University of Sussex

Three Essays on the Economics of Higher Education

Raymond Bachan

Submitted for the degree of Doctor of Philosophy
Department of Economics
University of Sussex
January 2015

Declaration

I hereby declare that this thesis has not been and will not be submitted in whole or in part to another university for the award of any other degree.

At the time of submission sections of this thesis have been edited for publication. Specifically abridged versions of Chapters 3 and 4 have been published in *Studies in Higher Education* (2014), *39(5),* and on-line (2015) and part of Chapter 2 has been published in *Fiscal Studies* (2015), *36(1),* which was co-authored with Professor Barry Reilly.

Signature:

Raymond Bachan

University of Sussex

Raymond Bachan, Doctor of Philosophy

Three Essays on the Economics of Higher Education

SUMMARY

This thesis is comprised of three essays that examine three contemporary themes in UK higher education that have emerged, particularly over the past two decades, within an expanding higher education sector.

The first essay focuses on the issue of Vice Chancellor (VC) pay, which has risen considerably in real terms since the early 1990s. Vice Chancellors are among the highest paid public sector CEOs and the level and annual increase in pay generates an annual furore in the popular media and from teaching and lecturers' unions. Specifically, we investigate whether VC pay awards are justified, given that VCs now require greater managerial skills than in the past due to the complexity and the size of the institutions they now manage. We find that VC pay is related to success in furthering university expansion and is associated with success in widening participation in accordance with current government policy, which suggests that there may be scope in introducing some performance element in VC pay determination. There is also evidence that internal pay structure and external comparable pay are important in determining VC pay.

The second essay is set against the backdrop of rising student debt and examines student debt expectation. We offer a novel contribution to the limited literature that exists on this issue. We find that expected debt is related to student demographic and socio-economic characteristics, future earnings expectations, student time preference and risk taking behaviour. Moreover, the evidence suggests that the current system of student financial support has little effect on debt expectations and may compromise HE participation particularly amongst students in the lower socio-economic groups.

The final essay investigates the upward drift in the percentage share of ‘good’ degree classifications in UK higher education, which increased considerably since the mid-2000s and coincides with a rise in the maximum limit universities are allowed to charge potential students for tuition. We find evidence of grade inflation in UK higher education since the mid-2000s which coincides with the sharp increase in fees students were obliged to pay. Thus, degree classifications may lose their worth as signals of graduate ability and the current system of degree classification may need some revision if correct signals of graduate ability and effort are to be sent to interested parties.

Acknowledgements

Writing this thesis has been a challenging and unique experience and I am grateful to all those who supported me.

First and foremost I would like to express my sincere gratitude to my supervisors Mike Barrow and Professor Barry Reilly for their continual support and guidance. In particular I would like to express my profound indebtedness to Barry Reilly whose intellect, attention to detail and constructive comments have been so inspiring throughout the whole process and without whom this thesis would not have been possible.

My sincere thanks go also to the University of Brighton for providing financial support. I would also like to express my gratitude to Peter Dolton for providing an early draft of the student questionnaire used in chapter 3 and Penny Jones and the Strategic Planning Unit at the University of Brighton for providing the data used in chapter 4. I would also like to thank Roger Saunders for his continual encouragement.

Finally, I would like to thank Alice, Hannah, my parents, and other family and friends for their understanding, support and encouragement.

Contents

List of Tables

Chapter 2

Chapter 3

Chapter 4

List of Figures

Chapter 1

Chapter 3

Chapter 4

Chapter 1

Introduction

This thesis comprises three essays that examine three contemporary issues relating to UK higher education that have surfaced as a result of the changing nature of UK higher education over the past half century in terms of its size and funding.

The first essay concerns Vice Chancellor (VC)[1] pay which in the UK has increased considerably over the past two decades. It has also become an issue of public debate receiving attention in the educational press and has also been raised in government. This essay attempts to shed light on the question as to whether such increases in pay can be justified. The empirical analysis is conducted using a large, national, and comprehensive dataset which gives more precise estimates of the factors that determine VC pay than those reported to date for the limited research that exists in this area.

The second essay concerns the issue of student debt and in particular the factors that influence student debt expectations once students are in higher education. Student funding has undergone major reforms over the past two decade in the UK including the replacement of the maintenance grant with maintenance loans and the introduction of tuition fees to cover some of the resource costs of university tuition. These changes, for the majority of students, manifest themselves in increasing student/graduate indebtedness. With much debate on the potential negative effect that rising student/graduate debt exerts on higher education participation rates particularly amongst potential students from less advantaged socio-economic groups there has been very little research into the factors that could influence student expected debt. The empirical analysis is conducted using a questionnaire administered to students in a single educational establishment the responses to which provide a rich and original dataset. These data are analysed in a more rigorous statistical manner that has been employed

[1] 'VC' will be used as a generic term to describe all heads of UK higher educational institutions (unless otherwise stated) encompassing: Vice Chancellors; Principals; Rectors; Directors and Provosts.

previously. In so doing we offer a novel contribution to the contemporary literature on this topic.

The third essay is concerned with students' performance in UK higher education in terms of their final degree classification and in particular the continual increase in the proportion of 'good' honour degrees awarded since the early 1990s. This trend has brought with it the charge of 'grade inflation' that may be a result of falling standards in UK higher education. The compression or the 'bunching' of degrees in the top end of the grading distribution can also send confusing signals to potential employers in regard to the 'quality' of new graduates. These issues have received attention in the educational and national press. Moreover, there has been recent concern in government over the worth of the current classification system. Surprisingly, there has been very little empirical research using UK data on this issue. This essay uses recent institution level data to empirically examine the factors that are associated with the recent rise in the proportion of good degrees awarded and is complemented with an analysis of student performance using student level administrative data. This essay therefore contributes to the relatively thin UK literature that exists in this area and sheds light on whether grade inflation has occurred in UK higher education in recent times.

The following two sections provide an overview of the relevant changes in the landscape of UK higher education that have influenced the three issues described above. This is followed by a more detailed account of the contextual background specific to each issue. Collectively, these sections provide the motivation for the empirical analysis undertaken in each of the three essays.

1.1 The Size and Structure of UK Higher Education

The first UK University was founded in Oxford in 1169 and about 40 years later the University of Cambridge was established. In the middle ages four more universities were established in Scotland. During the late 19th and early 20th century the number of UK universities increased with the establishment of 'civic' and 'red brick' universities**.** Prior to 1963 there were 31 UK universities (Taylor, 2003).

Over the past 50 years the UK higher education sector has gone through substantial reform and growth. One can identify three major policy changes over the period when the number of UK universities increased considerably. The first followed the publication of the report by the Committee on Higher Education in 1963 (Robbins, 1963). This resulted in 10 colleges of advanced technology (CATs) being granted university status by the Privy Council and a further 10 'plateglass' universities were also created. These universities together with those that were created before the 1960s will be collectively referred to as 'pre-1992 universities' henceforth. The second major expansion followed the publication of the Further and Higher Education Act 1992, which paved the way for the Privy Council to grant university status to 38 former polytechnics and several other higher education institutions shortly after 1992. These 'new' universities will be collectively referred to as 'post-1992 universities'. In 1997 there were 115 UK universities including the constituent colleges of the University of London and Wales (National Committee of Inquiry into Higher Education, 1997). The third expansion came in the wake of the publication of the Higher Education White Paper in 2003 (Department for Education and Skills, 2003a). Several, former university colleges and other higher education institutions were granted university status and these universities will be referred to as 'post-2003 universities' henceforth. By 2010/11 there were 129 universities of these 19 were former university colleges or colleges of higher education prior to 2003. Moreover, UK universities no longer offer a narrow portfolio of 'traditional' academic degree programmes but offer a wide range of programmes that now include vocational as well as academic pathways.

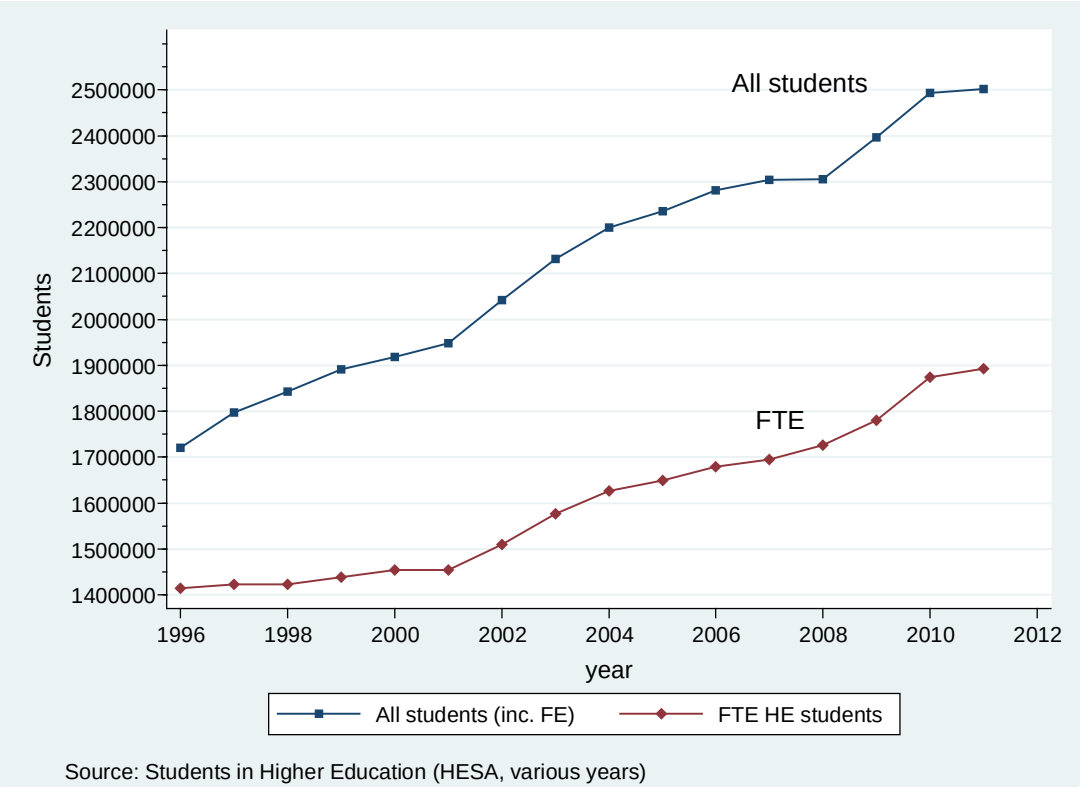
It should be recognised that the higher education institutions (HEIs) that comprise the UK higher education sector differ markedly in terms of their history but they also differ in terms of their organisational structure, size and the markets for which they cater (Dolton and Makepeace, 1982; Parry, 2006). In addition to universities that have independent degree awarding powers, the UK HE sector includes university colleges, colleges of higher education, and specialist higher education and postgraduate institutions (e.g. arts and music colleges, colleges/schools of medicine and nursing, and teacher training colleges). In 1997/98 there were 176 publically funded HEIs in the UK and by 2010/11 there were 165 such institutions. This fall in the number of institutions is in part due to several mergers and the demise of a small number of institutions. Appendix A1 provides a chronology of UK HEIs based on the date of their creation

and the nature of the programmes offered from the medieval period to 2011 and appendix A2 documents some of the major mergers in UK higher education between 1994/95 and 2009/10.

Although the actual number of HEIs fell between 1997/98 and 2010/11 the 'size' of these institutions, in terms of their student body, increased considerably. Greenaway and Haynes (2003) noted that in the early 1960s there were about 400,000 full-time and part-time students in UK higher education and between 1980/81 and 1999/00 the number of full-time students doubled. Dolton, *et al.* (1997) reported similar findings suggesting that between 1989/90 and 1994/95 there was a 61% increase in higher education enrolments.[2] Data compiled by the Higher Education Statistical Agency (HESA) in 2012, see figure 1.1, suggests that between the academic years 1995/96 and 2010/11 the number of students (full-time and part-time) in UK higher education increased by 45.4%, but there was a slight fall in the rate of increase in participation around 2006/07 when tuition fees were raised (see below). By the academic year 2010/11 HEIs enrolled about 2.5 million students (Higher Education Statistical Agency, 2012). If we exclude further education students, and students enrolled at the Open University and specialist medical colleges/schools then, in terms of full-time equivalent (FTE) students, the number students on higher education programmes increased by one-third since 1995/96 to just under 1.9 million by 2010/11. In particular there was a sharp increase in the number of FTE students in UK higher education between 2001/02 to 2009/10 (Higher Education Statistical Agency (a), various years).

[2] Macfarlane (1992) points out that between 1980/81 and 1988/89 there was a 20% increase in full-time new undergraduate enrolment in UK higher education but much of this increase was concentrated in Polytechnics and colleges of higher education.

Figure 1.1 Students in UK Higher Education 1995/96-2010/11



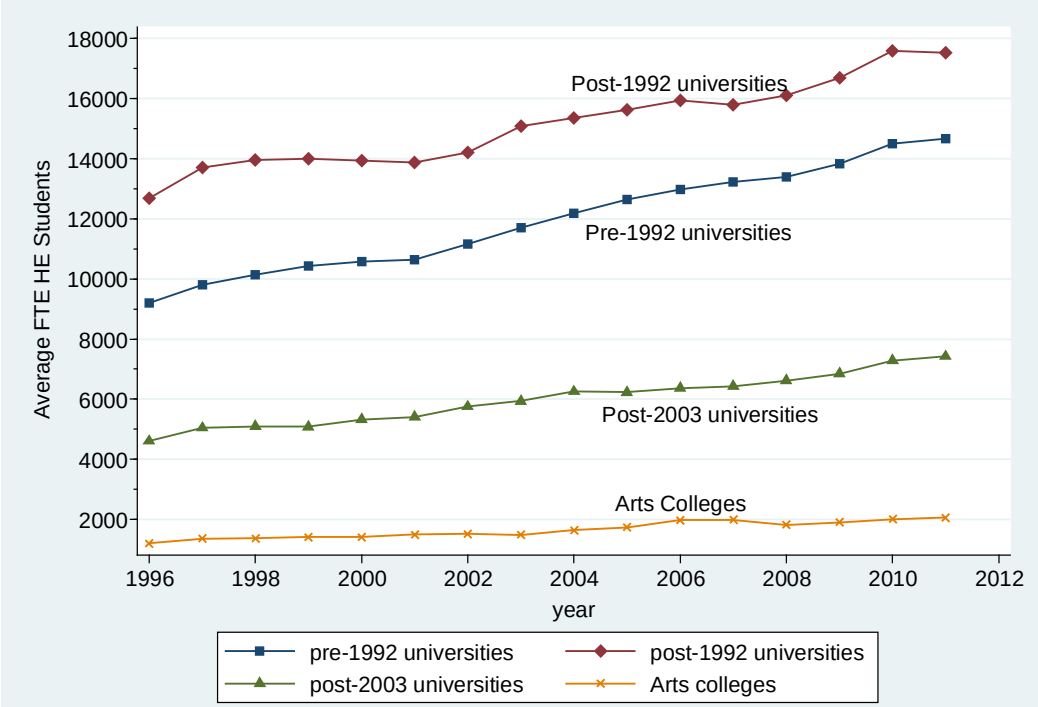
Source: Students in Higher Education (HESA, various years)

Note: FTE HE students exclude those enrolled at the Open University and specialist colleges (e.g. Royal College of Nursing).

Although there has been a significant increase in the number of students in UK higher education there are differences in the pattern of student enrolment between institution types. Total FTE enrolments in pre-1992 universities was greater than in other any other HEI type between the academic years 1995/96 through 2010/11, see appendix A3. For instance, in 2010/11 pre-1992 and post-1992 universities enrolled about 866,000 FTE and 701,000 FTE students respectively. This represented just-under 1.6 million FTE students on higher education programmes in these universities, an increase of 45% since 1995/96. In contrast post-2003 universities are much smaller and in 2010/11 they enrolled about 163,000 FTE students in total, an increase of 69% since 1995/96. There is also a niche of 'Arts' colleges, specialising in a range of arts, drama and music qualifications (academic as well as vocational) that, in 2010/11 enrolled about 43,200 total FTEs students (Higher Education Statistical Agency (a), various years). These figures indicate that the size of post-2003 universities in terms of FTE enrolments increased at a greater rate than their pre-1992 and post-1992 counterparts over the sample period.

However, between 1995/96 and 2010/11 although larger in terms of total FTE student enrolments pre-1992 enrolled fewer FTE students on average than post-1992. It should also be noted that pre-1992 universities are more numerous than other types of HEIs (see appendix A1). Figure 1.2 shows that in 2010/11 pre-1992 universities enrolled just over 14,600 FTE students on average, an increase of about 59% since 1995/96, whereas post-1992 universities enrolled about 17,500 on average, an increase of just over 38% over the same period. Average FTE enrolments in post-2003 universities increased to 7,400 in 2010/11 which represents a 61% increase over the sample period. Arts colleges enrolled about 2,100 FTE students on average in 2010/11 (Higher Education Statistical Agency (a), various years).[3]

Figure 1.2 Average FTE HE Students in UK Higher Education 1995/96-2010/11 (by institution type)



Source: Students in Higher Education (HESA, various years)

Note: The Open University, postgraduate institutions and other small HEIs are excluded.

[3] University size can also be measured by the number of academic staff employed or by university income. Based on these measures pre-1992 and post-1992 universities remain the largest institutions in 2010/11 - pre-1992 universities employed 1,815 academic staff on average, and received about £298.9m in total income. Post-1992 employed 1,149 academic staff on average, and received about £159.9m in total income. In the same year post-2003 universities employed 468 academic staff on average, and received about £66.2m. Arts colleges employed about 274 academic staff on average and received about £29.6m in total income (Higher Education Statistical Agency (b), Various years).

The increase in participation in UK HE and its changing nature, particularly since the late 1980s, and early 1990s is seen as a major movement from an 'elite' system of higher education catering for the needs and abilities of the few to a system of 'mass' higher education catering for the needs and abilities of the many (Fulton, 1991; Parry, 2006). A key feature of the post Robbins expansion of UK higher education was to increase participation rates amongst young adults. In the early 1970s only 10% of school leavers participated in higher education (Dolton, *et al.*, 1997).[4] The policy was given a major impetus in September 1997 when the then Prime Minister, Tony Blair, declared a desire to increase higher education participation of young adults particularly amongst those from disadvantaged socio-economic backgrounds and those from families with no previous participation in higher education.[5] The government set out to widen and increase higher education participation to 50% in the 17-30 year age category by 2010 (Department for Education and Skills, 2003a: 57).[6] Evidence suggests that this policy has been reasonably successful (Crawford, 2012). Lindley and Machin (2012) report that initial participation rates amongst full-time undergraduate students under the age of 21 and domiciled in Great Britain increased from 13% in 1981 to 35% in 2001. This change also impacted on the profile of students in UK higher education. More women and mature students entered higher education and the academic background of students became more diverse – some entering higher education through 'non-traditional' (non A-level) routes (i.e., through GNVQ and Access qualifications). Dolton and Lin (2011) find that the introduction of loans and fees in the 1990s to some extent negatively impacted on HE participation. However, recent figures indicate that initial participation for all 17-30 year old UK domiciled students in 2010/11 was about 47% up from about 42% in 2006/07. Moreover, the participation rate for students under 21 years of age from the lower social classes increased from 30.6% in 2006/07 to 39.8% by 2010/11. Participation rates for students from low participation areas also increased between these years from 9% to 10.5% (Higher Education Statistical Agency, 2012).

[4] It is instructive to note that in the early 1960s the participation rate was 5% for students in the 17-30 year category and increased to about 35% by 2001 (Finegold, 2006).

[5] This commitment was made in a speech delivered at the Labour Party's conference in 1997.

[6] Widening participation in higher education is also seen as a vehicle to reduce socio-economic inequality in educational attainment, and widen labour market opportunities. Evidence suggests that the expansion of UK higher education during the 1980s and early 1990s actually benefitted the children from relatively rich backgrounds (Machin and Vignoles, 2004; Blanden and Machin, 2004), though there has been some narrowing of the inequality gap in the late 1990s and early 2000s (Raffe, *et al.*, 2006).

1.2 Funding Students in UK Higher Education

Since the late 1980s and early 1990s, problems associated with funding a growing 'mass' higher education system emerged (Dolton, *et al*., 1997; Greenaway and Haynes, 2003) and quasi-market elements were introduced into UK higher education.[7] Public funding for research would be determined by the quality (determined by the institution's performance in the Research Assessment Exercise (RAE)),[8] the volume of research undertaken (determined by the number of research 'active' staff), and the relative cost of research in specific areas (i.e., laboratory based or 'library' based).

A competitive process for allocating teaching funds was also introduced that required universities to bid for funding according to the number of FTE students they anticipate to enrol and the cost of the undergraduate programme offered. Institutions were then ranked according to their anticipated costs, with those with the lowest cost per FTE student the first to be allocated funds in accordance to their subject mix (i.e., laboratory based versus classroom based programmes, see appendix A4 for further details). Glennerster (1991) commented that such a bidding process based on price would reduce the quality of higher education provision. This process was replaced in the late 1990s by a more direct formulaic mechanism where different subjects are allocated to one of four 'price groups' which determines the funds that each institution receives according to the number of FTE students they expect to attract in specific 'price groups' (see appendix A4). Recurrent funding (ongoing funding) or the block grant for teaching amounted to £4,719m in 2010/11 which represented 64% of total funds allocated to UK HEIs (Higher Education Funding Council for England, 2010).

With constraints on public finances, particularly in the 1990s, real public funding per student halved between the early 1990s and 2000 (Greenaway and Haynes, 2003). The Green Paper on *The Development of Higher Education into the 1990s* emphasised the need to justify the cost of higher education and to improve efficiency within the sector (Department of Education and Science, 1985). Concern was also raised over the quality

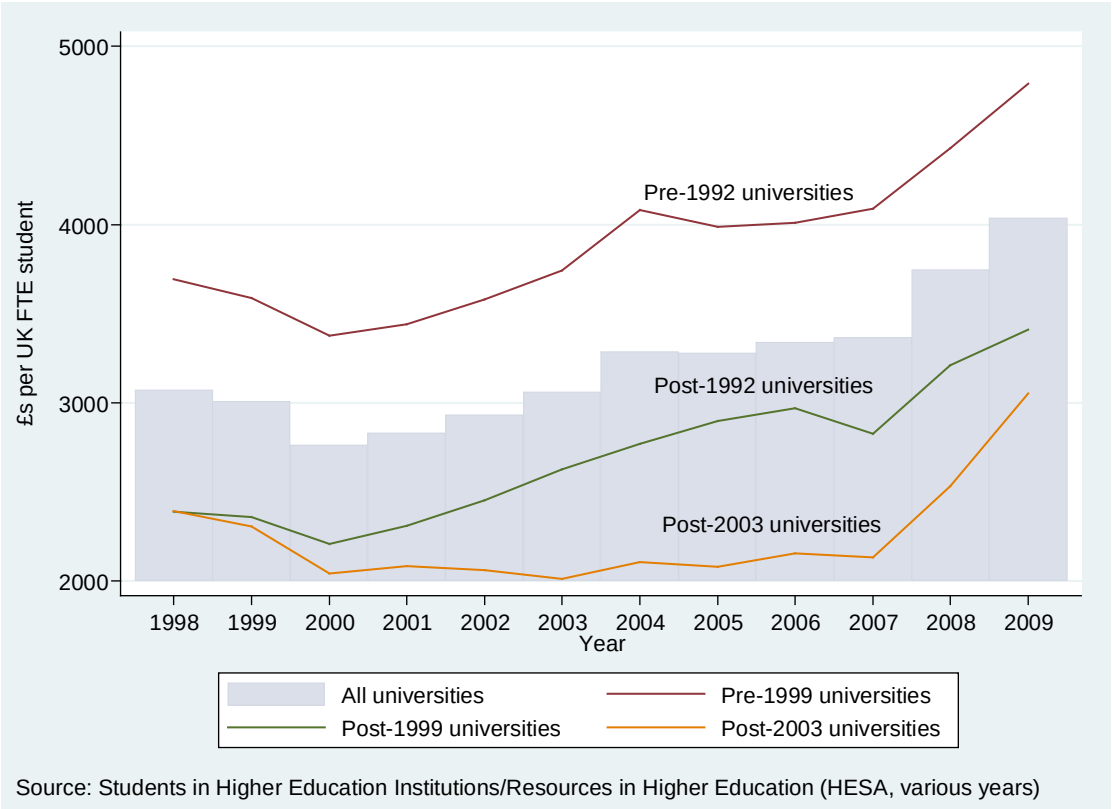
[7] See Glennerster (1991) and Rothschild and White (1993) for a theoretical expositions of quasi-markets in higher education.

[8] The research assessment exercise (RAE), which is carried out approximately every five years, was introduced in 1992 to rank universities in terms of the quality of their research output. It should be noted that the universities grants committee (UGC) also conducted surveys of university research output in 1986 and its successor the university funding councils carried out the research selectivity exercise in 1989 which was also aimed at assessing the quality of research output.

of the programmes delivered in UK HEIs as student-staff ratios increased (Greenaway and Haynes, 2003; Barr, 2004). The issue of student funding led to the adoption of student loans and the introduction of tuition fees as an alternative method for funding British students in UK higher education. Up front tuition fees of £1,000 were introduced in the academic year 1998/99 and provided HEIs with a means by which funding per student could be increased. At the same time the maintenance grant was reduced to £1,000. In the academic year 2006/07 undergraduate students in England and Northern Ireland faced a deferred top-up fee of up to £3,000 as a contribution to the cost of their tuition rising to £3,290 in 2008/09. The Browne report (Browne, 2010) recommended raising the cap on tuition fees to £9,000 at the start of the academic year 2012/13. However, serious questions have been raised in regard to the effect that the recent increase in tuition fees would have on 'widening participation' (Micklewright, 2012; Chowdry, *et al.*, 2012).

Recent evidence, see figure 1.3, suggests that real tuition and teaching funding per UK domiciled undergraduate FTE student increased since the introduction of tuition fees in 1998/99. From 1999/2000 funding per UK FTE student in all universities increased by 46% from £2,762 in 1999/2000 to £4,034 in 2008/09 (see shaded bars). It is interesting to note that although funding remained relatively constant between 2003/04 and 2006/07 there was a further real increase in student funding thereafter, in particular after the introduction of top-up fees. These trends are broadly similar to the trends found by Dearden *et. al.* (2012) who report a rise in the average level of funding per UK undergraduates since the introduction of top-up fees in 2006/07. Figure 1.3 also reveals a large differential between the average funding per UK undergraduate FTE students in pre-1992 universities compared to both post-1992 and post-2003 universities. Pre-1992 universities achieved about 46% more funding per undergraduate student than post-1992 over the period and about one and a half as much funding per student as post-2003 universities. The differences in funding between universities depicted in figure 1.3 is in part due to composition effects (i.e. due to subject mix), with pre-1992 offering more high cost laboratory based programmes that attract greater income from funding councils (see appendix A3).

Figure 1.3 Average Tuition and Teaching Funding per UK Domiciled FTE Undergraduates 1997/98-2008/09 (£ in 1998 prices)



Source: Students in Higher Education Institutions/Resources in Higher Education (HESA, various years)

Note; The Open University, postgraduate institutions and other small HEIs are excluded.

It is instructive to note that university performance indicators relating to student non-continuation rates, graduate employment rates, and the number students enrolled from under-represented groups were published by the Higher Education Statistical Agency in December 1999.[9] Although these indicators did not initially affect the funding HEIs received from the Funding Councils, those relating to access or 'widening participation' do currently influence the allocation of additional funds for teaching provision. At the same time new demands were placed on higher education institutions such as more engagement with the local and national community through innovation and knowledge transfer.

Moreover, there was also a desire for universities to become more self-financing by generating alternative income streams to those traditionally available from central

[9] UK higher education performance indicators from 2002/03 onwards and details on their construction can be found at: http://www.hesa.ac.uk, Performance indicators for the period 1996/97 to 2001/02 are available via the Higher Education Founding Council for England's (HEFCE) website: http://www.hefce.ac.uk/data/pi/.

government, for example, by attracting more fee-paying students (largely from overseas) and sourcing alternative income streams (e.g. from research contracts). As the competition for fee-paying students and scarce research funds increased, universities have had to employ highly paid specialist staff, academic and non-academic (e.g. finance and marketing specialists), to identify, manage, and compete for these alternative streams of income, driving up staff costs.

In 2010/11 total government spending on higher education was £15.7b which represented about 2.4% of total government expenditure (HM Treasury, 2012). The sector had a total income of £27.5b. A large proportion of total income, 32.2% was is in the form of funding council grants, 32.6% in the form of tuition fees and education contracts, and 16.1% in research grants and contracts.[10] The sector employed just under 382,000 individuals in 2010/11 of which about 47% were academic staff. Staff costs are a high proportion of total sector expenditure comprising about 56% of all expenditure in 2010/11, a rise of 3% in nominal terms over the previous year (Higher Education Statistical Agency, 2012).

1.3 Essay 1: On the Determinants of Vice-Chancellor Pay in UK Higher Education

It is against the changing landscape of UK higher education over the past half century, as described in the previous section, that the role of the Vice Chancellor (VC) has evolved from a relatively comfortable end of career appointment as the head of an academic patriarchy to corporate executive. The modern VC now requires the leadership and managerial skills to enable them to run large and complex higher education institutions, similar to those needed to manage and lead large private sector companies (Jarret, 1985; Farnham and Jones, 1998; Smith, *et al.*, 1999; Shattock, 1999; Bargh, *et al.*, 2000; Whitchurch, 2006).[11] Moreover, it is the VC who is ultimately responsible for academic standards, facilitating research, financial probity, and defining the institution's short and long term strategy (Breakwell and Tytherleigh, 2008). In many cases they would also be seen as a vehicle for attracting private funds and

[10]Higher Education Statistical Agency (HESA) *headline statistics* available at http://www.hesa.ac.uk/ . Accessed 12/10/2010.
[11] This view of VCs has been contested in the literature (Cyert, 1975; Cyert and March, 1992; Ehrenberg, 2003)

securing institutional growth. We would expect VC pay to reflect these demands and success in meeting the institution's mission and goals. Furthermore, if potential candidates with the required managerial talent to run a modern UK university are in scarce supply then the competition for such scarce and specialised human capital could bid up VC pay (Dolton and Ma, 2003).

The pay of UK VCs has been the subject of public scrutiny since 1994 when UK higher education institutions (HEIs) were required to publicly disclose the annual pay of the head of their institution. It was reported that in 2008/09 12 VCs received annual pay in excess of £300,000, up from five in 2007/08, and 30 earned over £250,000, up from 16 in the previous year (*Times Higher Education (THE)).*[12] More recent evidence suggests that this was still the case in 2010/11.[13] The rate of increase in VC pay has been of particular concern. The then Business Secretary, Vince Cable, was reported as 'taken aback' by the 10% rise in VC pay in the academic year 2008/09 and urged 'restraint' in pay awards granted to top university officers (*Daily Telegraph*, May 26, 2010).

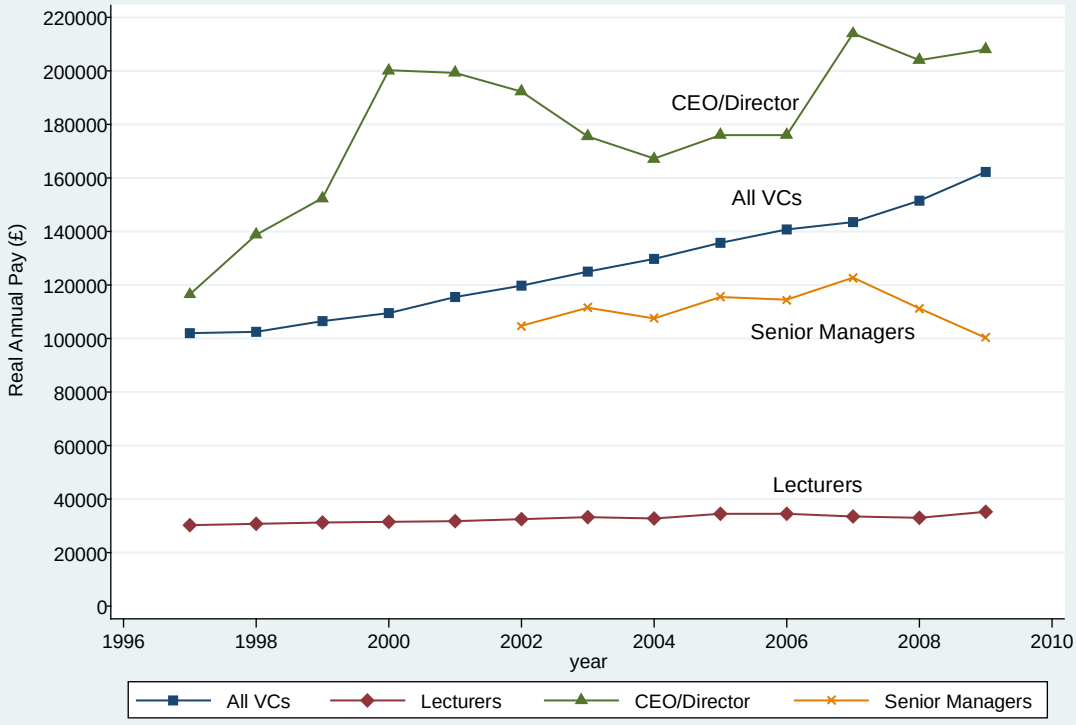
It is informative to note that general concern has also been raised in the UK regarding the pay of senior executives in major public sector organisations. For instance, in July 2003 the then deputy prime minister, John Prescott, criticised the £200,000 annual salary offered by Bradford Metropolitan Borough Council to fill its CEO position, pointing out that it exceeded the salary of the Prime Minister. More recently the incumbent Communities and Local Government Secretary, Eric Pickles, criticised the 'bloated salaries' paid to senior town hall officials emphasising that some pay packages would '....make a football manager blush'. He further commented that only a few public sector workers should expect to earn over £100,000 (*The Telegraph*, July 10, 2010). Moreover, Hutton (2011) reported that median pay of senior executives in the public sector was found to be widely dispersed with VCs amongst the top earners.

Figure 1.4 depicts the national trend in real VC pay between 1997 and 2009, which increased by 59% in real terms over this period. In contrast full-time lecturers and senior academics in higher education received just under a 16% real pay increase over the same period. The evidence suggests that on average VCs received a pay award that

[12] 'It was fun while it lasted', *THE*, April 1, 2010.
[13] See accompanying tables to 'Executive overdrive', *THE*, May 10, 2012.

was above that of lecturers by a factor close to four over the period and we also note a widening of the differential over time. These differences have been the major focus of criticism vented in the media and by lecturer unions with assertions that the pay awards granted to VCs have been 'outrageous', 'shameless', 'despicable' and unjust (see appendix A5). We also note that between 2002 and 2009 the pay of VCs, on average, was about 25% greater than the pay of private sector UK senior managers.

Figure 1.4 Average Annual Real Pay 1997 – 2009 (£ in 1998 prices)



Source: Times Higher Education Supplement and the Annual Survey of Hours and Earnings (ASHE, various years)

Notes:
(a) All VCs include: Vice Chancellors; Principals; Rectors; Directors and Provosts of all UK HEIs including: universities, university colleges, other higher education institutions, and art, drama, and music colleges.
(b) Lecturers include: full-time university lecturers and senior academics excluding professors.
(c) CEO/Director: full-time directors and CEOs that head large enterprises and organisations employing over 500 people at single or multiple site establishments.
(d) Senior managers: senior managers and executives of large enterprises and organisations employing over 500 people at single or multiple site establishments.

In the light of the evidence presented in figure 1.4 VC pay in the UK may not be excessive on the basis that their remuneration should be comparable to that received by private sector CEOs with similar executive responsibilities. Between 1997 and 2009 average VC pay was about 74% of the annual pay of full-time CEOs/Directors of large

private sector enterprises. Moreover, CEO/Director pay increased by 75% compared to the 59% received by VCs. It is also interesting to remark that between 2000 and 2004 there was a general downward trend in CEO/Directors' pay, possibly due to the disclosure requirement set out by the Directors' Remuneration Report Regulations,[14] although there was an increase between 2006 and 2007 and then a subsequent fall in the wake of the financial crisis of 2007. The trends in pay reported in figure 1.4 may suggest that VCs of HEIs are 'underpaid' when compared to their private sector counterparts who manage similar 'large' and complex organisations (Tarbert, *et al.*, 2008).

Despite a high level of public interest in VC pay only a few studies on the VC labour market, and in particular the pay determining process, have been undertaken. The primary motivation of this research is to examine the relationship between VC pay and performance and in so doing seek to shed some light on whether or not their headline pay awards are justified. Specifically, we investigate if there is scope to introduce incentive based pay schemes into the determination of VC pay, by examining the association between VC pay and widely published performance indicators, including those related to widening participation and other 'mission' based measures. In this particular respect we offer a novel contribution to the literature.

We also consider whether remuneration committees set VC pay commensurate with the earnings of other VCs who run comparable institutions. We examine this issue using an external pay 'benchmark' that remuneration committees are assumed to use when setting VC pay (Committee of University Chairs, 2009:27).

In regard to the changing role of the modern VC, within a changing higher education landscape, a secondary motivation for this research is to examine the extent to which VC personal characteristics impact on pay. These considerations have been explored before but we employ a large and more comprehensive dataset than those used in previous research in this area. In so doing we offer, not only an update of the VC pay

[14] This is a legal requirement that binds listed UK firms to publish director remuneration reports since the financial year ending 31st December 2002. Available at: http://www.legislation.gov.uk/uksi/2002/1986/pdfs/uksi_20021986_en.pdf, accessed 21/10/11.

determining process, but also more precise and consistent set of estimates than those currently reported in the literature.

1.4 Essay 2: Students' Expectations of Debt in UK Higher Education

Student loans were introduced in 1990/91 to help alleviate the public cost of funding students in UK higher education. Advocates of student loans argue that graduates are the main beneficiaries of higher education (e.g., in terms of enhanced future earnings)[15] and should contribute to its cost (Barr 1991, 1993). Others see the system of loans, and the resultant fear of accumulated debt, as a potential barrier to access into higher education. This is particularly evident for potential students from lower socio-economic groups, which may compromise the policy objective to 'widen participation' (Knowles, 2000; Callender, 2003; Callender and Jackson, 2005; Micklewright, 2012). Government concern over the perception of student debt and participation in higher education was highlighted in the lead up to the 2004 Higher Education Act (Department for Education and Skills, 2003b). Indeed in 2001, the then Secretary of State for Education, Estelle Morris, highlighted the issue of student debt and its negative impact on widening participation in higher education by stating:

> '*I recognise that for many lower-income families the fear of debt is a real worry and could act as a bar to higher education. I want to make sure that our future reform tackles this problem.*' [16]

However, participation in higher education for young students has increased since the introduction of loans (Department for Education and Skills, 2003b). Moreover, there is evidence that financial support for students maybe inadequate (Callender and Willkinson, 2003), which can contribute to rising student debt. The expectation of a higher debt burden whilst in higher education can potentially affect student performance by reducing the time students devote to study (e.g., through taking on part-time employment by necessity) and/or alter a student's future opportunity set (e.g., the ability to secure a mortgage or the ability to pursue particular labour market choices).

[15] Several UK studies have found evidence of substantial returns to higher education qualifications (see, for example, Harkness and Machin, 1999; Blundell, *et al*., 2000; Bratti, *et al*., 2008)
[16] Estelle Morris' speech: Key challenges of the next decade. London Guildhall University: 22 October, 2001.

This essay contributes to the literature in several ways. First, it contributes to the sparse literature on the factors that influence student indebtedness in UK higher education. This is all the more surprising given the reduction in public support for UK students' maintenance and the introduction of tuition fees and their subsequent increase over the past two decades. Knowledge of these factors would clearly help policy makers to carefully target the limited funds available for student support.

Second, it uses unique survey data to examine the factors expected, *a priori*, to influence student debt expectations from which the factors that have a significant association with student debt can be identified. In particular, these data allow several issues to be explored that have only minimum exposure in the literature. These include the influence that student future wage expectations (taken as a proxy for future financial expectations), risk attitudes, time preference, and aversion to debt have on expected indebtedness. The survey data used in this essay were collected via a questionnaire administered to undergraduate students in seminars and lectures during the winter of the academic year 2008/09.

Third, and on a more general level, the essay contributes to the literature on the determinants of individual debt.

1.5 Essay 3: Grade Inflation in UK Higher Education

As UK higher education expanded in the 1990s there was a corresponding increase in the relative proportion of 'good' honour (or bachelor) degrees awarded which has become the focus for assessing the extent of 'grade inflation' or falling educational standards in the UK literature (Johnes, 2004). In the UK a 'good' degree is often taken as the award of either a first class honours degree (1^{st}, the top classification) or an upper second (2:1, the second best ranked classification). In general, there are four UK degree classes that are awarded with honours and a further two without. Degree classifications

that are currently awarded in UK higher education and the threshold delineating each degree class can be found in appendix A6.[17]

The quality of bachelor degrees is controlled according to nationally established and organised procedures. The award indicates that a student has undertaken an agreed level and period of study, and achieved an externally verified quality benchmark in terms of their assessments. The final degree classification is determined by the number of credits a student achieves in a variety of assessments averaged over their undergraduate career; usually the credits gained in their second and final year of study, with more weight placed on final year credits.[18]

The increase in the proportion of 'good' honours degrees awarded particularly since the early 1990s and the consequent compression of degrees in the top end of the degree class distribution has led some commentators to question the usefulness of the current degree classification system to provide correct signals on graduate quality. It has been a particular feature in the educational and national press (see appendix A7), and concern over the phenomenon has been expressed by government, and employers' associations. For instance, Alan Smithers from the University of Buckingham remarked that there has been 'extraordinary grade inflation' as UK higher education expanded from the 1990s onwards. He also questioned the worth of final degree classifications to employers, suggesting the need to introduce a 'starred first' classification to identify 'exceptional talent' (*Mail Online*, September 23, 2011).[19]

It may also be the case that university grading practices such as awarding 'borderline' students with the higher degree classification, giving higher weightings to final year performance, the use of the 'whole grading distribution' when awarding marks, giving credit to low marks or failure on coursework or in examinations, have all contributed to 'grade inflation' over the past two decades. These actions it is argued favours the award

[17] This system of classification has its origins in the 19th century and was first introduced at the University of Oxford. The university did not differentiate between its 'upper' and 'lower' seconds (2:2) until the late 1970s.

[18] Typically undergraduates take 6 20-credit single modules each academic year accounting for 120 credits per year. Students can combine 'double' modules, worth 40 credits with single modules in any year.

[19] 'First-class? Top-level degrees up by 34% prompting fresh concerns over grade inflation'. Available at: http://www.dailymail.co.uk/news/article-2040806/First-class-Top-level-degrees-34-prompting-fresh-concerns-grade-inflation.html. Accessed 28/07/2013

of a 'good' degree and is partly due to a 'demand for success by fee-paying undergraduates' and over time it is expected that 'everyone will get a first or a 2:1' (*The Sunday Times*, July 14, 2013).[20] It was also reported that staff appraisal should be linked to the number of 'good' degrees awarded which would increase the proportion of these awards.[21] The incumbent Universities Minister, David Willets insisted that the 'whole system of degree classification does need reform' (*The Telegraph*, January 12, 2012).[22]

Employers' associations have raised concern of over the 'bunching' of grades in the top end of the grade distribution which send confusing signals on graduate quality and ability to potential employers when making job offers. The chief executive of the Association of Graduate Recruiters stated that:

> *"Over the past decade, employers have become less confident that the degree class in itself tells them what they need to know… to some extent, it is an indication that the degree class isn't regarded now as being the most accurate measurement of what somebody has achieved"* (Carl Gilleard, *The Telegraph*, January 12, 2012).

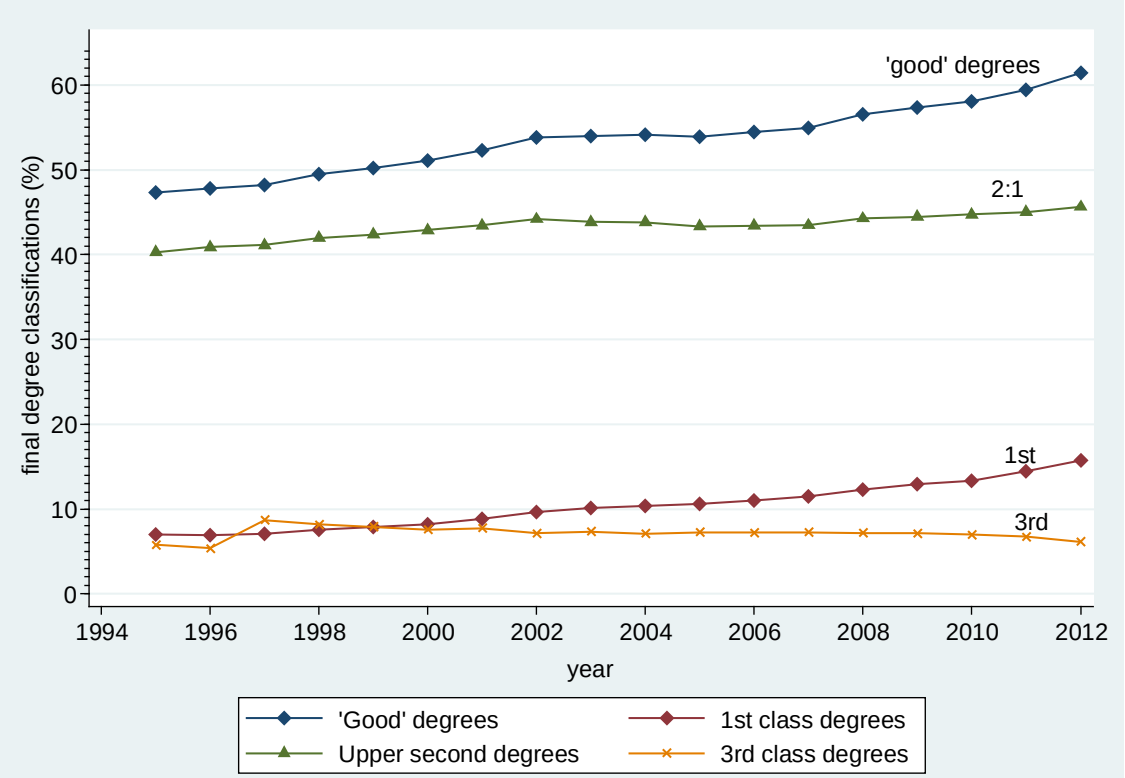
In the light of these issues the UK government has recently recommended that a Higher Education Achievement Report (HEAR) should be introduced in 2010/11 as 'the key vehicle for measuring and recording student achievement' and to be available alongside information on students' degree class (Universities UK, 2007:5).[23] Indeed in the academic year 2013/14 the Higher Education Academy launched a 2-year pilot study that involves implementing a grade point average (GPA) system, as used in US universities and colleges, to provide a more detailed measure of a student's academic performance than captured by the current classification system. It is also worth noting that 'grade inflation' is an international phenomenon with recent concern being raised in several other western countries.[24]

---

[20] 'Universities twist their rules to award more firsts'.
[21] 'Surrey considered grade targets for staff appraisals' (*Times Higher Education*, July 18, 2013).
[22] 'Warning over 'grade inflation' as first-class degrees double'.
[23] See also 'Degree classification is unfair to many graduates' (*The Guardian*, April 18, 2001)
[24] For the US see: 'A history of college grade inflation' (*New York Times*, July 14, 2011); 'To Stop Grade Inflation, Just Stop Inflating Grades' (*The Chronicle of Higher Education*, June 25, 2012); 'Want a higher GPA? Go to a private college' (*New York Times*, April 19, 2010), 'An eye for an A: Economics focus' (*The Economist, March 9, 2002);* and for Germany see: 'Unis und Prüflinge auf Kuschelkurs: Wertlose Traumnoten' – '*Universities and examinees cosies: worthless dream scores'* (*Das Spiegel*, December 12, 2002).

Figure 1.5 depicts recent trends in honour degrees that were awarded to graduating students by all UK HEIs from 1994/95 through 2011/12. We first note that the proportion of 'good' honour degrees awarded increased from 47.3% of all new graduates in 1994/95 to 61.4% in 2011/12.[25] In absolute terms the number of 'good' degrees awarded increased by 113% over the period from 112,511 to 240,030 (see appendix A8).

Figure 1.5 Honour Degree (Bachelors) Classifications (%)
All UK HEIs 1994/95 - 2011/12



Source: Higher Education Statistical Agency (various years)available at:http://www.hesa.ac.uk/index.php/content/view/1973/239/

Notes: All institutions include pre-1992, post-1992, and post-2003 universities, the Open University, Colleges of the Arts, and small specialist colleges, but exclude Medical Schools.

This increase was not constant over this period. Between 2001/02 to 2006/07 the proportion of 'good' degrees awarded increased by 0.6 percentage points from 53.8% to 54.4%. However, there was a substantial rise between 2006/07 (the academic year in

[25] Johnes and Taylor (1987) present data that shows the share of 'good' honour degrees awarded by UK universities (excluding the University of Oxford as at the time there was no division in the second class classification) increased from about 31% in 1976 to about 37.5% in 1984 (see table 1, p. 584). Macfarlane (1992) reports that the proportion of 'good' degrees awarded to male (female) students increased from 32% (33%) in 1981 to about 44% (47%) by 1988 and for both gender groups the figure was 49% in 1990.

which top-up fees were introduced) and 2011/12 with the proportion of good degrees increasing by seven percentage points. It also evident that the increase in 'good' degrees was largely driven by an increasing proportion of 1st class degrees awarded to new graduates which more than doubled from just over 7% in 1994/95 to just under 16% in 2011/12. This increase represents a 269.2% increase in the actual number of 1st awarded. In contrast the proportion of 2:1s increased by only 5.2 percentage points from 40.4% to 45.6%, an 86.2% increase in the actual number of 2:1s awarded over the period. We also note that the proportion of third class degrees awarded fell from 8.7% in 1996/97 to 6.1% in 2011/12.

The evidence presented above can be used to support the notion of 'grade inflation' in UK higher education. The phenomenon has been explored in the literature before, but very little research has been conducted using UK data. Moreover, previous UK research has generally focussed on pre and post-1992 universities. The primary focus of this essay is to examine 'grade inflation' in the UK using publically available institution level data. These data provide information on degree classifications that were awarded by pre-1992, post-1992 and post-2003 universities covering a seven year period from 2006 to 2012 given data limitations. We therefore provide a wider coverage of 'grade inflation' in UK higher education institutions than provided in previous published UK research. We are also able to include variables that may explain grade inflation, *a priori,* that have not featured in previous research. We therefore offer a useful contribution to the thin body of literature that exists on this issue.

The primary analysis is complemented by an examination of 'good' degrees awarded to five cohorts of graduates from 2006 to 2010 in a single UK university using individual level administrative data. These data contain rich information that allows us to control for a variety of student characteristics that are not generally publically available and are expected, *a priori,* to impact on student performance. The results from this analysis help to confirm the robustness of the findings from the primary analysis as well as contributing to the literature on undergraduate degree performance.

Chapter 2

On the Determination of Vice-Chancellor Pay in UK Higher Education

2.1 Introduction

In the UK concern has been raised regarding the pay awards granted to senior executives in major public sector organisations. In particular some VCs are amongst the highest paid in the public sector (Hutton, 2011). It is therefore not surprising that VC pay has often been a focus of public criticism from lecturer unions and students. The former may perceive the pay awards as 'unjust' in comparison to the pay awarded to teaching and research staff and the latter may perceive increasing tuition fees as contributing to VC pay awards.

The primary motivation for this essay is to examine the relationship between VC pay and performance. We examine VC performance across two dimensions: first, in terms of the financial performance of the university and second, in terms of furthering the institution's 'mission' or strategic plan. The latter typically includes statements on 'widening participation', teaching and research excellence, and growth. We also consider whether the remuneration committee sets their VC's pay with 'equity' considerations in mind. The remuneration committee may not want to grant huge pay awards that may appear unjustified in order to assuage public outrage. The committee may seek to award a 'legitimate' pay increase that would be commensurate with the pay of other VCs who run comparable institutions in terms of their size, university sub-sector, or nature of student intake. We explore this issue using a suitably defined external pay 'benchmark' that remuneration committees are assumed to use when setting VC pay (Committee of University Chairmen, 2004:26; Committee of University

Chairs, 2009:27).[26] Furthermore, we consider whether internal pay structures influence the pay determining process and infer from this whether remuneration committees seek to preserve pay differentials within the institution.

A secondary motivation is to examine the relationship between VC personal characteristics and pay within a changing landscape of UK higher education. We employ a large and unique dataset in the empirical analysis, which is more comprehensive than the datasets employed in previous studies. The dataset was constructed from a variety of sources and covers the academic years 1994 through 2009, a period where there has been considerable change in the funding and nature of the UK higher education sector as already noted. Previous research on the determination of VC pay covered a period up to and including the academic year 2002 (Dolton and Ma, 2003; Tarbert, *et al.*, 2008). Moreover, since 2003 the UK HE sector has witnessed radical change. For instance, over half the institutions classified as University Colleges in 2002 have since been granted independent degree awarding powers by the Privy Council and subsequently assumed 'university' status. We are able to extend the period of analysis to examine the pay determining process for these 'new' VCs.

Explanations of CEO pay are often couched within the framework of human capital theory, agency theory, tournament theory, and the theory of managerial power. A further motivation for this research is to identify which of these theories best explains the determination of VC pay in UK higher education given data constraints. This empirical study as well as providing new evidence on the determination of VC pay will also shed light on which of the theories mentioned above best explain the pay of UK VCs and on a more general level it also contributes to the relatively small body of research on the determinants of CEO pay in the public sector.

The structure of this essay is now outlined. Section 2.2 provides a brief overview of the literature on executive compensation and VC remuneration. Section 2.3 provides a

[26] According to the guidelines set out in these documents when setting the pay of senior officials the remuneration committee 'must seek comparative information on salaries and other benefits and conditions of service in the higher education sector' (CUC, 2004:26). Two primary sources of information are available: the CUC database which is only available to chairs of governing bodies and contains information on salaries, benefits and conditions of service for heads of institution; and the Universities and Colleges Employers Association (UCEA) that collects data on the salaries of other senior staff.

description of the evolution of VC pay between 1994/95 through 2008/09. Section 2.4 provides a description of the data employed to examine the VC pay-performance relationship which is followed by a description of the data that are employed to investigate the VC pay-personal characteristics relationship in section 2.5. A description of the econometric methodologies employed is presented in section 2.6. Empirical results are presented in section 2.7 and some concluding remarks are presented in the final section.

2.2 Literature Review

The purpose of executive remuneration or compensation is to attract, retain, and motivate top managers in the interest of the parties that are most likely to be affected by managerial behaviour, principally the shareholders or owners of the firm. The relationship between executive pay and the factors that are assumed, *a priori,* to influence such rewards has received substantial attention in the academic literature. In particular this body of literature attempts to explain why senior executives are compensated above their marginal product and why such a situation may be considered efficient. In addition to the well-known human capital theory which suggests that pay is determined by years of schooling, age, and labour market experience and training (Mincer, 1974; Becker, 1993), three other general approaches to explain the relatively high levels of compensation for CEOs can be identified in the literature: agency theory or 'optimal contracting', tournament theory, and the theory of managerial power. This research is predominantly concerned with executive compensation in the private sector. However, it should be noted that these theories have been applied to the pay of public sector workers at lower grades to that of senior management in the UK (Croxson, *et al.*, 2001; Burgess, *et al.*, 2001; Croxson and Atkinson, 2001; Ratto, *et al.*, 2001; Burgess, *et al.*, 2002; Burgess, *et al.*, 2004), The purpose of this section is to provide a general overview of the theories and results from the empirical literature that can potentially explain VC pay.

This section is arranged as follows. The following sub-sections provide an overview of the theories that have been developed to explain senior managerial pay: agency theory; tournament theory; and the theory of managerial power, accompanied with the relevant

empirical literature. This is followed by a review of the small body of literature that is specifically focussed on UK VC pay. A summary is provided in the final section.

2.2.1 The Determination of Managerial Pay

Agency Theory

Agency theory or 'optimal contracting' focuses on the design of efficient compensation packages that include base salary and bonus payments, plus stock options and non-pecuniary perks. Stock-based payments are included to provide top management with the necessary incentives that maximises shareholder value where managerial effort is unobservable or costly to monitor. This is an important consideration when there is some divergence of interest between shareholders (principals) and the CEO (agent) (Mirrlees, 1976; Holmstrom, 1979). The design of optimal contracts can potentially limit this conflict of interest. The basic model assumes that shareholders are risk neutral and the CEO risk averse. The CEO expends unobservable effort *e* which produces stochastic shareholder value (*y*):

$$y = e + \varepsilon \qquad \text{where, } \varepsilon \sim N(0,\sigma^2). \qquad [2.1]$$

The CEO receives compensation $w(y, z)$, where z is a vector of observable measures of the contract. The CEO is assumed to have an exponential utility function of the form:

$$U = -exp[-r(w- C(e)] \qquad [2.2]$$

where $r \geq 0$ and is the coefficient of absolute risk aversion and $C(e)$ is the convex disutility of effort, i.e., $C', C'' > 0$. For tractability the disutility of effort is expressed in quadratic form: $C(e) = \frac{1}{2}ce^2$. Shareholders know what level of effort they want but cannot observe it directly. The optimum contract will maximise shareholders wealth y-w and will be of the linear form (Holmstrom and Milgrom, 1988):

$$w(y) = s + \beta y \qquad [2.3]$$

where s is a fixed salary and β is the pay-performance sensitivity (or sharing rate). The optimal contract will be subject to the CEO choosing effort e^* to maximise [2.2]:

$$e^* = \frac{\beta}{c} \qquad [2.4]$$

This last expression is known as the *incentive compatibility constraint* (ICC). The CEO will provide effort if [2.4] is satisfied subject to the participation constraint also being satisfied (i.e., the CEO's expected utility exceeds the reservation utility or compensation in the next best occupation). The first best level of effort is given by 1/c which will occur if β = 1. By optimising over the choice of compensation contracts the firm chooses its optimal pay-performance sensitivity which is expressed:

$$\beta = \frac{1}{1 + r\sigma^2 C''(e)} \qquad [2.5]$$

Expression [2.5] states that β =1 when output is certain, i.e. σ^2 =0, or when the CEO is risk neutral i.e. r = 0. We also note that incentives will be weaker the more risk averse the CEO and the greater the variation in the firm's value. Furthermore, the CEO's expected compensation can be expressed:

$$\mathrm{E}(w) = s + \beta\,\mathrm{E}(y) \qquad [2.6]$$

and will increase monotonically with β to compensate for any increased risk imposed and the increased effort induced. Much of the empirical literature has focused on estimating the pay-performance sensitivity described by expression [2.3] or in the form of a 'pay-change' specification: $\Delta w(y) = s + \beta \Delta y$. In any case executive compensation depends on the *likelihood* that the desired effort is expended. Holmstrom (1979) suggests that compensation should be based on stock-based measures as this provides information on the effort expended (the 'informativeness principle').There is also a possibility for non-stock based measures to enter into the contract (e.g. accounting ratios and sales growth) which may also provide information on the actions taken. However, Holden (2005) notes that the inclusion of stock options in senior executive compensation provides the executive with the incentive to take excessive risk and to focus on short-term corporate performance. This behaviour it is argued will be more

costly to the firm than to a risk adverse executive. Another negative feature of performance based compensation is that it provides senior executives with the incentives to misreport or manipulate the firm's financial performance. Efendi, Srivastava and Swanson (2007) find that the likelihood of accounting irregularities and misreported financial statements increases the value of CEO stock options.

Agency Theory: Empirical Evidence

The early literature examining the relationship between CEO pay and performance using the 'optimal contract' framework was predominantly conducted in the US, but has grown considerably over the last three decades. The main focus of this research agenda is to explain the considerable rise in CEO compensation during the 1980s to the present.[27] This body of research focuses, *inter alia*, on the relationship between executive pay and measures of corporate performance (e.g. changes in shareholder wealth, or shareholder returns and/or stock market returns), company size (e.g. sales revenue or value of assets) and long term incentive plans. Much of the empirical research conducted in the US and UK find evidence of the pay-performance sensitivity being higher in the US than in the UK (Main, *et al.*, 1994; Abowd and Kaplan, 1999; Conyon and Murphy, 2000).[28] US studies have found some evidence of a link between executive pay and various measures of corporate performance, corporate size, and long term incentive plans (Ciscel and Carroll, 1980; Murphy, 1985; 1986; 1999; Jensen and Zimmerman, 1985; Jensen and Murphy, 1990; Rosen, 1992; Main, *et al.*, 1994; Hall and Lieberman, 1998; Prendergast, 1999; Conyon and Murphy, 2000; Jensen, *et al.*, 2004; Gabaix and Landier, 2008; Frydman and Jenter, 2010).

Studies conducted using UK data generally find that company size rather than stock-based measures or accounting ratios has a greater influence on CEO pay (Cosh, 1975; Gregg, *et al.*, 1993; Main and Johnston, 1993; Main *et al*, 1996; Conyon and Leech,

[27] For comprehensive reviews of the literature see Murphy (1999), Prendergast (1999), Jensen *et al.* (2004) and Frydman and Jenter (2010) for a contemporary update of the US literature.

[28] Conyon and Murphy (2000) found that after controlling for firm size and other factors US CEOs earned 190 per cent more than their UK counterparts. Moreover, the highest paid UK CEO ranked only 97th on the list of the most highly pain US CEO. For further international comparisons see Kaplan (1994), Abowd and Bognanno (1995), Abowd and Kaplan (1999), Conyon and Schwalbach (1999; 2000), Muslu (2003), Becker (2006) and Bruce *et al.* (2006).

1994; Conyon, *et al.*, 1995; McKnight, 1996; Conyon, 1997; Girma, *et al.*, 2007).[29] Buck, *et al*, (2003) find that the presence of long term incentive plans reduced the pay-performance sensitivity of senior UK executives. Gregg *et al.*, (2010) find a significant difference between the pay-performance sensitivities for executives of firms operating in the financial sector of the UK and executives of firms in other industries. They also confirm the general finding that company size is the dominating factor in determining executive pay. They also note that the pay-performance sensitivity is high when stock returns are relatively high, but pay is less sensitive to performance when stock returns are low. The recent empirical analysis of Bell and Van Reenen (2011) using a large sample of publically listed companies covering just under 90% of the market capitalization of the UK stock market between 2001-2010 find a strong relationship between senior management pay and various measures of company performance (such as shareholder return).

Overall results from the UK empirical research are mixed and where a significant relationship between performance and pay is detected the magnitude of the effect is often very small suggesting that (excessive) pay awards are not optimal.[30] However, there is strong evidence that company size has a positive and significant effect on CEO pay.[31]

It is recognised that the pay of senior executives in the public sector is generally lower than the pay received by their counterparts in publically listed companies in the UK. There is a paucity of UK research on the determination of CEO pay in the public sector that uses the efficient contract framework.[32] It is often difficult to define and measure the performance of public sector organisations, particularly when dealing with public sector services, and the degree to which performance can be attributed to CEO effort. Moreover, within the public sector agents may have vaguely defined tasks and face multiple principals who may have to compete for the agent's effort. These

[29] There is also evidence that a change in shareholder wealth has a significant effect on CEO pay see Conyon and Leech (1994) and Conyon (1997).
[30] Conyon, *et al.* (1995) have criticised the methodology adopted in these studies and argue that much of this research uses reduced form regressions and fails to measure the structural parameters of a detailed principal-agent model.
[31] Rosen (1992) argues that company size (measured in terms of sales) displays a robust and near universal relationship with executive pay.
[32] Burgess and Metcalfe (1999b) cited 133 papers. Only four were empirical studies using public sector data and none were on public sector CEOs.

characteristics of public sector organisations result in agents facing several incentive structures that may offset each other making the overall incentive weak (Tirole, 1994; Dixit, 1997; 2002). Of the few UK studies that exist on CEO pay in the public sector Besley and Machin (2008) modelled the pay-performance sensitivity of UK secondary school headmasters for the period 1994 to 2002. They found evidence of a pay-performance gradient using publically available school performance indicators after controlling for head teacher and school fixed effects. They conclude that these public sector CEOs are not paid like public sector 'bureaucrats', whose pay and performance are not linked, but were remunerated, in part, according to their ability to raise the performance of their school.

There is also some evidence that UK public sector workers below the grade of senior management respond favourably to incentive schemes where they exist, particularly in the education and health care sector, but since the incentives are small so too is the response (Burgess, *et al.*, 2007). Whether the use of incentive schemes in public sector agencies is optimal is unclear. The empirical analyses of Burgess and Metcalfe (1999a) find incentive schemes in the UK are far less prevalent in the public than the private sector.[33] However, within the NHS performance related pay or 'merit' schemes have a relatively long history of operation and are used to determine the remuneration of consultants and hospital managers (Abel and Esmail, 2008).

In certain respects the pay of VCs in UK higher education can be viewed as a principal-agent problem, but the design of an 'optimal' contract is fraught with difficulty in this context. First, unlike publically listed firms HEIs have no shareholders and are not quoted on the stock market. Performance, therefore, cannot be measured in terms of stock-based measures and incentives cannot be framed in terms of stock options. Moreover, it is difficult to define what exactly constitutes 'performance' in higher education, for example, income generation, research/teaching quality, student enrolment, etc. This issue becomes more acute given that universities are multiproduct organisations (Johnes, 1993). Cyert (1975) recognises the difficulties involved in assessing university performance. He suggested that research output should be judged in

[33] See Burgess and Metcalfe (1999b) and Burgess *et al.* (2007) for a review of the UK literature on the pay-performance incentives in the UK public sector. See also Croxson *et al.* (2001), Ratto *et al.* (2001) for applications in the UK health care sector; and Croxson and Atkinson (2001), Burgess *et al.* (2001) for applications in the UK education sector.

terms of the quality of journals that the research appears and teaching quality be assessed by responses to student questionnaires. These criteria have some resonance with the research assessment exercise (RAE) and the National Student Survey (NSS) conducted in the UK that are used to assess HEIs research and teaching quality respectively. The results from the empirical literature in this regard are mixed but there is some evidence that VCs are rewarded for good financial management (proxied by various measures of university income), size (total student enrolment), and research performance (see below). However, it may be the case that VCs are appraised on other aspects of their performance as reflected in university league tables. For instance, meeting enrolment targets for students whose family have no history of HE participation or who are drawn from areas where HE participation is historically low. VC pay may be linked to success in this regard.

Second, and related to the first point, it is the case that universities are run by a team consisting of the VC and Pro-VCs who share the workload involved in running the university on a day-to-day basis. This organisational structure makes it particularly difficult to identify which element(s) of institution performance is to be attributed to VC effort.

Third, it is often not possible to specify precisely who the 'principal(s)' is(are). It can be argued that either the council, senate or governing body fulfils this role as the VC has to report to these 'committees' on institutional affairs. Moreover, the VC is also an executive member of these committees and is therefore in a position to influence executive decisions. In this sense, the VC can be both principal and agent. It is also the case that VCs face multiple 'principals' (e.g. government, students, staff, governors, and the local community). These principals may have conflicting interests and differ according to the power they can potentially exert over university policy (and VC pay). The VC will therefore face multiple tasks that would differ according to the differing interests of the principals. In such a situation the VC may wish to satisfy the desires of the most powerful principals first.

The foregoing suggests that measuring VC performance is difficult and as a result the design of optimal contracts is a challenging task. This is compounded by the fact that

VCs face multiple principals, perform multiple tasks, and work as part of a team seeking to meet institutional goals. However, it is not unreasonable to suggest that good financial management and furthering the institution's mission should be rewarded. If we assume that a VC is mission driven then it may be possible to identify VC performance as meeting or furthering the institution's mission (e.g. securing institution growth and widening participation). These issues are addressed in the empirical section of this essay.

Tournament Theory

In contrast to the empirical literature on optimum contracting there has been less direct testing of predictions from tournament theory in an empirical setting and even fewer studies on tournaments in public sector organisations. This lack of empirical analysis is partly due to the lack of suitable data particularly in the UK. Tournament theory attempts to explain the high level of executive pay by starting with the observation that workers in hierarchical organisations are paid according to their grade rather than the value of their marginal product (Lazear and Rosen, 1981; Rosen, 1986). This framework assumes that promotion lotteries provide the necessary incentives for high ranking executives where executive effort again is unobservable. Firms and organisations are prepared to spend large sums of money on CEO salaries and benefits to reward capability because it also serves to motivate workers at all levels in the firm to work hard for promotion. Workers are ranked according to their relative performance and winners secure the 'prize', known in advance, in terms of higher pay and the opportunity to participate in subsequent promotional tournaments. As a fixed number of competitors are promoted in each round of the competition, the performance of workers is based on relative rather than absolute performance. The ultimate prize is promotion to the rank of CEO. Employees are assumed to exert effort to increase the likelihood of securing the 'prize'. The effort expended depends on the differential in pay or the 'pay spread' between a high rank and a lower ranked position, the pay of and the number of competitors in the lottery and the likelihood of winning (McLaughlin, 1988).

It should also be noted that if there is a wide dispersion of ability within the group of competitors then effort will decrease. Those at the top of the ability distribution will reduce effort as they know that they will win with almost certainty whereas those at the

bottom of the distribution reduce effort as they have little chance of winning. Thus the wider the dispersion in ability the wider is the dispersion in the chance of winning the promotion, and the wider the pay difference between grades must be to elicit effort. It also should be noted that promotional tournaments may lead to competitors sabotaging the output or effort of other contestants and therefore reducing the likelihood of opponents winning. To counter these negative effects employers may take steps to limit this particularly if worker marginal products are interdependent. One possible solution is to make executives work in teams and thereby introduce more cooperation amongst group members (Lazear, 1989).

The basic theory as outlined in Lazear and Rosen (1981) assumes two identical workers (j,k) who compete in a promotion tournament based on their relative output q. Each worker is assumed to be risk neutral and output of the i^{th} worker, which is additive across workers, can be expressed:

$$q_i = e_i + \varepsilon_i \qquad \text{where, } \varepsilon_i \sim \text{iid}(0, \sigma^2) \text{ and } i = j,k \qquad [2.7]$$

where e_i is worker effort (input) or average output[34] and ε_i is a random component (luck). Greater effort is assumed to increase productivity but is unobservable to the employer. The employer only observes q and is unable to distinguish between the amount of effort expended by the worker and the amount of 'luck' involved in producing q. The probability of j winning can be expressed:

$$\Pi = \text{prob}(q_j > q_k) = \text{prob}(e_j - e_k > \varepsilon_k - \varepsilon_j) \qquad [2.8]$$

$$= \text{prob}(e_j - e_k > \delta) = G(e_j - e_k)$$

where $\delta = \varepsilon_k - \varepsilon_j$, $\delta \sim g(0, 2\sigma^2)$ and $G(\cdot)$ is the CDF of δ.

Each worker can increase the probability of winning by investing in skills and thus increasing e_i. Investing in skills is costly and the individual has to balance increasing the probability of winning and securing the prize with the cost of investment. Suppose that

[34] e can also be interpreted as the level of investment in effort.

the cost of effort is convex in effort and denoted $C(e_i)$ which is strictly increasing i.e. $C'(e_i)$, $C''(e_i) > 0$ and utility functions linear. There are two prizes of w_1 (awarded to the winner) and w_2 (awarded to the loser), where $w_1 > w_2$. Each worker chooses a level of effort input e^* to maximise expected utility:

$$\begin{aligned}\max_{e^*} EU(e^*) &= G(\cdot)\times U[w_1 - C(e^*)] + \{1 - G(\cdot)\}\times U[w_2 - C(e^*)] \\ &= G(.)\times w_1 + \{1 - G(\cdot)\}\times w_2 - C(e^*)\end{aligned} \qquad [2.9]$$

The model assumes a Nash-Cournot equilibrium and given identical workers *j* and *k*, their reaction functions are identical. Given symmetry then in equilibrium each worker supplies the same optimum level of effort i.e. $e^* = e_j = e_k$, and since there is a 50/50 chance of winning then $\Pi = G(0) = 0.5$.[35] Under these conditions the equilibrium condition can be expressed:

$$(w_1 - w_2)\frac{dG(0)}{de^*} = C'(e^*) \qquad [2.10]$$

This last expression is the *incentive compatibility constraint* (ICC) in this case and workers will supply effort if it is satisfied. If we define the pay spread: $\Delta w^* = (w_1 - w_2)$, and $g(0) = \frac{dG(0)}{de^*}$, then we can re-express [2.10] as:

$$\Delta w^* = \frac{C'(e)}{g(0)} \qquad [2.11]$$

From this last expression we see that workers will supply and invest in more effort the greater the spread between the winning and losing 'prize'. We also note that if the probability of winning decreases the spread required between the 'prizes' to elicit effort is larger. The model can be augmented to include risk-averse individuals who would prefer less risk and smaller pay differentials (Lazear and Rosen, 1981).

[35] Note that $G(0) \equiv \int_{-\infty}^{0} g(\varepsilon_k - \varepsilon_j)d\xi$ where ξ is the distribution function for δ and summates all instances where $\varepsilon_k < \varepsilon_j$.

The model also assumes a risk neutral firm operating in a competitive product and labour market. Competition for labour increases the total value of the prize to the point where it equals the firm's expected revenues i.e., $P\times(e_j + e_k) = w_1 + w_2$, where P is the unit price of output. In equilibrium this implies $P.e* = \frac{w_1 + w_2}{2}$ and substituting this expression into [2.9] (recalling that G(0) = ½), the worker's expected utility at the optimum investment strategy can be expressed as:

$$Pe^* - C(e^*). \qquad [2.12]$$

The firm selects w_1 and w_2 to maximise [2.12]:

$$[P - C'(e^*)]\times(de^*/dw_i) = 0, \quad i = 1,2. \qquad [2.13]$$

Expression [2.13] implies that $P = C'(e^*)$, we can rewrite [2.11] as:

$$\Delta w^* = \frac{P}{g(0)} \qquad [2.14]$$

Expression [2.14] shows that a firm's choice of Δw is constrained by the equilibrium price in both the labour and product market. All firms will offer workers the same level of expected utility. Firms offering workers Δw > Δw* will lose workers to firms offering Δw = Δw*, as workers will be supplying less effort in the latter. In contrast firms choosing Δw < Δw* will be driven out of business since the level of effort supplied by workers will be less than e^*. Note that expression [2.14] can be generalised to include n-contestants and k-promotions by replacing g(0) with the probability of finishing k^{th} among n-contestants.

Tournament Theory: Empirical Evidence

Tournament theory has been applied to executive pay in private sector firms with varying degrees of success.[36] For instance, Rosen (1986) examines a sequential tournament and finds that a large prize spread at the end of a career game offers the necessary incentive to provide effort at all stages of the game. O'Reilly, *et al.* (1988) using a sample of 105 US firms finds no evidence of tournaments but evidence counter to that predicted by the theory. They find that as the number of vice-presidents increase, the pay spread between senior executives and the president falls, which contradicts the implications of tournament theory. They do find some evidence that the pay of vice-presidents has a minimal influence on the pay spread but they interpret this in terms of equity considerations rather than a tournament effect. In addition they find that the pay of members of the board of directors has a positive influence on the compensation of the president. Main *et al.* (1993) find that the pay spread between the president and vice-presidents of US firms increases as we move up the executive hierarchy and it increases by 3% for every vice-president that enters a promotional tournament assuming that vice-presidents compete for the top job in the organisation. They take this result as evidence of tournaments in a promotion lottery. Bognanno (2001) confirms these findings and Eriksson (1999) finds a significant relationship between the pay differentials of managers at different grades in Dutch firms.

Although not strictly related to the pay of senior executives Coupe *et al.* (2003) find little evidence of tournaments in determining remuneration amongst economists in US economics departments. They conclude that the pay increase in the hierarchy of US economics departments is linked with productivity (standards) rather than tournament effects. Knoeber and Thurman (1994) find evidence of tournament in the US broiler chicken industry. They find that firms reward farmers on their relative performance: larger prizes induce better performance (measured by the weight of the chicken).

[36] Tournament theory has also been applied in the context of sports tournaments where it is found that effort increases as the winning 'prize' increases. For example, Ehrenberg and Bognanno (1990) found that the performance of contestants in a golf tournament improved with the value of the prize. However, Orszag (1994) found evidence contradicting their results. Sunde (2003) found that effort increases the more homogeneous the contestants in tennis tournaments. Simmons and Berri (2010) found evidence of tournament effects in basketball.

Of the few UK studies Conyon *et al.* (2000a; 2000b) find evidence of tournaments determining cash and total CEO compensation in 100 large companies quoted on the UK stock exchange. They conclude that the pay spread increases as they move up the executive hierarchy and increases with the number of participants in a tournament with each additional executive adding about 3.5% to the pay spread.[37] It is interesting to note that Chen *et al.* (2011) find no relationship between the number of contestants in the tournament and the level of executive pay for a sample listed Chinese firms.

Audas *et al.* (2004) examining the pay structure of large firms in the UK financial sector find that as the pay spread increases, workers expend more effort. They also conclude that as the incidence of luck falls in a promotional tournament the greater is the effort expended by participants. Devaro (2006) finds that large pay spreads, in a hierarchal organisation, increase effort for a cross section of UK firms. The model has been extended to cases where there are two or more prizes (Clark and Riis, 1998; Moldovanu and Sela, 2001). Clark *et al.* (2009) finds evidence of tournaments in investigating workers' well-being (job satisfaction) and pay grades.

It should also be recognised that a market for scarce executive talent also exits outside the confines of the firm. High executive pay may simply reflect the bidding for executive talent in a competitive labour market (Rosen, 1981; 1982; Gabaix and Landier, 2008; Tervio, 2008). It is also argued that the rise in US CEO pay is due to a rising trend in external appointments. Murphy and Zabojnik (2004; 2007) report that during the 1970s to the first half of the 2000s external CEO appointments in the US increased from 15 percent to almost one third. They state that this is a reflection of increasing demand for CEOs with general managerial skills that are needed to run modern corporations rather than firm specific skills that are not transferable between firms. Chan (1996) develops a tournament model that includes both internal and external candidates with firm specific and general human capital respectively. The firm is assumed to value both firm specific and general human capital. Therefore, in order to win the prize (tournament) the external candidate's general human capital will be valued, by the firm, more than the sum of the firm specific and general human capital possessed by the internal candidate. Since the firm has to compete for this general

[37] They also conclude that the 'tournament ratio' is greater in the US than in the UK.

human capital in competitive markets there will be bidding up of pay. Thus the external candidate will receive a pay greater than the incumbent and the pay spread is assumed to widen. It is also argued that the high pay offered to external candidates can potentially provide workers at lower grades with the incentive to expend effort in an attempt to win the tournament.

It is possible that VC pay is influenced by the pay packages received by those in a lower ranked position (e.g., a Pro-VC) or simply by the presence of highly paid academics and/or administrative staff (Ehrenberg, *et al.*, 2001; Dolton and Ma, 2003). Whether the pay offered to the VC motivates workers employed at lower ranks to strive for the top position will in part depend on the pay spread between the VC and a Pro-VC say (i.e., $W_{vc} - W_{pvc}$), the extent to which internal promotion is the 'norm' and the probability of securing the prize. However, it is impossible to know the number and percentage of Pro-VCs competing for the office of VC. Moreover, if an institution predominantly appoints external candidates then there may be less incentive for incumbent workers to invest in effort and strive for the top position. That is, institution specific knowledge may be less valued than general managerial capital (Murphy and Zabojnik, 2004). It is the case that most VC appointments are external but tend to be from within the HE sector. Moreover, a significant proportion of appointments in pre-1992 universities tend to be Pro-VCs from other pre-1992 universities, and post-1992 universities have a propensity to appoint candidates from other post-1992 universities. Pro-VCs, or their equivalent, in similar institutions may be seen as the 'heir apparent' (Breakwell and Tytherleigh, 2008). These 'recruitment strata' (Giddens, 1974) were found for pre-1992 universities between 1991 and 1997, when 78% of VC appointments were from other pre-1992 universities (Smith, *et al.*, 1999). For the period 1997 to 2006 the corresponding figure was 55% (Breakwell and Tytherleigh, 2008). Given that recruitment tends to be from 'within' a recruitment stratum and the pay of VCs is higher than that of Pro-VCs there may be tournament like 'effects' operating in the market for VCs. Pro-VCs may have an incentive to invest in effort if the 'reward' is promotion to the rank of VC in a similar organisation defined by the HEI's sub-sector in which the Pro-VC is employed.

Tournament theory suggests that the spread of the winning and losing prizes is larger the number of competitors and the chance (luck) of winning, which in turn is influenced

by the ability distribution of the pool of competitors. Moreover, we may expect a vacant VC position in a prestigious institution, noted for its quality in research and teaching to attract more candidates for the post than a lower ranked institution on the basis of these attributes. The likelihood of winning the 'tournament' and securing the post in a highly ranked institution would be lower in comparison, and pay will be higher in these institutions compared to a similar vacancy in a lower ranked institution.

To apply tournament theory to the pay of VCs requires data on the number of candidates competing for the post of VC and the current pay of candidates for the post. Such data are simply unavailable. However, it may be the case that the internal pay structure in regard to senior university officers and academics may influence the pay of the VC, and may be an indication of tournament effects at work. Data on the number of highly paid staff within a particular institution are publically available which potentially can be used to examine tournament effects.

The Theory Managerial Power

The third approach, the theory of managerial power, focuses on the influence that CEOs have over their own pay package which is determined by the governance structure of the firm. The strength of this influence will depend on their relationship with the board of directors and/or the remuneration committee (Crystal, 1991; Main and Johnston, 1993; Conyon, 1997; Newman and Mozes, 1999; Conyon, 2006; Frydman and Jenter, 2010). It is suggested that managerial power will be strong and compensation high for a number of reasons. First, when the board is weak and ineffective vis-à-vis the CEO for instance, when board membership is large (Acharya and Volpin, 2010; Morse, *et al.*, 2011); second, when outside directors have been appointed by the CEO or when the CEO is chairman of the board (Core, *et al.*, 1999; Hallock, 2002); and third, when there is no large outside shareholder who may subject the CEO to closer monitoring (Bebchuck and Fried, 2003; 2006). If such conditions are present it is argued that excessive executive pay arrangements can reflect adverse executive rent seeking behaviour rather than providing efficient incentives (Blanchard, *et al.*, 1994; Bertrand and Mullainathan, 2001a). There is also some evidence that the composition of the board or remuneration committee and the level of pay enjoyed by its constituent members can influence awards (Ezzamel and Watson, 1998; Forbes and Watson, 1993).

It may also be the case that the remuneration committee simply award generous remuneration packages to signal good managerial quality to outsiders and to limit retention and recruitment problems (Ezzamel and Watson, 1998; 2002). However, CEOs are constrained from unfavourable rent seeking behaviour by the amount of 'outrage' a proposed compensation package is expected to generate among relevant outsiders (Bebchuck and Fried, 2003; Ogden and Watson, 2004; Kuhnen and Niessen, 2012; Rayton, *et al.*, 2012). Such sentiments are likely to cost CEOs embarrassment and loss of reputation and will act to constrain excessive awards (Johnson, *et al.*, 1997). The remuneration committee may also be concerned with the legitimacy of CEO pay awards and may seek to use external pay benchmarks (e.g., CEO pay in comparable corporations) when setting CEO pay (Baker, *et al.*, 1988; Smith and Szymanski, 1995; Ezzamel and Watson, 1998; 2002). Such 'equity' concerns may be used to justify the pay awarded that outsiders may deem excessive.

In UK higher education the governing body[38] has ultimate responsibility for the conduct of the institution's affairs (Committee of University Chairmen, 2002). It is chaired by an independent chairman and its composition includes other lay members who comprise the majority of the board and institution officers typically drawn from the institution's own staff (academic and non-academic) including the VC and student representatives. The governing body also appoints a remuneration committee that reviews the pay of all professors and other senior (highly paid) staff including the VC. The VC and the chairman of the governing body are also members of the remuneration committee that also include lay members appointed from the governing body but its membership is considerably smaller (Tarbert, *et al.*, 2008). In reviewing salaries the VC is not present when his/her salary is under review and this is also true for other institution officers who are also members of the remuneration committee. In determining the VC's pay award the remuneration committee will use comparative pay information on salaries and benefits of VCs who head comparable institutions, typically in terms of type and size. The committee will also consider the VC's performance in terms of furthering 'corporate' goals when determining pay awards.[39]

[38] The governing body in pre-1992 universities is generally known as the 'university council' and in post-1992 universities it is referred to as the 'board of governors'.
[39] This process was confirmed through interviews with the secretaries of two separate remuneration committees.

It is possible that the composition of the senate/board of governors or remuneration committee and their relationship with the VC could influence the remuneration package as suggested by the theory of managerial power. Indeed outside pressure from government, the media and labour unions, could act as a constraint on excessive pay awards.

2.2.2 The Determination of VC Pay in UK Higher Education

Research into the determination of VC pay in UK higher education is limited in comparison to the literature on the determination of CEO pay in the private sector.[40] An early study by Bainbridge and Simpson (1996) using a cross section of 64 UK VCs and Principals of UK universities, for the academic year 1993/94, modelled pay as a function of forty-one variables capturing individual specific characteristics (including age, gender, educational background, and experience), and institutional factors (including the number of undergraduates/postgraduates, staffing levels, and financial variables to proxy performance). The model presented was poorly specified and appears to be contaminated by multicollinearity given the relatively high R^2 with only a few estimated coefficients reaching conventional levels of statistical significance. Specifically, they found few significant effects from their university size variables, but they did find some evidence of university income (income from research grants and fees) exerting a positive effect on pay. Furthermore, they found some evidence that the public status and the academic discipline of the VC exerting significant effects on pay. Moreover, they found that tenure (years in post) exerted a mild but significant negative effect, which ran counter to their priors. Their evidence also suggested that regional and economic indicators had significant but opposite influence on pay (i.e., average regional earnings had a positive influence on pay but regional house prices had a negative impact).

[40] There has been some empirical research in the US on the remuneration of college presidents. For example Ehrenburg *et al.* (2001) found a weak link between remuneration and institution performance (i.e. the presidents success in securing private donations). However, they do find some evidence linking the president's tenure and experience with pay and evidence linking institution size, type and income to remuneration though these effects are not robust across the specifications reported. Cornell (2004) found that elite US universities do not find it difficult to recruit suitable candidates for the position of president even though they are paid significantly less and have similar skills and abilities as top corporate CEOs.

Dolton and Ma (2003) using a similar formulation of the earnings function to that of Bainbridge and Simpson (1996), estimated an earnings relationship for VCs of UK HEIs using a data panel covering eight academic years from 1993/94 through 2001/02. They reported the estimates for two models: a 'pooled' OLS regression for the entire period and a random effects model at the institutional level to take account of the unobservable institution heterogeneity. Given the panel nature of their dataset up to 1007 observations and 49 explanatory variables were included in the various models reported although their sample size falls to 357 when reporting models that include both individual and institutional controls leading perhaps to imprecise estimates. Their models were better defined and had greater explanatory power vis-à-vis Bainbridge and Simpson (1996). This may be as expected given the larger dataset and the methodology employed. They found evidence that certain human capital variables (age, academic qualifications and fellowships), had positive and significant effects on pay although the magnitudes of these effects were relatively small. It is interesting to note that they found that VCs with an Oxbridge educational background received less pay than their counterparts without this attribute. They found little evidence that previous experience as a VC influenced pay. Moreover, they detected an unexpected negative relationship between VC pay and those previously appointed as Pro-VC.

In terms of institution characteristics Dolton and Ma (2003) found some evidence of university type, and size (proxied by the number of cost centres, size of the student body and staffing levels) influencing pay. However, the significance and impact of these variables on pay varied across the econometric specifications reported. They also included controls for institution performance. These included financial performance indicators and the results from the Research Assessment Exercise (RAE). They found some evidence that these controls have a positive and significant effect on pay. However, the use of the results from the RAE is debateable on the grounds that many of the institutions included in their dataset were not part of the RAE. Moreover, it is difficult to assess how RAE scores can be attributed to a specific VC since RAE is carried out over a period of about 4-5 years and it may be the case that several VCs could have held the office during this time period. It is also interesting to note that they found a negative relationship between pay and tenure, which was contrary to their priors, but confirms the findings of Bainbridge and Simpson (1996). Finally, they found that regional economic conditions exerted no influence on pay. The study also

investigated 'tournament effects' and found some evidence that the presence of highly paid staff increases VC pay in UK higher education.

It is also debatable whether a VC fixed/random effects estimator would have been more appropriate instead of the university random effects estimator employed in the study. It would appear that controlling for unobservable VC fixed/random effects rather than university fixed/random effects would be more appropriate and it would seem difficult to justify ignoring within-VC correlations across years. However, it is conceded that much of the variation in VC characteristics would be absorbed by the fixed effects, and it would be difficult if not impossible to estimate the effects of VC characteristics on their pay unless these characteristics vary over time. A VC random effects model would seem appropriate provided that the unobservable characteristics are not correlated with the observable characteristics. The use of a pooled OLS estimator was clearly not appropriate given the panel nature of the dataset employed. In view of these issues there must be some concern about the reliability of the findings presented by Dolton and Ma (2003).

In a more recent study, Tarbert *et al.* (2008) used VC salary data for the period 1997-2002, to model the relationship between VC pay and university performance employing dynamic pay change models. They also included controls for internal and external pay benchmarks. In contrast to Dolton and Ma (2003) they found no evidence that VC pay is influenced by observable performance measures (such as university income and student recruitment). This may not be surprising given the poor explanatory power of first difference pay change models regardless of the definition of pay used and the performance measures employed (Conyon, *et al.*, 1995). However, they did find a positive and significant relationship between VC pay and the presence of 'highly' paid staff in the institution[41], and the pay of VCs heading comparable higher educational institutions. Moreover, when their sample was split between pre-1992 and post-1992 universities, they found evidence that changes in VC pay were related to changes in research income, changes in the number of postgraduate students for pre-1992 universities, and changes in the total number of students for post-1992 universities. These results were interpreted as being loosely 'mission' relevant.

[41] 'Highly paid' was defined as earning over £50,000. Whether this is indeed 'high pay' is debatable; mean academic pay over the sample period covered was about £33,000 (ASHE (various years)).

2.2.3 Summary

The foregoing review suggests that CEO pay can be explained in terms of human capital, agency theory, tournament theory, and the theory of managerial power. This literature offers insights into the possible determinants of VC pay. The data required to rigorously test these theories in the context of VC pay is seldom available publically. However, the data employed in this essay do allow several predictions from these theories to be tested. Specifically, the effect that internal pay structures, institution performance and remuneration committee pay setting policy has on VC pay.

The limited literature that exists on VC pay suggests that VC human capital, university performance and size, and the institution's internal pay structures and external pay benchmarks are relevant considerations in the pay determination process. The difficulty in determining how university performance indicators employed in these studies can be attributed to the VC has been alluded to above.

Furthermore, it is not unreasonable to expect that VCs are motivated agents and care about the 'mission' of the institution they run. It may therefore be more appropriate to examine the relationship between achieving mission or corporate goals and VC pay, such as success in widening participation and securing institutional growth. These objectives appear regularly in university mission statements and/or strategic plans and their effect on VC pay (to my knowledge) has not been empirically researched. In the empirical section of this essay we define a parsimonious model to investigate pay-performance sensitivity using variables that are directly related to the institution's mission and its corporate goals.

2.3 VC Pay in UK Higher Education 1994/95-2008/09

Since 1994/95 HEIs have been formally required to disclose details of the pay of their VC[42] and other highly paid staff although some universities made this information available in the academic year 1993/94. Data on VC annual pay were obtained from the *Times Higher Education Supplement (THES)* and university financial accounts. From the academic year 1993/94 the *THES* has published annual salary information for VCs derived from data published in an institution's annual accounts (see appendix B1 for further details on the data sources used). These annual data cover the salary paid from 1st August in a particular year to 31st July the following year. It is important to note that the salary reported include any performance-related pay, an estimated value of benefits in kind (e.g. subsidised accommodation, a university-provided car, medical insurance and subsidised loans and any compensation for loss of office) but exclude pension contributions made by the institution. It is not possible to distinguish between the elements that make up the final pay from the information provided. This should be borne in mind when interpreting the results presented in section 2.7.

We have information on the pay of the 325 VCs who headed the 136 UK HEIs, for the period 1994/95 through 2008/09 that includes 35 leading 19 colleges of the 'Arts' (Art, Music and Drama colleges). The overall distribution of pay is first described followed by a description of the pay data that are employed in the empirical analysis. The pay data employed are transformed into real terms using RPI (1998=100).[43] It should be noted that for reasons of comparability and data availability VCs that lead post graduate institutions, medical and business schools, the Open University and colleges of the 'Arts' and small specialist HE colleges (e.g., the institutes that form London University's school of advanced studies) are excluded from the empirical analysis due to their atypical student intake. It should be recalled that there have been several significant mergers between HEIs over the sample period (see appendix A2) and as a result certain institutions are no longer in existence (e.g., UMIST and the University Of Wales College Of Medicine). The pay of VCs that administered these institutions is also excluded from the analysis.

[42] It should be noted that several arts and drama colleges have merged to form a larger 'federal' body (e.g. the University of the Arts, London) and information on the pay of the heads of constituent colleges is only available up to the academic year 2005/06.

[43] Retail Price Index accessed at http://www.statistics.gov.uk/statbase/TSDdownload2.asp

2.3.1 The Distribution of VC pay 1994/95-2008/09

The distribution of VC pay (including the pay of the leaders of colleges of the Arts) and associated summary statistics for each academic year from 1994/95 through 2008/09 is reported in table 2.1. In section (i) of table 2.1 we see that the mean pay of all VCs over the sample period is £120,770 in 1998 prices (see last row). On average VC pay increased by just over 70.5% in real terms which represents a 3.9% real annual increase. However, as is evident from section (ii) of the table the increase in pay is not evenly spread across all VCs. It is instructive to note that many of those in the bottom 20th percentile are VCs that lead former university colleges and colleges of HE that were granted university status post 2003. VCs in this part of the pay distribution received a 75.4% increase in their real pay over the sample period the largest relative increase of any group in the pay distribution and represents a 4.1% real annual increase. In comparison those VCs at the top end of the pay distribution, who tend to be the heads of large pre-1992 and post-1992 universities, received a real pay increase of about 71%, not the largest increase but sizeable. The table also reveals that VC mean and median (50th percentile) real annual pay were very similar over the period which suggests the absence of any significant outliers.

Over the fifteen year period covered by these data the dispersion in VC pay increased by about 15.2%.[44] The largest dispersion in pay is found to be in the academic year 2000/01[45] and can be attributed to a small group of VCs, of 'prestigious' institutions, receiving substantial end of term payments. For instance, in the academic year 2000/01, Sir John (Charles) Kingman, the then Vice Chancellor of University of Bristol, received a substantial end of term payment of £236,877, an increase in real terms of 95% on his previous year's salary. We also note that the Gini coefficient has increased by two points over the sample period which represents a 17% increase in the index. This would suggest an increase in inequality of pay across the pay distribution and this effect is significant at the 5% level (t = 2.07).[46]

[44] Given that both the mean and standard deviation has increased over the sample period by 70.5% and 85.7% respectively the coefficient of variation = 15.2%.
[45] Coefficient of variation =24.6%.
[46] Note that the standard error for the Gini in 1994 is 0.007 and the standard error for 2009 is 0.008

Table 2.1 Distribution of VC Pay 1994/95 to 2008/09 (£ in 1998 prices)

		(i) Summary Statistics				(ii) Percentiles									
Year	**N**	**Mean**	**St.Dev**	**Min**	**Max**	**q10**	**q20**	**q30**	**q40**	**q50**	**q 60**	**q70**	**q80**	**q90**	**Gini**
1994/95	136	94,972	19,183	54,628	141,117	67,028	76,479	85,753	89,590	96,809	99,423	103,793	109,911	120,837	0.116
1995/96	136	98,290	20,442	58,049	152,145	68,385	80,750	88,544	93,665	99,673	104,546	108,707	116,281	124,389	0.117
1996/97	136	100,482	20,277	60,402	149,671	71,507	78,602	92,155	97,140	101,360	106,559	113,565	116,874	126,493	0.114
1997/98	136	100,798	20,349	60,000	147,000	71,294	81,000	91,000	96,800	102,231	107,200	114,000	119,600	127,300	0.115
1998/99	136	104,576	21,888	49,227	180,469	72,763	86,445	95,632	98,679	104,541	112,277	115,232	125,671	133,944	0.117
1999/00	136	107,515	21,320	60,262	154,004	77,069	88,270	96,611	103,116	107,310	112,873	118,612	127,153	137,360	0.113
2000/01	136	113,429	27,869	50,759	236,877	79,420	89,524	97,947	107,911	110,919	119,379	123,985	136,110	147,578	0.133
2001/02	136	117,709	25,116	68,414	201,545	82,412	94,116	106,343	112,791	117,414	122,717	129,132	137,383	150,984	0.120
2002/03	136	122,744	28,298	70,982	225,526	86,035	95,960	108,810	117,525	122,160	125,792	131,991	147,356	158,677	0.127
2003/04	136	127,632	30,140	71,547	227,728	91,013	103,433	111,898	119,536	127,581	130,878	136,114	150,597	169,188	0.131
2004/05	136	133,309	32,689	63,633	237,563	90,902	104,606	118,056	126,417	133,205	139,164	143,711	160,781	173,930	0.136
2005/06	136	138,068	32,003	72,363	238,471	94,092	110,676	123,347	131,290	137,261	144,069	152,046	164,962	179,758	0.130
2006/07	131	143,084	32,116	79,636	243,640	99,111	115,662	126,630	136,726	141,656	149,946	158,606	165,628	181,666	0.134
2007/08	131	150,770	35,845	79,630	266,716	103,391	122,059	134,074	141,487	146,367	153,956	166,085	176,551	198,544	0.131
2008/09	129	161,942	35,628	82,289	261,463	115,295	134,162	147,128	155,865	159,698	165,568	178,470	188,249	206,426	0.136
% change	N/A	70.5	85.7	50.6	85.3	72.0	75.4	71.6	74.0	65.0	66.5	71.9	71.3	70.8	17.2
N / Mean	*2023*	120,770	33,886	49,226	266,716	79,926	92,546	101,000	109,038	117,000	125,081	134,682	146,751	165,523	0.125

Notes: Post graduate institutions, medical and business schools, the Open University and small specialist colleges are excluded.

2.3.2 VC Pay by Institution Type 1994/95-2008/09

UK universities differ markedly in terms of their size and structure one would expect VC pay to reflect the size, type, and complexity of the organisation for which they have ultimate responsibility. The pay data employed in the empirical analysis include the pay of VCs that administered pre-1992, post-1992 and post-2003 universities from the academic year 1994/95 to 2008/09 (inclusive). We have data on the pay of 141 VCs who led 55 pre-1992 universities, 92 who led 39 post-1992 universities and 57 who led 23 post-2003 universities. This provides information on the pay of 290 VCs who led 117 universities over the sample period. The pay of those leading institutions classified as colleges of the 'Arts', which do not enter the empirical analysis, can be found in appendix B2 for reasons of comparison. Table 2.2 reports the mean pay of VCs that have headed the three university types that enter the empirical analysis. We first note that the mean real pay of these VCs is £125,464 and VC pay increased by about 70% over the sample period which represents a 3.8% real annual increase similar to that noted earlier for all heads of UK HEIs. We also note a wide variation in the mean pay across the different university types. The mean pay of VCs of pre-1992 institutions is £135,985 and is higher than the pay received by VCs of the other university types. In particular their pay was significantly higher than the pay of £126,918 received by their counterparts in post-1992 universities ($t = 4.12$). In general we also see that the median pay was near to that of the mean in most years and the difference does not appear large enough to suggest problems with outliers. It is also instructive to note that the mean pay of those leading colleges of the 'Arts' is lower than that received by those leading universities, see appendix B2.

Table 2.2 also reveals that VCs of pre-1992 received the highest increase in real pay of 79% over the period, rising from an average of £102,173 in 1994/95 to £183.209 in 2008/09. In contrast, VCs in post-1992 universities were awarded the smallest increase over the sample period of 58%, rising from £103,685 to £163,792 over the period. It is also the case that in almost every year VCs of post-1992 universities received, on average, a lower year on year increase in pay, in comparison to their pre-1992 university counterparts. Vice chancellors of post-2003 universities received a 67.5% increase in pay over this period and between 2003 and 2009 they received an increase in pay in the

Table 2.2 VC Pay by University Type 1994/95 to 2008/09 (£ in 1998 prices)

Academic Year	All Universities (ex. Arts colleges)		Pre-1992 university		Post-1992 university		Post-2003 university	
	Mean	*Median*	Mean	*Median*	Mean	*Median*	Mean	*Median*
1994/95	98,053 (17,166)	*98,330*	102,173 (15,144)	*101,607*	103,685 (14,185)	*100,515*	78,657 (12,022)	*76,859*
1995/96	101,834 (17,796)	*102,412*	106,667 (15,237)	*105,983*	106,729 (14,714)	*102,728*	82,225 (14,320)	*76,957*
1996/97	104,161 (18,016)	*105,047*	110,475 (15,241)	*111,703*	108,092 (13,249)	*105,497*	82,941 (14,613)	*76,958*
1997/98	104,691 (17,901)	*105,000*	112,034 (16,115)	*113,000*	107,029 (11,519)	*104,727*	83,222 (13,639)	*82,000*
1998/99	108,387 (19,915)	*107,352*	116,970 (18,119)	*115,231*	110,041 (11,599)	*107,352*	85,164 (16,805)	*86,634*
1999/00	111,408 (18,963)	*110,959*	119,695 (17,504)	*118,612*	113,370 (11344)	*111,916*	88,038 (13,284)	*86,567*
2000/01	117,627 (26,432)	*114,678*	127,399 (27,218)	*123,138*	121,240 (16,272)	*120,318*	88,157 (15,058)	*88,970*
2001/02	122,367 (22,947)	*120,187*	132,079 (22,638)	*128,508*	124,947 (13,005)	*122,961*	94,617 (13,241)	*94,301*
2002/03	127,728 (26,203)	*123,994*	138,881 (27,305)	*129,385*	130,309 (13,245)	*128,487*	96,472 (12,292)	*92,547*
2003/04	133,018 (27,998)	*130,878*	145,819 (28,686)	*140,476*	132,768 (17,532)	*130,006*	102,523 (14,590)	*102,346*
2004/05	139,182 (30,381)	*137,446*	154,516 (30,748)	*150,173*	136,174 (19,568)	*135,791*	107,269 (15,217)	*108,763*
2005/06	144,497 (28,730)	*140,845*	159,387 (28,236)	*158,706*	142,209 (16,976)	*139,793*	112,327 (16,561)	*114,428*
2006/07	147,528 (29,968)	*146,657*	160,451 (28,062)	*160,850*	147,956 (24,587)	*143,021*	115,903 (17,169)	*115,906*
2007/08	154,854 (33,338)	*151,884*	170,031 (33,149)	*169,877*	155,433 (21,830)	*146,804*	117,583 (17,648)	*119,065*
2008/09	166,618 (32,964)	*162,604*	183,209 (30,920)	*181,423*	163,792 (22,300)	*158,559*	131,736 (23,447)	*129,588*
% Change	69.9		79.3		57.9		67.5	
Mean pay 1994-2009	125,464 (32,550)	*120525*	135,985 (34,429)	*129,925*	126,918 (24,829)	*124,000*	97,837 (21,949)	*95,654*
Universities	117		55		39		23	
VCs	290		141		92		57	
Observations	1755		825		585		345	

Note: Standard deviations are in parentheses

order of 36.5% compared to an increase of 20.2% in the earlier period 1994-2002. This may reflect a need to attract or retain experienced VCs with the talent needed to run

these ‘new’ universities and with knowledge of the modern environment in which universities compete. It is also worth noting that the heads of institutions classified as a college of the ‘Arts’ received a similar percentage increase in pay compared to their counterparts in post-1992 universities (58.1%) with their actual pay increasing from £75,841 to £119,858 over the period, see appendix B2.

Although not reported in table 2.2 the mean real pay of male VCs was £121,454 which is significantly higher than the £115,564 received by female VCs over the sample period ($t = 2.51$, [p-value = 0.012]), see appendix B3. However, although the gender pay differential is just under £5,890 the table reveals that the mean and median pay of male VCs has been above that of their female counterparts over the entire sample period and in relative terms male pay increased at a greater rate (73%) than female pay (65%). These figures translate to an annual increase of 3.9% for males, and 3.6% for females. The dispersion of pay has been far greater for male than for female VCs.

2.4 VC Pay-Performance Data

The primary focus of this essay is to examine the relationship between VC pay and university performance. We use several measures of performance that include variables that capture success in meeting the institution’s mission and variables that capture success in attracting funds for teaching and research, together with other institution specific contextual data (see appendix B4 for the definitions of university contextual variables and appendix B1 for data sources). It should be recalled that mission-based performance data are only available from 1997/98 onwards. These data are only available for the whole period under review for the pre-1992 and post-1992 universities included in the sample. Thus, the analysis focuses on the pay-performance relationship for VCs of these two university types. For this reason we exclude post-2003 universities from the analysis. Moreover, focusing the analysis on the pay-performance relationship for VCs of pre-1992 and post-1992 universities provides a more homogeneous group of institutions, and furthermore, it is the pay of these VCs that attract most public criticism. We estimate a parsimonious model so that the relationship between VC pay and performance is made precise, and multicollinearity is minimised. For instance, we detected a high degree of correlation between university size variables and income

variables (see below). This sub-sample includes the pay 193 VCs who led 95 pre-1992 and post-1992 UK universities over the period 1998/99 to 2009/09 (inclusive). Once allowance is made for missing values these data represent an unbalanced panel consisting of 1045 observations. The associated summary statistics are detailed below in table 2.3.

The mean pay over the sample period in original monetary units (the natural log of real pay is employed in the empirical analysis) is £141,567 in 1998 prices and on average VCs of pre-1992 universities are paid more (£146,674) than their counterparts in post-1992 universities (£134,234). We also employ a variable that captures the pay awarded to VCs of comparable universities (i.e., an external pay benchmark). This variable is constructed for each year in the dataset according to the type of university and the size of the institution determined by the total number of FTE students (undergraduate and postgraduate). By university type, each university is arranged in ascending order according to the total number of FTE students. The universities are then grouped into fives starting from the smallest institution. Within each group and for each VC the average group pay is calculated excluding the pay of the VC under focus. This variable is calculated for all VCs and its natural log is used to define the external benchmark pay which we assume remuneration committees potentially use to inform equitable and fair pay awards.[47] We argue that it is unlikely that remuneration committees will know the current pay awarded to VCs in comparable institutions. However, we assume that they will have information on the previous year's pay awards. To capture this effect, our measure of the external pay benchmark is lagged by one year. We expect VC pay to be positively related to this variable indicating that as the comparable pay of relevant VCs increase, so too will the pay of the VC under consideration. We note that the mean benchmark pay is £135,955 and is highest for VCs of pre-1992 universities at £146,674.

[47] This was confirmed by interviews with the VC's personal assistants (PAs) in two universities. It would appear that in setting VC pay one important source of information available to remuneration committees is the pay of VCs (assumed to be the previous year's pay) in 'comparable' institutions. We have no access to this information but in the interviews PAs hinted that university type and size of institution by number of students were important considerations when setting pay.

Table 2.3 Summary Statistics: Pay-Performance Measures 1998/99-2008/09

	All Universities	Pre-1992 Universities	Post-1992 Universities	z-score/t-stat [a]
VC Pay				
Real pay (£ in 1998 prices)	141,567 (30,658)	146,674 (33,702)	134,234 (23,858)	6.58
(ln) Real pay	11.838 (0.209)	11.870 (0.227)	11.792 (0.171)	5.99
Real external benchmark pay (£ in 1998 prices)	135,955 (22,351)	140,352 (23,752)	129,642 (18,444)	7.83
(ln) Real external benchmark pay	11.8079 (0.159)	11.838 (0.167)	11.763 (0.136)	7.63
VC Characteristics				
Mean age (years)	58.10 (4.21)	58.29 (4.28)	57.82 (4.11)	1.76
Age (years) <=55	0.254	0.234	0.282	-1.76
Age (years) 56 -60	0.446	0.438	0.457	-0.59
Age (years) > 60	0.300	0.328	0.261	2.32
$\chi^2_{(2)} = 6.281$ [b] $[p = 0.000]$				
Tenure expired (years)	7.968 (4.270)	7.354 (3.755)	9.021 (4.901)	-2.13
Tenure (years)	5.504 (4.024)	4.942 (3.523)	6.312 (4.533)	-5.49
University Characteristics				
Pre-1992 University	0.589	*Not Applicable*	*Not Applicable*	
Proportion of staff earning more than £70,000	0.025	0.035	0.011	2.67
Number of cost centres	20.07 (5.17)	20.02 (5.88)	20.14 (5.64)	-0.36
Real house price (£ in 1998 prices)	129,286 (55,428)	131,822 (55,323)	125,645 (55,441)	1.77
(ln) house price	11.678 (0.431)	11.699 (0.432)	11.648 (0.430)	1.86
Mission Based Performance Variables				
Merger [c]	17 (0.016)	14 (0.023)	3 (0.007)	1.98
Hit benchmark for comprehensive schooled students	0.692	0.539	0.911	-12.83
Hit benchmark for students from low participation areas	0.427	0.331	0.564	-7.49
Financial Based Performance Variables				
Real Funding Council Grants (£000s in 1998 prices)	47,818 (27,346)	52,739 (33,093)	40,752 (12,867)	7.13
(ln) Real Funding Council Grants	10.626 (0.556)	10.671 (0.662)	10.561 (0.344)	3.18
Real Tuition Fees (£000s in 1998 prices)	30,146 (15,903)	32,505 (18,394)	26,757 (10,545)	5.84
(ln) Real Tuition Fees	10.171 (0.572)	10.219 (0.632)	10.102 (0.464)	3.27
Real Research Council Grants (£000s in 1998 prices)	22,143 (33,692)	35,481 (38,599)	2,990 (2,107)	17.41
(ln) Real Research Council Grants (£000s)	9.009 (1.519)	9.906 (1.189)	7.721 (0.879)	32.40
Number of Universities	95	56	39	
Number of VCs	193	119	74	
Number of observations	1045	616	429	

Notes to table:

(a) z-scores are used to test differences in proportions between old and new universities, and t-stats are used to test differences in means. The appropriate critical value at the 0.05 level using a two-tailed test is ± 1.96.

(b) Chi-squared statistic with two degrees of freedom is used to test the assumption of independence of age categories across university type.

(c) Actual number.

(d) Standard deviations are reported in parentheses for continuous variables.

It was noted in the introductory chapter that the UK higher education sector grew considerably over the past half century and a major policy focus was on widening participation. Many universities now have missions to 'widen participation' through attracting students from socially disadvantaged groups and from areas where university participation is low. We use two measures to identify if institutions achieve such aims: the percentage of students they enrol from areas where there has been traditionally low participation in higher education (i.e., areas where participation rates are less than two-thirds of the national figure) and the percentage of young students enrolled from state comprehensive schools. Each university is given a 'benchmark' which is expressed as a percentage of their first year student enrolment from state comprehensive schools and underrepresented areas. The 'benchmark' used is calculated as a sector average which is adjusted for the university's subject mix, and students' qualifications and age on entry.[48] We construct two dummy variables based on this information which equals one if the university meets its relevant benchmark figure or zero otherwise. The data reveal that just over 69% of all universities achieve their benchmark figure in attracting students from comprehensive schools but do less well in attracting students from low participation areas with just under 43% of universities achieving their benchmark figure. Moreover, it appears that post-1992 universities have been more successful in widening participation for these groups of students. We would expect there to be a positive relationship between VC pay and success in this regard.

Over the eleven year period covered by these data institutions have invested heavily in developing and expanding their teaching and learning environment. Such expansion can be brought about by investment in new facilities both in the UK and abroad or by merging with other institutions. These developments can also be seen as part of the university's mission and successful expansion through a merger or acquisition may be attributed to successful leadership and good strategic management. We would expect VC pay to reflect such success. In these data we note that there have been 17 instances of major mergers over the period. It is clear that pre-1992 universities were more active in this regard.

[48] See HESA: www.hesa.ac.uk – 'performance indicators' tables T1a, T1aii, T1b, Tbii, and Tc, for further information on the calculation of these measures.

It is expected that VC pay is positively related to university income, as a reward for sound financial management and leadership. We employ three income variables to test this proposition. These are income from: funding council grants; tuition fees and educational grants; and research grants and contracts and are transformed to natural logarithms in the empirical analysis. The actual sample mean income from these sources is about £47.8m, £30.1m and £22.1m respectively. It is clear that pre-1992 universities receive significantly more income from these sources than post-1992 universities particularly in the form of research grants and contracts.

Other observable measures of institution performance are the results from the Research Assessment Exercise (RAE) and the Teaching Quality Assessment (TQA). The former is a measure of university research performance and the RAE scores are used to allocate government research funds. The RAE was initially conducted over a four/five year cycle commencing in 1994. However, there has been a gap of seven years since the publication of the results from the most recent exercise in 2008 and the previous one in 2001. There have also been major changes in the methods used to calculate the RAE scores that make the published figures difficult to compare over time.[49] We transformed the three sets of RAE scores in the data to percentiles, based on research performance, to try to overcome this problem but this did not yield a robust or intuitive set of results. Also in many cases, we are unable to attribute RAE scores to the effort of a single VC. For instance, due to the length of time between the 2001 and 2008 RAE there have been instances where two or more VCs have occupied the relevant office. Finally, the TQA is an assessment of teaching quality in a selection of subjects. The review is not repeated for most subjects and for many institutions these results are not available. It is for the above reasons that these variables do not feature in our empirical analysis.

We noted in section 2.2 that research finds that the size of the firm is an important determinant of executive pay. To capture university size and complexity we use the number of cost centres and expect it to impact positively on VC pay. We do not include FTE students in this specification due to its high correlation with the three income

[49] See Higher Education Funding Council for England for a description of the methods used to calculate the RAE score available at http://www.hefce.ac.uk/research/ref/reform/

variables.[50] The inclusion of FTE students and the three income sources resulted in these variables becoming less significant and reversals of signs on the estimated coefficients and the R^2 was necessarily high. This pointed to the possibility of multicollinearity between these variables. As we focus on exploring the separate relationship between the income variables and VC pay, as done in previous research FTE students were dropped from subsequent analysis (see, Tarbert, *et al.*, (2008)). The correlation between the number of cost centres and the income variables was less pronounced and it was felt that the use of the number of cost centres as the size variable would give more precise estimates than using FTE students.[51] The average number of cost centres in these data is around 20 and there is no significant difference between the number of cost centres in pre-1992 and post-1992 universities.

We noted earlier that tournament theory suggests that the presence of highly paid staff in an institution will drive up the pay of CEOs or directors. In the context of a university, highly paid staff generally comprise of senior executives and professors. The pay of senior executives and professors is not publically available but we do have information on the number and proportion of staff earning in excess of £70,000 for all years.[52] About 2.5% of university staff earn over £70,000, but we note that there are significantly more staff earning in excess of this amount in the pre-1992 than in the post-1992 universities.

Human capital variables such as age, tenure, educational background, and experience are expected to enhance the pay of the VCs. The methodology that is adopted to examine the pay-performance relationship does not allow for the inclusion of variables that are time invariant such as gender and previous educational qualifications. However, we examine the relationship between VC pay and their personal characteristics in the secondary analysis. We include age and tenure of the VC in the analysis, which vary

[50] The correlation between the number of FTE students and tuition fee income was found to be 0.70 [*p*-value=0.00] and between FTE students and funding council grants it was 0.89 [*p*-value=0.00].
[51] The correlation between: cost centres and FTE students was found to be 0.46 [*p*-value=0.00]; cost centres and funding council grants was 0.41 [*p*-value=0.00]; cost centres and tuition fee income was 0.41 [*p*-value=0.00].
[52] Although universities reported the number of staff earning over £100,000 over the sample period, many did not or reported a zero figure in their annual financial statements. This was generally the case with many post-1992 universities. The numbers/proportions of staff earning over £100,000 were very small, in many cases less than 1% except for a few large civic universities. The variable proved insignificant in the regressions undertaken and was omitted from further analysis. Most universities registered some staff earning over £70,000 over the period and this variable was used in the regressions reported.

over time. It is possible that VC pay is positively associated with age (Dolton and Ma, 2003) we investigate if this is still the case. The age of VCs in the data employed is defined as the age in the academic year under study minus the year of birth. The average age is just over 58 years and there is no significant difference in mean age between VCs heading these two types of university, but we note that pre-1992 universities appoint proportionally more VCs that are over sixty years of age. Their average length of tenure is just under eight years for those VCs who have completed their term in office and five-and-a-half years over the entire sample. We note that for VCs that have completed their term in office those in post-1992 universities on average stay in post just over a year and a half longer than their counterparts in pre-1992 universities.

Local economic conditions may also impact on VC pay and we also include county-level house prices to account for this possibility. The log of average county-level house prices is used to capture local economic conditions that may impact on pay.

2.5 VC Pay-Personal Characteristics Data

The secondary motivation for this research is to empirically examine the relationship between VC personal characteristics. The pay of the 290 VCs who led the 117 universities over the sample period from 1994/95 through to 2008/09 (inclusive) described in section 2.3.2 is used to examine the pay-characteristics relationship. Thus the data employed spans fifteen years.

First, we recall that the real mean VC pay over the period, in original units, is £125,464 in 1998 prices and VCs of pre-1992 universities are paid more, on average, than VCs in other university types (see table 2.2). We also include an external pay ‘benchmark’ the reason for its inclusion and its construction was described in the previous section and note that the mean benchmark pay is £121,222 which again is highest for VCs administering pre-1992 universities.

The personal characteristics of 35 individuals who led colleges of the 'Arts' are also reported for comparative reasons.[53] Specifically, we use information on VCs' age, gender, educational background (i.e., the type of university attended as an undergraduate, and the academic discipline studied), tenure, work experience and academic/public esteem (e.g., the award of a honorary degree or the bestowment of a Knighthood). The definitions of these variables can be found in appendix B5. This information was compiled from various sources (see, appendix B1 for details), including *Who's Who – An Annual Biography (*various years*),* and *Who's Who of VC's Presidents and Rectors of Commonwealth Universities (ACU's Who's Who,* various years*).* Information on VCs that were not in these publications was obtained from alternative bibliographical sources (e.g., *Who's Who in British Art*), official institution documents, press releases or through personal contacts. From these sources it was possible to construct a dataset that provides rich information on individual specific characteristics. It should be noted that the characteristics of the heads of postgraduate institutions, medical schools, the Open University and small specialist colleges are excluded due to data availability and the atypical nature of their student intake. We focus the discussion that follows on the summary statistics for pre-1992, post-1992 and post-2003 universities which are reported in table 2.4 below.

Gender and Age

Farnham and Jones (1998) reported that between 1990-1997 male VCs accounted for 96% of all university heads. Breakwell and Tytheleigh (2008) for the period 1997-2006 reported a figure of 85%. The data collected in the present study is in broad agreement with these observations. Moreover, previous research suggests that male VCs earn more than their female counterparts (Dolton and Ma, 2003). We note that just under 88% of all VCs (excluding those leading 'Arts' colleges) are male. Although these data reveal a distinct male dominance of the profession, male VCs are relatively more represented in pre-1992 universities and females in post-2003 universities. We also note that over the sample period the proportion of male VCs leading pre-1992 universities fell from 98% to 87%, those leading post 1992 universities fell from 90% to 82% and those leading post-2003 universities fell from 91% to 70% (see, appendix B6).

[53] This represents about 83% of all HEIs in the UK higher education sector in 2008/09.

Table 2.4 VCs' Personal Characteristics by Institution Type 1994/95-2008/09

Variable	All Universities (ex. Arts) (i)	Pre 1992 (ii)	Post 1992 (iii)	Post 2003 (iv)	Colleges of Arts (v)	Z score t-stat [a] (vi)
Gender and Age						
Male	0.877	0.941	0.856	0.762	0.925	5.67
Age (years)	57.283	58.075	57.117	55.669	55.970	4.88
	(4.581)	(4.361)	(4.372)	(4.982)	(5.253)	
Age <= 55	0.329	0.254	0.349	0.472	0.437	-4.28
Age 56 to 60	0.421	0.441	0.426	0.368	0.384	0.53
Age >=61	0.250	0.305	0.225	0.160	0.179	3.85
$\chi^2_{(4)} = 62.07$ [$p = 0.000$] [b]						
Age at appointment	51.739	53.233	50.725	49.889	49.306	11.27
	(4.717)	(4.102)	(4.877)	(4.720)	(5.021)	
University Attended (UG) [c]						
Ancient/civic	0.447	0.399	0.458	0.482	0.163	-1.29
London	0.139	0.136	0.121	0.203	0.180	-0.22
1960s	0.067	0.058	0.065	0.046	0.031	-1.00
Polytechnic	0.042	0.008	0.118	0.000	0.028	-9.04
Overseas Educated	0.051	0.086	0.030	0.017	0.094	5.18
Other	0.013	0.000	0.000	0.070	0.292	0.00
Oxford/Cambridge	0.241	0.313	0.208	0.182	0.212	5.01
$\chi^2_{(10)} = 155.29$ [$p = 0.000$] [b]						
University Attended (PG) [d]						
Ancient/civic	0.402	0.401	0.369	0.453	0.191	1.43
London	0.173	0.122	0.164	0.310	0.272	-2.58
1960s	0.127	0.115	0.168	0.087	0.004	-3.32
Polytechnic	0.035	0.000	0.089	0.026	0.000	-8.89
Overseas Educated	0.043	0.065	0.036	0.017	0.112	2.39
Other	0.000	0.000	0.000	0.000	0.283	0.00
Oxford/Cambridge	0.220	0.297	0.174	0.107	0.138	5.68
$\chi^2_{(8)} = 106.65$ [$p = 0.000$] [b]						
Academic Specialism						
Engineer	0.118	0.179	0.082	0.036	0.000	5.26
Social Scientist	0.497	0.401	0.538	0.658	0.220	-6.58
Arts	0.056	0.046	0.049	0.089	0.780	-0.70
Natural Scientist	0.329	0.374	0.331	0.217	0.000	2.71
$\chi^2_{(6)} = 115.65$ [$p = 0.000$]						
PhD	0.742	0.828	0.694	0.620	0.332	6.40
Academic and Public Esteem						
Professor	0.870	0.935	0.844	0.762	0.858	7.25
FRS	0.077	0.160	0.007	0.000	0.022	9.91
Honorary degree	0.455	0.633	0.396	0.130	0.272	9.57
Knighthood	0.118	0.196	0.063	0.017	0.112	7.67
Work Experience [e]						
Civil Service	0.080	0.132	0.053	0.000	0.059	4.99
Education	0.015	0.007	0.000	0.061	0.041	2.39
Academic	0.864	0.808	0.897	0.939	0.721	-5.07
Industry	0.041	0.053	0.050	0.000	0.179	0.84
$\chi^2_{(6)} = 43.72$ [$p = 0.000$]						
Overseas Appointment	0.041	0.070	0.014	0.017	0.004	5.23
Externally appointed	0.723	0.837	0.648	0.580	0.783	9.83
Ex VC	0.094	0.137	0.073	0.029	0.075	1.56
Pro-VC	0.520	0.446	0.742	0.371	0.201	-7.66
Tenure expired (%)	0.114	0.125	0.107	0.101	0.097	1.31
Tenure - term expired (years)	8.303	7.540	9.153	9.143	10.192	-6.66
	(4.572)	(3.816)	(4.842)	(5.821)	(5.492)	
Tenure - all VCs (years)	5.558	4.842	6.415	5.817	6.779	-7.14
	(4.046)	(3.431)	(4.445)	(4.378)	(4.688)	
Number of institutions	117	55	39	23	19	
Number of VCs	290	141	92	57	35	
Number of Observations	1755	825	585	345	268	

Notes to table:

(a) Z-score are used to test differences in proportions and t-statistics are used to test differences in means of VC characteristics reported in columns (ii) and (iii). The appropriate critical value at the 0.05 level of significance using a two-tailed test is ±1.96.
(b) Chi-squared values are used to test the assumption of independence in the sets of categorical variables across the three university types (excluding colleges of the Arts). Probability values are reported in parenthesis beneath the relevant test statistic.
(c) Due to zero and low cell counts other university types, overseas universities and polytechnics were combined in the computation of the chi-squared statistic.
(d) Due to zero cell counts other university types were dropped and due to low cell counts polytechnics and overseas universities were combined in the computation of the chi-squared statistic
(e) Due to zero cell counts VCs with a career history in the civil service, private sector or with dept. education were combined in the computation of the chi-squared statistic.

As in the primary analysis we expect VC age to be positively associated with VC pay and note that the average age of VCs in this sample is just over 57 years. There is also some variation across HE sub-sectors. For instance, VCs of pre-1992 are about one year older than their counterparts in post-1992 universities (t=4.88) and about two to two and a half years older than those that lead post-2003. We again note that the largest relative proportion of VCs who are over 60 is found in pre-1992 universities (30%), perhaps suggests that for these VCs the post of VC seems to be more of an end of a career appointment. This is not reflected in post-2003 universities where a large proportion of VCs (47%) are aged 55 or under. We also note an upward trend in the average age of VCs rising from about 56 years four months in 1994/95 to about 58 years seven months in 2008/09 (see, appendix B6).

Bargh *at al.,* (2000) note a shift towards appointing VCs who have more managerial and/or leadership expertise and skills than simply appointing someone to be a mere 'substitute' for the Chancellor in a prestigious end-of-career post. They argue that over the two decades preceding the mid-1990s UK HEIs have had to become more business-like in line with changes in government higher education policy. They hypothesise that this changing landscape would lead UK universities to seek the appointment of VCs with proven managerial/leadership skills who may be younger than their earlier counterparts. They find no discernible trend in VC age at appointment.[54] The average age at appointment in the current sample is just under 52 years. There is also variation across university types. In particular pre-1992 universities appoint VCs who are older (just over 53) than their counterparts in other UK universities. For instance, VCs appointed in post-1992 universities are about two and a half years younger than those appointed in pre-1992 universities. These data also reveal that the average age at appointment has risen from just under 51 in 1994/95 to just under 53 by 2008/09, (see appendix B6). This may reflect a preference to appoint VCs with greater experience and

[54] Although they note that for 'old' universities the age at appointment was higher in the 1970s 1980s and 1990s than in the 1950s and 1960s, and for ex-polytechnics the age at appointment increased in the 1990s.

knowledge of UK higher education as the sector expands and the complexity of running a modern university increases. It may also reflect that the pool of suitable candidates for the office of VC is rather small as candidates with more experience and knowledge of UK higher education management are more highly sought and in scarce supply. The upward trend in appointing older VCs may impact positively on VC pay and may help to explain the upward trend in pay already noted in the introduction.

Although not reported in table 2.4 it is interesting to note that the average age of male VCs is just over 57 years which is similar to the overall average for all VCs. For females the average age is just over 56 years. As noted above there is evidence of an upward trend in the average age of VCs over the sample period and this trend is particularly striking amongst females, whose average age was just under 51 in 1994/95 rising to just under 59 by 2008/09. The comparable figures for their male counterparts are 56 and 59 respectively. The gender age profiles seem to have converged over time. Both groups have also witnessed a distinct upward trend in their age at appointment. For females the average age at appointment has increased from just over 49 in 1994/95 to just under 53 by 2008/09. For male VCs the average age at appointment was just over 50 in 1994/95 and just under 53 years by 2008/09.

Educational Background

It is hypothesised that VC pay will be positively related to certain academic qualifications and schooling as predicted by human capital theory. There are two general reasons. First, from a supply-side perspective potential VCs may expect to be compensated for the loss of earnings whilst in education and for many VCs they would have spent at least six years in higher education. Second, from a demand-side perspective the acquisition of higher education raises individual productivity and hence enhances pay. It is therefore possible that the appointing committee may take the view that VC quality is to some extent influenced by an individual's educational background and qualifications (Bargh, *et al.*, 2000). These sentiments may lead to a preference for candidates who have a certain type of schooling (e.g., a graduate from a certain university type) and/or with a certain academic discipline (e.g., engineering) and/or with a certain type qualification (e.g., a PhD). Such candidates may be perceived by the appointing committee to be of high academic calibre vis-à-vis those who have attended

less prestigious colleges, or universities. In the minds of the appointing committee it may also be a signal of high quality 'traditional' education which may be more familiar to those on such committees. It is difficult to determine the precise effect that these factors will have on pay, *a priori*, and it is possible that these factors would influence appointment rather than pay directly. However, it is still possible that a VC's educational background can have a significant influence on pay. For instance, a VC who received a doctoral degree from an institution that is highly regarded both nationally and internationally may be expected to bring with her important academic and public contacts, and an institution may offer higher pay and attractive increases in pay to retain such individuals.

In terms of a VC's undergraduate education just under one-quarter (24.1%) of VCs were Oxbridge educated (educated at either Oxford or Cambridge), just under 45% were educated in an ancient or civic university, about 14% in a London university college, 6.7% in a 1960s university, and just over 4% in a former polytechnic. However, the proportion of VCs who were Oxbridge undergraduates or undergraduates at an ancient or civic university, or a London University college, has fallen over the sample period whereas the proportion of VCs who were undergraduate at a 1960s or former polytechnic has increased (see appendix B7). We also note that the universities represented in columns (ii) – (iv) in table 2.4 appear to have a preference for appointing VCs with an undergraduate career in an ancient or a civic university. There is some variation in the type of university the VC attended as an undergraduate across these universities. For instance, pre-1992 universities appoint the largest proportion of VCs (31.3%) who were Oxbridge undergraduates whereas post-1992 universities tend to appoint the largest relative proportion of VCs who studied at a 1960s university (6.5%) or former polytechnic (11.8%). We also note that 'Arts' colleges appoint a large proportion of VCs (29.2%) educated in other HE institutions.

In terms of postgraduate qualifications just over two-fifths of VCs have a postgraduate qualification from an Ancient/Civic university and 22% received their qualification(s) from either Oxford or Cambridge. We also note that post-1992 universities appoint proportionally more VCs with a postgraduate qualification from a 1960s university and pre-1992 universities tend to appoint proportionally more VCs with an Oxbridge background (about 30%). Interestingly we note that a relatively large proportion of VCs

(11.2%) with postgraduate qualifications from an overseas institution are appointed in 'Arts' colleges. This may reflect a national shortage of suitable candidates for this particular role.

The trends highlighted above are similar to those identified by Bargh *et al.* (2000) and Breakwell and Tytherleigh (2008) who noted a decline in the proportion of VCs with an Oxbridge educational background since the 1970s. The later study noted a preference for pre-1992 universities to appoint VCs with either undergraduate or postgraduate experience from similar institutions. Interestingly the authors also noted that no VC appointed since 1997 in pre-1992 universities studied at a former polytechnic this is also generally true for the data used in this study the exception being Bob Boucher (appointed VC of Sheffield University in 2001) who studied as an undergraduate at Borough Polytechnic.

Information on a VC's academic specialism is captured by four broad categories, see appendix B5 for definitions. This is done so that the evidence presented can be compared with previous studies (see, Breakwell and Tytherleigh, 2008; Dolton and Ma, 2003; Bargh *et al.*, 2000; Farnham and Jones, 1998). Specifically these are: Science; Engineering; Social Science and the Arts. The overall summary statistics, reported in table 2.3, reveal that just under one-half of VCs have an academic specialism in the Social Sciences and about 33% in the Natural Sciences and fewer have specialised in Engineering (11.8%) and the Arts (5.6%). We also note that pre-1992 universities employ the largest relative proportion of VCs with an Engineering (18%) or a Science (37%) background and VCs of post-1992 universities and post-2003 universities predominantly have an educational background in the Social Sciences, about 54% and 66% respectively. This is in broad agreement with the recent evidence presented by Breakwell and Tytherleigh (2008). We also note a general upward trend in appointing Social Scientists and a downward trend in the appointment of Natural Scientists (see appendix B7). It is also interesting to note that the proportion of VCs with an academic specialism in Engineering has fallen over the sample period.

The amount of education acquired is captured by the award of a PhD or equivalent (e.g. DSc or MD). It is argued that this variable will capture variation in the data pertaining to

academic attainment.[55] Just under three-quarters of VCs have a PhD or equivalent qualification. We also note a wide variation across university types. The largest relative proportion of VCs with a PhD or equivalent qualification is found in pre-1992 universities (83%) followed by their counterparts in post-1992 universities (69%) and post-2003 universities (62%).

Academic Esteem and Public Honours

One would expect that academic esteem to be positively related to VC pay and we capture this particular feature of a VC's background in terms of: a professorship; a honorary degree; or a fellowship of the Royal Society. Such individuals may be expected to enhance the university's reputation, increase the potential of private sector funding opportunities, and bring with them a set of network contacts.

A high proportion of VCs (87%) have reached the grade of professor and also note that relatively more professors are found in pre-1992 (93%), compared to their counterparts in post-1992 universities (84%), post-2003 universities (76%). Over the sample period the proportion of VCs with a professorship increased from about 83% in 1994/95 to just under 89% in 2008/09 (see, appendix B8). This trend possibly reflects the changing nature of the UK higher education sector with its particular emphasis on research and the increase in the number of universities awarded university status. It should also be noted that a professorship often carries responsibilities that can be best described as managerial (e.g. Dean of School, head of a research centre/institute/department), and can also include senior administrative tasks, see Bargh *et al.*, (2000).

Just under 8% of VCs are fellows of the Royal Society. However, VCs with a Royal Society fellowship (22) are exclusively confined to those leading pre-1992 universities, 64% (14) of whom lead Russell Group universities, but it may be the case that world class research intensive universities are best led by internationally renowned researchers (Goodall, 2006). We also note that just over 45% have been awarded at least one honorary degree (from either UK or overseas university), although the proportion of VCs with this particular honour has fallen over the sample period (see, appendix B8).

[55] All VCs in the sample have an undergraduate and postgraduate degree.

It is also hypothesised that a VC with a public honour(s) outside academia, such as a Knighthood has the potential to bring future benefits to the institution, in terms of private sources of income or by exploiting their public standing and contacts. Such honours may capture the VC's 'social capital' (Dolton and Ma, 2003). It is possible that a VC who has been knighted may attract higher pay than one without such public recognition. We note that 11.8% of VCs have been awarded knighthoods, but the number of VCs with this honour has fallen over the period (see, appendix B8). The largest proportion of VCs with this honour is found in pre-1992 universities and interestingly leaders of 'Arts' colleges (mainly the Heads of the Royal colleges).

Previous Work Experience and Training

Following the publication of the Jarrett Report (1985) universities were required to become more 'efficient' and their VCs more business-like having direct responsibility for the institution's financial position and executive decisions rather than delegating these roles to bursars and administrators. Universities were assumed to look to the private sector for potential candidates with the necessary business/managerial skills and experience. This however never really took hold and VC appointments from the private sector are still a rarity in UK Higher Education (Breakwell and Tytherleigh, 2008). We expect those VCs drawn from the private sector to command more pay than career academics.

Previous work experience is defined by four categories describing the 'sector' from which the incumbent was drawn, ten years prior to being appointed VC. Specifically these four categories are: civil service; education (or related service); academia and 'industry' (private sector employment), see appendix B5 for definitions of these categories. Column (i) of table 2.4 shows that the majority of VCs (86.4%) have had a recent career history firmly established in academia, followed by those who were formerly employed in the civil service (8%), and then by those who were employed in industry (about 4%). A small proportion (1.5%) have been employed in education or related services. These figures reveal only marginal changes to those reported in earlier studies (Farnham and Jones, 1998; Bargh, *et al.*, 2000; Breakwell and Tytherleigh,

2008). We also note that the proportion of VCs drawn from academia or from industry has remained fairly constant over the sample period (see, appendix B8).

However, there is variation across institutions. The largest relative proportion of VCs with experience in the civil service (13%) is found in pre-1992 universities and the largest proportion of VCs with an 'education' background (6%) is found in post-2003 universities. Somewhat surprisingly, the largest proportion of VCs with industrial experience (18%) are found leading Arts colleges and very few VCs with this characteristic are found leading pre-1992 and post-1992 universities, about 5% respectively. No VC leading a post-2003 university has this experience. The proportion of VCs appointed from outside academia is relatively small. This is all the more surprising considering the way in which the role of the VC has changed over time with a greater emphasis on business accruement. Whether or not industrial experience equates with managerial competence in HE is not clear, but in the case of 'Arts' colleges many VCs have had considerable experience of managing theatres and/or directing or coordinating shows or musical events which could be more valued in terms of managing such institutions.

Relevant training for the post of VC is captured by two attributes. The first is whether or not the incumbent was previously appointed as a VC in another university. The second is whether or not the incumbent was previously a Pro-VC or equivalent. Table 2.4 reveals that 9.4% were appointed to a similar office in another university and the proportion of VCs who were former VCs more than doubled over the sample period (see, appendix B8). We also note that 52% of the sample was previously appointed as Pro-VCs and the proportion of VCs with this attribute has increased by just over three-quarters over the sample period. These proportions are suggestive of a preference for appointing VCs with HE managerial experience rather than industrial experience. These data also reveal that the largest relative proportion of VCs who were former VCs (13.7%) is found in pre-1992 universities and post-1992 universities have the largest proportion of VCs who were former Pro-VCs or equivalent (74%).

It is interesting to note that there were 237 instances where a VC's term in office expired of these 170 were retirements. If we exclude appointments in post-2003 universities, and appointments from overseas we find that there were 19 instances where

VCs were reappointed VC in another university: 15 were reappointments in the same sub-sector.[56] One VC moved from a pre-1992 to a post-1992 university and 3 VCs moved from a post-1992 to pre-1992. This may suggest a preference of VCs to appoint from within a particular HE subsector. This may not be surprising if the appointing committee favours candidates for the post of VC who have familiarity with managing similar institutions in terms of size, mission and goals. It should also be highlighted that in all instances with the exception of two, there was an increase in the real pay.[57]

In regard to the appointment of former Pro-VCs and excluding appointments made in post-2003 universities, then there were 128 VCs who were former Pro-VCs (or equivalent). Of these, 26 (20%) were internal appointments; 15 of which were internal appointments in pre-1992 and 11 (24%) were internal appointments in post-1992. Moreover, 101 (89%) former Pro-VCs were appointed VC within the same HE sub-sector, 43 (34%) moved between pre-1992 universities and 58 (45%) moved between post-1992 universities. In regard to movement across sub-sectors 21 (16%) former Pro-VCs move from a pre-1992 to lead a post-1992 university and only 5 (4%) former Pro-VCs moved in the opposite direction. One former Pro-VC moved from a post-2003 university to lead a post-1992 university. These data may provide further evidence of a preference for appointing VCs from within the same HE sub-sector (Bargh, *et al.*, 2000; Breakwell and Tytherleigh, 2008).

External Appointments and Tenure

Table 2.4 reveals that that just over 72% of the sample of VCs were appointed to their post externally and the proportion of external appointees has increased by 17.5% over the sample period (see, appendix B8). We also note that pre-1992 universities have the largest proportion of VCs appointed externally (83.7%). It is difficult to be precise about the nature of the relationship between an external appointment and pay. However, one may speculate that the relationship is positive if the supply of suitable candidates is indeed 'globally limited'. Therefore, salaries would be driven up in accordance with the

[56] 9 VCs moved from a pre-1992 to a pre-1992 and 6 moved from a post-1992 to a post-1992.
[57] George Bain was the principal of the London Business School from 1989-1997 and then was appointed VC of Queen's Belfast from 1998-2004. Alfred Morris was VC of the University of West of England until 2008 and was appointed VC of Lampeter University in 2009. In both these case there was a fall in their real pay.

shortage in supply. Chan (1996) suggests that those externally appointed to senior positions are generally of superior quality in contrast to potential internal candidates. This feature will tend to be drive up the pay of externally appointed CEOs, above those of their internal competitors.

The average term in office is just under eight and a half years for those VCs who completed their term in office, see table 2.3.[58] This is slightly longer than 7.65 years cited by Dolton and Ma (2003) but similar to the 8.9 years reported by Breakwell and Tytheleigh (2008) for appointments made between 1991 and 1996. In the latter study it is also pointed out that VC tenure has fallen over time. However, their analysis also included VCs still in office. The data used here does not reveal any discernible trend in VC tenure over the sample period. However, we do observe some variation across institution type. For instance on average, VCs of post-1992 and post-2003 universities, and who have completed their term in office, are in post for about one and a half years longer than their counterparts in pre-1992 and Heads of Art colleges are the longest serving with tenure of just over 10 years on average.

As in the primary analysis we expect university type and size as well as hierarchical structure to influence VC pay and include variables to capture these effects in the empirical analysis (see appendix B4 for definitions of variables). Local economic conditions may also impact on VC pay and we again include county-level house prices to account for this possibility. It should be noted that we do not include 'performance' variables that relate to the university's mission (i.e., those related to 'widening participation') and as already noted these data were only available from 1998/99 onwards. However, we do include a variable capturing success in securing university expansion through a merger or acquisition. In these data we note that there have been 25 instances of major mergers over the period and we expect a positive association between VC pay and university expansion. It is clear that pre-1992 universities were more active in this regard compared to the other two university types. As noted earlier other performance measures such as the results from the Research Assessment Exercise (RAE) are not available for all institutions over the sample period and are therefore not included in the analysis (see section 2.4.5). All financial data used, including VC pay,

[58] If we include VC still in office then the average term is 5.5 years.

are measured in 1998 prices and transformed to natural logarithms for use in the empirical analysis. The relevant summary statistics are presented in table 2.5 below.

We also note that pre-1992 universities account for 47% of the sample, post-1992 universities represent one-third of the sample and post-2003 universities account for about one-fifth (see, table 2.5 below). In this analysis we include two variables that can potentially capture university size and complexity. These are the natural logarithm of all FTE students and the number of cost centres which reflects the nature and the diversity of the work undertaken by each institution. We note that the average number of cost centres is about 18, but it is clear from table 2.5 that, based on this measure, pre and post-1992 are more 'complex' and diverse than the newer post-2003 universities. Similarly, these institutions are larger than post-2003 universities in terms of FTE students. We would expect VC pay to be positively related to these variables. It is conceded that university size can be measured in terms of the number of FTE staff and university income. However, we detect a high degree of correlation between these measures for instance, the correlation between FTE students and funding council grants is 0.91 [*p*-value = 0.00]; between FTE students and tuition fees is 0.89 [*p*-value = 0.00]; and between FTE students and research grants and contracts is 0.62 [*p*-value = 0.00]. These financial variables are therefore not included in the specifications reported in section 2.7.

We noted that tournament theory suggests that the presence of highly paid staff in an institution will drive up the pay of CEOs or directors. The pay of senior executives and professors is not publically available but we do have information on the number and proportion of staff earning in excess of £70,000 for all years.[59] We note that this proportion is highest in pre-1992 universities. The promotion to professor also brings with it an increase in remuneration. We see from table 2.5 that the proportion of professors in pre-1992 universities (11.8%) is higher than the proportion of these academics found in the other two university types. We also include the proportion of senior academic staff (senior lecturers and above) and find that this proportion is highest

[59] Although universities reported the number of staff earning over £100,000 over the sample period, many did not or reported a zero figure in their annual financial statements. This was generally the case with many post-1992 universities. The numbers/proportions of staff earning over £100,000 were very small, in many cases less than 1% except for a few large civic universities. The variable proved insignificant in the regressions undertaken and was omitted from further analysis. Most universities registered some staff earning over £70,000 over the period and this variable was used in the regressions reported.

in post-1992 universities. These variables are also expected to exert a positive influence on VC pay as predicted by tournament theory.

Table 2.5 Summary Statistics: VC Pay and University Characteristics 1994/95 – 2008/09

Variable	All Universities	Pre-1992	Post-1992	Post-2003
VC Pay				
Real Pay (£ in 1998 prices)	125,464	135,985	126,918	97,837
	(32,550)	(34,429)	(24,829)	(21,949)
(ln) Real pay	11.707	11.772	11.720	11.466
	(0.254)	(0.250)	(0.192)	(0.223)
Real external pay benchmark (£ in	121,222	131,308	123,025	93,964
1998 prices)	(26,426)	(25,888)	(19,665)	(17,470)
(ln) Real external pay benchmark	11.681	11.767	11.708	11.432
	(0.219)	(0.192)	(0.153)	(0.187)
University Characteristics				
University type	*n/a*	0.470	0.333	0.197
University Size				
#Cost centres	18.495	20.044	19.641	12.849
	(5.925)	(5.629)	(4.333)	(5.594)
FTE (Number)	11,440	11,829	14,616	5,123
	(5,817)	(5,425)	(4,679)	(2,705)
(ln) FTE students	9.177	9.264	9.531	8.372
	(0.645)	(0.506)	(0.360)	(0.635)
Merger[a]	25	15	6	4
Hierarchical Structure				
Proportion of Senior Academic	0.167	0.156	0.188	0.157
Staff	(0.133)	(0.074)	(0.173)	(0.159)
Proportion of Professors	0.074	0.118	0.041	0.028
	(0.063)	(0.058)	(0.035)	(0.038)
Proportion of Staff	0.017	0.029	0.007	0.008
Remuneration >70k	(0.024)	(0.030)	(0.009)	(0.012)
Regional Variation				
Real county-level House Price (£ in	116,106	116,973	112,107	120,813
1998 prices))	(54,955)	(54,589)	(53,700)	(57,569)
(ln) Real county-level	11.560	11.567	11.526	11.602
House Prices	(0.447)	(0.451)	(0.442)	(0.440)
Number of Universities	117	55	39	23
Number of VCs	290	141	92	57
Number of observations	1755	825	585	345

Notes: (a) Actual numbers.

2.6 Methodology

The primary theme of this essay is to examine the relationship between VC pay and observable performance indicators. The data described in section 2.4 are employed in analysing the pay-performance relationship. Given the panel nature of these data the use of individual VC fixed effects is favoured over institution fixed effects (and random

effects)[60] in modelling the pay-performance relationship, which allows for within-VC correlations across years, for the VCs of pre and post-1992 universities that feature in these data. This is because we believe that the remuneration package offered is more strongly influenced by the attributes the individual brings to the job rather than the characteristics of the institution. In addition, we argue the assumption of time-invariant individual attributes are more persuasive in the current context than time-invariant institutional characteristics given the rapidly changing nature of the university landscape in the UK over the time period covered by the analysis presented. The robustness of the results is also investigated using an alternative model containing institutional fixed effects. We also experimented with a number of pay-change specifications but these had very poor explanatory power, similar to what was found in previous research (see, Tarbert *et al*, 2008).[61] We therefore do not report the results for pay change models and instead we estimate the relationship by employing a VC fixed effects methodology, where the omitted unobservable VC effects are assumed fixed and allowed to be correlated with the included variables.

The secondary theme of this essay is to examine the relationship between VC pay and their personal characteristics using the data described in section 2.5. To model this relationship we would like to use a model that is flexible enough to allow for unobserved heterogeneity across individuals and institutions over time. Employing the fixed effects estimator would mean that VC (or institution) characteristics that are time invariant would be 'swept' out in the estimation procedure. Thus valuable information on VC personal characteristics would be lost such as gender, career and schooling histories. It would therefore be more informative to use the random effects estimator in this regard.

[60] A Hausman test was performed to test if the random effects estimator was preferable to a fixed effects estimator using expression [2.15] in the text. The resultant χ^2 statistic with 23 d.f = 75.85 [*p*-value = 0.000] favours the fixed effects estimator being efficient and more consistent than the random effects estimator. A likelihood ratio test was also performed to test if a pooled regression fits the data better than two separate institution equations. The resultant χ^2 statistic with 214 d.f = 51.877 and we accept that a pooled equation fits the data better than two separate institution equations.

[61] The annual difference in the log of VC pay was used as the dependent variable and the annual difference in the performance measures were used as regressors. The specifications were very poorly determined and no inference could be drawn from the estimated parameters. Conyon *et al*, (1995) discusses the problems associated with models of this kind. The fixed effect estimator in this case is similar in spirit to pay change models and allows for within-VC correlation across years.

2.6.1 Modelling VC Pay and Performance

The basic model can be expressed as:

$$w_{ijt} = \alpha_i + \beta' \mathbf{X}_{ijt} + \sum_{t=2}^{T} \varphi_t D_t + \mathbf{u}_{ijt} \qquad i = 1, 2,...,N, \quad j = 1, 2,\ldots,J, \quad t = 1, 2,\ldots,T \qquad [2.15]$$

where: w_{ijt} is the natural log of real annual pay for the i^{th} VC in institution j at time t; $\mathbf{X}_{ijt}$ is a k×1 vector of VC and institution specific pay determining variables excluding those that are mission and financial performance relevant. Specifically, these include the set of mutually exclusive age specific dummies capturing the age of the VC at time t; tenure (years in current post), a university size variable (number of cost centres), the proportion of staff (excluding the VC) earning more than £70,000, a university type dummy variable to capture the distinction between pre-1992 and post-1992 universities, and the log of average county-level house prices for the j^{th} institution. It is important to note that the vector $\mathbf{X}_{ijt}$ also includes an external pay benchmark as described in section 2.4 and for reasons already outlined the natural logarithm of this variable, lagged by one year, is used in estimation. A set of time specific dummies (D_t) are introduced to capture exogenous events that affect all VCs over time and $\mathbf{u}_{ijt}$ is an error term assumed to conform to standard assumptions as *per* $\mathbf{u}_{ijt} \sim iid(0,\sigma^2)$. The unknown parameters α_i (the intercepts) are the VC their fixed effect that are estimated and assumed to capture differences across VCs in terms of unobservable characteristics.

Three variants of the basic model are also estimated. The first augments the basic model to include variables that capture mission-based performance indicators lagged by one-year. This is done to take account of the fact that such information is only available after the event usually in the following academic year. This model can be expressed as:

$$w_{ijt} = \alpha_i + \beta' \mathbf{X}_{ijt} + \gamma' \mathbf{Z}_{ijt-1} + \sum_{t=2}^{T} \varphi_t D_t + \mathbf{u}_{ijt} \qquad [2.16]$$

Where $\mathbf{Z}_{ijt-1}$ is a h×1 vector of mission based performance indicators that capture institution growth through merger and widening participation. The other vectors are as defined in expression [2.15].

The second variation uses financial based performance indicators lagged by one-year (i.e., grants from UK funding councils, tuition fees and research grants and contracts) in lieu of mission-based performance indicators and is expressed as:

$$w_{ijt} = \alpha_i + \beta'\mathbf{X}_{ijt} + \delta'\mathbf{V}_{ijt-1} + \sum_{t=2}^{T}\varphi_t D_t + \mathbf{u}_{ijt} \qquad [2.17]$$

where $\mathbf{V}_{ijt-1}$ is a h×1 vector of financial performance variables. The final model augments the basic model to include both mission and financial based performance indicators and is expressed as:

$$w_{ijt} = \alpha_i + \beta'\mathbf{X}_{ijt} + \gamma'\mathbf{Z}_{ijt-1} + \delta'\mathbf{V}_{ijt-1} + \sum_{t=2}^{T}\varphi_t D_t + \mathbf{u}_{ijt} \qquad [2.18]$$

All vectors are as defined above and β, γ, δ and φ are unknown parameters and are estimated according to the relevant specification. The dataset employed in this analysis consists of 1045 observations on 193 VCs and represents an unbalanced panel.

2.6.2 Modelling VC Pay and Personal Characteristics

As noted above employing a fixed effects methodology to model the VC pay-characteristics relationship would mean time-invariant VC characteristics would be lost in the estimation process. A general estimation (random effects) model with separate heterogeneity terms for individuals and institutions can be expressed:

$$w_{ijt} = \beta_1^{'}\mathbf{H}_i + \beta_2^{'}\mathbf{H}_{it} + \gamma_1^{'}\mathbf{I}_j + \gamma_2^{'}\mathbf{I}_{jt} + \sum_{t=2}^{T}\varphi_t D_t + v_{ijt} \qquad [2.19]$$

where w_{ijt}, and D_t are defined in expression [2.15]. $\mathbf{H_i}$ is a m×1 vector of VC personal attributes that are time invariant. Specifically these include information on VC gender; educational background characterises (i.e., university attended as an undergraduate, the academic discipline studied and the achievement of a doctorate); previous work experience; and whether the VC was a professor or pro-VC at appointment. We also

include an indicator for the termination of the VC contract to examine the effects of severance pay. $\mathbf{H_{it}}$ is a n×1 vector of VC personal attributes that vary with time including VC age and tenure (as defined in specification [2.15]). Variables relating to academic esteem (the award of a fellowship to the Royal Society or honorary degrees) and public honours (the award of a knighthood) that vary over time are also included. As there has been some movement of VCs between universities we also include a variable capturing whether the VC had been previously appointed VC in another institution in this vector.

$\mathbf{I}_j$ is a q×1 vector of time invariant university characteristic (i.e., university type dummies). $\mathbf{I}_{jt}$ is a r×1 vector of time varying university characteristics including those relating to university size lagged by one-year (i.e., the number of cost centres and FTE students); the institution's hierarchical structure (the proportion of professors and senior academic staff); and a location specific pay determining condition for the j^{th} institution to capture local economic conditions as defined in expression [2.15]. We do not include financial variables in this specification due to the high degree of correlation between these variables and the size of the student body as outlined in the previous section, but we do include an external pay benchmark (lagged one-year), the proportion of staff paid above £70,000 in the year of observation, and an indicator of a successful merger.

The stochastic error term in expression [2.19] is defined as: $\mathbf{v}_{ijt} = \psi_i + \lambda_j + \varepsilon_{ijt}$, where, ψ_i captures unobserved heterogeneity across individuals,, λ_j captures unobserved heterogeneity across universities and ε_{ijt}, captures unobserved heterogeneity across individuals and time. A GLS procedure is used to estimate the unknown parameters β_1, β_2, γ_1 γ_2. We are therefore able to model unobserved heterogeneity across both universities and individuals. We model the relationship using a random effects estimator at both the level of VC and institution.

The dataset used for the VC random effects estimation consists of 1755 observations on 286 VCs and represents an unbalanced panel. In contrast when employing the institution random effects estimator the sample consists of 1755 observations on 117 institutions and represents a balanced panel over the fifteen years covered by the data employed.

2.7 Empirical Results

2.7.1 VC Pay and Performance

The estimates for the four models described by expressions [2.15] to [2.18] in section 2.6.1 are reported in table 2.6 below. Before we discuss the results in detail we first note that on the basis of the goodness of fit measure reported at the bottom of the table, the specifications fit the data well by the standards of broadly comparable fixed effects applications on the determination of CEO pay (e.g., see Besley and Machin, 2008; Gregg *et al.*, 2010). Second, we note that that estimated coefficients on the academic year dummies are well determined and are jointly significant at a conventional level in all specifications, suggesting a steady *ceteris paribus* monotonic increase in VC pay over time. In general, the point estimates suggest substantial pay inflation since the academic year 1998/99 once we control for individual fixed effects and other pay determining characteristics.

It should be noted that the econometric methodology adopted does not necessarily suggest that causal relationships exist between VC pay and all the explanatory variables included on the right-hand side of expression [2.18]. Although the application of fixed effects to these data helps to mitigate the bias that may be inherent in the estimated coefficients, due to time invariant unobservable variables that may be potentially correlated with the included variables, there is the possibility that bias may be introduced due to time-varying omitted variables. If these omitted variables are correlated with an included variable(s) then, dependent on the nature of this correlation (positive/negative), the relevant coefficients on these potentially endogenous variables may be either over or under estimated. For instance, the pay of highly paid university officers (e.g. pro-VCs) may exert a direct positive effect on VC pay in the light of tournament theory, but such information is not publically available. Further, this time-varying omitted variable may also be highly correlated with the proportion of staff earning above £70,000 per annum. If we assume a positive correlation then the estimated coefficient for this variable may be an over estimate. To address this issue would require the introduction of proxy variables that are highly correlated with the time varying omitted variables but uncorrelated with the error term (the exclusion criteria). Finding such ‘proxy’ variables is not an easy task. Therefore, caution should

be exercised when interpreting the impact that these potential endogenous variables have on VC pay.

Furthermore, there is still a possibility that certain key variables may be endogenous due to 'reverse' causality which causes the estimated coefficients to be biased and inconsistent. For instance, it is possible that the proportion of staff earning in excess of £70,000 may be affected by the *current* VC pay award, since it is possible that remuneration committees may have decided on the pay increment to be awarded to the VC before deciding on the pay awards to be given to senior or highly paid staff, while at the same time it is possible that the proportion of highly paid staff influences VC pay on the basis of tournament effects. To separate the causal impact that the proportion of staff earning more than £70,000 per annum has on VC pay from a mere correlation, we need an exogenous source(s) of variation (instrument(s)) that is highly correlated with the proportion of staff earning more than £70,000, which have no direct impact on VC pay (i.e. the covariance between VC pay and instruments is zero) but affects VC pay indirectly only through the relevant endogenous variable, conditional on the other explanatory variables in the model. It is difficult to suggest such an exogenous source(s) of variation that meets these requirements, and the dataset employed offers no suitable variable(s) to act as an instrument(s). A further problem with such instrumentation is that no suitable method is available to test the assumption that the instrument(s) have no direct impact on the VC pay. This then raises the possibility that the estimated coefficient relating to the proportion of staff earning in excess of £70,000 may be an under or overestimate of the true causal effect, and caution should be exercised in interpreting the estimated coefficient. It may be argued that a similar concern may be attributed to the external benchmark pay. For instance, and conditional on the other explanatory variables in the model, we may expect that the previous year's external pay benchmark to have a positive correlation with the current year's pay benchmark and does not affect current year's VC pay. If these assumptions are true, then it is possible that the estimated coefficient on the external pay benchmark is an overestimate of the true causal effect, but finding suitable instruments would again be a challenging exercise.

Table 2.6 Vice-Chancellor Pay and Performance
VC Fixed Effects Estimates

Variable Names	[1] Non mission or performance relevant	[2] Mission relevant	[3] Financial performance relevant	[4] Mission and financial performance relevant
VC and University Characteristics				
Age <=55	-0.002 (0.017)	-0.003 (0.018)	-0.001 (0.017)	-0.002 (0.018)
Age 56 -60	-0.018 (0.010)*	-0.018 (0.010)*	-0.016 (0.009)*	-0.016 (0.009)*
Age > 60	*f*	*f*	*f*	*f*
Tenure (years)	0.001 (0.004)	0.001 (0.004)	-0.001 (0.004)	0.0004 (0.0043)
(ln) external pay benchmark (lagged by one year)	0.168 (0.071)**	0.175 (0.069)**	0.148 (0.071)**	0.151 (0.068)**
#Cost centres	0.004 (0.002)**	0.005 (0.002)**	0.003 (0.0016)*	0.003 (0.002)
Proportion of staff earning > £70k	0.599 (0.232)***	0.576 (0.230)***	0.479 (0.229)**	0.419 (0.224)*
Pre 1992 university	-0.017 (0.062)	-0.019 (0.073)	0.007 (0.045)	0.009 (0.053)
(ln) Real Average house price	-0.087 (0.025)***	-0.075 (0.023)***	-0.064 (0.027)**	- 0.047 (0.025)*
Mission Based Performance Measures (lagged one year)				
Merger/expansion	†	0.038 (0.023)*	†	0.056 (0.023)**
Hit benchmark for comprehensive schooled students	†	0.017 (0.015)	†	0.024 (0.013)*
Hit benchmark for students from low participation areas	†	0.022 (0.010)**	†	0.021 (0.010)**
Financial Based Performance Measures (lagged one year)				
(ln) Real Funding Council Grants	†	†	0.071 (0.035)**	0.092 (0.035)***
(ln) Real Tuition Fees	†	†	0.017 (0.040)	0.017 (0.041)
(ln) Real Research Council Grants	†	†	-0.009 (0.011)	-0.010 (0.012)
Year Dummies				
1999	*f*	*f*	*f*	*f*
2000	0.016 (0.008)**	0.024 (0.010)**	0.022 (0.011)*	0.018 (0.011)*
2001	0.074 (0.017)***	0.068 (0.016)***	0.074 (0.016)***	0.068 (0.015)***
2002	0.123 (0.022)***	0.116 (0.022)***	0.120 (0.021)***	0.110 (0.020)***
2003	0.180 (0.030)***	0.171 (0.029)***	0.173 (0.029)***	0.161 (0.027)***
2004	0.226 (0.037)***	0.215 (0.036)***	0.216 (0.036)***	0.200 (0.034)***
2005	0.271 (0.046)***	0.257 (0.044)***	0.257 (0.043)***	0.237 (0.041)***
2006	0.312 (0.051)***	0.298 (0.048)***	0.296 (0.048)***	0.275 (0.046)***
2007	0.332 (0.057)***	0.317 (0.055)***	0.313 (0.055)***	0.291 (0.053)***
2008	0.401 (0.062)***	0.385 (0.059)***	0.379 (0.060)***	0.354 (0.057)***
2009	0.464 (0.067)***	0.445 (0.064)***	0.441 (0.066)***	0.413 (0.063)***
Observations	1045	1045	1045	1045
Number of VCs	193	193	193	193
σ_i	0.143	0.148	0.133	0.135
σ_e	0.080	0.080	0.080	0.080
rho_i	0.761	0.773	0.734	0.740
R^2 - within	0.691	0.6909	0.6947	0.6974
χ^2 statistic $_{(df=10)}$ for year dummies	213.07 [0.000]	178.77 [0.000]	169.27 [0.000]	150.01 [0.000]

Notes to table:
(a) Robust standard errors corrected for clustering on VC in parentheses.
(b) * significant at 10%; ** significant at 5%; *** significant at 1%
(c) *f* denotes base category in estimation.
(d) † denotes not applicable in estimation.
(e) σ_i and σ_e are the estimated standard deviations for the fixed effects and the error term respectively, and rho_i is the fraction of the variation in the dependent variable accounted for by the fixed effects.
(f) See appendices B2 and B4 for definitions of the variables.

In all specifications age is entered as a categorical variable indicting the age group to which the VC belongs at time t. Age is expected to have a positive influence on pay, *a priori.* The non-mission/non-financial performance related specification reported in column [1] [expression 2.15], suggests that VC pay increases to some extent with age in a linear fashion.[62] Those VCs who are in the 56 to 60 age group are paid less than those aged over 60 years. The point estimate suggests that a VC in this age group is paid, on average and *ceteris paribus*, just under two percent less. This effect remains robust across the specifications reported. There also appears to be no significant differences in VC pay between those who are 55 years or under and those aged over 60 years. However, this particular result may be picking up a quality effect where the bidding for talent, through the award of higher pay, is not dependent on age. These effects remain relatively robust across all specifications reported.

Human capital theory predicts a positive relationship between pay and tenure though the relationship may be nonlinear. Whether such non-linearities exist in this particular market is difficult to assess, *a priori*, since the post of VC is often an end of career choice and the period in office is likely to be relatively short. Quadratic tenure terms were entered into the analysis but these were found to be insignificant and dropped from further analysis. In any case tenure was found not to have a significant influence on pay in this investigation.[63]

We find evidence that university size and complexity, as proxied by the number of cost centres, increases VC pay as expected. Using specification [2.15] (column [1]), a unit increase in size increases VC pay by about 0.4% on average and *ceteris paribus*. However, although this effect remains robust in specifications [2.16] and [2.17]

[62] Human capital theory suggests that the age–earnings profile is concave and reaches a peak in the latter period of an individual's working life. Quadratic age terms were used in previous estimations but were found to be insignificant and dropped in subsequent estimations. This may be due to the fact that the position of VC is not an initial career choice and such appointments are generally only available to suitable candidates towards the end of their academic career and the actual period in office is likely to be relatively short in comparison to an individual's overall career history.

[63] We also experimented with a VC previous experience dummy variable capturing whether or not the incumbent had previously been appointed a VC at another university (including non-UK universities) and included this as a regressor. The estimated coefficient was statistically insignificant (|t|=1.02 [*p*-value=0.31]). In addition, the exclusion of this variable made no material difference to the empirical results for the key performance variables reported in table 2.6. It was, therefore, dropped from further analysis.

(columns [2] and [3]) it fails to reach statistical significance in specification [2.18] (column [4]) when controls for both mission and financial performance are included.

Typically the remuneration committee sets pay awards for professors and other senior staff prior to determining the pay of their VC (Tarbert, *et al.*, 2008). It is assumed that such committees will have information regarding the pay awards granted to senior or highly paid staff in any one year at the time of setting their VC pay. The results in this regard confirm some of the findings from previous work. There is evidence that VC pay is contemporaneously and positively influenced by the presence of highly paid staff (i.e., staff earning in excess of £70,000). The point estimate suggests that a one percentage point increase in the proportion of staff earning in excess of £70,000, on average and *ceteris paribus,* raises VC pay by about 0.6% per annum. The significance and direction of this effect is robust across specifications but its magnitude falls by about one-fifth in the financial performance specification, column [3] and by three-tenths in the mission and financial relevant specification, column [4].

We assume remuneration committees use an external pay benchmark in determining the pay of their VC in any particular year. The estimated coefficient for this variable is well determined and the point estimate in the non-mission/non-financial performance specification column [1], suggests that a ten percent increase in relative VC pay in comparable institutions, in the previous year increases current VC pay, on average and *ceteris paribus,* by just under 1.7%. Again this effect remains robust across specifications but the impact of this variable is attenuated slightly as we move to the specifications reported in columns [3] and [4]. This suggests that external benchmarking exerts an important influence in the framing of VC pay even after controlling for the performance of the institution.[64] We find no evidence that VC pay is influenced by the type of the university that the VC leads suggesting no *ceteris paribus* differential in pay across pre-1992 and post-1992 universities. It is acknowledged that the poorly determined nature of this institutional pay gap effect is explained by the fact that the VC fixed effects absorb most of its variation and the estimated effect is identified through the small number of VCs who switch between these two types of universities.

[64] We also experimented with a wider external benchmark measure comparing incumbent VC pay in groups of six (rather than five) comparable institutions. The estimated coefficient remained significant but reduced in magnitude.

The average county level house price is entered into the regressions in logged form to control for regional economic conditions that impact on local living costs and the possibility that they impact on VC pay. A significant but negative effect is detected in all specifications. This seems counterintuitive, but it could reflect the receipt of some form of payment in 'kind', such as housing subsidy or transport costs afforded to VCs living in areas where the cost of living is high. This may be true for VCs heading universities in major cities or the heads of prestigious universities that provide accommodation in kind.

We now turn our attention to the relationship between VC pay and mission and financial related performance indicators. The mission based indicators are lagged by one year to allow for the possibility that pay awards are made in commensurate with VC success in meeting the institutional goals set in the previous year. The results are reported in column [2]. The specification includes variables that are assumed to capture elements of the university mission: growth and widening participation. One way in which an institution may grow is through an acquisition or merger. We find a significant effect on VC pay from managing a successful merger. The point estimate suggests that a successful merger increases VC pay by just under 4%, on average and *ceteris paribus.* This effect increases when we control for mission and financial based covariates, column [4]. There is also a significant effect for reaching the benchmark level for admitting students from areas where university participation has been traditionally low. The point estimate suggests that VCs in charge of such a university will receive, on average and *ceteris paribus,* a 2% increase in pay. Again we find this effect remaining in the specification reported in column [4].

The results for the specification that excludes mission relevant performance indicators but includes variables to proxy financial performance are reported in column [3]. These comprise, as noted above, funding council grants, tuition fees, and grants from research councils received in the previous year. Only the estimated coefficient on the funding council grant achieves statistical significance at a conventional level. The point estimate suggests that a ten percent increase in funding council grants increases VC pay by just under 0.7%, on average and *ceteris paribus.* The negative point estimate for research income has been reported in previous work (Dolton and Ma, 2003; Tarbert, *et al.*,

2008), though it is emphasized that the effect reported here is not statistically distinguishable from zero. The other variables in this model yield similar effects to those reported in column [1].

The results for the specification that includes both mission and financial performance variables are reported in column [4]. We note that all the 'mission' relevant performance measures, achieve statistical significance in this specification. VC pay is positively related to successful growth of the institution through a merger as well as meeting the 'benchmark' figure for admitting students from comprehensive schools and from traditionally low participation areas. In addition, VC pay remains significant and positively related to the size of the funding council grants received in the previous year. The magnitude of the effect is marginally larger than that reported in column [2].

As a check of the robustness of the results, we re-estimate the specification in column [4] using university rather than VC fixed effects. The results using university fixed effects are reported in table 2.7 below along with the results for the VC fixed effects specification to facilitate easy comparison.[65] First, we note that the signs of the estimated coefficients in both models are broadly similar and some of the estimated effects remain stable across the two specifications. The effect of internal pay structure and the external pay benchmark remain significant across specifications although the external pay benchmark now yields twice the estimated effect. The coefficient on the merger variable remains significant though with an impact that is now numerically larger than when VC fixed effects are used. In terms of financial performance, the effect of attracting funding council grants remains robust across specifications but its impact falls slightly when university fixed effects are used. However, pay is not affected by success in 'widening participation' when institution fixed effects are used in the estimation. This may be reflective of different missions between the two types of universities. The impacts reported for the year dummies, though still significant and exhibiting a monotonic increase, are attenuated by just over one-half in most cases. Overall, these results taken together generally provide some confidence in the robustness of the results reported in table 2.6.

[65] The correlation coefficient between the 95 current VC fixed effects and the comparable university fixed effects is 0.75 suggesting a high inter-correlation between the unobservables in this application.

Table 2.7 Vice-Chancellor Pay and Performance
VC Fixed Effects versus University Fixed Effects Estimates

Variable Name	VC fixed effects		University fixed effects	
VC and University Characteristics				
Age <=55	-0.002	(0.018)	-0.035**	(0.017)
Age 56 -60	-0.016*	(0.009)	-0.030***	(0.011)
Age > 60	*f*		*f*	
Tenure (years)	0.0004	(0.0043)	0.004**	(0.002)
(ln) external pay benchmark (lagged by one year)	0.151**	(0.068)	0.321***	(0.070)
#Cost centres	0.003	(0.002)	0.001	(0.002)
Proportion of staff earning more than £70k	0.419*	(0.224)	0.578***	(0.212)
Pre 1992 university	0.009	(0.053)	n/a	n/a
(ln) Average house price	-0.047*	(0.025)	0.002	(0.037)
Merger/expansion	0.056**	(0.023)	0.082***	(0.029)
Mission Based Performance Measures (lagged one year)				
Hit benchmark for comprehensive schooled students	0.024*	(0.013)	0.003	(0.017)
Hit benchmark for students from low participation areas	0.021**	(0.010)	0.003	(0.011)
Financial Based Performance Measures (lagged one year)				
(ln) Funding Council Grants	0.092***	(0.035)	0.073*	(0.042)
(ln) Tuition Fees	0.017	(0.041)	0.028	(0.038)
(ln) Research Council Grants	-0.010	(0.012)	-0.016	(0.012)
Year Dummy				
1999	*f*		*f*	
2000	0.018*	(0.011)	0.008	(0.011)
2001	0.068***	(0.015)	0.054***	(0.014)
2002	0.110***	(0.020)	0.072***	(0.018)
2003	0.161***	(0.027)	0.099***	(0.023)
2004	0.200***	(0.034)	0.111***	(0.030)
2005	0.237***	(0.041)	0.133***	(0.036)
2006	0.275***	(0.046)	0.153***	(0.037)
2007	0.291***	(0.053)	0.151***	(0.041)
2008	0.354***	(0.057)	0.193***	(0.043)
2009	0.413***	(0.063)	0.249***	(0.043)
Observations	1045		1045	
Number of VCs/Universities	193		95	
σ_i	0.135		0.103	
σ_e	0.080		0.092	
rho_i	0.740		0.554	
R^2 - within	0.6974		0.6985	

Notes to table:

(a) Robust standard errors corrected for clustering on either VC or institution depending on fixed effects specification in parentheses.

(b) * significant at 10%; ** significant at 5%; *** significant at 1%

(c) *f* denotes base category in estimation.

2.7.2 VC Pay and Personal Characteristics

The relationship between VC pay and individual characteristics is estimated using a random effects estimator at both the level of the VC and institution. The results are presented in table 2.8. Before we discuss these results it is instructive to highlight some of the specification tests that were undertaken. First, non-nested J-Tests were conducted on alternative specifications the first based on VC personal characteristics and the second on institution characteristics. These tests reject the null of no influence of the predicted values from the alternative specification in both cases suggesting that an optimal approach is to combine both sets of variables when modelling the relationship between VC pay and VC/Institution characteristics.[66] Second, a Hausman test favoured the institution random effects estimator over the institution fixed effects estimator (χ^2 (47) = 49.72 [*p*-value = 0.365]).[67] A further test favoured the VC fixed effects over VC random effects (χ^2 (30) = 53.11 [*p*-value = 0.005]). However, as already noted the use of the VC fixed effects estimator does not allow the use of time invariant covariates and as the focus here is on the VC pay-characteristics much of the valuable information on VC characteristics would be lost. This must be borne in mind when interpreting the regression results. For the reasons previously discussed it is possible that the modelling strategy adopted may not establish causation but associations. In particular, variables relating to the proportion of senior academic staff and professors as well as the proportion of staff earning above £70,000 may be endogenous leading to the possibility of 'reverse causality' causing the coefficient estimates to be biased and inefficient. Caution should therefore also be exercised when interpreting these coefficients

The estimation results are presented in table 2.8, and we focus the discussion on the estimated coefficients for the institution random effects specification presented in column [1]. The results for the VC random effects, presented in column [2], are used for comparative purposes and as a check on the robustness of the coefficients presented in column [1]. We first note that the goodness of fit measures reported at the bottom of the table suggests a good fitting model in both cases, and in general the categorical variables are appropriately entered in each model. We also note that the estimated coefficient on the academic year dummies in both specifications show a general *ceteris*

[66] The t-statistic for the coefficient on the institution predicted values was 12.6 [*p*-value=0.00] and on the VC characteristics predicted values was t = 12.89 [*p*-value = 0.00].
[67] A Breusch-Pagan test was conducted to test for random effects in the latter specification which decisively rejected the null of no random effects χ^2 (1) = 1305.33 [*p*-value = 0.000].

paribus monotonic increase in VC pay from 1998/99 through 2008/09. This effect was also found for the pay-performance relationship investigated in the previous section.

The estimated coefficient for the external pay benchmark is well determined in both models and this variable exerts a positive influence on VC pay, although the magnitude of this effect is greater in the institution random effects specification. The point estimate in column [1] suggests that a one percent increase in the external pay benchmark, on average, and *ceteris paribus* increases VC pay by about 0.38%. These results confirm the earlier findings that external benchmarking plays an important role in the determination of VC pay even after controlling for VC characteristics.

In the institution random effects specification we find some evidence that VC personal attributes impact on VC pay. We first note a significant gender effect with male VCs earning about 5%, on average and *ceteris paribus*, more than their female counterparts. This may be due to the fact that proportionally more females VCs are found leading post-2003 universities and these VCs are paid less than VCs of pre and post-1992 universities. Whether this provides evidence of gender pay discrimination in this particular labour market is difficult to determine as the data does not allow a robust decomposition to be undertaken due to the small number of female VCs. However, it does suggest that universities may treat the pay of male and female VCs differently. We also find that older VCs are paid more than their younger counterparts confirming the findings from the pay-performance analysis.

In terms of educational background VCs with an academic specialism in the arts are found to be paid less than their counterparts with a specialism in the natural sciences. There appears to be no significant difference in the pay received by those VCs with either a social science/engineering background and those with an academic specialism in one of the pure sciences. There is however a pay dividend associated with receiving a first degree from an ancient/civic university or the University of London 2.6% and 4.5% respectively compared to receiving a first degree from Oxford or Cambridge.[68] Furthermore, an honorary degree increases VC pay, on average and *ceteris paribus*, by

[68] We also experimented with the institution at which VCs studied for postgraduate awards but the estimated coefficients proved to be individually insignificant and dropped from further analysis.

about 2% but there appears to be no significant role for other public/academic esteem measures to influence VC pay.

Table 2.8 VC Pay-characteristics Equations 1994/95-2008/09

Variable	Institution Random Effects [1]	VC Random Effects [2]
Constant	6.157 (0.725)***	7.425 (0.687)***
General Characteristics		
Male	0.049 (0.016)***	0.018 (0.022)
Age <=55	-0.017 (0.013)	0.002 (0.012)
Age 55 - 60	-0.018 (0.009)**	-0.005 (0.008)
Age >= 61	*f*	*f*
(ln) External pay benchmark (lagged one year)	0.377 (0.062)***	0.267 (0.053)***
Education Background		
Doctoral Degree	0.001 (0.012)	0.009 (0.015)
Academic Discipline:		
Engineering	0.023 (0.021)	0.031 (0.026)
Social Science	-0.002 (0.015)	-0.016 (0.014)
Arts	-0.040 (0.024)*	-0.052 (0.023)**
Science	*f*	*f*
University Attended		
Ancient/Civic	0.026 (0.012)**	0.011 (0.016)
London	0.045 (0.020)**	0.026 (0.021)
1960s/CAT	0.031 (0.036)	0.003 (0.026)
Ex Polytechnic	0.019 (0.023)	-0.005 (0.027)
Overseas	0.045 (0.031)	0.046 (0.038)
Other	0.056 (0.049)	0.001 (0.038)
Oxford/Cambridge	*f*	*f*
Esteem and Public Honours		
Professor	0.013 (0.019)	0.023 (0.018)
FRS	0.015 (0.024)	0.052 (0.029)*
Knighthood	0.017 (0.020)	0.030 (0.020)
Honorary Degree	0.021 (0.011)*	0.005 (0.013)
Career History and Training		
Previous work experience		
Civil Service	0.010 (0.025)	0.051 (0.024)**
Education	0.039 (0.051)	0.012 (0.036)
Industry	0.046 (0.031)	0.061 (0.041)
Academia	*f*	*f*
Training		
Ex VC	0.056 (0.026)**	0.060 (0.025)**
Ex pro VC	-0.013 (0.014)	0.007 (0.015)
Current Employment		
External Appointment	0.001 (0.015)	-0.004 (0.017)
Tenure (years)	0.006 (0.002)***	0.006 (0.002)***
Contract Terminated	-0.006 (0.009)	-0.002 (0.009)
Institution Characteristics		
Pre-1992	0.002 (0.022)	0.008 (0.017)
Post-2003	-0.046 (0.028)*	-0.048 (0.032)
Post-1992	*f*	*f*
Institution Size Variables (lagged one year)		
#Cost centres	0.001 (0.001)	0.002 (0.001)*
(ln) FTE students	0.082 (0.017)***	0.093 (0.016)***
Merger	0.061 (0.017)***	0.042 (0.014)***
Institution Hierarchical Structure		
Proportion of Senior Academic Staff	0.020 (0.030)	0 .037 (0.032)
Proportion of Professors	0.234 (0.121)*	0 .164 (0.103)
Proportion of Staff Remuneration >70k	0.922 (0.221)***	0 .714 (0.176)***
Regional Variation (lagged one year)		
(ln) Real county-level house price	0.013 (0.020)	-0 .001 (0.017)
Year Dummy		
1995		
1996	0.023 (0.007)***	0.024 (0.007)***
1997	0.017 (0.011)	0.021 (0.011)*
1998	0.011 (0.014)	0.017 (0.013)
1999	0.035 (0.016)**	0.045 (0.015)***
2000	0.045 (0.016)***	0.057 (0.016)***
2001	0.071 (0.020)***	0.089 (0.020)***
2002	0.092 (0.021)***	0.119 (0.021)***
2003	0.110 (0.024)***	0.146 (0.024)***

Variable	Institution Random Effects [1]	VC Random Effects [2]
2004	0.118 (0.028)***	0.169 (0.029)***
2005	0.140 (0.031)***	0.195 (0.032)***
2006	0.157 (0.036)***	0.220 (0.034)***
2007	0.161 (0.037)***	0.229 (0.037)***
2008	0.197 (0.038)***	0.271 (0.039)***
2009	0.266 (0.039)***	0.342 (0.041)***
Number of observations	1755	1755
Number of groups	117	284
R^2: *Overall*	0.797	0.798
Within	0.795	0.771
Between	0.780	0.840
Wald χ^2_{49}	5220.96 [0.000]	3872.69 [0.000]
Model Diagnostics		
σ_i	0.069	0.093
σ_e	0.089	0.073
rho_i	0.374	0.613
$\chi 2$ *tests for categorical Variables (df)*		
Age Dummies (2)	8.16 [0.017]	2.55 [0.280]
Academic Discipline(3)	16.11 [0.001]	7.78 [0.050]
University Attended (6)	33.85 [0.000]	3.94 [0.685]
Work Experience (3)	12.12 [0.007]	7.46 [0.058]
University Sub-sector (2)	5.39 [0.068]	8.77 [0.012]
Year Dummies (14)	168.83 [0.000]	234.86 [0.000]

Notes to table:
(a) Robust standard errors reported in parentheses corrected for clustering on VC or institution depending on specification.
(b) * significant at 10%; ** significant at 5%; significant at 1%
(c) ***f*** denotes base category in estimation
(d) † denote not applicable in estimation
(e) rho_i is an estimate of proportion of the variance in the unobservable random effects in the total variation in the error structure.
(f) *p-values* are reported in squared brackets.

In terms of VC training ex VCs are paid about 5.6% more, on average and *ceteris paribus,* than incumbents without this attribute, suggesting that previous experience of running a university is highly valued by potential employers. It is worth also pointing out that there is little role for other measures of a VC's previous work experience in influencing pay in this specification. We do find evidence that an extra year in post increases VC pay, on average and *ceteris paribus*, by about 0.6%. This effect is also evident in the VC random effects specification.[69]

We now turn our attention to the effect that university characteristics have on VC pay focussing our attention on the estimated coefficients for the institution random effects specification. We find evidence of a differential in pay between those VCs who head post-1992 and those leading post-2003 universities. The point estimate suggests that the latter group of VCs are paid, on average and *ceteris paribus,* about 4.6% less than their counterparts in the base category.

[69] Quadratic tenure terms were also employed but found to be insignificant at conventional levels of significance and dropped from subsequent analysis.

We also note that the estimated coefficients for the variables used to capture university size: the number of FTE students and the estimates for the number of cost centres are both well determined and suggest that university size exert a positive influence on VC pay. For instance, a 1% increase in the number of FTE students increases VC pay by about 0.08%. However, the number of cost centres only achieves statistical significance in the VC random effects specification.

We also note that VCs are awarded for the completion of a successful merger. The estimated coefficient for this variable is well defined and suggests that a successful merger increases VC pay, on average and *ceteris paribus,* by about 6%. The magnitude of this effect is similar to that reported in column [4] of table 2.6. Again this effect is robust across specifications. This particular result is similar in magnitude to the result reported in the pay-performance relationship, and provides further evidence that VC performance through the management of a successful merger impacts positively on VC pay.

The results also suggest that the presence of highly paid staff, proxied by the proportion of staff earning over £70,000, exerts a positive influence on VC pay. The point estimate suggests that a one percentage point increase in the proportion of staff earning in excess of £70,000 increases VC pay by 0.92%. This particular finding confirms the earlier finding for the pay-performance relationship although the effect was smaller. This may be taken as further evidence of 'tournaments' influencing VC pay. Similarly, a one percentage point increase in the proportion of professors in the institution, who also represent high earners, increases VC pay, on average and *ceteris paribus*, by about 0.2%. This provides further supporting evidence that 'tournaments' may indeed impact on VC pay.

In general several of the significant effects reported for the institution random effects remain robust in the VC random effects specification. However, on balance only few VC personal characteristics are found to influence VC pay. The main effects tend to be determined by the institution's characteristics. This has also been confirmed in previous research (Dolton and Ma, 2003).

2.8 Concluding Remarks

There has been recent public interest in the determination of CEO pay in the public sector. The primary analysis undertaken empirically examined the relationship between VC pay and mission-based and financial performance indicators. In addition, a complementary analysis examined the relationship between VC pay and VC personal characteristics after controlling for university specific characteristics.

From the primary analysis we find new evidence of a relationship between VC pay and mission and financial based performance measures. There is evidence that success in 'widening participation' which is now a key feature of the mission statements and strategic plans of many universities, impacts VC pay although the responsiveness in pay is low (inelastic), and indeed many VCs may be mission driven. However, when university rather than VC fixed effects are used in the analysis, neither of the social inclusion measures used achieve statistical significance at a conventional level. This may be attributable to the fact that the institutional fixed effects absorb most of the variation associated with these two measures. This is perhaps to be anticipated since these social inclusion measures can be reflective of different university policy or 'missions' between pre-1992 and post-1992 universities. We also find that VCs are rewarded financially for securing steady financial flows through funding council grants as a possible reward for sound financial management although the responsiveness of VC pay to this variables is again fairly inelastic. We also found that VCs were awarded for success in securing institution growth through merger. These results provide evidence that VCs are not entirely paid like public sector bureaucrats but good management and furthering the institution's mission is rewarded. However, in both the analyses undertaken there was evidence of substantial VC pay inflation particularly since the academic year 1998/99 onwards.

The complementary analysis examined the relationship between VC pay and VC personal characteristics. The results from the institution random effects specification suggest only marginal evidence that a VCs' human capital impacts on VC pay after controlling for university characteristics (similar conclusion can be drawn from the VC random effects specification). However, there is evidence that certain aspects of VC training (i.e., whether the incumbent was a former VC), and current employment

(tenure) impacted positively on VC pay. There was little evidence that a VC's previous work experience influencing pay. This is all the more surprising given the drive to appoint a VC with commercial experience. In addition we found evidence that VCs with an educational background in the arts are paid less than their counterparts with a science background. This perhaps reflects the commercial worth of such degrees.

There was also evidence of a gender dimension to VC pay with male VCs being paid about 5% more than their female counterparts. Whether this reflects gender discrimination in this labour market is difficult to discern and the small sample of female VCs means that a gender decomposition was not possible. But the evidence does suggest that universities do, to some extent, pay female VCs less than their male counterparts. We also found that to a certain extent universities pay older VCs more than their younger counterparts. In general however, there was little evidence of VC characteristics impacting on pay, and we conjecture that the characteristics examined may be more important in determining employment than pay.

In both the primary and secondary analysis undertaken the data employed allowed the examination of the influence that external pay benchmarks and internal pay structures exert on the pay determination process. In particular the results confirm some of the findings from the limited previous research that exists in this area. These variables, it is argued, capture some of the information that the remuneration committees utilise when determining their VC pay. The remuneration committee may seek to set VC pay commensurate with the pay awards of VCs at comparable institutions in regard to the guidelines set by the Committee of Universities Chairs (2009:27). We find robust evidence that this is indeed the case. Such pay awards may also represent a signal of comparable quality and assist retention thus reducing the costly process of recruitment. Moreover, comparative pay awards may also be used by the remuneration committee to justify the increase in pay to relevant stakeholders (e.g., lecturer unions, academic staff and students). However, the results reveal that that the effect is fairly inelastic suggesting that the responsiveness of the remuneration committee to VC pay in other comparable universities is relatively low.

We find evidence that VCs are paid according to internal pay structures as predicted by tournament theory. This may not be that surprising given UK universities employ highly

paid financial and marketing staff to manage and identify changing income streams (e.g., income from research/consultancy contracts and new markets for overseas students). Moreover, universities with business and/or medical schools now have to compete for high quality academics who command high salaries. The evidence suggests that the presence of highly paid staff impacts positively on VC pay and is in comport with previous findings (Dolton and Ma, 2003; Tarbert, *et al.*, 2008). Whether these results provide evidence of 'tournaments' in determining VC pay is difficult to confirm as most VCs are appointed externally. However, it is interesting to note that just over one-fifth of the VCs in the primary analysis reach their position through internal promotion. Of these, 55% VCs were promoted internally in 'new' and 45% in 'old' universities. This may further suggest that 'tournaments' impact positively on VC pay if internal promotion reflects success in a promotional contest.

Evidence from the secondary analysis also found that the proportion of professors, who also command high pay impacted positively on VC pay providing further support for internal pay structures influencing VC pay. The results from the secondary analysis also suggest that VCs are compensated for the size of the institution as measured by the size of the student body. However the evidence presented suggests that the responsiveness in VC pay to changes in the size of the student body is highly inelastic. There was no evidence of a 'size' effect in the pay change models reported by Tarbert *et al* (2008) possibly due to the poor explanatory power of the pay-change models presented. There is also evidence that VCs of post-2003 universities were paid about 5% less than their counterparts in pre and post-1992 universities suggesting some differential in VC pay across the sector.

There was only marginal evidence that VC human capital impacted on pay although experience as a former VC had a positive influence. We were unable to test the theory of managerial power in this labour market due to the limited availability of relevant data. In order to do so would require more detailed data on the composition and pay of the members of the remuneration committee and other stakeholders. Such data are not readily accessible, but is another area that provides a potential for future research on VC pay. Finally, it will prove of interest in time to determine how the pay/performance gradient is affected by the levy of higher tuition fees as recently introduced by the UK coalition government in the academic year 2012/13.

Chapter 3

Students' Expectation of Debt in UK Higher Education

3.1 Introduction

Student loans were introduced in 1990/91 following the publication of the 1990 Education (student loans) Act. These loans were initially introduced to reduce public subsidy towards student living costs. In 1991 the maximum loan was set at £420 for full-time students living away from home and outside London. This represented about one-sixth of the maximum amount of public support towards student living expenses, the rest being made up by a combination of educational grants, bursaries, and parental contributions. Over time these loans gradually replaced the existing maintenance grant and by 1996/97 the maximum loan accounted for 50% of the grant.[70] For students entering higher education in the academic year 1998/99 the maximum maintenance grant was set at £1,000.

Moreover, at the same time students were also expected to contribute to the cost of tuition up to a maximum of £1,000. The 1998 Teaching and Higher Education Act abolished mandatory grants which were replaced by income assessed loans; it also introduced means-tested tuition fees. In 1999 all new entrants to UK Higher Education and those that started a year earlier, received all their maintenance allowance in the form of an income assessed loan.[71] Student loans also accounted for 50% of student income in 2002/03, the rest being largely made up in the main by commercial borrowing and/or by paid employment (Callender and Willkinson, 2003).

[70] These were 'mortgage-type' income-contingent loans repayment of which commenced following graduation and when the graduate's gross income exceeded 85% of national average earnings. If gross income remained above the 85% threshold then repayment was made over a five year period in 60 equal monthly repayments at a zero real rate of interest. For a discussion of the merits of income-contingent loans and a graduate tax as replacements for mandatory grants on equity and efficiency grounds, see Barr (1991;1993), Barr and Crawford, 1998 and for an international perspective, see Barr (2004), Johnson (2000) and Woodhall (2002).

[71] Repayments were income-contingent and set at 9% of gross annual income above £10,000. This threshold was raised in 2005 to £15,000.

The 2004 Higher Education Act saw student loans as a means by which students, after graduation, could repay their tuition fees. In the academic year 2006/07 new students attending Higher Education institutions in England and Northern Ireland were charged a variable fee of up to £3,000 as a contribution to the cost of tuition. Students were given the option to take out a tuition fee loan to cover these extra costs.[72] Tuition fees were raised incrementally to £3,290 in 2008/09. The maintenance loan was raised to £4,625 in 2008/09 and to £4,950 in the academic year 2010/11. In October 2010 the Browne report (Browne, 2010) recommended that students should start to repay their loans once their income reached the new threshold of £21,000. It was suggested that the cap on tuition fees should be raised from its then £3,290 to £6,000 per annum. In addition under certain circumstances universities are now able to set a fee of up to £9,000 per annum if they could prove that students from low income backgrounds are not disadvantaged from gaining access to the institution. The proposals came into effect in the academic year 2012/13. These changes in student financial support meant that graduate indebtedness was expected to increase particularly from 2006/07 and in the near future. Appendix C1 at the end of this chapter provides a summary of the major changes in student finance from 1962 to the present.

The primary focus of this essay is to examine the factors that are correlated with the level of debt students expect to accumulate once their undergraduate studies are completed, in the context of the changes in student finance following the 2004 Higher Education Act. In particular, we use a unique dataset that is derived from information gathered from a survey of undergraduate students. In addition to demographic and socio-economic characteristics and student attitudes to debt we also include information on student time preference, risk taking behaviour, and expected future earnings. Information on these latter variables is often absent from research on student debt particularly in UK studies. This essay makes a novel contribution to the literature on the student indebtedness, by examining the possible associations that may exist between the variables highlighted above and student expected debt and to the author's knowledge there is very little research on this issue using UK data.

[72] Some students were also eligible for a new income assessed maintenance grant of up to £2,700.

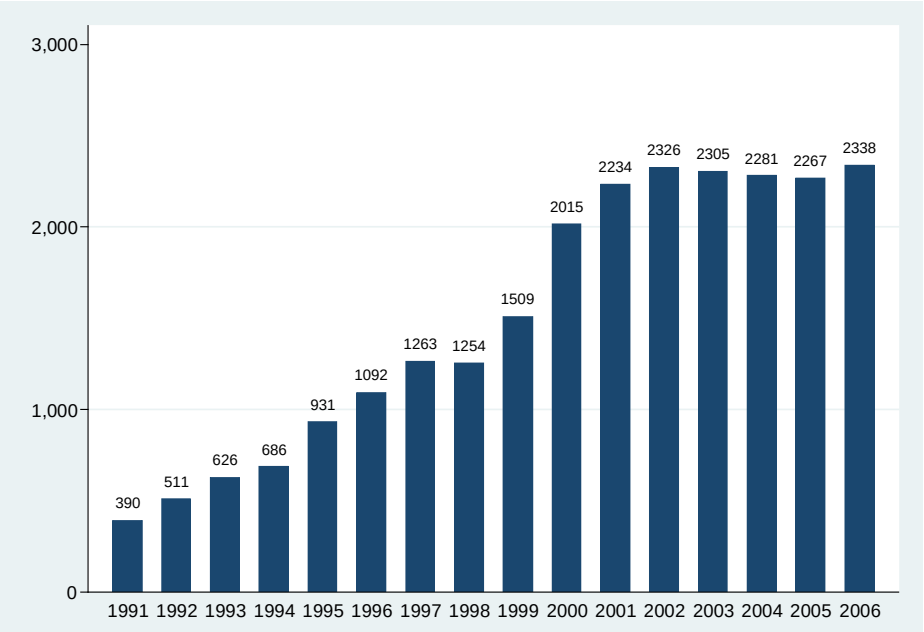
This chapter is arranged as follows. The next section provides a brief background to the current state of graduate debt in UK higher education. This is followed by a review of the relevant literature in section 3.3. The data used in the empirical analysis are discussed and described in section 3.4 which is followed by a description of the methodology employed in the empirical analysis. Section 3.5 presents the empirical results and the final section provides some concluding remarks.

3.2 Student Debt in the UK

3.2.1 Student debt 1990/91- 2005/06

Figure 3.1 shows that the average loan taken out by eligible students, domiciled in England and Wales, increased considerably over the period 1990/91 to 2005/06. We note that in the academic year 1990/91, following the introduction of the Education Act 1990, the average student maintenance loan was £390 in 1991 prices, and over the decade to 1998/99 increased in real terms to £1,509 as loans replaced maintenance grants.

Figure 3.1 Average Student Maintenance Loan 1990/91-2005/06 (£ in 1991 prices) English and Welsh Domiciled Students



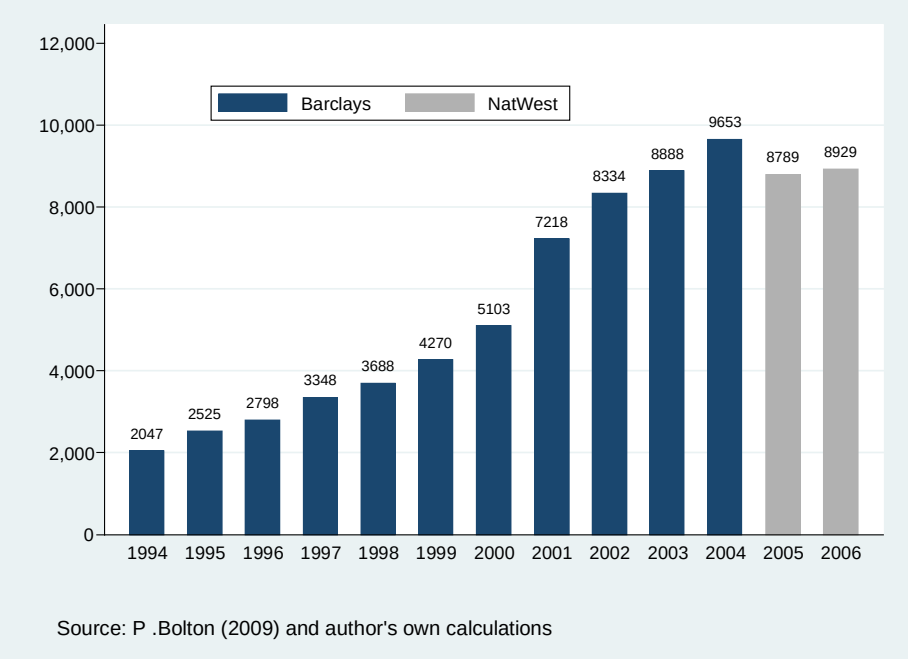
Source: Student Loans Company available at http:www.slc.co.uk/ and author's own calculations

Between 1998/99 and 1999/2000, subsequent to the Teaching and Higher Education Act 1998, the maintenance allowance was replaced by a means tested loan and the real average value of the loan increased by just over 33%. By the academic year 2005/06, the average student loan stood at £2,338 for student who took out a loan.

This increase in the size of the average loan was also accompanied by an increase in the number of students taking out loans. In the academic year 1990/91, 180,200 students took out a loan, which represented a 28% take up rate across all eligible students. By 1999/2000, 699,700 students took out a loan, representing a 72% take-up rate which rose to 80% representing 880,700 students by 2005/06 (Students Loans Company). These trends were anticipated given the changes in student funding arrangements in England and Wales.

Surprisingly, given the growing public concern over student debt, there is a dearth of official statistics on the level of actual student debt after graduation. Barclays Bank Graduate Debt survey (Barclays Bank, 2005), covering the period 1994 to 2004, reported that student debt for new graduates increased in real terms by a factor of 3.7 from £2,047 in 1994 to £9,653 by 2004. A similar survey carried out by NatWest (Natwest Bank, 2007), covering the period 2000 to 2006, suggested that in real terms student debt more than doubled over the period. In particular in 2005 real student debt was £8,789 and in 2006 it was £8,929. These surveys illustrate a clear increase in student debt between 1994 and 2006, see figure 3.2 below.

Figure 3.2 Average Student Debt 1994-2006 (£ in 1991 prices)
English Domiciled Students



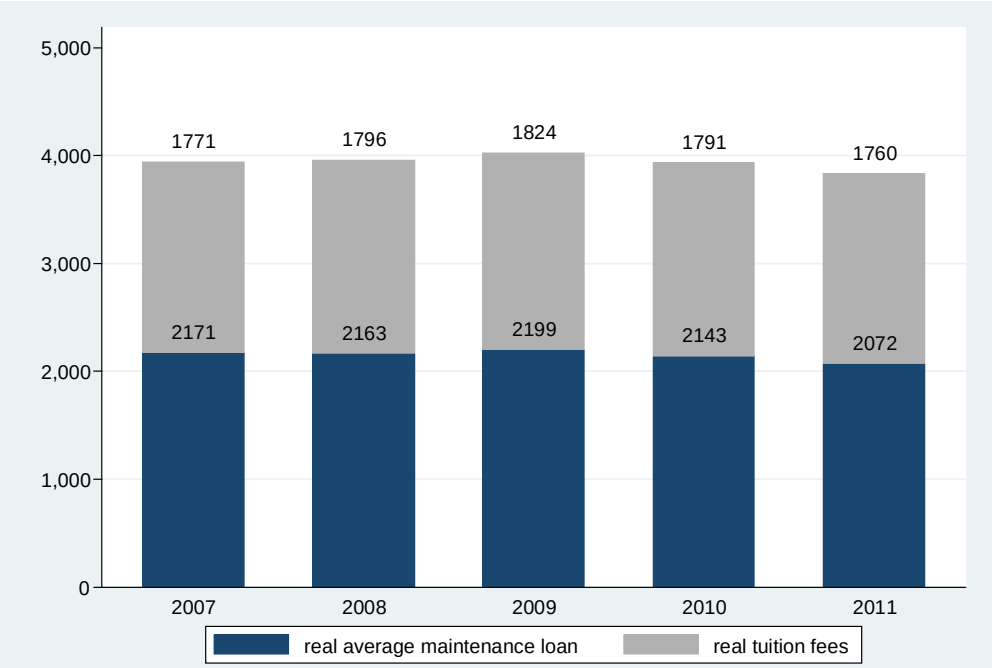
Notes: The figures reported above do not apply to students who were liable for variable tuition fees. The data for both series were derived from surveys of graduates carried out 6-18 months after graduation.

Evidence from national surveys broadly supports these trends. Callender and Wilkinson (2003) report that average student debt for full-time students amounted to £8,666 in the academic year 2002/03 – 2.5 times higher, in real terms, than average student debt in 1998/99 (£3,462) and 3.5 times higher than average student debt in 1996/97 (Callender and Kemp, 2000). It is worth noting that the Push survey (Push, 2007) showed average student debt remaining static or even falling in 2004 and 2005, and the UNITE survey revealed a small decline in average debt among students in 2005 (UNITE, 2007).The proportion of students expecting to be in debt after completing their undergraduate studies also increased from 81% in 1998/99 to 92% in 2002/03 (Callender and Willkinson, 2003). Metcalf (2005) found that 89% of 3rd year students who started university in 1998 expected to be £8,739 in debt by the time they graduated. In contrast 84% of students who started a year earlier (before the introduction of means tested tuition-fees) expected to be £5,371 in debt at graduation.

3.2.2 Student debt post 2005/06

In the academic year 2006/07 students enrolling in English universities were charged a variable fee of up to £3,000 as a contribution to their tuition costs. Students were given the option to take out a loan, in addition to the maintenance loan, to cover these additional costs. Figure 3.3 illustrates that between the period 2006/07 to 2010/11 the average maintenance loan decreased by about 4.6% and tuition fee loans remained relatively constant in real terms, which in part is due to the increase in the maximum tuition fee institutions were permitted to charge their students. Overall, the average level of total student public borrowing, in real terms decreased by just under 3%. It is also worth noting that the number of student borrowers increased from 2.9 million in 2008/09 to 3.2 million in 2009/10 (Student Loan Company, 2010).

Figure 3.3 Average Maintenance Loan and Tuition Fee Loan (£ in 1991 prices) England 2006/07-2010/11



Source: Student Loans Company, statistical first release (November, various years)

Notes: These figures represent awards to English domiciled students who entered university in November of the relevant academic year irrespective of where they study.

There are very few official data on the level of debt experienced by graduates who enrolled in the academic year 2006/07. The 2007/08 *Student Income and Expenditure*

Survey, covering only English domiciled students, found that student loans made up 88% of all student borrowing and the average level of expected debt for final year full-time students graduating in 2007, who were not part of the 'new' student funding regime, was about £7,800 (Johnson, *et al.*, 2009). The Push survey (2007) estimated that students who started higher education in 2006/07 could expect an average level of debt of £17,500 on graduation and those starting in 2007/08 could expect to owe £21,000. More recent evidence suggests that students graduating in the years 2009, 2010 or 2011 anticipate debt amounts of £22,000, £23,000 and £24,700 respectively (Push, 2010). Purcell and Elias (2010) report that 31% of final year students graduating in 2008/09 expect to be in debt by an amount of more than £20,000. These figures are expected to be higher in the future in the wake of the Browne report (Browne, 2010). The portrait that emerges from this evidence is a significant increase in student expected indebtedness from 2006.

International evidence on the debt students expect on graduation is rare. Usher (2005), however, reports a wide variation in student debt burden post-graduation across eight countries including the UK. The study finds that UK students have the fourth highest debt at graduation and only Swedish, Canadian, and US students have higher debts. Recent evidence for the US suggests that students graduating in 2009 from private not-for-profit higher education institutions who relied on student loans to fund their undergraduate studies had an average debt of $26,200 (£16,725), and those graduating in 2010 on average owed of $28,100 (£18,175) (College Board, 2011).[73] It is not easy to compare these figures with student debt in the UK, but if student debt expectations are realised then these figures may suggest that UK graduates will be at least as indebted as their US counterparts in the near future.

[73] The Bank of England annual spot exchange rates were used to convert the $ value debt to its sterling equivalent these were 1.5665 for 2009 and 1.546 for 2010.

3.3 Literature Review

The previous section provided evidence to show that since the introduction of student loans in 1991 and the introduction of tuition fees in 1999 (and its subsequent increase) student indebtedness and the level of expected debt have risen considerably. The next sub-section provides an overview of the general issues surrounding student indebtedness. This is followed by a sub-section that reviews the literature on the determinants of debt in the general population which identifies factors that may help to explain why individuals get into debt and which may be associated with the causes of student indebtedness. The penultimate sub-section reviews the small body of literature that is focused on the determinants of student debt and the final sub-section provides a brief summary of the literature reviewed.

3.3.1 Issues Surrounding Student Debt

There are several negative consequences associated with high student indebtedness such as non-continuation in higher education, its impact on student performance, future financial well-being and labour market choices (Purcell and Elias, 2010). It is also possible that student indebtedness may impact on income distribution if graduates demand higher future wages to compensate for higher levels of debt making it more unequal in the future. Nevertheless, advocates of student loans often argue that graduates are the main beneficiaries of higher education (e.g., in terms of enhanced future earnings) and should contribute to its cost (Barr, 2004; Friedman and Friedman, 1980; Glennerster, *et al.*, 1968). This argument is grounded in human capital theory (Becker, 1993) which supposes that students are able to rationally assess the cost and benefits of investing in human capital (post-compulsory education). It is further assumed that investment in human capital will enhance an individual's future productivity (e.g., through the acquisition of further knowledge and skills) which in turn raises labour market lifetime earnings relative to the earnings that could be earned if the individual did not pursue further 'schooling'.

The net *private* benefit of higher education is the difference between the present value of discounted future earnings *with* university education and the present value of the

discounted earnings *without* (secondary schooling only). The costs associated with such an investment include the direct cost (e.g., expenditures on tuition, learning materials, and living expenses) and the indirect (opportunity) costs of participation (e.g., the loss of potential earnings while studying). If we set the net private benefit to the cost of human capital investment we can find the private rate of return, *r* (the rate of return the individual discounts future benefits and costs), from the following expression:

$$\sum_{t=1}^{R} \frac{(W_u - W_s)_t}{(1+r)^t} = \sum_{t=1}^{S} (W_s + D_u)_t \, (1+r)^t \qquad [3.1]$$

The left-hand side of expression [3.1] reflects the net discounted benefits associated with human capital investment and the right-hand side its costs (both direct and indirect). In this expression the subscript $\boldsymbol{u}$ denotes an individual with university education and $\boldsymbol{s}$ reflects an individual with only secondary education and $\boldsymbol{W_u}$ and $\boldsymbol{W_s}$ represents the earnings stream associated with each level of 'schooling'. The quantity ($\boldsymbol{W_u}$ - $\boldsymbol{W_s}$) represents the earnings differential between graduate and non-graduate earnings (the net private benefits), assumed to be positive, but may be negative for a short time after graduation. $\boldsymbol{R}$ and $\boldsymbol{S}$ denote time in the labour market and time in higher education respectively and *t* is the time index. On the right-hand side $\boldsymbol{D_u}$ denotes the direct cost and $\boldsymbol{W_s}$ is the opportunity cost associated with university participation. We note that the greater the earnings differential, c*eteris paribus*, participation in higher education becomes more attractive but a rise in the cost, *ceteris paribus,* makes participation less attractive. It would be rational for the individual to invest in human capital up to the point where the net benefits equal the costs as stated in expression [3.1]. It is also possible that the market rate of discount, ***i,*** differs from ***r*** and investment in human capital will be financially attractive if:

$$\boldsymbol{r > i} \qquad [3.2]$$

This suggests that the perceived price of a loan (the subjective (private) discount rate relative to the market rate of interest) will influence students' borrowing behaviour and a reduction of the market interest rate may impact positively on the student's willingness to borrow and invest in human capital. This has implications for the design of the

repayment scheme i.e., setting an interest rate on student loans that minimises the possibility of non-take up i.e., one that does not deter participation.

However, whether or not a person can participate in higher education will depend in part on the extent to which a prospective student is able to borrow freely to finance the direct costs and the terms on which such borrowing takes (see, Tumino and Taylor (2013) for recent evidence). In this regard the capital market may ration the available credit and fail to provide the necessary level of student loans for an efficient level of higher education investment. One of the principal reasons cited for such capital market failure is the lack of sufficient information on the part of both the lender and borrower (Barr 2012, 2004). For instance, lenders will not know how well a prospective student will perform in higher education or even if the student is able to complete the degree programme. This leads to an uncertain outcome and raises concern over whether the student is able to gain suitable graduate employment with sufficient future income to make the repayments. Moreover, lenders may be reluctant to lend to students from low-income backgrounds with little or no collateral on the basis of uncertain future income, and access to higher education for this particular group of students may be hindered. Such an inequitable distribution of higher educational resources may further impact on intergenerational mobility. Furthermore, students will not necessarily have complete information on what they are buying, which is a particular characteristic of students from lower social-economic groups (Glennerster, 1991), assuming they or their family members or friends have no previous experience of higher education. This may also perpetuate the possibility of withdrawal or poor performance.

Given that the capital market may fail to provide an efficient or equitable level of student loans, for the reasons noted above, then the government may need to intervene and provide students with publically funded loans (or grants) to cover some of the direct costs of university education. Depending on the terms of the loans this can result in students accumulating high levels of debt on the completion of their studies regardless of the source of the loans. Moreover, if students expect to realise a net benefit from their human capital investment then one may expect students in general to have a positive attitude towards using loans as a means of financing their higher education. This may be true for students who expect high future earnings with a low risk of unemployment. Thus the level of debt students anticipate by the end of their studies may reflect the

availability of student loans (or other financial subsidies) and the higher future earnings they expect in the graduate labour market.

Several UK studies have found evidence of substantial returns to higher education qualifications. For example, Harkness and Machin (1999) analysed earnings data from the General Household Survey for the period 1974 to 1995 and found that the wage premia on degrees relative to A-levels increased significantly in 1980s, particularly for those holding degrees in the Sciences, Social Sciences, and Business. However the authors observed little change in the wage premia in the 1990s. Interestingly, they found that female graduates have improved their relative wage position by more than men since the start of the 1980s. Blundell *et al.* (2000) find that returns to a first degree, relative to A-level qualifications for individuals of about 33 years of age, was about 15% for males and 37% for females after controlling for socio-economic factors. Walker and Zhu (2003) find that between 1993 and 2000 the returns to a degree varied between 13% to 18% for men and 19% to 31% for women, relative to two or more A-levels using their basic specification. Bratti *et al.* (2008) using data from the British Cohort Study 1970, examine the returns to UK degree class and find that graduates with a 'good' degree class (1st or upper second) earn a wage premia of 6.5% compared to graduates with a lower degree class (lower second or 3rd). In a more recent UK study Walker and Zhu (2011) find that the hourly wage premia for men with a first degree is around 20% and the comparable figure for female graduates is around 31% compared to those with 2 or more A-levels. Moreover, they estimate that tuition fees of between £3,290 and £7,000 p.a. reduce the wage premia by 1-3%. Much of the evidence from UK studies is consistent with international evidence (Psacharopoulos and Patrinos, 2004).

However, the evidence is more mixed as to whether or not students can form realistic expectations of their future earnings. For the UK, Jerrim (2011) finds that first year full-time students over estimate their expected starting salary by 20% and expectations become more realistic over time with final year students over-estimating their starting salary by about 15%. Brunello *et al.* (2004) found that business and economics students in ten European countries also tend to over-estimate their future wages. However, several studies conclude that students can make accurate predictions on their future earnings. For instance, Webbink and Hartog (2004) find that the expected wages of Dutch students closely match their actual wages. Wolter (2000) finds that future wage

expectations made by Swiss students closely matches the actual wage distribution. For the US, students were also found to make realistic predictions of their future incomes (Dominitz and Manski, 1996; Betts, 1996). It is instructive to note that several UK surveys find that UK students expect relatively high earnings post-graduation. Callender and Kemp (2000) report that students graduating in 1999 expect to earn on average £13,500 in their first job after graduation and £22,000 five years thereafter. Johnson *et al.* (2009) report that full-time students in 2007/08 expect to earn about £19,800 per annum in their first job after graduation, and about £32,000 per annum five years later. It is also worth noting that the survey finds that higher than average expected average earnings are found amongst students studying Medicine and Dentistry, and lower than average expected earnings are found amongst those studying Languages. More recent evidence suggests that in 2009 31% of final year undergraduates expect to earn an average of £19,665 (Purcell and Elias, 2010). The survey also finds that being male, Black or Asian, the subject of study (Law or Social Studies), age, and university entry tariff, have a positive association with higher expected future earnings.

There is another strand of literature which interprets a system of student loans, and the fear of indebtedness, as a potential barrier in accessing higher education. This is particularly evident for potential students from lower socio-economic groups, which may compromise the stated policy objective to 'widen participation'. Callender (2003), using a sample of 1,953 pre-university students drawn from Further Education (FE) and sixth-form colleges, investigated whether the fear of debt acted as a potential barrier to higher education. The survey found that students who expressed a feeling that student debt would be a major factor inhibiting their decisions to enter higher education were generally: white women over 21 years of age; from lower social classes; and studying at a FE college. Although anti-debt attitudes were expressed by students with different personal characteristics it did not act as a strict deterrence on the decision to enter higher education for the majority of students. Students who held anti-debt attitudes were generally from lower social classes, lone parents, Muslims, and from minority ethnic groups. Students with tolerant attitudes to debt were more likely to participate in higher education and were generally male, from independent schools, and from the higher social classes. Attitude to debt was measured on a 5-point scale derived from ten attitudinal statements. The mean score was 2.78 suggesting that these students had a

marginally tolerant attitude to debt.[74] In a follow up study Callender and Jackson (2005) using the same data, but a different (logit) methodology, found that students studying for vocational qualifications were less likely to apply for higher education than students studying for A-level qualifications, due to their greater debt aversion. Similar, conclusions were drawn for students from a low social class. For further evidence on this issue see, Connor, *et al.* (2001), Knowles, (2000), Forsyth and Furlong (2003), Pennell and West (2005) and Johnston *et al.* (2009).

Furthermore, the expectation of a high level of indebtedness can have some further unintended consequences particularly for those students from disadvantaged socio-economic groups and students with limited financial support from their parents. For instance, it can potentially reduce the time these students devote to study through taking on paid part-time employment by necessity. Christie *et al.*, (2001) examined the impact that changes in the student funding regime (i.e., from grants to loans) had on student choices in relation to paid work, their level of debt and savings. Parental financial support was found to be an important factor in determining these choices and students without parental financial support found paid work and also go into financial debt.[75] They also reported that even when parental support is generous there is a tendency for students to seek paid work. Moreover, they found that student attitudes to debt influenced how they accumulated debt (e.g., in the form of overdrafts). Evidence from UK national surveys of students' income and expenditure report that the proportion of full-time students working term-time increased from 47% to 58% between the academic year 1998/99 and 2002/03 (Callender and Kemp, 2000; Callender and Willkinson, 2003), and fell slightly in 2007/08 to 53% (Johnson, *et al.*, 2009). The average hours students worked during term-time also increased from around 11 hours per week in 1998/99 to about 14 hours per week in 2002/03 (Callender and Kemp, 2000; Callender and Willkinson, 2003) and ranged between 11 and 17 hours per week during term-time in 2007/08 (Johnson, *et al.*, 2009). In a more recent survey 47% of final year students reported taking on paid work during term-time in the academic year 2008/09 with hours worked during term-time varying between 12.5 to 15.5 hours per week (Purcell and Elias, 2010). The general picture that emerges is the proportion of UK students working

[74] From the responses the authors used factor analysis to extract 3 factors associated with debt attitude: liberal, moralistic/debt averse, and fearful of debt.
[75] It should be noted that the sample size was very small and consisted of 49 students.

part-time during term-time and the hours worked has generally increased over the last decade, but fell slightly towards the end of the decade during the recession that was brought on by the financial crisis of 2007.

Moreover, there is evidence that term-time work can also adversely affect student academic achievement and experience of higher education. An early UK study by Ford *et al.* (1995) found that in the wake of the changes in student funding arrangement in 1990, 29% of the 1,059 students sampled worked during term-time. Of these 40% reported that academic standards were not affected, 27% said academic work suffered and 30% said they were unable to prepare efficiently for tutorials. Metcalf (2003) found that term-time working had a negative effect on the quality of university experience in a study of 782 full-time 3rd year undergraduates in four UK universities in 2000/01. Specifically, 30% of all students found it difficult to balance work with educational demands. For those who were in work 78% reported that it affected time devoted to study. Furthermore, there was evidence that females (particularly from ethnic minorities) were more likely to be in term-time employment which hindered their academic performance. Although financial and cultural factors were found to influence the decision to work term-time the incidence of work differed across universities in the sample and students attending pre-1992 universities were less likely to be working during term-time. Humphrey (2006) also confirms the findings that term-time work negatively impacts on academic performance (measured in terms of end of year grades), and the student experience (i.e., membership of university societies). The more recent UK study by Callender (2008) using a sample of 1,012 full-time students drawn from six UK universities in 2002 reports that 53% of students worked term-time. The study finds that irrespective of university type term-time work had a negative impact on end of year marks and degree classifications. Male students working part-time during term-time were less likely to do as well as their female counterparts and older students in work performed better than their younger counterparts. For further evidence on these issues see, Humphrey (2006) and Brennan *et al.* (2005).

It is interesting to note that in a study of final year students Metcalf (2005) found that between 45% and 47% of the 1,112 students in the sample worked term-time at an average of about 14 hours per week. The study found that there was no significant difference in the propensity to work between students with and without hardship grants,

but term-time work increased for those students without financial support from their parents or families. However, those in receipt of hardship grants expected a higher level of debt by the end of their studies. Further, students who were deemed to have fewer employment opportunities (determined by subject of study) or had lower future earnings potential were more inclined to work during term-time. The prospect of rising debt was once again found to have a significant negative influence on students' university experience for a large minority of those sampled (29%-34%).

Evidence also suggests that financial problems can be a key influence on the decision to withdraw from higher education. For instance, Davies and Elias (2003) in a survey of 1,510 students who either withdrew from UK higher education in 1996/97 or 1998/99 found that 18% of former students cited financial pressures as a major reason to withdraw from higher education with relatively more males (56%) than females (40%) citing financial pressures as the reason for their exit. Those aged 21 years also cited financial pressures as a major reason for withdrawal. Yorke and Longden (2008) in a survey of 1st year students who failed to return to higher education for their second year found that 29% of a sample of 312 students cited financial pressure as influencing their departure. See also McGivney (1996) and Yorke (1999) for further evidence on the relationship between financial pressures and the decision to withdraw from higher education. There is also evidence that student debt can inhibit future educational and labour market choices, such as the desire to pursue postgraduate studies or the need to find non-graduate jobs post-graduation to pay off debts (Purcell and Elias, 2010).

Studies in the US also find that financial pressure is positively associated with term-time working which can have a detrimental effect on academic performance, the decision to continue with undergraduate studies and future choices (Astin, 1993; Strinebrickner and Strinebrickner, 2003; Chapman and Lounkaewa, 2010; Kalenkoski and Pabilonia, 2010; Scott-Clayton, 2012; Zhang, 2013). For students from New Zealand, Lange and Byrd (1998) suggest that credit-card debt had negative consequences on students' psychological well-being.

Given the issues outlined above it is surprising that the economics academic literature has been relatively silent on the determinants of student indebtedness and has not sufficiently addressed the question of why students get into debt. Although research on

the determinants of student debt is relatively sparse, there is a large body of literature that examines the causes of indebtedness in the general population at the individual and household level. The factors identified as significant in determining indebtedness, from general public surveys, provide useful insights on the factors that may be associated with student indebtedness. It should be noted that there is no real consensus on the definition of 'indebtedness' or 'over-indebtedness' in the literature (D'Alessio and Iezzi, 2012) whether it being unable to meet regular bills or payments on unsecured 'structural' debt (OXERA, 2004) or meeting all obligations over a long period of time (Haas, 2006).

3.3.2 The Determinants of Debt

There is a large body of literature that has examined several aspects of individual debt. Much of it focuses on the general determinants of 'over-indebtedness' but the literature also examines, *inter alia,* the impact of debt on financial hardship and poverty (Mewse, *et al.*, 2010; Drakeford and Gregory, 2008; Citizen's Advice Bureau, 2006); health, stress and social exclusion (Brown, *et al.*, 2005ba; Drakeford and Sachdev, 2001; Taylor, *et al.*, 2011) and its potential to act as a barrier to employment (Kempson, *et al.*, 2004).

The literature on the determinants of debt has grown over the past decade but studies by economists using UK data are still relatively rare. This is all the more surprising given the growth in UK individual and household debt over the past two decades (Brown, *et al.*, 2005a).[76] This in part is due to the lack of suitable UK data and scepticism amongst economists over the use of subjective data in such studies. The reasons for such scepticism include concerns over the use of attitudinal variables in regression analysis and the creditability of inferring subjective expectations from realisations. These concerns arise for several reasons. First, the specific wording of the questions and their ordering can potentially create cognitive problems on the part of the subject and lead to biased responses. Second, certain types of questions may seek to elicit the strength of attitudes on numerical scales. Fundamentally, the use of such scales assumes that individuals have the same underlying preferences and perceives each point on the scale in a similar way. If this assumption does not hold then responses again may be biased

[76] In a survey of 1,647 between 1994 and 2000, Kempson (2002) reports that unsecured debt doubled in the seven year period.

and may only reveal what individuals think the survey wants e.g. averages. In addition there is also concern over the nature of questions used to elicit subjective expectations. For instance, it is not unusual to find survey questions asking respondent to select the likelihood of a certain outcome by reporting if a certain event is 'unlikely', 'probable', or 'expected'. Again it is debatable if individuals interpret these choices in a similar way. Another consideration concerns the use of probabilistic expectations questions as there is no general way of assessing how well elicited expectations reflect an individual's way of thinking about an event. For these reasons, and more, economists are sceptical about using subjective data, see Dominitz and Manski (1997) and Bertrand and Mullainathan (2001b), for further details on these issues.

However, the determinants of individual debt – generally focused on unsecured debt (e.g. credit card debt) – have been examined in the economics of psychology literature and also separately explored in the psychology and sociology literature. An early study on the determinants of debt by Berthoud and Kempson (1990) found that about three-quarters of a survey of 2,000 British households in 1989 use credit as a means to finance consumption.[77] The authors found that young people and those on low income were likely to have debt problems. They also found that attitudes toward credit were correlated with indebtedness. Livingston and Lunt (1992) using UK survey data on 219 adults (including pensioners) and employing discriminant and regression analysis found that social, economic, and psychological factors influenced the extent of individual indebtedness and debt repayment. They found little evidence of socio-demographic factors impacting on debt, but they did find that being in a lower social class increased debt. Interestingly, they found that individuals with high disposable income experienced high levels of debt, which confirmed the earlier finding by Cameron and Golby (1990)[78] but ran counter to the findings of Berthoud and Kempson (1990). Moreover, they also found that subjective attitudes to debt and locus of control[79] had a significant influence

[77] A similar proportion is reported by Kempson (2002).
[78] These authors also noted that the degree to which individuals had control over financial matters was a significant predictor of debt.
[79] Measures of locus of control are used in the psychology literature to gauge the degree to which individuals feel in control of their personal circumstances e.g. being in debt. It is constructed by presenting subjects with a series of questions related to their personal circumstances, and responses are often recorded on a Likert scale. Factor analysis is then employed to identify two common factors. One factor is usually related to an individual's internal locus of control (i.e., the extent to which individuals regards their lives as controlled by their own actions) and the other is related to an individual's external locus of control (the extent to which individuals regard their lives as controlled by destiny or other people). See Rotter (1966) for further details.

on indebtedness. Lea *et al.* (1993) in a survey of 420 individuals with either no debt, mild debt or severe debt with a water company found that those with severe debt were characterised as young, from a lower social class, non-home owners and with dependent children. Like Berthoud and Kempson (1990) they also found a negative association between income and indebtedness. Furthermore, they found that although each debtor group generally held anti-debt attitudes those with severe debt held more pro-debt attitudes. Similar conclusions were drawn from a follow up study by Lea *et al.* (1995)[80] except that attitudes to debt and locus of control did not correlate with indebtedness in contrast to their previous findings. However, in contrast to non-debtors, they found that debtors had high levels of current consumption and lacked the necessary money management skills and facilities to manage their debt such as access to direct debit facilities. In a later survey of 1,647 UK households Kempson (2002) found households held more pro-debt attitudes in 2002 compared to the attitudes they held concerning debt in 1989. The study concluded that household indebtedness was influenced by use of credit facilities with one in five households holding considerable credit card debt in 2002. They also found that indebtedness was influenced by family structure and low income. Bridges and Disney (2004) found evidence that credit constraints play an important role in determining indebtedness, and Kempson *et al.* (2004) found further evidence of young low-income UK households being at greater risk of debt. It is also instructive to note that Brown *et al.* (2010) using data from the UK *Expenditure and Food Surveys*, 2001-2007 found that gambling (financial risk-taking behaviour) is positively correlated with credit card use and therefore higher unsecured debt at both the individual and household level.

Much of the international literature confirms the findings from the literature cited above.[81] For instance, Stone and Maury (2006), using US survey data on first term enlisted US Air Force personnel, examined the likelihood of indebtedness using a sample of 501 individuals. They developed a 'multi-disciplinary behavioural model' using a logistic regression and found that demographic characteristics (e.g. age, gender, and ethnicity), economic factors (e.g. total income and financial activities), social factors (e.g. parental attitudes to debt), psychological factors (e.g. attitudes to money) and

[80] The survey data was of a similar size and variables constructed in a similar way to that used in Lea *et al.* (1993).
[81] Valins (2004) provides a useful review of the international literature on the determinants of indebtedness.

situational aspects (life altering events), are significant in explaining unsecured debt. Crook (2001) using data from 1990 to 1995 found that US household debt is influenced by family income, family size, and home ownership. Another strand of the US literature has found that credit constraints are a significant influence on household debt (Jeppelli, 1990; Cox and Jappelli, 1993; Gross and Souleles, 2002).[82] Using Italian household level data Margi (2007) found further evidence on this latter issue. Ottaviani and Vandone (2011) in a survey of 445 Italians found, using a probit model, a significant relationship between impulsive behaviour and the probability of holding unsecured debt (e.g., credit card debt), but not for secured debt (e.g., mortgages).[83] Betti *et al.*, (2007) in a study of 13-EU states found that in general the proportion of households in debt fell with income. However, in some low borrowing states (including Italy, Greece and Portugal) the proportion of borrowers remained relatively constant in income. The authors suggest this finding is influenced by the existence of credit constraints that differ across member states.

In general much of the literature interprets individual and household indebtedness in terms of life-cycle theory (Ando and Modigliani, 1963). Individuals are predicted to accumulate debt in the early stages of their working life when income is relatively low. Income is assumed to increase during working life and savings are accumulated. Income then falls in retirement and consumption is maintained by drawing on savings. Individuals are therefore assumed to be debtors in the early part of working life and savers in the latter period in order to smooth consumption over the life-cycle.

However, within the life-cycle framework, future financial expectations are an important consideration in consumption (saving) smoothing. Surprisingly, few empirical studies have explored the association between financial expectations and consumption behaviour. As noted above, this is in part due to economist scepticism of using subjective expectation data (Dominitz and Manski, 1997). Despite these concerns there has been a growing body of economics research that has employed information on subjective expectations in various contexts for example, the determinants of household

[82] It should also be noted that in the case of the US different states have different tax laws on borrowing, where some types of borrowing are tax-deductible (Poterba, 2002)

[83] Impulsive behaviour was determined by 'electrodermal responses' to specific tasks. In this case the selection of cards from four alternative decks. The choice was recorded using biological skin conductance responses (SCR) using an autonomic index of emotional arousal.

debt (Brown, *et al.*, 2005a; Keese, 2012); income expectations (Dominitz and Manski, 1997; Dominitz, 1998; Das and van Soest, 1999), and self-assessed heath status (Lindeboom and Van Doorslaer, 2004).

The study by Brown *et al.*, (2005a) examines the relationship between future financial expectations on the current state of indebtedness using UK data.[84] They posit a two-period theoretical model with uncertain second period income. Their basic model is outlined in appendix C2. The authors test the model using a sample of 2,700 working adults collected from the 1995 and 2000 wave of the British Household Panel Survey. The data contained information on the current level of debt at the individual and household level as well as information on *expected* future income. They construct a financial expectations index based on the individual's assessment of their financial situation one year ahead from responses to the question: '*looking ahead, how do you think you will be financially a year from now*?' Using a Tobit methodology, due to a significant proportion of the sample registering zero debt, they found that there is a positive association between optimistic financial expectations and the level and growth of debt as predicted by their model after controlling, *inter alia,* for individual characteristics (e.g. gender, ethnicity, marital status, education, household characteristics, and occupation) and wealth (e.g. savings, investments, mortgage(s), earnings from a second job). Although this research is not specifically focused on student debt expectations the model is clearly applicable to the debt students *expect* to accumulate during their undergraduate years as a consequence of their expected future income. Thus students who expect high returns to their higher education qualifications may expect to accumulate debt whilst at university and repay it later in life.

Keese (2012) examined the factors that influence future expected debt burden using data from the 2005-2008 German Socio-Economic Panel (SOEP). He finds that objective (current) debt burden is associated with future subjective (expected) debt burden using the responses to the following question: '*does repaying these [current] loans place a major burden on your household, a minor burden or no burden at all?'* Using a random

[84] There are now several studies in the economics literature that exploit subjective expectations data. For instance, Dominitz and Manski (1997) use income expectation data to fit subjective income expectations. Das and Soest (1999) using Dutch household-level data find that financial expectations were low relative to realisations. Souleles (2004) finds that US household expectations are biased and inefficient. See also Jappelli and Pistaferri (2000) and Guiso, *et al.* (1992; 1996). However, there is still debate amongst economists on its predictive value.

effects ordered probit model the author found that household and individual subjective (expected) debt burden is positively associated with objective (current) debt burden, household size, unemployment, but decreases in income, education, and internal locus of control. There is also evidence that individuals who are worried about their personal future economic and financial security perceive a higher debt burden. Interestingly age, gender, and external locus of control were only found to exert a significant influence on individual debt expectations and had little effect at the household level.

It is possible that an individual's attitude to risk will influence overall indebtedness. Intuitively, we may expect that an individual who expresses a dislike of risk may be fearful of accumulating debt if there is a non-zero probability of not being able to service the debt, due to the uncertainty attached to future income streams (e.g., due to unforeseen spells of unemployment and/or changes in the real wages). Surprisingly, the economics literature examining the relationship between risk attitudes and indebtedness is relatively thin, possibly due to the reluctance of economists to use subjective data in their empirical models for the reasons noted earlier. However, to gauge 'global' risk attitudes several authors have used a simple point scale (e.g. 0 = 'risk averse' to 10 = 'fully prepared to take risks') and ask individuals and households to select a point on the scale which best reflects their attitudes to risk.[85] The results from this procedure have proved to be a reliable predictor of actual risk-taking behaviour *(*Dohmen, *et al.*, 2005, 2011; Ding, *et al.*, 2010; Booth and Nolan, 2012; Donkers and van Soest, 1999) however, Keese (2012) using a similar procedure finds that risk attitude has no independent effect on expected debt burden for both individuals and households.

Brown *et al.* (2013) using an alternative method to elicit risk preferences finds that risky behaviour is negatively related to unsecured household debt, for a sample of US households. This result is also robust across the econometric specifications reported. Moreover, risk attitudes were found to be a significant and the most important determinant of unsecured household debt. The negative relationship between risky behaviour and indebtedness was as expected from the 2-period theoretical model the author's develop that suggests debt is a decreasing function of risk aversion. Similarly,

[85] This question has been used to gauge individual 'global' risk attitudes in the 2004 wave of the German Socioeconomic Panel (SOEP). See Dohmen *et al.* (2005) for summary details for the 2004 survey. The questionnaire is available at: http://www.diw.de/en/diw_02.c.222729.en/questionnaires.html. Accessed 04/05/2012.

in an earlier study, Crook (2001) found a negative and significant relationship between a dislike of risk and desired debt for a sample of US households.

It is also instructive to note that subjective discount rates have also been elicited. It is common to find researchers eliciting discount rates for example, by asking individuals how much a certain sum of money received in the future is worth in the present or how much is the individual willing to sacrifice to get the sum immediately. Such procedures have been employed in several studies on financial behaviour. For instance, Donkers and van Soest (1999) from a survey of Dutch households, and using a set of nine questions that relate to the compensation required *not* to receive a certain sum in the future, construct a measure of a household's subjective discount rate. They found that subject discount rates have a significant negative influence on home ownership and ownership of risky assets. Harrison *et al.* (2002) using experimental economic methods and Danish data found that subjective nominal discount rates remain relatively constant over time but differ across individuals according to socio-demographic characteristics and household types (see also, Harrison, *et al.*, 2005). Using US data Meier and Springer (2012) find that subject discount rates influence the decision to become financial literate.[86]

Although students as a group differ in terms of the socio-economic characteristics present in the general population they do offer a relatively homogenous group with regard to their relatively low income and higher necessary expenditures. They also represent a group that are particularly exposed to debt. The evidence reviewed above suggests a core set of factors that may also influence student indebtedness.

3.3.3 Student Debt

It was highlighted earlier that changes in public financial support for students in UK higher education, over the last two decades in particular, have clearly impacted on student indebtedness. However, the determinants of student debt expectations are relatively under researched in the UK. An early UK study by Davies and Lea (1995)

[86]Frederick *et al.* (2002) provides a critical review of the studies and techniques used to elicit discount rates since the 1970s.

examined the extent of undergraduate indebtedness using a sample of 140 undergraduate students of which 43% reported being indebted with an average debt of £306 though average debt increased with the year cohort. The study used a 'pseudo-longitudinal' design for three different cohort years (as a proxy for time) from a single university.[87] Using a logistic regression the authors found that male students are more likely to report being in debt compared to their female counterparts and the probability of being in debt increased with age. In an OLS regression gender and age were found not to be significant in influencing the level of student debt but access to credit cards increased debt. In both regressions pro-attitudes to debt had a significant association with higher indebtedness.[88] It is also worth noting that locus of control had no significant effect on debt. However, the study's main focus was to explore how attitudes to debt changes with the level of debt over time.[89] They found that the mean level of student debt increases most between the first and second year of study with students becoming only slightly more tolerant of debt. But between the second and third year, and as debt increases, students are found to have more pro-debt attitudes and become more tolerant of debt. This led the authors to conclude that increasing indebtedness induces a change in attitudes to debt so that attitudes adjust to current behaviour. Variables found to be correlated with tolerant attitudes to debt included age, religion, and credit card use. Although these authors did not explicitly examine future income expectations they interpret these results in the context of a life-cycle model of economic behaviour (i.e., students borrow to finance human capital investment in regard to expected future income).

A more recent UK survey by Purcell and Elias (2010) utilises the responses from a survey of 24,500 undergraduates in 2009 to explore the extent to which final (3rd) year students are worried about debt. The extent of their worries was recorded on a 7-point scale with the higher scores indicating a greater fear of debt. The majority of students were classified as being fearful of debt. The authors report that students expect to owe on average £15,700 on graduation and 31% expect to owe more than £20,000.[90] Using OLS and a sub-sample of their data (n=8,769) they find evidence that higher expected

[87] Their survey was conducted in 1992 and consisted of 49 1st year, 40 2nd year, and 51 3rd year students.
[88] Attitude to debt was measured on a 7-point scale: *1=anti-debt; 7= pro-debt.*
[89] The mean level of debt indicted that students in the sample were tolerant of debt in contrast to that found in the general population (Livingstone and Lunt, 1992; Lea, *et al.*, 1993).
[90] Of the 31% of students, 8% expect to have accumulated £25,000 or more of debt at graduation.

earnings on graduation lessened the extent of these worries and male students are less fearful of indebtedness compared to their female counterparts.[91] But in contrast to Davies and Lea (1995) they found that students were more fearful of debt in their final year of study than in any of the two preceding years.

Like the general literature on household and individual debt there is a paucity of literature on the relationship between student debt and attitudes to risk. Of the few studies that exist on this issue Oosterbeek and van den Broek (2009) used a survey of 5,621 Dutch higher education students to explore the factors that govern student non take-up of student loans, and hence their level of indebtedness. They present a model that examines the relationship between student borrowing behaviour and risk attitudes which was measured on a 10-point linear scale *(1= unwilling to take risks, 10 = fully prepared to take risks)* similar to that used in the general empirical literature discussed earlier.[92] They find that students who are more prepared to take risks have a higher propensity to borrow to finance their higher education as expected. In a related study Booji *et al.* (2012), using a similar procedure to elicit risk attitudes, find a similar negative association between risk attitudes and student borrowing. Similarly, Eckel *at al.* (2007) find that individuals who are risk seeking tend to borrow to finance their higher education. The general picture that emerges from these studies is that there exists a negative empirical relationship between student borrowing/debt and a dislike of risk which has been found in the more general literature on debt (see for example, Brown *et al*, 2013).

The studies on the borrowing behaviour of Dutch students by Oosterbeek and van den Broek (2009) and Booji et al. (2012) find a positive relationship between the subjective discount rate and borrowing. It is informative to note that in both these studies the subjective discount rate (or rate of time preference) is elicited by asking students a series of questions concerning the value of a sum (Euros) received in the future compared to receiving €1000 today. Although relatively simple to construct, this covariate has been found to be a significant determinant of student debt in other studies (see, Eckel *at al.* (2007) for a study of Canadian students and Coller and Williams (1999) for a study

[91] Students were simply asked to state what they expected their per annum gross earnings to be when they start work after graduation. The mean was £19,665.
[92] Note that this is in contrast to the 11-point linear scale used by Keese (2012), Dohmen *et al.* (2011) and Dohmen (2005). The authors justify its use as being more understandable to Dutch subjects.

based on a sample of US students). The conclusion to be drawn from these studies suggests that the higher the rate of time preference the more likely it is that the individual borrows to finance higher education. This assertion conforms to the general conclusion drawn from standard intertemporal choice theory[93] i.e. the higher the rate of time preference the greater the individual discounts future consumption which implies that higher utility is gained from current consumption rather than future consumption. This then raises the possibility that university students with a high rate of time preference will assign a low present value to future consumption and may accumulate high levels of debt to finance high levels of current consumption whilst at university.

In a novel contribution to the literature on student debt Oosterbeek and van den Broek (2009) included two variables to capture student uncertainty in their estimating equations: the probability of completing the course and the probability of finding a job post-graduation. The authors argue that the more uncertain the situation (e.g. greater uncertainty of finding a suitable graduate job to pay back the loan) the less debt we would expect the student to accumulate. However, the authors find no significant association between these measures of uncertainty and the willingness of students to borrow. But beyond this study there is very little in the academic literature that has explicitly explored the relationship between attitudes to uncertainty and student debt.

It is informative to note that Oosterbeek and van den Broek (2009) also find that students who are more debt averse (measured on a simple 4-point linear scale) have a lower probability of borrowing and if parental income is above the modal value then the probability of borrowing (i.e., going into debt), decreases. In addition they also found that older students, who are nearer to their undergraduate completion, have a propensity to borrow more. Moreover, they find little evidence that future earnings expectations affect the borrowing decision of these students. Unlike UK studies they find no statistical evidence of gender affecting the desire to borrow which may reflect differing cultural attitudes to risk between Dutch and UK students.

Opheim (2009), using data from the Norwegian Graduate Survey 2007, found little evidence of gender influencing the take-up of student loans amongst graduates with a

[93] See Frederick *et al.*, (2002) for a review of this literature.

bachelors and/or masters degree. However, there was evidence that loan take-up was influenced by age, study delays, prior educational experience, the time spent at university and parental place of birth. Moreover, it was found that student attitudes to debt influenced the take up of loans between these groups of students. Interpreted broadly, the study only finds a weak association between expected earnings and the level of student debt. Seaward and Kemp (2000) in a survey of 230 New Zealand students found that over optimistic future financial expectations was correlated with higher levels of student debt. The study simply asked students to estimate their future income following graduation and in the ten years following graduation.

Studies conducted on student debt using US data often focus on the repayment of debt post-graduation (see for example, Chapman and Sinning, 2011; Chapman and Lounkaewa, 2010; Shen and Ziderman, 2009; Greene, 1989). A notable exception is the study by Norvilitis *et al.* (2003) that examined credit card debt of 227 US college students; 75% of whom held some form of credit card debt. Using psychometric methods they found little evidence of personality traits (measures of impulsive behaviour, life satisfaction, and internal-external locus of control) influencing the level of student debt. However, they found some association between debt and perceived financial well-being. Although the study provided little evidence on why students get into debt it did find that personality traits were associated with student attitudes to debt. The authors conclude that students need to be more informed on the future financial consequences of obtaining and using credit cards whilst at college so that their attitudes to debt can be more informed.[94] In a later study of 445 students in five US college campuses Norvilitis *et al.* (2006) found that student age, the number of credit cards, attitudes to credit card use, and lack of financial knowledge were positively associated with student debt. However, gender and surprisingly attitudes to debt were found not to influence indebtedness, but having debt caused greater distress and decreased financial well-being. In a more recent study Norvilitis and Mao (2012) compare financial self-confidence, perceived financial well-being, and attitudes to debt between college students from the US and China. Although they find that Chinese students have less debt they report lower levels of financial well-being and financial self-confidence.

[94] In a study of college seniors Markovich and DeVaney (1997) found that male students were more informed on financial matters than their female counterparts.

3.3.4 Summary

The general results from this review of the literature point to a common set of factors that are associated with indebtedness in the general population at both the individual and household level these include: socio-economic/demographic factors (e.g., age, income, ethnicity, social class, education, family structure etc.); attitudes to debt; psychological factors (e.g., locus of control); risk taking behaviour and attitudes to risk, life events, credit constraints and lending practices; money management skills and future financial expectations. However, the significance of each of these factors differs between studies due to: inter-country difference in terms of lending regulations and lending practices; cultural differences that influence attitudes to debt; the time at which the studies took place (e.g., the stage of the business cycle); and the nature and the size of the sample used.

Several factors that are associated with indebtedness in the general population are also found to influence student indebtedness. These include: socio-demographic factors (e.g., age, gender, ethnicity etc.), attitudes to debt, access to credit, money management skills, risk attitudes, and future income expectations. In addition and more specifically associated with student indebtedness, parental income, parental financial support, availability of grants and bursaries, and subjective time preference have some association with student indebtedness. However, the evidence is mixed on the influence that these factors have on student indebtedness. For instance, there is little evidence that the locus of control influences student indebtedness (Davies and Lea, 1995; Norvilitis, *et al.*, 2003). The influence of gender on indebtedness is found to be a significant influence on student indebtedness in the UK literature but seems to have little influence in other country studies. However, student attitude to debt is found to be a significant influence on indebtedness in many studies (see, for example, Davies and Lea, 1995; Brennan, *et al.*, 2005; Johnson, *et al.*, 2009).

3.4 Data

The data for this study were collected through a questionnaire administered to 425 students in lectures and seminars who were enrolled full-time on three-year business

undergraduate degree programmes at a UK university during January/February 2009. This means that the final year students sampled commenced their university career during the autumn of 2006 and were among the first to face a charge of up to £3,000 to cover the cost of their tuition. Information was collected on a student's socio-economic characteristics, year of study, earnings expectations, risk attitude, time preference, attitudes to debt and uncertainty, and expected debt at the end of the programme of study as well as expected debt at the end of the *current* academic year. As our focus is on student debt we are simply concerned with the amount of unsecured debt students expect to accumulate during their undergraduate study. Typically, the level of student indebtedness will include the cost of tuition, living expenses, and the use of credit to finance other current expenditures (e.g., social activities) over and above income received from private (e.g., parents) and/or public sources (e.g., bursaries and grants). A copy of the questionnaire and details of how it was administered can be found in appendix C3.[95] It should be noted that due to time constraints and the practicalities of administering several questionnaires to the same set of students, questions concerning locus of control were dropped from the final questionnaire.[96] Moreover, the literature reviewed suggest that locus of control had only a minor role in influencing student indebtedness. It was felt that this omission would not seriously affect the empirical results. After allowance was made for missing values a sample of 308 useable observations was obtained. The descriptive statistics for the variables used in the empirical analysis are presented in table 3.1 below. Column [1] reports the summary statistics for the sample as a whole and columns [2] and [3] report the sample means and proportions by gender.

From table 3.1 column [1] we first note that the proportion of undergraduate students expecting to be in debt at the end of their time at university is just over 81%. The full sample of students report an average expected debt of £14,022 and those who anticipate being debt by the end of their undergraduate studies reckon for an average level of debt of £17,276. This latter figure is within the range of expected debt levels reported for students graduating in 2009 (Purcell and Elias, 2010; Push, 2010).

[95] The questionnaire is based on an early draft of a similar questionnaire provided by Peter Dolton.
[96] There were also issues surrounding research ethics and student confidentiality which were pointed out by senior university officers.

Table 3.1 Summary Statistics: Student Characteristics

	All students [1]	**Female** [2]	**Male** [3]	**t-stat/z-score[a]/**
Students debt characteristics				
Proportion of students expected to be in debt by the end of their studies	0.815	0.778	0.841	-1.40
Proportion of students expected to be in debt at the end of the academic year	0.795	0.746	0.829	-1.79
Expected debt at the end of studies (£) – all students.	14022 (9543)	12499 (9460)	15077 (9482)	-2.35
Expected debt at the end of studies (£) – students who expect to be in debt.[c]	17276 (7473)	16236 (7432)	17934 (7449)	-1.76
Expected debt at the end of the academic year (£) – all students.	6641 (5716)	5568 (6117)	7384 (4907)	-2.77
Expected debt at the end of the academic year (£) – students who expect to be in debt.[d]	8349 (5176)	7463 (4251)	8900 (5619)	-2.13
Students individual characteristics				
Male students	0.591	*n/a*	*n/a*	*n/a*
Age (years)	20.5 (3.195)	20.222 (3.091)	20.692 (3.258)	-1.27
Ethnicity:				
White non-British [e]	0.139	0.183	0.110	1.81
Other ethnic group [f]	0.250	0.238	0.258	-0.40
White British	0.611	0.579	0.632	-0.93
$\chi^2_2 = 0.137$ [b]				
Cohort:				
First year student	0.623	0.667	0.593	1.30
Second year student	0.198	0.182	0.209	-0.57
Third year student	0.179	0.151	0.198	-1.06
$\chi^2_2 = 0.043$ [b]				
Has a grant/scholarship	0.516	0.548	0.494	0.92
Has part-time job during term-time	0.292	0.246	0.324	-1.48
Students' family characteristics				
Estimated family annual income (£)	53897 (36292)	52563 (35537)	54821 (36874)	-0.54
Father went to university	0.314	0.349	0.291	1.08
Mother went to university	0.256	0.310	0.220	1.97
Father and mother university educated	0.175	0.222	0.142	1.80
Receives parental contribution	0.464	0.444	0.478	-0.58
Monthly parental contribution (£)	152.15 (240.47)	151.49(227.97)	152.60 (249.37)	-0.04
Family home owners	0.854	0.849	0.857	-0.19
Students future income expectations				
Expected earnings in first job after graduation (£)	25108 (8227)	23821 (8119)	26000 (8205)	-2.30
Expected earnings at age 30 with a degree (£)	50397 (22652)	46190 (18447)	53310 (24789)	-2.74
Expected earnings at age 30 without a degree (£)	44561 (44109)	39984 (11131)	47730 (56478)	-1.52
Students attitudes to debt and risk				
Discount rate	0.084 (0.077)	0.082 (0.077)	0.086 (0.076)	-0.51
Risk attitude	6.166 (2.105)	5.540 (2.226)	6.598 (1.906)	-4.48
Debt aversion	3.406 (1.289)	3.810 (1.237)	3.126 (1.253)	4.73
Uncertainty aversion	2.990 (1.072)	2.770 (1.104)	3.143 (1.025)	-3.04
N	*308*	*126*	*182*	

Notes to table:
(a) t-stats are used to test differences in means between male and female students, and z-scores are used to test differences in proportions. The appropriate critical value at the 5% level of significance is ± 1.96.
(b) Chi-squared values are used to test the assumption of independence in the sets of categorical variables between male and females. The appropriate critical value at the 5% level of significance is 5.99.
(c) Number of students who expect to be in debt by the end of their studies is 250.
(d) Number of students who expect to be in debt by the end of the academic year is 245.
(e) White non-British includes EU and other overseas students.
(f) Other ethnic groups include British Asian, British Afro-Caribbean, British Chinese, and other overseas students.
(g) Standard deviations are reported in parenthesis for continuous variables.

We also note that 79% of all students expect to be in debt at the end of the *current* academic year (2008/09) suggesting that more students expect to be in debt as their undergraduate studies progress. As expected, on average students reckon to be less in debt at the end of the academic year compared to the level of indebtedness they expect at the end of their course (except third year students). The average level of expected debt at the end of the academic year for the full sample of students is £6,641 and for those who expect to be in debt at the end of the year the figure is £8,349.

There is a dominance of male students (59%). A large proportion of the sample are classified as white British (61%) , about 14% classified as white non-British and 25% are from other ethnic groups (see notes to table 3.1 for definitions of these categories). The sample average age is just over 20 years and the majority (62.3%) are in their first year of study. Just over 29% of the sample of students hold a part-time job during term-time which is lower than proportions generally reported in national surveys.

The literature suggests that a student's socio-economic characteristic is associated with student debt. We include several variables to capture different dimensions of a student's social economic background, parental home ownership (including mortgaged homes), parental education and parental financial contributions. We note that 85.4% of students are from families that own their own home, 31% have a father and 25.6% have a mother who went to university, and 17.5% are from families where both parents were university educated. In terms of student finance 51.6% report they are in receipt of a student grant, scholarship, or bursary and 46.4% receive parental contributions averaging about £152 per month.

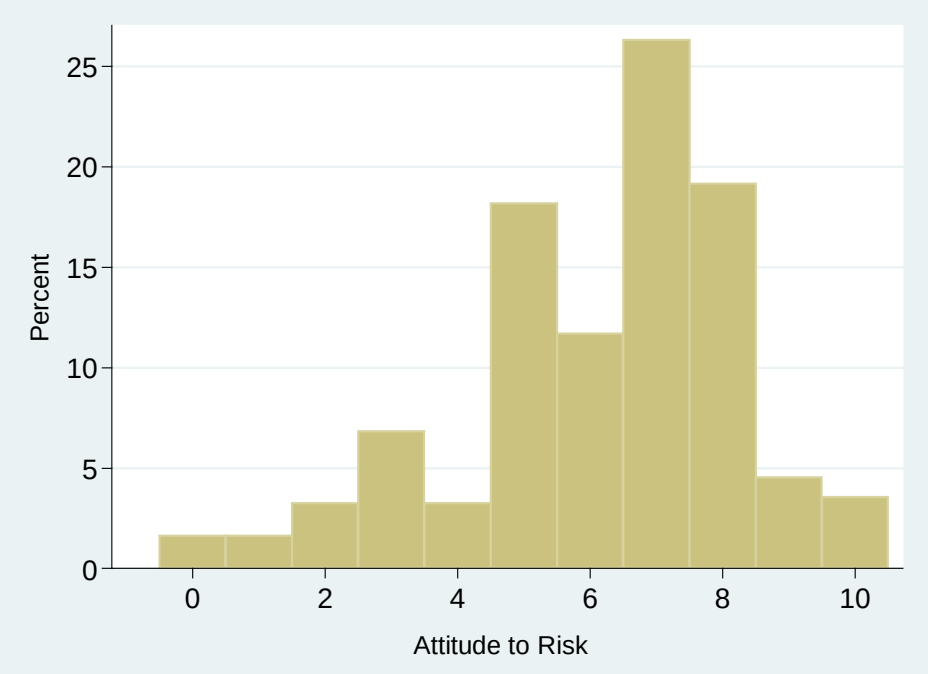
In terms of future graduate earnings students expect to earn on average £25,108 per annum in their first job post-graduation, which is higher than that reported in other studies (Johnson, *et al*., 2009; Purcell and Elias, 2010). By the time the individual reaches the age of 30 they expect to be earning, on average, £50,397 per annum. It is also interesting to note that for these students they would expect to be earning about £5,900 per annum less had they not studied for a degree by the time they reach 30 years of age. This figure suggests substantial anticipated returns to their investment in human capital if such expectations are actually realised.

We measure the personal discount rate by presenting students with five different scenarios. In each scenario students were asked to consider if they felt '*better off*', '*worse off*' or '*the same'* by comparing a given sum of money received by a friend in a year's time compared to £1,000 received by the student today. These sums were: £950, £1,000, £1,050, £1,100, £1,200. The discount factor was elicited on the basis of when students selected the option the 'same'.[97] Thus, they were implicitly given one of the following discount factors: -0.05, 0, 0.05, 0.1 or 0.2. The average discount rate was a plausible value of 0.084 (Donkers and van Soest, 1999). Donkers and van Soest (1999) argue that it is also possible for an individual to have a negative discount rate if the individual does not want to spend all income at once and is prepared to pay a premium for self-control. Although simple, and as noted earlier similar procedures have been adopted in the literature to elicit individual discount rates, it has been found to be a significant determinant of student debt in the Netherlands (Booji, *et al.*, 2012; Oosterbeek and van den Broek, 2009).

Figure 3.4, below, depicts the distribution of risk attitudes across the sample of students. Risk attitudes were elicited by presenting students with the following question: "*How do you see yourself? Are you a person who is fully prepared to take risks, or do you try to avoid taking risks*?" Students were then invited to select a value on an 11 point risk-scale ranging from 0 ('*not prepared to take risks'*) to 10 ('*fully prepared to take risks'*) and as already noted such a procedure has proven to be a reliable predictor of risk taking behaviour (see for example, Dohmen, *et al*., 2011; Dohmen, *et al*., 2005).The average for the sample of students is 6.16 (SD = 2.1) suggesting that, on average, students are prepared to undertake some risky behaviour. This is broadly similar to that reported by Oosterbeek and van den Broek, (2009). Each bar represents the percentage of individuals selecting a particular value on the risk-scale. There is some degree of heterogeneity across the sample. In the extremes a small percentage of students (1.6%) are not willing to take any risk and have selected zero on the risk-scale, and about 3.6% of students report a high degree of willingness to take a risk by selecting 10 on the scale. The modal response is 7, which was selected by just over 26% of students.

[97] This was undertaken to check for consistency in responses. For instance, if a student considered £1,050 received by the friend the '*same*' as £1,000 today then for lesser amounts they should feel 'better off' and for greater 'worse off'. Only students who responded consistently were included in the sample.

Figure 3.4 Student Risk Attitudes



Information on student debt aversion was obtained from the question '*I am not scared of being in debt*'. Responses were recorded on a five-point scale – *strongly agree* (1), *slightly agree* (2), *neither* (3), *slightly disagree* (4) and *strongly disagree* (5). Thus, the higher the score the more is the student's aversion to debt. The mean score is 3.4 (SD= 1.99) and the median 3 suggesting that on average students are neutral in respect of their aversion to debt. Similar questions have been used in previous studies attempting to elicit the degree to which students are averse to debt (Purcell and Elias, 2010; Oosterbeek and van den Broek, 2009).

In the spirit of Oosterbeek and van den Broek (2009) we include a variable that explicitly captures students' dislike of uncertainty. Students were asked to indicate their dislike of uncertainty by indicating their strength of agreement with the following question: '*I do not handle uncertainty well*'. Responses were recorded on the same five-point scale as described above. Thus, the higher the score the better the student copes with an uncertain situation. The mean score is 2.99 (SD = 1.07) suggesting that students are generally neutral in respect of their concerns about uncertainty.[98] Intuitively we would expect that a student with concerns over an uncertain future is likely to refrain

[98] It is instructive to note the coefficient of variation is higher for debt aversion (58%) than for dislike of uncertainty (36%).

from building up debt due to the uncertainty that may be attached to future income streams. Thus we would expect a positive association between our measure of uncertainty and student debt.

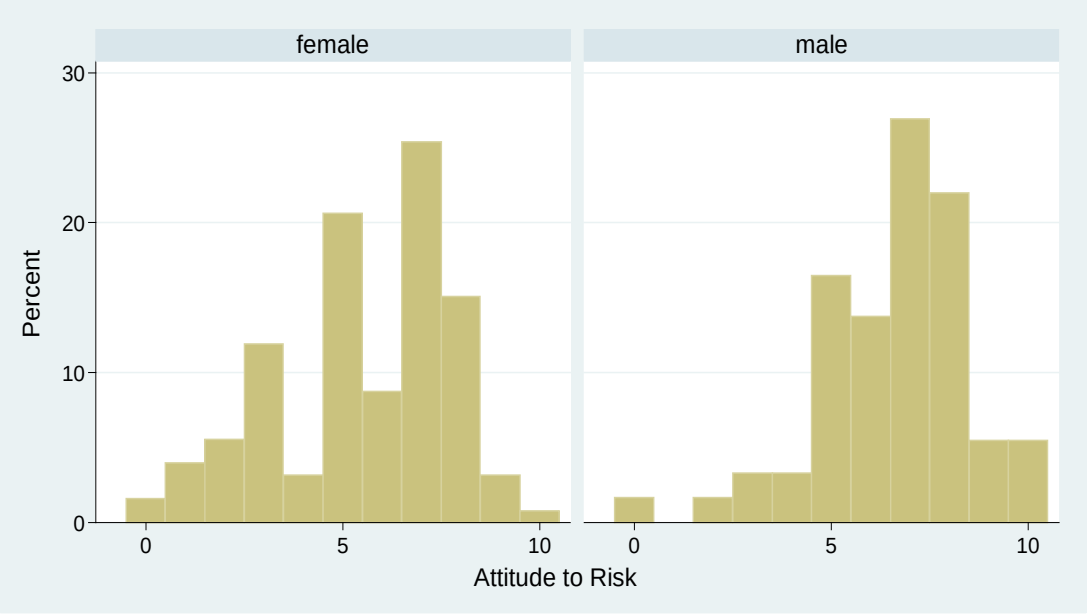
There are gender differences in the responses to the questions asked and these are reported in columns [2] and [3] of table 3.1. The statistical significance of these differences is reported in the final column of the table. Relatively fewer females expect to be in debt by the end of their undergraduate studies compared to their male counterparts, 78% and 84% respectively, and these percentages are broadly comparable with those reported by Purcell and Elias (2010). It may also reflect different spending patterns between the two gender groups (Davies and Lea, 1995). However, we note that this difference is not statically significant (t=-1.4). Male students report a higher level of expected debt by the end of their studies and expect to be more indebted than females by £2,578 on average. However, there is no significant difference between the level of debt expected between males and females who anticipate being indebted by the time they complete their studies (t = -1.76). It is also interesting to note that relatively fewer females expect to be in debt by the end of the academic year and their end of year average expected debt is significantly less than that of their male counterparts. In terms of ethnicity and age, the female and male sub-samples are broadly comparable, although white non-British are more represented in the female than the male sub-samples.

In terms of cohort, the majority of females are in their first year and proportionately more males are in their second and third years, but these differences are not statistically significant at conventional levels. The sub-samples are also broadly comparable in terms of the proportion of males and females in part-time work, in receipt of a grant/scholarship and receiving financial support from parents. The monthly amount of parental financial support received on average is also comparable.

Male graduates expect to earn £2,179 more than their female counterparts in their first job and by the time they are 30 years of age they expect to be earning £7,120 more. The finding that males expect higher earnings in their first job after graduation is also generally found in previous surveys. However, there is no statistically significant difference between what male and female students expect to be earning by the time they are 30 years of age had they not studied for a degree.

The mean discount rate reported by males and females is very similar and the distribution of the discount rate by gender is also broadly comparable. However there are significant gender differences in reported risk attitudes, aversion to debt and dislike of uncertainty. In terms of risk attitudes females are relatively less willing to take risks compared to their male counterparts their mean scores being 5.54 (SD=1.9), and 6.59 (SD=2.2) respectively and this difference is statistically significant (t=-4.48). Figure 3.5, below, depicts the distribution of risk attitudes by gender. We first note that the modal response is 7, which is the same across gender groups. The figure also reveals that very few male and female students, approximately 1.6%, report an unwillingness to take risks. However, at the other end of the distribution, a larger percentage of males are more willing to take risks than females. For instance about 60% of males report a risk attitude in the range of 7 to 10, and 5.5% have selected 10. In contrast about 45% of female students report a risk attitude in the rage of 7 to 10, and less than 1% have selected 10.

Figure 3.5 Student Risk Attitudes by Gender



In terms of debt aversion female students are on average more averse to debt than their male counterparts, which is a standard finding in the literature. We note that about 73% of females disagreed with the statement '*I am not scared of being in debt*' with the comparable figure for males about 45%. Similarly, females in the sample appear to dislike uncertainty more than their male counterparts.

There are also important cohort differences in regard to expected debt, time preference, and attitudes to risk, debt, and uncertainty. These differences are reported in table 3.2 below. We first note that expected debt declines by cohort. First year students anticipate an average debt of £14,556 by the end of their degree programme and the corresponding figures for second and third/final year students are £14,211 and £11,950 respectively. The level of debt reported for third/final year students, however, is lower than that reported by Purcell and Elias (2010). It may be that students borrow too much in their first and second years and then realise that they do not need to borrow as much in their final year.

Table 3.2 Student expected debt, time preference and attitudes by cohort year

	1st year	**2nd year**	**3rd year**
Expected debt at the end of undergraduate programme	£14,556	£14,211	£11,950
Discount rate	0.08	0.10	0.09
Risk attitude	6.16	5.97	6.42
Debt aversion	3.43	3.41	3.29
Uncertainty aversion	2.91	3.07	3.18

In terms of the subjective discount rate we see that it rises between the first and second year suggesting greater current consumption and higher debt in the second year, and falls thereafter, but this may be due to random variation. However, second year students expect a lower than average expected debt than those in their first year which runs counter to what may be expected. Students also become less willing to take on risks between their first and second year and expected debt falls as expected. However, between the second and third year they become more willing to take on risk but expected debt falls which runs counter to our priors. These unexpected patterns may be a result of the small set of observations of second and third year students.

We also note from table 3.2 that there is very little difference between student attitudes to debt between their first and second year and students become less debt averse in their final year. However, expected debt falls in the third year. This may be explained by the level of debt accumulated during the first and second year influencing attitudes to debt in the following year. Students who have experienced high debt levels in their first and second year may adjust their attitudes to debt in their final year (Davies and Lea, 1995) even though they may seek to reduce their debt in their final year. In terms of student attitudes to uncertainty we see that students tend to feel that they can cope more with uncertain situations as their time at university progresses.

3.5 Methodology

The dependent variable employed in this study can be described as 'censored'. In other words, the dependent variable, expected debt, records a zero for students who expect not to be in debt by the end of their studies or end of year or a positive non-zero value otherwise. As a significant proportion of the sample of students report zero expected debt, application of OLS to these data can potentially lead to biased and inconsistent coefficient estimates. We therefore model student expectation of debt using a censored tobit model which gives consistent coefficient estimates when the dependent variable is censored.[99] We define the latent debt equation as:

$$y^*_i = \mathbf{x_i}'\boldsymbol{\beta} + u_i \qquad [3.3]$$

where y^*_i is a partial latent dependent variable that captures the i^{th} individual's propensity to be in debt, $\mathbf{x}_i$ is a vector of debt determining variables for individual i, $\boldsymbol{\beta}$ is a vector of fixed unknown coefficients to be estimated, and $u_i \sim N(0, \sigma^2)$. Thus:

$$y_i = y^*_i \quad \text{if } \mathbf{x_i}'\boldsymbol{\beta} + u_i > 0 \quad \text{and}$$
$$y_i = 0 \quad \text{if } \mathbf{x_i}'\boldsymbol{\beta} + u_i \leq 0$$

where y_i represents the actual expected debt by the i^{th} individual. Thus y_i is either positive ($y_i > 0$) or zero ($y_i = 0$). Using this information, the log-likelihood function (L) can be expressed as follows:

$$L = \sum_{i=1}^{n}\left[Z_i \times \ln \frac{\phi\left[(y_i - x'\beta) \div \sigma\right]}{\sigma} + (1 - Z_i) \times \ln\left[1 - \Phi\left(x'\beta \div \sigma\right)\right]\right] \qquad [3.4]$$

where $Z_i = 1$ if $y_i > 0$, and $Z_i = 0$ if $y_i = 0$, ϕ is the standard normal density function, Φ is the cumulative distribution function of the standard normal, and $\ln(\cdot)$ is the natural log operator. The parameter values β, and σ are chosen to maximise L (the log-likelihood

[99] The tobit estimator has been used in studies on the determinants of student loan default (Greene, 1989), the determinants of student part-time work hours (Kalenkoski and Pabilonia, 2010), and household and individual debt expectations (Brown, *et al.*, 2005a). Amemiya (1984) provides an early but extensive survey of tobit models.

function) using non-linear iterative methods (e.g., the Newton-Raphson method). The resultant estimates are known to be consistent and asymptotically normal. The estimated coefficients are not readily interpretable as the underlying stochastic index, expression [3.3], is not observed when students report zero expected debt. To aid interpretation of the estimated coefficients for continuous variables the marginal effects for each coefficient is computed (Greene, 1999). The marginal effects for the tobit model can be expressed:

$$\frac{\partial E[y_i \mid x_i]}{\partial x_i} = \beta\Phi\left(\frac{x_i'\beta}{\sigma}\right) \qquad [3.5]$$

Thus, the tobit coefficients have to be adjusted by a factor equal to $\Phi(\mathbf{x'_i\beta/\sigma})$ to find the effect on expected debt for small changes in the continuous independent variables. This scaling factor is constructed in the current application using the sample average values for x_i variables, where $(\mathbf{x'_i\beta/\sigma})$ is interpretable as the proportion of non-limit (or non-censored) observations in the sample based on sample average characteristics. In other words, the proportion of the sample that expects to be in debt.

For discrete or dummy variables impact effects are calculated by computing the difference in unconditional expected values when the dummy is one and when it is zero. If we re-express the latent model in [3.3] as:

$$y^*_i = \mathbf{x_i'\beta} + \gamma D_i + u_i \qquad [3.6]$$

where $D_i = 1$ if a specific characteristic is present and zero otherwise the impact effect can be computed as the difference between two unconditional expected values:

$$E[y_i|\,\mathbf{x_i}, D_i = 1] = \Delta_1 = \Phi((x_i'\,\boldsymbol{\beta} + \gamma) \div \sigma)[(\,x_i'\,\boldsymbol{\beta} + \gamma) + \sigma\,\phi(x_i'\,\boldsymbol{\beta} + \gamma) \div \sigma)] \qquad [3.7]$$

$$E[y_i|\,\mathbf{x_i}, D_i = 0] = \Delta_0 = \Phi(x_i'\,\boldsymbol{\beta} \div \sigma)[\,x_i'\,\boldsymbol{\beta} + \sigma\,\phi(x_i'\,\boldsymbol{\beta} \div \sigma)] \qquad [3.8]$$

The impact effect in this case is simply expression [3.7] minus expression [3.8]. This can be computed at the sample average values of the covariates contained in the **x** vector.

3.6 Empirical Results

Five alternative specifications are estimated using a tobit model, and the corresponding marginal/impact effects are also estimated for each specification. Each model includes variables that capture a student's individual and socio-economic characteristics. Following Oosterbeek and van den Broek (2009) the first specification can be described as an 'uncertainty' model that includes variables that capture student expected (uncertain) earnings post-graduation. Specifications 2 and 3 augment specification 1 to allow for student discount rates and attitudes to risk to enter the analysis. Specifications 4 and 5 can be described as 'behavioural' models that augment the uncertainty model to include student reported debt aversion and dislike of uncertainty. The coefficient estimates for the tobit index functions can be found in appendix C4. We first note that the goodness-of-fit measures, reported at the bottom of the table, are satisfactory for models of this kind. Furthermore, the majority of the estimated coefficients reported in the table are well determined at a conventional level of statistical significance.

Table 3.3 below, reports the estimated maximum likelihood tobit marginal/impact effects derived from expression [3.3] for the five expected debt equations. The majority of the estimated coefficients, in all five specifications, are well determined at a conventional level of statistical significance. Each specification was also tested to determine if separate male and female equations fitted the data better than a single 'pooled' equation using likelihood ratio tests. The null of a pooled regression was upheld by the data in all cases; see test statistics at the bottom of table 3.3. It should be noted that there is no comparable method or routine for adjusting the standard errors for the presence of heteroscedasticity in the tobit model as there is in the OLS estimated linear regression model (e.g., through use of a robust estimator). Greene (2008) is critical of the use of such robust procedures in qualitative response models like the tobit because the asymptotic properties of such estimates are unknown. He suggests modelling heteroscedasticity directly, but this is not feasible in the current application due to the small sample size available. Moreover, it is not always transparent if such a procedure actually deals with the problem or merely controls for some underlying non-linear mis-specification that is unrelated to heteroscedasticity.

Table 3.3 Tobit Maximum Likelihood Estimates: Marginal/Impact Effects
Expected debt at the end of the course

	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Gender (male)	2558.898** (1045.40)	2490.071** (1039.27)	1799.670* (1059.86)	2036.378* (1078.06)	1589.142 (1068.32)
white non-British	-2492.986 (1567.60)	-2629.599* (1559.04)	-2294.468 (1553.61)	-2322.105 (1351.12)	-2219.983 (1549.70)
other ethnic group	-4098.849*** (1228.81)	-4365.615*** (1227.65)	-3499.635*** (1254.01)	-3483.319*** (1251.82)	-3313.197** (1257.58)
white British	*f*	*f*	*f*	*f*	*f*
age (years)	-97.137 (170.55)	-79.313 (168.93)	-62.956 (167.92)	-58.074 (167.98)	-59.870 (167.44)
grant/scholarship	1265.626 (1144.21)	1048.938 (1141.36)	753.023 (1135.78)	850.813 (1137.06)	672.601 (1133.78)
has part-time job	-8590.715*** (1208.96)	-8536.019*** (1201.71)	-8441.873*** (1191.73)	-8457.571*** (1189.84)	-8610.544*** (1194.48)
monthly contribution (£)	-11.709*** (2.56)	-11.628*** (2.55)	-11.909*** (2.54)	-12.029*** (2.54)	-12.082*** (2.53)
first year student	1091.396 (1471.92)	1457.336 (1471.88)	1565.639 (1459.05)	1494.338 (1457.77)	1652.151 (1455.85)
second year student	4258.316** (1717.30)	4257.002** (1707.18)	4430.030*** (1693.76)	4447.743*** (1689.76)	4504.362*** (1689.31)
third year student	*f*	*f*	*f*	*f*	*f*
family home owners	-3098.619** (1420.32)	-3160.541** (1411.47)	-2880.196 ** (1401.89)	-2944.440** (1400.45)	-3083.756** (1405.45)
Mother and father university educated	-3281.140** (1381.42)	-3352.706** (1371.92)	-3474.237*** (1362.91)	-3459.429** (1360.58)	-3505.761*** (1358.57)
Expected earnings >£30,000 after graduation	4050.037*** (1580.87)	3973.433** (1570.70)	2568.635* (1533.15)	2773.774* (1640.40)	2622.472* (1629.20)
Expected earnings >£50,000 at 30	2740.183*** (1023.38)	2745.483*** (1016.79)	2590.176*** (1009.78)	2638.543*** (1008.89)	2711.933*** (1010.96)
discount rate	§	14199.556** (6507.81)	13985.731** (6449.61)	13628.944** (6441.97)	13643.780** (6432.91)
risk attitude	§	§	750.374*** (268.89)	797.997*** (271.66)	707.777*** (269.71)
debt aversion	§	§	§	457.355 (400.48)	§
uncertainty aversion	§	§	§	§	635.735 (471.56)
Log-Likelihood	-2686.349	-2683.987	-2680.104	-2679.454	-2679.199
Scale factor [e]	0.9209	0.9227	0.9249	0.9255	0.9258
LR test for separate gender specifications[f]	13.513 [0.332]	19.295 [0.114]	14.313 [0.427]	13.954 [0.529]	15.238 [0.434]
Observations	308	308	308	308	308

Note to tables:
(a) Asymptotic standard errors are reported in parentheses beneath coefficient estimates.
(b) * denotes significant at 10%; ** significant at 5%; *** significant at 1%
(c) *f* denotes base category in estimation
(d) § denotes variable not used in estimation
(e) Scale factor used in the computation of the marginal/impact effects.
(f) The chi squared statistic for these tests are reported in the relevant column. The degrees of freedom are 12, 13, 14, 15, and 15, for specifications 1- 5 respectively, and the probability value for the null of a pooled specification is reported below the relevant statistic in squared brackets.
(g) All estimations reported were undertaken using NLOGIT 3.0 (2003).

It is important to note that the results from estimation strategy adopted do not necessarily suggest that causal relationships exist between students' expected debt and all the explanatory variables included on the right-hand side of expression [3.3]. There is a possibility that certain key variables may be endogenous. Such variables may include those that relate to part-time work and expected earnings. For instance, higher expected future earnings may cause students to be less frugal in their expenditures leading to higher expected debt and higher expected debt could imply that students expect higher future earnings. As outlined in the previous chapter (see section 2.7.1) such 'reverse causality' will result in the estimated coefficients being biased and inconsistent. In order to separate the causal impact from mere correlation we will require a set of suitable instruments for each endogenous variable, which is often difficult in practice (see section 2.7.1 for the requirements for a good instrument).

However, we conjecture that one possible source of exogenous variation in part-time work is a variable that captures whether or not the individual worked *before* enrolling at university. Using previous work experience as an instrument assumes it has no direct impact on student expected debt but is correlated with *current* part-time work, and expected student debt does not affect previous work experience, which are both plausible. If there is a high positive correlation between previous work experience and gaining part-time work whilst at university, then the estimated coefficients relating to part-time work may be overestimates of the true causal effect.

Similarly, finding instruments for expected earnings is difficult. We could instrument student expected earnings with parental occupation class.[100] It is possible that students from families where either one or both parents are in a professional occupation, may expect higher future earnings than those with parents in more menial occupations, but parental occupation class does not affect the debt a student reckons. Additionally, previous academic performance (e.g., A-level entry score) could also be considered as a possible instrument as we might expect high achieving individuals to presume higher future earnings, and previous academic performance is assumed not to effect student expected debt. If these relationships hold, then it is possible that the estimated

[100] Question 9 on the questionnaire administered to the sample of students invited them to write down their parental occupation(s). The responses were difficult to interpret and could not be used in any meaningful way.

coefficients on student expected earnings are also overestimates of the true causal effect. For the reasons raised above the reader should exercise some caution in interpreting the estimated coefficients for part-time work and future expected earnings that are reported in tables 3.3 and 3.4 below.

We initially focus on a student's individual personal and socio-economic characteristics and examine their impact on expected debt. Several of the estimated coefficients relating to a student's individual characteristics are statistically significant at conventional levels and the results remain robust across all specifications reported in table 3.3. There is a significant gender effect on expected debt. Male students expect to have more debt than their female counterparts by the end of their undergraduate studies. For instance, the impact effect in specification 1 suggests that male students, on average and *ceteris paribus*, anticipate a level of debt that is about £2,559 greater than that anticipated by female students at the end of their studies. This effect remains after controlling for time preference, though the impact diminishes to £1,799 when we control for students' time preference and risk attitudes. However, the estimated gender effect is statistically insignificant when dislike of uncertainty is included in the specification, which may suggest a high intercorrelation between gender and this uncertainty measure.

We find evidence that student ethnicity impacts on expected debt. In the basic uncertainty model, students classified as being non-white (e.g., British Asian, Black and Chinese) expect to be about £4,100 less in debt by the end of their undergraduate studies than their White counterparts, on average and *ceteris paribus*. This result is taken to reflect differing cultural and religious attitudes to debt in that non-White ethnic groups have a greater aversion to debt than their White counterparts (Callender, 2003). This effect remains robust across all specifications but the magnitude of this effect diminishes with movement across the five regression models reported in table 3.3.

Students in their second year of study expect a higher debt than their final year counterparts, but there is no statistically significant difference between debt expectations of students in their first and final years of study. This could be explained by changing attitudes to debt over time with students becoming more tolerant of debt between their first and second year as debt increases, but in the third year they seek to reduce their debt possibly to widen their job market opportunities (Purcell and Elias, 2010; Chapman

and Lounkaewa, 2010; Johnson, *et al*., 1997). It is also plausible that students find that they borrow too much in their second year and reduce their borrowing in their third year as noted above.

The income received from part-time work is expected to reduce the need for students to borrow to finance current expenditure. As expected a large and significant negative effect on expected debt is found for students who have a part-time job during term-time. The estimated coefficient suggests that holding such a job reduces expected debt, on average and *ceteris paribus*, by about £8,500 in all specifications compared to those students who are not in part-time employment. This seems to be a plausible estimate assuming a student earns on average about £81 per week for 35 weeks of the academic year.

After some experimentation three variables that capture the socio-economic characteristics of the student's family enter the empirical models: parental contributions, parental educational background, and home ownership. First, students whose parents contribute to their living expenses anticipate their debt to be reduced by just under £12 for every £'s worth of financial help received per month, on average and *ceteris paribus,* according to specification 1. This result suggests that students may be using parental contributions to reduce debt on about a 1:1 basis (i.e., given 12 months in the year every £ received in parental contribution reduces debt by a similar amount each month) and not used to increase expenditure. This effect is broadly similar across all five empirical specifications reported here. Second, on the basis of specification 1, a student whose mother and father were university educated expects to be in debt by £3,281 less than students with either one or no parent who was university educated, on average and *ceteris paribus*. Again this effect remains reasonably stable across all specifications and may reflect the possibility that better educated parents are more able to instruct their children on how to manage their finance better than students with less well educated parents. Third, students from families that own their own home anticipate being about £3,000 less in debt than students who do not possess this socio-economic attribute. It is possible that this variable is related to family/household debt and it is well documented that home ownership and personal/household debt increased considerably in the UK during the 1990s and 2000s (Brown, *et al*., 2005a; Kempson, 2002; Disney, *et al*., 2008). Thus, home ownership may reflect household or family indebtedness, particularly after

the financial crisis of 2007, and this may have influenced the spending and borrowing behaviour of the students that comprise the sample.[101] But it is also possible that home ownership may be picking up other socio-economic attributes that are associated with student debt reduction.

There is no evidence that the age of the student or, rather surprisingly, the receipt of a grant or scholarship impacts significantly on expected debt. This latter result may imply that publically available student financial support is inadequate (Callender and Willkinson, 2003) and has little impact on reducing student indebtedness. However, student expected debt may be influenced by the earnings they anticipate in the future, which may reflect a student's expected set of employment opportunities. For instance, using the results from the first specification, students who anticipate earning more than £30,000 in their first job post-graduation expect to be about £4,000 more in debt than students who report a more modest future earnings level. This effect is attenuated as we control for risk attitudes, aversion to debt and dislike of uncertainty. A similar, but considerably smaller, effect is found for those students who expect to earn more than £50,000 by the time they reach 30 years of age.

In terms of time preference we note a significant and positive relationship between the subjective discount rate and expected debt as anticipated i.e., higher discount rate implies that an individual prefers current consumption to future consumption. This finding supports results presented in previous studies. The point estimate reported for specification 2 suggests that a one percentage-point increase in the discount rate increases expected debt by about £142.[102] This particular result remains robust across all the specifications reported in table 3.3.

The third specification adds attitude to risk as an additional covariate. The estimated coefficient is well determined and statistically significant and as expected suggests that the more a student is prepared to take on risk the higher is expected debt. It should be noted that in this specification the possibility that risk attitude is endogenous was tested using the approach suggested by Smith and Blundell (1986). In conducting this test risk

[101] It is instructive to note that real mortgage to debt ratio increased by about 63% from 3.86 in 1999 to 6.27 in 2009 (Data.Gov.UK).
[102] Given that the discount rate is expressed in proportional terms, multiplying the coefficient estimate by 0.01 yields the effect of a one percentage point rise in the discount factor.

attitude is regressed on a set of four exogenous identifying dummy variables (instruments) that include information on whether or not the student: gambles (i.e. regularly partakes in lotteries): played a fruit machine in the week in which the questionnaire was administered; had a personal savings account; and/or ever participated in a dangerous sport. These variables were found to be individually and jointly significant in influencing risk attitudes with a F(4, 303) = 11.67 [*p*-value = 0.000].
The residuals from this model were inserted into specification 3 and the statistical significance of the estimated coefficient was tested using a t-test. On the basis of the resulting t-statistic we accept the null that risk attitude is *weakly* exogenous (t-statistic= 1.48 [*p*-value = 0.141]). Furthermore, the four identifying instruments were tested for orthogonality with the error process using a Sagan test. The test suggests that this was indeed the case (χ^2_3= 2.45 [*p*-value = 0.4844]) and we accept the null that the instruments are independent of the error process.

Specification 4 introduces the variable designed to capture the student's attitude to debt. The estimated coefficient is counter-intuitively signed but is statistically insignificant at a conventional level. Thus, it can be inferred from this sample that a student's attitude to debt exerts no independent effect on anticipated debt, on average and *ceteris paribus*. The final specification replaces attitude to debt with an alternative that measures student feelings in regard to uncertainty. Again the estimated effect for this variable fails to attain statistical significance at an acceptable level of statistical significance.

As a test for consistency the five specifications are re-estimated but with expected debt at the end of the *current* academic year as the dependent variable. The index functions are reported in appendix C5. The fit of these specifications is satisfactory. The coefficients found to be statistically significant in the expected debt at the end of course specifications are also found to be well determined in the end of year specifications. The coefficient estimates for the marginal/impact effects for all five end of year debt specifications are presented below in table 3.4.

We note that in general the results are qualitatively similar to those presented above. Furthermore, the signs on the estimated coefficients are also broadly similar, but the size of the estimated coefficients have fallen, as one would expect given we are considering expected debt at the end of *current* academic year. For instance, belonging to non-white

ethnic group, or having a part-time job during term-time, or having parents who are university educated, are all associated with a reduction in student expected debt, but the impact of these variables on student expected debt, in general, have fallen between one-fifth and just over one-half. Similarly, every £'s worth of parental contribution now reduces expected end of year debt by about half the amount found earlier.

However, there are some differences to what was found above. We find that first and second year students expect to be less in debt by the end of the academic year compared to their final year counterparts by around £6,600 and £3,300 across all specifications. This change in sign on the estimated coefficients is expected as the positive signs on the corresponding estimates in table 3.3 reflect the flow of debt through time i.e., student can take actions to reduce debt by the end of their course. However, the debt that a student reckons at the end of the academic year better reflects their 'stock' of debt and we may expect students in their final year to accumulate great levels of debt than students in either their second and third year. This seems reasonable given the increase in tuition fees. Moreover, as found earlier, higher expected earnings are associated with higher end of year debt, but unlike the previous finding expected earnings over £30,000 at graduation have little effect on end of year debt once we control for risk attitudes. The estimated coefficients on the risk attitudes and the discount rate both have the expected signs and the higher the student's subject discount rate or the more risk loving the student the higher the expected debt.[103] The age of the student, and whether or not a student is in receipt of a grant or scholarship fail to reach statistical significance. Furthermore, and in contrast to the results presented in table 3.3, we note that the gender effect disappears once we control for risk attitudes this is because debt attitudes and gender are highly correlated. However, in general these results give some confidence in the results presented earlier for expected end of course debt.

[103] The risk attitude variable was tested for exogeneity using the method suggested by Smith and Blundell (1980). The t-test suggests that risk attitudes are once again exogenous (t-stat = 1.29 [*p*-value = 0.197])

Table 3.4: Tobit Maximum Likelihood Estimates: Marginal/Impact Effects Expected debt at the end of the academic year

	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Gender (male)	1207.706 ** (561.860)	1174.269** (560.095)	837.001 (572.583)	853.661 (583.186)	727.471 (577.730)
white non-British	-2008.146 ** (845.821)	-2071.940** (843.519)	-1914.079** (842.592)	-1917.042** (842.873)	-1873.063** (841.107)
other ethnic group	-2528.346 *** (660.471)	-2645.404*** (661.411)	-2226.401*** (677.0137)	-2225.617*** (677.046)	-2136.361*** (679.130)
white British	*f*	*f*	*f*	*f*	*f*
age (years)	-68.700 (91.02)	-76.629 (90.464)	-84.610 (90.147)	-84.969 (90.201)	-86.331 (89.971)
grant/scholarship	494.065 (614.738)	404.945 (614.586)	271.730 (612.734)	278.732 (614.511)	231.94 (612.019)
has part-time job	-3741.685*** (650.819)	-3708.455*** (648.617)	-3668.187*** (644.863)	-3669.471*** (644.947)	-3760.730*** (647.420)
monthly contribution (£)	-5.983*** (1.383)	-5.943*** (1.381)	-6.081*** (1.378)	-6.089*** (1.379)	-6.183*** (1.379)
first year student	-6787.403 *** (787.350)	-6646.153 *** (788.432)	-6609.783*** (783.230)	-6614.691*** (783.905)	-6569.478*** (782.115)
second year student	-3387.201** (911.804)	-3406.819*** (908.513)	-3328.388*** (903.417747)	-3326.512*** (903.440)	-3288.546*** (901.949)
third year student	*f*	*f*	*f*	*f*	*f*
family home owners	-1428.587* (765.679)	-1450.818* (763.064)	-1312.990* (759.756)	-1317.895* (760.439)	-1415.304* (762.050)
Mother and father university educated	-1925.523*** (746.695)	-1953.696*** (743.462)	-2027.237*** (740.964)	-2026.830*** (741.001)	-2038.483*** (738.975)
Expected earnings >£30,000 after graduation	1976.738** (848.112)	1940.823** (845.097)	1258.314 (880.209)	1273.267 (885.796)	1288.625 (878.681)
Expected earnings >£50,000 at 30	1207.116** (550.792)	1208.950** (548.668)	1127.967** (546.397)	1131.747** (546.985)	1190.004** (547.437)
discount rate	§	6245.172* (3505.419)	6110.385* (3482.807)	6092.652* (3484.801)	6010.980* (3475.618)
risk attitude	§	§	370.106** (146.319)	373.503** (148.053)	347.214** (146.909)
debt aversion	§	§	§	32.560 (216.146)	§
uncertainty aversion	§	§	§	§	328.377 (254.579)
Log-Likelihood Scale factor[e]	-2493.985 0.8737	-2492.405 0.8751	-2489.206 0. 8766	-2489.195 0.8766	-2488.376 0.8774
Observations	308	308	308	308	308

Notes to table:

(a) Asymptotic standard errors are reported in parentheses beneath coefficient estimates.

(b) * denotes significant at 10%; ** significant at 5%; *** significant at 1%.

(c) *f* denotes base category in estimation.

(d) § denotes variable not used in estimation.

(e) Scale factor used in the computation of the marginal/impact effects.

(f) All estimations reported were undertaken using NLOGIT 3.0 (2003).

3.7 Concluding Remarks

The results presented here suggest that there is a gender dimension to student debt expectations with males having a greater expected level of debt on the completion of their undergraduate studies (and at the end of the *current* academic year) than females supporting the findings from the empirical analysis of Purcell and Elias (2010). This particular result may also reflect the role of greater risk-taking behaviour on the part of male students and confirms the findings of Ding, *et al.* (2010) for higher education students and Booth and Nolan (2012) for pre-university students. Non-white students expect a lower level of debt compared to their white British counterparts suggesting a possible cultural impact on expected debt supporting the finding of Callender (2003). There also appears to be some change in the level of debt a student expects over time with second year students anticipating more debt than their first and third year counterparts.

Students who work part-time during term-time expect to have a lower level of debt. If there is a trade-off between being a 'full-time' student and part-time work then raising tuition fees in the future may compromise the time students will devote to study and may result in an increase in the withdrawal rate (Yorke and Longden, 2008; Davies and Elias, 2003) and/or a reduction in student academic achievement, particularly among students from the lower socio-economic groups (Callender, 2008). Student attrition may also impact on intergenerational mobility (Blanden and Machin, 2007) and may impact on future income distribution if those students who drop-out are 'scarred' in the labour market in a similar way to the long term unemployed (see, for example, Arulampalam, *et al*., 2001; Gregg and Tominey, 2004). These possibilities need to be taken into account when setting the level of public financial support.

As in previous studies measures of a student's socio-economic background are significantly associated with the level of debt a student accumulates as well as the level of debt a student expects (Callender, 2003; Callender and Kemp, 2000; Callender, 2008; Johnson, *et al*., 2009). Parental home ownership was found to reduce student expected debt. It is possible that home ownership may reflect parental/family indebtedness and this may act to reduce student borrowing or spending. This may be particularly true for the sample students used in the empirical analysis. Parental experience of higher

education also had a negative impact on student debt expectations. Further, we noted that parental contributions reduced student indebtedness on around a 1:1 basis. This suggests that such contributions may not be used to increase expenditures but used to reduce debt. There is evidence that students anticipate a high return to their university education in terms of high expected earnings, which in turn contributes to higher expected debt. Whether or not these expectations are to be realised in the future is difficult to discern and may indeed be an overestimate (Jerrim, 2011).

Further, we found that students who have a high discount rate and those with a high risk attitude are prone to higher expected debt. These particular results confirm the findings from previous, but limited, research that exists on student debt and borrowing behaviour. The receipt of a grant, scholarship, or bursary has no significant effect on reducing student expected indebtedness and may suggest that current levels of financial support are inadequate and ineffective in reducing anticipated debt.

Chapter 4

Grade Inflation in UK Higher Education

4.1 Introduction

The expansion of UK higher education particularly in the 1990s was also accompanied with a higher proportion of new graduates receiving a 'good' degree classification. With rising staff-student ratios and constraints on public funding some commentators questioned if educational standards have been maintained (see chapter 1 for details on these issues).

Information on student academic performance is not only of interest to universities when reviewing the effectiveness of their teaching and learning provision, but also to potential employers who use degree classifications as a signal of a graduate's ability and effort or as a measure of human capital when making job offers. This information is also of value to the policy maker when evaluating policy effectiveness (Smith and Naylor, 2001a). For instance, if policy is directed at improving student academic performance and higher education standards remain constant through time then, based on this measure, a rise in the proportion of 'good' degrees can be taken as evidence of an improving higher educational system. On the other hand, if the proportion of 'good' degrees awarded falls then this may be interpreted as an indication of a failing or sub-standard higher educational system and remedial action on the part of the policy maker may be necessary. However, if standards in higher education fall (e.g., through more lenient marking) and the proportion of 'good' degrees awarded rise then the information contained in degree classifications will not correctly inform on the performance of the educational system (Johnes, 2004).

In the UK information on the degree classifications awarded on various undergraduate programmes, offered in any particular university, is available to potential students (and

other stakeholders) through a number of public sources.[104] This information can potentially influence a student's choice of university and programme of study. Clearly, the more accurately a degree class reflects student ability and effort the better will be the signal sent to all interested parties.

The substantial rise in the proportion of new graduates receiving a 'good' degree since the 1990s was seen as evidence of 'grade inflation' by some commentators. There is no general definition of grade inflation in the literature but in the UK higher education context it can be taken to mean an increase in the share of 'good' degrees awarded over time holding student ability and effort constant or in an American context:

> *'an upward shift in the grade point average (GPA) of students over an extended period of time without a corresponding increase in student achievement'* (Rosovsky and Hartley, 2002:4).

Another version of grade inflation is 'content deflation' where students receive the same grades as students in the past but with less work required and less learning (Cohen, 1984). Thus if grade inflation is evident then it may be a consequence of falling educational standards.

In regard to economic theory grade inflation has some implication for human capital theory (Becker, 1993) and signalling or screening models (Spence, 1973; Arrow, 1973). In the former, it is assumed that human capital enhances productivity, and greater productivity is rewarded with higher pay.[105] As human capital theory is concerned with the level of 'schooling' acquired whether or not an individual achieves a particular credential (e.g. a 'good' degree), which in turn depends on the assessment regime, will not materially affect the predictions of the theory. What matters is the acquisition of human capital not the credential *per se*. Given a stock of human capital in the economy formal assessments have little role to play in the human capital model, since

[104] Information on the final degree classification of new graduates is officially available to the public though UNISTATS Key Information Set (KIS) available at: http://www.unistats.ac.uk. Information on 'good' honour degrees awarded by university is also available through HESA's main website, and the websites hosted by national news agencies such as *The Times* and *The Sunday Times* and are routinely included in the university 'league tables' that are published annually on the website of *The Complete University Guide* available at: http://www.thecompleteuniversityguide.co.uk/league-tables/rankings?o=Good+Honours.

[105] See chapter 3 section 3.3.1 for a description of human capital theory and a brief review of the associated empirical literature.

productivity gains are reflected by higher earnings in the labour market. Therefore formal assessments are of incidental interest at the individual level. However, Johnes (2004) points out that aggregate assessment results are important in determining the performance of the higher education sector. In the presence of 'grade inflation' (i.e., falling standards) the policy maker will find it difficult to use summative assessment results as reliable indicators of the performance of educational system. In such a situation the association between human capital acquisition and subsequent productivity is lost.

In the case of the signalling model (Spence, 1973), employers use educational credentials to identify the more able workers, who are assumed to be more productive than less able workers in performing the same tasks. More able workers, with higher levels of educational attainment, will earn a wage that reflects their presumed greater marginal productivity which will be higher than that awarded to the less able. The model also assumes that the cost of acquiring education is lower for the more able. As a result the more able acquire better qualifications than the less able and the qualifications attained act as a signal to employers of the likely productivity of their prospective employees. In the case of the screening model (Arrow, 1973) workers perform a variety of tasks with some tasks requiring more ability on the part of the worker than other tasks. In this case educational qualifications act as a screening device to sort workers into jobs. **It is interesting to note that** r**ecent research suggests that in the US College graduates reveal their ability through their final grades, but for high school graduates education acts a signal and for such individuals their ability is revealed to employers through time on the job (Arcidiacono *et al,* 2010).**[106]

The signalling model can be viewed as a special case of the more general screening model. Nevertheless, in both these models summative assessments do matter. It is the individual's rank in any particular cohort of workers that determines earnings rather than an absolute measure of productivity. The individual's rank will be determined by the credential she achieves through formal assessments. In the presence of 'grade inflation' if an individual's rank order in the distribution of grades is preserved then

[106] It is possible that the US college system reveals more information to prospective employers than UK university system which is based on degree classification without, traditionally, more detailed information on graduate skills and abilities.

there is little effect on the implications of these models, and formal assessments retain their value as a signalling/screening device for allocating workers to particular jobs. However, if 'grade inflation' results in the 'bunching' or 'compression' of grades, in particular at the top end of the grade distribution, due to an upper limit, then grades lose their value in identifying low and high ability individuals. Thus summative assessments will lose their value in identifying worker ability and the usefulness of education as a signalling/sorting device is reduced.

It is instructive to note that there is no real consensus in the vast empirical literature that exists as to which theory best explains the role of education in the labour market. In general the evidence suggest that education is productivity enhancing although it does play a role in screening or sorting individuals in certain sectors of the labour market (see for example, Layard and Psacharopoulos, 1974; Oosterbeek and Groot, 1994; Weiss 1995; Johnes, 1998; Bedard, 2001; Miller, 2003; Chevalier *et al.,* 2004).[107] Moreover, existing empirical studies offer very little on the effect of grade inflation on predictions of these theories. However, in a study of US students, Summary and Weber (2012) note that between the mid-1980s and mid-2000s, students' GPA increased from 2.6 to 3.1. This increase occurred despite no observed improvement in university efficiency, suggesting 'grade inflation'. Moreover, using an entropy index Summary and Weber (2012) report that the information content of grades fell over their sample time frame and they conclude that the screening content of education fell. Similarly, Chan *et al.*, (2007) develop a theoretical model that shows that as schools relax their grading standards the information content contained in grades concerning student ability falls. To my knowledge there is no UK empirical literature that examines the association between grade inflation and the predictions of the theories noted above.

We noted in chapter 1 section 5 that from 1994/95 through 2011/12 the percentage share of new graduates graduating in the UK with a 'good' degree increased from 47.3% to 61.4%. However, the percentage of 'good' degrees awarded differs by university type. Figure 4.1 illustrates that between the academic years 1995/96 and 2011/12 (inclusive) the percentage of 'good' degrees awarded by pre-1992 universities was much higher than the percentage of 'good' degrees awarded by post-1992 and post-

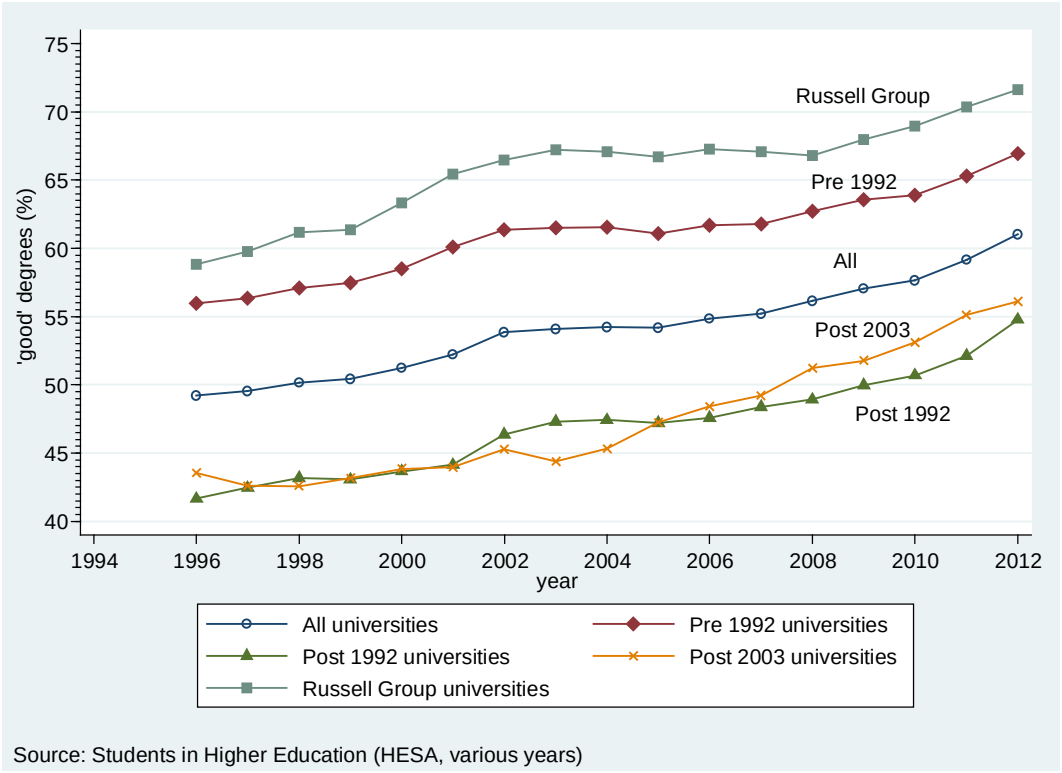
[107] See Brown and Sessions (2004) for a review of the empirical literature.

2003 universities.[108] In 1995/96 56% of degrees awarded by pre-1992 universities were classified 'good' and by 2011/12 the figure was 67%. It is also instructive to note that the percentage of 'good' degrees awarded by the 'elite' Russell group of universities[109] on average is higher than in other university type. We also note that between 2002/03 to 2011/12 the percentage of 'good' degrees awarded by post-2003 universities increased by 12 percentage-points from 44% to 56%, compared to the 6 percentage-point rise for pre-1992 universities and a 7 percentage-point increase for post-1992 universities over the same period. Further, the percentage of 'good' degrees awarded increased significantly, particularly in post-1992 and post-2003 universities after 2006 when the cap on tuition fees increased to £3,000 (see chapter 3) and may reflect universities attempting to attract fee paying students through the possible lowering of standards in grading.

[108] Macfarlane (1992) found that in 1989 there was variation in the proportion of 'good' degrees awarded across pre-1992 universities but those universities created in the 1960s awarded on average 4.2% more 'good' degrees than their older counterparts. He also reports that 'big' universities (those with an annual number of first degree graduates of over 2000) tend to award a lower proportion of 'good' degrees than smaller institutions (with 1000 or fewer annual graduates) 45.5% and 49.6% respectively. Similarly, Johnes and Taylor (1987) report that universities created in the 1960s were more likely to award 'good' degrees than their older counterparts.

[109] These are large research intensive universities and are included in the pre-1992 category of universities.

Figure 4.1 Good Degree Classifications by University Type (%) 1995/96-2011/12



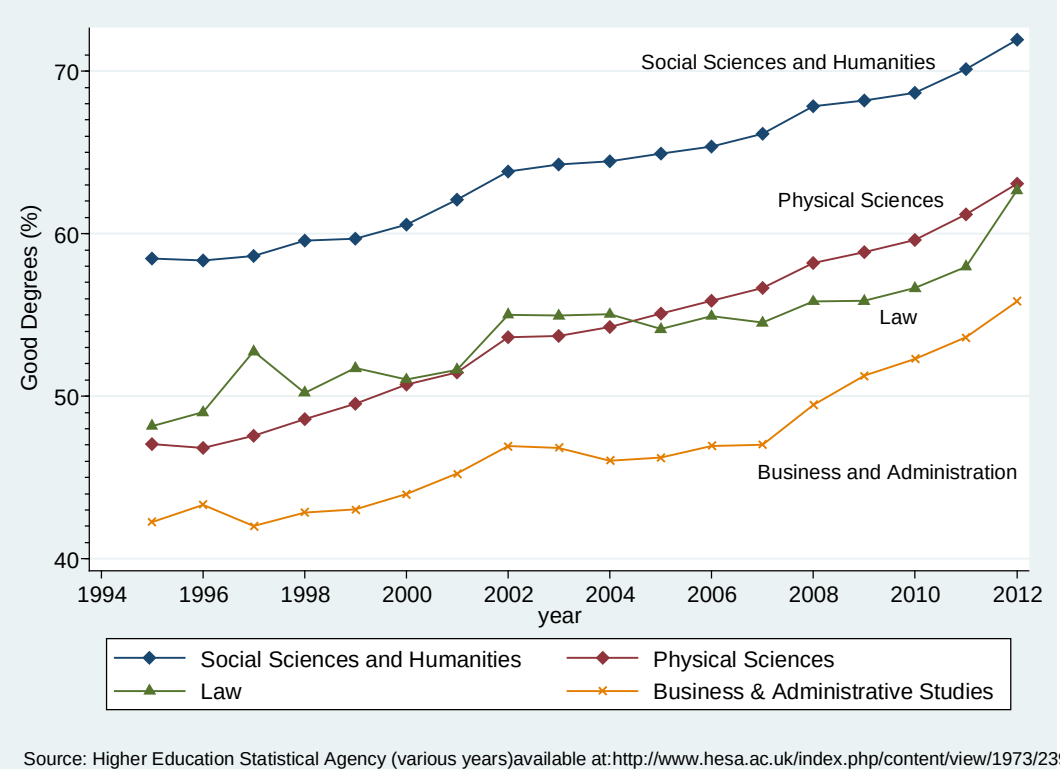
Source: Students in Higher Education (HESA, various years)

Notes: All universities include post-1992, pre-1992, and post-2003 universities only and the degrees awarded by the Open University, Colleges of the Arts, and small specialist HEIs are excluded.

The evidence also suggests that the increase in 'good' degrees awarded is not uniform across academic disciplines. Students graduating in the Social Sciences tend to be awarded proportionally more 'good' degrees compared to their counterparts from the Physical Sciences, Law, and Business. Figure 4.2 below shows that between 1994/95 and 2011/12 the percentage of new Social Science and Humanities graduates receiving a 'good' degree increased from 58.5% in 1994/95 to 72% in 2011/12. There was also a marked increase in the percentage of science students graduating with a 'good' degree over the same period increasing from 47% to just over 63%. A similar upward trend is also noted for new graduates in Law and Business and Administration. However, over the entire period the proportion of new graduates awarded a 'good' degree in Business and Administration was less than the proportion awarded in the other three subject groups. Similar to the data presented in figure 4.1 the increase in the percentage of 'good' degrees awarded in all four subject fields increased significantly after 2006. This is particularly evident in the Social Sciences and Business and Administration

programmes with the number of students receiving a 'good' degree increasing by about 30% and 61% respectively since 2006.[110]

Figure 4.2 Good Degrees Awarded by Subject Field (%) 1994/95-2011/12



Source: Higher Education Statistical Agency (various years)available at:http://www.hesa.ac.uk/index.php/content/view/1973/239/

Notes:
Social Sciences and Humanities include: Sociology, Economics, Political Sciences, Humanities, and Languages.
Physical Sciences include: Biological Sciences, Physics, Mathematics, Computer Science, and Engineering, but excludes Medical, Veterinary and Agricultural related degrees.
Law includes all broadly based Law programmes.
Business and Administrative Studies include: Business Studies, Marketing, Accounting, Office Skills, Human Resource Management, Management Studies, Finance, and other broadly based Business programmes.

The reasons for the observed trends in 'good' degrees, as depicted above, is an area that has received little empirical investigation using UK data. However, the trends highlighted in figures 4.1 and 4.2 may suggest that grade inflation is present in UK higher education and a reflection of falling standards bringing the integrity of the classification system into question (Sadler, 2009). Elton (2004) suggests replacing the current system of degree classification with an unclassified degree accompanied with a

[110] Several studies have also found evidence that Arts based disciplines award proportionally more 'good' degrees than Science based disciplines (Nevin, 1972; Macfarlane, 1992). However, the evidence also suggests that there is wide variation is the proportion of good degrees awarded within these broad classes (Smith and Naylor, 2001a).

student portfolio that documents student achievement as they progress through the higher education system.

Similar sentiments were expressed in the Dearing Report (1997) which recommended that degree classifications be accompanied with a 'progress file' detailing the range of key skills demonstrated by the graduate alongside the cognitive achievements traditionally associated with higher education. The UK government set out proposals to introduce a transcript of student achievement over their undergraduate career to accompany the final award. This, it was suggested, would provide employers with greater insight into a graduate's full range of academic and non-academic skills, abilities, and interests (Department for Education and Skills, 2003a: 49). In 2005 the Measuring and Recording Student Achievement Steering Group was set up to consider changes to the UK honours degree classification system. The group's final report on behalf of Universities UK[111] concluded that:

> *'the UK honours degree is a robust and highly-valued qualification but the honours degree classification system is no longer fit for purpose. It cannot describe, and therefore does not do full justice to, the range of knowledge, skills, experience and attributes of a graduate in the 21st century.'* (Universities UK, 2007:5)

This body also recommended that a Higher Education Achievement Report (HEAR) should be introduced in 2010/11 as 'the key vehicle for measuring and recording student achievement' and to be available alongside information on a student's degree class (Universities UK, 2007:5). It was reported that over half of UK universities introduced the new *Higher Education Achievement Report* for undergraduate students entering higher education in the academic year 2012/13 with the rest expected do so in the near future (Higher Education Funding Council for England). Furthermore, in the academic year 2013/14 the Higher Education Academy launched a two-year pilot study that involves implementing a grade point average (GPA) system as used in the US to measure student academic achievement (see appendix D1 table 1 for further details). The study is expected to attract between 20-25 HEIs from across the sector. Each

[111]Universities UK is an independent advocacy organisation (formally known as the Committee of Vice-Chancellors and Principals of Universities of the United Kingdom (CVCP) until 2000), and is a representative body for the executive heads of UK universities and is recognised as the umbrella group for the university sector.

participating institution will grade student performance according to a proposed 13-point national GPA scale ranging from zero (representing a fail (grade F)) to 4.25 (representing an excellent 1st class degree (grade A+)), see appendix D1 table 2 for further details. Each student's GPA will be available alongside the traditional degree classification to provide finer detail on a student's academic progress through the higher education system in participating UK HEIs. It is argued the system would also provide a means by which the quality of UK graduates could be compared to their counterparts in other countries that use the GPA classification system such as China and the US. The results from the pilot study are expected to inform on the desirability of introducing a GPA system in the UK (Higher Education Academy, 2013).

The compression of degree classifications at the top end of the distribution may cause fee-paying students to perceive, rightly or wrongly, that a degree classification below a 2:1 is of little value for money in regard to gaining meaningful graduate employment in a more competitive graduate labour market (Universities UK, 2007:23; Purcell, *et al*., 1999). Indeed, Morley *et al.,* (2006) in a survey of 141 employers from across the UK found that although over half the employers in their interview sample were generally satisfied with the current system of degree classification some suggested sub-dividing graduates falling into the 2:1 category so that the academic qualities of these students can be made more transparent. Those that expressed this desire based their justification on 'grade inflation'. They also reported that some employers sort through job applications by degree category, and do not consider candidates awarded below a 2:1 degree class (see also, Universities UK, 2007:22). This practice therefore potentially ignores the skills, abilities, and attributes of graduates with a lower second or below. This may suggest that student perception of the worth of a degree classification below a 2:1 may not be misplaced.

The increase in the share of top degree classifications has also been observed in several other countries. A particular concern in the US is the increase in the proportion of A-grades and the cumulative increase in GPA since the mid-1960s. Astin (1998), using a large national US survey, noted that between 1969 and 1974 the percentage of A-grades awarded to students graduating from US universities and colleges increased from 12.5% to 18.8% with a corresponding fall in the proportion of C-grades awarded. Between 1990 and 1996 the proportion of A-grades awarded was observed to increase from

22.6% to 31.5%. Kuh and Hu (1999) observe that the GPA increased from 3.07 to 3.34 between the mid-1980s to the mid-1990s across 198 US universities and colleges. More recently Popov and Bernhardt (2013) report that the GPA across US universities and colleges increased by 0.59 points between 1960 and 2000. Particular concern has also been focused on the grade inflation observed in the most prestigious or 'Ivy League' universities (Gose, 1997; Kuh and Hu, 1999; Popov and Bernhardt, 2013).[112] Grade inflation has also been observed in higher education in Ireland where the share of 'good' degrees increased from 35.9% to 52.2% between 1994-96 and 2002-04 (O'Grady and Guilfoyle, 2007) and in Canada (Dickson, 1984), Australia (Marginson,1995) and Germany (Bauer and Grave, 2011).

However, the rise in the number or share of graduates with 'good' degrees may not be an indication of UK grade inflation, *per se*. For instance, it can be argued that students have become more diligent in their attitude to study realising the connection between 'good' degrees and labour market opportunities and remuneration. It may also reflect that more efficient methods of teaching and learning have been successfully employed in higher education. It may also be due to an increase in the 'quality' of new undergraduates, measured by their pre-entry qualifications.[113] But it is still possible that there has also been a contemporaneous fall in standards.

The primary purpose of this essay is to identify if grade inflation has been evident in UK higher education, and in so doing offer evidence on whether the drive to replace the current system of degree classification with a GPA system is warranted. To this end we use aggregate university level data to explore this issue over a period from 2005/06 through 2011/12, a period identified above, in which there was a substantial rise in the proportion of 'good' degrees awarded particularly after the academic year 2006/07. We complement the primary analysis by focussing on grade inflation in a single university. This allows an examination of grade inflation controlling for a rich variety of student level information that are not readily available from public sources. Moreover, the

[112] A widely reported statistic is that 91 percent of seniors graduated with honours from Harvard in 2001 largely due to a rise in A and B-grades awarded (Healy, 2001). The US magazine '*Chronicles in Higher Education'* published by the University of Texas provide a vast archive of articles and letters that raise concern over grade inflation in various US colleges and universities. These documents are available at: http://chronicle.com/section/Home/5

[113] Typically the 'quality' of the student intake is measured in terms of A-level scores for students educated in England, Wales or Northern Ireland and scores in the Scottish Highers for students educated in Scotland.

economics literature on ‘grade inflation’ using recent UK data, to the author’s knowledge, is thin. Thus, this essay offers a useful contribution to the literature in this regard.

This chapter is arranged as follows. Section 4.2 provides an overview of the relevant literature. Section 4.3 provides a description of the data employed in the empirical analyses. The econometric methodology employed is described in section 4.4 and the empirical results are presented in section 4.5. The final section provides some concluding remarks.

4.2 Literature review

The phenomenon of grade inflation has been well documented in the US but less so in the UK and, as noted above, it has been an issue of concern in both counties for some time. It has been argued that the upward drift in the proportion of ‘good’ degree classifications in the UK, since the early 1990s, is due to the modularisation of degree programmes and changes in assessment methods, with the introduction of coursework and assignments, without changes in the boundaries delineating degree classifications (Elton, 1998; Gibbs and Lucas, 1997). Rosovsky and Hartley (2002) list several reasons for the grade inflation observed in the US since the mid-1960s that include changing student attitudes in the 1960s partly as a response to the Vietnam War and the reluctance of tutors to award male students low grades which may have resulted in them being forced out of higher education and into the military draft. Other reasons include; a change in the ethnic and racial mix of students, a change in the curricula and grading policies, the impact of student evaluations, students becoming more like consumers, and a softening in the academic content of degrees. Suslow (1977) suggests that the rise in A-grades in the 1960s and 1970s in the US is due to changes in student behaviour with students having more influence over their final GPA, faculty became more inclined to award ‘good’ grades to their own students to give them a competitive advantage in the graduate labour market and graduate school admission and, changes in grading practices that excluded the inclusion of poor grades from student records.

McKenzie and Tullock (1981) offered an explanation in terms of market demand and supply. They argue that excess demand for university places in the US in the 1960s resulted in a rise in the direct price of tuition (tuition fees) and as the supply of university and college places increased in the 1970s, universities and colleges resisted lowering the price of tuition to its long run equilibrium due to the potential adverse signal on quality that such a reduction would send to the market and problems associated with reducing fees if staff pay is linked to tuition fee income, thus creating an excess supply of places. If the direct price of tuition remains fixed then students could be attracted to fill surplus places with a fall in the 'hedonistic' price which is assumed to depend on such factors as expected grades and employment opportunities through more lenient marking and grading (Johnes, 2004). Thus grades were inflated to attract students resulting in a fall in standards for a given level of ability and effort. These and related issues are at the focus of many empirical studies on grade inflation outlined below.

Grade inflation is often taken to reflect a fall in educational standards over time. The literature on academic standards identifies future wages as a channel through which grades may affect a student's future welfare. Costrell (1994) develops a theoretical model to describe how educational standards are set and demonstrates that if the policy maker seeks to promote greater equality in outcomes (e.g., in terms of future labour market earnings) then lower standards will be set. Marks (2002) argues that educational standards once set share similar characteristics to that of a public good, in that educational standards, are known both to students and instructors and are non-excludable and non-rival in consumption. Such standards are defined by 'norms' that are informal group held beliefs that govern the expected behaviour of faculty, students, and the institution and can act as a guide when grading students, or defining an institution's reputation. The production of norms or standards confirms benefits on group members and also on the wider society and are valued by those who adhere to them (e.g., increased public trust in the value of university output (grades)). However, since norms and standards can be defined as a public good they are subject to the familiar free-riding problem. Students may also put pressure on faculty to award high grades, and instructors may free-ride on grading norms and award the desired grade

through more lenient marking assuming that others will not.[114] Johnes (2004) offers a simple game theoretic exposition of how student pressure on faculty can affect grading. The model assumes two students whose future prospects rely on their ranking in the grading distribution. The utility of the i^{th} student is expressed:

$$U_i = x_i - x_j, \qquad [4.1]$$

where $i \neq j$ and x_i is the grade awarded to the i^{th} student. The grade received is assumed to partly depend on some actual standard achieved by the i^{th} student (x_{oi}). Students are also assumed to exert pressure on faculty to be more lenient and award a high grade, for example to improve their employment opportunities. This is represented by a binary variable δ that equals 1 if pressure is exerted. The actual grade received by the i^{th} student is then represented by:

$$x_i = x_{oi} + \delta_i + \sigma\delta_j \qquad [4.2]$$

where $0 < \sigma < 1$ to reflect the fact that the grade awarded to the i^{th} student will also depend on the pressure the j^{th} student brings to bear on the marker, but not as much as the pressure that the i^{th} student brings to bear.[115] The Nash equilibrium in this setting is one where both students set $\delta = 1$. Thus student pressure results in faculty setting a grade higher than that commensurate with student ability and grade inflation ensues even though both players are no better off in terms of their ranking.[116]

It is also possible that if faculty tenure, pay or promotion is dependent on course enrolments or student evaluation of teaching (SET) then there may be incentives for faculty to seek to 'buy' favourable SET or improve course enrolments 'cheaply' and free-ride on standards by grading more leniently. Moreover, if lenient marking becomes widespread then 'grade inflation' will become a logical outcome (Love and Kotchen, 2010; Marks, 2002; McKenzie, 1975). In general US empirical literature finds a positive and significant relationship between students expected grades[117] and SET scores (see,

[114] Marks (2002) provides further examples where free-riding on academic standards may occur in higher education at the level of the student, faculty, and administration.
[115] This fact was established through correspondence with the author.
[116] Correa (2001) offers a game-theoretic explanation in terms of teaching faculty's competitive and cooperative behaviour that can influence grading policies and course enrolments.
[117] It should be noted that US students were found to be over-optimistic in their expectations (Nowell and Alston, 2007). Similarly, first year students in UK higher education were also found to over-estimate their

for example, Kau and Rubin, 1976; Dilts, 1980; Aigner and Thum, 1986; Isely and Singh, 2005; Langbein, 2008; Ewing, 2012), particularly when SET scores are linked to faculty pay, promotion opportunities or tenure (Nichols and Soper, 1972; Mirus, 1973; Zangenehzadeh, 1988; Krautmann and Sander, 1999).

In the UK faculty pay, promotion, and tenure is not typically linked to student evaluations, and there is little empirical evidence to support the notion that student evaluations affect faculty behaviour. However, Rogers and Ghosh, (2001) using student-level cross-sectional national data for UK students graduating in 1985, and employing a multinomial logit, find that students dissatisfaction with their degree programme (used as a proxy for student motivation) reduces the probability of achieving a 'good' degree by 15% and increases the probability of being awarded a third class honours degree by 6.7%. In a later study, Rogers (2007) again using student-level national data but employing an ordered probit methodology finds that student dissatisfaction reduced the probability of achieving a 'good' degree by a similar magnitude (13.7%) to that previously found. Moreover, we noted earlier that the percentage share of 'good' degree classifications in the UK increased considerably since 2006 which coincided with the year in which the results from the first National Student Survey (NSS) (administered in 2005) were made available. The NSS is completed by final year students (before their degree classification is known) and includes questions regarding students overall satisfaction with teaching, learning resources, and course design. Soo (2009) investigated student performance in English universities using university-subject-level data obtained from the Student Experience Survey administered by the Higher Education Policy Institute and data from the NSS for 108 universities in 2006 and 2007. Controlling for pre-entry scores and student effort (attendance) the author finds that overall student satisfaction had no significant effect on a 'good' degree classification using OLS but a positive and significant association was found employing 2SLS/GMM. Based on this result and those from specifications using average degree performance as an alternative dependent variable the author concludes that teaching quality (measured by the NSS score) impacts positively on degree performance. However, when the sample was divided by university type it was reported that student

---

actual performance and this over-estimation differs according to gender and social class (Chevalier, *et al*., 2009).

satisfaction was a significant factor determining performance in pre-1992 universities but was insignificant for post-1992 universities.

Faculty may free-ride on educational standards and grade more leniently to increase course enrolments and thereby improve job security. Dickson (1984) using Canadian data controlling for course size (student enrolment), student year of study, and the staff-student ratio finds evidence that professors in classes with a low staff-student ratio have an incentive to inflate grades due to low student enrolment and fear over job security. But as Johnes (2004) points out classes with low staff-student ratios provide an environment in which learning can takes place more effectively with fewer opportunities for students to free-ride and higher grades may not be a consequence of falling standards in this case.

Bar *et al*., (2009) examined the effect that grading practices had on students' subsequent course choice at Cornell University in 2006. The study aimed to establish if providing students with information on the grades awarded in various subjects in 1994 and 2004 influenced subsequent subject choice. The data employed were aggregated to the course-level and the authors employed a course-level fixed effects methodology to estimate the relationship between course enrolment and grades. The authors found evidence of 'compositional' grade inflation with proportionally more students opting for courses where grading practices were more lenient. More recent US evidence confirms the finding that grading practices can influence the pattern of enrolments and has contributed to grade inflation. See for example, Ehrenberg (2010), Ost (2010) and Rask (2010) for evidence on grading standards and student persistence in Science, Technology, Engineering, and Technology (STEM) subjects. Arcidiacono, *et al*., (2012) provide evidence on the effect that student ethnicity and grade inflation have on course choice.

Anglin and Meng (2000) using Canadian data for the years 1973/74 and 1993/94 suggest that grade inflation is due to faculty attempting to increase course enrolments as a result of universities having to compete for limited public funds that in turn are dependent on course enrolment and student continuation. Similarly, in a more rigorous analysis Bagues *et al.*, (2008) examined the effect that university funding mechanisms based on student academic performance have on the grading practices adopted in the

fields of study in Italian public universities. The study exploited data from the Italian Survey on University-to-Work Transition for 1998, 2001 and 2004. It included information on students who graduated from public universities three years prior to the date of the survey. They estimate the relationship between final grade and the field of study by OLS using data aggregated to the departmental level controlling for student, institutional and location specific characteristics as well as the student's self-reported labour market information (i.e., earnings and employment history). They found evidence that differential grading practices and standards are employed across Italian universities, university departments, and geographical regions. They argue that competition for limited public funds, that is based on course enrolment or student performance, provides an incentive for universities to encourage enrolment and achieve better outcomes by lowering the 'hedonistic' price (i.e., by adopting lower standards). They also suggest that competitive public funding favours universities with low standards.

Bauer and Grave (2011) also examined the effect that the introduction of a performance (output) based university funding mechanism had on grade inflation in Germany, with funding being partly dependent on student academic achievement (i.e., the number of graduates universities produce). The policy was introduced in several German federal states starting in the 1990s to improve the efficiency and performance of universities via more intense competition. The study employed a difference-in-difference approach and exploited student-level data obtained from the German Student Surveys 1983-2007 for students who attended university in one of 13 German states over the period. The authors conclude that the change in funding arrangements had increased competition amongst German universities for the available public funds but in contrast to Anglin and Meng (2000) and Bagues *et al.*,(2008) they found no significant evidence of grade inflation as a consequence of the policy.

It is interesting to note that Bagues *et al.*, (2008) find that Italian graduates from low grading academic units earn a higher average wage than graduates from high grading fields. Similarly, Freeman (1999) suggested that divergent grading practices are due to the market benefits that the course offers in terms of a student's future earnings. To test this hypothesis course-level data were obtained from the 1996 US National Center for Education and Statistics that included the average grade (GPA) achieved in 59 fields of

study in 648 US colleges and universities from which students graduated in 1992/93 and course-specific earnings one year after graduating. The relationship between grades and earnings was estimated by OLS and GLS controlling for student demographic characteristics (e.g., age, gender, ethnicity), pre-entry scores (measured by average course-specific Scholastic Assessment Test (SAT) scores - taken before entry into higher education), field of study, and the type of university/college (public/private). The results from the analysis are consistent with grade divergence: graduates from high-grading fields (e.g., in the Arts and Humanities) have lower labour market earnings than those from low-grading fields (e.g., STEM subjects and those that are Business related). Freeman suggests that subject areas in fields in which the labour market earnings are low have excess places to fill and by way of attracting students the 'hedonistic' price is lowered through lenient grading practices. This explanation may also help to explain the grade inflation evidenced across university departments and fields of study in several US studies that often focus on a single institution or a small group of institutions. For example, see Jewell and McPherson (2012) for evidence from the University of North Texas, Achen and Courant (2009) for evidence for the University of Michigan, Sabot and Wakeman-Linn (1991) for evidence for Williams College, Kolevson (1981) for evidence from Virginia Commonwealth University, and Prather *et al.*,(1979) for evidence from Georgia State University.

In the UK it is widely reported that the percentage of 'good' degrees awarded varies across academic disciplines, and fields of study (see, for example, Nevin, 1972; Sear, 1983; Macfarlane, 1992; Chapman, 1996; Yorke, *et al*., 2002). As portrayed in figure 4.2, between 1994/95 and 2011/12 the percentage share of 'good' degrees awarded in the UK was higher in the Social Sciences and Humanities than in the Physical Sciences, Law, or Business related disciplines. Early UK econometric studies using OLS and exploiting national data aggregated up to the university-level find little evidence that the field of study impact on degree outcome (Bee and Dolton, 1985; Johnes and Taylor, 1987). However, the influential study by Smith and Naylor (2001a) finds evidence of a significant association between the field of study and degree classification. They exploited national student-level data from the UK Universities' Statistical Records (USR)[118] comprising information on 94,485 students who graduated from pre-1992

[118] The Universities Central Council on Admissions (UCCA) was the body responsible for compiling the USR since its inception in 1963 (a predecessor to HESA). In 1993 UCCA merged with Polytechnics

universities in 1993. Using an ordered probit, and controlling for a variety of student level and institution level characteristics, they find that students were more likely to secure a 'good' degree, relative to degrees in Social Studies, if they specialised either in Biological Sciences, the Humanities, or Literary and Classical Studies, but performed worse in Mathematics, Computing, Languages, and Education (see also, Rogers (2007) who finds similar results using the same methodology). The recent UK study by Soo (2009) finds that students perform better in Creative Arts and Design and Mass Communication Studies and perform worse in Architecture, Business Studies and Law.

Whether the different percentage share of 'good' degrees across academic disciplines in the UK, depicted in figure 4.2, is a consequence of departments trying to fill excess places in certain fields by reducing the 'hedonistic' price or an attempt to attract publically available tuition fee income that is dependent on programme enrolment is not easy to discern, due to the lack of UK literature on this issue, but it is a possibility. Further, it may also be possible that the grade differential between the subject fields may reflect the labour market earnings associated with a particular degree subject. In regard to this last point empirical estimates using large national UK datasets suggest the earnings premium on STEM and Business related degrees, are in general higher than those in the Arts and Humanities (see, for example, Harkness and Machin, 1999; Blundell, *et al*., 2000; Walker and Zhu, 2003; 2011) and it would appear that subjects that are more leniently assessed in the UK attract lower labour market returns than those that are more harshly marked as evidenced by Freeman (1999).

Yorke (2002) examined the association between subject field and the upward drift in 'good' degree classifications in the UK between 1994/95 and 1998/99. Using HESA data aggregated to the subject field and employing a basic OLS specification the study found that the magnitude and direction of the trend varied over the five years and between subject fields. The upward trend was found to be particularly significant in STEM subjects and in Languages and Humanities. The author offers several pedagogic reasons for the general upward trend. These include curricula development and changing methods of assessment that focus on competences (i.e., leaning outcomes)

Central Admissions System (PCAS) to form the Universities and Colleges Admissions Service (UCAS). The compilation UK higher education statistics were transferred to the Higher Education Statistical Agency (HESA) in 1993.

with a move from norm-referencing towards criterion-referencing (i.e., a move from assessing students on their relative performance to an absolute measure of performance). Other suggestions offered include greater student diligence, the closure of departments that under-perform in the RAE, the influence of external monitoring of standards by government agencies (Elton, 1998), such as the Quality Assurance Agency (QAA),[119] and the pressures on universities to improve their 'league table' position. Yorke *et al.*, (2002) provide evidence to suggest that the nature of the marking schemes adopted (i.e., the use of percentage marking or grade-point scales) on specific modules in post-1992 universities between 1994/95 and 1998/99 influence the spread of marks and students' overall attainment. In general the adoption of percentage marking was found to narrow the spread of marks and grade-point marking widens the spread. The marking processes adopted by different subject areas provide a further reason why 'good' degree classifications differ between various subject groupings and could contribute to grade inflation more generally.

Grade inflation in the US has been found to differ according to university and college type (see, for example Astin, 1998; Suslow, 1977). Popov and Bernhardt (2013) develop a theoretical model based on labour market outcomes that can potentially explain why 'good' universities award proportionally higher grades than other universities. The authors demonstrate that if employers, when assigning graduates to high skill and low skill jobs, are unable to distinguish between the abilities of graduates who are awarded high grades by both university types, particularly on the margin, then 'good' universities will became more lenient in their grading practices as the demand for graduate skills increase (e.g., due to technical progress), by reducing the boundary that delineates A-grades from B-grades. It is argued that faculty recognise that employers find it difficult to distinguish between graduates with A-grades and try to improve the employment prospects of their graduates (i.e., to secure high skilled jobs) by inflating their grades. These arguments may explain why grade inflation has been observed in 'Ivy League' universities in the US (Gose, 1997; Kuh and Hu, 1999; Healy, 2001).

[119] The QAA is an independent body that replaced Higher Education Quality Council (HEQC) in 1997 and monitors standards in UK higher education. The QAA reports back to HEIs and advise on how quality and standards can be improved. Further details on the work of the QAA can be found at: http://www.qaa.ac.uk/Pages/default.aspx.

The evidence presented in figure 4.1 reveals that UK pre-1992 universities award proportionally more 'good' degrees than other university types. Yorke (2002) suggests that for the period 1994/95 to 1998/99 this was due to the higher entry requirements or tariffs (i.e., A-level UCAS points) required for admission to a pre-1992 universities. This is also true for the period 2002/03 – 2011/12 over which the median entry score[120] on average was 356 for pre-1992 universities which is higher than that associated with post-1992 universities (233 points) and post-2003 universities (225 points). Moreover, the median entry score for students entering the 'elite' Russell group of universities is much higher at 416 on average. If entry scores reflect student ability we may expect to observe proportionally more 'good' degrees being awarded by pre-1992 universities and the Russell group of universities than by other types of university as depicted in figure 4.1.

Numerous UK studies using national data have confirmed the importance of pre-entry A-level scores, *inter alia*, as a significant determinant of undergraduate degree performance in UK higher education as well as finding evidence that the share of 'good' degrees awarded varies by university (see, for example, Macfarlane, 1992; Chapman, 1996; Johnes and Taylor, 1987; Rogers and Ghosh, 2001; McNabb, *et al*., 2002; Naylor and Smith, 2004a; Rogers, 2007). Smith and Naylor (2001a) found that a one letter grade increase in each A-level subjects taken prior to university entry, *ceteris paribus*, increases the probability of securing a 'good' degree by between 9 and 10 percentage points. They also find that the probability of securing a 'good' degree varies across the pre-1992 universities that comprise their sample. Bratti (2002) explicitly examined student performance across 53 pre-1992 UK universities. Specifically, the study was concerned with degrees awarded in the Life Sciences using student-level data for a cohort of students graduating in 1993 drawn from USR. Using a two-stage estimation procedure to correct for possible selectivity bias and an ordered probit to estimate the probability of being awarded a specific degree class, the study finds that 'good' degree classifications, in Life Sciences, vary across pre-1992 universities. Soo (2009) using national university-level data found that student pre-entry quality (measure by median A-level entry scores) has a significant and positive impact on the award of a 'good' degree. However, after controlling for unobserved student ability using 2SLS/GMM

[120] See appendix D2 for a description of the current point system which also includes the points awarded for achievement on non A-level pre-entry courses.

median pre-entry A-level points were found to have no significant effect on degree classification beyond a proxy for student ability. Smith and Naylor (2004a) report a general upward increase in pre-entry A-level point scores between 1982 and 1992.

Another branch of the literature considers whether faculty characterises influence grading practices. It is interesting to note that Jewell and McPherson (2012) find that female faculty tend to inflate grades at a greater rate than their male counterparts. The authors suggest that female faculty are more concerned with job insecurity, than their male counterparts and tend to award higher grades.[121] Kolevzon (1981) also finds that departments with more female faculty award higher grades.

The studies cited above suggest a number of factors that can potentially lead to grade inflation. However, many of the empirical studies cited exploit cross-sectional or pooled data and employ standard regression techniques. It is also important to note that much of the economics literature on student academic achievement treats such achievement within the framework of an educational production function, where students represents the 'raw materials' to which educational resources or inputs are added to produce an output (e.g. final 'grade' or test scores).[122] It is debatable if the grade inflation observed in these studies captures 'pure' grade inflation or is a result of increased student effort or diligence or due to a better quality student intake. In particular the rise in the proportion of 'good' degree classifications may be a result of falling standards but may be conflated by a rise in university efficiency in transforming raw material (students) into outputs (grades).

To address this issue Johnes and McNabb (2002) examines grade inflation in UK higher education controlling for changes in university efficiency using a standard stochastic frontier specification with a truncated half normal error term to control for changes in university efficiency over time. The specification also included time dummies which if statistically significant, it was argued, would indicate changes in standards and hence grade inflation. The study focuses on two time frames 1973-1993 and 1995-2000 and exploited institution-level data obtained from USR and HESA that included information on the proportion of 'good' degrees awarded by pre-1992 universities for the earlier

[121] See Ginther and Khan (2004) for a discussion of female faculty's job security in US universities.
[122] For a discussion of the conceptual and empirical issues involved, see Hanushek (1979).

period and pre-1992 and post-1992 universities in the latter period, excluding Scottish universities from both samples. The estimation strategy employed, controlled for student-specific characteristics (gender, pre-entry A-level scores, type of previous school and domicile), but did not include any university controls. The authors report no evidence of grade inflation in the later period. This general result seems surprising given that UK higher education expanded considerably during this period and the concern was raised over falling standards (see chapter 1). However, significant coefficients on the time dummies were reported for the earlier period. Specifically, between 1984 and 1993 there was evidence of grade inflation with a 14% rise in students graduating with a 'good' degree (measured by the estimated coefficients on the time dummies over this period) that could not be attributed to changes in university efficiency which remained relatively stable between 1973 and 1999 with a reduction in university efficiency in 2000. However, it was also acknowledged that significant coefficients on the time dummies may also indicate changes in student motivation possibly due, for example, to increasing labour market returns for successful completion of an undergraduate programme, or a better quality of student intake brought about by improving pedagogical processes used in lower levels of education (assuming no grade inflation has occurred in at the tertiary or secondary level of UK education)[123] or the influence of external monitoring by the QAA. It should be noted that although the authors used a panel data set the frontier estimator employed could not exploit the temporal (within) dimension of the data leading to the possibility of inefficient and inconsistent parameter estimates.

In a very recent study building on the work of Johnes and McNabb (2002), Johnes and Soo (2013)[124] exploit data from the *Sunday Times University Guide* for the period 2005 to 2012 employing an institution-level true random effect stochastic frontier estimator using a half-normal distribution for the efficiency term. They specify an austere model

[123] It should be noted that A-level grade inflation has also been a concern in the UK for some time. It is reported that there has been a steady rise in students achieving the top A-level grades since the 1980s (Tymms and Fitz-Gibbons, 2001). More recently Smithers (2011) shows that between 1982 and 2012 the percentage of students passing with an A-grade increased from 8.9% in 1980 to 27% in 2011, with a slight 0.4% fall in 2012. The A-level pass rate (grades E to A) also increased, from 68.2% to 98% in 2012. These trends lead to the annual furore over A-level grade inflation reported in the popular media and expressed by government ministers and contended by teaching unions. The important issue here is that if grade inflation at A-level is genuine then A-levels grades may not send the correct signals on students' ability/quality.

[124] This study only came to light in October 2013 after the much of this chapter was drafted for submission.

controlling for student pre-entry (median) A-level point scores and university characteristics including expenditure on educational facilities, staff-student ratio, the institution's RAE score, student satisfaction scores obtained from the NSS, and time dummies. The study found A-level scores, student satisfaction, and expenditure on library facilities impact positively and significantly on a 'good' degree classification. Although they found significant coefficients on the time dummies these were negatively signed indicating negative grade inflation between 2006 and 2011. However, in their most basic specification controlling for pre-entry A-level point scores and employing time (year) dummies grade inflation was observed in 2011 and 2012. They also found little evidence of changes in university efficiency which was on average about 95% over the sample time frame.

4.2.1 Summary

The literature reviewed above suggests a number of factors that can potentially explain grade inflation. Explanations offered from US studies include: the demand for and supply of undergraduate courses, graduate labour market conditions, the introduction of SET, and pressures placed on faculty that incentivise them to free-ride on standards or norms. There is also evidence that the characteristics and attributes of faculty and students are also associated with grade inflation. In addition the rate of grade inflation is found to differ according to academic subject/discipline, and varies between university departments and institutions. Several of these factors are found to influence student performance and grade inflation in other countries. In particular UK studies note the importance of; pre-entry qualifications, gender, socio-economic class, ethnicity, and domicile, the subject studied at A-level and the A-level grade achieved, and the undergraduate discipline studied, as significant determinants of degree classification. In terms of university characteristics, the amount of spending on teaching related facilities, changes in assessment methods and curriculum, staff/student ratios, student evaluations, and university size are also found to significantly influence degree classification. Studies conducted in other countries generally support the importance of these factors in determining student performance. UK studies that specifically examined changing standards found no evidence of grade inflation in UK universities between the mid-1990s and 2000, but did find evidence of grade inflation (or changing standards)

between 1984 and 1993. However, grade inflation was detected in 2011 and 2012. It is also interesting to note that in the case of Italy the movement towards funding universities based on graduate performance has been argued to contribute to grade inflation.

4.3 Data

In the primary analysis we examine grade inflation using university-level data. These data cover the academic years from 2005/06 to 2011/12 inclusive and comprise 700 observations on 100 UK universities. These universities include pre-1992 and post-1992 universities as well as post-2003 universities. We include variables that capture specific characteristics of the graduating cohort including the gender mix, their region of domicile, the nature of degree programme studied, the type of previous school attended, and the UCAS points for the pre-entry qualifications attained. We also include information on university characteristics these include variables that capture university size, expenditures on educational services and facilities, a measure of university performance (i.e., first year student attrition), and university stability. The definitions of the variables employed in this analysis and their associated sources can be found in appendix D2.

In addition we use student-level data obtained from the Strategic Planning Unit at the University of Brighton to explore student performance and grade inflation. These data include information on students gender, age, ethnicity, socio-economic background, pre-entry qualifications, mode of study and their school and course of study over a five year period. These data are employed to examine the extent to which student characteristics and the type of programme studied impacts on the proportion of 'good' degrees awarded which was not possible with the university level data used in the primary analysis. These data provide anonymised individual level information on 11,358 undergraduate students who completed their programme of study between 2005/06 and 2009/10.[125] These students were enrolled on various educational programmes offered in each of fourteen schools of study across the university. Students

[125] The university departments were reorganised in 2010/11 and it was not possible to access further data for inclusion in this analysis.

enrolled for higher national diplomas, foundation degrees, professional qualifications and other HE qualifications are excluded from the analysis.

We first describe the data used in the primary analysis followed by a brief description of the University of Brighton data.

4.3.1 Data: Primary Analysis

The sample time frame considered in the primary analysis is restricted to seven recent years for several reasons. First, due to changes in the measurement of important variables over the period (e.g., A-level pre-entry scores, see below); second, due to data availability, and third it is necessary to use lags of up to three academic years for some variables so that the characteristics of the graduating cohort are aligned as closely as possible with their entry characteristics. Following previous studies (Bee and Dolton, 1985; Johnes and Taylor, 1987; Johnes and Taylor, 1990; Yorke, 2002; Johnes and NcNabb, 2002; McNabb, *et al.*, 2002) we exclude Scottish universities for several reasons. First, Scottish students admitted to Scottish universities can start their university career at the age of 17 (usually 18 in most other UK universities). Second, it takes an extra year to graduate from a Scottish university with a honours degree compared to other UK universities and third, the award of non-honours degrees can be bestowed after three years of study. This last fact increases the proportion of pass/ordinary degrees in the sample data. For these reasons it is difficult to compare Scottish awards with those awarded in other UK universities. We also exclude degrees programmes in Medicine, Architecture, and Education which typically take longer than three years to complete.[126] The summary statistics for the data employed in the empirical analysis are reported in table 4.1 below. Column [1] shows summary statistics for all universities and columns [2]-[4] contain summary statistics broken down by university type.

[126] It is also possible that graduating students on other undergraduate programmes can take 4 years instead of 3 years to complete e.g., students on sandwich courses are generally required to undertake work placement and some programmes require a year of study abroad, typically this extra year of study is undertaken in the 3rd year. From the information available it is not possible to separate those who take four years from those who take three to graduate. However, the majority of students still complete their degrees after 3 years and we expect the proportion of students graduating from English, Welsh and Northern Irish universities after 4 years to be relatively small.

Table 4.1 Summary Statistics: Primary Analysis

	All universities [1]	Pre-1992 Universities [2]	Post-1992 Universities [3]	Post -2003 Universities [4]	t-stat[b]
Students characteristics					
% Good Degrees	59.27 (10.09)	65.81 (8.92)	53.15 (6.13)	51.97 (6.37)	18.59
% Female Graduates	55.57 (7.12)	53.36 (5.38)	55.32 (4.83)	62.16 (10.17)	-4.41
% Science Graduates	24.75 (13.34)	28.24 (14.84)	24.04 (10.48)	16.33 (8.79)	3.69
% UK Domiciled Students (lagged 3 academic years)	83.56 (9.54)	78.97 (10.02)	86.24 (5.74)	91.53 (5.89)	-9.86
% Students from State Schools (lagged 3 academic years)	89.51 (11.13)	82.97 (12.10)	95.51 (4.80)	96.99 (1.42)	-14.77
Median entry points (lagged 3 academic years)	294.88 (84.65)	358.52 (72.18)	234.02 (34.10)	226.30 (27.03)	24.14
NSS score (lagged 1 academic year)	81.67 (5.30)	84.67 (4.39)	78.24 (3.97)	79.44 (4.91)	17.76
University Characteristics					
University type	1.00	0.50	0.32	0.18	N/A
ln Expenditure (in 1998 prices)	9.12 (0.71)	9.38 (0.65)	9.17 (0.51)	8.34 (0.54)	4.02
Staff-Student Ratio	17.64 (3.43)	15.40 (2.76)	19.72 (2.61)	20.16 (2.03)	-18.69
% FTE Undergraduate Students	81.13 (8.08)	76.67 (8.26)	85.18 (4.16)	86.32 (5.63)	-14.28
% First Year Drop-outs (lagged 3 academic years)	8.89 (4.02)	6.36 (3.06)	11.26 (2.87)	11.71 (3.70)	-19.12
VC tenure (years)	5.39 (3.79)	4.87 (3.42)	5.62 (3.82)	6.45 (4.43)	-2.47
N	*700*	*350*	*224*	*126*	*574*

Notes to table:

(a) Standard deviations are reported in parenthesis for continuous variables.

(b) t-stats are used to test differences in means between pre and post 1992 universities. The appropriate critical value at the 5% level of significance is ±1.96.

(c) Scottish Universities, the Open University, colleges of the arts, and small specialist colleges are excluded from the analysis due to their atypical undergraduate intake. The University of Buckingham which is a private institution that awarded honour degrees after two-years of study is also excluded.

We first note that pre-1992 universities comprise 50% of the sample with post-1992 and post-2003 universities accounting for 32% and 18% respectively. On average, just under 60% of honour degrees awarded by these universities are either first or upper second class. We also note that pre-1992 universities award proportionately more 'good' degrees (65.8%) compared to post-1992 universities (53.1%) and post-2003 universities (51.9%). These percentages are in general agreement with the sector percentages reported in figure 1.5 in chapter 1, and figure 4.1.

There have been numerous studies on the effect of gender on degree performance. Several recent studies suggest that females out-perform their male counterparts in achieving a 'good' degree classification.[127] We control for a possible gender differential in degree performance by including the percentage of females graduating from each university and note that on average a higher percentage of women (55.6%) graduate each year compared to their male counterparts. This is true for all university types and is particularly evident in post-2003 universities where on average just over 62% of new graduates are female.

The literature also suggests that the rate of grade inflation differs across universities, departments within universities as well as across different subject groups. In particular, science and quantitative based programmes were generally found to be low grading fields. To capture this effect we include information on the percentage of students graduating with a Science degree from each university. These data reveal that just under a quarter of all students graduate with a Science degree and we also note that the percentage graduating in the sciences is higher in pre-1992 universities (28.2%) than in the other university types.

In general empirical evidence suggests that UK domiciled students perform better than their non-UK counterparts.[128] To examine this effect we include the percentage of UK-domiciled students in each university. The data show that 83.6% of students are UK-

[127] See for example, (Barrow, *et al*., 2009; Woodfield and Earl-Novell, 2006; Naylor and Smith, 2004a; McNabb, *et al*., 2002; Rogers and Ghosh, 2001; Macfarlane, 1992). However, it should be noted that some earlier studies found no significant difference in performance between male and female students, and in some studies males were found to perform better than females (see, McCrum, 1994; Johnes and Taylor, 1990; Rudd, 1984).

[128] See Makepeace and Baxter (1990), Marshall and Clinton (1995), Da Vita (2002), Leslie (2005), Morrison *et al.*, (2005), Barrow *et al.*, (2009), Richardson (2010), and Iannelli and Huang (2013).

domiciled this percentage is particularly high in post-2003 universities at 91.5%. This variable is lagged three academic years so that it is aligned with the graduating cohort who began their degree typically between two and a half to three years previously. Similarly, we include a variable that takes account of students from state schools. Previous research has also found that students from state schools perform better than their counterparts from public schools (Naylor and Smith, 2004a; HEFCE, 2014; Crawford, 2014*)* whereas Johnes and NcNabb (2002) find the opposite. The inclusion of this variable will enable us to observe if the former finding still holds. This variable is also lagged by two academic years to account for the cohort issue noted above. We note that on average 89.5% of new students enrolled in UK higher education were educated in state schools or colleges and the percentage is highest in post-2003 universities (97%). It would also appear that pre-1992 universities enrol a significant proportion of students (17%) from the independent sector.

University admission is mostly determined by the grades achieved on a variety of qualifications recognised by the higher education funding councils. These include A-levels, Scottish Highers (the Scottish equivalent to A-levels) and vocational qualifications (e.g., Advanced Vocational Certificate in Education (AVCE)) amongst others. The latter qualification was introduced in 2000 as a vocational alternative to the more 'academic' A-level qualification and can also be combined with A-level subjects. Points are awarded for the grades achieved on specific pre-university qualifications and summed over the number of qualifications taken.[129] The UK literature on student performance finds that pre-entry points, typically A-level entry points, are a significant predictor of undergraduate degree performance. It is important to note that the A-level points system was revised in 2000 with the introduction of a new two-year A-level structure: 'syllabus 2000' (see appendix D3 for details). Students examined in 2002 were the first to be awarded points according to the new points system and if they then pursued higher education they would have typically graduated in 2005, assuming no 'gap' year. Moreover, entry points are only available as a median value and it is difficult

[129] The Universities and Colleges Admissions Service (UCAS) is the organisation formally responsible for managing applications to higher education courses in the UK and provide a centralised application service for prospective undergraduates. The points awarded for specific qualifications can be found on the UCAS website at: http://www.ucas.com/how-it-all-works/explore-your-options/entry-requirements/tariff-tables

to covert previous A-level scores (where they exist) to make them comparable to the current point system and the data available. This is one reason why the sample period is restricted as noted earlier. To account for the variety of qualifications now available in UK tertiary education and recognised as valid by the funding councils we use the median entry points for *all* qualifications as a measure of student pre-entry quality. We argue that including the points for all pre-entry qualifications as our measure of students' prior ability will more accurately reflect student quality than just focussing on A-level point scores that is typically used in previous studies. Moreover, given the changing nature of institutions now classified as 'universities' and the drive to widen participation it would seem desirable to use a wider measure of student pre-entry quality. The median entry points for all universities is around 295 (equivalent to about two grade Bs and one grade C at A-level, see appendix D3) and is lagged two academic years to coincide with the relevant graduating cohort. We note that on average, and based on this measure, pre-1992 universities attract better qualified undergraduate students than both post-1992 and post-2003 universities.

Student evaluation of teaching was found to contribute to the grade inflation witnessed in the US. We thus include the results from the National Student Survey (NSS) to account for this possibility in the UK context. As noted earlier these data are only available for 2005 onwards, the year the NSS was introduced. The NSS is conducted annually usually before the publication of university examination results and are often presented through the popular media in terms of 'league tables'. The results from the survey are recognised nationally as a key measure of student satisfaction and favourable results are widely publicised by the university in question. Final year students are encouraged to complete an anonymous questionnaire on line.[130] We use the overall satisfaction score which is the response to question 22 on the questionnaire: '*Overall, I am satisfied with the quality my course*' which is reported as a percentage. The higher the percentage the greater is the student's level of satisfaction with the university and course. As the NSS score is published at the end of the academic year this variable is lagged by one year to account for this fact. This is a further reason why the sample data start in the academic year 2005/06. It is assumed that the lower the NSS score the higher will be the percentage of 'good' degrees awarded in the following year. It is assumed

[130] The student questionnaire is available at: http://www.thestudentsurvey.com/, accessed 30/10/2013.

that faculty respond to poor NSS scores by being less harsh in their grading the following year as universities, and departments seek to improve their ranking in the NSS 'league table'. It is possible that the upward drift in percentage share of 'good' degrees since the introduction of the NSS may be a response by faculty and universities to improve their position in the 'league table' and to secure future income streams from fee-paying students. Thus we may expect a negative association between student satisfaction and good degrees. In other words, student dissatisfaction (a low NSS score) may lead to more lenient marking the following year. We note that the overall level of student satisfaction is just under 82% indicating a reasonable level of student satisfaction across the sector. However, there is variation in student satisfaction across the sector with students being more satisfied with their higher education experience in pre-1992 universities than in either post-1992 and post-2003 universities.

In terms of university characteristics we include total university real expenditures (with the base at 1998=100) on student academic facilities including library and IT expenditures and the cost of academic service (e.g., academic staff costs and student support services). It is anticipated that increases in these expenditures will enhance learning and improve grades. We note that pre-1992 universities spend more on these services than other university types. Similarly, the lower the staff-student ratio the better should be student performance. Smaller tutorial/seminar sizes would offer greater opportunity for students to engage with tutors and as already noted would lessen the possibility of free riding so that more effective learning can take place. We note that on average there is between 17 and 18 students per member of teaching staff. A lower staff-student ratio is found in pre-1992 universities with classes, on average, comprising around 15 students per academic teaching staff with the ratio highest in post-2003 universities that operate with about 20 students per teaching staff. We also include a variable that reflects university student composition, the percentage of FTE undergraduate students. On average, just over 81% of all FTE students are on undergraduate pathways. This percentage is lowest in pre-1992 universities (76.7%) and about 10 percentage points higher in post-2003 universities (86.3%). It is ambiguous, *a priori,* the effect that this variable will have on degree classification.

We include a variable that can potentially capture student motivation and preparedness: the percentage of student attrition in the first year. It is acknowledged that there are

many factors that can influence a student's willingness to continue with their study beyond their first year (see, for example, Smith and Naylor, 2001b; Astin, 1995; Johnes, 1990; Johnes and Taylor, 1989). It is possible that higher rates of student attrition imply that the students that graduate from the cohort are of higher ability and more motivated than students that drop out. We would therefore expect higher attrition rates to be positively associated with 'good' degrees if this assumption is true. However, it is also possible that higher rates of attrition are associated with the adoption of poor methods of teaching and learning in a particular university and negatively associated with 'good' degrees. It can also indicate that high standards are applied in the first year and if carried through to the final year can potentially negatively impact on 'good' degrees. Thus the anticipated sign on this variable is ambiguous. This variable is also lagged two academic years. We note that, on average, about 9% of students drop out after their first year of study and note that attrition rates are higher in post-1992 and post-2003 universities compared to pre-1992 counterparts.

Finally, we include a variable to capture university managerial stability using Vice Chancellor (VC) tenure. We argue that the longer the VC stays in post the more stable is university policy and academic standards. The average VC tenure is just under five and half years, with those administering pre-1992 being in post for a shorter time period compared to those administering post-1992 and post-2003 universities. The figures reported in the table are in broad agreement with those reported in chapter 2.

4.3.2 Supplementary Analysis using University of Brighton Data

These data cover the period from 2006 to 2010 and include rich information on student characteristics. After allowing for missing values the sample consists of 11,358 individual observations on students who graduated from the university between 2006 and 2010. The summary statistics and variable definitions are reported in appendix D4. We first note that over the sample period just under 55% of degrees awarded were classified as either a first or upper second and this is comparable to the national figure of 56% for this period using the data presented in appendix A8. In terms of student characteristics about 58% of students are female, about 72% are in the 18-20 year old category, 82% of students reported their ethnicity as 'white', 92% are UK domiciled,

98% are on full-time honours degree programmes, just over 11% reported a disability, and just over 8% entered the university through clearing. These statistics are in broad agreement with the national percentages reported by HESA for the period. We also note that the majority of students in the sample, 57%, are from households where the head is in a white collar or professional occupation.

In terms of entry qualifications the majority of students (77%) enter university with traditional A-level and/or AVCE qualifications with 27% entering with between 161 and 260 UCAS point equivalent to between two and three grade-Cs at A-level on average. We note also that about 12% enter with a HE qualification below the level of an honours degree, and just under 5% hold a non-UK qualification. In terms of cohort issues the proportion of students graduating each year is relatively evenly spread across the five years covered by these data. Finally, in terms of the type of degree awarded in the fourteen schools of study we note that the largest proportion of students (14.5%) are graduates in Business or Finance and the smallest proportion, just over 3%, graduate with a degree in engineering.

4.4 Methodology

The primary focus of this essay is to examine grade inflation in UK higher education from 2005/06 to 2011/12 inclusive. We first examine the phenomenon using the university-wide data described in section 4.3.1. It was noted earlier that Johnes and McNabb (2002) and Johnes (2004) suggest that the empirical literature on grade inflation, that generally use educational production functions, fail to control for changes in university efficiency and the 'grade inflation' observed may be a result of universities becoming more technically efficient in teaching and learning. To account for changes in efficiency they use a stochastic production frontier framework.[131] Recent advances in stochastic frontier modelling and software development have made it possible to

[131] Stochastic cost and production frontier models were introduced in the literature by Aigner *et al* (1977) and their theoretical basis is described by Farrell (1957). There are a number of surveys on the applications of frontier analysis in several contexts (see, for example, Førsund, *et al*., 1980; Kumbhakar and Lovell, 2000). Schmidt and Sickles (1984) provide an early discussion on the use of production frontiers with panel data.

estimate stochastic frontier models that can exploit the temporal nature of the data (Belotti, *et al.*, 2012 ; Belotti, 2012). We employ the 'true' (university) random effects estimator (TRE) advanced by Greene (2005), which develops previous stochastic random effects panel models in that it allows for time varying university inefficiency to be distinguished from cross section university heterogeneity. Following Johnes and Soo (2013), and for the purpose of comparison we transform the continuous variables into natural logarithms. We also control for additional student and university characteristics that have been found to influence student performance.

The basic model can be expressed as:

$$g_{it} = (\alpha + \omega_i) + \beta' \mathbf{X}_{it} + \sum_{t=2}^{T} \gamma_t D_t + \mathbf{v}_{it} - \mathbf{u}_{it} \qquad i = 1,2,\ldots,N \quad t = 1,2,\ldots,T \qquad [4.3]$$

$$\mathbf{v}_{it} \sim \text{NID}(0,\sigma_v^2) \qquad \text{and} \qquad \mathbf{u}_{it} \geq 0 \ \text{ where } \ \mathbf{u}_{it} \sim N^{+}(0,\sigma_u^2)$$

where: g_{it} is the natural logarithm of the percentage of good degrees awarded by the i^{th} institution at time t; $\mathbf{X}_{it}$ is a k×1 vector of performance determining variables. Specifically, the vector $\mathbf{X_{it}}$ includes variables that describe student specific characteristics (i.e., the natural logarithm of; the percentage of female graduates, the percentage of science graduates, the percentage of students who are UK domiciled, the percentage of students from comprehensive schools, and the median A-level entry score of the graduating cohort. It also includes a set of variables that describe institution specific characteristics (i.e., a university type dummy variable, the natural logarithm of expenditure on student resources, the natural logarithm of the staff/student ratio, and the natural logarithm of the percentage of undergraduate students). Vector **X** also includes the natural logarithm of Vice Chancellor (VC) tenure (in years) to control for the level of managerial stability in the i^{th} institution. We argue that this variable captures standards in university policy that can be attributed to specific VCs. Variables that reflect university performance are also included in the vector **X** and these too are transformed to natural logarithms (i.e., student attrition rate, and the results from the NSS). A set of time specific dummies (D_t) are employed to capture exogenous factors that affect all universities in their award of 'good' degrees that are independent from changes in university efficiency (e.g., a general fall in standards). The unknown parameters α, ω_i, β, and γ_t are estimated using simulated maximum likelihood

techniques (for details see, Greene, 2005). In this specification $\omega_{i,}$ is a random effect and captures variation due to unobserved university-specific heterogeneity not associated with university-specific variation in efficiency. Moreover, it is assumed that $\omega_{i,,}$ is uncorrelated with the included variables contained in the vector **X**. This is a strong assumption and if it is not upheld then the coefficient estimates are inconsistent. This should be borne in mind when interpreting the results.

The error term $\mathbf{v}_{it}$ - $\mathbf{u}_{it}$ in expression [4.3] is a composed error term and comprises of two elements. The first term $\mathbf{v}_{it}$ is symmetrically distributed and captures conventional exogenous random shocks (i.e., effects not under the control of the institution) that vary across universities. The second term $\mathbf{u}_{it}$ is one-sided and assumed to capture changes in university (technical) inefficiency over time. Several, distributions can be assumed for the one-sided error term: half normal, truncated normal, and exponential (Greene, 2005; Belotti, *et al*., 2012). However, there is no real guidance as to the choice between these distributions and we assume a half normal distribution as this appears to be popular in the literature. It should be noted that the assumed distribution may give different inefficiency estimates to the alternatives available (Greene, 2005). Moreover, the identification of $\mathbf{v}_{it}$ and $\mathbf{u}_{it}$ can be problematic if the shape of the distributions is similar or if one of these parameters account for a large proportion of the overall distribution of the composed error. This latter issue is due to the signal-to-noise ratio,(σ_u^2/σ_v^2), which if vary large or very small will mean the likelihood function will be relatively flat leading to convergence problems in the maximum likelihood algorithm.[132]

Further, we employ the method suggested by Jondrow *et al.*, (1982) to estimate the expected value of university-specific inefficiency which uses the information on the composed error term i.e., E (u_{it} | $v_{it} - u_{it}$) and can be expressed formally:

[132]The 'true' fixed effects estimator (TFE) was also employed but the likelihood function was found to be relatively flat. As a result parameter estimates become unstable and thus lack precision (Belotti, *et al.*, 2012). The coefficient estimates are not reported in the text. It is instructive to note that two issues arise when using the TFE estimator to estimate non-linear panel models. The first is due to computational problems regarding the number of parameters to be estimated, which increases substantially and the second is an inferential issue surrounding the number of so-called 'incidental' parameters that arises when the number of units are large relative to the length of the panel. These issues imply that the fixed effects will be inconsistently estimated (Belotti, *et al.*,2012). For a detailed discussion of the 'true' random/fixed effects estimators see Greene (2005).

$$\hat{u}_{it} = E[u_{it}|\varepsilon_{it}] = \frac{\sigma\lambda}{1+\lambda^2}\left[\frac{\phi(a_{it})}{1-\Phi(a_{it})} - a_{it}\right] \qquad [4.4]$$

Where $\varepsilon_{it} = v_{it} - u_{it}$, $\sigma = \sqrt{(\sigma_u^2 + \sigma_v^2)}$, $\lambda = \sigma_u / \sigma_v$, $a_{it} = \varepsilon_{it}\lambda/\sigma$, ø is the standard normal density and Φ is the standard normal CDF. We evaluate efficiency using $\exp(-u_{it})$.

We also compare the estimated coefficient estimates from the TRE specification with those estimated from a standard university-random effects specification (without the inefficiency term) and a standard university-fixed effects model as a check of robustness. The fixed effects model can be expressed:

$$g_{it} = \alpha_i + \beta' \mathbf{X}_{it} + \sum_{t=2}^{T}\gamma_t D_t + \mathbf{v}_{it} \qquad i = 1,2,\ldots,N \quad t = 1,2,\ldots,T \qquad [4.5]$$

This specification allows for within-university correlations across years for the institutions that feature in these data. In this framework omitted unobservable university effects (e.g., university efficiency) remain fixed over time and consumed in α_i which is allowed to be correlated with the included variables. The assumption that omitted unobservable university effects remain fixed over time may be a strong assumption in this case given the data spans seven years, but the estimator will give more consistent parameter estimates, compared to the random effects estimator, if unobservable university heterogeneity is correlated with the included variables. The variables g_{it}, D_t, and those included in the vector **X** are as described above, but exclude the university type dummies. The parameters α_i, β and γ are unknown where α_i represents university fixed effects and γ_t is assumed to capture changes in standards or grade inflation in any particular year. The error term $\mathbf{v}_{it}$ is assumed to conform to standard assumptions i.e., $\mathbf{v}_{it} \sim iid(0,\sigma^2)$. The random effects model assumes α_i is randomly determined but as in the case of the TRE it is assumed that α_i is uncorrelated with the included regressors and if this assumption is not upheld the parameter estimates will be inconsistent and inefficient. As a check for robustness we re-estimate the models described in expressions [4.3] and [4.5] in their original units i.e., percentages.

In the supplementary analysis we use the student-level data described in section 4.3.2 and examine grade inflation using a standard binomial probit model. The latent performance equation can be defined as:

$$g^*_i = \beta' \mathbf{Z_i} + \sum_{t=2}^{T} \gamma_t D_t + u_i \qquad i= 1,\ldots.N \qquad [4.6]$$

where g^*_i denotes the latent dependent variable that captures the i^{th} individual's propensity to be awarded a 'good' degree, $\mathbf{Z}_i$ is a h×1 vector of student level degree performance determining variables for the i^{th} student (i.e., gender, age, ethnicity, domicile, mode of study, entry qualifications, and field of study), D_t is a set of time dummies and as noted above are employed to capture grade inflation, and u_i is the error term that conforms to standard assumptions i.e., $u_i \sim N(0, \sigma^2)$. If the latent variable exceeds zero a 'good' degree is awarded thus:

$$g_i = 1 \quad \text{if } g^*_i > 0 \quad \text{and}$$
$$g_i = 0 \quad \text{if } g^*_i \leq 0$$

The unknown parameters to be estimated are; β which represents a vector of fixed unknown coefficients including the constant, and γ_t that captures exogenous factors that affect the award of a 'good' degree class. In order to identify these parameters the conventional normalisation is made and we set $\sigma^2 = 1$.

Setting $\mathbf{V}_i = \beta' \mathbf{Z_i} + \sum_{t=2}^{T} \gamma_t D_t$ **,** the log-likelihood function can be expressed:

$$L = \sum_{i=1}^{n} g_i \times \ln[\Phi(\mathbf{V}_i)] + \sum_{i=1}^{n} (1 - g_i) \times \ln[1 - \Phi(\mathbf{V}_i)] \qquad [4.7]$$

Where, ln(·) is the natural logarithm operator, and Φ is the cumulative distribution function of the standard normal. Conventional algorithms can be employed to expression [4.7] to provide maximum likelihood estimates for the parameter vector β and γ_t. As the variables contained in vector $\mathbf{Z_i}$ are either categorical or dummy variables,

and to aid interpretation, the estimated impact effects are reported in the following section (see, Greene, 2008). This transformation allows the *ceteris paribus* effect on the probability of achieving a 'good' degree for discrete changes in the independent variables to be more transparent.

4.5 Empirical Results

The results for the TRE stochastic frontier estimates [expression 4.3] with the continuous variables transformed to natural logs, and assuming a half normal distribution for the inefficiency term $\mathbf{u}_{it}$, are reported in column [1] in table 4.2 below. The alternative coefficient estimates for the standard fixed and random effects specifications, are reported in columns [2] and [3] respectively. We also estimated the parameters of the TRE specification assuming an exponential distribution for the inefficiency term. The coefficient estimates were very similar to those reported assuming a half normal distribution. These estimates are reported in appendix D5 for purposes of comparison.[133] We first note that the statistical significance and the signs on the estimated coefficients are fairly robust across the specifications reported in table 4.2. The fixed effects specification fits the data reasonably well, but the variation in 'good' degrees explained by the university fixed effects is high at 88%.

It is important to note that the results from the estimation framework adopted in this chapter do not necessarily suggest that causal relationships exist between the proportion of good degrees awarded and all the explanatory variables included on the right-hand side of expression [4.3**].** There is a possibility that certain key variables may be endogenous causing the coefficient estimates for these variables to be biased and inconsistent. This will require the use of instrumental variables in place of the problematic variables (see chapter 2 section 2.7, for a brief discussion of what constitutes a good instrument). It may be the case that the variables that relate to student entry points and the NSS score may be endogenous. For instance, a higher proportion of good degrees may attract students with higher entry scores and higher entry scores may

[133] It should be noted that we also estimated the specification assuming a truncated normal distribution for the efficiency term but the simulated log-likelihood function failed to converge resulting in imprecise coefficient estimates and these are not reported.

also be associated with a higher proportion of good degrees awarded, suggesting a possible 'reverse' causality. In the current context it is extremely difficult to come up with suitable instruments as it would appear that anything that may influence these two variables will also impact on the proportion of good degree awarded. For instance, if we could get a measure of student ability which is likely to be correlated with entry score (e.g. more able students perform better at A-level) we would also expect more able students to perform well at university and achieve a 'good' degree classification, which rules out using ability as an instrument. However, the NSS questionnaire does not explicitly ask students about the material environment in which study takes place, generally it is concerned with student opinions on teaching quality, assessment, academic support, course organisation and management, access to learning facilities and personal development. We may conjecture that a better learning environment (e.g. adequate infrastructure, well maintained buildings and grounds) may improve the NSS score but may not be correlated with the share of 'good' degrees awarded. Nevertheless, again finding suitable instruments to address the endogeneity that may be inherent in the NSS and entry score variables is a difficult task. Moreover, suggesting the direction of bias in the relevant estimated coefficients would likewise be mere conjecture.

In addition, bias may be introduced in the estimated coefficients through omitted variables. For instance, it is intuitively plausible that variables that capture student ability, which is missing, may be positively correlated with the A-level performance and variables that capture student motivation, and/or teaching quality may also be positively correlated with the NSS score. Since these variables are omitted from specifications [4.3] and [4.6] the coefficient estimates for the NSS score and A-level points may be overestimated. Finding suitable proxies for the missing variables is difficult given the available data and given the possibility of 'reverse' causality the estimated coefficients reported in table 4.2 and 4.3 below should be interpreted with caution. We focus our discussion on the coefficient estimates reported in column [1] for the TRE specification and compare these to those reported in columns [2] and [3].

Table 4.2 True Random Effects, Standard Random Effects and Standard Fixed Effects Estimates (log form)

Variable Name	True University Random Effects (Half Normal) [1]	University Random Effects [2]	University Fixed Effects [3]
Students Characteristics			
Ln (% Female Graduates)	0.077 (0.070)	0.078 (0.088)	-0.140 (0.206)
Ln (% Science Graduates)	-0.007 (0.009)	-0.017 (0.009)*	-0.015 (0.012)
Ln (% UK Domiciled Students) (lagged 3 years)	0.151 (0.082)*	0.124 (0.098)	0.386 (0.180)**
Ln (% Students from State Schools) (lagged 3 years)	-0.268 (0.102)***	-0.253 (0.045)***	0.078 (0.151)
Ln (Median entry points) (lagged 3 years)	0.254 (0.046)***	0.253 (0.045)***	0.152 (0.051)***
Ln (NSS score) (lagged 1 year)	0.001 (0.102)	-0.041 (0.099)	-0.065 (0.107)
University Characteristics			
Pre-1992 university	0.042 (0.019)**	0.054 (0.025)**	†
Post-2003 university	-0.025 (0.036)	-0.037 (0.026)	†
Post-1992 university	*f*	*f*	†
Ln (expenditure (in 1998 prices))	-0.001 (0.011)	-0.006 (0.723)	-0.002 (0.018)
Ln (Staff-student ratio)	-0.011 (0.027)	-0.010 (0.029)	-0.006 (0.034)
Ln (% FTE undergraduate students)	-0.083 (0.107)	-0.053 (0.125)	0.056 (0.170)
Ln (% First year drop outs) (lagged 3 years)	-0.032 (0.014)**	-0.042 (0.015)***	-0.025 (0.014)*
Ln (VC tenure (years))	0.0004 (0.0039)	0.0004 (0.0043)	0.003 (0.004)
Year Dummies			
Year dummy 2012	0.096 (0.013)***	0.103 (0.014)***	0.116 (0.017)***
Year dummy 2011	0.054 (0.011)***	0.068 (0.012)***	0.078 (0.014)***
Year dummy 2010	0.031 (0.011)***	0.046 (0.012)***	0.052 (0.014)
Year dummy 2009	0.009 (0.009)	0.023 (0.009)**	0.032 (0.009)***
Year dummy 2008	0.003 (0.007)	0.014 (0.008)*	0.022 (0.008)***
Year dummy 2007	0.002 (0.009)	0.007 (0.007)	0.012 (0.007)
Year dummy 2006	*f*	*f*	*f*
σ_i	†	0.067	0.153
σ_e	†	0.056	0.056
rho_i	†	0.589	0.882
Within-R^2	†	0.314	0.337
ρ	†	†	-0.039
σ_u^2	0.081 (0.008) ***	†	†
σ_v^2	0.029 (0.004) ***	†	†
σ_v^2/σ_u^2	2.767 (0.011) ***	†	†
F-statistic[§] / Wald test χ^2_{20}	665.83[p= 0.000]	589.25 [p= 0.000]	8.35 [p = 0.000]
Log likelihood	-915.6472		1090.5931
Observations	700	700	700
Number of universities	100	100	100

Notes to table:
(a) Robust standard errors corrected for clustering by university are reported in parentheses.
(b) * significant at 10%; ** significant at 5%; *** significant at 1%
(c) † denotes not applicable in estimation.
(d) *f* denotes base category in estimation.
(e) σ_i and σ_e are the estimated standard deviations for the fixed effects and the error term respectively, rho_i is the fraction of the variation in the dependent variable accounted for by the fixed effects an ρ is the correlation between the fixed effects and the included variables.

In terms of student characteristics there is no statistical evidence that the gender-mix has a significant impact on the percentage share of 'good' degrees. This result is robust across the specifications reported in table 4.2, but runs counter to several studies that find a positive and significant female effect on performance. These studies are generally based on earlier student cohorts (Smith and Naylor, 2001a; McNabb, *et al*., 2002; Barrow, *et al.*, 2009). However, it does confirm the finding of Johnes and McNabb (2002) of no significant female effect on degree performance between 1995-2000 for pre-1992 and post-1992 universities (see also, Rogers, 2007). The result reported here may reflect a quality shift with new female entrants being of lower ability (in terms of pre-entry requirements) than females in the past and may be a result of widening participation that has narrowed the gender differential in performance.

Students graduating with a Science degree are found to be less likely to achieve a 'good' degree compared to non-science graduates using the standard random effects specification. The point estimate suggests that a ten-percent increase in the proportion of science students reduces the number of 'good' degrees awarded by 0.17%, on average and *ceteris paribus*. This particular result may suggest that Science subjects are more harshly marked or graded than subjects in other subject fields and confirms the findings of existing research on this issue noted earlier although the effect is fairly inelastic. However, this effect disappears when we control for changes in efficiency which may suggest that more efficient teaching methods or learning technologies have been successfully employed in this field of study. No significant effect is detected using the standard fixed effects specification.

The estimated coefficient for UK domiciled students in the graduating cohort is statistically significant. This particular result is in agreement with the general finding reported in the empirical literature on student performance (see, for example, Morrison, *et al*., 2005; De Vita, 2002). The point estimate suggests that a one-percent increase in the proportion of UK domiciled students raises the share of 'good' degrees by 0.15%, on average and *ceteris paribus*. A significant effect is also detected in the fixed effects specification reported in column [3] however being UK domiciled has about two and a half times the impact on 'good' degrees compared to the effect detected using the TRE estimator. These results can be taken to suggest that UK students have, on average, a relative advantage over non-UK domiciled students. However, it should be noted that

non-UK domiciled students include both EU and non-EU students and there may be a wide variation in the performance of these students compared to their UK counterparts.

We detect a significant negative association between the percentage of students enrolled from state secondary schools in the same graduating cohort and the award of a good degree. The coefficient estimate suggest that a one-percent increase in the proportion students from state schools lowers the share of 'good' degrees by just under 0.27%, on average and *ceteris paribus* and is in agreement with the finding of Johnes (2004), but runs counter to the results reported by Smith and Naylor (2001a; 2005) and McNabb *et al,* (2002) for earlier cohorts of students typically drawn from pre-1992 universities and the more recent studies by HEFCE (2014) and Crawford (2014).. Smith and Naylor (2001a; 2005) argue that although students drawn from the independent sector perform better in terms of their A-level points those admitted from state schools with similar A-level scores are of higher relative ability and are more motivated than their independent sector counterparts while at university and perform better on average than their independent counterparts. The results presented here suggest that there has been some reversal of this between 2006 and 2012. However, it should be noted that the studies by Smith and Naylor (2001a; 2005), McNabb *et al,* (2002) HEFCE (2014) and Crawford (2014) all use a different level of aggregation to the one used here. They focus on individual level as well as university level characteristics to uncover association between school type and student performance, and aggregation bias may be a reason why the results from previous studies differ from the results presented here (see Johnes, 2004). A similar effect is reported for the standard random effects specification, but the coefficient estimate is insignificant in regard to the fixed effects specification in column [3]. This latter effect may also be due to a high correlation between the fixed effects and this particular variable and may reflect the fact that potential state-school/public-school educated enrolees are attracted to certain types of universities based on unobserved university characteristics (e.g., university reputation) not captured in these data.

Like many previous studies we find a significant and positive relationship between pre-entry points and the percentage of good degrees awarded. For instance, a 10 percent increase in the median entry points increases the share of 'good' degrees by about 2.5%, on average and *ceteris paribus.* This also implies that a university with an average intake of students with three As at A-level will award 4% more 'good' degrees than a

university with an intake profile which on average achieve three Bs at A-level and this result is intuitively plausible. This effect is marginally smaller than the 5% differential reported by Johnes and Soo (2013).[134] However, unlike Johnes and Soo (2013) we use the median UCAS entry points for *all* entry qualifications, and control for a more comprehensive set of covariates and this difference may have been anticipated. A similar entry score effect is detected for the random effects specification reported in column [2] but is smaller in the fixed effects specification, which suggests that a 10% increase in the median entry score increases the share 'good' degrees by about 1.5%.

In contrast to the findings of Soo (2009) and Johnes and Soo (2013), we find no statistical evidence that student assessment of teaching via the NSS impacts on degree outcome. Unlike the performance specifications employed by Johnes and Soo (2013) the NSS score is entered using a one-period lag to reflect the reality that the results from the survey are generally available after the final degree classifications are awarded.[135] We argue that lecturers alter their behaviour in response to the NSS score the following year to improve 'league table' ranking. However, there appears to be little incentive for faculty to behave in such a way. This is also in contrast to US studies where the pursuit of high SET scores may induce faculty to free-ride particularly if faculty pay, promotion or tenure is dependent on student satisfaction scores.

We also find that pre-1992 universities award more 'good' degrees compared to their post-1992 counterparts. The point estimate, suggests that that this differential is 4.2 percentage points, on average and *ceteris paribus*, using the TRE specification in column [1]. However, a larger and significant effect is detected using the standard random effects estimator. This result may be picking up a quality effect with students of higher calibre are admitted to pre-1992 universities and we may expect better student outcomes for these universities. Very few other university characteristics are found to be statistically associated with a 'good' degree classification. There is no evidence that

[134] A basic TRE specification using just the median entry score and year dummies as regressors was also estimated, which concurs with the specification reported by Johnes and Soo (2013). The estimated coefficient for the pre-entry point score was 0.378 [p-value = 0.000], suggesting that universities with an average intake of students with three As at A-level award 8.5% more 'good' degrees than an institution with an average student intake with three Bs, which is higher than that reported by Johnes and Soo (2013), but is in general agreement with Smith and Naylor (2001a)

[135] It is acknowledged that student satisfaction may enhance motivation and increase performance in the current year, but it is not clear that students who report a high satisfaction score are necessarily more motivated than less satisfied students.

university spending on student related learning facilities and the staff-student ratio is significantly associated with the share of 'good' degrees awarded. This is in contrast to the results reported by Johnes and Soo (2013) who find marginal evidence that these factors impact on 'good' degrees. Student composition and our proxy for university managerial stability exert no significant effect on the percentage of 'good' degrees awarded. The statistical insignificance of these factors is found across all specifications reported in table 4.2. However, there is evidence that as the rate of student attrition, in the first year, increases by one-percent 'good' degrees awarded falls by 0.03%, on average and *ceteris paribus*. This result may indicate that high standards are applied in the first year and if carried through to the final year could potentially negatively impact on the share of 'good' degrees awarded. On the other hand high attrition rates may be associated with poor standards of teaching in the first year and if continued to the final can also negatively impact on the share of good degrees awarded. It is therefore difficult to interpret this association precisely.

We now turn our attention to changes in educational standards and grade inflation. In terms of standards we note that the size of the estimated coefficients on the academic year dummies increase monotonically in all specification reported in table 4.2 since 2005/06. Using the TRE specification reported in column [1] the estimated coefficients on the year dummies are statistically significant from the academic year 2008/09 onwards after controlling for student and university characterises, and most importantly university efficiency. The point estimate on the 2011/12 dummy suggests that the proportion of 'good' degrees awarded increased by about 9.6% since the academic year 2005/06 and this accounts for about four-fifths of the 12% increase in share of 'good' degrees over the sample period (see appendix A8).[136] Similar effects are noted when the standard random and fixed effects estimators are employed, however the coefficients on the year dummies become significant two-years earlier using these specifications. This may be taken as evidence of falling standards that may have resulted in the upward drift in the percentage of 'good' degrees awarded (i.e., grade inflation), and there is robust evidence of grade inflation since the academic year 2008/09. However, these results are in contrast to those reported by Johnes and Soo (2013) who find 'negative' grade inflation after controlling for university expenditures on student facilities, entry scores,

[136] This is calculated using the ratio of proportion of good degrees awarded in 2012 to the proportion awarded in 2006 and taking the natural logarithm of this ratio i.e., ln(0.614/0.544).

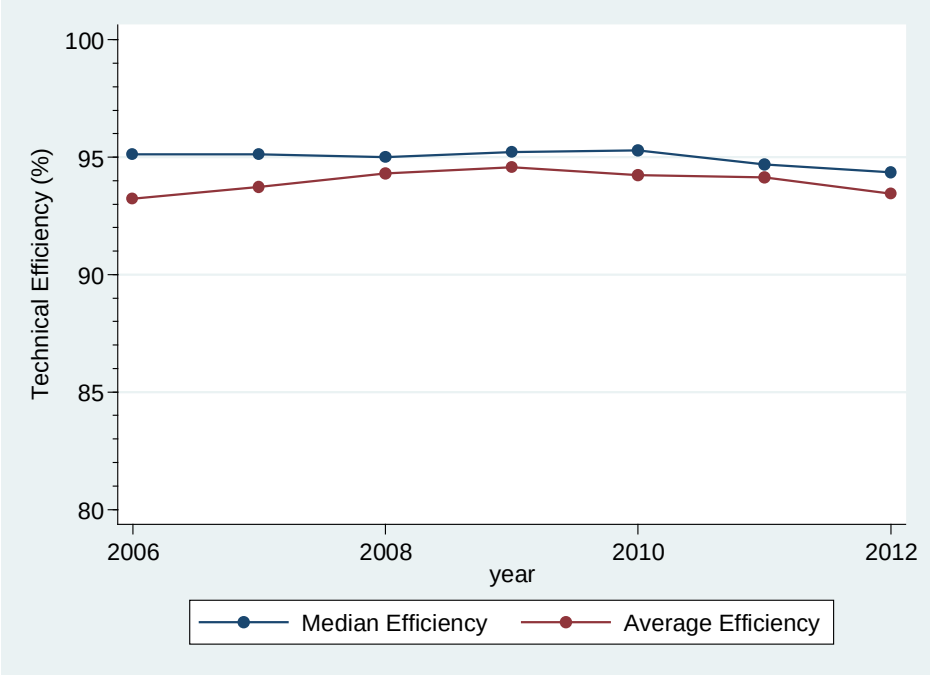
student satisfaction and university research quality, but they do find some evidence of grade inflation in 2011 and 2012 in their most austere model. Johnes and Soo (2013) argue that the grade inflation observed in their data may be explained by the increase in tuition fees in 2006 and 2012. However, we feel the evidence presented here provides more convincing evidence that this may be the case. The difference between these results and those presented by Johnes and Soo (2013) may be due to our use of more contextual data.

However, even after controlling for changes in university efficiency it is also possible that the estimated coefficients on the time dummies may not be an indication of 'pure' grade inflation. It is possible that the monotonic increase in the size of the coefficients that is observed may be due to a general increase in student motivation, the use of better teaching technologies, or simply due to a general rise in student ability for instance due to better teaching technologies being employed in lower levels of education. But it is still possible that to a certain extent the size of the estimated coefficients do reflect changing (falling) standards.

We now examine the evolution of technical efficiency over the sample time period. We recover the $\mathbf{u}_{it}$ based on the specification reported in column [1], from which we derive efficiency scores for each university in the dataset using the transformation $\exp -(\mathbf{u}_{it})$ suggested by Jondrow *et al.*, (1982). These are then averaged across institutions for each year and the results are presented in figure 4.3 below. We first note that in general (technical) efficiency has remained relatively constant over the period, averaging about 94%, with a median of about 95% concurring with the level of efficiency reported by Johnes and Soo (2013) using a TRE estimator. Similar results were found in the earlier study by Johnes and McNabb (2002) using a standard stochastic frontier estimator who report that mean technical efficiency remained relatively constant at around 93% between 1973 and 1993, but observed a small increase in inefficiency in 2000. The evidence presented in figure 4.3 suggests a small fall in efficiency across the sector between 2009 and 2012. However, the general picture suggest that university efficiency was relatively high and stable since the mid-2000s. The finding that university efficiency has remained stable over the time period covered in the current analysis may help explain why the standard random effects specification and fixed effects produced

similar results to the TRE specification, and the use of stochastic frontier models may be too elaborate in this application.

Figure 4.3 Average Technical Efficiency (%) UK Universities 2006-2012



As a check of consistency we re-estimate the models presented in table 4.2 with the variables in their original percentage form. The results from this exercise are presented in table 4.3 below. We note that, in general, the signs on, and the significance of the estimated coefficients are similar to those reported in table 4.2. Specifically, we find a negative association between the percentage share of 'good' degrees and the percentage of students admitted to university from state schools and the percentage of science students, although this latter effect is more robust across the specifications reported in table 4.3. Using the point estimate for the TRE reported in column [1] for this latter effect a one-percentage point increase in the percentage of students graduating with a science degree reduces the share of 'good' degrees by just over 0.07 of a percentage point, on average and *ceteris paribus*. We find no significant role for gender and NSS score in influencing the percentage share of 'good' degrees.

We note a significant and positive association between the percentage share of 'good' degrees and UK domiciled students and pre-entry scores. For instance, using the coefficient estimate from the TFE specification reported in column [1] the estimate

suggests a 20-point increase in the median entry points (equivalent to a one grade increase at A-level) increases the percentage of good degrees by one percentage point, *ceteris paribus*. This also implies that a university with an average intake of students with three As at A-level will award 3 percentage points more 'good' degrees than a university with an intake profile which on average achieve three Bs at A-level. A similar entry score effect is detected for the random effects specification reported in column [2] but is smaller in the fixed effects specification, which suggests that a 20-point increase in the median entry score increases the percentage of 'good' degrees by about 0.6 of a percentage point. These results are in general agreement with the findings presented in the models in log form.

As with the log models presented above very few university characteristics are found to be associated with a 'good' degree classification. Moreover, in comport with the results presented in table 4.2 the estimated coefficients on the time dummies increase monotonically in all three specifications reported. Using the results for the TRE specification reported in column [1] of table 4.3 the point estimates on the time dummies suggest that since 2008/09 onwards the percentage share of 'good' degrees increased by just over six percentage points to 2011/12. This effect accounts for a large proportion of 7.2 percentage point rise in 'good' degrees awarded over the sample period. A similar effect is detected using the standard random effects estimator (column [2]) and the standard fixed effects estimator (column [3]), although grade inflation is detected starting in 2007/08 using the former specification and in 2007/06 using the latter. In general, the results reported in table 4.3 give some confidence for the results reported in table 4.2.

Table 4.3 True Random Effects, Random Effects and Fixed Effects Estimates (percentage form)

Variable Name	True University Random Effects (Half Normal) [1]	University Random Effects [2]	University Fixed Effects [3]
Students Characteristics			
% Female Graduates	0.016 (0.076)	0.019 (0.096)	-0.162 (0.193)
% Science Graduates	-0.075 (0.029) ***	-0.082 (0.035) **	-0.074 (0.041) *
% UK Domiciled Students (lagged 3 years)	0.118 (0.044) ***	0.101 (0.070)	0.225 (0.127) *
% Students from State Schools (lagged 3 years)	-0.214 (0.054) ***	-0.207 (0.063) ***	0.073 (0.112)
Median entry points (lagged 3 years)	0.050 (0.008) ***	0.048 (0.009) ***	0.031 (0.009) ***
National Student Survey (NSS) score (lagged 1 year)	-0.011 (0.062)	-0.030 (0.069)	-0.046 (0.074)
University Characteristics			
Pre-1992 university	2.716 (1.104) ***	3.525 (1.422) **	†
Post-2003 university	-1.185 (0.941)	-1.796 (1.444)	†
Post-1992 university	*f*	*f*	†
(ln) expenditure (in 1998 prices)	-0.172 (0.552)	-0.242 (0.685)	-0.141 (0.962)
Staff-student ratio	-0.019 (0.089)	-0.057 (0.085)	-0.026 (0.093)
% FTE undergraduate students	-0.069 (0.066)	-0.027 (0.089)	0.060 (0.112)
% First year drop outs (lagged 3 years)	-0.246 (0.087) ***	-0.294 (0.087) ***	-0.203 (0.092) **
VC tenure (years)	0.031 (0.051)	0.027 (0.051)	0.072 (0.052)
Year Dummies			
Year dummy 2012	6.079 (0.781) ***	6.228 (0.818) ***	6.621 (0.855) ***
Year dummy 2011	3.851 (0.706) ***	4.217 (0.724) ***	4.403 (0.768) ***
Year dummy 2010	2.570 (0.718) ***	2.982 (0.727) ***	3.049 (0.779) ***
Year dummy 2009	0.702 (0.540)	1.143 (0.519) **	1.477 (0.534) ***
Year dummy 2008	0.254 (0.459)	0.570 (0.445)	0.943 (0.432) **
Year dummy 2007	0.056 (0.398)	0.267 (0.389)	0.510 (0.387)
Year dummy 2006	*f*	*f*	*f*
σ_i	†	4.096	8.877
σ_e	†	2.934	2.934
rho_i	†	0.661	0.901
Within-R^2	†	0.362	0.382
ρ	†	†	0.111
σ_u^2	3.334 (0.600)***	†	†
σ_v^2	2.158 (0.292)***	†	†
σ_v^2/σ_u^2	1.545 (0.857)*	†	†
F-statistic[§] / Wald test χ^2_{20}	1248.52 [p= 0.000]	614.82 [p= 0.000]	9.48 [p= 0.000]
Log likelihood	-1878.0014		-1674.6104
Observations	700	700	700
Number of universities	100	100	100

See notes to table 4.2

Again, and in general, we note the similarity between the estimated coefficients reported using the TRE estimator and those reported using standard random effects estimator in table 4.3. This may imply that controlling for university efficiency, which has remained relatively constant over the sample period, as illustrated in figure 4.3, has little influence on the share of 'good' degrees awarded. Thus differences in university efficiency may be assumed fixed and time invariant over the short period of time reviewed here. Moreover, given the possibility that the estimated random effects may be correlated with the included variables, which lead to imprecise coefficient estimates, the results using the fixed effects estimator may therefore provide more consistent parameter estimates.[137] Furthermore, if the fixed effects estimator is preferable then based on the evidence presented above, and in contrast the Johnes and Soo (2013), we assert that grade inflation has been evidenced in UK higher education since 2006/07.

We now turn to the probit estimates using administrative data for the University of Brighton that are the focus of the supplementary analysis to examine the influence that student characteristics have on student performance. The coefficient estimates for the probit index function, which are not discussed below, are reported in appendix D6, but we note that the majority of the coefficient estimates are statistically significant at conventional levels and the signs on the coefficients are intuitively plausible supporting the findings from many previous studies on the importance of student individual characteristics in determining student academic performance.

The estimated impact effects are reported in table 4.4 below. The estimated gender effect is statistically significant and suggests that being female increases the probability of achieving a 'good' degree classification by just over 9.4 percentage points, on average and *ceteris paribus.* This effect is in contrast with the results presented in the aggregate university-wide analysis, but it could reflect that females perform better in post-1992 universities. We also note that older students perform better than their younger counterparts and 'White' students perform better than other ethnic groups. Students whose household head is in a professional occupation are 9.9 percentage

[137] The fixed effects specification is preferred to a random effects specification in table 4.3 based on the results from a Hausman test. The test statistic overwhelmingly rejects the random effects model in favour of fixed effects: χ^2 (17 df) = 44.69 [*p*-value = 0.000]. Similarly based on a Hausman test the fixed effects specification in table 4.2 is preferable to the random effects estimates, χ^2 (17 df) = 41.19 [*p*-value = 0.000].

points, on average and *ceteris paribus,* more likely to secure a ‘good’ degree than a student whose family head is in a skilled-manual or non-manual occupation suggesting a socio-economic dimension to student performance.

There is further evidence that the higher a student’s pre-entry UCAS points the greater the probability of securing a ‘good’ degree classification. For instance, having three A-grades at A-level increases the probability of gaining a ‘good’ degree classification by 30.1 percentage points, on average and *ceteris paribus,* than a student entering with only two D-grades. We also note that there is evidence of differential grading across schools of study.

Moreover, we note that the estimated coefficients on the academic year dummies increase monotonically and become statistically significant from the academic year 2009. The estimated coefficient on the 2010 year dummy suggests that a student graduating in this particular year is 7.9 percentage points more likely to be awarded a ‘good’ degree than students graduating in 2006, after controlling for student characteristics and school of study. Furthermore, this increase is in line with the 7.2 percentage point national rise in ‘good’ degree reported over the period and lends support to the grade inflation observed using the TRE estimator. This result suggest that grade inflation may have occurred since 2008 in this particular university and supports the previous findings using the TRE and standard random and fixed effects estimators presented above, but it is acknowledged that the increase in the probability of receiving a ‘good’ degree can be due to the other factors as discussed earlier.

It is also noted that using the results presented in table 4.3 the 95% confidence interval for the point estimate on the dummy variable for 2010 using the fixed effects specification is [1.522, 4.576] which suggests a significant difference between the probit estimate and the estimate presented in table 4.3. This is also true for the coefficient estimate on the year dummy for 2009 reported in table 4.3 with an estimated confidence interval [0.430, 2.523] using the fixed effects specification. However, the confidence interval for the coefficient estimate for 2012 from table 4.3 is [4.886, 8.356] which suggests no statistical difference between the coefficient estimates for 2010 using the probit specification and the fixed effects specification.

Table 4.4 Probit Maximum likelihood Estimates for Good Degree Classification

	Impact Effect	
	Coefficient	***Standard error***
Constant	n/a	
Female	0.094***	*0.022*
Age at entry		
21-24	0.091***	*0.017*
25-29	0.098***	*0.031*
30+	0.126***	*0.049*
18-20	*f*	
Ethnicity		
Asian/British Asian	-0.165***	*0.034*
Black/British Black	-0.185***	*0.021*
Mixed race	-0.078***	*0.029*
Other ethnic	-0.156***	*0.032*
Ethnicity unknown or refused	0.045	*0.035*
White	*f*	
Occupational group of H/H head		
Professional/managerial	0.099***	0.015
Semi-skilled/unskilled	-0.017	0.016
Unemployed/retired	-0.151***	0.029
Skilled manual/non-manual	*f*	
Domicile		
UK	0.127***	0.047
Overseas	-0.081	0.051
EU	*f*	
Pre entry qualifications		
161<UCAS points< 260	0.030	0.020
261<UCAS points< 320	0.246***	0.020
UCAS points > 320	0.301***	0.024
Other UK qualification	0.020	0.036
HE Qualification	0.083***	0.027
Non UK qualification	0.181***	0.055
No formal qualification	-0.008	0.046
UCAS points < 160	*f*	
Other Characteristics		
Full time =1	0.067*	0.039
Disability declared	-0.024	0.019
Clearing =1	-0.034	0.027
School of Study		
Architecture and Design	-0.119***	0.009
Arts and Communication	0.039***	0.012
Historical and Critical Studies	-0.024**	0.010
Service Management	-0.088***	0.015
Computing, Mathematical and Information Sciences	-0.163***	0.002
Sport science	-0.159***	0.006
Education	-0.178***	0.013
Languages	-0.004	0.009
Applied Social Science	-0.146***	0.010
Health Professions	-0.038**	0.017
Engineering	-0.014	0.009
Environment	0.044***	0.003
Pharmacy and Biomolecular Sciences	0.010	0.008
Business and finance	*f*	
Year of Graduation		
2010	0.079***	0.030
2009	0.041*	0.023
2008	0.040	0.027
2007	0.026	0.028
2006	*f*	
Psuedo_R^2	0.093	
Loglikelihood	-7098.884	
Observations	11358	

Notes to table:

(a) Standard errors corrected for heteroscedasticity and clustering across academic units.

(b) * significant at 10%; ** significant at 5%; *** significant at 1%

(c) *f* denotes base category in estimation.

4.6 Concluding Remarks

The purpose of this chapter was to examine evidence for the presence (or otherwise) of grade inflation in UK higher education. We employed a true random effects methodology to distinguish between changes in university efficiency from unobserved university heterogeneity. We also employed a standard random and fixed effects estimator to check for robustness. The results reported suggest that the fixed effects specification is preferable to both random effects specifications, given that efficiency seems to have remained relatively stable over the time horizon considered in this analysis. The use of a stochastic frontier specification may therefore be unnecessary in this particular application, and the results from other studies that use such a specification may be more elaborate than required (Johnes and NcNabb, 2002; Johnes and Soo, 2013).

The results confirm some standard findings in the literature. For instance, the importance of pre-entry scores and student region of domicile are found to be important determinants of UK student performance. In the primary analysis using university-wide data we find no statistical evidence that female undergraduates outperform their male counterparts, which may reflect a fall in average female ability and motivation, as more females participate in higher education that are drawn from a wider ability distribution.

We find that as the proportion of students enrolled from state secondary schools and colleges increase the proportion of good degrees awarded falls. This may be a consequence of the policy of 'widening' participation with many more students from secondary schools and colleges, and from low participation areas accessing higher education during the period covered by these data (see chapter 1 for details). This result may also suggest that universities may be failing to cater for a wider range of students that now differ in many respects, in terms of abilities and skills, from students that have traditionally accessed UK higher education, even though spending on student facilities and learning technologies have increased over the past decade (this may also explain why spending on student facilities was found to be significant in the empirical analysis). It may also simply indicate that on average state schooled students are of a lower quality than those admitted from state schools in previous decades. Student satisfaction scores

(lagged one year) and Vice Chancellor tenure were found to have no significant impact on student performance.

Although very few university characteristics were found to be significantly associated with a 'good' degree classification we do find that for any particular graduating cohort the attrition rate in their first year reduces the share of 'good' grades awarded. This effect may be due to high standards being applied in the first year that are maintained over the remaining years of study.

Finally our results from the primary analysis show that grade inflation may have been present in English, Welsh and Northern Irish universities since 2008/09 after controlling for university (technical) efficiency (which remained relatively constant over the sample time frame), university type, university and course characteristics and the characteristics of the graduating cohort. It seems plausible that the observed upward drift in 'good' degree classifications may have been due to changes in the methods of assessment and the result of modularisation of degree programmes (Yorke, 2002; Elton, 1998).

The results from the analysis based on performance data drawn from the University of Brighton suggest that after controlling for a wide variety of student level characteristics there is possible evidence of grade inflation from the academic year 2007/08 onwards reinforcing the nationally based results obtained.

The presence of grade inflation in UK higher education since 2008/09 is in mild agreement with the evidence presented in the limited UK literature on this topic. In one of the two unpublished papers using UK data Johnes and Soo (2013) find some evidence of grade inflation in all UK universities since 2011, but negative grade inflation in preceding years. It is unclear why there should be negative grade inflation and it would seem counterintuitive given the rise in the share of 'good' degrees over the period of their analysis.

Chapter 5

Conclusions

Since the late 1980s the funding of UK higher education became a major focus of public policy debate as student participation rates increased. Public subsidy to students in the form of maintenance grants and 'free' tuition were gradually replaced by maintenance loans and tuition fees. Funding for undergraduate teaching, through the 'block grant,' became formulaic and distributed to institutions in accordance with the number of FTE students they enrol and the nature of undergraduate programmes offered. Along with these changes there has been increasing demand for information on the participation rates of under-represented groups, undergraduate non-continuation rates, and graduate employment rates. During this period of 'mass' higher education VC pay, student debt, and grade inflation (an indication of falling education standards) in UK higher education have received substantial public interest. This thesis has provided an empirical analysis of whether recent public concern over these and related issues have some justification. In particular, we offer new and original evidence of the factors that are associated with VC pay, student debt expectations, and grade inflation, using data drawn from a variety of sources.

The primary analysis undertaken in the second chapter empirically examined the relationship between VC pay and elements of a university's 'mission' and financial performance over an eleven-year period in the UK spanning the academic years 1998/99 to 2008/09. The data employed also allowed the examination of the influence that internal and external pay benchmarks exert on the pay determination process. These variables, it is argued, capture some of the information that remuneration committees utilise when determining VC pay. The results presented confirm some of the findings reported in earlier research on this issue. Moreover, new evidence of a relationship between VC pay and mission-based performance measures was detected and this represents a novel contribution to the literature on the determination of VC pay.

Specifically, the evidence presented reveals that VC pay is linked to widely published performance indicators, including those related to 'widening participation', suggesting that there may be scope in the setting VC pay to introduce incentive pay schemes aligned to these indicators. We also find that VCs are rewarded financially for securing steady financial flows through funding council grants as a possible reward for sound financial management although the responsiveness of VC pay to this variables is fairly inelastic. Overall, these results provide evidence that VCs are not entirely paid like public sector bureaucrats but good management and furthering the institution's mission is rewarded. These results reflect to some extent the predictions from agency theory suggesting that VCs are rewarded according to their managerial performance. It may be the case, therefore, that VC pay is more merited than some of the harsher public criticism suggests. However, there is evidence from the estimated year effects that even after controlling for a rich array of observable and unobservable factors, there has been sizeable annual increases in real VC pay in the more recent years covered by the analysis that are not readily explainable.

The evidence also suggests that the presence of highly paid staff impacts positively on VC pay and confirms the findings from previous research (Dolton and Ma, 2003; Tarbert, *et al.*, 2008). Whether these results provide evidence of 'tournaments' in determining VC pay is difficult to confirm as most VCs are appointed externally. However, it is interesting to note that just over one-fifth of the VCs in the primary analysis reach their position through internal promotion. Of these, 55% VCs were promoted internally in 'new' and 45% in 'old' universities. This may further suggest that 'tournaments' impact positively on VC pay if internal promotion reflects success in a promotional contest.

Remuneration committees may seek to set VC pay commensurate with the pay awards of VCs at comparable institutions in regard to the guidelines set by the Committee of Universities Chairs (2009:27). We find evidence that this is indeed the case and the finding in this regard is congruent with that reported by Tarbert *et al.* (2008). Such pay awards may also represent a signal of comparable quality and assist retention thus reducing the costly process of recruitment. Moreover, comparative pay awards may also be used by the remuneration committee to justify the increase in pay to relevant stakeholders (e.g., lecturer unions, academic staff and students). However, our results

reveal that that the effect is fairly inelastic suggesting that the responsiveness of the remuneration committee to VC pay in other comparable universities is relatively low.

In the additional analysis of chapter two the relationship between VC pay and VC personal characteristics was examined after controlling for university specific characteristics over a fifteen year period from the academic year 1994/95 through 2008/09. The results from this analysis confirm the significance of internal pay structures, external pay benchmark, university size, and institution growth by merger impacting on VC pay. However, only a few VC specific characteristics are found to influence pay. Specifically, after controlling for a variety of university specific characteristics we find some evidence that male VCs are paid more than their female counterparts. Whether this reflects gender discrimination in this labour market is difficult to discern given the small sample of female VCs. There is evidence that certain aspects of VC training (i.e., whether the incumbent was a former VC), and current employment (tenure) impacted positively on VC pay. There was little evidence that a VC's previous work experience influences pay. This is all the more surprising given the drive to appoint a VC with commercial experience. However, there was little evidence of other VC characteristics impacting on pay, and we conjecture that the characteristics examined may be more important in determining employment than pay. The results also confirm the existence of substantial VC pay inflation, particularly since the academic year 1998/99 onwards.

Modelling the relationship between CEO pay and performance in the public sector is not an easy task. Equally the relationship between VC pay and performance is also fraught with difficulties given data constraints not least because it is often difficult to determine what exactly constitutes 'performance' in higher education (e.g., income generation, research/teaching quality, student enrolment), and indeed what elements of performance are legitimately ascribed to VC effort alone. However, if more detailed data on internal university pay structures (such as the pay of professors or other highly paid staff), or if compatible performance data on other aspects of performance not covered in this research (such as teaching and research) becomes available, we may gain more fruitful insights into the pay-performance relationship. This would be a worthwhile avenue for further research in this area.

The analysis of chapter three is focused on the determinants of student expected debt in UK higher education using a sample of Business and Finance students within a single university. We argue that such an approach using data for a single institution has the merit of removing the effects of inter-institution heterogeneity. However, it is acknowledged that some of the results presented may not be generalizable to the broader UK student population. Nevertheless, the quality and richness of the data permit the inclusion of variables that would otherwise be unavailable in national datasets. We believe that the analysis presented offers some stylised facts that are likely to be reflected in most comparable UK institutions, and take the view that the content of our findings potentially has broader implications.

After controlling for a variety of factors the empirical analysis suggests that the receipt of a grant, scholarship, or bursary has no significant effect on reducing student expected indebtedness. This may be indicative of the fact that current levels of financial support are inadequate and ineffective in reducing anticipated debt and resonates with the findings of many recent studies and surveys on student finance and debt. This issue has clear policy implications and suggest that the level of public financial support should be raised to reduce student borrowing and hence debt. Typically students in receipt of public financial support are from lower socio-economic groups. If these students perceive such support as inadequate they may choose not to participate in higher education which may ultimately impact unfavourably on widening participation in UK higher education. This is particularly important at a time when the majority of UK universities increased their tuition fees to £9,000 per annum in the academic year 2012/13. In addition there is evidence that parental financial support reduces student debt on a 1:1 basis. This result may suggest that students from families, who are unable to provide financial support (presumably from lower socio-economic groups), may perceive higher debt than those from better-off families, and may negatively impact on the policy objective of ‘widening participation’ in UK higher education.

There is evidence that students anticipate a high return to their university education in terms of high expected earnings, which in turn contributes to higher expected debt. Whether or not these expectations are to be realised in the future is difficult to discern and may indeed be an overestimate (Jerrim, 2011). Moreover, if wage expectations are unfulfilled, for instance due to unforeseen shocks to the graduate labour market or

simply because students are ill informed on graduate wages and/or job opportunities, then their life choices could be severely compromised (Jerrim, 2011; Callender and Kemp, 2000; Purcell and Elias, 2010). Improving the quality of information on graduate wages and jobs may not only help to match graduates to jobs but may also help to moderate student wage expectations and attenuate graduate debt (Norvilitis, *et al.*, 2003; Novilitis, *et al.*, 2006). Further, we found that students who have a high discount rate and those with a high risk attitude are prone to higher expected debt. This is a novel finding for UK students and supports the findings of Oosterbeck and van de Broek (2009) in their study of the borrowing behaviour of Dutch students. The results presented also confirm the findings from previous research on student debt that a student's gender, participation in term time-work, cohort year, and socio-economic background are associated with student anticipated debt.

Robustness checks were also carried out and the results provide some confidence in the findings reported and the conclusions drawn. It would be interesting to see if these results generalize to other universities and for students on different degree programmes across the UK higher education sector. It would also be interesting to see if these results extend to A-level students contemplating higher education and whether or not their expectation of debt and the debt they actually incur in higher education are correlated. These provide fruitful avenues for further research particularly in the wake of the 2010 Browne Report.

The purpose of the final essay was to examine evidence for the presence or otherwise of grade inflation in UK higher education. A true random effects methodology was employed to distinguish between changes in university efficiency from unobserved university heterogeneity. We also employed a standard random and fixed effects estimator to check for consistency. The results confirm some standard findings in the literature for instance, the importance of pre-entry scores and student region of domicile as important determinants of UK student performance. In the university-wide analysis we find no statistical evidence that female undergraduates outperform their male counterparts, which may reflect a fall in average female ability and motivation, as more females participate in higher education that are drawn from a wider ability distribution.

The results from the primary analysis of chapter four show that grade inflation may have been present in English, Welsh and Northern Irish universities since 2008/09 after controlling for university (technical) efficiency (which remained relatively constant over the sample time frame), university type, university and course characteristics and the characteristics of the graduating cohort. It seems plausible that the observed upward drift in 'good' degree classifications may have been due to changes in the methods of assessment and the result of modularisation of degree programmes (Yorke, 2002; Elton, 1998). If grade inflation is associated with lenient marking (or changes in the curricula and the introduction of new methods of assessment) then it is possible that there may be a conscious effort by UK universities to lower the 'hedonistic' price by lowering standards to attract fee paying students. This may also reflect that the work of the QAA and/or the external examination system that is a central feature of determining degree classifications may not be as effective as it could be and this too may need re-appraising. Our finding may suggest that employers' concern over using UK degree classifications as signals of graduate ability and current government efforts to review or replace the current system of degree classification may not be misplaced. The results from the supplementary confirm some standard findings regarding student performance. Specifically, the evidence presented confirms the importance of a student's age, ethnicity, socio-economic background, pre-entry qualifications and field of study in determining academic performance. Moreover, there is possible evidence of grade inflation from the academic year 2007/08 onwards reinforcing the nationally based results obtained.

The presence of grade inflation in UK higher education since 2008/09 is in mild agreement with the evidence presented in the limited UK literature on this topic. It is acknowledged that the time frame used in this analysis is short, covering only seven recent years, and we were unable to control for important factors in the empirical analysis. These include a detailed description of the learning, teaching, and the assessment strategies employed, at the course level and a description of the individual characteristics of tutors over a longer time frame. The inclusion of these factors in future empirical analyses would be a fruitful area for future research. It would also be interesting, using a longer time frame, to examine the impact that the recent increase in student tuition fees in the UK impacts on university grading in the future. Moreover, it is not clear, in the UK case, how and if the introduction of a grade point average system

would remedy grade inflation. The availability of such suitable data in the future this represents one avenue for future research in this particular area.

References

Abel, P. and Esmail, A. (2008). Performance pay remuneration for consultants in the NHS: is the current system fair and fit for purpose? *Journal of the Royal Society of Medicine*, 99(10):487-493.

Abowd, J. and Bognanno, M. (1995). International differences in executive and managerial compensation. In: R. Freeman and L. Katz, eds. *Differences and Changes in Wage Structure*, pages 67-103. Chicago: University of Chicago Press.

Abowd, J. and Kaplan, D. (1999). Executive compensation: six questions that need answering. *Journal of Economic Perspectives*, 13(4):145-168.

Acharya, V. and Volpin, P. (2010). Corporate governance externalities. *Review of Finance*, 14(1):1-33.

Achen, A. and Courant, P. (2009). What are grades made of? *Journal of Economic Perspectives*, 23(3):77-92.

Aigner, D., Lovell, C. and Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics*, 6(1):21-37.

Aigner, D. and Thum, F. (1986). On student evaluations of teaching ability. *Journal of Economic Education*, 17(4):243-266.

Amemiya, T. (1984). Tobit models: a survey. *Journal of Econometrics*, 24(1):3-36.

Ando, A. and Modigliani, F. (1963). The life-cycle hypothesis of savings. *The American Economic Review*, 53(1):55-84.

Anglin, P. and Meng, R. (2000). Evidence on grade inflation at Ontario's universities. *Canadian Public Policy*, 26(3):361-368.

Arcidiacono, P., Bayer, P. and Hizmo, A. (2010). Beyond signaling and human capital: education and the revelation of ability. *American Economic Journal: Applied Economics*, 2(4): 76-104

Arcidiacono, P., Aucejo, E. and Spenner, K. (2012). What happens after enrollment? An analysis of the time path of racial differences in GPA and major choice. *IZA Journal of Labor Economics*, 1(1):1-24.

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

Arulampalam, W., Gregg, P. and Gregory, M. (2001). Unemployment scarring. *Economic Journal*, 111(475):F577-584.

Astin, A. (1993). *What Matters in College: Four Critical Years Revisited*. San Francisco: Jossey-Bass.

Astin, A. (1995). *Preventing Students from Dropping Out*. San Francisco: Jossey Bass.

Astin, A. (1998). The changing American college student: thirty-year trends, 1966-1996. *The Review of Higher Education*, 21(2):115-135.

Audas, R., Barmby, T. and Treble, J. (2004). Luck, effort, and reward in an organisational hierarchy. *Journal of Labor Economics*, 22(2):375-395.

Bagues, M., Sylos Labini, M. and Zinovyevaz, N. (2008). Differential grading standards and university funding: evidence from Italy. *CESifo Economic Studies*, 54(2), p. 149–176.

Bainbridge, M. and Simpson, C. (1996). Rewards to academia: the remuneration of vice chancellors and principals. *Applied Economics*, 28(6):631-639.

Baker, G., Jensen, M. and Murphy, K. (1988). Compensation and incentives: practice vs. theory. *Journal of Finance*, 43(3):593-616.

Bar, T., Kadiyali, V. and Zussman, A. (2009). Grade information and grade inflation: the Cornell experiment. *Journal of Economic Perspective*, 23(3):93-108.

Barclays Bank (2005). Annual graduate survey, Press Release: April 14.

Bargh, C., Bocock, J., Scott, P. and Smith, D. (2000). University Leadership. *The Role of the Chief Executive*. Milton Keynes: Open University Press.

Barr, N. (1991). Income-contingent student loans: an idea whose time has come. In: J. K. Shaw, ed. *Economics, Culture and Education: Essays in Honour of Mark Blaug*, pages 155-170. Cheltenham: Edward Elgar.

Barr, N. (1993). Alternative funding resources for higher education. *Economic Journal*, 103(418):718-728.

Barr, N. (2004). Higher education funding. *Oxford Review of Economics*, 20(2):264-283.

Barr, N. (2012). *The economics of the welfare state*. 5th ed. Oxford: Oxford University Press.

Barr, N. and Crawford, I. (1998). Funding higher education in an age of expansion. *Education Economics*, 6(1):47-70.

Barrow, M., Reilly, B. and Woodfield, R. (2009). The determinants of undergraduate degree performance: how important is gender? *British Educational Research Journal*, 35(4):575-597.

Bauer, T. and Grave, B. (2011). Performance-related funding of universities: does more competition lead to grade inflation? IZA Discussion Paper no 6073, Bonn:IZA.

Bebchuck, L. and Fried, J. (2003). Executive compensation as an agency problem. *Journal of Economic Perspectives*, 17(2):71-92.

Bebchuck, L. and Fried, J. (2006). Pay without performance: overview of the issues. *Academy of management Perspectives*, 20(1):5-24.

Becker, B. (2006). Wealth, risk aversion and CEO compensation. *Journal of Finance*, 61(1):379-397.

Becker, G. (1993). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. 3rd ed. Chicago: University of Chicago Press.

Bedard, K. (2001). Human capital versus signaling models: university access and high school dropouts. *Journal of Political Economy*, 109(4): 749-775.

Bee, M. and Dolton, P. (1985). Degree class and pass rates: an inter-university comparison. *Higher Education Review*, 17(2):45-52.

Bell, B. and Van Reenen, J. (2011). Firm performance and wages: evidence from across the corporate hierarchy. CEP Discussion Paper no.1088, London: Centre for Economic Performance.

Belotti, F. (2012). Stochastic frontier analysis using Stata. Available at: http://www.econometrics.it/?p=286 [Accessed 23 June 2013].

Belotti, F., Daidone, S., Bardi, G. and Atella, V. (2012). Stochastic frontier analysis using Stata. Research Paper Series 10(12) no. 251, CESI Tor Vergata.

Berthoud, R. and Kempson, E. (1990). Credit and Debt. PSI Report, London: Policy Studies Institute.

Bertrand, M. and Mullainathan, S. (2001a). Are CEOs rewarded for luck? The ones without principals are. *Quarterly Journal of Economics*, 116(3):901-932.

Bertrand, M. and Mullainathan, S. (2001b). Do people mean what they say? Implications for subjective survey data. *American Economic Review*, Papers and Proceedings, 91(2):67-72.

Besley, T. and Machin, S. (2008). Are public sector CEOs different? Leadership wages and performance in schools. *Mimeo*: London School of Economics.

Betti, G., Dourmashkin, N., Rossi, M, and Yin, Y. (2007). Consumer over-indebtedness in the EU: measurement and characteristics. *Journal of Economic Studies*, 34(2):136-156.

Betts, J. R. (1996). What do students know about wages? Evidence from a survey of undergraduates. *Journal of Human Resources*, 31(3):27-56.

Blanchard, O., Lopez-de-Silanes, F. and Shleifer, A. (1994). What do firms do with cash windfalls? *Journal of Finance and Economics*, 36(3):337-360.

Blanden, J. and Machin, S. (2004). Educational inequality and the expansion of UK higher education. *Scottish Journal of Political Economy*, 51(2):230-249.

Blanden, J. and Machin, S. (2007). *Recent changes in intergenerational mobility in Britain*. London: Sutton Trust.

Blundell, R., Dearden, L., Goodman, A. and Reed, H. (2000). The returns to higher education in Britain: Evidence from a British cohort. *Economic Journal*, 110(461):F82-F89.

Bognanno, M. (2001). Corporate tournaments. *Journal of Labor Economics*, 19(2):290-315.

Bolton, P. (2009). Student and graduate debt statistics, SN/SG/1327, London: House of Commons Library.

Booji, A., Leuven, E. and Oosterbeek, H. (2012). The role of information in the take-up of student loans. *Economics of Education Review*, 31(1):33-44.

Booth, A. and Nolan, P. (2012). Gender differences in risk behaviour: does nurture matter? *Economic Journal*, 122(558):F56-F78.

Bratti, M. (2002). Does the choice of university matter? A study of the differences across UK universities in life sciences students' degree performance. *Economics of Education Review*, 21(5):431-443.

Bratti, M., Naylor, R. and Smith, J. (2008). Heterogeneities in the returns to degrees: evidence from the British cohort study 1970. *Mimeo*, Department of Economics, University of Warwick, UK.

Breakwell, G. and Tytherleigh, M. (2008). UK university leaders at the turn of the 21st century: changing patterns in their socio-demographic characteristics. *Higher Education*, 56(1):109-127.

Brennan, J., Duaso, A., Little, B., Callender, C. and Van Dyke, R. (2005). *Survey of higher education students' attitudes to debt and term-time working and their impact on attainment*. Bristol: Higher Education Funding Council for England.

Bridges, S. and Disney, R. (2004). Use of credit and arrears on debt among low-income families in the United Kingdom. *Fiscal Studies*, 25(1):1-25.

Brown, S. and Sessions, J. (2004). Signalling and screening. In: G. Johnes and J. Johnes, eds. *International Handbook on the Economics of Education*, pages 58-100. Cheltenham: Edward Elgar.

Brown, S., Dickerson, A., McHardy, J. and Taylor, K. (2010). Gambling and the use of credit: an individual and household level analysis. IZA Discussion Paper no. 947, Bonn: IZA.

Brown, S., Garino, G., Taylor, K. and Weatley Price, S. (2005a). Debt and financial expectations: An individual- and household-level analysis. *Economic Enquiry*, 43(1):100-120.

Brown, S., Garino, G. and Taylor, K. (2013). Debt and risk preference: a household level analysis. *Review of Income and Wealth,* **59**(2):283-304.

Brown, S., Taylor, K. and Wheatly Price, S. (2005b). Debt and distress: evaluation the psychological cost of credit. *Journal of Economic Psychology*, 26(5):642-663.

Browne, J. (2010). Securing a sustainable future for higher education: an independent review of higher education funding and student finance, London: Department for Business Innovation and Skills.

Bruce, A., Buck, T. and Main, G. (2006). Top executive remuneration: a view from Europe. *Journal of Management Studies*, 42(7):1494-1506.

Brunello, G., Lucifora, C. and Winter-Ebmer, R. (2004). The wage expectations of European Business and Economics students. *Journal of Human Resources*, 39(4): 1116-1142.

Buck, T., Bruce, A., Main, G. and Udueni, H. (2003). Long term incentive plans, executive pay and UK company performance. *Journal of Management Studies*, 40(7):1709-1727.

Burgess, S., Croxson, B., Gregg, P. and Propper, C. (2001). The intricacies of the relationship between pay and performance for teachers: do teachers respond to performance related pay schemes? CMPO Working Paper Series no. 01/3, University of Bristol: Centre for Market and Public Organisation.

Burgess, S. and Metcalfe, P. (1999a). The use of incentive schemes in the public and private sectors: evidence from British establishments. CMPO Working Paper Series no. 99/015, University of Bristol: Centre for Market and Public Organisation.

Burgess, S. and Metcalfe, P. (1999b). Incentives in organisations: a selective overview of the literature with application to the public sector. CMPO Working Paper Series no. 99/016, University of Bristol: Centre for Market and Public Organisation.

Burgess, S., Prentice, G. and Propper, C. (2007). Performance Pay in the Public Sector: a review of the issues and evidence. Available at: http://wwwomeukcom/downloads/Performance%20pay%20in%20the%20Public%20Sector%20A%20review%20of%20th [Accessed 14 Ferbruary 2009].

Burgess, S., Propper, C., Ratto, M. and Tominey, E. (2004). Incentives in public sector: evidence from a government agency. CMPO Working Paper Series no. 04/103, University of Bristol: Centre for Market and Public Organisation.

Burgess, S, Propper, C. and Wilson, D. (2002). Does performance monitoring work? a review of evidence from the UK public sector excluding health care. CMPO Working Paper Series no. 02/49, University of Bristol: Centre for Market and Public Organisation.

Callender, C. (2003). Attitudes to debt: school leavers' and further education students' attitude to debt and their impact on participation in higher education. London: Universities UK.

Callender, C. (2008). The impact of term-time employment on higher education students' academic attainment and achievement. *Journal of Education Policy*, 23(4):359-377.

Callender, C. and Jackson, J. (2005). Does fear of debt deter students from higher education? *Journal of Social Policy*, 34(4):509-540.

Callender, C. and Kemp, M. (2000). Changing student finances: income, expenditure and take-up of student loans among full- and part-time higher education students in 1998/9. London: Department of Education and Skills.

Callender, C. and Willkinson, D. (2003). 2002/03 student income and expenditure survey: students' income, expenditure and debt and changes since 1998. Nottingham: Department of Education and Skills.

Cameron, S. and Golby, D. (1990). An economic analysis of personal debt. *Bulletin of Economic Research*, 42(3):241-247.

Chan, W. (1996). External recruitment versus internal promotion. *Journal of Labour Economics*, 14(4):555-570.

Chan, W., Hao, L. and Suen, W. (2007). A signaling theory of grade inflation. *International Economic Review*, 48(3):1065-1090

Chapman, B. and Lounkaewa, K. (2010). Repayment Burdens with US College Loans. Centre for Economic Policy Research, Discussion Paper no.647, Canberra: Australian National University

Chapman, B. and Sinning, M. (2011). Student loan reforms for German higher education: financing tuition fees. IZA Discussion Paper no.5532, Bonn: IZA.

Chapman, K. (1996). Entry qualifications, degree results and value added in UK universities. *Oxford Review of Education*, 22(3):251-264.

Chen, J., Ezzamel, M. and Cai, Z. (2011). Managerial power theory, tournament theory, and executive pay in China. *Journal of Corporate Finance*, 17(4):1179-1199.

Chevalier, A., Gibbons, S., Thorpe, A., Snell, M. and Hoskins, S. (2009). Students' academic self-perception. *Economics of Education Review*, 28(6), p. 716–727.

Chevalier , A., Harmon, C., Walker, I. and Zhu, Y. (2004). Does Education raise productivity or just reflect it? *Economic Journal.* 114(499): F499-F517.

Chowdry, H., Dearden, L., Jin, W. and Lloyd, B. (2012). Fees and student support under the new higher education funding regime: what are different universities doing? Briefing Note BN134, London: Institute of Fiscal Studies.

Christie, H., Munro, M. and Rettig, H. (2001). Making ends meet: student incomes and debt. *Studies in Higher Education*, 26(3):363-383.

Ciscel, D. and Carroll, T. (1980). The determinants of executive salaries: an econometric survey. *Review of Economics and Statistics*, 62(1):7-13.

Citizen's Advice Bureau (2006). Deeper in debt: the profile of CAB debt clients. Available at: http://www.citizensadvice.org.uk/bf_consumer_deeper_in_debt [Accessed 24 February 2013].

Clark, A., Kristensen, N. and Westergard-Nielsen, N. (2009). Job satisfaction and co-worker wages: status or signal. *Economic Journal*, 119(536):430-447.

Clark, D. and Riis, C. (1998). Contests with more than one prize. *American Economic Review*, 88(1):276-289.

Cohen, H. (1984). Inflated grades, deflated courses: how insecurity induced compromise. *Change*, 16(4):8-10.

College Board (2011). Trends in student aid. [Available at: http://trends.collegeboard.org/downloads/Student_Aid_2011.pdf [Accessed 17 September 2012].

Coller, M. and Williams, M. (1999). Eliciting individual discount rates. *Experimental Economics*, 2(2):107-127.

Committee of University Chairmen (2002). Guide for members of governing bodies of universities and colleges in England, Wales and Northern Ireland. Bristol: HEFC.

Committee of University Chairmen (2004). Guide for members of higher education governing bodies in the UK. Bristol: HEFCE.

Committee of University Chairs (2009). Guide for members of higher education governing bodies in the UK: Governance code of practice and general principles. Bristol: HEFCE.

Connor, H., Dewson, S., Tyers, C., Eccles, J., Regan, J. and Aston J. (2001). Social class and higher education: issues affecting decisions on participation by lower social class groups. London: Department for Education and Employment.

Conyon, M. (1997). Corporate governance and executive compensation. *International Journal of Industrial Organisations*, 15(4):493-510.

Conyon, M. (2006). Executive compensation and incentives. *Academy of Management Perspectives*, 20(1):25-44.

Conyon, M., Gregg, P. and Machin, S. (1995). Taking care of business: executive compensation in the United Kingdom. *Economic Journal*, 105(430):704-714.

Conyon, M. and Leech, D. (1994). Top pay company performance and corporate governance. *Oxford Bulletin of Economics and Statistics*, 56(3):229-247.

Conyon, M. and Murphy, K. (2000). The prince and the pauper? CEO pay in the United States and the United Kingdom. *Economic Journal*, 110(467):F640-F671.

Conyon, M., Peck, S., Read, L. and Sadler, G. (2000a). The structure of executive compensation contracts: UK evidence. *Long Range Planning*, 33(4):478-503.

Conyon, M., Peck, S. and Sadler, G. (2000b). Corporate tournaments and executive compensation: evidence from the UK. *Strategic Management*, 22(8):805-815.

Conyon, M. and Schwalbach, J. (1999). Corporate governance, executive pay and performance in Europe. In: J. Carpenter and D. Yermack, eds. *Executive Compensation and Shareholder Value: Theory and Evidence*, pages 13-34. Dordrecht: Kluwer Academic Press.

Conyon, M. and Schwalbach, J. (2000). Executive compensation: evidence from the UK and Germany. *Long Range Planning*, 33(4):504–526.

Core, J., Holthausen, R. and Larcker, D. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics*, 51(3):371-406.

Cornell, B. (2004). Compensation and recruiting: private universities versus private corporations. *Journal of Corporate Finance*, 10(1):37-52.

Correa, H. (2001). A game theoretic analysis of faculty competition and academic standards. *Higher Education Policy*, 14(2):175-182.

Cosh, A. (1975). The remuneration of chief executives in the United Kingdom. *Economic Journal*, 85(337):75-94.

Costrell, R. (1994). A simple model of educational standards. *American Economic Review*, 84(4):956-971.

Coupe, T., Smeets, V. and Warzynski, F. (2003). Incentives in economics departments: testing tournaments? Department of Economics, Aarhus School of Business, Working Paper no. 03-25: Denmark.

Cox, D. and Jappelli, T. (1993). The effects of borrowing constraints on consumer liabilities. *Journal of Money, Credit and Banking*, 25(2):197-213.

Crawford, C. (2014). The link between secondary school characteristics and university participation and outcomes. Research Report 353, Department for Education. London: Centre for Analysis of Youth Transitions.

Crawford, C. (2012). Socio-economic gaps in HE participation :how have they changed over time? IFS, Briefing Note 133, London: Institute of Fiscal Studies.

Crook, J. (2001). The demand for household debt in the USA: evidence from the 1995 survey of consumer finance. *Applied Financial Economics*, 11(1):83-91.

Croxson, B. and Atkinson, A. (2001). Incentives in secondary schools: the impact of the performance threshold. CMPO, Working Paper Series no. 01/45, University of Bristol: Centre for Market and Public Organisation

Croxson, B., Propper, C. and Perkins, A. (2001). Do doctors response to financial incentives? UK family doctors and the GP fundholder scheme. *Journal of Public Economics*, 79(2):375-398.

Crystal, G. (1991). *In Search of Excess: The Overcompensation of American Executives*. New York: Norton.

Cyert, R. (1975). Management of nonprofit organisations: with emphasis on universities. In: R. Cyert, ed. *The Management of Nonprofit Organisations*, pages 7-32, Lexington: Lexington Books.

Cyert, R. and March, J. (1992). *Behavioural Theory of the Firm*. 2 ed. Oxford: Blackwell.

D'Alessio, G. and Iezzi, S. (2012). Household over-indebtedness, definitions and measurement with Italian data. Paper presented at the 6th IFC conference 28-29 August 2013, Basel.

Das, M. and van Soest, A. (1999). A panel data model for subjective information on household income growth. *Journal of Economic Behaviour and Organisation*, 40(4):409-426.

Davies, E. and Lea, S. (1995). Student attitudes to student debt. *Journal of Economic Psychology*, 16(4), p. 663–679.

Davies, R. and Elias, P. (2003). Dropping out: a study of early leavers from higher education, London: Department for Education and Skills.

De Vita, G. (2002). Cultural equivalence in the assessment of home and international business management students. *Studies in Higher Education*, 27(2): 221–231.

Dearden, L., Goodman, A. and Wyness, G. (2012). Higher education finance. *Fiscal Studies*, 33(1):73-105.

Dearing, R. (1997). National Committee of Inquiry into Higher Education. London: HMSO.

Department for Education and Skills (2003a). The Future of Higher Education. London: HMSO.

Department for Education and Skills (2003b). Student loans and debt. London: Department for Education and Skills.

Department for Innovation, Universities, and Skills (2012). Participation rates in higher education: Academic years 2006/07 - 2010/2011. Available at: http://www.bis.gov.uk/assets/biscore/statistics/docs/h/12-p140-participation-rates-in-he-2010-11[Accessed 20 06 2012].

Department of Education and Science (1985). The Development of Higher Education into the 1990s. cmnd: 9524.

Devaro, J. (2006). Strategic promotion tournaments and worker performance. *Strategic Management*, 27(8):721-740.

Dickson, V. (1984). An economic model of faculty grading practices. *Journal of Economic Education*, 15(3):197-203.

Dilts, D. (1980). A statistical interpretation of student evaluation feedback. *Journal of Economic Education*, 11(2):10-15.

Ding, X., Hartog, J. and Sun, Y. (2010). Can we measure individual risk attitudes in a survey? IZA Discussion Paper no.4807, Bonn: IZA.

Disney, R., Bridges, S. and Gathergood, J. (2008). Drivers of over-indebtedness, Centre for Policy Evaluation: University of Nottingham.

Dixit, A. (1997). Power of incentive in private vs public organisations. *American Economic Review*, 87(2):378-382.

Dixit, A. (2002). Incentives and organizations in the public sector. *Journal of Human Resources*, 37(4):696-727.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. and Wagner, G. (2005). Individual risk attitudes: new evidence from a large, representative, experimentally-validated survey. IZA Discussion Paper no. 1730, Bonn: IZA.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. and Wagner, G. (2011). Individual risk attitudes: measurement, determinants and behavioural consequences. *Journal of the European Economic Association*, 9(3):522-550.

Dolton, P., Greenaway, D. and Vignoles, A. (1997). Whither higher education? An economic perspective for the Dearing committee of inquiry. *Economic Journal*, 101(442):710-726.

Dolton, P. and Lin, L. (2011). From grants to loans and fees: the demand for post-compulsory education in England and Wales from 1955 to 2008. CEP Discussion Paper no.127, London: Centre for Economic Performance.

Dolton, P. and Ma, A. (2003). CEO pay in the public sector: the case of vice chancellors in UK universities. Discussion Papers in Economics, Newcastle University: UK.

Dolton, P. and Makepeace, G. (1982). University topography: a contemporary analysis. *Higher Education Review*, 13(3):33-47.

Dominitz, J. (1998). Earnings expectations, revisions and realizations. *Review of Economics and Statistics*, 80(3):374-388.

Dominitz, J. and Manski, C. (1996). Eliciting student expectations of the returns to schooling. *Journal of Human Resources*, 31(1):1-26.

Dominitz, J. and Manski, C. (1997). Using expectations data to study subjective income expectations. *Journal of the American Statistical Association*, 92:855-867.

Donkers, B. and van Soest, A. (1999). Subjective measures of household preferences and financial decisions. *Journal of Economic Psychology*, 20(6):613-642.

Drakeford, M. and Gregory, L. (2008). Anti-poverty practice and the changing world of credit unions: new tools for social workers. *Practice: Social Work in Action*, 20(3):141-150.

Drakeford, M. and Sachdev, D. (2001). Financial exclusion and debt redemption. *Critical Social Policy*, 21(2):209-230.

Eckel, C., Johnson, C., Montmarquette, C. and Rojas C. (2007). Debt aversion and the demand for loans for post-secondary education. *Public Finance Review*, 35(2): 233-262.

Efendi, J., Srivastava, A. and Swanson, E. (2007). Why do corporate managers misstate financial statements? The role of option compensation and other factors. *Journal of Financial Economics*, 85(3):667-708.

Ehrenberg, R. (2003). Studying ourselves: the academic labor market. *Journal of Labor Economics*, 21(2):267-287.

Ehrenberg, R. (2010). Analyzing the factors that influence persistence rates in STEM field majors: introduction to the symposium. *Economics of Education Review*, 29(6): 888–891.

Ehrenberg, R. and Bognanno, M. (1990). The incentive effects of tournaments revisited: evidence from the European PGA tour. *Industrial and Labor Relations Review*, 43(3):74-88.

Ehrenberg, R., Cheslock, J. and Epifantseva, J. (2001). Paying our presidents: what do trustees value? *Review of Higher Education*, 25(1):15-37.

Elton, L. (1998). Are UK degree standards going up, down or sideways? *Studies in Higher Education*, 23(1):35-42.

Elton, L. (2004). Should classification of the UK honours degree have a future? *Assessment and Evaluation in Higher Education*, 29(4):415-422.

Eriksson, T. (1999). Executive compensation and tournament theory: empirical tests on Danish data. *Journal of Labor Economics*, 17(2):262–280.

Ewing, A. (2012). Estimating the impact of relative expected grade on student evaluations of teachers. *Economics of Education Review*, 31(1):141– 154.

Ezzamel, M. and Watson, R. (1998). Market comparison earnings and the bidding-up of executive cash compensation: evidence from the UK. *Academy of Management Journal*, 41(2):221-231.

Ezzamel, M. and Watson, R. (2002). Pay comparability across and within UK boards: an empirical analysis of the cash pay awards to CEO and other board members. *Journal of Management Studies*, 39(2):207-232.

Farnham, D. and Jones, J. (1998). Who are the vice chancellors and principals in the UK? An analysis of their professional and social backgrounds 1990-1997. *Higher Education Review*, 30(3):42-58.

Farrell, M. (1957). The measurement of production efficiency. *Journal of the Royal Statistical Society* (*series A*), 210(3):253-281.

Finegold, D. (2006). The roles of higher education in a knowledge economy. *Mimeo*, Rutgars University.

Forbes, W. and Watson, R. (1993). Managerial remuneration and corporate governance: a review of the issues evidence and the Cadbury committees proposals. *Accounting and Business Research*, 23(1):331-38.

Ford, J., Bosworth, D. and Wilson, R. (1995). Part-time work and full-time higher education. *Studies in Higher Education*, 20(2):187-202.

Førsund, F., Lovell, C. and Schmidt, P. (1980). A survey of frontier production functions and their relationship to efficiency measurement. *Journal of Econometrics*, 13(1):5-25.

Forsyth, A. and Furlong, A. (2003). Access to higher education and disadvantaged young people. *British Educational Research Journal*, 29(2):205-225.

Frederick, S., Loewenstein, G, and O'Donoghue, T. (2002). Time discounting and time preference: a critical review. *Journal of Economic Literature*, 40(2):350-401.

Freeman, D. (1999). Grade divergence as a market outcome. *Journal of Economic Education*, 30(4):344-351.

Friedman, M. and Friedman, R. (1980). *Free to Choose*. London: Penguin.

Frydman, C. and Jenter, D. (2010). CEO compensation. *Annual Review of Financial Economics*, 2:75-102.

Fulton, O. (1991). Slouching towards a mass system: society, government and institutions in the United Kingdom. *Higher Education*, 21(4):589-605.

Gabaix, X. and Landier, A. (2008). Why has CEO pay increased so much? *Quarterly Journal of Economics*, 123(1):49-100.

Gibbs, G. and Lucas, L. (1997). Coursework assessment, class size and student performance: 1984-94. *Journal of Further and Higher Education*, 21(2):183-192.

Giddens, A. (1974). Elites in the British class structure. In: P. Stanworth and A. Giddens, eds. *Elites and Power in British Society*. Cambridge: Cambridge University Press.

Ginther, D. and Khan, S. (2004). Women in economics: moving up or falling off the academic career ladder? *Journal of Economic Perspectives*, 18(3), p. 193–214.

Girma, S., Thompson, S. and Wright, P. (2007). Corporate governance reforms and executive compensation determination: evidence from the UK. *The Manchester School*, 75(1):65–81.

Glennerster, H. (1991). Quasi-markets for education. *Economic Journal*, 101(408):1268-76.

Glennerster, H., Merrett, S. and Wilson, G. (1968). A graduate tax. *Higher Education Review*, 1(1):26-38.

Goodall, A. (2006). Should top universities be led by top researcher and are they? A citation analysis. *Journal of Documentation*, 62(3):388-411.

Gose, B. (1997). Efforts to curb grade inflation get an F from many critics. *Chronicle of Higher Education*, 43(46):41-42.

Greenaway, D. and Haynes, M. (2003). Funding higher eduation in the UK: the role of fees and loans. *Economic Journal*, 113(485):F150-F166.

Greene, L. (1989). An economic analysis of student loan default. *Education Evaluation and Policy Analysis*, 11(1):61-68.

Greene, W. (1999). Marginal effects in the censored regression model. *Economics Letters*, 64(1):43-49.

Greene, W. (2005). Fixed and random effects in stochastic frontier models. *Journal of Productivity Analysis*, 23(1):7-32.

Greene, W. (2008). *Econometric Analysis*. 6 ed. New Jersey: Pearson Education.

Gregg, P., Jewell, S. and Tonks, T. (2010). Executive pay and performance in the UK. AXA Paper 5, FMG Discussion Paper no. 657, London School of Economics.

Gregg, P., Machin, S. and Szymanski, S. (1993). The disappearing relationship between directors pay and corporate performance. *British Journal of Industrial Relations*, 31(1):1-10.

Gregg, P. and Tominey, E. (2004). The wage scar from youth unemployment. CMPO Working Paper Series no. 04/097, University of Bristol: Centre for Market and Public Organisations.

Gross, D. and Souleles, N. (2002). Do liquidity constraints and interest rates matter for consumer behaviour? Evidence from credit card data. *Quarterly Journal of Economics*, 177(1):149-185.

Guiso, L., Jappelli, T. and Terlizzese, D. (1992). Earnings uncertainty and precautionary savings. *Journal of Monetary Economics*, 30(2):307-337.

Guiso, L., Jappelli, T. and Terlizzese, D. (1996). Income risk, borrowing constraints and portfolio choice. *American Economic Review*, 86(1):158-172.

Haas, O. (2006). Over-indebtedness in Germany. Working paper 44, ILO: Geneva.

Hall, B. and Lieberman, J. (1998). Are CEOs really paid like bureaucrats? *Quarterly Journal of Economics*, 113(3):653-691.

Hallock, K. (2002). Managerial pay and governance in American nonprofits. *Industrial Relations*, 41(3):377- 406.

Hanushek, E. (1979). Conceptual and empirical issues in the estimation of educational production functions. *Journal of Human Resources*, 14(3):352-388.

Harkness, S. and Machin, S. (1999). Graduate earnings in Britain, 1974-95, London: Department for Education and Employment.

Harrison, G., Lau, M., Ruststrom, E. and Sullivan, M. (2005). Eliciting risk and time preferences using field experiments: some methodological issues. In: J. Carpenter, G. Harrison and J. Lists, eds. *Field Experiments in Economics* (Vol. 10), pages 125-218. Greenwich, CT: JAI Press.

Harrison, G., Lau, M. and Williams, M. (2002). Estimating individual discount rates in Denmark: A field experiment. *American Economic Review*, 92(5):1606-1617.

Healy, P. (2001). Harvard figures show most of its grades are A's or B's. Boston Globe, 21 November.

HEFCE (2014). *Differences in Degree Outcomes: Key Findings*. Issues Paper no. 2014/03.

Higher Education Academy (2013). HEA project to initiate a national debate on degree classifications. Available at: http://www.heacademy.ac.uk/alldisplay?type=newsandnewid=2013/degree_classification_GPAandsite=york [Accessed 28 September 2013].

Higher Education Funding Council for England (2010). Guide to funding. How HEFCE allocates its funds. Available at: http://www.hefce.ac.uk/pubs/year/2010/201024/ [Accessed 24 October 2012].

Higher Education Statistical Agency (a) (various years). Students in Higher Education Institutions, Reference Volume (1994/5-2010/11), Cheltenham: HESA.

Higher Education Statistical Agency (b) (various years). Resources of Higher Education Institutions, Reference Volume (1994/5-2010/11), Cheltenham: HESA.

Higher Education Statistical Agency (2012). Headline statistics. Available at: http://www.hesa.ac.uk [Accessed 12 October 2012].

HM Treasury (2012). Public expenditure statistical analysis, London: HMSO.

Holden, R. (2005). The original management incentive schemes. *Journal of Economic Perspectives*, 19(4):134-144.

Holmstrom, B. (1979). Moral hazard and observability. *Bell Journal of Economics*, 10(1):74-91.

Holmstrom, B. and Milgrom, P. (1988). Common agency and exclusive dealing. *Mimeo*, Department of Economics, MIT: Cambridge, MA.

Humphrey, R. (2006). Pulling structured inequality into higher education: the impact of part-time working on English university students. *Higher Education Quarterly*, 60(3):270-286.

Hutton, W. (2011). Hutton review of fair pay in the public sector: final report, London: HM Treasury.

Iannelli, C. and Huang, J. (2013). Trends in participation and attainment of Chinese students in UK higher education. *Studies in Higher Education*, Available On line, DOI:(:10.1080/03075079.2012.754863):1-18.

Isely, P. and Singh, H. (2005). Do higher grades lead to favourable student evaluations? *Journal of Economic Education*, 36(1):29-42.

Jappelli, T. (1990). Who is credit constrained in the US economy? *Quarterly Journal of Economics*, 105(1):219-234.

Jappelli, T. and Pistaferri, L. (2000). Using subjective income expectations to test for excess sensitivity of consumption to predicted income growth. *European Economic Review*, 44(2):337-358.

Jarret (1985). Report of the steering committee for efficiency studies in universities, London: CVCP.

Jensen, M. and Murphy, K. (1990). Performance pay and top management incentives. *Journal of Political Economy*, 98(2):225-264.

Jensen, M., Murphy, K. and Wruck, E. (2004). Remuneration: where we've been how we got to here what are the problems and how to fix them. Harvard NOM, Working Paper no. 04-28: Cambridge, MA.

Jensen, M. and Zimmerman, J. (1985). Management compensation and the managerial labor market. *Journal of Accounting and Economics*, 7(1):3-9.

Jerrim, J. (2011). Do UK higher education students overestimate their starting salary? *Fiscal Studies*, 32(4):483-509.

Jewell, R. and McPherson, M. (2012). Instructor-specific grade inflation: incentives, gender, and ethnicity. *Social Science Quarterly*, 93(1):95-109.

Johnes, G. (1993). *The Economics of Education*. London: MacMillan.

Johnes, G. (1998). Human capital versus sorting: new data and new tests. *Applied Economics Letters*, 5(2):85-88.

Johnes, G. (2004). Standards and grade inflation. In: G. Johnes and J. Johnes, eds. *International Handbook on the Economics of Education*, pages 462-483. Cheltenham: Edward Elgar.

Johnes, G. and NcNabb, R. (2002). Academic standards in UK universities: more for less or less for more? Paper presented in the Royal Economic Society Conference, 27 March.

Johnes, G. and Soo, K. (2013). Grades across universities over time. *Mimeo*, Lancaster *University School of Management*.

Johnes, G. and Taylor, J. (1989). Undergraduate non-completion rates: differences between UK universities. *Higher Education*, 18(2):209-225.

Johnes, J. (1990). Determinants of student wastage in higher education. *Studies in Higher Education*, 15(1):87-99.

Johnes, J. and Taylor, J. (1987). Degree quality: an investigation into differences between UK universities. *Higher Education*, 16(5):581-602.

Johnes, J. and Taylor, J. (1990). *Performance Indicators in Higher Education.* Buckingham: Open University Press.

Johnson, C., Pollard, E., Hunt, W., Munro, M., Hillage, J., Parfement, J. and Low, N. (2009). Student income and expenditure survey 2007/08 English-domiciled students, London: Department for Innovation, Universities, and Skills.

Johnson, M., Porter, S, and Shackell-Dowell, M. (1997). Stakeholder pressure and the structure of executive compensation. Available at: http://ssrncom/abstract=41780 or DOI: 102139/ssrn41780 [Accessed 24 June 2008].

Johnston, B. (2000). Student loans in international perspective: promises and failures, myths and partial truths. The International Comparative Higher Education Finance and Accessibility Project, Centre for Comparative and Global Studies in Education, Graduate School of Education: Buffalo, New York State University. Available at:http://www.tc.columbia.edu/centers/coce/pdf_files/studentloaninternatfinal.pdf.

Jondrow, J., Lovell, K., Materou, I. and Schmidt, P. (1982). On the estimation of technical efficiency in the stochastic frontier production function model. *Journal of Econometrics*, 19(2-3):233-238.

Kalenkoski, C. and Pabilonia, S. (2010). Parental transfers, student achievement, and the labor supply of college students. *Journal of Population Economics*, 23(2):469-496.

Kaplan, N. (1994). Top executive rewards and firm performance: a comparison of Japan and the United States. *Journal of Political Economy*, 102(3):510-546.

Kau, J. and Rubin, P., 1976. Measurement techniques, grades. *Journal of Economic Education*, 8(1), p. 59–62.

Keese, M. (2012). Who feels constrained by high debt burdens? Subjective vs. objective measures of household debt. *Journal of Economic Psychology*, 33(1):125-141.

Kempson, E. (2002). Over-indebtedness in Britain. A Report to the Department of Trade and Industry: available at http://www.berr.gov.uk/files/file38667.pdf.

Kempson, E., McKay, S. and Willetts, M. (2004). Characteristics of families in debt and the nature of indebtedness, DWP Research Report 211, Leeds: Department of Work and Pensions.

Knoeber, R. and Thurman, W. (1994). Testing the theory of tournaments: an empirical analysis of broiler production. *Journal of Labor Economics*, 12(2):155-179.

Knowles, J. (2000). Access for few? Student funding and its impact on aspirations to enter higher education. *Widening Participation and Lifelong Learning*, 2(1):14-23.

Kolevzon, M. (1981). Grade inflation in higher education: a comparative study. *Research in Higher Education*, 15(3):195-212.

Krautmann, A. and Sander, W. (1999). Grades and student evaluations of teachers. *Economics of Education Review*, 18(1):59-63.

Kuh, G, and Hu, S. (1999). Unraveling the complexity of the increase in college grades from the mid-1980s to the mid-1990s. *Educational Evaluation and Policy Analysis*, 21(3):279-320.

Kuhnen, C. and Niessen, A. (2012). Public opinion and executive compensation. *Management Science*, 58(7):1249-1272.

Kumbhakar, S. and Lovell, C. (2000). *Stochastic Frontier Analysis*. Cambridge: Cambridge University Press.

Langbein, L. (2008). Management by results: student evaluation of faculty teaching and the mis-measurement of performance. *Economics of Education Review*, 27(4):417-428.

Lange, C. and Byrd, M. (1998). The relationship between perceptions of financial distress and feelings of psychological well-being in New Zealand university students. *International Journal of Adolescence and Youth*, 7(3):193-209.

Layard, R. and Psacharopoulos, G. (1974). The screening hypothesis and the returns to education. *Journal of Political Economy*, 82(5): 985-998.

Lazear, E. (1989). Pay equality and industrial politics. *Journal of Political Economy*, 97(3):561-580.

Lazear, E. and Rosen, S. (1981). Rank-order tournaments as optimal labor contracts. *Journal of Political Economy*, 89(5):841-864.

Lea, S., Webley, P. and Levine, R. (1993). The economic psychology of consumer debt. *Journal of Economic Psychology*, 14(1):85-119.

Lea, S., Webley, P. and Walker, C. (1995). Psychological factors in consumer debt: money management, economic socialization and credit use. *Journal of Economic Psychology*, 16(4):681-701.

Leslie, D. (2005). Why people from the UK's minority ethnic communities achieve weaker degree results than whites. *Applied Economics*, 37(6):619-632.

Lindeboom, M. and Van Doorslaer, E. (2004). Cut-point shift and index shift in self-reported health. *Journal of Health Economics*, 23(6):1083-1099.

Lindley, J. and Machin, S. (2012). The quest for more and more education: implications for social mobility. *Fiscal Studies*, 33(2):265-286.

Livingstone, S. and Lunt, P. (1992). Predicting personal debt and debt repayment: psychological, social and economic determinants. *Journal of Economic Psychology*, 13(1):111-134.

Love, D. and Kotchen, M. (2010). Grades, course evaluations, and academic incentives. *Eastern Economic Journal*, 36(2):151 – 163.

Macfarlane, B. (1992). The 'Thatcherite' generation and university degree results. *Journal of Further and Higher Education*, 16(2):60-70.

Machin, S. and Vignoles, A. (2004). Educational inequality: the widening socioeconomic gap. *Fiscal Studies*, 25(2):107–128.

Magri, S. (2007). Italian household debt: the participation to the market and the size of the loan. *Empirical Economics*, 33(3):401-426.

Main, B., Bruce, A. and Buck, T. (1996). Total board remuneration and company performance. *Economic Journal*, 106(439):1627-1644.

Main, B. and Johnston, J. (1993). Remuneration committees and corporate governance. *Accounting and Business Research*, 23(1):351-362.

Main, B., O'Reilly, C. and Crystal, G. (1994). Over here and over there: a comparison of top executive pay in the UK and USA. *Contributions to Labour Studies*, 4 :115-127.

Main, B., O'Reilly, C. and Wade, J. (1993). Top executive pay: tournament or teamwork? *Journal of Labor Economics*, 11(4):606-628.

Makepeace, E. and Baxter, A. (1990). Overseas students and examination failure: a national study. *Journal of International Education*, 1(1):36-48.

Marginson, S. (1995). The decline in the standing of educational credentials in Australia. *Australian Journal of Education*, 39(1):67-76.

Markovich, C. and DeVaney, S. (1997). College seniors' personal finance knowledge and practices. *Journal of Family and Consumer Sciences*, 89(2):161-166.

Marks, D. (2002). Academic standards as public goods and varieties of free-rider behaviour. *Education Economics*, 10(2):145-163.

Marshall, P. and Chilton, E. (1995). Singaporean students in British higher education: the statistics of success. *Engineering Science and Education Journal*, 4(4):155–160.

McCrum, N. (1994). The academic gender deficit at Oxford and Cambridge. *Oxford Review of Education*, 1(20):3-26.

McGivney, V. (1996). Staying or Leaving the Course. Leicester: NIACE.

McKenzie, R. (1975). The economic effects of grade inflation on instructor evaluations: a theoretical approach. *Journal of Economic Education*, 6(2):99-105.

McKenzie, R. and Tullock, G. (1981). *The New World of Economics*. Homewood, Illinois: Richard D. Irwin.

McKnight, P. (1996). An explanation of top executive pay: a UK study. *British Journal of Industrial Relations*, 34(4):557-566.

McLaughlin, K. (1988). Aspects of tournament models: a survey. *Research in Labor Economics*, 9:561-580.

McNabb, R., Pal, S. and Sloane, P. (2002). Gender differences in student attainment: the case of university students in England and Wales. *Economica*, 69(275):481-503.

Mehdizadeh, M. (1990). Loglinear models and student course evaluations. *Journal of Economic Education*, 21(1):7-21.

Meier, S. and Sprenger, C. (2012). Discounting financial literacy: time preferences in financial education programs. *Journal of Economic Behaviour and Organisations*, doi:10.1016/j.jebo.2012.02.024.

Metcalf, H. (2003). Increasing inequality in higher education: the role of term-time working. *Oxford Review of Education*, 29(3):315-329.

Metcalf, H. (2005). Paying for university: the impact of increasing costs on student employment, debt and satisfaction. *National Institute Economic Review*, 191(1):106-117.

Mewse, A., Lea, S. and Wrapson, W. (2010). First steps out of debt: attitudes and social identity as predictors of contact by debtors with creditors. *Journal of Economic Psychology*, 31(6):1021-1034.

Micklewright, J. (2012). Higher education funding and access: introduction to the issues. London: Institute of Fiscal Studies.

Miller, P., Mulvey, C. and Martin, N. (2004). A test of the sorting model of education in Australia. *Economics of Education Review*, 23(5): 473-482.

Mincer, J. (1974). *Schooling, experience and earnings*. New York: National Bureau of Economic Research.

Mirrlees, J. (1976). The optimal structure of incentives and authority within an organisation. *Bell Journal of Economics*, 7(1):105-131.

Mirus, R. (1973). Some implications of student evaluation of teachers. *Journal of Economic Education*, 5(1):35-37.

Moldovanu, B. and Sela, A. (2001). The optimal allocation of prizes in contests. *American Economic Review*, 91(3):542–558.

Morley, L., Eraut, M., Aynsley, S., MacDonald, D. and Shepherd, J. (2006). Establishing the needs of employers and related organisations for information about the quality and standards of higher education provision and student achievement in England. Brighton: University of Sussex School of Education.

Morrison, J., Merrick, B., Higgs, S. and Le Métais, J. (2005). Researching the performance of international students in the UK. *Studies in Higher Education*, 30(3), p. 327–337.

Morse, A., Nanda, V, and Seru, A. (2011). Are incentive contracts rigged by powerful CEOs? *Journal of Finance*, 66(5):1779-1821.

Murphy, K. (1985). Corporate performance and managerial remuneration: an empirical analysis. *Journal of Accounting and Economics*, 7(1):11-42.

Murphy, K. (1986). Incentives, learning, and compensation: a theoretical and empirical investigation of managerial labor contracts. *Rand Journal of Economics*, 17(1):69-76.

Murphy, K. (1999). Executive compensation. In: O. Ashenfelter and D. Card, eds. *Handbook of Labor Economics*, pages 2485–2563. Amsterdam: North-Holland.

Murphy, K. and Zabojnik, J. (2004). CEO pay and appointments: a market based explanation for recent trends. *American Economic Review*, 94(2):192-196.

Murphy, K. and Zabojnik, J. (2007). Managerial capital and the market for CEOs. Department of economics. Working Paper Series no.1110, Ontario: Queens University.

Muslu, V. (2003). Board independence executive pay structures and pay disclosure: evidence from Europe. Sloan School of Management Working Paper no. 4432-03, Cambridge MA: MIT.

National Committee of Inquiry into Higher Education (1997). Higher Education in the Learning Society. Main Report, London: NCIHE.

Natwest Bank (2007). Student Money Matters. Press Release, August 14.

Naylor, R. and Smith, J. (2004a). Determinants of educational success in higher education. In: G. Johnes and J. Johnes, eds. *International Handbook on the Economics of Education*, pages 415-461. Cheltenham: Edward Elgar.

Naylor, R. and Smith, J. (2004b). Degree performance of Economics students UK universities: absolute and relative performance in prior qualifications. *Scottish Journal of Political Economy*, 51(2):250-265.

Nevin, E. (1972). How not to get a first. *Economic Journal*, 82(326):658-673.

Newman, H. and Mozes, H. (1999). Does the composition of the compensation committee influence CEO compensation practices? *Financial Management*, 28 (3):41-53.

Nichols, A. and Soper, J. (1972). Economic man in the classroom. *Journal of Political Economy*, 80(5):1069-1073.

Norvilitis, J. and Mao, Y. (2012). Attitudes towards credit and finances among college students in China and the United States. *International Journal of Psychology*, DOI:10.1080/00207594.2011.645486:1-10.

Norvilitis, J., Szablicki, B. and Wilson, S. (2003). Factors influencing levels of credit-card debt in college students. *Journal of Applied Social Psychology*, 33(5):935-947.

Novilitis, J. Merwin, M., Osberg, T., Roehling, P., Young, P. and Kamas, M. (2006). Personality factors, money attitudes, financial knowledge, and credit-card debt in college student. *Journal of Applied Social Psychology*, 36(6):1395-1413.

Nowell, C. and Alston, R. (2007). I thought I got an A! Overconfidence across the economic curriculum. *Journal of Economic Education*, 38(2):131-142.

O'Grady, M. and Guilfoyle, B. (2007). Grade inflation in Irish universities (1994-2004). Available at:
http://www.stopgradeinflation.ie/Grade_Inflation_in_the_University_Sector.pdf
[Accessed 2 December 2012].

O'Reilly, C., Main, B. and Crystal, G. (1988). CEO compensation as tournament and social comparison: a tale of two theories. *Administrative Science Quarterly*, 33(2):273-274.

Ogden, S. and Watson, R. (2004). Remuneration committees and CEO pay in the UK privatised water industry. *Socio-Economic Review*, 2(1):33-63.

Oosterbeek, H. and Groot, W. (1994). Earning effects of different components of schooling: human capital versus screening. *Review of Economics and Statistics*, 76(2):317-321.

Oosterbeek, H. and van den Broek, A. (2009). An empirical analysis of borrowing behaviour of higher education students in the Netherlands. *Economics of Education Review*, 28(2):170-177.

Opheim, V. (2009). New system – old barriers? Social inequalities, student debt and study delays after the implementation of the Bologna process. Maastricht: Paper presented at ELM 2009 2nd Conference on European Labour Market for Academic Graduates Maastricht University, October 22 - 24 (2009).

Orszag, J. (1994). A new look at incentive effects and golf tournaments. *Economics Letters*, 46(1):77-88.

Ost, B. (2010). The role of peers and grades in determining major persistence in the sciences. *Economics of Education Review*, 29(6), p. 923–934.

Ottaviani, C. and Vandone, D. (2011). Impulsivity and household indebtedness: evidence from real life. *Journal of Economic Psychology*, 32(5):754-761.

OXERA (2004). Are UK households over-indebted? Report commissioned by: Association of Payment Services, British Bankers Association, Consumer Credit Association and the Finance and Leasing Association. Available at:http://www.oxera.com/Oxera/media/Oxera/downloads/reports/Are-UK-households-overindebted.pdf?ext=.pdf.

Parry, G. (2006). Policy-participation trajectories in English higher education. *Higher Education Quarterly*, 60(4):392-412.

Pennell, H. and West, A. (2005). The impact of increased fees on participation in higher education in England. *Higher Education Quarterly*, 59(2):127-237.

Popov, S. and Bernhardt, D. (2013). University competition, grading standards, and grade inflation. *Economic Enquiry*, 51(3):1764–1778.

Poterba, J. (2002). Taxation and portfolio structure: issues and implications. In: L. Guiso, M. Haliassos and Jappelli, eds. *Household Portfolios*, pages 103-42. Cambridge, MA: MIT Press.

Prather, J., Smith, G. and Kodras, J. (1979). A longitudinal study of grades in 144 undergraduate courses. *Research in Higher Education*, 10(1):11-24.

Prendergast, C. (1999). The provision of incentives in firms. *Journal of Economic Literature*, 37(1):7-63.

Psacharopoulos, G. and Patrinos, H. (2004). Returns to investment in education: a further update. *Education Economics*, 12(2):111-134.

Purcell, K. and Elias, P. (2010). The impact of paid and unpaid work and of student debt on experience of higher education. Futruretrack Working Paper 3, Warwick: Institute for Employment Research, University of Warwick.

Purcell, K., Pitcher, J. and Sim, C. (1999). Working out? Graduates' early experiences of the labour market, Manchester: CSU Ltd.

Push (2007). The Push student debt survey. Available at: http://www.push.co.uk/ [Accessed 30 January 2011].

Push (2010). The Push Student Debt Survey. Available at: http://www.push.co.uk/Debt-Survey-2010-Summary [Accessed 30 January 2011].

Raffe, D., Croxford, L., Iannelli, C., Shapira, M. and Howieson, C. (2006). Social-class inequalities in education in England and Scotland, *Mimeo*, University of Edinburgh.

Rask (2010). Attrition in STEM fields at a liberal arts college: the importance of grades and pre-collegiate preferences. *Economics of Education Review*, 29(6), p. 892–900.

Ratto, M., Burgess, S., Croxson, B., Jewitt, I. and Propper, C. (2001). Team-based Incentives in the NHS: an economic analysis. Centre for Market and Public Organisation, Working Paper Series no. 01/37: University of Bristol.

Rayton, B., Brammer, S. and Cheng, S. (2012). Corporate visibility and executive pay. *Economics Letters*, 117(1):337-339.

Richardson, J. (2010). Conceptions of learning and approaches to studying among White and ethnic minority students in distance education. *British Journal of Educational Psychology*, 80(4):535-556.

Robbins. (1963). Report of the Committee appointed by the Prime Minister under the Chairmanship of Lord Robbins. London: HMSO.

Rogers, T. (2007). Measuring value added in higher education: a proposed methodology for developing a performance indicator based on economic value added to graduates. *Education Economics*, 15(1):55-74.

Rogers, T. and Ghosh, D. (2001). Measuring the determinants of quality in UK higher education: a multinomial logit approach. *Quality Assurance in Education*, 9(3):121-126.

Rosen, S. (1981). The economics of superstars. *American Economic Review*, 71(5):845-858.

Rosen, S. (1982). Authority, control, and the distribution of earnings. *Bell Journal of Economics*, 13(2):311-323.

Rosen, S. (1986). Prizes and incentives in elimination tournaments. *American Economic Review*, 76(4):701-715.

Rosen, S. (1992). Contracts and the market for executives. In: L. Wein and H. Wijkander, eds. *Contract Economics*, pages 181-211. Oxford, UK: Blackwell.

Rosovsky, H. and Hartley, M. (2002). Evaluation and the academy: are we doing the right thing? Available at: http://www.amacad.org/publications/monographs/Evaluation_and_the_Academy.pdf [Accessed 13 September 2013].

Rothschild, R. and White, L. (1993). The university in the market place: some insights and some puzzles. In: C. Clotfelter and R. Rothschild, eds. *Studies in Supply and Demand in Higher Education*. Chicago: University of Chicago Press.

Rotter, J. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80:1-28.

Rudd, E. (1984). A comparison between the results achieved by women and men studying for first degrees in British universities. *Studies in Higher Education*, 9(1):47-57.

Sabot, R. and Wakeman-Linn, J. (1991). Grade inflation and course choice. *Journal of Economic Perspectives*, 5(1):159-170.

Sadler, D. R. (2009). Grade integrity and the representation of academic achievement. *Studies in Higher Education*, 34(7):807-826.

Schmidt, P. and Sickles, R. (1984). Production frontiers and panel data. Journal of *Business and Economic Statistics*, 2(4):367-374.

Scott-Clayton, J. (2012). What explains trends in labor supply among U.S. undergraduates? *National Tax Journal*, 65(1):181-210.

Sear, K. (1983). The correlation between A Level grades and degree results in England and Wales. *Higher Education*, 12(5):609-619.

Seaward, H. and Kemp, S. (2000). Optimism bias and student debt. *New Zealand Journal of Psychology*, 29(1):17-19.

Shattock, M. (1999). Governance and management incentives: the way we live now. *Journal of Education Policy*, 14(3):271-282.

Shen, H. and Ziderman, A. (2009). Student loans repayment and recovery: international comparisons. *Higher Education*, 57(3):315-333.

Simmons, R. and Berri, D. (2010). Mixing the princes with the paupers: pay and performance in the national basketball association. *Journal of Labour Economics*, 18(3):381-388.

Smith, D., Bargh, C., Pocock, J. and Scott, P. (1999). New leaders at the top? The educational and career paths of UK university Vice-chancellors (1960–1996). *Higher Education Management*, 11(2):113–135.

Smith, J. and Naylor, R. (2001a). Determinants of degree performance in UK universities: a statistical analysis of the 1993 cohort. *Oxford Bulletin of Economics and Statistics*, 63(1):29-60.

Smith, J. and Naylor, R. (2001b). Dropping out of University: a statistical analysis of the probability of withdrawal for UK university students. *Journal of the Royal Statistical Society (series A)*, 164(2):389-405.

Smith, J. and Naylor, R. (2005). Schooling effects on subsequent university performance: evidence for the UK university population. *Economics of Education Review*, 24(5):549-562.

Smith, R. and Blundell, R. (1986). An exogeneity test for a simultaneous equation Tobit model with an application to labour supply. *Econometrica*, 54(3):679-685.

Smith, R. and Szymanski, S. (1995). Executive pay and performance: the empirical importance of the participation constraint. *International Journal of the Economics of Business*, 2(3):485-495.

Smithers, A. (2011). A-levels 2011. Centre for Education and Employment: University of Buckingham.

Soo, K. (2009). Estimating the production function of university students. Economics Working Paper Series: Department of Economics, Lancaster University.

Souleles, N. (2004). Expectations, heterogeneous forecast errors, and consumption: micro evidence from the Michigan Consumer Sentiment Surveys. *Journal of Money, Credit, and Banking*, 36(1):39-72.

Spence, M. (1973). Job market signalling. *Quarterly Journal of Economics*, 87(3):355-374.

Stone, B. and Maury, R. (2006). Indicators of personal financial debt using a mult-disciplinary behavioural model. *Journal of Economic Psychology*, 27(4):543-556.

Strinebrickner, R. and Strinebrickner, T. (2003). Working during school and academic performance. *Journal of Labor Economics*, 21(2):473-491.

Student Loan Company (2010). Student loans for higher education in England, financial year 2009-10, Statistical first release 03/2010. Available at: http://www.slc.co.uk/media/77939/slcsfr032010.pdf [Accessed 24 March 2011].

Summary, R. and Weber, W. (2012). Grade inflation or productivity growth? An analysis of grade distributions at a regional university. *Journal of Productivity Analysis,* 38(1):95-107.

Sunde, U. (2003). Potential prizes and performance: testing tournament theory with professional tennis data. IZA Discussion Paper no. 947, Bonn: IZA.

Suslow, S. (1977). Grade inflation: end of a trend? *Change*, 9(3):44-45.

Tarbert, H., Tee, K. and Watson, R. (2008). The legitimacy of pay and performance comparisons: An analysis of UK university chancellors pay awards. *British Journal of Industrial Relations*, 46(4):771-805.

Taylor, J. (2003). Institution diversity in UK higher education: policy and outcomes since the end of the binary divide. *Higher Education Quarterly*, 57(3):266-293.

Taylor, M., Jenkins, S. and Sacker, A. (2011). Financial capability and psychological health. *Journal of Economic Psychology*, 32(5):710-723.

Tervio, M. (2008). The difference that CEOs make: an assignment model approach. *American Economic Review*, 98(3):642-668.

Tirole, J. (1994). The internal organisation of government. *Oxford Economic Papers*, 46(1):1-29.

Tumino, A. and Taylor, M. (2013). The impact of local market conditions on school leaving decisions. *Mimeo*, Institute for Social and Economic Research.

Tymms, P. and Fitz-Gibbons, C. (2001). Standards, achievement and educational performance: a cause for celebration? In: R. Phillips and J. Furlong, eds. *Education, Reform and the State: 25 Years of Politics, Policy and Practice*, pages 156-173. London: Routledge Falmer.

UNITE (2007). The student experience report 2007. Available at: http://www.unitegroup.co.uk/Attachments/000171/Student%20Experience%20Report%202007.pdf [Accessed 30 January 2011].

Universities UK (2007). Beyond the honours degree classification, Burgess Group Final Report, London: Universities UK.

Usher, A. (2005). Global debt patterns: an international comparison of student loan burdens and repayment conditions. Toronto: Educational Policy Institute.

Valins, O. (2004). When debt becomes a problem: a literature study. Strategic Social Policy Group: Ministry of Social Development, New Zealand.

Walker, I. and Zhu, Y. (2003). The returns to education: evidence from the labour force surveys. *Labour Market Trends*.

Walker, I. and Zhu, Y. (2011). Differences by degree: evidence of the net financial rates of return to undergraduate study for England and Wales. *Economics of Education Review*, 30(6):1177– 1186.

Webbink, D. and Hartog, J. (2004). Can students predict starting salaries? Yes! *Economics of Education Review*, 23(2):103-113.

Weiss, A. (1995). Human capital vs signalling explanations of wages. *Journal of economic Perspectives*, 9(4): 133-154.

Whitchurch, C. (2006). Who do they think they are? The changing identities of professional administrators and managers in UK higher education. *Journal of Higher Education Policy and Management*, 28(2):159-171.

Wolter, S. (2000). Wage expectations: a comparison of Swiss and US students. *Kyklos*, 53(1):51-69.

Woodfield, R. and Earl-Novell, S. (2006). An assessment of the extent to which subject variation between the arts and sciences in relation to the award of a first class degree can explain the 'gender gap' in UK universities. *British Journal of Sociology of Education*, 27(3):355-372.

Woodhall, M. (2002). Paying for learning: the debate on student fees, grants and loans in international perspective. *Welsh Journal of Education*, 11(1):1-9.

Yorke, M. (1999). Leaving early: undergraduate non-completion in higher education. London: Falmer Press.

Yorke, M. (2002). Degree classifications in English, Welsh and Northern Irish Universities: trends, 1994-95 to 1998-99. *Higher Education Quarterly*, 56(1):92-108.

Yorke, M., Barnett, G., Bridges, P., Evanson, P., Haines, C., Jenkins, D., Scurry, D., Stowell, M. and Woolf, H. (2002). Does grading method influence honours degree classification? *Assessment and Evaluation in Higher Education*, 27(3):269-279.

Yorke, M. and Longden, B. (2008). The first-year experience of higher education in the UK, York: Higher Education Academy.

Zangenehzadeh, H. (1988). Grade inflation: a way out. *Journal of Economic Education*, 19(3):217-226.

Zhang, L. (2013). Effects of college educational debt on graduate school attendance and early career and lifestyle choices. *Education Economics*, 21(2):154-175.

Appendix A1

A Chronology of UK Universities to 2011

Pre-1992 Universities[a]	
Ancient Universities	Oxford † (1167), Cambridge† (1209), St Andrews (1413); Glasgow† (1451); Aberdeen (1495); Edinburgh† (1495).
Civic and Red Brick Universities	Durham† (1832); Manchester†(1904); Birmingham†(1900); Liverpool†(1903); Leeds†(1904); Sheffield†(1905); Bristol†(1909); Queen's Belfast†(1908); Reading‡(1924); Swansea (1920); Nottingham†(1948); Southampton†(1952); Hull (1954); Exeter† (1955); Leicester‡(1957); **University of Wales Founding Constituent Colleges** (1894): Aberystwyth; Bangor; Trinity St David (2010) - *formed by a merger between Trinity UC and UW, Lampeter*. **University of London Constituent Colleges** (excluding medical and art colleges and LBS): King's† (1836); UCL † (1836); Royal Holloway‡ (1879); Queen Mary† (1885); LSE† (1895); Goldsmith's‡(1904); Imperial College† (1907); SOAS‡ (1916); Birkbeck‡ (1926); Institute of Education London‡ (1987).
1960s Universities	Sussex‡ (1961); Keele (1962); Newcastle†(1963)- *became independent from Durham;* Dundee (1967); Cranfield (1969) (PG). **Plateglass Universities**: East Anglia‡ (1963); York† (1963); Lancaster‡ (1964); Strathclyde (1964); Essex‡ (1965); Kent (1965); Warwick† (1965); Heriot-Watt (1966); Stirling (1967); Ulster (1968). **CAT:** Aston (1966); Salford (1965); Bath (1966); Bradford (1966); Brunel (1966); Loughborough‡ (1966); Surrey (1966); Cardiff† (1966); City (1966);
Post-1992 Universities[b]	Abertay Dundee; Anglia Ruskin; Bedfordshire (2006) – *formerly university of Luton (1992)*; Bournemouth; Brighton; Birmingham City (2007) - *formerly University of Central England (1992);* Central Lancashire; Coventry; De Montfort; Derby; East London; Glamorgan; Glasgow Caledonian; Greenwich; Hertfordshire; Huddersfield; Kingston; Leeds Met; Liverpool John Moores; Lincoln; London Metropolitan (2002) – *formed by a merger between North London University (1992) and London Guildhall University (1992)*; Manchester Met; Middlesex; Napier; Northumbria; Nottingham Trent; Oxford Brookes; West of Scotland (2007) – *formed by a merger between University of Paisley (1992) and Bell College of HE*); Plymouth; Portsmouth**;**; Robert Gordon; Sheffield Hallam; South Bank; Staffordshire; Sunderland; Teesside; West London (2010) - *formerly Thames Valley University (1992);* UW Newport; UWI Cardiff; West of England; Westminster; Wolverhampton.
Post-2003 Universities[c]	
Former University Colleges	Bath Spa (2005); Canterbury Christ Church (2005); Chester (2005); Chichester (2005); Liverpool Hope (2005); Northampton (2005); Worcester (2005); Buckinghamshire New (2007) – *formerly Bucks Chilts.*

Former Colleges of HE	Gloucestershire (2003); Bolton (2004); Roehampton Institute (2004); Southampton Solent (2005); Winchester (2005); Edge Hill (2006); York St John (2006); Cumbria (2007) ; Glyndwr (2008) - *formerly NE Wales inst. of HE;* Swansea Metropolitan (2008);
Medical and Business Schools	Brighton and Sussex Medical School; Institute of Cancer Research (PG); Hull York Medical School; London School of Hygiene and Tropical Medicine (PG); Royal College of Nursing; Royal Veterinary College; School of Pharmacy; St Georges Hospital Medical School; UW College of Medicine; London Business School (PG).
Colleges of Art, Music or Drama	Arts UC Birmingham; Central School of Speech and Drama; Conservatoire for Dance and Drama; Courtauld Institute of Art; Edinburgh College of Art; Glasgow School of Art; Guildhall School of Music and Dance; Leeds College of Music; Liverpool Institute for the Performing Arts; Norwich UC of Arts; Ravensbourne; Rose Bruford; Royal Academy of Music; Royal College of Art; Royal College of Music; Royal Conservatoire of Scotland; Royal Northern College of Music; Royal Welsh College of Music and Drama;Trinity Laban Conservatoire of Music and Dance; University of the Arts London; University for the Creative Arts (2008); UC Falmouth (2005).
Other HE Institutions[e]	**Agricultural Colleges** Harper Adams; Royal Agricultural College; Scottish Agricultural College; Writtle College. **University Colleges:** Bishop Grossetteste UC Lincoln (2006); Leeds Trinity UC (2009) – *formerly Trinity and All Saints College;* Newman (2007); Queen Margret UC, Edinburgh; St Mary's UC Belfast; St Mary's UC Twickenham (2007); Stranmills. **HE institutions:** Bretton Hall; Heythrop; St Martin's College; University Campus Suffolk; University College Birmingham (2008) – *formerly Birmingham College of Food, Tourism and Creative Studies*
Miscellaneous Institutions	Open university (1969*)*; University of Buckingham (1976); Institutes of the University of London (e.g. advanced legal studies, Commonwealth studies, Germanic studies, Historical Research, Latin American studies, Marine Biological station, Warburg institute).

Notes: Dates in parenthesis indicate year of establishment/granted the Royal Charter where appropriate. 'PG' denotes postgraduate institution.

† Denotes the 24 universities that are members of the Russell group – large research intensive universities.

‡ Denotes the 12 universities that are members of the 1994 group – small research intensive universities.

(a) The classification 'pre-1992' is used in the text refers to the following institution types: Ancient, Civic and Red Brick, and the 1960s universities. Civic universities are those established between the late 19th century and the late 1950s. 1960s universities are those created just before and as a result of the Robbins Report 1963. Note that Chelsea College of Advanced Technology was later subsumed as part of Kings College London.

(b) Post-1992 Universities include former Polytechnics and Higher Education Institutions that were granted university status shortly after the passing of Further and Higher Education Act 1992.

(c) Post-2003 received the Royal Charter from 2003 onwards and includes former university colleges (UC) and other higher education institutions.

(d) Institutes that offer HE programmes but have not received full degree awarding powers by 2011.

Appendix A2

Major Mergers within the UK Higher Education Sector 1994/95-2008/09

2009-20010:

University of Wales, Lampeter merged with Trinity UC to form University of Wales, Trinity St David in July 2010.

2008-2009:

Reading University merges with the Henley College of Management.
Royal Holloway enters into collaborative agreement with St George's Hospital University of London.

2007-2008:

Dartington College of Arts merged with UC Falmouth in April 2008
Paisley University merged with Bell College HE on 1st August 2007 to form University of West Scotland.
St Martin's College and Cumbria Institute of Arts merged on 1st August 2007 to form the University of Cumbria.

2005-2006:

Trinity College of Music and Laban College of Dance merged to form Trinity Laban Conservatoire of Music and Dance (2005).

University College for the Creative Arts formed by a merger between Kent Institute of Art and Design and the Surrey Institute of Art and Design in May 2005. It received the Royal Charter in 2008 and became the University College for the Creative Arts.

2004-2005:

University of the Arts London, formed by a merger between, Camberwell School of Art, Central St Martin's College of Arts and Design, Chelsea College of Arts and Design, London College of Communication, London College of Fashion, and Wimbledon College of Art.

2003-2004:

University of Wales College of Medicine merged with Cardiff University on 1 December 2004
UMIST merged with the Victoria University of Manchester on October 1, 2004 to form the University of Manchester.

2002-2003:

London Guildhall University and University of North London merged on 1 August 2002 to become London Metropolitan University.

2001-2002:

Northern College of Education merged with Aberdeen and Dundee Universities
Bretton Hall College merged with University of Leeds

2000-2001:

College of Guidance Studies merged with Canterbury Christ Church University College
Westminster College, Oxford merged with Oxford Brookes University
Wye College merged with Imperial College of Science, Technology and Medicine
North Riding College merged with The University of Hull

1999-2000:

St Andrew's College of Education merged with The University of Glasgow
Westhill College merged with The University of Birmingham

1998-99:

United Medical and Dental Schools of Guy 's and St Thomas 's Hospitals merged with King's College London
Loughborough College of Art and Design merged with Loughborough University
Moray House Institute of Education merged with the University of Edinburgh
The Scottish College of Textiles merged with Heriot-Watt University
Royal Free Hospital School of Medicine merged with University College London

1997-98:

Royal Postgraduate Medical School and Charring Cross and Westminster Medical School merged with Imperial College of Science, Technology and Medicine
Institute of Psychiatry merged with King's College London
La Sainte Union College of higher education merged with the University of Southampton

1996-97:

Coleg Normal merged with University College of North Wales,
Bangor Winchester School of Art merged with the University of Southampton
Salford College of Technology merged with the University of Salford

1995-96:

The British Postgraduate Medical Federation was incorporated into Imperial College of Science, Technology and Medicine, King 's College London, University College London and London University - Senate institutes
St.Bartholomew 's Hospital Medical College and the London Hospital Medical College merged with Queen Mary and Westfield College

1994-95:

West London Institute of Higher Education merged with Brunel University
The Welsh Agricultural College merged with the University College of Wales, Aberystwyth
Duncan of Jordanstone College of Art merged with The University of Dundee
Other mergers, both within the higher education constituency and across the higher/further education boundary are under discussion.

Source: University of Edinburgh and university websites.

Appendix A3

Total and Average FTE HE Students in UK Higher Education 1995/96-2010/11 (by institution type)

	Number of HEIs by type					Average FTE enrolments by HEI type					Total FTE enrolments by HEI type				
Academic Year	All HEIs	Pre-1992	Post-1992	Post-2003	arts	All HEIs	Pre-1992	Post-1992	Post-2003	arts	All HEIs	Pre-1992	Post-1992	Post-2003	arts
1995/96	157	61	41	21	23	9006	9206	12684	4605	1197	1413968	561561	520045	96710	27539
1996/97	157	61	41	21	23	9068	9799	13701	5045	1354	1423673	597709	561752	105953	31146
1997/98	157	61	41	21	23	9066	10141	13969	5093	1367	1423339	618627	572720	106962	31436
1998/99	157	61	41	21	23	9161	10437	14003	5084	1413	1438204	636652	574107	106757	32489
1999/00	157	61	41	21	23	9263	10586	13947	5330	1407	1454366	645760	571843	111921	32365
2000/01	158	61	41	21	23	9209	10646	13882	5408	1495	1454951	649412	569143	113574	34387
2001/02	168	61	41	22	24	8990	11155	14216	5756	1517	1510275	680485	582869	126628	36405
2002/03	170	61	41	22	25	9275	11716	15092	5940	1484	1576763	714654	618783	130670	37092
2003/04	169	61	41	22	24	9622	12177	15352	6258	1642	1626060	742769	629451	137669	39405
2004/05	168	60	41	22	24	9814	12646	15630	6227	1730	1648735	758740	640830	136999	41516
2005/06	168	59	40	22	25	9999	12981	15944	6372	1970	1679847	765900	637760	140194	49240
2006/07	170	59	40	22	26	9969	13226	15800	6427	1986	1694659	780325	632012	141395	51631
2007/08	166	59	40	22	22	10397	13404	16114	6619	1815	1725819	790823	644554	145626	39934
2008/09	165	59	40	22	21	10790	13842	16687	6848	1899	1780376	816707	667484	150662	39884
2009/10	165	59	40	22	21	11363	14501	17601	7291	2000	1874916	855571	704024	160397	41991
2010/11	164	59	40	22	21	11537	14677	17534	7424	2061	1892048	865918	701355	163335	43289
%-change 1995/96-2010/11						28%	59%	38%	61%	72%	34%	54%	35%	69%	57%

Source: Students in Higher Education (HESA (various years))

Notes: Post graduate institutions, medical and business schools, the Open University and small specialist colleges are excluded.

Appendix A4

The Allocation of Teaching Funds by Price Group

Public funds for teaching are allocated according to the number and type of students enrolled and subject mix. For the academic year 2010/11 the 'base price' for teaching was set at £3,951. Each 'price group' is given a weight according to their anticipated resource cost. There are currently 4 price groups as shown in the table below:

Price Group	Subjects included	Weighting
A	clinical stages of: medicine and dentistry and veterinary science	4
B	laboratory-based subjects including: science, pre-clinical stages of medicine and dentistry, engineering and technology	1.7
C	subjects with a studio, laboratory, or fieldwork element	1.3
D	all other subjects	1

Source: Guide to Funding. How HECFE Allocates Funds (Higher Education Funding Council for England, 2010, p.23). Available at: http://www.hefce.ac.uk/pubs/year/2010/201024/ [Accessed 24 10 2012].

The base price is multiplied by the weight and the number of FTE students in each category and adjustments are made according to London weighting and non-completion rates to arrive at an overall figure for an institution's funding for teaching or its 'standard resource'. Further teaching funds are also available for enrolling students from under-represented groups i.e., for 'widening participation', retention, and success. These extra funds accounted for 20% of the teaching funds awarded in 2010/11 (Higher Education Funding Council for England, 2010). Income secured from Funding Councils for teaching and research form a large proportion of the block grant the rest include funds for community engagement and infrastructure maintenance and improvement. See HEFCE (2010) for further details.

Appendix A5

Media Comments on VC Pay

The following articles were published in *Times Higher Education (magazine) (THE)*:

‘The Annual Pay Review: Are VCs Worth Every Penny? (March 28, 2013);
‘Identity check: Vice-chancellors’ education and pay revealed’ (March 24, 2011);
‘It was fun while it lasted’ (April 1, 2010).

The following articles were published in *Times Higher Education Supplement (THES):*

‘Large rises at top as pay dispute grips sector’ (March 10, 2006);
‘25% wage hike for V-Cs’ (March 10, 2006);
‘Heads enjoy 100% rise in pay over ten years’(February 25, 2005);
‘V-C pay survey: Thriving V-Cs net 6.1% rise in wages’ (February 20, 2004);
‘Disparity is a disgrace’ (March 1, 2002);
‘Union fury at ‘shameless’ V-C pay rises’ (January 26, 2001);
‘Pay rises for university chiefs more than double increases given to their staff’ (January 26, 2001);
‘Uni boss’s pay top £250,000’ (January 28, 2000);
‘Union envy 4.8% rise’ (February 5, 1999);
‘Institution chief’s pay rise’ (February 6, 1998);
‘More v-cs get six appeal’ (February 7, 1997);
‘Pay watch for vice chancellors’ (February 9, 1996);
Vice chancellor’s pay’ (March 24, 1995).

Appendix A6

UK Undergraduate (Bachelors) Degree Classification

Degree Class	Thresholds across contributory assessments
1. First Class with honours (1st)	≈ 70%+
2. Upper Second with honours (2:1)	≈ 60-69%
3. Lower Second with honours (2:2)	≈ 50-59%
4. Third class with honours (3rd)	≈ 40-49%
5. Pass or ordinary degree *without* honours	≈30-39%
6. Fail or unclassified degree	< 30%

Source: Barrow, Reilly, and Woodford (2009)

Notes:

a) Across universities there may be some variation in the thresholds that delineate the degree class but in general degree classifications are awarded according to the scheme presented above with the award of a first class honours degree ranked the highest. Universities in Scotland often awarded students ordinary degrees after three years of study and honour degrees are awarded to students who satisfactorily complete a further year of study.

b) The University of Cambridge may award a 'double first' which means that a first class was achieved in two sets of examinations corresponding to two different parts of the Triposes system.

c) *Aegrotat* degrees are sometimes awarded to students who for reasons of illness or death were unable sit their final examinations or assessments. They are honour or pass degrees without classification.

Appendix A7

Media Comments on Grade Inflation

‘Universities fix results in 'race for firsts'’ (*The Telegraph*, July 15, 2013);

‘How to get a first-class degree’ (*The Telegraph*, February 19, 2013);

‘British universities bend their rules to award more firsts’ (*The Sunday Times*, July 13, 2013);

‘Top jobs 'restricted to graduates with first-class degrees' (*The Telegraph*, July 4, 2012);

‘University marking to be reviewed over grade inflation fears’ (*The Guardian*, September 10, 2009);

’Bursting bubbles; education standards’ (*The Economist*, September 29, 2007);

‘Degree grades ‘are too crude’’ (*Times Higher Education*, May 7, 2004); ‘

‘Grade expectations: university exams’ (*The Economist*, March 20, 2004);

‘Tear up the class system’ (*The Guardian*, October 14, 2003);

‘Rise in good degrees not just grade inflation’ (*Times Higher Education*, March 29, 2002).

Appendix A8

Number of All Graduates in Each Degree Class 1994/95-2011/12

year	Total First Degrees	'Good' Degree	First class	Upper second	Lower second	Third class	Pass
1994/95	237798	112511	16687	95824	82898	13770	27874
1995/96	251248	120025	17305	102720	89146	13536	28541
1996/97	255260	123028	18079	104949	90802	22190	19240
1997/98	258753	128060	19472	108588	89491	21205	18158
1998/99	263671	132479	20728	111751	92048	20829	18315
1999/00	265270	135510	21770	113740	90300	20110	19350
2000/01	272660	142560	24095	118465	89750	21150	19205
2001/02	274440	147695	26455	121240	86650	19625	20475
2002/03	282380	152430	28635	123795	88260	20670	21010
2003/04	292090	158110	30175	127935	90470	20785	22725
2004/05	306365	165235	32465	132770	92605	22285	26235
2005/06	315985	172060	34825	137235	94265	22850	26815
2006/07	319260	175390	36645	138745	92795	23195	27880
2007/08	334890	189415	41150	148265	95145	23990	26255
2008/09	333725	191485	43125	148360	93030	23800	25325
2009/10	350860	203780	46830	156950	96970	24455	25540
2010/11	369010	219305	53210	166095	99210	24825	25535
2011/12	390985	240030	61605	178425	100310	23935	26715
% change							
1994/95-2011/12		113.34	269.18	86.20	21.00	73.82	-4.16
1994/95-2001/02		31.27	58.54	26.52	4.53	42.52	-26.54
2001/02-2006/07		18.75	38.52	14.44	7.09	18.19	36.17
2006/07-2011/12		36.855	68.11	28.59	8.10	3.19	-4.18

Notes to table:
(a) The figures quoted include both UK and non-UK domiciled students graduating from all UK university types excluding post-graduate institutions.
(b) Data were collected from the Higher Education Statistical Agency, available at: http://www.hesa.ac.uk/index.php/content/view/1973/239/. Accessed 28/7/2013.

Appendix B1

Data Sources

Annual Survey of Hours and Earnings (ASHE**,** various years). Accessed at http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=13101

Halifax House Price Data (average UK county level house price). Accessed at http://www.hbosplc.com/economy/HistoricalDataSpreadsheet.asp

Higher Education Performance Indicators.
Accessed at http://www.hefce.ac.uk/learning/perfind/default.asp for 1996/97 to 2001/02 and at www.hesa.ac.uk/pi/ for 2002/03 to 2008/09

Higher Education Statistical Agency, (1994/95-2008/09). *Reference Volume: STUDENTS in Higher Education Institutions*. Cheltenham: HESA.

Higher Education Statistical Agency, (1994/95-2008/09). *Reference Volume: RESOURCES of Higher Education Institutions,* Cheltenham: HESA.

International Who's Who (various years), London: Europa Publications Limited.

Times Higher Education Supplement (THES). Vice Chancellors' Salary Data accessed at http://www.thes.co.uk/statistics/

Who's Who (1993-2010). *An Annual Biography*, London: A and C Black,

Who's Who (various years), *Vice-Chancellors, Presidents, Principals, Rectors,* The Association of Commonwealth Universities, London: ACU.

Who's Who in British Art (various years), Andover: Art Trade Press

Appendix B2

VC Pay by Institution Type 1994/95-2008/09 (£ in 1998 prices)
All HEIs Including Arts Colleges

Academic Year	Pre-1992 university		Post-1992 university		Post-2003 university		Colleges of the 'Arts'	
	Mean	*Median*	Mean	*Median*	Mean	*Median*	Mean	*Median*
1994/95	102,173 (15,144)	*101,607*	103,685 (14,185)	*100,515*	78,657 (12,022)	*76,859*	75,841 (21,050)	*69,774*
1995/96	106,667 (15,237)	*105,983*	106,729 (14,714)	*102,728*	82,225 (14,320)	*76,957*	75,827 (23,031)	*67,426*
1996/97	110,475 (15,241)	*111,703*	108,092 (13,249)	*105,497*	82,941 (14,613)	*76,958*	76,846 (19,082)	*70,280*
1997/98	112,034 (16,115)	*113,000*	107,029 (11,519)	*104,727*	83,222 (13,639)	*82,000*	76,399 (18,735)	*69,698*
1998/99	116,970 (18,119)	*115,231*	110,041 (11,599)	*107,352*	85,164 (16,805)	*86,634*	80,741 (19,488)	*74,124*
1999/00	119,695 (17,504)	*118,612*	113,370 (11344)	*111,916*	88,038 (13,284)	*86,567*	83,579 (20,225)	*77,719*
2000/01	127,399 (27,218)	*123,138*	121,240 (16,272)	*120,318*	88,157 (15,058)	*88,970*	87,515 (23,060)	*82,519*
2001/02	132,079 (22,638)	*128,508*	124,947 (13,005)	*122,961*	94,617 (13,241)	*94,301*	88,906 (18,621)	*87,182*
2002/03	138,881 (27,305)	*129,385*	130,309 (13,245)	*128,487*	96,472 (12,292)	*92,547*	92,077 (21,220)	*88,772*
2003/04	145,819 (28,686)	*140,476*	132,768 (17,532)	*130,006*	102,523 (14,590)	*102,346*	94,406 (20,866)	*93,065*
2004/05	154,516 (30,748)	*150,173*	136,174 (19,568)	*135,791*	107,269 (15,217)	*108,763*	97,019 (22,080)	*91,921*
2005/06	159,387 (28,236)	*158,706*	142,209 (16,976)	*139,793*	112,327 (16,561)	*114,428*	98,278 (21,543)	*94,784*
2006/07	160,451 (28,062)	*160,850*	147,956 (24,587)	*143,021*	115,903 (17,169)	*115,906*	105,932 (25,223)	*96,736*
2007/08	170,031 (33,149)	*169,877*	155,433 (21,830)	*146,804*	117,583 (17,648)	*119,065*	116,635 (39,063)	*100,735*
2008/09	183,209 (30,920)	*181,423*	163,792 (22,300)	*158,559*	131,736 (23,447)	*129,588*	119,858 (31,764)	*123,871*
% Change	79.3		57.9		67.5		58.1	
Mean pay 1994-2009	135,985 (34,429)	*129,925*	126,918 (24,829)	*124,000*	97,837 (21,949)	*95,654*	90,003 (25,346)	*83,438*
Institutions	55		39		23		19	
Institutions (%)	40.4		28.7		(16.9)		(14.0)	
VCs	141		92		57		35	
Observations	825		585		345		268	

Notes : Standard deviations are in parentheses

Appendix B3

VC Average Pay by Gender 1994/95 to 2008/09 (£ in 1998 prices)

Year	N	Male (%)	Male Pay n	Mean	St. Dev	Median	Min	Max	Female Pay n	Mean	St. Dev	Median	Min	Max
1994/95	136	94	128	95,257	18,946	97,604	54,628	141,117	8	90,402	23,643	89,043	61,131	136,570
1995/96	136	93	127	98,574	20,512	100,279	58,049	152,145	9	94,287	20,149	91,744	61,289	135,483
1996/97	136	92	125	101,232	20,188	102,141	61,023	149,671	11	91,959	20,259	92,051	60,402	134,457
1997/98	136	92	125	101,423	20,191	103,000	60,000	147,000	11	93,691	21,775	93,000	61,000	139,000
1998/99	136	92	125	105,515	21,852	105,382	49,227	180,469	11	93,900	20,253	94,548	63,033	138,869
1999/00	136	90	123	108,717	21,220	108,089	60,262	154,004	13	96,135	19,503	95,654	66,002	140,612
2000/01	136	89	121	115,492	27,866	111,858	50,759	236,877	15	96,787	22,361	91,836	60,253	144,758
2001/02	136	88	119	119,714	24,860	119,262	73,499	201,545	17	103,677	22,926	104,470	68,414	154,395
2002/03	136	88	119	124,681	28,254	123,095	74,217	225,526	17	109,185	25,419	112,313	70,982	159,935
2003/04	136	86	117	129,982	30,085	129,133	74,522	227,728	19	113,159	26,897	115,173	71,547	165,779
2004/05	136	86	117	135,545	33,160	135,750	63,633	237,563	19	119,539	26,367	123,871	72,117	171,384
2005/06	136	85	116	139,775	31,835	139,381	77,297	238,471	20	128,171	31,974	128,404	72,363	193,243
2006/07	131	84	110	144,261	31,355	143,109	80,855	243,640	21	136,918	36,038	133,253	79,636	239,698
2007/08	131	83	109	153,262	36,668	147,884	79,630	266,716	22	138,423	29,108	142,046	83,313	194,145
2008/09	129	83	108	164,509	36,350	161,223	82,289	261,463	22	149,339	29,403	150,516	91,637	205,054
% change			-15.6	72.7	91.9	65.2	50.6	85.3	175.0	65.2	24.4	69.0	49.9	50.1
N / Mean	2023	88.8	121,454	121,454	34,003	117,523	49,227	266,716	235	115,564	32,426	113,715	60,253	239,698

Appendix B4

Variable Definitions: University Characteristics

Variable[1]	Definition of variable [a]
University Mission and Financial Performance Variables	
Merger/expansion	Dummy variable 1 = Successful merger, zero otherwise
Hit benchmark for comprehensive schooled students	Dummy variable 1 = hit benchmark for comprehensive students, zero otherwise
Hit benchmark for students from low participation areas [b]	Dummy variable 1 = hit benchmark for students from low participation areas, (areas from which university participation in less than 2/3 of the national average), zero otherwise
(ln) Funding Council Grants	Natural log of *real* grants from all UK funding councils, and include block grants for general teaching and research, and capital grants.
(ln) Tuition fees [c]	Natural log of *real* fees for full-time/part-time, degree and sandwich degree, diploma and other HE credit-bearing and non credit-bearing courses for UK and non-UK domiciled students.
(ln) Research grants and contracts	Natural log of *real* income from externally non-government sponsored research, and income from UK research councils and other non-UK sources.
University Size Variables	
#Cost Centres	Number of cost centres
(ln) FTE students	Natural logarithm of all FTE students in year of observation.
Institution Hierarchical Structure	
Proportion of senior academic staff	Proportion of senior academic staff to all academic staff
Proportion of professors	Proportion of professors to all academic staff
Proportion of Staff Remunerated > 70k	Total FTE staff (academic/non academic, excluding the VC) remunerated £70,000 per annum or more to all FTE staff.
Other Contextual Variables	
Average Regional House Prices	Natural log of *real* average county level house prices (*Halifax House Price Index,* Halifax PLC) in year of observation

Notes:
(a) All financial variables are in *real* terms (1998=100).
(b) Areas for which the participation rate is less than two-thirds of the UK average rate are defined as *low-participation neighbourhoods*. Students are allocated to these neighbourhoods on the basis of their postcodes.
(c) This also includes education grants and contracts.

Appendix B5

Variable Definitions: VC Personal Characteristics

Variable	Definition
Male	= 1 if Male. Zero otherwise.
Age	Age in years (year of observation minus year of birth).
Age <=55	= 1 if VC is 55 years of age or younger in year of observation. Zero otherwise.
Age 56 to 60	= 1 if VC is aged 56 to 60 in year of observation. Zero otherwise.
Age >=60	= 1 if VC is aged 61 or over in year of observation. Zero otherwise.
Education Background	
School Attended	*Categorical variables*
Public School	= 1 if attended a public school. Zero otherwise.
Grammar School	= 1 if attended a grammar school. Zero otherwise.
Secondary Modern	= 1 if attended a secondary modern. Zero otherwise.
Other	= 1 if attended another type of school including technical colleges and ecclesiastical colleges. Zero otherwise.
Overseas educated	= 1 if schooled overseas. Zero otherwise.
Type of University Attended	*Categorical variables*
Ancient/Civic	= 1 if attended either an ancient (medieval) university (excluding Oxford and Cambridge) or a civic 'red brick' university (i.e. universities established in late 19th Century to late 1950s) as an undergraduate or postgraduate. Zero otherwise.
London	= 1 if attended a London University College as an undergraduate or postgraduate. Zero otherwise.
1960s	= 1 if attended a university created in 1960s or a former College of Advanced Technology as an undergraduate or postgraduate. Zero otherwise.
Polytechnic	= 1 if attended an ex-polytechnic (post-1992 university) as an undergraduate or postgraduate. Zero otherwise.
Overseas	= 1 if attended a foreign university as an undergraduate or postgraduate. Zero otherwise.
Other	= 1 if attended another HE institution including: art college, teacher training institution, specialist PG institutions, etc. This classification also includes the Open University. Zero otherwise
Oxford/Cambridge	= 1 if educated at an Oxford/Cambridge College (postgraduate or undergraduate) Zero otherwise.
Academic Specialism	*Categorical variables*
Engineering	= 1 if engineer (or related disciplines e.g. urban planner or computer technologist). Zero otherwise.
Social Science	= 1 if social scientist (historian, philosopher, sociologist, economist (or from business/finance), lawyer, educationalist). Zero otherwise.
Arts	= 1 if fine/modern artist, musician, dramatist, linguist, language scholar. Zero otherwise.
Natural Science	= 1 if biologist, chemist, physicist, geologist, mathematician/statistician or with background in medical/ veterinary related disciplines. Zero otherwise.
Doctoral Degree	= 1 if a PhD or equivalent (e.g. MD, DSci) is held in year of observation. Zero otherwise.
Academic and Public Esteem	
Professor	= 1 professorship awarded in year of observation. Zero otherwise.
Honorary degree	= 1 if honorary degree awarded in year of observation. Zero otherwise.
FRS	= 1 granted fellowship of Royal Society in year of observation. Zero otherwise.
Knighthood	= 1 if granted Knighthood year of observation. Zero otherwise.
Career History and Training	
Previous work experience	*Categorical variables indicating VCs' recent employment history (ten years prior to the incumbents current appointment) by employment type.*
Civil Service	= 1 if previously employed in civil service, excluding Dept. of Education. Zero otherwise.
Education	= 1 if previously employed by official public education bodies e.g. DfES, HEFC, QCA etc. Zero otherwise.
Industry	= 1 if previously employed in the private sector with managerial and/or research responsibility. Zero otherwise.
Academia	= 1 if previously employed in the HE sector as lecturer, senior lecturer, or professor. Zero otherwise.
Training	
Ex VC	= 1 if previously appointed as a Vice Chancellor, Principal, Rector; Director, Provosts or equivalent in another HE institution. Zero otherwise.
Pro VC	= 1 if previously appointed as a Pro Vice Chancellor, Assistant Principal, Deputy Director or equivalent. Zero otherwise.
Current Employment	
New Appointment	= 1 if appointed in year of observation. Zero otherwise.
External Appointment	= 1 if externally appointed to current post in year of observation. Zero otherwise.
Tenure (years)	Years in current post (year of observation minus year of appointment)
Tenure expired (years)	= 1 if contract expired in year of observation. Zero otherwise.

Appendix B6

VC Gender, Age, and Age at Appointment 1994/95-2008/09 by Institution Type (including Heads of Colleges of the Arts)

Year	ALL VCs (i)				VCs of Pre-1992 (ii)				VCs of Post-1992 (iii)				VCs of Post-2003 (iv)				Heads of Arts colleges (v)			
	n	Male (%)	Age (App)	Age (years)	*n*	Male (%)	Age (App)	Age (years)	*n*	Male (%)	Age (App)	Age (years)	*n*	Male (%)	Age (App)	Age (years)	*n*	Male (%)	Age (App)	Age (years)
1994/95	*117*	94	50.75 (5.17)	56.35 (5.47)	*55*	98	52.93 (4.12)	57.56 (4.76)	*39*	90	48.51 (5.08)	54.74 (5.07)	*23*	91	49.34 (5.69)	56.17 (7.02)	*19*	95	47.79 (5.39)	53.16 (6.88)
1995/96	*117*	93	50.62 (4.99)	56.32 (5.11)	*55*	96	52.78 (4.10)	57.47 (4.55)	*39*	90	48.21 (4.45)	55.03 (4.53)	*23*	91	49.56 (5.73)	55.73 (6.69)	*19*	95	48.00 (5.49)	53.68 (6.78)
1996/97	*117*	91	50.67 (4.94)	56.14 (5.04)	*55*	96	52.76 (4.09)	57.73 (4.20)	*39*	90	48.28 (4.48)	55.51 (4.47)	*23*	83	49.69 (5.55)	55.35 (6.14)	*19*	95	48.95 (5.92)	53.79 (5.86)
1997/98	*117*	91	50.79 (4.67)	56.16 (5.87)	*55*	98	52.65 (4.54)	57.67 (4.65)	*39*	87	49.00 (4.52)	55.41 (3.96)	*23*	83	49.39 (5.26)	53.64 (5.73)	*19*	95	48.94 (5.72)	54.10 (5.76)
1998/99	*117*	91	51.49 (4.83)	56.72 (4.58)	*55*	98	53.00 (4.05)	57.89 (4.06)	*39*	87	50.46 (5.12)	56.49 (4.35)	*23*	83	49.61 (5.09)	54.30 (5.29)	*19*	95	48.94 (5.72)	54.10 (5.76)
1999/00	*117*	90	51.38 (4.72)	57.05 (4.53)	*55*	98	52.91 (4.09)	58.25 (4.26)	*39*	87	50.26 (4.76)	56.97 (4.00)	*23*	74	49.61 (5.10)	54.48 (5.07)	*19*	95	48.94 (5.72)	54.10 (5.76)
2000/01	*117*	89	51.57 (4.82)	57.31 (4.54)	*55*	98	53.22 (4.32)	58.42 (4.09)	*39*	87	50.59 (4.91)	57.41 (4.52)	*23*	70	49.30 (4.62)	54.47 (4.57)	*19*	89	49.05 (4.75)	55.21 (4.55)
2001/02	*117*	87	51.99 (4.80)	57.49 (4.67)	*55*	96	53.91 (4.03)	58.36 (3.98)	*39*	87	50.82 (4.87)	57.72 (4.27)	*23*	65	49.39 (4.69)	55.04 (4.18)	*19*	89	49.21 (4.28)	55.05 (3.37)
2002/03	*117*	87	52.01 (5.15)	57.63 (4.66)	*55*	95	53.65 (4.80)	58.15 (5.00)	*39*	85	51.03 (5.10)	58.31 (4.14)	*23*	74	49.74 (4.95)	55.26 (4.00)	*19*	89	49.21 (4.28)	55.05 (3.37)
2003/04	*117*	85	51.95 (4.53)	57.28 (4.21)	*55*	91	53.00 (4.06)	57.33 (4.53)	*39*	85	51.51 (5.00)	57.95 (3.85)	*23*	74	50.17 (4.23)	56.04 (3.84)	*19*	89	49.21 (4.28)	57.05 (3.37)
2004/05	*117*	85	52.18 (4.56)	57.69 (4.07)	*55*	91	53.25 (4.15)	57.67 (4.35)	*39*	82	51.82 (4.99)	58.21 (3.64)	*23*	78	50.26 (4.19)	56.86 (4.11)	*19*	89	49.47 (3.89)	57.74 (4.08)
2005/06	*117*	84	52.53 (4.38)	57.82 (4.09)	*55*	91	53.56 (3.98)	58.33 (4.14)	*39*	82	52.67 (4.44)	58.00 (3.76)	*23*	69	49.82 (4.18)	56.30 (4.32)	*19*	95	49.68 (4.13)	58.31 (3.80)
2006/07	*117*	83	52.69 (4.08)	58.28 (4.07)	*55*	89	53.51 (3.68)	58.64 (4.26)	*39*	82	52.69 (4.43)	58.72 (3.65)	*23*	70	50.74 (3.91)	56.70 (4.06)	*14*	93	51.29 (5.18)	58.50 (4.07)
2007/08	*117*	82	52.64 (3.85)	57.94 (4.20)	*55*	87	53.36 (3.60)	58.45 (4.20)	*39*	82	52.67 (3.90)	57.95 (4.35)	*23*	70	50.87 (3.97)	56.74 (3.88)	*14*	93	51.29 (5.18)	59.50 (4.07)
2008/09	*117*	82	52.82 (4.11)	58.63 (4.36)	*55*	87	53.98 (4.00)	59.20 (4.39)	*39*	82	52.36 (3.86)	58.36 (4.57)	*23*	70	50.83 (4.00)	57.74 (3.88)	*12*	92	51.41 (5.45)	58.83 (5.25)

Notes: Standard deviations for continuous variables are reported in parentheses. The number of observations is reported in italics.

Appendix B7

VC Academic Background 1994/95 to 2008/09 (% of All VCs ex heads of colleges of the 'Arts')

Year	N	(i) University Attended as Undergraduate (UG) and Postgraduate (PG)														(ii) Academic Specialism				
		Oxbridge		*Ancient/ Civic*		*London*		*1960s (Plateglass/ CAT)*		*Polytechnic*		*Overseas*		*Other*		*Natural Science*	*Engineer*	*Social Science*	*Arts*	*PhD*
		UG	PG	UG	PG	UG	PG	UG	PG	UG	PG	UG	PG	UG	PG					
1994/95	117	27.3	22.2	47.0	42.7	15.4	17.9	3.4	8.5	0.8	1.7	2.5	6.8	0.8	0.0	36.7	13.7	45.3	4.3	68.4
1995/96	117	27.3	23.1	46.1	42.7	15.4	16.2	3.4	9.4	0.8	1.7	3.5	6.8	0.8	0.0	36.7	14.5	43.7	5.1	68.4
1996/97	117	27.3	23.1	46.1	41.9	14.5	16.2	3.4	9.4	2.5	1.7	3.4	6.8	0.8	0.0	35.1	14.5	45.3	5.1	67.5
1997/98	117	29.9	27.3	41.9	41.9	12.0	12.8	5.1	11.1	2.5	1.7	5.1	5.1	0.8	0.0	32.5	12.0	50.4	5.1	67.5
1998/99	117	29.0	25.6	41.0	40.2	13.7	16.2	5.1	11.1	2.5	1.7	4.3	5.1	0.8	0.0	35.0	10.3	50.4	4.3	69.2
1999/00	117	26.5	24.7	42.7	39.3	13.7	17.1	6.0	11.9	2.5	1.7	4.3	5.1	1.7	0.0	35.0	10.3	49.6	5.1	70.1
2000/01	117	24.8	25.6	41.9	38.5	12.8	17.1	6.0	11.1	4.3	3.4	6.0	4.3	1.7	0.0	32.6	11.1	50.4	5.9	72.6
2001/02	117	22.2	23.1	43.6	41.0	13.7	17.9	5.1	10.2	4.2	3.4	6.8	4.3	1.7	0.0	29.9	13.7	49.6	6.8	74.4
2002/03	117	22.2	23.9	41.9	38.5	13.7	17.1	6.0	12.8	5.1	3.4	6.8	4.3	1.7	0.0	30.8	12.0	50.4	6.8	77.8
2003/04	117	22.2	20.5	41.0	37.6	16.2	21.4	6.0	11.1	5.1	4.2	5.1	5.1	1.7	0.0	30.8	12.9	50.4	5.9	76.1
2004/05	117	21.4	20.5	39.3	40.1	15.4	17.9	6.8	12.8	5.1	3.4	7.7	5.1	1.7	0.0	30.8	12.9	51.2	5.1	76.1
2005/06	117	20.5	17.9	40.2	40.1	13.6	17.9	8.5	16.2	6.0	5.1	6.0	2.5	1.7	0.0	31.6	12.0	52.1	4.3	79.5
2006/07	117	21.4	17.9	41.8	39.3	14.5	17.1	8.0	17.1	6.0	6.0	5.1	2.5	0.8	0.0	31.6	10.3	53.8	4.3	80.3
2007/08	117	19.6	17.1	44.4	48.4	11.9	17.9	6.0	17.9	8.5	6.0	5.1	2.5	0.8	0.0	31.6	9.4	51.3	7.7	82.0
2008/09	117	19.6	15.4	41.8	37.6	11.9	18.8	7.7	19.7	9.4	6.0	5.1	2.5	0.8	0.0	32.5	8.5	51.3	7.7	83.8
% change	n/a	-28.2	-30.6	-11.1	-11.9	-22.7	5.0	126.5	131.8	1075	252.9	104.0	-63.2	0.00	0.00	-11.4	-37.9	13.2	79.0	22.5
N / Mean	*1755*	24.1	22.0	44.7	40.2	13.9	17.3	6.7	12.7	4.2	3.5	5.1	4.3	1.3	0.00	32.9	11.8	49.7	5.6	74.2

Notes . See appendix B2 for definitions of categories.

Appendix B8

Esteem, Work Experience, Training and Tenure All VCs (ex. Heads of Colleges of the Arts) 1994/95 - 2008/09

		(i) Esteem and Public Honours (%)				(ii) Work Experience (%)				(iii) Training and Tenure				
Year	N	professor	Honorary Degree	Fellow of the Royal Society	Knighted	Civil Servant	Dept. Education	Industry	Academia	External appointment (%)	Former Vice Chancellor (%)	Former Pro-Vice Chancellor (%)	Tenure in years (s.d)	Appointment expired (%)
1994/95	117	82.9	50.4	11.1	13.7	7.7	1.7	4.3	86.3	69.8	7.35	31.6	8.5 (5.33)	10.2
1995/96	117	87.2	50.4	11.9	13.7	8.5	1.7	4.3	85.5	69.8	6.62	33.3	10.56 (6.94)	7.6
1996/97	117	87.2	50.4	11.9	14.5	10.2	2.5	2.5	84.8	60.7	5.88	34.2	8.38 (5.03)	17.9
1997/98	117	88.9	52.9	10.2	11.9	8.6	1.7	2.5	87.2	64.1	6.62	38.4	9.69 (4.66)	11.1
1998/99	117	88.0	49.6	10.2	13.7	9.4	1.7	1.7	87.2	69.2	5.89	41.0	7.50 (4.69)	6.8
1999/00	117	88.0	49.6	10.2	14.5	9.4	1.7	2.5	86.4	68.4	6.62	42.7	7.64 (3.43)	11.9
2000/01	117	86.3	51.3	8.5	16.2	8.5	1.7	3.4	86.4	72.6	7.35	47.9	8.50 (3.95)	13.6
2001/02	117	86.3	52.1	6.8	14.5	7.6	1.7	4.3	86.4	75.2	11.0	48.7	7.43 (3.10)	11.9
2002/03	117	87.2	52.9	6.8	11.9	6.8	1.7	5.1	86.4	73.5	11.0	50.4	8.11 (4.30)	15.4
2003/04	117	85.5	47.0	4.3	12.8	7.7	0.8	5.1	86.4	74.4	9.56	53.0	9.50 (4.48)	8.5
2004/05	117	86.3	42.7	4.3	9.4	7.7	0.8	5.1	86.4	78.7	11.0	53.0	8.37 (4.74)	13.6
2005/06	117	87.2	39.3	4.3	7.7	7.7	1.7	5.9	84.7	80.3	10.3	53.8	10.00 (5.83)	5.9
2006/07	117	88.0	35.9	5.1	8.5	7.7	1.7	5.1	85.5	82.9	11.5	53.0	8.28 (4.58)	15.3
2007/08	117	88.0	29.0	5.1	6.8	6.0	0.8	5.1	88.1	83.8	13.0	54.7	7.00 (5.58)	6.8
2008/09	117	88.9	29.0	5.1	7.7	6.0	0.8	4.3	88.9	82.0	15.4	55.6	6.41 (3.53)	14.5
% change	n/a	7.7	-42.5	-54.1	-43.8	-22.1	-52.9	0.0	3.0	17.5	109.5	75.9		n/a
N / Mean	*1755*	87.0	45.5	7.7	11.8	8.0	1.5	4.1	86.4	72.3	9.4	52.0	8.3 (4.57)	11.4

Notes : See appendix B2 for definitions of categories. Figures for Tenure are for those VCs who completed their term in office

Appendix C1

UK Student Loans and Grants 1962 to 2010

1962/63	Mandatory maintenance grants are introduced for students to cover tuition fees and living costs, following the publication of the Robbins report
1980	Student grants are increased from £380 to £1,430.
1984	The then Conservative Education Secretary Keith Joseph abandons plans for parents to be made to contribute to tuition fees.
1989/91	The Government freeze grants and introduce student loans, following the publication of the 1990 Higher Education Act. Grants of up to £2,265 remain available for poorer students, while loans of up to £420 are on offer to all applicants.
1996	John Major, the then Conservative prime minister, commissions Lord Dearing to make recommendations on higher education funding.
1997	Labour is elected on a manifesto which includes a commitment to ensure that "the costs of student maintenance should be repaid by graduates on an income-related basis ..." The Dearing report is published. It recommends that students should pay approximately 25 per cent of the cost of tuition but that government grants should remain in place. David Blunkett, the then Labour Education Secretary, announces the introduction of £1,000 tuition fees to be paid by every student in each year of study, beginning in September 1998. The student grant of £1,710 is abolished to be replaced by means-tested student loans.
1998	The Teaching and Higher Education Act is passed into law – setting an annual tuition fee for England of £1,000. Means testing means a third of students will not pay anything.
1999	A committee led by Lord Cubie begins a comprehensive review of higher education funding in Scotland. The Cubie report recommends in December that tuition fees in Scotland should be scrapped and the Scottish executive should fund higher education in full. Students would be required to pay £3,000 of it back when their earnings reached £25,000 a year.
2000	The Scottish executive accepts Lord Cubie's proposals, with one adjustment. Students in Scotland must now pay back £2,000, not £3,000, but repayments start once earnings reach just £10,000 – way below the £25,000 recommended.
2001	Labour is re-elected with a manifesto pledge that it "will not introduce top-up fees and has legislated against them".
2002	More than 80 Labour backbenchers support calls to scrap tuition fees.
2003	Less than two years after pledging not to introduce top-up fees, the Labour government publishes a white paper setting out proposals to allow universities to set their own tuition fees up to a cap of £3,000 a year. The fees were to be repaid once graduates earn above £15,000 and will be accompanied by a means-tested package of support. Tony Blair faces his biggest backbench rebellion as prime minister in a vote on top-up fees, with 72 Labour MPs voting against the motion. He wins by five votes. The government announces a full-scale independent review of the top-up fees system after three years in a bid to head off the rebels. Iain Duncan Smith, the Conservative leader, pledges that all university tuition fees would be abolished under a future Tory government and condemning the fees as "a

	tax on learning".
2004	Charles Clarke, the Labour Education Secretary, stands by his plans to introduce variable tuition fees but presents a series of concessions to Labour rebels in a bid to avoid defeat in the Commons vote on January 27. Amendments to the bill include an increase in the maintenance grant for the poorest 30 per cent of students from £1,000 to £1,500. There will be an independent review of the £3,000 fee cap after three years. Student loans will be increased to meet the real cost of living, and all student debt will be written off after 25 years.
2005	Almost all universities set fees at the maximum level of £3,000 per year, while about eight out of 10 offer bursaries to students from low-income families.
2006	Students starting university in the autumn become the first to be charged the higher £3,000 fees. Universities say they still need £1.3bn in extra funding. Conservative leader, David Cameron, says tuition fees are unavoidable. "The money's got to come from somewhere."
2008	The National Union of Students drops its opposition to tuition fees.
2010	Lord Browne recommends that students should pay at least £21,000 for a three-year-degree in the most radical shake-up of higher education funding for 50 years.
2012	Maximum tuition fee set at £9,000 per annum.

Source: The Telegraph 10/11/10

Appendix C2

Brown's *et al.* Model of Expected Debt

Brown *et al.* (2005a) propose a theoretical model to examine the relationship between expected future income and debt which can be easily applied to student indebtedness. The author's assume two time periods (t=1,2) where consumers can borrow (or save) freely between each period at an interest rate factor of R (where R = 1 + r, with 0 < r >1). Their time preference is defined as R^{-1}. They further assume that consumers have a twice differentiable utility function that is strictly concave in consumption, i.e. U′(C), U″(C) < 0. With price normalised to 1 the individual's utility function can be expressed:

$$U(C_t) \qquad [C2.1]$$

where C_t is consumption in period t. Lenders are assumed risk neutral and earn zero profits on their lending denoted by D. Borrowers are assumed to have a certain first period income $y_1 > 0$ but second period income $y_2 > 0$ may be high (y_{2H}) or low (y_{2L}) . The high income state in the second period occurs with exogenous probability *p* where $0<p<1$, and the low income state with probability 1-*p*. It is assumed that borrows can always pay back their debt i.e. $D < y_{2L}/R$, thus there is consumption smoothing.

In the first period consumers maximise the utility function:

$$U(y_1 + D) + (pU[y_{2H} - RD] + (1-p)U[y_{2L} - RD])/R. \qquad [C2.2]$$

The first order condition is expressed:

$$U'(y_1 + D) = pU'[y_{2H} - RD] + (1-p)U'[y_{2L} - RD]) \qquad [C2.3]$$

Partially differentiating this last expression in the optimum loan size D with respect to *p* gives:

$$\frac{\partial D}{\partial p} = \frac{U\prime[y_{2H}-RD]-U\prime[y_{2L}-RD\,]}{U\prime\prime[y_1+D]+R[pU''(y_{2H}-RD)+(1-p)U''(y_{2L}-RD)]} > 0 \qquad [C2.4]$$

Given that both the numerator and denominator are negative by concavity the above expression is positive. Debt incurred in period one is positively correlated with optimistic expectations in the second period. Thus some form of consumption smoothing over the time period explains this positive effect. The authors extend the model to situation where individuals face repayment difficulties in the second period and a situation in which borrowers have unlimited liability and lenders can appropriate the money lent. In both cases optimistic second period financial expectations is positively associated with debt.

Appendix C3

Details of the Student Questionnaire

The questionnaire was administered by myself with no other staff involved during January/February 2009 in seminars and lectures to full-time business and finance students who were registered on three-year business degree programmes at the university of Brighton. The students were given instructions on how to fill in the questionnaire and informed that the questionnaire had two sections. They were told that the first section related to questions concerning their personal characteristics (questions 1- 7); family characteristics (questions 8 – 11); personal financial situation (questions 12-14); and future financial expectations (questions 15-20). Students were given 10 minutes to fill in the first part and were assured that all information would be strictly confidential and not to enter any identifying information (e.g. name or student number) other than the general information requested on the questionnaire. Students were also told that the exercise was voluntary and they had the right to refuse to partake, but only a few refused. Once all students had completed section one they were given instructions on how to fill in the second section. They were informed that the questions related to their subjective risk attitudes, risk taking behaviour, and time preference. In particular questions 2-4 in this section were described in detail to the students before they answered the questions. Students were given an extra five minutes to fill in this part of the questionnaire once instructed on how to do so. In total the questionnaire took between 20-25 minutes to administer and collect in. It was felt that this would be enough for students on any one sitting and it was not possible to have longer as the seminar/lecture only lasted for 50 minutes which meant that there were only 20 minutes left for teaching. This was the most that colleagues were willing to give up. Furthermore, it was not possible to do any follow-up questions (e.g. questions relating to the span of control) due to the practicalities of finding a suitable time. More importantly this meant that students had to be ‘identified’ which is against the university’s policy on research ethics. A copy of the questionnaire is provided below.

Questionnaire for Students

Section 1: Basic Details

1. Age: …….. **2. Are you:** Male □ Female □

3. What do you consider to be your race or cultural origin? Please tick one of the following

□ White British □ Black Other □ Black British □ White Irish
□ Indian □ Other □ White Other □ Pakistani
□ Black African □ Bangladeshi □ Black Caribbean □ Chinese

4. Please tick all the qualifications that you have:

□ No formal qualifications □ GCSE/O-Level/Scottish O grade
□ NVQ/City and Guilds □ A-Level/Scottish Higher
□ GNVQ □ Degree
□ HNC/HND/SHNC/SHND □ Other

5. Subject of your degree:……..**Year of Your Degree** _____

6. Are you married or living with someone as 'married'? □ Yes □ No

7. Do you think you will ever become self-employed in your career?

□ Yes □ No □ Possibly □ Don't Know □ Have Already

8. Do either/both of your parents have a university degree?

Mother □ Yes □ No **Father** □ Yes □ No

9. What are your parents occupation(s):

Mother _____ **Father** _____

10. Do your parents own their own house? □ Yes □ No

11. Can you estimate your family's gross annual income. £_____

12. Are you in receipt of a grant/scholarship or other financial support?

□ Yes □ No

13. Are your parents contributing towards your subsistence? □ Yes □ No

If so how much approximately per month? £_____

14. Do you work during term-time? □ Yes □ No

15. In your first job after graduation what do you expect to earn (gross per year)?

£……

16. By the age of 30, how much do you expect to be earning gross per year?

□ As self-employed **£**…….. □ As Employed **£**…….

17. By the age of 30, if you had <u>not done a degree</u> how much do you expect to be earning gross per year?

□ As self-employed **£**…….. □As Employed **£**……..

18. What is your best estimate of the average expected (gross annual) earnings, at age 30, of someone on your course.

£……

19. What will your estimated debt be at the end of the *<u>current academic year</u>*? (Exclude mortgage debt. If you will not be in debt, please answer zero).

£……

20. What will your estimated debt be at the end of your *<u>course</u>*? (Exclude mortgage debt. If you will not be in debt, please answer zero).

£……

Section 2: Risk Attitude Related Questions

1. Please *tick* Yes or No	**Yes**	**No**
a) Do you have a personal accident/illness or medical insurance policy?	□	□
b) Do you smoke?	□	□
c) Do you usually take out travel insurance when you travel abroad?	□	□
d) Have you incurred interest charges on credit cards in the last year?	□	□
e) Do you regularly play the football pools or the lottery?	□	□
f) Do you have a personal savings account?	□	□
g) Have you used a slot/fruit machine in the last week?	□	□
h) Do you walk out of your way to cross roads at pedestrian crossings?	□	□
i) Have you ever participated in any of the following sports? Hand gliding, parascending, parachuting, bungee-jumping, climbing, flying or motor racing?	□	□

2. Please *tick* the boxes best describing your attitude to the statements.

	Strongly Agree	Slightly Agree	Neither	Slightly Disagree	Strongly Disagree
a) I would not feel comfortable speaking to a bank manager about getting a business loan.	□	□	□	□	□
b) I enjoy the risk of situations that many consider challenging.	□	□	□	□	□
c) I am not scared of being in debt.	□	□	□	□	□
d) I do not handle uncertainty well.	□	□	□	□	□

3. Someone offers you a bet. You will win a net amount of £1,000 with probability 0.5 or end up losing the initial bet and your stake with probability 0.5. Please *tick* the maximum amount you are prepared to pay for this gamble.

□ Will not participate	□ £200	□ £800
□ £50	□ £400	□ £1,000
□ £100	□ £600	□ £1,100

4. If you are given £1,000 in Dec 2008 and five of your friends (A, B, C, D and E) are given the following amounts in Dec 2009. How would you consider your situation compared to theirs? Are you better off, worse off or the same?

	Better	**Worse**	**Same**
A £1,050	□	□	□
B £1,100	□	□	□
C £1,000	□	□	□
D £1,200	□	□	□
E £ 950	□	□	□

5. How do you see yourself? Are you generally a person who is fully prepared to take risks, or do you try to avoid taking risks? Please check a box on the scale where the value 0 means: "not prepared to take risks" and the value 10 means: "fully prepared to take risks." You can use the values in between to make your estimate.

Not prepared to take risks — *Fully* prepared to take risks

□0 □1 □ 2 □3 □ 4 □5 □6 □7 □8 □9 □10

Appendix C4

Tobit Maximum Likelihood Estimates: Index Function

	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Gender (male)	2778.829** (1135.057)	2698.596** (1126.108)	1945.72* (1145.521)	2200.331* (1164.468)	1716.42 (1153.611)
white non-British	-2707.252 (1703.659)	-2849.808* (1691.023)	-2480.673 (1680.933)	-2509.062 (1677.272)	-2397.787 (1675.025)
other ethnic group	-4451.135*** (1338.231)	-4731.201*** (1334.493)	-3783.644*** (1358.557)	-3763.769 *** (1355.364)	-3578.558*** (1360.942)
white British	*f*	*f*	*f*	*f*	*f*
age (years)	-105.485 (185.223)	-85.95528 (183.083)	-68.06565 (181.5533)	-62.74967 (181.5119)	-64.66597 (180.8673)
grant/scholarship	1374.403 (1242.840)	1136.778 (1237.174)	814.1341 (1228.101)	919.3138 (1228.78)	726.4714 (1224.727)
has part-time job	-9329.065*** (1314.503)	-9250.845*** (1303.963)	-9126.963*** (1290.228)	-9138.506*** (1287.42)	-9300.18*** (1291.812)
monthly contribution (£)	-12.71511*** (2.785663)	-12.60206*** (2.772099)	-12.87514*** (2.754683)	-12.99704*** (2.751435)	-13.05032*** (2.747557)
first year student	1185.199 (1598.316)	1579.376 (1595.03)	1692.697 (1577.31)	1614.65 (1574.97)	1784.475 (1572.276)
second year student	4624.307** (1865.06)	4613.493** (1850.392)	4789.544*** (1831.436)	4805.839*** (1826.018)	4865.126*** (1824.783)
third year student	*f*	*f*	*f*	*f*	*f*
family home owners	-3364.937** (1542.454)	-3425.212** (1529.731)	-3113.935 ** (1515.613)	-3181.503** (1513.154)	-3330.741** (1517.94)
Mother and father university educated	-3563.146** (1502.076)	-3633.47** (1488.673)	-3756.185** (1475.511)	-3737.955** (1472.095)	-3786.544** (1469.363)
Expected earnings >£30,000 after graduation	4398.127** (1718.200)	4306.177** (1703.67)	2777.089* (1663.05)	2997.096* (1773.093)	2832.511* (1760.28)
Expected earnings >£50,000 at 30	2975.695*** (1112.742)	2975.397*** (1103.299)	2800.379*** (1092.935)	2850.978*** (1091.354)	2929.138*** (1093.169)
discount rate	§	15388.66** (7053.512)	15023.42** (6973.531)	14726.24** (6961.176)	14736.54** (6948.69)
risk attitude	§	§	811.2701*** (291.0654)	862.2457*** (293.8944)	764.4649*** (291.6456)
debt aversion	§	§	§	494.1774 (432.7096)	§
uncertainty aversion	§	§	§	§	686.6526 (509.2374)
σ	9113.382 (425.2541)	9034.38 (421.4977)	8923.831 (493.4554)	8901.029 (490.5441)	8888.974 (492.6188)
Goodness of fit stats:					
R^2 - ANOVA	0.263	0.275	0.277	0.281	0.277
R^2 - Decomposition	0.272	0.284	0.287	0.291	0.290
Log-Likelihood	-2686.349	-2683.987	-2680.104	-2679.454	-2679.199
Likelihood Ratio Test - χ^2_k	138.95 [0.000]	143.68 [0.000]	151.44 [0.000]	152.75 [0.000]	153.25 [0.000]
Observations	308	308	308	308	308

Notes to table:
(a) All estimations reported were undertaken using NLOGIT 3.0 (2003).
(b) Asymptotic standard errors are reported in parentheses.
(c) * denotes significant at 10%; ** significant at 5%; *** significant at 1%
(d) *f* denotes base category in estimation
(e) § denotes variable not used in estimation
(f) R^2- ANOVA = variance in predicted conditional mean over variance in dependent variable
(g) R^2 – Decomposition = variance in predicted mean over variance in predicted mean plus model residual variation
(h) The likelihood ratio test is defined: -2×(Log-likelihood value (constant only) - Log-likelihood value (full model). The test statistic is a chi-squared statistic with the degrees of freedom determined by the number of independent variables (*k*) in the relevant specification. The null tests the joint restriction that all the estimated coefficients from a specific specification are simultaneously equal to zero.

Appendix C5

Tobit Maximum Likelihood Estimates: Index Function Debt at End of Academic Year

	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Gender (male)	1382.324** (642.875)	1341.854 ** (639.805)	954.818 (652.865)	973.838 (665.001)	829.095 (658.165)
white non-British	-2298.497** (969.591)	-2367.636** (965.426)	-2183.509 ** (962.621)	-2186.919** (962.967)	-2134.721** (959.995)
other ethnic group	-2893.911*** (758.950)	-3022.941*** (758.896)	-2539.793*** (774.482)	-2538.935*** (774.526)	-2434.801*** (776.078)
white British	*f*	*f*	*f*	*f*	*f*
age (years)	-78.633 (104.145)	-87.565 (103.339)	-96.520 (102.798)	-96.931 (102.862)	-98.390 (102.500)
grant/scholarship	565.501 (703.883)	462.736 (702.509)	309.979 (699.122)	317.971 (701.167)	264.344 (697.633)
has part-time job	-4282.681*** (745.148)	-4237.705*** (741.373)	-4184.527*** (735.909)	-4186.052*** (736.022)	-4286.087*** (738.115)
monthly contribution (£)	-6.848*** (1.590)	-6.7914*** (1.585)	-6.936*** (1.580)	-6.947*** (1.581)	-7.047*** (1.579)
first year student	-7768.769*** (892.242)	-7594.654*** (892.212)	-7540.187 *** (885.089)	-7545.894 *** (885.943)	-7487.205*** (883.178)
second year student	-3876.944*** (1040.466)	-3893.02*** (1034.963)	-3796.898 *** (1027.518)	-3794.812*** (1027.551)	-3747.941*** (1024.977)
third year student	*f*	*f*	*f*	*f*	*f*
family home owners	-1635.141* (876.014)	-1657.87* (871.572)	-1497.808* (866.271)	-1503.426* (867.073)	-1613.016* (868.035)
Mother and father university educated	-2203.927** (856.041)	-2232.516 *** (850.893)	-2312.594 *** (846.739)	-2312.164*** (846.792)	-2323.25*** (843.664)
Expected earnings >£30,000 after graduation	2262.548** (971.933)	2217.806** (966.880)	1435.436 (1004.593)	1452.516 (1011.012)	1468.641 (1001.924)
Expected earnings >£50,000 at 30	1381.648** (631.672)	1381.485** (628.190)	1286.742** (624.393)	1291.072** (625.086)	1356.243** (625.049)
discount rate	§	7136.448* (4005.636)	6970.494* (3972.902)	6950.364* (3975.198)	6850.687 * (3961.041)
risk attitude	§	§	422.2024** (167.206)	426.0842** (169.197)	395.7183** (167.697)
debt aversion	§	§	§	37.14454 (246.581)	§
uncertainty aversion	§	§	§	§	374.250 (290.117)
σ	5125.616 (241.171)	5097.048 (239.800)	5049.157 (237.249)	5049.087 (237.244)	5033.051 (236.471)
Goodness of fit stats:					
R2 - ANOVA	0.316	0.325	0.325	0.325	0.326
R2 - Decomposition	0.340	0.248	0.346	0.346	0.347
Log-Likelihood	-2493.985	-2492.405	-2489.206	-2489.195	-2488.376
Likelihood Ratio Test - χ^2_k	166.89 [0.000]	170.05 [0.000]	176.45 [0.000]	176.47 [0.000]	178.11 [0.000]
Observations	308	308	308	308	308

Note to tables:
(a) Asymptotic standard errors are reported in parentheses.
(c) * denotes significant at 10%; ** significant at 5%; *** significant at 1%
(d) *f* denotes base category in estimation and § denotes variable not used in estimation
(f) R^2- ANOVA = variance in predicted conditional mean over variance in dependent variable
(g) R^2 – Decomposition = variance in predicted mean over variance in predicted mean plus model residual variation
(h) The likelihood ratio test is defined: -2×(Log-likelihood value (constant only) - Log-likelihood value (full model). The test statistic is a chi-squared statistic with the degrees of freedom determined by the number of independent variables (*k*) in the relevant specification. The null tests the joint restriction that all the estimated coefficients from a specific specification are simultaneously equal to zero.

Appendix D1

Table 1 Proposed UK GPA Classification Scheme

Grade	Standard	Grade Point	UK current descriptor
A+	Excellent	4.25	Top 1st
A	Excellent	4.00	Good 1st
A-	Excellent	3.75	Low 1st
B+	Good	3.50	High 2-1
B	Good	3.25	Mid 2-1
B-	Good/Satisfactory	3.00	Low 2-1
C+	Satisfactory	2.75	High 2-2
C	Satisfactory	2.50	Mid 2-2
C-	Satisfactory	2.25	Low 2-2
D+	Adequate	2.00	3rd
D	Pass	1.00	Low 3rd or pass
D-	Marginal Fail	0.50	Marginal Fail
F	Fail	0.00	Fail

Source: Higher Education Academy (2013)

Table 2 US GPA Classification Scheme

Grade	Percentage Grade	Grade Point
A+	97-100	4.25
A	93-96	4.00
A-	90-92	3.75
B+	87-89	3.50
B	83-86	3.25
B-	80-82	3.00
C+	77-79	2.75
C	73-76	2.50
C-	70-72	2.25
D+	67-69	2.00
D	65-66	1.00
E/F	Below 65	0.00

Source: College Board: http://www.collegeboard.com/html/academicTracker-howtoconvert.html

US universities and colleges are free to determine their own degree classification systems, but in general, most universities and colleges award degrees according to a five-point letter scale: A+ (the highest qualification) and E/F (the lowest classification). These grades are determined by a student's grade point average (GPA) that typically ranges from 0 for an E/F-grade to 4 for an A-grade. Students are required to attain a minimum GPA to continue with their studies within a university. A student's GPA is determined by the numerical value of the letter grade awarded in each course taken during a semester weighted by the credits each course attracts determined by the hours timetabled for each course. Some universities use a 100-point grading system. Similar, grading systems are used in American high schools, but the number of classes and the thresholds delineating classes can differ between states.

Appendix D2

Variable Definitions for Primary Empirical Analysis

Variable	***Definition***	**Source**
% good degrees	Percentage of 1st Class and upper second (2:1) awarded in year of observation (leaving year)	Higher Education Statistical Agency (HESA)
% Female Graduates	Percentage of FTE HE Female students graduating in year of observation	HESA Students in HE
% Science Graduates	Percentage of FTE students on science related undergraduate programmes excluding medically related subjects relative to Arts undergraduate programmes	Science subjects include: Biological sciences; Veterinary science; Agriculture and related sciences; Physical sciences; Mathematical sciences; Computer science; Engineering and technology. Arts Subjects include: Social studies; Law; Business and administrative studies; Mass communications and documentation; Languages; Historical and philosophical studies; Creative arts and design; Education.
% UK Domiciled Students	Proportion of FTE undergraduate students domiciled in the UK to all undergraduates.	HESA Students in HE: FTE undergraduate (UG) students. UK domiciled students are those whose normal residence is in the UK (inc. Guernsey, Jersey and the Isle of Man) European Union (EU) students are those whose normal residence is in countries which were European Union (EU) members as at 1 December of the reporting period. Non-European Union students are those whose normal residence prior to commencing their programme of study in the UK resided outside the EU.
% Students from State Schools	Percentage of young full-time undergraduate entrants from state schools or colleges	Higher Education Statistical Agency (HESA) Performance Indicators: Table T1b - Participation of under-represented groups in higher education: Young full-time undergraduate entrants. Available at: www.hesa.ac.uk/pis/urg
Pre-entry points	Median entry tariff points of students on admission to specific university	The data are compiled as part of the National Student Survey (NSS) and available on the Higher Education Funding Council for England's (HEFCE) website: http://www.hefce.ac.uk/whatwedo/lt/publicinfo/nationalstudentsurvey/nationalstudentsurveydata/
NSS student satisfaction score	The average value of overall student satisfaction with their programme of study measured on a scale of 0-100. The higher the rating the better is students' overall satisfaction with the teaching and overall learning experience.	The data can be found on the HEFCE website: http://www.hefce.ac.uk/whatwedo/lt/publicinfo/nationalstudentsurvey/nationalstudentsurveydata/ and includes the response to question 22 on the student questionnaire 'Overall, I am satisfied with the quality my course' that is used in the analysis. It should be noted that these scores were registered on a scale from 1-5 in 2005 and 2006 and the results were multiplied by 20 to make them comparable to satisfaction ratings from 2007 onwards.

Variable	***Definition***	**Source**
ln Expenditure	Natural logarithm of real total expenditure (£'000) on academic services (1998=100)	Expenditures on: Central Libraries and Information Services; Central Computer and Computer Networks; and other academic services. Including Staff costs (Academic/Other Academic /Other service staff); Other expenses and depreciation of equipment). 2002/03 Finance Return (£000s) Table 6 Expenditure by Activity: Academic Services
Staff-Student Ratio	Numerator: Total FTE of students studying at higher education institutions. Denominator: Total FTE of teaching /teaching and research academic staff and atypical teaching staff.	HESA: Students and staff in HE
% FTE undergraduate students	Percentage of full-time equivalent undergraduate students to all FTE equivalent students	HESA: Students in HE
% First Year Drop Outs	Percent of full-time first degree entrants who are no longer in HE	Performance Indicators: Table T3a - Non-continuation following year of entry: Full-time first degree entrants. Available at: www.hesa.ac.uk/pis/urg
VC	Dummy for change of Vice Chancellor	Whos Who (various years) An Annual Biography, London: A and C Black, and university websites.

Appendix D3

The Universities and Colleges Admissions Service Points System

Qualification	A-level	A/S	Advanced Scottish Highers	Scottish Highers
Grade				
A*	140	N/A	N/A	N/A
A	120 (10)	60 (5)	130	80
B	100 (8)	50 (4)	110	65
C	80 (6)	40 (3)	90	50
D	60 (4)	30 (2)	72	36
E	40 (2)	20 (1)	N/A	N/A

Source: UCAS tariff tables accessed September 2012 available at: http://www.ucas.com/how-it-all-works/explore-your-options/entry-requirements/tariff-tables

The first A-level students to be awarded points based on the new UCAS tariff shown above completed their A-levels, Scottish Highers, or Advanced Vocational Certificate in Education (AVCE) in 2002. Further information on allocation of points for the AVCE and other qualifications can be found on the UCAS website as referenced above. The points previously awarded to specific grades in the old points system are shown in parenthesis next to the current scores. It should be noted that the A* grade was first awarded in 2010 to indentify exceptional A-level performance as concern was raised over grade inflation at A-level. It is also important to note that a one-year A/S qualification was also introduced at the same time which is typically seen as equivalent to half a full A-level and the grades achieves in this qualification attracts half the tariff points for the equivalent grades in the 'full' two year A-level qualification as shown in column three in the table. It should also be noted that AVCE qualifications can be combined with a traditional A-level.

Appendix D4

Variable Definitions and Summary Statistics for Variables used for the Secondary Empirical Analysis

Variable	Definition	Proportion
Good Degree	= 1 if 1st or 2:1 degree class, zero otherwise	0.546
Individual Characteristics[2]		
Female	= 1 if female, zero otherwise	0.577
Age at entry:		
18-20	= 1 if aged 18-20, zero otherwise	0.718
21-24	= 1 if aged 21-24, zero otherwise	0.183
25-29	= 1 if aged 25-29, zero otherwise	0.045
30+	= 1 if aged is 30 or over, zero otherwise	0.054
$\chi^2_3 = 132.54$ [*p-value* =0.000]		
Ethnicity:		
White	= 1 if white, zero otherwise	0.821
Asian	= 1 if asian, zero otherwise	0.058
Black	= 1 if black, zero otherwise	0.036
Mixed Race	= 1 if mixed race, zero otherwise	0.032
Other Ethnic	= 1 if other ethnic group, zero otherwise	0.011
Ethnicity unknown	= 1 if ethnicity is unknown, zero otherwise	0.042
$\chi^2_5 = 22.89$[*p-value* =0.000]		
Area of origin:		
UK	= 1 if UK domiciled, zero otherwise	0.921
EU	= 1 if EU domiciled, zero otherwise	0.046
Overseas	= 1 if overseas domiciled, zero otherwise	0.033
$\chi^2_2 = 0.76$ [*p-value* =0.685]		
Other characteristics		
Full-time programme	= 1 if full-time student, zero otherwise	0.981
Disability declared	= 1 if disability declared, zero otherwise	0.116
Clearing	= 1 if entered the university through clearing, zero otherwise	0.085
Pre-entry qualifications		
UCAS Points:[3]		
≤160	= 1 if UCAS entry points *≤160*	0.116
161 - 260	= 1 if UCAS entry points *161 - 260*	0.271
261 - 319	= 1 if UCAS entry points *261 - 319*	0.221
≥ 320	= 1 if UCAS entry points *≥ 320*	0.161
Other UK qualification (non A-level)[4]	= 1 if student holds non-A level qualification	0.055
HE qualification [5]	= 1 if student holds a higher education qualification below the level of a honours degree, zero otherwise	0.121
Non-UK qualification	= 1 if student holds non-UK qualification, zero otherwise	0.047
No formal qualification	= 1 if no formal educational qualification is held, zero otherwise	0.008
$\chi^2_7 = 188.97$ [*p-value* =0.000]		
Year of exit		
2005/06	= 1 if year of exit is 2006, zero otherwise	0.208
2006/07	= 1 if year of exit is 2007, zero otherwise	0.226
2007/08	= 1 if year of exit is 2008, zero otherwise	0.189
2008/09	= 1 if year of exit is 2009, zero otherwise	0.185
2009/10	= 1 if year of exit is 2010, zero otherwise	0.192
$\chi^2_4 = 6.49$ [*p-value* =0.165]		

Variable	Definition	Proportion
Head of household's occupational group:[6]		
White collar/professional	= 1 if white collar/professional occupation, zero otherwise	0.574
Skilled manual/non-manual	= 1 if skilled manual/non-manual occupation, zero otherwise	0.249
Semi-skilled/unskilled	= 1 if semi-skilled/unskilled occupation, zero otherwise	0.160
Unemployed/retired	= 1 if unemployed or retired, zero otherwise	0.017
χ^2_3=6.73 [*p-value* =0.081]		
School of Study		
Architecture and design	= 1 if architecture or design, zero otherwise	0.073
Art and communication	= 1 if arts or communication studies, zero otherwise	0.093
Historical and critical studies	= 1 if historical or critical studies, zero otherwise	0.035
Business and finance	= 1 if business or finance, zero otherwise	0.145
Service management	= 1 if service management, zero otherwise	0.057
Computing, mathematical and information services	= 1 if studying for honours degree in computing, mathematics or information services, zero otherwise	0.080
Sports science	= 1 if sports science, zero otherwise	0.101
Education	= 1 if education, zero otherwise	0.089
Modern Languages	= 1 if modern languages, zero otherwise	0.036
Social science	= 1 if social science, zero otherwise	0.082
Health care	= 1 if health care, zero otherwise	0.042
Engineering	= 1 if engineering, zero otherwise	0.031
Environmental sciences	= 1 if environmental sciences, zero otherwise	0.069
Pharmacy and biological sciences	= 1 if pharmacy and biological sciences, zero otherwise	0.067
χ^2_{13} = 1700 [*p-value* =0.000]		
Number of observations		11358

Notes:

[1] z-scores are used to test differences in sample proportions between females and males. The appropriate critical value at the 0.05 level using a two-tailed test is ± 1.96.

[2] Chi-squared values are used to test the assumption of independence in the sets of categorical variables and performance. The significance levels of these tests are reported in parenthesis.

[3] The scores reported are those for A-level, AVCE and Scottish Higher or equivalent qualifications.

[4] Other UK qualifications include Access, BTECH and NVQ level 3 qualifications

[5] HE qualifications include HND, HNC and Foundation degrees and other HE qualification lower than degree standard.

[6] Occupational groups: 1) White collar and professional occupations include: CEOs/senior managers of large public/private sector companies, local government senior officers, bank/financial service managers surveyors, officers in the armed forces, university/FE lecturers, teachers, doctors, lawyers, accountants, chemists, physicists etc; 2) Skilled manual/non-manual include: librarians, medical and legal secretaries, bricklayers, machine operatives, welders, train drivers, HGV drivers etc. 3) Semi-skilled/ unskilled include: traffic wardens, assistant teacher/nurses hairdressers, farm labourers sales assistants etc.

Appendix D5

True Random Effects Estimates
(Exponential Distribution for the Efficiency Term)

Variable Name	**Coefficient**	***Robust Standard error***
Students Characteristics		
Ln (% Female Graduates)	0.062	*0.071*
Ln (% Science Graduates)	-0.004	*0.007*
Ln (% UK Domiciled Students (lagged 3 years))	0.148**	*0.070*
Ln(% Students from State Schools (lagged 3 years))	-0.244**	*0.110*
Ln (Median entry points (lagged 3 years))	0.247***	*0.046*
Ln(NSS score (lagged 1 year))	-0.017	*0.106*
University Characteristics		
Pre-1992 university	0.050***	*0.019*
Post-2003 university	-0.013	*0.040*
Post-1992 university	*f*	
Ln (expenditure (in 1998 prices))	0.002	*0.013*
Ln(Staff-student ratio)	0.020	*0.027*
Ln(% FTE undergraduate students)	-0.122	*0.099*
Ln(% First year drop outs (lagged 3 years))	-0.022*	*0.012*
Ln(VC tenure (years))	0.001	*0.004*
Year Dummies		
Year dummy 2012	0.089***	*0.012*
Year dummy 2011	0.046***	*0.010*
Year dummy 2010	0.025***	*0.009*
Year dummy 2009	0.003	*0.008*
Year dummy 2008	-0.001	*0.007*
Year dummy 2007	-0.0004	*0.006*
Year dummy 2006	*f*	
σ_u^2	0.048***	*0.005*
σ_v^2	0.031***	*0.004*
σ_v^2/σ_u^2	1.568	*0.007*
F-statistic[§] / Wald test χ^2_{20}	746.21 [0.000]	
Simulated- likelihood	934.1582	
Observations	700	
Number of universities	100	

Notes to table:
(a) Robust standard errors corrected for clustering by university.
(b) * significant at 10%; ** significant at 5%; *** significant at 1%
(c) f denotes base category in estimation.

Appendix D6

Maximum Likelihood Probit (index) Estimates for 'Good' Degree Classification

	Probit index function	
	Coefficient	***Robust Standard error***
Constant	-0.882***	*0.171*
Female	0.239***	*0.055*
Age at entry		
21-24	0.232***	*0.044*
25-29	0.255***	*0.083*
30+	0.330***	*0.134*
18-20	*f*	
Ethnicity		
Asian/British Asian	-0.418***	*0.088*
Black/British Black	-0.472***	*0.055*
Mixed race	-0.198***	*0.074*
Other ethnic	-0.395***	*0.083*
Ethnicity unknown or refused	0.116	*0.091*
White	*f*	
Occupational group of H/H head		
Professional/managerial	0.251***	*0.038*
Semi-skilled/unskilled	-0.044	*0.039*
Unemployed/retired	-0.382***	*0.077*
Skilled manual/non-manual	*f*	
Domicile		
UK	0.320 ***	*0.119*
Overseas	-0.205	*0.129*
EU	*f*	
Pre entry qualifications		
161<UCAS points< 260	0.076	*0.052*
261<UCAS points< 320	0.660***	*0.062*
UCAS points > 320	0.844***	*0.080*
Other UK qualification	0.051	*0.092*
HE Qualification	0.213***	*0.071*
Non UK qualification	0.487***	*0.164*
No formal qualification	-0.021	*0.118*
UCAS points < 160	*f*	
Other Characteristics		
Full time =1	0.168*	*0.098*
Disability declared	-0.062	*0.050*
Clearing =1	-0.087	*0.069*
School of Study		
Architecture and Design	-0.301***	*0.025*
Arts and Communication	0.100***	*0.032*
Historical and Critical Studies	-0.063**	*0.027*
Service Management	-0.222***	*0.037*
Computing, Mathematical and Information Sciences	-0.396***	*0.026*
Sport science	-0.402***	*0.017*
Education	-0.451***	*0.034*
Languages	-0.011	*0.024*
Applied Social Science	-0.368***	*0.028*
Health Professions	-0.096**	*0.043*
Engineering	-0.036	*0.023*
Environment	0.114***	*0.008*
Pharmacy and Biomolecular Sciences	0.027	*0.021*
Business and finance	*f*	
Year of Exit		
2009/10	0.202***	*0.080*
2008/09	0.104*	*0.061*
2007/08	0.103	*0.070*
2006/07	0.066	*0.073*
2005/06	*f*	
Psuedo_R^2	0.093	
Log-likelihood	-7098.884	
Observations	11358	

Notes to table:

(a) Robust standard errors corrected for heteroscedasticity and clustering by academic units.

(b) * significant at 10%; ** significant at 5%; *** significant at 1%

(c) *f* denotes base category in estimation.