

CEO Pay in the Public Sector: The Case of Vice Chancellors in UK Universities¹

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Abstract

We analyse top management public sector pay using a panel data of university Vice Chancellors (VC) in UK. We assess how institutional performance, hierarchical effects, and personal characteristics determine VC pay. VC personal data covers personal details, qualifications and career history, which let us distinguish between internal promotions and hires from outside academia. We use the results of three Research Assessment Exercises as academic performance indicators, and university financial positions as measures of sound executive management. We analysed the importance of university salary structure and how they affect VC pay. Fixed and random institutional effects are also identified and analysed.

Keywords: pay, public sector, CEO, universities.

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1. Introduction

The large literature on CEO pay is mainly motivated by agency theory. Theoretical research in this area has focused on the measurement of managerial effort, and the alignment of CEOs' incentives with shareholders' welfare. The empirical literature has examined whether CEO pay is dependent on financial performance and characteristics of the firms. However, much of this research studies top management salaries in the private sector. Research on the remuneration of public sector CEOs is rather scarce⁴. This empirical study on Vice-Chancellor (VC) pay in UK universities contributes to the literature in two ways.⁵ At the simplest level this paper studies the effects of personal and institutional characteristics on the remuneration of UK universities VCs using a unique panel of recent data. At the more subtle level this paper extends the empirical study of CEO pay to public sector, and assesses whether there is any evidence of performance enhanced pay and tournament effects.

Ideally, to study executive pay in the public sector, we need information on both individual pay and the performance of the organisation. Seldom is individual pay information disclosed and it is relatively rare for public organisations have their performance measured.⁶ Our study is made possible only because UK universities have been required, since 1994, to disclose the pay of their VCs.⁷ Furthermore, the academic performance of UK universities have been evaluated approximately every 5 years in the Research Assessment Exercise (RAE) and they are required to submit their annual accounts to the Higher Education Statistics Agency (HESA).

The structure of this paper is as follows. The next section briefly reviews what economic theory has to say about public sector CEO pay. In section 3 we describe the governing structure of UK universities and the administrative arrangements that exist to determine VC pay. Section 4 discusses the measurement of VC performance and describes the data. The

⁴ One exception is Baimbridge and Simpson (1996) using a cross-sectional dataset of UK vice chancellor pay. With a limited sample size, many of their variables are insignificant. Halsey and Trow (1971) report some summary statistics relating to a survey of VCs in 1967 but this data is not published. Ehrenberg et. al. (2001) studied only the pay of private college presidents in US. There is now a growing literature on performance standards in public sector organisations, see Courty and Marschke (1997).

⁵ The CEOs of universities and other higher education institutions in the UK are often given other titles like Principal, Rector or Director. We abstract from this titular subtlety by referring to them all as a group as VCs.

⁶ In a survey on incentives in public organizations, Burgess, et al (1999) cited 133 papers and only 4 are empirical studies using public sector data and none on CEOs in the public sector.

⁷ Although UK higher education institutes are required to disclose their VC's pay starting from 1994, most institutes started to report their figures from 1993.

econometric model to be estimated is reviewed. Finally we discuss the empirical results and present our conclusions.

2 The Economic Theory of Public Sector CEO Pay Determination.

UK Higher education institutions have an annual expenditure over £13.5 billion and provided services to over 1.85 million students in 2000/1.⁸ The men and women who preside over these institutes manage very large budgets that affect many people. It is their job to run organisations that educate young people, contribute to human knowledge. They are charged with facilitating the growth of their institution as well as generating money from private sources. Their roles have been analysed and it is suggested that their executive role is not dissimilar to that of a CEO in a private company.⁹ The VC is the most powerful person in university – he is both the chief executive of the Council and the chairman of the Senate in older universities.

Economic theory has little to say about the determination of CEO in the public sector explicitly, rather the explanation of their pay would draw on: human capital theory, principal agent models, tournament theory and theories of public sector organisations and their operation. The education and experience that an individual acquires over their working life may have a direct effect on their marginal productivity and effectiveness in a senior management role. Human capital theory would suggest that these factors would play a role in their pay determination. There are however many other factors which will influence what a VC is paid.

The central question of importance here is: can a public sector organisation observe executive effort and performance and is it able and willing to reward it? In many respects this is the classic principal agent problem. Principal-agent models consider situations in which it is necessary to motivate an agent to act on behalf of the principal while keeping the principal's best interests in mind. It is unclear whether this theoretical structure can be applied to analyse the governance of universities by VCs. First, it is not clear who are the principals. We can argue that the Council and Senate are the principals as the VC is expected to report to them on the state of affairs in a university. But since both bodies have the VC as a member, their

⁸ HESA publications.

⁹ See Dolton and Ma (2001) for a summary regarding Fielden and Lockwood (1973), Moodie and Eustance (1974) and McKinnon and Statham (1999).

views and visions regarding the running of university are susceptible to the VC's influence. Therefore although the VC is hired to run the university, his role in practice, can be both that of an agent and a principal. Furthermore, university councils are usually chaired by laypersons with members composed of senior university members but include prominent local, regional, and national figures, whose wellbeing are not affected by the state of the universities they help to run.

Tournament theories view workers' promotions up a hierarchical organisation as competitive. Workers are motivated by the two prizes that come with promotion: first, the pay rise which accompanies the promotion and second the chance to compete in future competitions. As one goes higher up in the hierarchy, the number of future competitions falls causing the incentive to win a promotion race to fall. Thus the pay rise that comes with promotion must increase to compensate for the lost incentive (Lazear and Rosen, 1981). This generates the pattern seen in many large organisations where top management pay is proportionately much higher than those that are directly under them. A corollary to this reasoning means that VCs in universities with more highly paid staff, themselves receive disproportionately higher relative salaries. As business school professors and clinical academic staff tend to have higher salaries, this theory suggested that VCs in business schools or universities with medical schools are paid more. Furthermore, the more competitors there are for the VC post, the higher is the VC pay. Thus the number of highly paid academic staff in an institution would also exert upward pressure on VC pay.

Quasi-Markets and Publicly Funded Organisations.

Public sector organisations that are encouraged by the government to compete on desirable attributes are said to operate in quasi-markets. With successive Conservative governments in the 1980s the performances of public sector organisations were increasingly placed under scrutiny. The public sector management policy in the last 20 years has been dominated by the development of new performance criteria to empower the consumers and create competition in the markets. As a result league tables of the best performing schools, universities and hospitals on various aspects are published. These quasi-markets have been the subject of research.¹⁰

¹⁰ See Glennerster (1991).

Cyert (1975) recognised there are difficulties in assessing universities on their performance in teaching and research. Seeking to apply economic principles and efficient management techniques on publicly funded universities, he suggested that the quality of research be *'measured by the quality of the journals in which the research is published.'* and judged by the times publications were cited.¹¹ For teaching, he suggested that be measured by responses from student questionnaires, and *'by peer ratings based on syllabi, homework assignments, and class visitation'*.¹² Clearly the ideas behind the time consuming Research Assessment Exercise (RAE) and Qualitative Assurance Assessments (QAA) for judging university performance are not new.

Cyert (1975) also suggested that the more criteria an institution is judged by, the better, as there would be more measurements and feedbacks, making it harder for executives to “win the game” arbitrarily.¹³ Yet later research by Holmström and Milgrom (1991) shows that multiple criteria, with some targets easier to meet than others, could have detrimental effects on the principal's welfare and augmented measurement costs. Dixit (1996, 1997) considered a similar model where the agent instead of facing multiple tasks, have to deal with being evaluated by multiple principals. This is the situation faced by university CEOs when there is *'...no agreement among the trustees, faculty, and students on the criteria for judging the performance of the president'*¹⁴

A final set of factors which may influence the determination of VC pay relate to the political factors governing the allocation of resources in UK higher education. Increasingly quasi-market indicators have been used to allocate HEFCE funds. The problem with these quasi-market indicators are that usually they respond far too slowly. For example, market forces would suggest that student enrolment would react to the performance improvement of a university. Unfortunately the university would not recoup the full returns until at least three years later when the first wave of students started their third year in higher education. Likewise research performance depends highly on an institution's ability to hire and retain outstanding faculty. In addition the RAE is conducted only every 4 or 5 years, which means it

¹¹ See Cyert (1975) , p.9

¹² See Cyert (1975) , p.9.

¹³ See Cyert (1975), p.10.

¹⁴ See Cohen and March (1974), p.26.

cannot keep up with the radical changes that take place in many departments during that time.¹⁵

One major limitation on the operation of UK universities (and potentially the pay of their VC) is that they are constrained by how much public funding they are allocated. Although their dependence on state funding has fallen over the last 20 years, most of the research universities still get around 40% of their funding from the government block grant. This figure is as high as 70% for the universities created in 1992. As a large part of this money is earmarked, the scope for the initiative of the CEO is curtailed, making it hard to undertake radical change and introduce new income generating activities. The public funding formula that generates a university's income will have strong effects on the universities' finances, yet they are often subject to changes resulting from political rather than economical reasons. These irregular changes could distort assessment and judgements over the effectiveness of a VC. Furthermore, with the few exceptions of older universities, most universities' assets and properties are provided by public funds. Without the permission of the Treasury, the universities have no rights to sell them or convert them for other uses.¹⁶ At the same time these universities are committed to increasing the component of turnover not attributable to the block grant. This process is difficult and often places great strain on the existing funding infrastructure.

3 Determination of Pay and Tenure for VCs

In CEO pay literature the financial performances of the firm is used to measure the competency of the CEO. As public sector firms usually have objectives that differ from those in the private sector, it is not clear how we can measure the managerial skills of VCs by looking at university's financial performance. Besides, universities are increasingly run by a team of VCs and Pro-VCs, making it hard to identify the personal contribution of the VC towards the university's performance.¹⁷ It is also hard to judge whether the university has performed well as a result of good management or the perpetuation of its accomplished reputation.

¹⁵ Cyert (1975) , p.11.

¹⁶ Our thanks for Paul Hare for enlightening us on the property right issue.

¹⁷ This problem was first studied Holmström (1982).

It is now common for VCs to be appointed on fixed term contracts with the possibility of reappointment. These days VCs are appointed at a much younger age and vice chancellorship is no longer a final appointment for prominent academics to round up their impressive career before they retire. Our data indicate that currently the usual term of appointment is 5 to 7 years. However there are a few VCs in post-1992 universities who were appointed more than 20 years ago and have remained there ever since.

Eligible candidates for VC jobs are in short supply in UK as well as around the world.¹⁸ This competition for a limited pool of talents has driven up VC relative salaries, making long term contracts more expensive than ever. One simple way for a VC to improve their pay is to move to another university. Indeed there has been an increasing trend for VC appointments to be individuals who were former VCs at other universities. It is also possible that the 5 year RAE cycle has contributed to shortening the tenure of VC appointments. VCs often resign in the year leading up to next round of results reasoning that this will allow their successor time to learn about the organisation, so that they would be prepared to make the necessary changes and reorganisation to respond to the upcoming RAE results. A more cynical view suggested that some VCs decided to resign if a bad RAE performance is expected.¹⁹

Salary Components and Review

The method of setting initial pay and the relative size of the different pay components are dependent upon the competency of the candidate, availability of similarly suitable candidates, and the pay of the previous incumbent. Usual pay packages come in the form of salary, pension, housing and the use of a company car. Some VC contracts may have an implicit or explicit performance related component but it has become increasingly hard to implement: if the VC awards himself with a large pay rise, it becomes difficult to control the pay rise expectation of his staff.²⁰ Such considerations put pressure on search committees to give VCs large initial pay, followed by gentle rises in the future.

Some VC has their annual pay rise explicitly linked to the university's annual performance relative to a comparable set of universities. For example the members of the Russell Group of

¹⁸ See Guardian Education, 30th May, 2000, Basinger (2002) and Basinger and Perry (2002) reported that now it is common for the salaries of public universities in the States to be paid out of private donations and funds.

¹⁹ See Guardian of May 30, 2000, and the THES of 30th Jan, 2000, p.11.

²⁰ The difference between implicit and explicit performance related pay is that the former type of contract need not be observed or may be enforced by third parties, while the later does.

universities would compare among themselves on financial indicators, RAE, QAA, research contracts, teaching incomes, student recruitment and rankings on newspapers league tables. Salary reviews of all senior members of a university, professors and upwards, are considered by a university remuneration committee. Only committee members of grades higher than the grades that are being considered would remain to discuss, peers of the considered grade are excluded. When they consider the VC pay, only senior lay members remain.

4 Performance Measurement and Data

In this section we describe the data and the performance measurement variables we used²¹. We will first discuss the institutional characteristics, personal variables, and finally some regional controls for costs of living. All monetary terms are adjusted to 2001 prices.

From 1994, institutions prepare their accounts using a standardised method.²² These changes enable us to compare universities' financial performances with unprecedented accuracy and make these indicators become more important over time. Our choice of financial performance indicators are *Grants*, funding from the research councils; *Fees*, total of support grants and academic fees; *Research and Contracts*, total research grants and contracts from private sources and charities; *Sundry*, additional funds generated from the operations of accommodation, catering services and etcetera. These variables are also correlated to institutional size.

Layard and Verry (1975) reported evidence of scale economies in running UK universities. Oi and Idson (1999) provided an overview on how firm size affects pay. It was suggested that the larger is the firm, and more responsibility is held by the CEO, therefore they are remunerated accordingly. The size measurement variables are number of *Undergraduate* and *Postgraduate* students, number of *Academic Staff*, and number of *Academic Cost Centres*.

Enrolment of overseas students, especially for taught postgraduate degrees, is an important source of income for many institutions as well as a mean to elevate their international

²¹ Detailed list of data sources available from the authors on request.

²² CVCP (1994).

reputation. Many British universities have overseas offices that act as information portal, administrate entrance exams and resits. Representatives are sent to education fairs around the world and they plan strategies to raise their international profiles. We expect VC performance to be partially evaluated on overseas student enrolments. We choose three variables that are continuously available in HESA publications to measure such effects: *Fees Received from Non Home-Fees Students*, *Entrants of Non Home-Fees Postgraduates*, *Number of Non Home-Fees Undergraduates*.

Higher Education Funding Councils in UK administrate reviews on university teaching and research performances. Each year universities are reviewed on their teaching performances on a list of subjects by a QAA panel; this review is not repeated for most subjects. We decided against using this variable as it is insignificant and severely limits our sample size.²³ RAE is conducted every 4 to 5 years to review the research performance of university departments. Funding Councils use the RAE results to determine the amount of funding allocated to university departments. Departments are rated on a 7-grade scale, with that we construct an average RAE score per staff assessed for each university. Our sample covers the RAE carried out in 1992, 1996 and 2001.

Tournament theories predict that the existence of a medical school as well as the number of highly paid academic staff give upward pressure to VC salaries. To measure such effects we use the *ratio of medical students to all students*, *ratio of academic staff with annual salary more than £50,000* and *ratio of academic staff who earns more than £100,000*. The number of medical students a university has may indirectly influence VC pay as medical students are taught by clinical staff who are better remunerated than the average academics.

The age (*Age*) of an institution has impact on pay as it correlates to prestige and cumulative influence of the university in, and outside, the academic world. We define age of institutions as the number of years passed since (1) an institute became a university through the award of a Royal Charter; or (2) becoming a member of a university federation. Colleges with no degree awarding power of their own have age set equal to zero.

The institutions are a very diverse group. They range from civic universities with over 16,000 undergraduates with courses on a broad variety of subjects, to small colleges specialised in vocational trainings for professionals. Their backgrounds, the markets they cater for, and their administration structures are all very different (see Dolton and Makepeace, 1982). To improve the comparability among them, we introduce a group of institutional type dummies: *Oxbridge* for Oxford and Cambridge; *Civics* for Civic universities; *Former CAT* for former colleges of advanced technology; *New* for universities established in 1960s; *London* for London University colleges; *Business / Technology / Medicine* for colleges specialized in such subjects; and *Former Polytechnics* is the reference group that covers polytechnics and colleges that were granted university status in early 1990s. Lastly, a dummy called *Russell Group* is equal to one for a group of research emphasized universities whose heads meet regularly in the Russell Hotel to discuss matters of common concern. Now a powerful lobby group, its membership has grown through the years. Alphabetically they are Birmingham, Bristol, Cambridge, Cardiff, Edinburgh, Glasgow, King's College, Imperial College, Leeds, Liverpool, LSE, Manchester, Newcastle, Nottingham, Oxford, Sheffield, Southampton, UCL, and Warwick.

Personal Characteristics and VC Career Path

We collected personal information on VC from *Who's Who of VCs, Presidents and Rectors of Commonwealth Universities (ACU's Who's Who)* and *Who's Who - An Annual Biographical Dictionary*. Together the two provide us with birth year, gender, marital status, and academic qualifications. We also know when they received knighthoods, public honours, fellowships, honorary degrees, and their career histories. Observations with VCs who were not in either dictionary are excluded estimations which use personal variables.

Most VCs were academics at the time of appointment, most of them have extensive work experiences in academia, or governmental bodies linked to education. The newer universities have appointed a few VCs with nearly no working experience in the education sector but are equipped with management skills acquired in the private sector. Just over half the VCs have worked in non-academic jobs and 10% of the VCs have spent more than half of their career in such jobs.

²³ Inclusion of QAA causes us to drop all the observations of an institution until it receives its first QAA report.

Until recently VCs hold their offices until they retire and rarely leave to take up another VC appointment. Nearly half (45.5%) of them were pro-VCs before they were appointed, and 37.4% were promoted from within the same institution. For those whose terms were completed, an average VC spends 7.65 years in the job, and 6.0 years if we are including those who are still in office.

VC salaries were published annually in the *Times Higher Education Supplement (THES)* since 1995. We have 7 or 8 years of observations for most institutions, depending on whether they started to disclose the VC pay and benefits in their financial statements from 1993 or 1994. The reported figures for benefits are the estimated values of benefits in kind – such as university-provided car, medical insurance, subsidised loans and subsidised accommodation – but usually exclude pension contributions by employers. We are aware that there are elements of remuneration that are not accounted for in the reported salary figures. Some VCs do not have to pay any tax for the university provided accommodation because their universities have long standing tax agreements with their local tax inspectors. Also, arrangements for pension contributions vary across institutions, particularly for VCs approaching retirement. These factors could disguise the real worth of pay packages to VCs and the pay comparability across institutions. Finally, since the living costs differ across the country, we expected the VC to be compensated accordingly. Such effects are measured by two county level variables: the average price of a semi-detached house and average weekly wage.

5. Econometric Model and Estimation

In our dataset we observed 104 VC changes. Therefore ideally we would wish to estimate an econometric model for the determination of VC pay which will distinguish between the individual's personal attributes the characteristics of the institutions they work for. In addition we would like the model to be flexible enough to allow for unobserved heterogeneity across individuals and institutions and over time. A general estimation model which captures many of the above features is a random effects model with separate heterogeneity terms for universities and individuals:

$$y_{ijt} = X_i^0 \beta^0 + X_{it}^1 \beta^1 + Z_j^0 \delta^0 + Z_{jt}^1 \delta^1 + W_{kt} \gamma + u_i + v_j + \varepsilon_{ijt}$$

Sample size reduces by 37 to 47% depending on the model specification.

where the i subscript is for the individual VC, the j subscript is for the specific institution, k is for the region the institution is located, and t relates to the time period.

Both the individuals and universities have time invariant and variant attributes. Time invariant attributes of individual i and institution j are respectively represented by X_i and Z_j . Time variant attributes of are represented by X_{it} and Z_{jt} where t denotes the time period. The natural log of real earnings of VC i at university j at time t is denoted by y_{ijt} . The set of time varying economic variables for region k are denoted by W_{tk} . The stochastic error terms that capture unobserved heterogeneity across individuals, universities and over time are denoted respectively by $u_i, v_j, \varepsilon_{ijt}$. The parameters we are to estimate are $\beta^0, \beta^1, \delta^0, \delta^1$ and γ .

The model outlined above is of the most general form. Our first task is to investigate a simplified form of this model using OLS estimation without estimating the individual and institution specific unobserved heterogeneity. Then we model the effect of the unobserved heterogeneity of institutions with random effects estimation.

6. Regression Results

We estimated the model using three sets of explanatory variables. First we used only *Personal Characteristics*, then only *Institutional Characteristics*, and finally we put the two together and estimated a *Combined* regression. *Personal Characteristics* regressions are human capital estimations where we measure the personal characteristics of VC on pay. In *Institutional Characteristics* regressions we estimate the relationship between VC pay and institutional performances, hierarchical structure and size. The *Combined* is a combination of personal and institutional characteristics, principal components created using size variables, and regional variables. University type dummies and a Golden-handshake dummy are used in all estimations, where the later equals to one if it is the final observation of an appointment as

bonuses are usually awarded to VC for completing the contract.²⁴ The results of ordinary least squares (OLS) and random effects (RE) estimations are presented in Tables 1 and 2 respectively.²⁵

The R^2 of the *Personal Characteristics* specification is relatively high, at 0.46 it is higher than many of the human capital earning regressions reported in the literature where most fall between 0.3 and 0.4. For the *Institutional Characteristics* and *Combined*, their R^2 are respectively 0.73 and 0.75. Unfortunately, these figures are not strictly comparable as the samples of the three estimations differ due to missing observations. As there are a few observations with extremely high salaries, we estimated the equations without observations where salaries are out of the 95% bound for comparison.²⁶ Results show that these high salaries observation did not introduce many biases to the regressions. We observe only some marginal changes in significance levels and a few original estimators lie outside the 95% confidence intervals of the estimators in the supplementary regressions.

Results of particular importance are that we find that VCs are remunerated for the academic performance of a university; we also find that the paid of VCs are higher if there are many potential competitors for the post, as predicted by the tournament theory; and VCs are remunerated for the amount of responsibility they held.

Personal Details

All variables except the dummy representing *public honours* were significant in the *Personal* estimation. The signs of the significant estimators are as expected with the exception that the knighthood-public honour interactive dummy, which lowers instead of increases pay in all *Personal* estimations. It is possible that those VCs well known in public life are either receiving a compensating differential by being employed at one of the most prestigious institutions or are in line for the receipt of lucrative company directorships and don't need a higher VC salary.

²⁴ Such bonuses may include monetary compensation for leaves that the VC had not had the chance to take.

²⁵ The Fixed Effects results are available from the authors on request.

²⁶ Supplementary estimation results available on requests.

Table 1 Effects of Personal and Institutional Characteristics on VC Pay

	Personal Characteristics			Institutional Characteristics			Combined		
Constant	11.04808	(.077820)	***	11.33151	(.034898)	***	11.16704	(.110447)	***
Golden Handshake	.0131095	(.017653)		.0842654	(.022342)	***	.0558143	(.023219)	**
VC's Personal Details									
Gender	.0428636	(.021655)	**				.0656362	(.024815)	***
VC's Age	.0064436	(.001408)	***				.0033885	(.001865)	*
Current Marital Status	.037924	(.020150)	**				.0366431	(.024686)	
Knighthood	.0796841	(.019542)	***				.0373386	(.025738)	
Public Honours	-.0304475	(.059998)					-.0931009	(.054598)	*
Have Both Knighthood and Public Honours	-.2089489	(.113062)	*				.1237425	(.139688)	
VC's Training and Experience									
Law	-.0245676	(.031078)					.0313391	(.046927)	
Engineer	.0463117	(.021972)	**				-.0297251	(.026560)	
Science	.0270187	(.017586)	***				.0111267	(.020636)	
Social Science	.0645142	(.017645)	***				-.0242043	(.020070)	
Business	.1417668	(.033054)	***				-.0308784	(.040043)	
Non-Academic	.0880667	(.021601)	***				.0546178	(.025014)	**
Batchelor Degrees	.0451126	(.013289)	***				.0210196	(.021309)	
Master Degrees	.0282397	(.009855)	***				.0295365	(.013125)	**
Doctoral Degrees	-.0108153	(.008625)					.0072679	(.012145)	
Other Degrees and Certificates	.0452102	(.009769)	***				.0348143	(.012784)	***
Fellowships, Memberships, and Honorary Degrees	.0060946	(.001885)	***				-.0009663	(.002284)	
Tenure	.0046107	(.003769)					-.0036616	(.005542)	
Tenure ²	-.000393	(.000265)					.0005456	(.000399)	
Oxbridge	.0178001	(.011286)					-.0275993	(.015129)	*
Non Academic Job Experience	.008847	(.011563)					.0444746	(.014943)	***
Internally Promoted	.0025789	(.013607)					.0501454	(.017718)	***
Ex Pro-VC	.0181085	(.013783)					-.0496916	(.018122)	***
Ex VC	.0559032	(.017774)	***				-.0143271	(.026113)	
Professorship	.0220788	(.014520)					.0303322	(.019470)	
Institutional Characteristics (Lagged 1 Year)									
Ln (Grants) (£ in 2000 prices)				2.67e-09	(1.29e-9)	**			
Ln (Fees) (£ in 2000 prices)				4.40e-09	(1.56e-9)	***			
Ln (Research Contracts) (£ in 2000 prices)				-1.86e-09	(1.14e-9)				
Ln (Sundry Fund) (£ in 2000 prices)				-1.43e-09	(1.16e-9)				
Number of Academic Cost Centres				.007846	(.001504)	***			
Undergraduates				-2.28e-06	(4.82e-6)				
Postgraduates				1.23e-06	(.000010)				
Staff				-5.62e-06	(.000011)				
RAE Results				.0190191	(.007824)	**	.0125292	(.008456)	
Ratio of Medical Students				.2951039	(.087039)	***	.1604057	(.078673)	**
Ratio of Academic Staff with an annual salary of £50k or above				.9692457	(.164184)	***	.897573	(.150667)	***
Ratio of Academic Staff with an annual salary of £100k or above				.8657148	(.350433)	**	1.280331	(.324482)	***
University's Age				.0001542	(.000088)	*	.0001555	(.000082)	*
Regional Statistics (Lagged 1 Year)									
Average Weekly Wage (2000 prices)							.000095	(.000099)	
Average Price of a Semi-Detached House (2000 prices)							3.54e-07	(2.41e-7)	
Principal Components (Lagged 1 Year)									
Factor 1 (Financial)							.1268301	(.018149)	***
Factor 2 (Size of Undergraduate body)							.030542	(.011548)	***
Factor 3							-.0650502	(.013263)	***
Factor 1 Squared									
Factor 2 Squared									
Factor 3 Squared							-.0650502	(.013263)	***
Overseas Students									
Fees received from Non Home Fees Students				-6.33e-06	(4.92e-6)		-4.06e-06	(4.36e-6)	
Entrants of Non Home Fees Postgraduates				.0000507	(.000050)		.0000814	(.000045)	*
Number of Non Home Fees Undergraduates				-2.93e-06	(.000047)		-.0000679	(.000043)	
University Types									
Russell 19	.146913	(.019025)	***	.0487259	(.042320)		.0400484	(.036151)	
Oxbridge	-.3217496	(.050456)	***	-.3317906	(.109846)	***	-.4899861	(.103056)	***
Civic	-.0649266	(.018958)	***	-.0740547	(.028856)	**	-.062737	(.027184)	**
Former CAT	.0458363	(.023166)	**	.0497445	(.030618)	*	.0375518	(.030997)	
New	-.0970651	(.02308)	***	-.0363055	(.034334)		-.0566404	(.032769)	*
Business / Technology / Medicine	.1425671	(.025487)	***	.0769948	(.053392)		.0472743	(.049137)	
Arts and Performing Arts	-.2776672	(.027866)	***	-.1378244	(.034743)	***	-.1663925	(.049389)	***
London University's Colleges	-.1315722	(.021761)	***	.0223982	(.034711)		-.0735234	(.034858)	**
Others (e.g. College of Guidance Studies)	-.2059438	(.025227)	***	-.1482024	(.023440)	***	-.1089657	(.032926)	***
No of Observations		1007			455			357	
R-squared		0.4617			0.7319			0.7514	
Adjusted R-squared		0.4423			0.7157			0.7126	

Asterisks specify the significance level of the estimated coefficients, * is 10%, ** is 5%, and *** is 1%.

Table 2 VC Pay Estimation with Random Institutional Effects

	Personal Characteristics			Institutional Characteristics			Combined		
Constant	11.34827	(.0935995)	***	11.31207	(.041527)	***	11.08466	(.150176)	***
Golden Handshake	.0109002	(.0132227)		.0944404	(.016885)	***	.0850927	(.019309)	***
<u>VC's Personal Details</u>									
Gender	-.0367968	(.0299698)					.0693807	(.039379)	*
VC's Age	.005074	(.0016585)	***				.0049434	(.002665)	*
Current Marital Status	-.0326259	(.0242989)					.0540255	(.033664)	
Knighthood	.0092645	(.0194163)					.0099357	(.032447)	
Honours	.0368796	(.0595846)					-.0316296	(.061504)	
Have Both Knighthood and Honour	-.2227898	(.0973283)	**				.0088534	(.111943)	
<u>VC's Training and Experience</u>									
Law	-.0488606	(.0362362)					.0678904	(.076271)	
Engineer	.016657	(.0267597)					-.0439509	(.038272)	
Science	-.005065	(.0230277)					.0004846	(.029285)	
Social Science	-.0090495	(.0213474)					-.0178098	(.029021)	
Business	.1014387	(.0539004)	*				-.0261795	(.060180)	
Non-Academic	.0761911	(.0232961)	***				.0422492	(.034556)	
Batchelor Degrees	.0209523	(.0168742)					.0204418	(.029812)	
Master Degrees	.0119983	(.012456)					.0280026	(.018199)	
Doctoral Degrees	-.0255239	(.0101525)	***				.0197844	(.017140)	
Other Degrees and Certificates	.0082108	(.0121684)					.0308328	(.015073)	**
Fellowships, Memberships, and Honorary Degrees	.007014	(.0020908)	***				-.0011464	(.002771)	
Tenure	-.0010981	(.0033671)	**				-.0218416	(.005883)	***
Tenure ²	.0005618	(.0002396)					.0016619	(.000434)	***
Oxbridge	.0118916	(.0147989)					-.0397671	(.021254)	*
Non Academic Job Experience	-.0136314	(.0143275)					.0497036	(.021448)	**
Internally Promoted	-.0187675	(.0189609)					.0436809	(.025093)	*
Ex Pro-VC	.0234796	(.0165997)					-.0605997	(.025487)	**
Ex VC	.0234826	(.0224161)					-.0463378	(.038147)	
Professorship	.0201372	(.0170102)					.0103867	(.027111)	
<u>Institutional Characteristics (Lagged 1 Year)</u>									
Ln (Grants) (£ in 2000 prices)				3.17e-09	(1.51e-9)	**			
Ln (Fees) (£ in 2000 prices)				3.90e-09	(1.91e-9)	**			
Ln (Research Contracts) (£ in 2000 prices)				-2.42e-09	(1.50e-9)				
Ln (Sundry Fund) (£ in 2000 prices)				1.94e-10	(1.45e-9)				
Number of Academic Cost Centres				.0067496	(.001716)	***			
Undergraduates				-7.26e-07	(5.80e-6)				
Postgraduates				-5.66e-06	(.000011)				
Staff				-3.70e-06	(8.40e-6)				
RAE Results				.027785	(.007041)	***	.0270033	(.007994)	***
Ratio of Medical Students				.2966463	(.127301)	**	.1316123	(.119574)	
Ratio of Academic Staff with an annual salary of £50k or above				.744708	(.150916)	***	.7309793	(.148064)	***
Ratio of Academic Staff with an annual salary of £100k or above				1.063498	(.312992)	***	1.121992	(.287540)	***
University's Age				.0001036	(.000134)		.000136	(.000131)	
<u>Regional Statistics (Lagged 1 Year)</u>									
Average Weekly Wage (2000 prices)							.0000185	(.000078)	
Average Price of a Semi-Detached House (2000 prices)							1.02e-06	(2.98e-7)	***
<u>Principal Components (Lagged 1 Year)</u>									
Factor 1 (Financial)							.1447848	(.027878)	***
Factor 2 (Size of Undergraduate body)							.0233624	(.017525)	
Factor 3							-.0433994	(.013553)	***
<u>Overseas Students</u>									
Fees received from Non Home Fees Students				-8.30e-07	(4.91e-6)		-1.77e-06	(4.40e-6)	
Entrants of Non Home Fees Postgraduates				.0000127	(.000061)		-8.21e-06	(.000055)	
Number of Non Home Fees Undergraduates				-.0000731	(.000051)		-.0000791	(.000051)	*
<u>University Types</u>									
Russell 19	.1638834	(.0417574)	***	.0287701	(.062242)		.0715768	(.055836)	
Oxbridge	-.2327085	(.1100898)	**	-.2968314	(.164774)	*	-.4459123	(.158129)	***
Civic	-.0341213	(.0399122)		-.0748123	(.042061)	*	-.071218	(.041712)	*
Former CAT	.0857759	(.0474951)	*	.0437048	(.044987)		.0117346	(.047570)	
New	-.0425531	(.0513281)		-.0395325	(.049780)		-.0639566	(.049281)	
Business / Technology / Medicine	.2015011	(.0479001)	***	.0805973	(.076596)		.0315863	(.072421)	
Arts and Performing Arts	-.3071065	(.0519966)	***	-.1401125	(.049780)	***	-.2203684	(.071549)	***
London University's Colleges	-.0771141	(.0437565)	*	.0187146	(.049983)		-.1403243	(.050728)	***
Others (e.g. College of Guidance Studies)	-.2233728	(.0503275)	***	-.1530284	(.034698)	***	-.0988479	(.051085)	*

Sigma u	.12641261	.10396861	.08753796
Sigma e	.10623817	.08368987	.06699066
Rho (fraction of variance due to u _i)	.58606838	.60681466	.63065751
Number of Observations	1007	455	357
Number of Groups	142	159	124
R-square Within	0.1303	0.2444	0.4372
R-square Between	0.4930	0.7985	0.7783
R-square Overall	0.3916	0.7257	0.7193

¹ The Combined regression has all the Personal Characteristics, Institutional Characteristics minus the eight size variables, the three Principal Components, Regional Statistics, and the University Type dummies. Asterisks specify the significance level of the estimated coefficients, * is significant at 10%, ** is at 5%, and *** is at 1%.

The estimates for *gender* effect are positive and significant in the two *OLS* and the *Combined RE* estimations, showing that men earns more (*gender* = 1 for men). Interestingly, we estimated the same equations using only pre-92 universities in our sample and found a negative and significant estimator for *gender* in the *FE* and *RE Personal* estimations but insignificant in *Combined*. This estimator shows the effect of salary changes within the same institution when the gender of a new VC appointment changes. Lazear and Rosen (1990) hypothesised that because females on average have better non-labour market opportunities than man, thus among those who participate in the labour market, the females would on average have higher ability than males. As a result, the gender wage gap would close up as the ability level demanded of the workers increases. The different results generated from the two samples may suggest that the set of skills required for governing the pre-92 universities are relatively scarce.

VC's Training and Experience

The human capital of VCs are measured by a set of academic background subject dummy variables showing the academic training they received with *Arts and Humanities* as the reference group. There is a *Non-Academic* dummy for VCs who have spent more than half of their career outside academia or had never worked in academia. We measure the amount of academic training they received by the numbers of bachelor degrees, master degrees and other degrees they have. All the degree variables have positive and significant estimated coefficients in the *Personal* estimation. The estimator for doctoral degrees, however, is insignificant and negative in *Personal OLS* estimation but significant and negative in the *Personal RE* estimations.

Results of the *OLS* estimations show no significant relationship between income and tenure. In the *RE* estimations, the estimators of tenure and tenure² are both significant in only the *Combined* estimations. Together the signs on the tenure and tenure² terms indicate a U-shaped relationship of pay with time in the job. Since on average VCs stay in their jobs for 7.65 years, this rise could be driven by the bonus one gets for completing a contract. In addition, the available supply of potential VCs is very limited, thus driving up VC starting salaries. However, it may be politically unwise for VCs to accept large pay rises amid tenure when those offered to their staff are relatively modest. These factors make it difficult to award pay rise to incumbent VCs that are in line with the market rates, forcing the institutes to offer increasingly large initial salaries and small pay rises to VCs.

These observations contradict human capital theory, that is, pay is concavely related to tenure. In the context of a VC appointment the theory suggests that a VC would rapidly acquire human capital specific to the job in the early years, but marginal increases in such investment become more costly as the stock of human capital grows larger. Typically the returns from acquiring further connections and committee positions, and the specific skills of high-level networking may be less obvious after the first few years in the post.

The career histories of VCs are represented by a set of dummy variables and we highlight the results of variables relating to *non-academic job experience*, *internally promoted*, and *ex-VC*. VCs with *Non-academic Job Experience* are paid significantly more according to the *FE* and *RE Combined* estimations. This positive effect on pay is possibly caused by the constant pressure put upon universities to be more business-like in the last 25 years, making managerial experience acquired out of academia very valuable. *Internally Promoted* is positive and significant in the *OLS* and *RE Combined* estimations, showing that internally promoted VCs are paid more than those externally hired. This contradicts Chan (1996), a paper that extended tournament theory to describe internal versus external recruitment, shows that workers recruited externally are usually significantly superior to the internal candidates and would be paid more than internally promoted workers. It is possibly due to workers are concerned about the reputation of the institutions they work for, as it gives strong signal about their stock of human capital, as well as pay. Some might be willing to accept lower pay for a

post at an institution with better reputation. With the prestige factor at work, the relationship between pay and external recruitment becomes less clear.

Our variable, *Ex-VC* equals to one if the VC had worked as a VC elsewhere. Only a quarter of the institutions in our sample had appointed such candidates, which is possibly why *Ex-VC* is significant only in the *Personal OLS* estimation. A study on VC characteristics by Catherine Bargh et al. (2000) reported that only a few VCs moved from the post-1992 universities to the older universities, but none moved in the other direction.

Institutional and Regional characteristics

Eight of the institutional characteristics variables are correlated with institutional size. They are the four financial variables: *Grants*, *Fees*, *Research Contracts* and *Sundry Funds*; and the number of *Academic Cost Centres*, *Undergraduates*, *Postgraduates*, and *Academic Staff*. They are also correlated to the reputation of the institution. For example, the covariance between the number of postgraduate students and research contract size is 0.75. Institutions with wider research portfolios can offer a broader variety of postgraduate degrees. On the other hand, students are attracted by the reputation of the institution and being taught by researchers who are leaders in their fields.

The *Institutional OLS* regression has a very high R^2 despite the fact that many of the size variables are insignificant, a sign that the model is affected by multicollinearity. We therefore replace the size variables with the first three loadings of principal components derived from them in the *Combined* regressions.²⁷ In the *OLS* estimation we find evidence that the size of university affect VC pay: estimators of the first and second loadings are positive and significant at 1%, estimator of the third loading is negatively significant at the 1% level. For the *RE* estimation the first loading is positively significant and third loading is negatively significant, both at the 1% level. This shows that the size of the institution has a direct effect on the VCs remuneration. In addition the variable related to the diversity of the institution as measured by the number of Academic Cost Centres suggests that there is some compensating differential for the complexity of the job.

²⁷ A table showing the composition of the principal components can be found in the Appendix.

Institutional type and the *Russell 19* dummies show that Oxbridge and Civic universities pay significantly lower salaries to their VCs than the reference group, the former polytechnics. This result might seem counter-intuitive as one might guess that the VCs at Oxbridge and Civic universities, with greater responsibility since they run larger and more prestigious universities would be paid more. One explanation of the negative effect observed on the Oxbridge and Civic university type dummies is that it might be attributable to the difference between housing benefits offered to the VCs by the old and new universities. Older universities also usually have special arrangements with the local tax offices so that their VCs pay no tax on university provided accommodation; whereas VCs of new universities often do not usually enjoy this privilege. In addition, the VC at the more prestigious university might be able to look forward to more lucrative company directorships and other honorary posts with sizeable stipends after leaving their university job.

Results of the *RE* estimations show that VCs are not rewarded for larger overseas student recruitment – the number of *non home-fees postgraduate entrants* and *non home-fees undergraduates* decrease pay. What we observe here could be driven by institutions with financial difficulties seeking to turn the tide by expanding their overseas student intake, which is why the VC pay is negatively correlated with the number of overseas students. We have also considered whether it is the year on year changes of these values relative to the average in the industry that really mattered. As the recruitment of overseas students is highly dependent on the performance of the world economy, one can see this as a benchmark of how well a university is faring compared to others. Due to problems with data availability, the use of difference values severely reduce our sample size by one-third, we chose not to present the results in here although we found that the change in real income derived from fees paid by overseas student relative to the industry's average is positively and significantly related to VC pay.²⁸

The three ratio variables we use to estimate the effect of highly paid academics on VC pay are positively significant in the *RE* and *OLS* estimations. Overall results show the number of highly paid academic staff does push up VC pay. This finding is of considerable interest

²⁸ Results are available on request from the authors.

since it is compatible with elements of tournament theory. The suggestion is that higher relative pay in the senior echelons of a university induces pressure for high pay of the VC at the institution. This finding is consistent with competitive elements in a hierarchical organisation.

Perhaps the most interesting result in this study is the positively significant effects of our institution performance variable. Average *RAE* score, that is the average *RAE* score per staff entered for assessment, represents the average departmental academic performance of an institution. Results for the *OLS Institutional* estimation and both the *Institutional* and *Combined RE* estimations show a positive relationship between academic performance and VC pay. This result is important as it is one of the very few studies that report the importance of institutional performance on pay in the public sector. This result could be regarded as evidence of the increasing importance of the quasi-market and its functioning. If this market is working efficiently then we would expect to find this result. The fact that evidence from the public sector is rare increases the interest in this data and our findings.

Although our estimated regressions are successful in explaining the variation in VC pay, what we have learned from the data still has limitations. Our knowledge of the quality of the pay data is far from exhaustive. Some institutions do not disclose information on pension contributions. The other pecuniary benefits enjoyed by VCs are unreported, let alone the tax levied on them. We also do not know whether the annual pay adjustment in each university is explicitly determined by performance-related remuneration schemes or via negotiation. The situation is further clouded because some VCs have admitted to us that they would not risk taking large pay rise (which may be in line with their performance), for fear of inciting resentment from their staff. It is potentially possible to explore the relationship between staff pay and the pay of the VC but data on this is limited. The only statistics we have are the year on year percentage change of expenditure on academic staff salary by institution, but it does not reflect the true pay rise for staff as the rank and age of the faculties change every year.²⁹

Lastly, we might expect that the organisation and governance structure of an institution could and should affect VC pay. Given the diversity of institutions that are in the higher education

sector, many of them have a less than conventional administrative structure that differ from, say, a Russell Group university.³⁰ Information on these aspects are again unavailable.

7. Conclusion.

We use a unique panel data set covering 8 years to study VC pay. The data is distinct in that it contained detailed individual and institutional information over time. This panel data enabled us to provide an explanation of the essential elements that determine VC pay and explain its variability. The econometric results highlighted the importance of many personal and institutional factors in VC remuneration.

Most importantly this article has found that VCs are remunerated more favourably for the academic research performance of the institutions they govern. Hitherto there has been very little evidence of revealed performance elements being important in public sector pay – particularly of CEOs. Hence our paper also provides some evidence of the functioning of the quasi-market in higher education, which is in turn important to understanding how the UK education system has evolved in the 1990s.

We also find limited evidence of the internal hierarchical competitive elements in senior university pay, since those who govern universities with a large number of highly paid academics, are paid more. This could provide efficient incentives to ensure a larger pool of potential competitors for VC posts in the future. In turn this could lead to a more efficient functioning of this market which may, in turn, encourage higher ability people to apply for VC jobs. This could only be good news for the UK university system.

²⁹ Such values have been used in the estimations in Ehrenberg et. al. (2001).

³⁰ One of our discussants cautioned us on the great difference between the managerial structure of a university and that of a post-92 university.

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Appendix: Elements of Principal Components

(principal factors; 4 factors retained)

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	5.50383	4.53170	0.8504	0.8504
2	0.97213	0.84367	0.1502	1.0006
3	0.12846	0.08549	0.0198	1.0204
4	0.04297	0.06387	0.0066	1.0270
5	-0.02090	0.01614	-0.0032	1.0238
6	-0.03704	0.01819	-0.0057	1.0181
7	-0.05523	0.00662	-0.0085	1.0096
8	-0.06186	.	-0.0096	1.0000

Factor Loadings

Variable	1	2	3	4	Uniqueness
Real Grants	0.97548	-0.07714	0.06773	-0.12380	0.0225
Real Fees	0.91980	-0.18268	-0.12851	0.07799	0.0979
Real Research	0.74395	0.58285	-0.04824	-0.08471	0.09732
Real Sundry	0.85811	0.37051	0.06195	0.06828	0.11787
CostCentres	0.71440	-0.19112	0.21152	0.06476	0.40417
Undergraduate	0.78177	-0.57411	0.03729	-0.05567	0.05474
Postgraduate	0.84480	-0.14513	-0.22671	0.01891	0.21349
Staff	0.76236	0.26195	0.06049	0.04555	0.34446

. score f1 f2 f3

(based on unrotated factors)

(1 scoring not used)

Variable	Scoring Coefficients		
	1	2	3
realgrants	0.51691	0.14494	1.12682
realfees	0.20345	-0.09278	-0.68756
realrescon	0.05544	0.50038	-0.61028
realsunfund	0.15678	0.24430	0.42310
costcent	0.01413	-0.01579	0.25135
ug	0.03488	-0.85045	-0.16063
pg	0.05321	-0.03276	-0.57405
staff	0.04292	0.07873	0.08642