Keeping up with Academic Jones': Benchmarking and University Vice Chancellors' Pay in the UK

Introduction

The pay-performance relationship has long been a contentious issue in economics, particularly concerning Chief Executives of higher education institutions in the UK, referred to as Vice-Chancellors (VCs). These VCs have faced consistent criticism for their perceived excessive pay (Bennett 2017). Given the significance of the UK higher education sector, both in terms of economic output and employment, it is crucial to understand how the decentralization of managerial models, aligned with new public management ideals, has impacted the relationship between pay and performance, akin to the private sector (Besley and Ghatak 2005). In this context the main motivation for the present paper is to understand how VC's pay is set and whether performance or other considerations are more important in this process.

Various economic theories attempt to explain the link between pay and performance, with Agency Theory being one of the most prominent. This theory posits that executive pay is designed to attract and motivate managers who act as agents on behalf of owners, commonly known as principals (Fama 1980, Jensen & Murphy 1990, Jensen & Meckling 2019). However, identifying the principal in the context of higher education institutions is complex, as there are no direct equivalents to shareholders, and universities receive public funding while being accountable to the government, students, parents, and the university's governing body. Consequently, VCs are evaluated based on numerous parameters, making it challenging to determine a universal performance measure that applies to all universities (Johnes & Virmani 2020).

Another theory relevant to pay-performance dynamics is the Efficiency Wages Hypothesis, which suggests that higher pay leads to improved performance (Marshall 1890, Carmichael 1990, Kato et al. 2005, Peach & Stanley 2009). However, establishing causality between pay and performance presents a challenge, as it is unclear whether performance drives higher pay or vice versa. Structural theory, tournament theory, and human capital theory offer additional perspectives on determining VC pay, based on organizational complexity, hierarchical rank, and individual qualifications and experience, respectively (Simon 1957, Lazear & Rosen 1981, Becker 2009).

In practice, remuneration committees for VCs tend to reference the pay of similar universities, a process known as benchmarking, when determining compensation (Tarbert et al. 2008, Bachan & Reilly 2015). However, the selection of comparable universities as benchmarks remains ambiguous, and there is limited transparency regarding the benchmarking process in terms of executive remuneration.

This paper contributes to the literature by proposing a novel approach to benchmarking VCs' pay using the LASSO (Least Absolute Shrinkage and Selection Operator) regression analysis method. It allows for the identification of performance parameters strongly associated with VC pay for each university and determines the relevant institutions for benchmarking purposes. The findings suggest an asymmetric benchmarking pattern, where lower and medium pay institutions primarily benchmark against

universities with higher pay, while higher pay institutions benchmark against performance parameters. This asymmetry may contribute to the observed inflation in VC pay within the higher education sector.

To our knowledge the only other study using LASSO in this context is by Lucey et al. (2022). The paper also uses data from the UK to estimate models for which the outcome is VC pay. However, the focus of the paper is meaningfully different from our focus. Whilst Lucey et al. (2022) address whether Vice Chancellors are over or undercompensated, we seek to quantify and provide details on the role of benchmarking in determining pay. Moreover, as will be explained later, the two papers use LASSO for completely distinct purposes. The core aim of the present paper lies in benchmarking and the important role it plays in determining VCs pay. As the literature section below shows, this role has been analyzed before, but we claim that using LASSO is better suited to determine the sources of benchmarking. LASSO allows us to not quantify the number of universities towards which VC pay might be benchmarked against and not predetermine which university, or group of universities, the VC pay is set upon. We let the 'data speak' and allow the benchmark to be chosen for each university from the pool of all universities available in the sample. We believe that through this agnostic approach we bring a significant contribution to the benchmarking methodology and to the literature on executive pay in general. Moreover, the results and policy recommendations derived are especially relevant in context where universities in the UK struggle under financial pressure.

Simulations demonstrate that asymmetric benchmarking leads to an increase in average VC pay over time, while symmetric benchmarking, where institutions adjust pay proportionally to their position relative to the mean, maintains stable mean VC pay. Based on empirical evidence and simulation results, a policy recommendation is proposed, suggesting that institutions adopt symmetric benchmarking against the mean to address the issue of inflated VC pay.

The paper proceeds with a review of existing literature on VC remuneration, outlining the techniques and performance parameters used in previous studies. Subsequently, the institutional background of UK higher education is discussed, providing contextual information for the analysis. The methodology, results, and data description follow, culminating in the conclusion, which acknowledges the challenges of reforming governance mechanisms within different types of universities while offering policy recommendations applicable to other benchmarking contexts experiencing pay inflation.

Related Literature

Numerous studies have examined the relationship between pay and performance, with a particular focus on chief executives in the UK. This review will primarily discuss literature that employs benchmarking as an analytical approach and excludes studies that solely rely on performance metrics. One notable study by Ezzamel and Watson (1998) investigates the remuneration process of chief executives in 199 listed companies using a model with lagged pay. Their regression analysis includes an adjustment process for underpaid and overpaid executives, indicating an asymmetric adjustment with underpaid executives exhibiting a stronger tendency to bid up pay. The authors suggest that such adjustments may be motivated by recruitment, retention, and motivational factors, irrespective of firm performance.

Building upon their previous work, Ezzamel and Watson (2002) expand the analysis to include board members other than the chief executive and incorporate "internal benchmarks" such as the proportion of non-executives on the board. Their findings support an asymmetric pay adjustment process, with underpaid executives displaying greater sensitivity to external market comparisons. These studies highlight the importance of pay comparability variables, aligning with equity theory and

social comparison theory, which emphasize fairness and comparison when determining remuneration.

Ogden and Watson (2004) apply a similar methodology to analyze the pay of CEOs in UK water companies. They find evidence of asymmetric benchmarking leading to a "bidding-up" behavior. Additionally, they establish a significant relationship between company performance and CEO pay when considering benchmark variables. Tarbert et al. (2008) employ a comparable method to examine the pay of university Vice-Chancellors in the UK. Their analysis includes multiple performance measures, high-paid staff, and two benchmarks: a VC pay benchmark and a CEO pay benchmark to account for potential outside options of VCs. The findings reveal adjustments towards both benchmarks, with pre-1992 universities correlating VC pay with research income and highly paid staff, while post-1992 universities correlate VC pay with the number of total students.

Bachan and Reilly (2015) also adopt a benchmarking approach for VC pay analysis, utilizing a benchmark constructed based on university type and size. They find a significant influence of benchmarking on VC pay and highlight the positive effect of widening participation targets on VC remuneration. Similarly, Bachan and Reilly (2017) extend their study by examining a longer time period, a larger sample, and additional variables. They observe significant benchmark effects on VC pay, especially in pre-1992 universities. In contrast to these studies, our research introduces a data-driven approach using LASSO regression to select a benchmark group for each university, allowing for a more comprehensive and flexible benchmarking process.

Two studies in the CEO literature worth mentioning are DiPrete et al. (2010) and Faulkender and Yang (2010). DiPrete et al. employ counterfactual simulations to analyze the growth of executive compensation and find that CEO "leapfrogging" contributes to the upward movement of pay. Faulkender and Yang (2010) incorporate firm performance parameters and use the median CEO pay of the compensation peer group as a benchmark. Their findings indicate that firms tend to select highly paid peers to justify CEO compensation, leading to a ratcheting effect over time.

Regarding the impact of remuneration committees (Remcos) on CEO pay, previous literature primarily shows that most Remcos work closely with the CEO over the year and this might erode their ability, or willingness, to exercise independent judgment in compensation decisions (see Singh and Harianto 1989 as well as Fierman 1993). We are not aware of an existing database of Remco composition or study regarding the impact of the Remco composition on VC pay. However, similar to the setting of the cited papers that discuss CEO pay, the VC works closely with the Remco and hence the Remco might not be completely impartial when setting VC pay. This is true even though Remcos typically include 1-2 lay persons, and despite the fact that the VC, as a member of Remco, does not attend the meetings regarding their own pay in most cases.

In conclusion, the reviewed literature provides insights into the pay-performance relationship for chief executives and VCs in the UK. Benchmarking methodologies have proven valuable in understanding the determinants of executive pay and the role of peer comparisons. Our study contributes by utilizing LASSO regression to determine benchmarks, addressing the limitations of previous approaches, and offering a more comprehensive analysis of VC pay.

Institutional Background

The UK's higher education sector has undergone significant changes in recent decades. The age cohort participation rate more than doubled from 1987 to 1997, reaching 33%, and the government set a target of 50% in the following decade (Lunt 2008). Although the rate was 43% by 2019, there has been a substantial increase in the number of students, from 1.5 million in 1994/95 to 2.6 million in 2020/21. This expansion has transformed UK higher education from elite to mass higher education,

accompanied by the creation of new universities through the Further and Higher Education Act in 1992 (Johnes & Virmani 2020). These institutions, referred to as 'post-1992' or 'new universities,' are generally considered more teaching focused than the 'pre-1992' universities. As of 2019, there were 164 universities and higher education institutions in the UK, with nearly half being post-1992 universities.

The UK higher education sector also features other group divisions, such as the prestigious 'Russell Group' comprising universities known for strong research and high rankings. However, there are several UK universities with excellent research that are not part of the Russell Group. The sector has witnessed marketization due to factors such as the introduction of student tuition fees and a complex student loan system, resulting in increased challenges for university vice-chancellors (VCs) (Johnes & Virmani 2020). Student fee increases have been associated with wage inequality and VC pay inflation (Bachan 2008, Walker et al. 2019, Cai & Heathcote 2022). The sector also faces additional complexities from assessments based on research and teaching performance, as well as external shocks like Brexit and the Covid pandemic.

Given these increasing complexities and pressures, it is expected that VC pay would rise according to the structural theory of executive pay. However, VC salaries have faced intense scrutiny. In 2017, the VCs of the University of Bath and Bath Spa University resigned amid criticism of excessive pay, drawing attention to VC pay across the UK. Academics argue that the ratio between VC and staff pay is increasing, with some VCs earning significantly more than academic staff and local workers (Bennett 2017). Students and their representatives find this unacceptable, especially as tuition fees have increased, leading to high student debts. Consequently, the pay agreements of VCs have come under investigation by regulatory bodies.

This study aims to contribute to the ongoing debate by examining how remuneration committees at universities set VC pay. The Committee of University Chairs (CUC), responsible for regulating staff remuneration in the UK higher education sector, recommends benchmarking VC salaries against comparable companies and considering relative performance. However, the definition of "comparable companies" and the performance parameters tied to VC salaries are not clearly explained. Different studies have yielded significant results for different parameters, suggesting a lack of consensus across UK universities. Bachan and Reilly (2017) argue that measuring VC performance is challenging due to the multitude of tasks and team-based institutional goals, further complicated by complex university structures. Setting VC salaries is a delicate task for remuneration committees, as they must balance avoiding criticism for excessive pay while attracting and retaining talented individuals capable of leading complex institutions.

This study employs a method that allows for the selection of specific parameters to determine VC pay for each university in the sample. To the authors' knowledge, this is the first study with this specific goal. While Lucey et al. (2022) also examined determinants of VC pay in the UK and use LASSO regression, the fundamental topic of that paper differs meaningfully from ours. Lucey et al. (2022) address whether VCs are over- or underpaid. We seek to quantify and understand the heterogeneous role of benchmarking as a determinant of pay. Our use of LASSO is as a fundamental estimation strategy, allowing for university-specific predictors of pay and heterogeneity in benchmarking. Lucey et al. assume the same variables affect VC pay for all institutions, and primarily use LASSO as a robustness check to confirm their OLS results are not driven by a subjective choice of variables. Their panel regressions also primarily focus on whether VCs are overpaid, while ours are designed to quantify the heterogeneous role of benchmarking based on an institution’s quantile of the VC pay distribution.

Data and Methodology

Data

Measures of pay

Since the academic year 2006/07 *Times Higher Education* have compiled data on the pay of vice-chancellors of UK institutions. This data includes details on salary, pensions, and benefits, and has further included data on academic staff pay (separated by professor and non-professor and by gender). We include all reported components of pay (salary, benefits, and pensions) as this represents total reward. We adjust for inflation using a GDP deflator for the UK and all values are in 2017 prices. Therefore, we analyze 10 years of data from 2007-2016.[1] VC pay in the UK is set by the remuneration committee of the institution, appointments to which are generally made by nomination committees which are often chaired by the VCs themselves. Remuneration boards appear to consist, on average, of several members stemming from the 'big business' such as multinationals, banks and consultancies alongside with members from the University itself or from non-profit organizations (Weale 2018). The dependent variable is 'Salary&Pension' which is the total of salary, non-salary benefits, and pensions (see Table 1).

Insert Table 1 Here

Measures of Performance and Determinants of Pay

The study employs six performance measures to assess university performance. Firstly, student numbers and competition for places are evaluated using indicators such as applications, acceptances, and applications-per-place, reflecting the relative demand for each institution. Data on student applications and acceptances are obtained from the Universities and Colleges Admissions Service (UCAS). Secondly, university league tables, specifically those published by the Guardian Newspaper and the Complete University Guide (CUG), provide overall scores and rankings for teaching and research attributes.

Research performance is measured using scores from nationally conducted 'research excellence reviews' (note that these are published every five years, and the value is thus constant over five-year blocks, thus, this variable has little variation). These scores reflect the research quality of institutions and their associated funding through the UK government. Financial information, obtained from the Higher Education Statistics Agency, includes total income and surplus, which represent the financial outcomes of universities. Income from student fees is considered a performance measure strongly correlated with VC pay.

An additional determinant we consider is "widening participation", which has previously been defined by the number of students from comprehensive schools and low-participation areas. The study addresses the idea through the assessment of 'value added,' which compares students' degree results with their entry qualifications. University size, proxied by student-related parameters, and the percentage of highly paid staff, represented by the average pay of professors, are considered in line with tournament theory. Institutional characteristics, such as memberships in university groups (e.g., pre-post 1992 or Russell Group), are also examined.

VC-related characteristics, such as gender and tenure, are explored because they have been found to relate to VC pay in previous studies. Gender and tenure serve as proxies for accumulated human capital. While other determinants could be considered, the study focuses on benchmarking VC pay among universities.

At the suggestion of a referee, we also performed analysis using predictors of (1) the enrolment of international students who went through UCAS (2) the proportion of all UK based UCAS enrolments an institution has for first time undergraduate students which come from the lowest 20% of participating neighbourhoods and (3) the same variable except for the lowest 40% of participating neighbourhoods. Qualitative results regarding benchmarking were unchanged, and these variables were minimally chosen as predictors, although international student enrollment appeared to be relevant for VC pay at about 14% of universities. Results shown use our baseline specification that does not include these variables but results using them are available upon request.

Methodology

The first step of our analysis is to partial out the effects of time. In turn for each numerical variable in our data set, we use our full panel of data and run a regression in which that variable is the outcome and the regressors are a set of dummy variables for each year. We use the residuals from those regressions in what follows.

LASSO Estimation

We restrict the data to universities for which we observe VC pay for at least nine time periods. The goal is to estimate regressions of following form for each *i*:

$$\Delta VCPay_{it} = \beta_{i0} + \sum_{j \neq i} \beta_{ij}(VCPay_{j,t-1} - VCPay_{i,t-1}) + \Delta X_{it}'\Gamma_i + W_{it}'\alpha_i + \varepsilon_{it} \quad (1)$$

Where β_{ij} represents the effect of the lagged difference in VC Pay between universities i and j on the difference in VCPay for university i (i.e., the effect of university i benchmarking against university j). Γ is a vector of coefficients for X_i, controls which are differenced, as well as lags of each of these.[2] A list of all variables used and some summary statistics can be found in Table 2. α_i is a vector of coefficients for W_{it}, controls which are not differenced (specifically the number of years the VC had been in the post as well as binary variables if the VC was new that year or female, as well as the lags of these three variables). We do not have exhaustive descriptive statistics for each regression because we have one LASSO regression for each institution and having summary statistics for each regression would be overly extensive. However, Table 2 includes basic statistics for the variables used in the regressions.

Insert Table 2 Here

We also include binary variables indicating if each variable above is missing. To maintain the small sample size we do have, if a variable is missing, we code the value as -10000000 to allow for estimation to proceed.[3]

Due to sample size limitations, it is impossible to estimate this equation by OLS for any *i*. We must perform model selection and do so by implementing LASSO. Variables are normalized to have mean 0 and standard deviation of 1. Let Θ denote the set of all coefficients. The following is minimised for a chosen value of λ,

$$\sum_{t=1}^{T}\left(\Delta VCPay_{it} - (\sum_{j \neq i} \beta_{ij}(VCPay_{j,t-1} - VCPay_{i,t-1}) + \Delta X_{it}'\Gamma_i + W_{it}'\alpha_i)\right)^2 + \lambda \sum_{\theta \in \Theta} |\theta| \quad (2)$$

We begin with a very small λ and slowly increase λ until 5 non-zero coefficients are selected. This provides our set of the "best" predictors of $\Delta VCPay$ for university i. For completeness, we continue to increase λ until 4 non-zero coefficients are chosen, then 3, then 2, and 1. This results in a rank ordering of the importance of each of the predictor variables.

LASSO is a useful tool, only providing nonzero coefficients if the reduction in the sum of squared residuals is large enough to overcome the penalty imposed by λ. While allowing for model selection, the method is not perfect. Due to small-sample issues, it is likely that random correlations may be more likely to drive results in our context compared to other contexts. The sample size used for each LASSO estimation is small due to the limited number of time periods in our sample. The results of each individual LASSO estimation are subject to being heavily influenced by randomness. However, we feel confident in interpreting aggregate results when averaged across all LASSO estimations because aggregate results are less likely to be driven by random correlations. Thus, in what follows, we minimally utilize the results from each individual estimation (such as one university benchmarking against another university) and report patterns that are prevalent (such as lower-paying universities benchmarking against higher-paying universities).

Results

Benchmarking

In total, 38.98% of all institutions have only other institutions pay in their top five predictors. That is, for these institutions neither performance metrics nor other control variables have predictive power when compared against the value of the pay dynamics of other institutions. Moreover, 83.05% of institutions have the lag difference between their VC pay and another university's VC pay as their main predictor variable (the variable with a nonzero coefficient when only one variable is picked out of the LASSO algorithm).

To fully interpret results when the lag difference with another university's VC Pay is a predictor, we must consider the sign of the coefficient estimate. From a benchmarking perspective, we expect the coefficient to enter with a positive value. That is, higher pay in the institution that is benchmarked against leads to a university increasing pay. However, in 23.73% of cases when the pay of another university is picked out as an important indicator, the associated coefficient is negative. Moreover, the distribution of when these negative coefficients are selected is relatively uniform in the rank of priority in the LASSO process; that is, these negative coefficient estimates get selected across the distribution of first-most to fifth-most important predictive variable. These negative-benchmarking coefficients are evaluated further below. For the remainder of this subsection, we differentiate our variables between 'positive-benchmarking', 'negative-benchmarking', 'performance', and 'control' variables.

In total, 51.69% of institutions have a benchmark variable with a positive coefficient as the main predictor, whereas 6.78% of institutions have *only* benchmarking variables with positive coefficients in their top five predictors. In total, half of all institutions have three-or-more benchmarking variables with positive coefficients in their top five predictors. Importantly, average VC pay of a university is decreasing with the number of benchmarking variables that have positive coefficients. The average salary of institutions with 0 to 2 positive-benchmarking is £289k and those with three or more have an average of £262k. On average, those institutions who already have lower levels of pay for their VCs are more likely to benchmark more than those at higher levels of pay. This outcome is presented in Figure 1 which illustrates the distribution of VC pay for institutions with three or more positive benchmark coefficients and those with two or fewer; the distribution of the latter is shifted to the left and less frequently takes high values.[4] Interestingly, those institutions with higher league table performance tend to have more positive benchmarking coefficients (Figure 2).

Insert Figure 1 Here

Insert Figure 2 Here

We can further consider the question of the relative VC pay between the benchmarking and benchmarked institutions by analysing the differences between these; this is done in Figure 3 which presents the distribution of the difference between the VC pay in the benchmarking institution and the average of the benchmarked institution(s), split by quartile of VC pay of the benchmarking institution. A number of interesting results are of note. First, institutions with lower pay (the third and bottom quartiles) strongly benchmark against institutions with higher pay. Institutions in the second quartile also on average benchmark against higher-paying institutions. Second, there is some reversion to the mean with those already at the top of the distribution (naturally) benchmarking against those with lower pay. Third, and importantly, despite natural reversion to the mean, the distributions are not symmetric in their reversion to the mean for high and low paying institutions. The median differences are: 84,318 in the bottom quartile, 27,084 in the third quartile, 2,579 in the second quartile, and -45,347 in the top quartile. This suggests that the extent of benchmarking up by low-paying institutions is greater than the extent of benchmarking down by higher paying institutions. This is evidence for a type of asymmetric benchmarking similar to the one described in the literature above.

Insert Figure 3 Here

Performance and control

We turn attention to non-benchmarking predictors of VC pay. Focusing on performance, 5.08% of universities have a performance-related variable as their main predictor of VC pay. In total 40.68% of universities feature at least one performance-related variable in their predictors (30.51% with exactly one, 8.47% with two and 1.69% with three). Institutions with no performance predictors have average VC pay of £266k, whereas those with one and two performance predictors average £282k and £287k. That is, those institutions who pay their VCs less, benchmark against other institutions, whereas universities with high pay already are more prone to using performance as a determinant of VC pay. The most common performance measures that predict dynamics in VC pay are (1) research quality and (2) the ratio of applications to acceptances (a measure of demand for an institution). However, these variables are predictors for only twelve and eleven institutions each, which makes up a total of only 37% of uses of performance predictors when combining the usage of those two. This highlights that different institutions target different measures of performance, in line with Bachan (2008), Bachan & Reilly (2015, 2017), Johnes & Virmani (2020). All acceptances and all applications are predictors chosen by LASSO for ten institutions each. Interestingly, overall league table performance is only chosen by LASSO as a predictor of VC pay dynamics in 5 institutions and NSS scores is chosen for only one university; the measure of total income is a predictor for eight institutions. The National Student Survey (NSS) is the biggest component in both league tables and report the proportion of students who either 'definitely' or 'mostly agree' to the statement, 'Overall, I am satisfied with the quality of my course'.[5]

Of the control variables, the most important predictor is a change in the VC. This is chosen as a predictor in 22 institutions. Having a female VC was a predictor for 13 institutions, the pay of all staff was a predictor for 9, and time spent in post (tenure) is a predictor for 8.

Negative Benchmark Results

As discussed above, the case of negative benchmarked institutions goes against how one might see 'benchmarking' working; that is, to be negatively benchmarked means that higher pay in one institution is correlated with *lower* pay in the other.

One driver of these results may be the LASSO process. We have at most ten years of VC pay data for an institution. Furthermore, we difference variables, resulting in nine observations in our LASSO

specifications. From LASSO, we pick five "best" predictors; some randomness will naturally be present in results.

A separate interpretation of these negatively benchmarked institutions is to think of these as resulting from the nature of competition between institutions. Institutions in the UK likely have a set of universities who they see as their closest competitors. If the VC pay in these institutions is increasing, this might represent some form of success for those institutions, and to the extent that performance is a zero-sum-game, success for a competitor may result from worse relative outcomes for another institution, leading to lower relative pay. Of course, performance variables did enter the LASSO process, so these could have been identified directly, but this is not an impossibility when working with small sample sizes. While possible, we searched for another explanation.

We investigated further to explore whether there is any systematic variation in the presence of negative benchmarking. Specifically, we ask the question, "does the presence of negatively benchmarked institutions correlate with any other observed characteristic?". If so, this correlation suggests a core relationship; if not, then negative benchmarking might result from an unobserved characteristic, random noise, or the competition story.

We run a regression for which the outcome is the number of predictors chosen by LASSO that were the difference in VC pay with another institution and had a negative coefficient (the number of negative benchmarking coefficients for the institution). The regressors are observable VC characteristics in our dataset (gender, time in post, if there was a change in the VC, and salary, league table performance, and total income). The unit of observation is the institution-year, although the outcome does not vary across years for an institution. Standard errors are clustered at the institution level. None of the predictors were statistically significant. However, the coefficient for overall league table performance was negative and had a p-value of 0.106. This suggests that institutions with improved performance were less likely to be identified as negatively benchmarking and is suggestive evidence of the story of competition. We augmented the regression model to include controls for applications, acceptances, and research quality. The p-value for overall score is higher in this specification, 0.279. The only variable with a p-value less than 0.2 is research quality, with a negative coefficient and p-value of 0.025. This is also consistent with a story of competition, as better-performing institutions are less likely to have negative benchmark coefficients.

Specific Results

The sections above have identified core results, which we reiterate in this paragraph. The following paragraphs consider results for some specific institutions. First, universities are estimated to benchmark the pay of their VC to other institutions more than have remuneration be determined by performance (half of all institutions have three-or-more benchmarking variables with positive coefficients in their top five predictors). Second, this behaviour is seen more in those universities with lower VC pay (Figure 1), whereas those with higher initial pay are seen to use performance measures more frequently. Third, those in the bottom 75% of the pay distribution benchmark against those with higher pay (the average VC salary of the benchmarked institution where the benchmarking university is in the bottom quartile of the distribution is £84k higher: Figure 3). Finally, when performance measures are used, a variety of measures are estimated to be important to different institutions; the most common of these are research quality and the ratio of applications to acceptances (a measure of demand for an institution). Whilst we do not know of any other measure similar to ours related to demand, several studies find that research income is an important determinant of VC pay (Baimbridge & Simpson 1996, Tarbert et al. 2008, Bachan & Reilly 2015, 2017, Walker et al. 2019).

Table 3 presents results from ten individual representative institutions; to create this list, we take the average Complete University Guide ranking over the time period, and take the 5^{th}, 15^{th}, 25^{th}, and

so on ranked universities.[6] Across the 55 estimated predictors (five for eleven organizations), five are related to performance (four based on applications and applications-to-acceptances ratios, and one to research quality), two are controls related to staff pay and one is related to the change of the VC. However, most of the determinants of VC pay are related to the pay of VCs in other institutions. LASSO finds the covariates that are the strongest predictors of the outcome in the sample used. With such a small sample, it is very possible for random correlations to drive results in any one single LASSO estimation. We run a lot of LASSO estimations, and the general themes that result we believe can be trusted. I.e., we shouldn't put too much confidence in sentences of the form "university A benchmarks against university B". But we can have confidence in saying "lower-paying universities benchmark against higher-paying universities" because that is the conclusion amassed by several LASSO results and is less susceptible to be the result of one random correlation.

Insert Table 3 Here

We also considered groups of universities (Russell Group, Million+, Guild HE, and University Alliance) to evaluate if universities are more likely to benchmark against other universities within the same group. In contrast, we found the opposite, that universities outside of these groups were more likely to benchmark against universities within each group. We hypothesize this is due to the overall trend that low-paying universities tend to benchmark against higher paying universities, and universities in these groups tend to be higher-paying. We believe this effect dominates any "within-group" benchmarking that takes place.

Robustness Checks

Changes in pay

Specification (2) used within-year demeaned variables; an alternative specification would be to use variables in levels while estimating the same equation:

$$\Delta VCPay_{it} = \beta_{i0} + \sum_{j \neq i} \beta_{ij}(VCPay_{j,t-1} - VCPay_{i,t-1}) + \Delta X'_{it}\Gamma_i + W'_{it}\alpha_i + \varepsilon_{it} \quad (3)$$

Performing the same analysis without demeaning provides similar aggregate results. One interesting thing to note is the direction of the coefficient estimates regarding other university executive pay. In total, 49% of institutions have a positive-benchmark variable as their most predictive, whereas 4 institutions have only positive benchmarking variables in their top five most predictive variables. In total, half of all institutions have three-or-more positive benchmarking variables in their top five predictors; importantly, the more positive benchmarking variables for a given institution, the lower the average VC pay of that university. The average salary of institutions with no positive-benchmarking institutions is £292k, for those with one or two it is £288k and for those with three or more it is £257, reinforcing the previous results.

Panel specification[7]

A core finding in our analysis is an asymmetric benchmarking of institutions; those with lower VC incomes benchmark more than those with higher incomes. A separate way to test for this result directly would be to estimate regressions of the following form:

$$\Delta VCPay_{i,t} = \phi\left[VCPay_{i,t-1} - \overline{VCPay}_{t-1}\right] + \gamma VCPay_{i,t-1} + \alpha_i + c_t + \varepsilon_{i,t} \quad (4)$$

which compares changes in current pay ($\Delta VCPay_{i,t}$) against the difference between lagged pay and the mean from the industry ($VCPay_{i,t-1} - \overline{VCPay}_{t-1}$). We allow the response to the lagged difference of pay to the industry mean to be impacted by where the institution is with respect to the distribution of VC pay. Specifically, we estimate the equation separately depending on the quartile of the distribution the institution is in. For this specification, we exclude those institutions who either had a change in VC in the year in question, or the prior year. In these cases, the university is often paying both the outgoing and incoming VC and this leads to outlier observations in changes in pay.

Results presented in Table 4 demonstrate that when all observations are considered, there is no statistically significant relationship between the lag of the difference between VC pay and the industry average and changes in pay this year; there is evidence of a reversion to the mean, but this is not statistically significant. For those in the bottom and third quartile, those in the lower half of VC pay, there is clear statistically significant evidence of a revision to the mean. For those in the second quartile, there is a slight revision to the mean (suggesting lower relative wages for these VCs over time) but this result is not statistically significant. Furthermore, for those in the top quartile, no reversion to the mean is estimated and the opposite is the case; for these institutions, if the average increases, their pay is estimated to increase even more, maintaining their relative position (although, again, this relation is not statistically significant). These results confirm those above in the core finding that institutions asymmetrically benchmark against competitors.

Insert Table 4 Here

Simulations

It is a heuristic claim that benchmarking of the form we document results in upward ratcheting of VC pay compared to a situation without benchmarking. This section shows this by simulation.

Our goal is to mimic the data-generating process when creating our "fake" data. To begin, we estimated a regression using the real data for which the outcome is the difference in VC pay and regressors are the lagged difference in VC pay from the lagged mean of VC pay, the lagged value of the institution's VC pay, as well as time and individual FE. The residuals from that regression were calculated. A regression of the residual on the lagged residual resulted in an autocorrelation coefficient of -0.34. In 2010, the mean and standard deviation of VC pay were 275,196.2 and 71,451.49 respectively.

Fake data were created for 10 time periods for 100 institutions. In the initial time period, the average salary was 275,196.2 and a normally distributed error, u_{i1} was drawn with standard deviation of 71,451.49. For times 2 through 10, the error, u_{it} was $-0.34 \cdot u_{it\text{-}1} + v_{it}$ where (v_{it}) is normally distributed with standard deviation such that the standard deviation of u_{it} is 71,451.49.

These errors are held fixed regardless of the form of benchmarking. This is a critical assumption that our results hinge on. It may be that remuneration affects VC actions, and thus may influence their salary through means other than benchmarking. We believe this assumption is reasonable, that VC actions should be motivated by the goals of the university and to maximize their own salary regardless of whether benchmarking is in place, nevertheless we stress the assumption for transparency.

When simulating benchmarking, iteratively for time periods 2 through 10, the lag average of salary was created, and benchmarking was applied using coefficients from table 4 and the lagged quartile for the institutions. The only exception is the 0.193 coefficient in table 4 for the top quartile is replaced with 0 due to the large standard error on that estimate. Letting $\gamma_{q(i,t-1)}$ denote the coefficient for institution i that depends on i's quartile at time t - 1. VC pay evolves according to,

$$VCPay_{it} = VCPay_{it-1} + \gamma_{q(i,t-1)}\left(VCPay_{i,t-1} - \overline{VCPay_{t-1}}\right) + u_{it} \quad (5)$$

This was then repeated without benchmarking at all (i.e., imposing $\gamma_{q(i,t-1)} = 0$, but using the same errors). Average pay across universities was calculated for each time period for both the benchmarking and no-benchmarking methods.

This simulation method was repeated 1000 times. The mean and s.d. of average pay for each time period were calculated. Figure 4 plots the mean, (mean + 1.96*s.d.), and (mean - 1.96*s.d.) for each method. Benchmarking is in gold. No benchmarking is in black. As was hypothesized, benchmarking results in upward ratcheting, while the lack of benchmarking results in VC pay remaining stable over time.

Insert Figure 4 Here

To show the result regarding symmetric benchmarking persists even in the presence of a non-zero $\gamma_{q(i,t-1)}$, we repeated this $\gamma_{q(i,t-1)}$ = - 0.3. Results were nearly identical.

Discussion

Our results both validate our methodology and much of the existing literature. For example, Besley & Ghatak (2003) (amongst others) highlight how not-for-profit organizations have the freedom to value and promote different objectives. This is supported in our results with 40.68% of universities featuring at least one performance-related variable as a predictor, but the specific variable used by each university is from a diverse set of candidates (the most common being research quality and demand for places). Further, when one introduces the idea of benchmarking against the pay of other institutions (as evidenced by the university spokespeople who respond to the Times Higher Education VC pay data referencing benchmarking), the situation becomes more complex. This is because, to which institutions should one benchmark against? Those of a similar size, and if so, how do we measure size (by students, income, etc.)? To those with a similar geographical location? Those institutions with similar values? Maybe those with a similar overall league table performance? Our results indicate asymmetric benchmarking, with those with lower VC pay benchmarking against those institutions with higher pay (very consistent with the findings of Ezzamel & Watson 1998, 2002).

Despite the empirical evidence of asymmetric benchmarking behaviour found in this and other papers, and despite the support from the simulation exercises above, there is no clear reason why asymmetric benchmarking must be present in the market equilibrium. One argument would be that universities want to pay more than the average either because the institution is better than average and/or they want to send a signal to the market of this. In this respect, the asymmetric benchmarking can be seen as 'aspirational benchmarking'. Indeed, Carpenter & Sanders (2004) support this concept and further suggest that paying employees more provides a signal that the level of human capital is higher within that organization. Another argument is that certain executives have higher power in the market and can therefore maintain their high salary relative to others.[8] In such a case, their pay changes act as a positive externality for all executives in the market, as their salary changes drive up the average, from which those with less power can take advantage (DiPrete et al. 2010). Combined with the first explanation, universities aspiring to be of the quality of those institutions within the highest paid VCs need to increase their own pay. A third argument is that these VCs, and the remuneration committees setting their wages may, internally, look at different market segments against which to compare wages. Indeed, in 2013 when commenting on the relatively high pay of their VC, the University of Warwick cited that the pay was comparable with other Russell Group institutions (Grove 2013); that is, the salary was compared against a more favourable segment of

the market than the population average. Faulkender & Yang (2010), Bizjak et al. (2011) and Laschever (2013) demonstrate the remuneration committees are more likely to choose higher-paying-CEO firms for benchmarking purposes, holding all else constant. A fourth argument is that higher paid VCs and their remuneration committees may look externally for benchmarking purposes, analysing beyond the UK and/or beyond Higher Education. Faulkender & Yang (2010) demonstrate that it is common for remuneration committees to select benchmark CEOs outside the specific industry of the company, especially if this CEO is highly paid.[9] Card et al. (2012) demonstrates an asymmetry of (dis)satisfaction of staff responses to transparent wages; those with pay lower than average experience dissatisfaction, whereas those who receive above average pay do not receive any additional happiness from this. Therefore, another explanation of this asymmetric benchmarking behaviour would be that universities with below average pay want to increase the pay of the VCs to improve motivation; asymmetric (dis)satisfaction leads to asymmetric benchmarking. Finally, it is common in macroeconomic models to maintain the Keynesian belief that wages are sticky downwards, that is, there is an aversion to pay reductions; this aversion would stop those above average to regress downwards. For example, Shue & Townsend (2017) show that there is a downward nominal rigidity in CEO pay. In the context of all these arguments brought from the literature, the evidence brought here appears to suggest that simply the recommendation to benchmark towards 'similar institutions' without defining 'similar' clearly, results in asymmetric benchmarking. It might be worth mentioning that the asymmetric benchmarking result found here is inconsistent with a standard peer effect story (Angrist 2014). If common shocks across peers drove our results, we should observe symmetric benchmarking.

Our results also highlight the difficulty in regulating, or even just reflecting on, VC pay. That is, if different universities are targeting different performance metrics, and none of them (or at least a very small minority) have the unifying goal of income/profit generation, how can we determine if a pay level or increase is fair? What makes this even more complex is the lack of disclosure in this respect. We know from remuneration committees that different objectives are used to determine pay and we know that benchmarking is an important part of this process, but it is not standard for institutions in the UK to explicitly report on what metrics are being used to set pay, and which benchmarking institutions are applied.

In the US, listed companies need to declare their compensation peer groups (against those they benchmark) and a commentary of pay and performance dynamics over the past five years. Requiring the remuneration committees to both pre-commit and explicitly declare both benchmark institutions and the objectives or performance metrics against which VCs are assessed would increase transparency. Moreover, such practice would make for an easier reflection on the 'fairness' of pay. As is evidenced by our results, institutions are seen to predominantly benchmark; however, this behaviour appears to be asymmetric leading to an inflation of executive pay.

Our approach takes an empirical perspective to find what statistically best aligns with pay movements; declaring what is targeted provides transparency within this process. Then, one can assess if there is some form of asymmetric benchmarking in the process, and more easily evaluate both the causes and effects of this. The end goal though, should be symmetric benchmarking, which allows for pay to fall as easily as it does to increase depending on performance. Asymmetric benchmarking applies a multiplier on underlying inflation within the system, a concertina effect pushing up pay of the distribution, which subsequently pushes up pay at individual institutions, and subsequently the distribution again.

More importantly, it is recommended that instead of focusing on benchmarking for benchmarking's sake, pay related to explicitly stated performance measures should be adopted. A part of this process would be to benchmark performance against other institutions, but our results imply that performance is a small part of the pay awarding process. Pay driven by benchmarks,

especially non-disclosed benchmarks, is too opaque and lends itself most easily to behaviour which will naturally increase chief executive pay.

Conclusions

The present study analyses the pay of chief executives of higher education institutions in the UK, known as 'Vice Chancellors' (VCs), over a ten-year period across a large number of UK institutions. In contrast to previous studies, we do not define a priori a pay equation for all institutions in the sample. Our method allows for each institution to have its own determinants of VC pay. LASSO, the method used here, picks out the determinants that best predict VC pay for each institution out of a large sample of potential determinants. We believe that this is a significant improvement on the methodologies used until now and is especially useful for this type of non-profit organization pursuing multiple goals. Whilst LASSO has been used before in different contexts (including VC pay) we claim that the way we are using it here to explain the benchmarking process is novel. Overall, our results are similar to previous findings in that they bring evidence for asymmetric benchmarking (Ezzamel & Watson 1998, 2002, Ogden & Watson 2004). The extent of benchmarking upwards by low-paying institutions appears to be greater than the extent of downwards benchmarking by higher paying institutions. However, our results differ from previous findings by showing that this pay adjustment process is mostly in place for institutions at the bottom of the pay-distribution, whereas those at the higher end of the distribution tend to have performance parameters and other controls in place as the main determinants of their VC pay. If institutions in the lower half of the pay distribution benchmark against institutions with higher pay, and those at the top of the distribution benchmark mainly against performance parameters, then this might be the reason behind the high inflation in chief executive pay. It is the description of this pay-determination mechanism that we find most valuable, rather than determining exactly towards which institutions or determinants the institutions benchmark against.

It is important to stress that our results could be relevant and have meaningful policy implications not only for institutions of higher education but also for other types of salaries that are benchmarked (professional athletes, CEOs). The results and policy recommendations obtained here for university presidents in the UK (VCs) could apply to these settings as well and hence bear more generality. Firstly, the regulator already recommends benchmarking towards 'comparable companies' so as not to lead to an upward ratchet of remuneration, and this recommendation could be made more specific. Higher education institutions in the UK could be asked to report the names of the institutions against which they benchmark, in a similar way to companies in the US, i.e., the institutions in their peer group that they use as material to set the compensation of their VCs.[10] The disclosure of the names of these institutions, and an explanation as to why they were selected as peers, would not only allow for more transparency but would also encourage symmetric benchmarking. In our context, this means that VC pay should be allowed to rise and also *to fall* by the same proportion, depending on performance relative to the chosen peers.

Secondly, and perhaps most importantly, our study shows that higher education institutions have multiple objectives, which leads to a variety of potential criteria on which performance could be assessed. One potential way would be to test if the institution has improved in the last year(s) on the performance parameter(s) declared in their mission statement, and to tie an increase in the remuneration (or a part of it) to this outcome. In both cases, this would lead to a more robust and transparent benchmarking process and a more stable average chief executive pay over time.

Conflict of Interest Statement: On behalf of all authors, the corresponding author states that there is no conflict of interest.

References:

Insert References Here

---

[1] Data end in 2016, however due to the pandemic in 2020 which causes a structural break we view this as only a minor inconvenience.

[2] Specifically: applications (allapp), acceptances (allacc), applications per place (appaccratioall), overall CUG score (overallscore), average teaching score (averagetreaching), total income, professors pay (pallpay), research quality, student evaluations(nssoverall), and value-added score (valueaddedscore).

[3] There are several versions of the same variable. We include (1) a baseline variable, (2) a lagged version of the variable, (3) a binary variable taking the value 1 if the baseline variable is missing, and (4) a binary variable taking the value 1 if the lagged version is missing. In what follows we do not distinguish these, just using the generic name of the variable to reference that the variable was an important predictor of VC Pay. Note also that multiple versions of the same variable may be chosen by LASSO, and in our tables these variables will appear with the same name.

[4] Another way to test this is performing a regression with time fixed effects for which VC pay is the dependent variable and the count of positive benchmarking institutions is the independent variable. For each additional positive benchmarking institution, pay is estimated to be £10k lower (p-value = 0.013).

[5] As there is strong competition for students among universities in the UK, they put a lot of emphasis on this metric that reflects student satisfaction.

[6] A similar table with all institutions can be obtained by the authors upon request.

[7] This method has been used in a previous working paper (Gschwandtner McManus 2018) that had a stronger focus on the relationship between pay and performance and where benchmarking was not the core of the analysis. The present study focusses on benchmarking and uses LASSO. We believe this is a superior method. This is the reason why we use the panel specification only as a robustness check here.

[8] Gritsko et al. (2013) construct a game theoretic model of CEO pay to illustrate that only a small proportion of higher paying firms compensating higher performing CEOs can lead to an 'arms-race' type behaviour, as competition amongst firms filters through the market.

[9] Although this behaviour in remuneration committees would explain levels of inflation in VC pay and an asymmetric use of benchmarking behaviour, it is still an open question as to why the committees would do this in the first place. Weale (2018) documents that 47% of VCs are on their own remuneration committees, and a further 42% are allowed to attend the committee's meetings.

[10] https://www.sec.gov/rules/final/2009/33-9089.pdf

Angrist, J. D. (2014). The perils of peer effects. *Labour Economics*, *30*, 98-108.

Bachan, R. (2008). On the determinants of pay of CEOs in UK public sector higher education institutions.

Bachan, R., & Reilly, B. (2015). Is UK vice chancellor pay justified by university performance?. *Fiscal Studies*, *36*(1), 51-73.

Bachan, R., & Reilly, B. (2017). Pay in education: Vice chancellor and rector remuneration. In *Handbook of contemporary education economics* (pp. 416-438). Edward Elgar Publishing.

Becker, G. S. (2009). *Human capital: A theoretical and empirical analysis, with special reference to education*, University of Chicago press.

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

Bennett, R. (2017). Bath university under fire for handling of excessive pay. *Times Higher Education (21st November)*.

Besley, T. and Ghatak, M., 2003. Incentives, choice, and accountability in the provision of public services. *Oxford review of economic policy*, *19*(2), pp.235-249.

Besley, T. and Ghatak, M., 2005. Competition and incentives with motivated agents. *American economic review*, *95*(3), pp.616-636.

Bizjak, J., Lemmon, M., & Nguyen, T. (2011). Are all CEOs above average? An empirical analysis of compensation peer groups and pay design. *Journal of financial economics*, *100*(3), 538-555.

Cai, Z., & Heathcote, J. (2022). College tuition and income inequality. *American Economic Review*, *112*(1), 81-121.

Card, D., Mas, A., Moretti, E., & Saez, E. (2012). Inequality at work: The effect of peer salaries on job satisfaction. *American Economic Review*, *102*(6), 2981-3003.

Carmichael, H. L. (1990). Efficiency wage models of unemployment-one view. *Economic Inquiry* 28(2), 269–295.

Carpenter, M. A., & Sanders, W. G. (2004). The effects of top management team pay and firm internationalization on MNC performance. *Journal of management*, *30*(4), 509-528.

DiPrete, T. A., Eirich, G. M., & Pittinsky, M. (2010). Compensation benchmarking, leapfrogs, and the surge in executive pay. *American Journal of Sociology*, *115*(6), 1671-1712.

Ezzamel, M., & Watson, R. (1998). Market comparison earnings and the bidding-up of executive cash compensation: Evidence from the United Kingdom. *Academy of Management journal*, *41*(2), 221-231.

Ezzamel, M., & Watson, R. (2002). Pay comparability across and within UK boards: an empirical analysis of the cash pay awards to CEOs and other board members. *Journal of Management Studies*, *39*(2), 207-232.

Fama, E. F. (1980). Agency problems and the theory of the firm. *Journal of Political Economy* 88(2), 288–307.

Faulkender, M., & Yang, J. (2010). Inside the black box: The role and composition of compensation peer groups. *Journal of Financial Economics*, *96*(2), 257-270.

Fierman. J. (1990). The people who set the CEO's pay. *Fortune*, March 12: 58-66.

Grove, J. (2013). Higher Education pay survey, 2013. *THE, 28th March*.

Gritsko, N., Kozlova, V., Neilson, W., & Wichmann, B. (2013). The CEO arms race. *Southern Economic Journal*, *79*(3), 586-599.

Gschwandtner, A. and McManus, R., 2018. University vice-chancellor pay, performance and (asymmetric) benchmarking.

Jensen, M. C. & Murphy, K. J. (1990). Performance pay and top-management incentives. *Journal of Political Economy,* 98(2), 225–264.

Jensen, M. C. & Meckling, W. H. (2019). Theory of the firm: Managerial behavior, agency costs and ownership structure, *in* 'Corporate Governance', Gower, pp. 77–132.

Johnes, J., & Virmani, S. (2020). Chief executive pay in UK higher education: the role of university performance. *Annals of Operations Research*, *288*, 547-576.

Kato, H. K., Lemmon, M., Luo, M. & Schallheim, J. (2005). An empirical examination of the costs and benefits of executive stock options: Evidence from Japan. *Journal of Financial Economics* 78(2), 435–461.

Laschever, R. A. (2013). Keeping up with CEO Jones: Benchmarking and executive compensation. *Journal of Economic Behavior & Organization*, *93*, 78-100.

Lazear, E. P. & Rosen, S. (1981). Rank-order tournaments as optimum labor contracts. *Journal of political Economy* 89(5), 841–864.

Lucey, B., Urquhart, A., & Zhang, H. (2022). UK Vice Chancellor compensation: Do they get what they deserve?. *The British Accounting Review*, *54*(4), 101108.

Lunt, I. (2008). Beyond tuition fees? The legacy of Blair's government to higher education. *Oxford Review of Education*, *34*(6), 741-752.

Marshall, A. (1890), *Principles of economics*, Macmillan.

Ogden, S., & Watson, R. (2004). Remuneration committees and CEO pay in the UK privatized water industry. *Socio-Economic Review*, *2*(1), 33-63.

Peach, E. K. & Stanley, T. D. (2009). Efficiency wages, productivity and simultaneity: A meta-regression analysis. *Journal of Labor Research* 30(3), 262–268.

Shue, K., & Townsend, R. R. (2017). Growth through rigidity: An explanation for the rise in CEO pay. *Journal of Financial Economics*, *123*(1), 1-21.

Simon, H. A. (1957). The compensation of executives. *Sociometry* 20(1), 32–35.

Singh, H., & Harianto, F. (1989). Management board relationships, takeover risk, and the adoption of golden parachutes. *Academy of Management Journa*l, 32: 7-24.

Tarbert, H., Tee, K., & Watson, R. (2008). The legitimacy of pay and performance comparisons: An analysis of UK university vice chancellors pay awards. *British Journal of Industrial Relations*, *46*(4), 771-805.

Walker, J., Greve, P., Wood, G., & Miskell, P. (2019). Because you're worth it? Determinants of Vice Chancellor pay in the UK. *Industrial Relations Journal*, *50*(5-6), 450-467.

Weale, S. (2018). Majority of university leaders involved in setting their own pay. *The Guardian (15th February)*.