance of an excellent research quality reputation. The funding councils undertook an assessment of the quality and quantity of research published by departments in 2001. The funding councils use these RAE values to reward the departments for the research produced and this will have a positive effect on research funding. However, departments seeking to achieve the highest RAE ratings must attract professors with an international reputation for research quality. These academics command larger salaries than junior lectures. A department that has invested heavily in high quality academics

might have a higher salary expenditure, which suggests a negative association with financial performance. The independent variable is computed by averaging the departments' official research assessment exercise results across the institution. The fifth hypothesis examines the cost-benefit issue and asserts that a university will only be willing to invest resources in the creation of an excellent reputation for the quality of its research if there are sufficient returns on this investment:

H5: *Ceteris paribus*, there is a significant positive association between financial performance and the results of the research assessment exercise.

Hypothesis six examines the association between financial performance and the quality of the new students under the age of 21 entering to read for its degree programmes. The independent variable is the average A' level point scores of the student intake in the 2000-2001 academic year. The motivation for this hypothesis is to assess the economic impact of the recruitment of well-qualified students. The underlying theory is that students are more likely to apply to high quality universities. Since EU quota are fixed by the government, A' level entry grades provide a signal of the quality of the university. A positive association between financial performance and A' level entry grades is expected if high quality universities attract more governmental funding and premium fee student applications. This hypothesis insists that the students with the best A' level profiles will be attracted to well resourced universities:

H6: *Ceteris paribus*, there is a significant positive association between operating surplus and the average A-level point scores of entering students.

Hypothesis seven tests the relationship between financial performance and the student-staff ratio. *A priori*, one might think that that well resourced universities will be able to provide their students with more staff contact time due to low staff-student ratios. However, the recruitment of additional staff is inherently costly. Therefore the short-term financial performance of universities with a high student-staff ratio might be better than those with a low student-staff ratio because the former have used their resources more economically. This hypothesis is based on the Higher Education Statistics Association computation of the number of students and staff in universities between 2000 and 2001. The independent variable is the ratio of the total number of students to the total number of academic and related staff. The motivation for this hypothesis is to assess the financial implications of a high ratio of students to staff:

H7: *Ceteris paribus*, there is a significant positive association between operating surplus and the student-staff ratio.

Hypothesis eight assesses the relationship between financial performance and the institution's expenditure on library and computer facilities. This hypothesis uses Higher Education Statistics Association estimates of library and computer spending per student between 1998 and 2001. The independent variable is the ratio of the total amount spent on library and computer activities to the total number of students. The motivation for this hypothesis is to assess the economic consequences of expenditure on the library and information technology. This hypothesis asserts that the financial performance of universities that allocate large amounts to library and computer budgets for each student will be poorer than those that have allocated their resources more economically. This hypothesis should also be treated with caution because premium fee students may be more willing to apply to and/or accept offers from universities with extensive facilities as those with less well resourced libraries and computer facilities:

H8: *Ceteris paribus*, there is a significant negative association between operating surplus and library and computing expenditure.

Hypothesis nine assesses the relationship between financial performance and the amount spent on sports, recreation, health and counselling facilities. This hypothesis uses the Higher Education Statistics Association computation of expenditure on these facilities between 1998 and 2001. The independent variable is the ratio of the amount spent on sports, recreation, counselling and health to the number of full-time-equivalent students. The motivation for this hypothesis is to assess the monetary impact of expenditure on facilities for students. This hypothesis maintains that the short-term financial performance of universities that allocate large amounts per student to facilities' budgets will be poorer than those that have allocated their resources more economically. This hypothesis should again be treated with caution because premium fee students may not be equally willing to apply to and/or accept offers from low expenditure universities as those that spend large amounts on student facilities:

H9: *Ceteris paribus*, there is a significant negative association between operating surplus and the amount spent on sports, recreation, health and counselling.

Hypothesis ten tests the association between financial performance and degree results. This hypothesis is based on the Higher Education Statistics Association database of degree results for 2000-2001. The independent variable is the proportion of graduates that are awarded first and upper-second class degrees in the 2000-2001 academic year. The motivation for this hypothesis is to test whether premium fee students will be attracted to apply to and accept offers from universities that have a reputation for producing high-class graduates. Other spin-

offs from the production of more top graduates might include the attraction of high quality staff (and therefore research funding), improvements to teaching and greater links with local businesses. This hypothesis contends that the financial performance of universities that produce many well-educated graduates will be better than those that produce poorly educated graduates:

H10: *Ceteris paribus*, there is a significant positive association between operating surplus and the proportion of graduates awarded first and upper second degrees.

Hypothesis eleven examines the relationship between financial performance and the employment record of university graduates. This hypothesis is centred on the Higher Education Statistics Association assessment of the number of graduates that take up employment or further study relative to the total number of graduates with a known destination for the 2000-2001 academic year. The independent variable is the percentage of students in graduate-level jobs or further study shortly after graduation relative to all known destination graduates. The motivation for this hypothesis is to assess whether premium fee students will be attracted to apply to and accept offers from universities whose graduates are regularly recruited by employers. Firms are known to target a select number of universities as evidenced by 'TargetGrad', careers fairs and company presentations. If premium fee students apply to such universities this should have a positive effect on financial performance. Therefore, this hypothesis argues that the financial performance of universities that produce graduates that are attractive to employers will be better than universities that produce graduates without desirable skills and qualifications:

H11: *Ceteris paribus*, there is a significant positive association between operating surplus and the percentage of graduates in graduate-level jobs or graduate-track employment or further study.

The final hypothesis tests the association between financial performance and student efficiency. This hypothesis is assessed using performance indicators computed by the Higher Education Funding Council for England (HEFCE) for 1999-2000. HEFCE compares the length of time student studied at each university with the length of time they would be expected to study if they completed the course normally. The independent variable is the proportion of students that complete their course in the minimum length of time. Premium fee students may be more likely to apply to universities that produce graduates in a time efficient manner. Furthermore, there is a financial and educational burden associated with students that are asked to sit referred examinations and/or repeat the year. This hypothesis maintains that

the financial performance of universities that train graduates in a time-efficient manner will be better than universities that train graduates in a less efficient manner:

H12: *Ceteris paribus*, there is a significant positive association between operating surplus and the proportion of students completing course in the expected time.

These hypotheses are tested using the quality proxies adopted by the Times Good University Guide 2004. Economic, academic and student data are collected from the Association of University Teachers, the Department for Education and Skills, the Higher Education Statistics Association, HEFCE, the Higher Education and Research Opportunities, and the Universities and Colleges Admissions Service. Staffing costs, operating expenses, depreciation, interest payable, funding council grants, tuition fees, education contracts, research grants, research contracts, endowment income, investment income and other income data are collated for a randomly selected population of 60 UK universities. Two universities are removed from the sample because their data are incomplete or documented in a non-standard format that prevents the estimation of break-even fees. The aggregated revenue and cost data of these two universities are not materially different from those included in the sample. The final sample comprises of 35 universities from the pre-1992 sector and 23 universities post-1992 sector. The average EU tuition fee for the final sample of 58 universities is computed by dividing the total EU fee by the number of EU students. The average premium fee is estimated using the same method for these students and the operating surplus or deficit is included in the break-even EU tuition fee analysis. Hypothesis H2 is analysed by estimating break-even fees after sensitising staff costs for any salary differentials. If the revenues exactly equal the costs then the university will break-even. Otherwise, the relationship between the revenues and costs of a university is stated formally as follows:

$$surplus_{jt} = \left[funding_{jt} + research_{jt} + other_{jt} - staff_{jt} - operating_{jt} - overheads_{jt} + p_{jt}q_{jt} \right] \quad (1)$$

where:

$surplus_{jt}$ = surplus (deficit) of university j in period t

$funding_{jt}$ = government funding of university j in period t

$research_{jt}$ = research income of university j in period t

$other_{jt}$ = other income of university j in period t

$staff_{jt}$ = staff costs of university j in period t

$operating_{jt}$ = other operating expenses of university j in period t

$overheads_{jt}$ = depreciation charge of university j in period t

p_{jt} is the tuition fee charged by university j in period t

q_{jt} is the quantity of places available in university j in period t

Equation (1) can then be manipulated to show the break-even price (p^{BE}_{jt}) is:

$$p^{BE}_{jt} = \frac{[staff_{jt} + operating_{jt} + overheads_{jt} - funding_{jt} - research_{jt} - other_{jt} - surplus_{jt}]}{q_{jt}} \quad (2)$$

Hypotheses H3-H12 are examined by regressing the surplus or deficit of the university against reputation and quality dummies produced by The Times:

$$surplus_{jt} = \alpha_0 + \beta_1 Institution_{jt} + \beta_2 Quality_{jt} + \varepsilon \quad (3)$$

4. Results

Table 3 presents a summary of the 2001-2002 financial statements and break-even EU tuition fees for the 58 UK universities in our sample. The first column shows that the operating results vary between a £10,414,000 deficit (Bradford) to £20,583,000 surplus (Oxford). The mean operating surplus is £229,000 in 2000/01 and £656,000 in 2001/02. 25 universities report deficits in 2000/01 whilst 23 institutions report deficits in 2001/02. These results imply that 40% of the sample failed to break-even when EU tuition fees of £1,025 to £1,075 per annum were charged despite the relatively low staffing costs. If the number of university students, costs and the amount of public funding remain unchanged, these findings suggest that nearly half of the universities sampled must raise the tuition fee levy on EU students or make further efficiency gains to ensure their economic survival.

The central section of Table 3 shows that the total amount of fees paid by EU students in 2000-2001 (£718,641,000) and 2001-2002 (£751,311,000) exceeds the revenues paid by premium fee students (£402,242,000 and £471,551,000 respectively). However, the total number of full time EU scholars (921,009 and 961,200) is ten-fold greater than the number of premium fee students (84,549 and 94,165). The computation of the average fee per student indicates the extent to which the numerical dominance of EU over premium fee students is not reflected in fee revenues. The tuition fees per EU student (£817 and £821) are significantly lower than the average premium fees (£4,587 and £4,724). A survey by the Association of Commonwealth Universities observes that UK universities currently charge their international undergraduate students a tuition fee of £6,523-£7,639 per annum. The Times (20 February 2004) observes that these fees are 50% greater than those charged for comparable courses in New Zealand (£4,451-£5,215 per annum), Australia (£4,131-£4,389 per annum) and Canada (£3,911-£4,081 per annum). These results provide compelling

evidence that the fees paid by premium fee students to UK universities are larger than those paid in Commonwealth countries. Furthermore, although there may be some additional recruitment and teaching costs, it is clear that premium-fee students cross subsidise EU students.

The penultimate column of Table 3 shows estimates of the break-even EU tuition fee assuming that funding, costs and student numbers are held at the 2000/01 and 2001/02 levels. Only one university (Cambridge in 2000-2001) would break even if EU tuition fees were abolished. Break-even fees range from -£205 (Cambridge) to £2,752 (London School of Economics) in 2000-2001 and from £32 (Oxford) to £2,544 (London School of Economics) in 2001-2002. *Ceteris paribus*, the average break-even EU tuition fee for the 58 universities is £809 in 2000-2001 and £803 in 2001-2002. Consistent with hypothesis H1, even at the current low staffing costs, unless additional funding and/or premium fee students are recruited universities must charge EU tuition fees close to the current ceiling to continue as viable business enterprises.

The final column re-estimates the average break-even fee sensitising for the salary differential referred to in the White Paper¹³. This computation provides an indication of the break-even level of EU tuition fees that would be needed to reverse the decline in comparative academic salaries, assuming that all of the monies generated by increasing tuition fees are passed on to staff. If the level of public funding and number of students remain constant, only one university (Anglia Polytechnic) can afford to bring academic salaries back into line with comparative professions at the current rate of EU tuition fees. *Ceteris paribus*, the break-even EU fee ranges from £1,032 per annum (Anglia Polytechnic University) to £7,470 per annum (London School of Economics) after adjusting for the implicit salary differential. Consistent with hypothesis H2, the average break-even EU tuition fees for the 58 universities after sensitising wages increases to £2,608 per annum in 2000-2001 and £2,634 per annum in 2001-2002¹⁴.

¹³ Mr Blair implicitly noted the 38% salary differential between university and public sector professions was 38% in his speech during Prime Minister's questions on 27 November 2002. Anecdotal evidence from previous pay negotiations indicates that the government and/or university management are unlikely to sanction pay increases much above the rate of inflation. Furthermore, a 38% pay rise is extremely unlikely even if tuition fees are raised to £3,000 per annum because of the political costs and the possible effects on inflation.

¹⁴ This would, however, still not address the doubling of the student / staff ratio that has occurred since the 1970's.

These findings confirm the widely held view that premium fee students cross subsidize the education of their EU counterparts but they also show that this is so even allowing for the UK government's funding contribution to EU students and the additional costs of recruiting premium fee students. The Times (20 February 2004) notes that UK universities charge their international students tuition fees that are nearly 50% higher than their Commonwealth rivals. This cross subsidisation evidence implies that many UK universities are financially exposed to volatilities in the demand for undergraduate degrees from the premium fee market. Consistent with hypothesis H1, EU tuition fees of £800 are required simply to ensure that the average university breaks-even under current conditions. Consistent with hypothesis H2, staff salaries at the average university must benefit from all of the monies raised from £2,600 per annum EU fees to bring them into line with comparative professions. Assuming that some of the monies raised from tuition fees are spent on meeting the demands of the Office for Fair Access (OFFA), bursaries and other concessions, universities that wish to redress the salary differential must attract alternative funding, make further efficiency gains, expand further into the premium fee market and/or raise the proposed £3,000 per annum cap on EU fees.

-Insert Table 3 about here-

Although there has been an extensive press debate about the legitimacy of differential fees across universities, there has been very little analysis of the feasibility of variable pricing across undergraduate degrees. Unreported results documented in 'Prospects Today' show that the highest starting salaries are offered to graduates from the numerate disciplines (£23,671 per annum) and science and engineering (£24,000 per annum). The demand for degrees reported in Table 2 and these variable career prospects results imply that the numerical, therapeutic and engineering degrees are the strongest candidates for premium fees should management choose to extend the variable pricing adopted at the postgraduate level to undergraduate courses.

The left-hand section of Table 4 documents the OLS estimation results of equation 3 for the full sample of 58 universities. Consistent with hypothesis H3, financial performance is significantly associated with the Russell Group dummy. UK universities receive funding from the research councils based on the assessment of their publications in the research assessment exercise. The Russell Group is a self-selected small group of universities that try to differentiate themselves from other institutions by producing world-class research units. The

positive relationship between financial performance and the Russell dummy implies that these universities earn a strong positive return on their investment in brand name reputations.

Consistent with hypothesis H7, the financial performance of universities is significantly associated with the student-staff ratio. The positive association between financial performance and student-staff ratios suggests that the operating surplus of a university will improve if it increases the rate of expansion of student numbers and decreases the rate of staff recruitment. Short-term gains will clearly arise if the university increases the amount of fee income and reduces salary expenditure by failing to replace the staff lost through natural wastage processes. However, there is a limit to the extent to which operating results are likely to improve in association with increases in student staff ratios. The medium term operating results are likely to be adversely affected by the bad publicity, loss of morale and reduced productivity associated with any voluntary or compulsory redundancies. Furthermore, a university that has a very high ratio of students to staff may become unattractive to students and/or research orientated academics. Any loss of students and research active staff would reduce both tuition fees and research income.

Consistent with hypothesis H8, financial performance is significantly associated with computer and library expenditure. The negative association between financial performance and library and computer expense implies that the operating surplus of a university will improve if the institution reduces its investment in these facilities. One must also treat this result with caution because significant cuts in information technology and library budgets are likely to impair operating results in the medium to long term. Students may be dissuaded from applying to and accepting offers from a university that provide little or no library or computer facilities. Research active staff may also choose not to take up offers from or leave institutions that neglect their library and computer facilities. The operating results of a university that cuts its computer and library expenditure might improve in the short term but investment in these facilities is necessary to reap long-term benefits and because of externalities.

The central section of Table 5 reports the estimation results for the sub-sample of post-1992 universities. Consistent with hypothesis H8, there is a significant negative association between the financial performance of the post-1992 universities and expenditure on information technology and library facilities. These findings suggest that expenditure on computer and library facilities impairs the short-term results of the post-1992 universities. However, the caveat that investment should reap long-term benefits must be made for the

post-1992 sub-sample as for the full sample of universities. Students and research active staff may choose not to study and work at institutions that neglect their library and computer laboratories.

The right-hand section of Table 5 reports the estimation results for the sub-sample of pre-1992 universities. Consistent with hypothesis H5, the financial performance of the pre-1992 universities is significantly associated with the results of the Research Assessment Exercise. This result is interpreted as evidence that the operating results of the pre-1992 universities will be significantly improved if the institution can generate and maintain an excellent research reputation. Departments that produce world-class research will receive the highest level of research funding and this will boost the financial performance of the institution. There are more world-class research departments in the pre-1992 sector than the post-1992 sector providing further anecdotal evidence to support this hypothesis.

Consistent with hypothesis H7, the financial performance of the pre-1992 sector is significantly associated with the ratio of the number of students to the number of staff. The positive association suggests that universities can improve their financial performance by admitting more students or by cutting salary expenditure. The marginal cost of admitting one extra student to a degree is low because the university is already offering lecture and tutorial classes for this discipline. The marginal revenue associated with one more student is the tuition fees paid and any government funding. The admission of one extra student should generate a positive income flow because the marginal revenues exceed the marginal costs. The short-term financial position of universities will also improve by reducing wages and salaries through natural wastage and reducing the rate of staff recruitment. Marginal increases in student numbers and decreases in staff numbers should improve the financial performance of the university. These findings suggest that the pre-1992 universities that can attract academics able to teach large numbers of students and produce international quality research will reap the greatest financial benefits in the short-term.

One should interpret these findings with some caution because there is a limit to the extent that these arguments can be extended. Large increases in student numbers create additional demands on academics, support staff, resources and classrooms. Furthermore, able students are unlikely to apply to and accept offers from departments that teach huge numbers of students in each class. Students are usually attracted to departments with small class sizes because they believe that lecturers will be able to devote more of their time to individual

students. Also, staff numbers cannot be cut indefinitely because research active academics may choose to leave to avoid large increases in their workloads. Furthermore, the morale of staff members will be adversely affected if a university chooses to undertake voluntary or compulsory redundancies. These contentions imply that financial performance will improve by marginal increases in the student-staff ratio but there is a threshold level beyond which universities may find that their student fee and research income will fall.

-Insert Table 4 about here-

5. Summary

There has been an intense discussion about whether tuition fees are, in principle, justified but relatively little empirical analysis of the need for tuition fees. This study finds that 40% of a substantial set of UK universities reported a deficit over the period 2000-2002. The average tuition fee paid by full-time premium students (£4,587 per annum and £4,724 per annum) is much greater than the average fee paid by EU students (£817 per annum and £821 per annum). These results imply significant cross-subsidisation even allowing for the UK government's contribution to the education costs of EU students and the increased recruitment costs of premium fee students. Many institutions report an operating deficit that would increase in size if the revenues from the premium fee market were to decline. *Ceteris paribus*, EU tuition fees must be raised above £2,600 per annum and all the monies transferred to university staff if management wishes to use tuition fees to bring academic salaries into line with other public sector bodies. The monies earmarked for OFFA, bursaries and other concessions in the White Paper imply that the proposed £3,000 per annum tuition fees will bring insufficient funds into universities to move salaries into line with those of comparative professions. Furthermore, this strategy would do little for student / staff ratios that have more than doubled over the last thirty years.

The financial results of the Russell Group of universities are statistically better than those outside that group. These findings suggest that Russell Group institutions earn positive returns on their investment in a brand name reputation. The financial performance of the pre-1992 universities is significantly associated with student-staff ratios and the Research Assessment Exercise results. These findings imply that academics that can teach large numbers of students and produce international quality research will significantly improve the financial results of their university. The financial performance of the post-1992 universities is negatively related

with computer and library expenditure. This expense impairs financial performance in the short term but is presumably incurred for long-term gain or due to externalities.

Admission and career data indicate that demand is greatest for the accounting, business, physiotherapy and electrical and electronic engineering degrees that command the greatest starting salaries and have the widest employment opportunities. Despite the strong demand for degree places, accounting departments are at a critical stage of development because of the substantial recruitment problems caused by the huge salary differential relative to the profession, the large student to staff ratios and the proximity of many senior academics to the age of retirement.

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Table 1 Earnings: academics and comparators

Occupation	1993	2002					% Change
Westminster MP	£30,854	£55,118					79
Vice-Chancellor, University of Surrey (including benefits in kind and pension contributions)	£110,425	£184,000					67
School teacher (England and Wales)	£30,441	£46,131					52
NHS hospital senior registrar	£27,212	£37,775					39
Pre-1992 Senior lecturer	£29,788	£38,603					30
Post-1992 Principal lecturer	£30,426	£39,141					29
Academic salaries 2001-2002	UK £	UK \$	US \$			UK as % US	
Professor (UK average)	51,378	78,560					
Professor (US (average \$94,788/(9/11)) to calculate calendar year salary			115,852			67.8	
Senior lecturer (UK average)	38,441	58,778					
Associate professor (US average \$64,953/(9/11)) to calculate calendar year salary			79,387			74.0	
Lecturer B (UK)	31,169	47,659					
Assistant professor (US average \$55,404/(9/11)) to calculate calendar year salary			67,716			70.4	
	UK £	ROI EUR	UK \$	ROI \$	UK as % ROI		
Professor (UK minimum)	40,841		62,448		63.8		
Professor (Republic of Ireland minimum (including extra 1/19 th))		87,075		97,947			
Senior lecturer (UK top of scale excluding discretionary points)	39,958		61,098		68.7		
Senior lecturer (Republic of Ireland (including extra 1/19 th))		79,054		88,925			
Lecturer B (UK top of scale excluding discretionary points)	33,679		51,497		82.2		
Lecturer (Republic of Ireland (to bar at point 12; including extra 1/19 th))		55,714		62,670			

The above table summarises the 2003 salary claim prepared for the Academic Staff Sub-Committee by the Association of University Teachers. The upper section of the table quotes public sector employee salaries as at April whenever possible. The remuneration of the Vice-Chancellor of Surrey includes benefits in kind and pension contributions. This data are taken for the 1993-1994 and 2001-2002 academic years.

The middle section of the table provides a comparison of the average salaries of UK and US academic staff over the 2001-2002 academic year. UK data are average full-time academic salaries excluding any non-salary remuneration of staff employed in pre-1992 higher education institutions. US data are average full-time academic salaries excluding any non-salary remuneration. The UK salary data are converted into US\$ by dividing by a factor of 0.654 that is the OECD purchasing power parity data for 2002. The US data are computed using average salaries reported in Academe. These salaries represent the contracted salary for the US academic year period that runs from mid-August to mid-May. These figures exclude supplementary pay for teaching during the summer period. The US salaries are converted to a calendar year basis by applying a factor of 9/11.

The lower section of the table presents salary scale points for the UK and the Republic of Ireland (the UK's nearest competitor). UK salary points are stated as of 1 August 2002. Republic of Ireland data are for Trinity College Dublin as at 1 October 2002. UK and Republic of Ireland data are converted into US\$ using OECD purchasing power parity data for 2002. UK data are converted using a factor of 0.654 and Republic of Ireland data are divided by the EURO area factor (0.889).

Table 2 Admissions Statistics Across Degree Disciplines For 2000.

Subject	UK apply	UK accept	Non EU apply	Non EU accept	Total apply	Total accept	Accept-apply ratio
Business studies	39758	5829	2296	293	43551	6297	6.92
Physiotherapy	21933	1765	952	58	25025	1887	13.26
Graphic communication	18310	3826	863	216	20119	4190	4.80
Information systems	15744	2815	1073	185	17259	3083	5.60
Accounting and finance	12638	1919	2312	282	15225	2242	6.79
Business administration	10664	1610	1971	272	13748	2127	6.46
Information engineering	9640	1983	730	106	10613	2169	4.89
Electrical / electronic engineering	6073	1197	2880	513	9814	1899	5.17
Fashion	8062	2007	450	123	8935	2204	4.05
Computer science/management	7348	1378	1076	180	8708	1599	5.45
Occupational therapy	7847	1389	132	12	8373	1446	5.79
Biomedical science	6913	1256	343	52	7633	1361	5.61
Film and television studies	6746	675	260	24	7410	736	10.07
Law and related subjects	6526	1171	305	27	7160	1227	5.84
Politics and history	6205	993	302	30	6978	1063	6.56
Business economics	5218	882	867	136	6667	1130	5.90
Hotel, catering & hospitality	5018	849	730	130	6277	1088	5.77
HND Business administration	5714	1331	145	39	5987	1387	4.32
Financial management/accounting	3948	461	1709	195	5834	674	8.66
Interior design	4862	1123	501	94	5698	1266	4.50
Industrial design	5059	1102	226	61	5542	1218	4.55
Mathematics / theoretical physics	4811	807	527	72	5491	913	6.01
Creative / performing arts	5281	807	49	10	5431	829	6.55
Photography	4488	872	207	53	5188	1006	5.16
Home economics	4888	986	58	8	5141	1027	5.01
Business and administration	3921	924	717	137	5064	1150	4.40
Institutional management/tourism	4320	660	267	35	4914	738	6.66
Theatre studies	4418	631	94	16	4719	674	7.00
Mathematics / computer science	3984	841	420	67	4516	931	4.85
European business management	3168	483	473	51	4273	663	6.44
Product design & manufacture	3829	884	135	23	4051	923	4.39
Animation	3636	675	136	33	4034	749	5.39
HND graphic communication	3818	1286	62	13	3942	1322	2.98
English and history	3700	692	63	7	3891	711	5.47
Criminology	3727	687	54	10	3856	704	5.48
Average	7778	1337	668	102	8887	1504	5.91
Minimum	3168	461	49	7	3856	663	2.98
Maximum	39758	5829	2880	513	43551	6297	13.26

This table summarises statistical data from the UCAS website www.ucas.ac.uk

Table 3 Income Statement Extracts and Break-Even Tuition Fees for 2001 and 2002

	Surplus (£'000)	Total EU fees (£'000)	Total premium fees (£'000)	Number of EU students	Number of premium students	Average EU fee per student (£'000)	Average premium fee per student (£'000)	Break- even EU fee per student (£'000)	BE fee with rise (£'000)
2000/01									
Total	13,268	718,641	402,242	921,009	84,549				
Average	229	12,390	6,935	15,879	1,458	0.817	4.587	0.809	2.608
Minimum	-10,414	3,801	229	4,187	179	0.303	1.279	-0.205	1.032
25%	-1,361	8,510	3,324	10,815	828.25	0.680	3.426	0.605	1.899
Median	425	11,596	5,352	16,544	1,309	0.798	4.386	0.738	2.402
75%	1,729	15,841	9,101	20,846	1,825	0.893	5.813	0.952	3.160
Maximum	20,583	26,373	28,617	29,482	3,364	2.473	9.658	2.752	7.458
2001/02									
Total	38,019	751,311	471,551	961,200	94,165				
Average	656	12,954	8,158	16,572	1,624	0.821	4.724	0.803	2.634
Minimum	-8,104	3,872	664	4373	261	0.289	1.712	0.032	1.040
25%	-1,240	8,700	3,871	11715	947	0.692	3.469	0.585	1.873
Median	703	11,872	6,327	17558	1468	0.791	4.608	0.719	2.403
75%	2,408	16,995	10,705	21791	2013	0.889	5.874	0.961	2.960
Maximum	16,561	25,469	33,335	29732	3957	2.733	10.044	2.544	7.470

This data are taken from the HESA Information Provision Service and the 2001-2002 financial statements of the following universities and colleges: Aberdeen, Abertay, Anglia Polytechnic, Bath, Birmingham, Bradford, Bristol, Brunel, Cambridge, Central Lancashire, Durham, East Anglia, East London, Edinburgh, Essex, Exeter, Glamorgan, Heriott Watt, Hertfordshire, Huddersfield, Hull, Keele, Kingston, Lancaster, Leeds, Leeds Metropolitan, Leicester, Leicester De Montfort, Liverpool, Liverpool Hope, Liverpool John Moores, Loughborough, London School of Economics, Luton, Manchester, Manchester Metropolitan, Middlesex, Newcastle, Nottingham, Oxford, Oxford Brookes, Reading, Robert Gordon, Salford, Sheffield Hallam, Stafford, Stirling, Sunderland, Surrey, Strathclyde, Ulster, UMIST, Warwick, West of England, Westminster and York.

Table 4 OLS estimates of the financial performance model

		Full sample		Post-92 universities		Pre-92 universities	
		Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Intercept	?	58546.17	0.86	1920.55	0.24	-9612.40	0.43
Russell	+	4483.87	2.31**				
TQA	+	-3118.38	1.34	309.01	0.62	-768.17	0.87
RAE	+	201.20	0.24	-637.61	0.81	4573.53	2.05*
A level	+	-521.65	1.26	-8.85	0.10	-217.39	0.51
Student-staff ratio	+	438.07	2.04*	-158.36	0.91	905.32	2.16*
PC & library expense	-	-11.16	2.11*	-10.05	2.10*	2.72	0.86
Facilities expense	-	-4.71	0.58	1.87	0.24	9.47	1.03
Degree result	+	-22.99	0.38	12.12	0.19	203.68	1.51
Destination	+	-265.39	1.61	-154.16	1.32	-66.81	0.59
Efficiency	+	-83.18	0.89	95.59	1.08	-127.33	0.69
N		58		23		35	
F		10.698		4.876		8.978	
R ²		27.96%		19.83%		26.09%	

*, ** and *** indicates that the coefficient is significant at the 10%, 5% and 1% level respectively.

Russell is a dichotomous dummy that takes the value of 1 if the university is a member of the Russell Group and 0 otherwise. TQA is the teaching quality assessment grading found by averaging the departments' official assessments across each university. RAE is the research assessment exercise grading found by averaging the funding councils' assessments of the departments across each university. A level is the average A-level score of new students under 21 in 2000-2001. The A level qualification is used in The Times league tables for Scottish universities because the established conversion system undervalues Scottish Highers. Student-staff ratio is the number of students divided by the number of staff, taking account of different patterns of staff employment. PC and library expense is the amount spent per student on library and computer facilities between 1998 and 2001. Facilities expense is the amount spent per student on facilities including recreation, health and counselling over a three-year period. Degree result is the proportion of graduates awarded first and upper second-class degrees in 2000-2001. Destination is the percentage of graduates in graduate-level jobs, graduate-track employment or further study as a proportion of all graduates with a known destination. Efficiency is the proportion of students completing courses in the expected time computed by the higher education funding councils.