The Gender Wage Gap Among University Vice Chancellors in the UK

Ray Bachan , Alex Bryson

PII: S0927-5371(22)00120-8
DOI: https://doi.org/10.1016/j.labeco.2022.102230
Reference: LABECO 102230

To appear in: *Labour Economics*

Received date: 9 February 2021
Revised date: 4 July 2022
Accepted date: 18 July 2022

Please cite this article as: Ray Bachan , Alex Bryson , The Gender Wage Gap Among University Vice Chancellors in the UK, *Labour Economics* (2022), doi: https://doi.org/10.1016/j.labeco.2022.102230

The Gender Wage Gap Among University Vice Chancellors in the UK

Ray Bachan (University of Brighton)
Alex Bryson (University College London)

Corresponding author:

Professor Alex Bryson
University College London
20 Bedford Way
London, London WC1H0AL
United Kingdom
E-mail: a.bryson@ucl.ac.uk

LE Highlights

1. The percentage of female Vice Chancellors running UK universities has more than doubled in the last 20 years to 24%
2. At the beginning of the Century women Vice Chancellors suffered a substantial wage penalty relative to their male counterparts, but this closed and became statistically non-significant in the second decade
3. The closure in the gender wage gap among Vice Chancellors is accounted for by change in the observed attributes of male and female Vice Chancellors and the universities they lead - in particular, the financial performance of universities employing female Vice Chancellors.
4. A "new starter" wage penalty women faced in the early 2000s disappeared. Similarly, in the first decade women received a lower wage when replacing an outgoing male Vice Chancellor, whereas no differential was apparent between incoming male Vice Chancellors and the women they replaced. This differential was no longer apparent after 2010.
5. This convergence in the gender wage gap among Vice Chancellors contrasts with the persistent gender wage gaps apparent among top academic professionals in UK universities.

Abstract

Using linked employer-employee data over two decades we examine the gap among university Vice Chancellors who are among the most highly paid employees in the UK. Traditionally dominated by men the occupation has experienced a recent influx of women. The gender wage gap of 12 log points in the first decade of the 21st Century closed markedly during the second decade, becoming statistically non-significant in later years. The closure in the gap is accounted for by change in the observed attributes of male and female Vice Chancellors and the universities they lead. A "new starter" wage penalty women faced in the early 2000s disappeared. Similarly, in the first decade women received a lower wage when replacing an outgoing male Vice Chancellor, whereas no differential was apparent between incoming male Vice Chancellors and the women they replaced. This differential was no longer apparent after 2010.

1. Introduction

The gender wage gap (GWG) has been closing, albeit gradually, in a number of countries over the last few decades (Kunze, 2018), including Britain (Bryson et al., 2020). However, the rate of convergence has been slower at the top of the earnings distribution (Blau and Kahn, 2017), despite women's increasing ability to break the "glass ceiling" previously limiting their entry to the top professions. One reason for the persistence of the GWG at the top of the earnings distribution has been substantial within-occupation gaps linked to gender roles in household production and social norms governing what men and women are expected to be doing at home and work (Bertrand, 2018). GWGs are larger among the highly educated in professions where it is costly for employers to offer flexible hours schedules which are compatible with child-care responsibilities. In those professions substantial wage penalties are attached to part-time work and to avoidance of long hours (Goldin, 2014; Bertrand et al., 2010). Women of

child-rearing age also face difficulties being promoted within top occupations when employers fear care responsibilities will affect their continuity of employment or in other ways interfere with their duties as employees (Kunze and Miller, 2017).

In this paper we examine trends in the GWG over two decades among the Vice Chancellors (VCs)[1] who run UK universities, in much the same way as CEOs run public listed firms. Ours is the first paper to track the GWG among VCs over such a long period of time. Universities are large organisations, employing an average of 2,490 full-time equivalent (FTE) staff, teaching 13,695 FTE students (Appendix Table A1, author calculations based on our data). It is a highly paid profession, and one that has seen very substantial real wage growth since the turn of the century. By 2019 our data (described in more detail in Section Four) indicate mean earnings for VCs were £282,000, having risen 142 percent in nominal terms and 63 percent in real terms (2015 prices) since 2000. The profession is male-dominated with men outnumbering women 5:1 across the whole period. But, as in other top professions, the percentage of women has been rising, from 11 percent in 2000 to 24 percent in 2019. People come to these jobs late in their careers: those in our data range between 43 and 76 years old, with a mean of 58 years. Only two VCs had been appointed to their position before the age of 40. Consequently, issues related to childrearing and childcare which are central to much of the literature regarding equal pay in top professions are less relevant in this profession (although, of course, they may affect the acquisition of human capital earlier in VCs' careers).

Two important features of this labour market are worth noting at the outset. The first is that universities differ markedly in the wages they offer VCs. This, coupled with the fact that over half the institutions in our data only ever employ men as VCs, indicates that women's ability to enter higher-paying universities is likely to impact on changes in their relative wages. Second, VCs rarely switch institutions. So, movement across institutions is not a major source of wage

1 The acronym 'VC' will be used as a generic term to describe all heads of UK higher education institutions encompassing: Vice Chancellors; Principals; Rectors; Directors and Provosts. Similarly, pro-VC is used to describe assistant or deputy heads or equivalent.

growth. This means changes in starter wages within and across institutions, and wage progression within institutions, are potentially important determinants of changes in the GWG.

We find that, at the beginning of the 21st Century, there was a substantial raw GWG of 19 log points in annual salary, but the gap closed rapidly such that it was no longer statistically significant towards the end of the period. The average gap in the period 2000-2009 was 12 log points. The gap was largely accounted for by observed differences between male and female VCs and the universities employing them. The gap was much smaller from 2010 and was no longer statistically significant. A substantial within-institution wage difference between men and women in the first decade disappeared in the second decade. Consistent with this, a "new starter" wage penalty women faced in the early 2000s also disappeared. Similarly, whereas women received a lower wage when replacing an outgoing male Vice Chancellor in the first decade this difference was no longer apparent after 2010. Taken together, these findings indicate that, even in top professions where women continue to face entry barriers, the gender wage gap can close where the profession is dominated by older workers who are beyond childrearing age.

In Section Two we consider the changing role of VCs in the UK and the previous literature on Vice Chancellors' pay. In Section Three we use our data to present trends in women's increased presence in the VC labour market in the UK and trends in the raw GWG, as well as identifying some important features of the VC labour market which should be taken into account when trying to understand the origins of a GWG among VCs. Section Four presents our data and estimation methods. Section Five estimates the GWG among VCs and presents decompositions to identify potential reasons for the closure of the GWG taking advantage of our longitudinal linked employer-employee data to examine trends within and across universities. Section Six concludes.

2. The Role of Vice Chancellors and the Literature on VC Pay

Following the publication of the Jarratt Report (1985) universities were required to become more 'efficient' and their VCs more business-like having direct responsibility for the institution's financial position and executive decisions rather than delegating these tasks to bursars and administrators. Universities were expected to look to the private sector for potential candidates. Although VC appointments from the private sector remain the exception it is still argued that the leadership and managerial skills needed to run a modern UK university are similar to those required to lead large private listed companies (Bargh, et al. 2000; Whitchurch, 2006). In many cases the VC is expected to attract private funds and secure institutional growth. VCs also have ultimate responsibility for academic standards, facilitating research, financial probity, and defining the institution's short and long-term strategy (Breakwell and Tytherleigh, 2008).

Over the last 60 years the UK university sector experienced three periods of major expansion when new universities were created and when former higher education institutions (HEIs) were granted university status along with independent degree awarding power. The first period of expansion occurred in the wake of the Robbins Report in 1963 (Robbins, 1963). The universities that were in existence prior to Robbins and those created in the 1960s are collectively referred to as pre-1992 or 'old' universities in the literature. The second wave of expansion followed the Further and Higher Education Act 1992, when former Polytechnics were granted the Royal Charter, which confirmed university status and gave these institutions independent degree awarding power. These institutions are often referred to as post-1992 universities or 'new' universities. The most recent expansion followed the publication of the Higher Education White Paper in 2003 (Department for Education and Skills, 2003) when several university colleges and other HEIs were granted the Royal Charter. In 2019 there were 2 million FTE students enrolled in 169 UK HEIs employing 370,000 FTE academic staff. Of these, 142 are classified as universities (including post-graduate, arts, drama and music colleges), the rest being predominantly small specialist institutions.

A principal motivation for the enlargement of the sector was to widen university participation. The policy was given a major impetus in 1999 when the then Prime Minister, Tony Blair, declared a desire to increase higher education participation of young adults to 50%, including amongst those from disadvantaged socio-economic backgrounds and those from families with no previous history of higher education participation.[2] Universities have now made 'widening participation' a focus of their mission.

2.1 Literature on Vice Chancellors' Pay

The small literature that exists on VC pay determination for the UK has tested propositions from human capital theory (Mincer, 1974; Becker, 1993), agency theory (Jensen and Meckling 1976; Hölmstrom, 1979) and tournament theory (Lazear and Rosen, 1981). An early study using a cross section of 64 VCs for the academic year 1993/94, found that university income from research grants and tuition fees, the VC's public status and academic discipline exerted statistically significant effects on VC pay, but gender did not feature in the analysis (Bainbridge and Simpson, 1996). Dolton and Ma (2003) examined the pay determination process using information on VC and institution characteristics for the period 1994-2002. The relationship was estimated using OLS and random institutional effects. A GWG between 4 - 7% in favour of men was detected in the various specifications reported. Bachan (2008) analysed a sample of 1,473 observations on 148 HEIs covering the period 1997-2006. Using fixed and random institutional effects he found a GWG in VC pay in the range 5-8% in favour of men, with women representing 12% of the sample. These studies also find that VC age, tenure, academic specialism, previous VC/Pro-VC appointments, previous work experience outside the university sector and public honours have a significant influence on pay. The results also point to the importance of university characteristics such as size, type, income and internal pay structures (measured by the presence of highly paid staff in the institution) as determinants of pay.

[2] This commitment was made in a speech delivered at the Labour Party's conference in 1999. This policy orientation has led to increased interest in the fortunes of those who were the first in their family to undertake higher education (Henderson et al., 2019).

Against a backdrop of rising tuition fees, cuts in public funding and concern over large increases in VC pay towards the end of 1990s, the focus of research shifted from identifying the determinants of VC pay to examining whether the 'hikes' in pay were justified. Tarbert et al. (2008) investigated the relationship between VC pay and university performance using 635 observations for the period 1997–2002. The authors found little evidence that VC pay was influenced by university performance in terms of research income. However, when their sample was divided by university type, they found that changes in VC pay were related to changes in research income and changes in the number of postgraduate students in pre-1992 universities, and changes in the total number of students in post-1992 universities. These results were interpreted as being 'mission' driven.

In a more comprehensive study, Bachan and Reilly (2015) investigated the pay-performance relationship for 193 VCs in pre-1992 and post-1992 universities between 1999 and 2009. The study employed a sample of 1,045 observations and a VC fixed effects estimator. They found a positive association between VC pay and meeting the objectives of the university's mission[3] and securing income from UK funding councils. They concluded that to a certain extent VC pay awards were associated with various performance measures but much of the variation in VC pay remained unexplained. Similar findings were found in an updated study using data covering the period 1999-2015 (Bachan and Reilly, 2018). Although it was not possible to identify a GWG due to the statistical methodology adopted they do confirm the importance of the role played by characteristics that were not immutable over time – such as age, tenure, university internal pay structure, size and income - in determining VC pay.

Using data on 149 VCs over the period 2009-2017 Johnes and Virmani (2019) examined the relationship between university performance and VC pay. They employed three measures of university performance: a measure of managerial efficiency, performance in media produced

[3] The variables used to capture university mission were related to 'widening participation' in higher education. Specifically, they included the participation rate of students from state schools and the participation rate for students from areas where traditionally there is a low take up of university places. A variable capturing institutional growth, which also features in mission statements, was also included.

university rankings and a measure of financial stability. Using a random effects estimator they found evidence of a significant and positive association between university performance in media rankings and VC pay. Women accounted for 20% of their sample, but no evidence of a GWG was found.

Walker et. al. (2019) using data covering the period 2014-2017 find that the size of the remuneration committee influences VC pay. They conjecture that VCs use their internal power to extract excess rents. They also confirm the importance of VC and university characteristics in explaining the wage variance. They found no evidence of a GWG in 'new' universities, but they did find a substantial GWG among VCs in 'old' universities in favour of females.

The issue of VC pay has attracted international interest particularly in the United States and Australia. Studies using data from the United States find university Presidents' personal characteristics (e.g. age, tenure and experience) and university characteristics (e.g. size, income and type) significantly affect President pay (taken to be equivalent to a VC in the UK). These studies provide mixed results on the association between gender and pay. For instance, from a sample of 593 observations in 1978 and 706 observations in 1983 for public and private universities where women accounted for 6% and 9% of each sample respectively, a GWG of around 10% in both years was identified in favour of men (Pfeffer and Ross, 1988). In contrast, Bartlett and Sorokina (2005) using a sample of 506 Liberal Arts Colleges covering the period 1999-2003 found evidence of a GWG of 9% in favour of women in top tier universities. However, Ehrenberg, et. al. (2001) using a sample of 2,074 observations on 400 Presidents for a sample of private colleges and universities between 1993 and 1998 found no evidence of a GWG. Similarly, Monks (2007) for the period 2001-2003, Huang and Chen (2003) for the period 1997-2004 and Cheng (2014) for the period 2005-2009 found no evidence of a GWG in presidential pay for public and private universities and colleges. Very little information on the GWG can be gleaned from the few Australian studies that exist (Clements and Izan, 2008; Soh, 2007). Beyond this literature very little is known about the GWG in executive pay in higher education for the UK or internationally.

3. The Gender Composition of the Vice Chancellor Profession and the Raw Gender Wage Gap[4]

University leadership is predominately male dominated. In 1995 there were only 7 women leading HEIs in the UK accounting for around 6% of VCs. However, women have been "breaking the glass ceiling" in universities over the last two decades. By 2000 11% of the VCs in our sample of 115 universities in the UK were women. This had doubled to 20% by 2010 and rose further to 24% by 2019, the last year in our data. The ratio of men to women over the period shifted from 5:1 to 3:1.

Over the same period what started out as a substantial gender wage penalty for women has closed. Figure 1 shows real earnings (in 2015 prices) for VCs over the whole period. The average earnings gap is 5.5 log points. But in 2000 the gap was 19.0 log points, rising to 20.1 log points in 2001. It falls thereafter such that it tends to be statistically non-significant in most years from 2011 onwards.

[FIGURE 1]

Figure 2 shows the rate of real earnings growth among men and women separately compared to earnings levels in 2000: earnings growth for men and women track one another in the first period through to around 2005, after which women's earnings tend to grow at a faster rate than men's. Both men's and women's real earnings drop around the time of the Great Recession and, whilst earnings of both men and women recover somewhat subsequently, earnings growth is much stronger for women.

[FIGURE 2]

[4.] This section relies heavily on the data set we have complied which is described in detail in Section Four.

What might account for the decline in the GWG among VCs over the period? We present evidence in relation to four issues.

First, using wage decomposition techniques, are the women entering the occupation better, when compared to men, in their human capital and other observed attributes, such that differences in these attributes over time may help explain convergence in the GWG? A standard assumption might be that, when a group is underrepresented at the outset, those who are successful in breaking into the profession are particularly able and that, as the minority group establishes itself, this differential in ability between majority and minority groups should diminish such that the two groups look more similar over time.[5] In the case of VCs this might imply those women breaking into the profession in the early 2000s were particularly able, and that the gradual increase in the proportion of women in VC positions might imply a reduction in their relative ability premium which, other things equal, would increase rather than compress the GWG. However, this is an empirical question.

As we will show in Section 4.1 the male and female VCs in our sample differ in their observed traits in a number of respects. Three-quarters (76%) of new appointees were external appointees from outside the university, whether they were women or men.[6] However, men and women take quite different routes on entering their VC roles which may have implications for their earnings and earnings growth. Men are twice as likely to have been in another VC post or equivalent (13.6% compared to 7.6%), whereas just over three-quarters of women had been a pro-VC or deputy in the past compared to just over two-thirds of men (77.8% compared to 68.7%). However, few VCs switch between universities: only 26 men and 3 women move from one university to another as VC over the course of the 20 years covered in our data. Thus, earnings growth is likely to reflect current job tenure which, over this period, was longer for men compared with women (5.74 years compared to 4.96 years).

[5] This pattern is well-established in other professions. For example, Goff et al. (2002) find this in the case of black-white productivity differentials in professional baseball and basketball.

[6] The external applicants account for four-fifths (80%) of person-year observations as noted in Appendix Table A1.

Second, returns to earnings-enhancing attributes may have changed over time in a way that benefits women relative to men. A convergence in the GWG arising from an improvement in women's relative returns to given attributes might be consistent with a reduction in discriminatory practices previously limiting women's earnings progression.

Third, perhaps women are entering higher-waged universities across time? It would appear that, not only are there more women in the profession across time, women have also broken into the 'top' institutions in the sector. For instance, the University of Oxford had a female VC (Louise Richardson) for the last four years of our data (2016-2019) after 16 years in which the university had been run by a succession of three male VCs. Nevertheless, the VC labour market remains segmented along gender lines: 63 universities employed men only in the VC role throughout the period. These universities were higher paying than their counterparts who had employed both men and women: mean log earnings were 6.4 log points higher in the universities that never employed women VCs compared to those that had employed women VCs. Among those universities employing women VCs, women were in post for an average of 39% of the time, ranging from as little as 10% in 5 universities to 85% in two universities (Bath and Napier).

Gender segregation in the VC labour market may affect the GWG and change in the GWG over time because there are sizeable differences in the earnings universities pay their VCs. Across the whole period, university mean real pay for VCs was £230,243 in 2015 prices, but the standard deviation in university mean real pay was £60,705, or 26% of the mean, with a minimum value of £120,710 at Writtle University College and a maximum of £364,472 at Imperial College London. In a model of log VC real earnings with no controls, university fixed effects alone account for two-fifths (43%) of the variance in earnings across VCs. We return to the role of HEIs in helping to explain the GWG when we decompose the gap into its constituent parts in Section Five.

Finally, are starter wages for men and women becoming more equal over time? We are able to address the question of starter wages due to the substantial turnover in VCs over the course of twenty years. We can compare starter wages for men and women, and how these differ over time. We can also establish whether there is a gender differential in the wage offered to a new starter, relative to the previous incumbent who was of the opposite sex.

4. Data and Estimation

4.1 Data

Our data comprise information on 346 VCs who led 115 UK universities with degree awarding powers between 2000 through 2019, giving a sample of 2,300 observations covering 20 years.[7] It was a period of considerable change in the UK higher education sector, including rising tuition fees, increasing student enrolment, cuts in funding and the introduction of university performance metrics aimed at making universities more accountable for student outcomes and the overall management of the institution. Pay and financial data are expressed in real terms (2015=100). Our sample of VCs excludes those leading post-graduate institutions, medical schools, art, drama, and music colleges and small specialist institutions due to their atypical student intake, the nature of the courses offered and data availability. Annual VC pay data were obtained from the *Times Higher Education* annual VC pay surveys (various years) and from the UK's *Office for Students* (2019). Where pay information was unavailable, it was sourced manually from university annual financial accounts/statements. The pay data include any performance-related pay and an estimated value of benefits in kind but exclude pension contributions made by the institution. It should be noted that it was not possible to distinguish between the elements that comprise the final pay for the full sample of VCs.

[7] These universities include 94 institutions that received the Royal Charter and independent degree awarding power prior to 2000. Twenty institutions received the Royal Charter during the period under study, and one institution was granted 'university college' status but has independent degree awarding powers. All institutions in the dataset are collectively referred to as 'universities'.

Data on the personal characteristics of VCs were compiled from *Who's Who* (various years). Information on VC characteristics that were not in these publications were obtained from alternative biographical sources including official institution documents, press releases or through personal contact. Institution performance data were obtained from the Higher Education Statistical Agency (various years). Summary person-year statistics for the full sample and by gender are presented in Appendix Table A1. Appendix Table A2 gives the definition of the variables used in our analysis. Appendix Table A3 provides the names of each of the universities run by our VCs grouped by the year of formation.[8] Below we discuss the variables used to describe VC personal characteristics, then those that describe university characteristics, followed by those used to proxy university performance.

4.1.1 VC characteristics

Individuals appointed to the office of VC bring a considerable amount of human capital and managerial experience to the post. We measure VC human capital and relevant managerial experience by two variables, both expected to be positively related to pay. The first captures instances when an incumbent VC had previously been VC in another institution. The second indicates whether the incumbent had previous pro-VC experience. On average, 12.5% of the sample were former VCs. There were 52 instances where VCs moved between institutions as VC: more males have moved in this way than females (46 compared to 6). Of these, 1 female and 16 male VCs previously held a similar position in an overseas university, 29 moved between institutions within the sample and six moved from UK institutions not included in the dataset. Just over 70% of VCs had previously held pro-VC positions, but more female VCs have pro-VC experience (77.8% compared to 68.7%). However, female VCs experience a shorter term in office compared to their male counterparts (5.74 years compared to 4.96 years). It should be borne in mind that the average length of tenure is based on incomplete spells in office in some cases.

[8] These are Pre-1992 universities (includes Russell Group universities), Post-1992 universities and Post-2003 universities.

A large proportion of VCs have an academic specialism in the social sciences (45.2%) and physical (or natural) sciences (33.4%) and fewer have specialised in engineering (11.4%) and the arts (10%). A continued upward trend in appointing social scientists and a downward trend in the appointment of physical scientists is revealed by the data, which is broadly in line with the trends reported by Bargh *et al.* (2000). There are significant differences by gender with more female VCs having an arts or social science background and more males with an engineering or science background.

Several VCs have been bestowed public honours during their time in office. These awards bring a certain amount of esteem to the institutions they run and may also reflect VCs' social capital. We might therefore expect a positive association between VC pay and Knighthood among male VCs and Damehood among female VCs. Over the period of our data, 11% of VCs had been granted these honours and although we observe more Dames than Knights (13.3% compared to 10.9%) this difference is not statistically significant. Similarly, we expect a fellowship to a Royal Society or Academy to confer a certain amount of academic kudos on the VC, which may also have a positive association with VC pay. Eight percent of both female and male VCs have a fellowship to at least one prestigious academic society or academy.

The literature on CEO remuneration suggests that those externally appointed to senior positions within organisations are generally of superior quality to internal candidates. This feature will tend to drive up the pay of externally appointed CEOs, above those of their internal competitors (Chan, 1996; Murphy and Zabojnik, 2007). Around 80% of all VCs in our sample were externally appointed. We also speculate that the relationship is positive if supply of suitable candidates is globally limited.

We separate VC previous work experience into four categories that describe the general nature of work the incumbent had been engaged in prior to being appointed VC. These categories are: worked for the civil service; worked for the department for education (or a similar related government department or service); worked in academia; worked in industry (private sector).

The majority (87.3%) have a recent career history in academia, followed by those who were formerly employed in the civil service (6.1%), and then by those previously employed in the private sector (5.3%). A small proportion (1.3%) had been employed by the department of education (or related service). More female VCs tend to be career academics (92% compared to 86%) and more male VCs are drawn from industry (6% compared to 1%). We expect VC pay to reflect career background as well as the managerial skills that these modes of employment bring to university management. We expect those VCs drawn from the private sector to command more pay than career academics.

4.1.2 University characteristics

The VC tends to be the highest remunerated member of staff within a university. However, in addition to other highly paid academic staff universities also employ highly paid administrative staff particularly in areas of finance and marketing. We include the proportion of staff paid more than £100,000 p.a. in our estimations to account for this fact and to test for tournament effects. We anticipate a positive association between VC pay and the proportion of highly paid staff. On average around 1-2% of all staff are found to be highly paid.

'Widening participation' appears regularly in university missions. We include the percentage of new entrants from comprehensive schools to capture this feature of a university's mission and note that a sizeable proportion of students are from state run schools (89%). More women tend to run universities that cater for students from state schools compared to their male counterparts.[9]

Universities differ markedly in terms of their history, organisational structure, portfolio of courses offered, the markets they cater and in their mission. The oldest was established in Oxford around 1169 and the most recent in our dataset, Cardiff Metropolitan University, received its Royal Charter in 2011. The 'older' universities tend to be more research intensive

[9] We do not use students from low participation neighbourhoods due to recent data being unavailable for Scottish universities.

than their modern counterparts and attract high numbers of international students and academics with international recognition. Some of these universities are members of the Russell Group of universities consisting of 24 institutions. We classify universities into two groups: those belonging to the Russell Group and those that do not. Just over 18% of universities in our data are members of this 'elite' group of universities which reflects their international reputation in terms of research and their general mission. We would expect the pay afforded to VCs of Russell Group universities to be higher than in other universities and note that on average more male VCs tend to lead these institutions (20.4% compared to 9.5%).

We also expect VC pay to be positively related to university age, based on when the institution received its Royal Charter. The average age of universities is around 75 years. Female VCs tend to lead 'newer' universities with an average age of 64 years compared to those run by male VCs, which have been in existence, on average, for 76 years.

4.1.3 University Performance

Empirical studies have found VC pay is linked to university performance. We expect VCs to be rewarded for their financial management and meeting the university mission. We include income from research grants and contracts as our measure of financial performance. Male-run universities tend to attract more income from this source than female led institutions.

The literature on CEO pay finds a positive association between CEO pay and the size of the organisations they run (Girma et al, 2007; Frydman and Jenter, 2010). Similarly, we would expect VC pay to have a positive relationship with university size as indicated by the total number of FTE students enrolled at the institution.[10] On average, the universities in our sample enrol 13,695 students but we also note a large variation across institutions ranging from 685 (Writtle University College) to 37,575 (University of Manchester). We also note that, on

10 We do not use the number of FTE staff employed by the university, as there is a high correlation between the size of the student body and the number of staff.

average, females tend to run smaller institutions than male VCs based on this measure (12,237 compared to 14,007).

4.2 Estimation

We begin our analyses of the gender wage gap among VCs with pooled estimates of log annual earnings for the period 2000-2019 for men and women. Our baseline specification (results shown in Table 1) is the following:

$$w_{ijt} = \beta_0 + \beta_1 Female_{ijt} + \sum_{t=2}^{T} \delta_t D_t + \sum_{t=1}^{T} \gamma_t Z_t + \beta_2' \boldsymbol{X}_{ijt} + \beta_3' \boldsymbol{W}_{jt} + \boldsymbol{\varepsilon}_{ijt} \qquad \textit{Eq. (1)}$$

i = 1, 2,…,N, j = 1, 2,…,J ,t = 1, 2,…,T

where *i* indexes individuals, *j* indexes universities and *t* indexes year. w_{ijt} is the natural logarithm of real annual pay for the i^{th} VC in university *j* at time *t*. $Female_{ijt}$ is a dummy variable taking the value of 1 if VC *i* in university *j* is female at time *t*, 0 otherwise. D_t is a set of year dummies and Z_t is a vector containing interaction terms between the female dummy variable and year dummies.

$\boldsymbol{X}_{ijt}$ is a vector of observed individual covariates, $\boldsymbol{W}_{jt}$ is a vector of observed university covariates, and ε_{ijt} is the disturbance term. We estimate this model using OLS with a robust estimator to account for potential heteroskedasticity.

Descriptive statistics of all the variables used in the analysis are reported separately for females and males in Appendix Table A1.

We supplement these OLS regressions with university fixed effects estimates, also presented in Table 1, exploiting the fact that we have multiple Vice Chancellor observations per university. In these models we are estimating the average size of gender wage gaps within universities, setting to one side the potentially non-random selection processes that lead to individuals of different genders entering particular universities. The value in running these estimates is that

they remove the effects of wage differentials between universities, which might be driven, at least in part, by unobserved university fixed characteristics. The specification is as follows:

$$w_{ijt} = \beta_1 Female_{ijt} + \sum_{t=2}^{T} \delta_t D_t + \sum_{t=1}^{T} \gamma_t Z_t + \beta_3' \boldsymbol{X}_{ijt} + \beta_4' \boldsymbol{W}_{jt} + \beta_5' \Phi_j + \boldsymbol{\varepsilon}_{ijt}$$

Eq. (2)

where Φ_j identifies each university in the sample. The only terms in the $\boldsymbol{W}_{jt}$vector which remain in this model are those that are time-varying and so are not collinear with the university fixed effects.

We use university fixed effects models to recover the residual wages men and women receive at the universities employing them over the two decades covered in our data. The inclusion of demographic VC traits (other than gender) in these fixed effects estimates means the residuals can be used to plot the extent to which men's and women's earnings depart from the mean real earnings offered to VCs in each university having stripped out the influence of VC characteristics.[11]

To establish how well our models account for variance in male and female earnings we run the same models in Table 2, but this time for men and women separately, so that the gender*year interactions fall out.[12]

Next, we decompose the gender wage gap using Gelbach's (2016) decomposition method to shed light on the factors underlying the GWG. [13] We present decompositions for the whole

[11] The residual earnings are the residuals from a log real earnings equation incorporating workplace fixed effects and the demographic characteristics of Vice Chancellors other than gender. Year dummies and time-varying characteristics are excluded from these estimates.

[12] A Likelihood ratio test for splitting the sample by gender using pooled OLS with a gender dummy, demographic controls and year dummies against separate gender equations rejects the null of a pooled model (χ^2= 187.25, df = 40, p > χ^2 =0.000).

period and separately for the first and second decades.[14] The Gelbach technique nests the Oaxaca-Blinder decomposition (Gelbach, 2016), but it also allows us to incorporate university fixed effects to estimate the role of fixed university attributes in accounting for the GWG. In doing so we are following others who have relied on the Gelbach procedure to decompose wage gaps with employer fixed effects (Addison et al., 2018). The technique also permits us to identify the contribution to the gender wage gap attributable to the blocks of covariates entering the model. We distinguish between the demographics of Vice Chancellors, university characteristics, university performance (which consists of the one-year lagged number of full-time equivalent students (logged) and the one-year lagged research grants and contract income (also logged)), year dummies and university fixed effects.

Our data contain too few Vice Chancellors switching universities to incorporate both university and person fixed effects into our wage equations. However, we do utilise the panel component of the data in ways other than simply incorporating university fixed effects in our estimates. First, we estimate VCs starter wages at the universities employing them. We do so by identifying their first year in the VC post at the university and recover their earnings for that year. At the start of our data in 2000, when many had been in post for some time, starters are defined as those whose tenure was under two years. We have 246 VCs (192 men, 54 women) in our data with starter wages. Having confined the estimation sample to these observations we recover the gender wage gap for log annual earnings by incorporating a female dummy into the regression.[15]

[13] We have chosen the Gelbach procedure for two reasons. First, there has been some debate regarding the appropriateness of incorporating organization fixed effects into a Oaxaca-Blinder decomposition (Heitmueller, 2005). Second, the Gelbach decomposition is robust to the sequence in which co-variates are added to the model. As Gelbach (2016: 510) notes: "the problem [with other approaches] is that the order in which additional covariates enter the regression can affect the accounting". He goes on to show that sequence sensitivity can have a very substantial impact on estimates using other techniques.

[14] Likelihood ratio test for splitting the sample by decade using model 2 in table 1, $\chi^2 = 205.25$, df = 50, $p > \chi^2 = 0.000$.

[15] The low sample size for these estimates means we do not incorporate the controls used in the rest of our analyses.

Second, we examine male and female returns to tenure from the separate gender fixed effects estimates in Table 2 which capture those returns within universities having stripped out potential fixed omitted differences across universities.

Third, we exploit the longitudinal linked employer-employee aspect of the data by recovering gender differences in the earnings paid to VCs when a woman replaces a man, or a man replaces a woman in the post, relative to scenarios in which someone of the same sex succeeds the outgoing VC. These estimates are recovered for both OLS and firm fixed effects models.

Finally, we briefly report some estimates incorporating person fixed effects which estimate wage growth within individuals over time. These models contain year dummies and their interaction with gender.

5. Results

As we showed in Figure 1, the raw GWG closed over time. We identified a number of possible reasons for this convergence. First, women's earnings-enhancing attributes may have improved relative to men's over time, or else the attributes of the universities they work in have changed relative to men in a way that has equalized pay. Second, it may be that the returns to those attributes – for example, returns to tenure or to university performance - changed in favour of women relative to men over time. Third, women may have been more successful over time in entering universities paying higher wages, resulting in an improvement in their relative wages. Fourth, it is conceivable that starter wages for women and men converged over time. We consider these possible explanations in this section.

[TABLE 1]

Table 1 presents the OLS and university fixed effects estimates outlined in equations (1) and (2) in Section Four. All four sets of estimates contain year dummies and interactions between being

a female VC and year dummies. In column 1 these are the only covariates in the model. The year dummies capture changes in log real pay among male VCs relative to the reference year (2000). The coefficient of 0.454 in 2019 indicates that male VCs experienced a 45-log point growth in real mean earnings over the first two decades of the 21st Century. The interactions between female and year are jointly statistically significant (p>f = 0.031) and reveal that women's earnings were 17-20 log points below those of men in the early years of the 21st Century. The gap closed in the first decade such that by 2010 the differences were no longer statistically significant.

When controls are added in column 2 the adjusted R^2 for the model is 0.72, confirming that the data capture a sizeable proportion of the variance in VC earnings.[16] The introduction of controls attenuates the real wage growth experienced by male VCs but it is still very substantial. The female interactions with year dummies are no longer jointly statistically significant (p>f=0.229). The gender wage gap in the early years is considerably smaller than in column 1 and the closure of the gender wage gap – as indicated by the non-significance of the interaction terms – occurs a little earlier.

Column 3 replicates column 1 but incorporates university fixed effects. Wage growth for men captured in the year dummy main effects is very similar to that in column 1. The pattern of earnings growth for women is statistically significantly different within universities (although the interactions are only on the margins of statistical significance p>f=0.067). This time there is no clear trend in the interaction coefficients. Instead, they tend to fluctuate between -.03 and -08 over the period and are even statistically significant as recently as 2017. Comparing the interaction coefficients in column 3 with those in column 1 the chief difference is that the gender wage differences within universities in the first decade were considerably smaller than the overall gender wage gap.

[16] It is possible that some 'controls' are themselves a function of differential treatment of men and women which might impact their earnings, thus biasing our estimates of the gender wage gap, something worth recalling when considering the size of the estimated gap.

Column 4 replicates column 2 by introducing controls, but also retains the university fixed effects introduced in column 3. This model accounts for over four-fifths of the variance in log annual real earnings among VCs (adjusted R^2 of 0.82). The introduction of controls has no effect on the year dummies, indicating that the within-university wage growth experienced by male VCs over the period was very substantial. However, coefficients on the female interactions with years are jointly statistically insignificant (p>f=0.263). Thus, the within-university wage growth experienced by women did not differ significantly over the period from that of men. If one compares the coefficients on the female interactions with year in columns 2 and 4 they are not markedly different in the presence of university fixed effects. Instead, what is striking is the reduction in the size of the coefficients between columns 1 and 2 once controls for Vice Chancellor and university characteristics are added.

[Table 2]

Table 2 runs OLS and university fixed effects models similar to Table 1 but this time separately for men and women, thus allowing all coefficients to vary by gender. The models account for a sizeable percentage of the variance in both male and female earnings. In the OLS models the year dummies indicate faster wage growth among women than among men in the absence of controls (column 4 versus column 1) and with controls (column 5 versus column 2), particularly in later years, as indicated in Figure 2. The introduction of controls reduces the wage growth by around a quarter in both cases (compare columns 2 and 1 for men and 5 and 4 for women). However, the year dummies in columns 3 and 6 indicate that wage growth within universities was similar over the two decades for men and women.

Table 2 also provides some evidence regarding differences in factors contributing to higher earnings among men and women. As one might expect from human capital theory earnings rise with tenure. Although men had longer job tenure than women on average (5.74 years compared to 4.96 years) returns to tenure were substantial and similar for both men and

women. Women appeared to benefit more from spells of over 11 years in the job, though this difference is not apparent when accounting for fixed unobserved differences across universities. Human capital predicts returns to experience, often captured by age, which peak late in employees' careers. However, because VCs tend to be considerably older than employees as a whole, conditioning on tenure in current post, it is unclear what value universities might attach to greater experience. The models show no returns to older VCs – whether male or female. Experience as an ex-VC is rewarded, with the returns to this experience being greater in the case of women, but this disappears when university fixed effects are included.

The characteristics of the institutions that VCs run also matter for their earnings. Both men and women earn more as VCs at universities which employ a larger share of well-remunerated colleagues, whilst running a university drawing a higher percentage of its students from state education is associated with lower earnings. The role of university performance in VC wage determination is of particular note given the debate about rewarding performance discussed earlier. In keeping with the CEO literature, those running larger organizations – as indicated by the log total number of FTE students in the previous year - are rewarded commensurately. This is also the case in the university fixed effects models where the FTE student term is capturing within-university growth in student numbers. The returns to growth in student numbers are considerably higher for women than they are for men (coefficients of 0.29 and 0.15 respectively). Women also seem to gain a little more than men from research and contract income, but growth in this income – as captured in the university fixed effects models – does not contribute to VC earnings for men or women.

It is possible that the convergence in the gender wage gap among VCs may have occurred if the fixed unobserved wage-enhancing attributes of women entering the position improved relative to those of men in the profession. To establish whether this might be the case we ran separate regressions for men and women containing year dummies and compared the coefficients to an identical model incorporating person fixed effects. Among men, log earnings rose 45 log points

between 2000 and 2019 in the absence of person fixed effects and 69 log points with person fixed effects. The equivalent numbers for women were 62 and 79 log points respectively. The implication is that wage growth was greater for both men and women having accounted for fixed unobserved differences across VCs which may have varied over time with the quality of those in VC posts. But since these trends were common to men and women variance in the fixed omitted 'quality' of VCs appears not to have played a role in the convergence of the gender wage gap.

[TABLE 3]

In Table 3 we use Gelbach's (2016) decomposition method to shed further light on the factors underlying the GWG. We present decompositions for the whole period and, given the differences in the rate of adjustment in the gender wage gap between the two decades identified in Table 1, we also present the decomposition for the first and second decades. The way variables are allocated to the blocks in the first column of the table is identical to the models presented in Tables 1 and 2 but we also include them in the footnote to the table.[17] We present estimates without university fixed effects (panel (a)) then estimates with university fixed effects (panel (b)). With their introduction we are capturing the gap in earnings that exists between men and women *within* universities.[18] The fixed effects estimator relies on wage variance in the subset of institutions which employed both male and female VCs over the period.

In panel (a) column 1 most of the raw gap of 5.5 log points across the period 2000-2019 is accounted for by the explained portion of the gap, that is, the observed differences in the

[17] It is possible to incorporate the year*female interactions as an additional block, as we did in Table 1. However, these are not jointly statistically significant in the decomposition and have little bearing on the rest of the decomposition so are omitted. Results containing them are available on request.

[18] For an earlier study investigating the role of firm fixed effects when decomposing the gender wage gap see Meng and Meurs (2004). Their approach builds on the decomposition method introduced by Juhn et al. (1991) whereas the approach here, as per Addison et al. (2018) builds on Gelbach's (2016) methodology.

attributes of VCs and the universities they led. Differences in VC characteristics accounted for 1.5 log points of the gap, but the biggest contributor is the lagged performance of universities which accounts for another 4.6 log points. The year dummies are positive and statistically significant, indicating that the gender wage gap was converging at a rate that is not wholly captured by the changes in these observed VC and university traits. The unexplained component of the gap, sometimes interpreted as a rough proxy for potential discrimination, is relatively small (1.5 log points) and is not statistically significance.

Columns 2 and 3 run the same decomposition, but this time separately for the periods 2000-2009 and 2010-2019. In the earlier period the raw gender wage gap averaged 12 log points. Once again, differences in the attributes of male and female VCs and the institutions employing them appear to account for most of the gap. Differences in the characteristics of universities run by men and women, together with their performance accounted for four-fifths of the gap (9.7 log points). The unexplained component of the gap is 2.3 log points.

The GWG is considerably smaller (3.3 log points) in the years after 2009 and is not statistically significant (column 3). The gap is wholly accounted for by differences in the characteristics of male and female VCs and the institutions they ran, such that the adjusted wage gap is positive and statistically non-significant (.001, t=0.03). The demographic traits of VCs relative to their male counterparts no longer contribute to the wage gap, with the coefficient falling by one-half compared to the earlier decade. Women no longer suffer a wage penalty by virtue of being in more poorly performing universities, with the coefficient falling by three-quarters when compared to the first decade.

In panel (b) these decompositions are rerun, but this time we incorporate university fixed effects, thus exploiting the panel component of the data. What is striking is that, although the university fixed effects do not contribute in a statistically significant way to the explained portion of the gender wage gap, their introduction increases that part of the gender wage gap that is unexplained. This is apparent by comparing the differences in the raw and adjusted gaps

reported in panels (a) and (b). In column 1 for the whole period the proportion of the gender wage gap that is explained falls from 75 percent without university fixed effects to 55 percent with university fixed effects. Consequently, the adjusted gap rises from 1.5 log points to 2.6 log points.

The impact of university fixed effects in increasing the percentage of the gap that is unexplained is confined to the first decade. Prior to 2010 the introduction of university fixed effects raises the percentage of the gap that is unexplained from 19 percent to 50 percent. After 2009 there is no unexplained gender wage gap, whether we condition on university fixed effects or not, and the regression-adjusted gap begins to turn positive with the inclusion of university fixed effects, albeit non-significant (0.013, t=0.61). The implication is that the unexplained portion of the wage gap relating to within-university gender wage differentials which was important in the first decade was no longer affecting the relative wages of female VCs in the second decade.

The other notable difference in the decompositions which is revealed through the introduction of university fixed effects is the reduced importance of lagged performance in accounting for the explained gap. Its contribution to the explained component of the gender wage gap is no longer statistically significant and the coefficients are much smaller than in the absence of university fixed effects, especially in the first decade. The implication is that the contribution of university performance to the gender wage gap arises due to women running more poorly performing universities (smaller and with lower grant and contract income), rather than to within-university changes in the performance.

[FIGURE 3]

We estimate the role played by variance between universities in the closing of the GWG by estimating the change over time in the degree to which women VCs were paid differently to men based on their gender. We depict this in Figure 3 which shows the residual wages paid to men and women over time relative to the mean wages paid by the universities employing

them. As noted in Section Four, these residuals are computed as the difference between what men and women received in log real earnings and the log mean real earnings paid to VCs in each university having stripped out the influence of VC characteristics. The red line depicting the mean residual earnings in universities employing women lies almost on top of the blue line representing mean residual earnings in universities employing men. The gap is very small and statistically non-significant throughout the period. Thus, although as noted earlier, there is very substantial variance between universities in what they pay their VCs, these do not account for the gender gap in VC pay and do not account for the closure of that gap in later years.

[TABLE 4]

Finally, we turn to the issues of 'starter' wages. Starter wages are the wages men and women receive on entering their VC job. Our data permit us to investigate this issue because VC turnover is reasonably high: of our 115 HE institutions, only two are run by the same VC throughout; 70 have two or three VCs; 36 have 4 VCs; and 4 institutions have 5 or 6 VCs. This turnover means that we observe their first year in post for 246 of the 349 VCs in our data (192 men and 54 women).

If, as some of the literature on the GWG suggests, women are less adept at bargaining over wages or are less inclined to ask for a better wage than that which is offered (Babcock and Laschever, 2003), we might anticipate a GWG in starter wages. Alternatively, employers may discriminate against women in terms of the starter wages they offer. Either way, there is clear evidence that female VCs received lower starter wages than men pre-2010: the female coefficient in a log annual pay model containing a female dummy and control for year was -.140 (t=2.70). This fell to a statistically non-significant -.050 (t=1.06) post-2009.

In a small number of cases a university appoints a VC of the opposite sex: in 30 cases a man replaces a woman, while in 45 cases a woman replaces a man. Panel (a) in Table 4 shows that in the absence of controls, when universities appoint a new female VC their wages are 7.4 log points lower than the previous male incumbent, compared to the reference category which is a

scenario in which the VC is replaced by someone of the same sex (Table 4, column 1). This is unsurprising if the previous incumbent has built up earnings through tenure. However, new male VC hires do not face the same penalty: their earnings are 3.1 log points lower than the female incumbent they were replacing but this differential is not statistically significant. What is more, there is little difference over time in this pattern of results (columns 2 and 3). When controls are added in panel (b) the gender differential is apparent across the whole period but it loses statistical significance in the second decade.

[INSERT TABLE 4]

Taken together these findings on starter wages suggest that the wage penalty female VCs faced in the first decade of the 21st Century had dissipated by the second decade.

We have noted above that average tenure was greater for men than for women. Tenure is positively associated with annual earnings: for each additional year of tenure VCs received an additional 0.9 log points in earnings. Among those who had started their job during the years we observed, returns to tenure were much larger: earnings rose by 6 log points per year on average, suggesting earnings growth is higher earlier on in VC contracts. However, for a given number of years in post, there was no statistically significant differential in the returns for men versus women, either among the whole sample or for new starters.

6. Conclusion

This study uses linked employer-employee data to examine the gender wage gap among those running universities in the UK, commonly known as Vice Chancellors, over the first two decades of the 21st Century. It was a period in which women more than doubled their representation in the occupation, and one in which the substantial wage penalty initially experienced by women disappeared.

We have shown that, despite some growth in the percentage of VCs who are women, it remains a male-dominated profession, and one characterised by gender segregation across institutions, as indicated by the fact that 63 of the 115 universities in our sample had not employed a female VC in the 20 years we study. This mattered because in the first decade employer differences, particularly the financial performance of universities, played a significant role in accounting for the GWG. However, the GWG did not converge because women were increasingly able to enter 'higher paying' universities. Fixed unobserved differences across universities were not jointly significant in explaining the GWG and the mean university residual earnings men and women VCs received were not significantly different throughout the period.

The increase over time in the amount of the gender wage gap that was explained by observed data might indicate that discriminatory behaviours against women may not have played an important role in explaining the GWG. But this would be to ignore the potential role that discrimination might have played with respect to hiring. Which institution hires you is rather important for wage formation among VCs because across-institution differences in VC wages are quite large, and because relatively few VCs appear to switch between VC jobs across institutions – at least in the period we observe them. This means that the wage offered for new starters, together with the returns to tenure, are key determinants in wage growth for VCs. Although we find no gender difference in the returns to tenure, we find starter wages were lower for women than they were for men in the first decade, but this starter penalty for women had disappeared in the second decade, thus contributing to a closure in the GWG. Similarly, in the first decade women received a wage penalty relative to the male VCs they replaced when universities switched from a male to a female VC, but male VCs replacing females faced no such penalty, a finding that is consistent with discriminatory hiring practices. However, this differential disappeared after 2010.

The convergence in the GWG among VCs contrasts with the persistence in GWGs in universities among other top professionals in academia, notably professors and associate professors. Mumford and Sechel (2020) examined the extent of the GWG among academic economists

employed at various academic ranks (i.e., lecturer, readers and professors) in UK universities. They point to growing female representation among academic economists (the sex ratio rising from 1:6 in 1996 to 1:4 by 2016) and note that over the period, women have increased their representation at all ranks. Nevertheless, a GWG persists. Using survey data based on a cross-section of 367 individuals the authors found an unexplained gender wage gap of 12.7 log points in favour of male economists. Further, the GWG increased by rank with male economics professors earning around 11.5 log points more than their female counterparts. Other studies, both in the United States (Bedard et al., 2021) and the United Kingdom (LSE, 2016) suggest the GWG among academics in universities opens up because "women progress more slowly through the ranks than men (Bedard et al., 2021: 72). This results in promotion gaps opening up despite similar productivity levels (LSE, 2016).

Further research is needed to examine why it is that the gender wage gap has converged among VCs, but persists in top academic positions, but it may be that the factors that affect women as they seek to climb the university career ladder no longer apply once they have reached the top of that ladder. Instead, other factors matter, such as the performance of the university which they lead. There has been substantial convergence in the way male and female VCs are rewarded for performance, perhaps because of the saliency of such issues for universities and the increasing recognition of the importance of transparency in rewarding men and women appropriately for their performance at the top of the organization. Transparency in the way in which top academics are rewarded may be necessary to achieve convergence in the gender wage gap below VC level.

From a broader labour market perspective, this case study in Vice Chancellor earnings indicates that gender wage gaps can converge rapidly in high-wage occupations, at least in circumstances where, by virtue of the average age of those in the occupation, caring responsibilities for young children are less prevalent.

References

Addison, J. T., Portugal, P. and Vilares, H. (2018). The sources of the union wage gap: the role of worker, firm, match and job-title heterogeneity. *CESIFO Working Paper No. 7392.*

Babcock, L. and Laschever, S. (2003). *Women Don't Ask: Negotiation and the Gender Divide*. Princeton, NJ: Princeton University Press.

Bachan, R. (2008). On the determinants of pay of CEOs in UK public sector higher education institutions. *IZA Discussion Paper No. 3858.*

Bachan, R. and Reilly, B. (2015). Is UK vice chancellor pay justified by university performance? *Fiscal Studies,* 36(1): 51–73. DOI: doi.org /10.1111/j.1475-5890.2015.12045.x

Bachan, R. and Reilly B. (2018). Pay in education: Vice Chancellor and Rector remuneration, in G. Johnes, J. Johnes, T. Agasisti and L. Lopez-Torres (eds), *Handbook of Contemporary Education Economics*. Edward Elgar, Cheltenham.

Bainbridge, M. and Simpson, C. (1996). Rewards to academia: the remuneration of vice chancellors and principals. *Applied Economics*, 28(6): 631–639. DOI: doi.org/10.1080/000368496328371

Bargh, C. Bocock, J. Scott, P. and Smith, D. (2000). *University leadership. The role of the chief executive.* SRHE and Open University Press.

Bartlett, R. and Sorokina O. (2005). Determinants of presidential pay at national liberal arts institutions. *Review of Higher Education,* 29(1): 53–68. DOI: 10.1353/rhe.2005.0059

Becker, G. S. (1993). *Human capital: a theoretical and empirical analysis, with special reference to education* (3rd Ed). University of Chicago Press.

Bedard, K., Lee, M., and Royer, H. (2021) Using Longitudinal Data to Explore the Gender Gap for Academic Economists, *AEA Papers and Proceedings*, 111: 69-73 *https://doi.org/10.1257/pandp.20211087*

Bennedsen, M., Simintzi, E., Tsoutsoura, M. and Wolfenzon, D. (2018). Do firms respond to gender pay gap transparency? *NBER Working Paper No. 25435.*

Bertrand, M. (2018). Coase lecture – the glass ceiling. *Economica*, 85(388):205-231. DOI: doi.org/10.1111/ecca.12264

Bertrand, M., Black, S. E., Jensen, S. and Lleras-Muney, A. (2018). Breaking the glass ceiling? The effect of board quotas on female labour market outcomes in Norway. *The Review of Economic Studies*, 86(1): 191-239. DOI: 10.1093/restud/rdy032

Bertrand, M., Goldin, C. and Katz, L. F. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American Economic Journal: Applied Economics*, 2(3): 228-255. DOI: 10.1257/app.2.3.228

Blau, F. D. and Kahn, L. M. (2017). The gender wage gap: extent, trends and explanations. *Journal of Economic Literature*, 55(3): 789-865. DOI: 10.1257/jel.20160995

Breakwell, G. and Tytherleigh, M. (2008). UK university leaders at the turn of the 21st century: changing patterns in their socio-demographic characteristics. *Higher Education*, 56(1):109-127. DOI: 10.1007/s10734-007-9092-2

Bryson, A., Joshi, H., Wielgoszewska, B. and Wilkinson, D. (2020). A short history of the gender wage gap in Britain. *Oxford Review of Economic Policy*, 36(4): 836-854. DOI: 10.1093/oxrep/graa046

Chan, W. (1996). External recruitment versus internal promotion. *Journal of Labor Economics,* 14(4): 555-570. DOI: 10.1086/209822

Cheng, S. (2014). Executive compensation in public higher education: does performance matter? *Research in Higher Education,* 55(6): 581–600. DOI: 10.1007/s11162-014-9328-9

Clements, K. and Izan, I. (2008). The stairway to the top: the remuneration of academic executives. *Australian Journal of Management.* 33(1): 1–30. DOI: 10.1177/031289620803300102

Department for Education and Skills (2003), *The future of higher education*, London: The Stationary Office, Cmd 5735.

Dolton, P. and Ma A. (2003). CEO pay in the public sector: the case of vice chancellors in UK universities, Discussion Papers in Economics, Newcastle University, UK.

Ehrenberg, R., Cheslock J. and Epifantseva J. (2001). Paying our presidents: what do trustees value? *Review of Higher Education*, 25(1): 15–37. DOI: 10.1353/rhe.2001.0014

Fortin, N., Bell, B. and Böhm, M. (2017). Top earnings inequality and the gender pay gap: Canada, Sweden, and the United Kingdom. *Labour Economics* 47 (2017) 107–123. DOI: 10.1016/j.labeco.2017.05.010

Frydman, C. and Jenter D. (2010). CEO compensation. *Annual Review of Financial Economics*, 2(1): 75–102.

Gelbach, J.B. (2016). When do covariates matter? And which ones and how much? *Journal of Labor Economics*. 34:509 – 543. DOI: 10.1086/683668

Goff, B., McCormick, R. E. and Tollison, R. D. (2002). Racial integration as an innovation: empirical evidence from sports leagues. *American Economic Review*, 92(1): 16-26. DOI: 10.1257/000282

Girma, S., Thompson, S. and Wright, P. (2007). Corporate governance reforms and executive compensation determination: evidence from the UK. *The Manchester School*, 75(1): 65–81. DOI: 10.1111/j.1467-9957.2007.01003.x

Goldin, C. (2014). A grand gender convergence: its last chapter. *American Economic Review*, 104(4): 1091-1119. DOI: 10.1257/jep.20.4.133

Heitmueller, A. (2005) A note on decompositions in fixed effects models in the presence of time-invariant characteristics. *IZA Discussion Paper No. 1886.*

Henderson, M., Shure, D. and Adamecz-Volgyi, A. (2019). First in family university graduates in England. *IZA Discussion Paper No. 12588.*

Higher Education Statistical Agency, (2016). *Data and Analysis,* accessed 21 July 2020 at www.hesa.ac.uk/data-and-analysis .

Hölmstrom, B. (1979). Moral hazard and observability. *Bell Journal of Economics*, 10(1): 74-91. DOI: 10.2307/3003320

Jarratt, A. (1985). Report of the steering committee for efficiency studies in universities, London: Committee of Vice Chancellors and Principals
http://www.educationengland.org.uk/documents/jarratt1985/index.html

Jensen, M. and Meckling, W. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4): 305–360. DOI: 10.1016/0304-405X(76)90026-X

Johnes. J. and Virmani, S. (2019). Chief executive pay in UK higher education: the role of university performance. *Annals of Operations Research*, 288: 547–576. DOI: 10.1007/s10479-019-03275-2.

Juhn, C., Murphy, K. M. and Pierce, B. (1991). Accounting for the slowdown in black-white wage convergence in Kosters, M. H. (ed.), *Workers and their Wages*, AEI Press, Washington DC, PP. 107-143

Kunze, A. (2018). The gender wage gap in developed countries, in S. L. Averett, L. M. Argys and S. D. Hoffman (eds) *The Oxford Handbook of Women and the Economy*, Oxford University Press

Kunze, A. and Miller, A. R. (2017). Women helping women? Evidence from private sector data on workplace hierarchies. *The Review of Economics and Statistics*, 99(5): 769-775. DOI: 10.1162/REST_a_00668

Lazear E. and Rosen, S. (1981). Rank-order tournaments as optimal labor contracts. *Journal of Political Economy,* 89(5): 841-864.DOI: 10.1086/261010

London School of Economics (2016) The Gender and Ethnicity Earnings Gap at LSE, *LSE Equity Diversity and Inclusion Task Force*, https://info.lse.ac.uk/staff/divisions/equity-diversity-and-inclusion/Assets/Documents/PDFs/theGenderAndEthnicityEarningsGapAtLSE.pdf

Manning, A. and Petrongolo, B. (2008). The part-time pay penalty for women in Britain. *The Economic Journal*, 118: F28-F51. DOI: 10.1111/j.1468-0297.2007.02115.x

Meng, X. and Meurs, D. (2004). The gender earnings gap: effects of institutions and firms – a comparative study of French and Australian private firms. *Oxford Economic Papers*, 56: 189-208. DOI: 10.1093/oep/gpf047

Mincer, J. (1974), *Schooling, Experience and Earnings.* New York: National Bureau of Economic Research.

Monks, J. (2007). Public versus private university presidents pay levels and structure. *Economics of Education Review,* 26(3): 338–48. DOI: 10.1016/j.econedurev.2005.11.003

Mumford, K., and Sechel, C. (2020). Pay and job rank among academic economists in the UK: is gender relevant? *British Journal of Industrial Relations*, 58(1): 82-113. DOI: 10.1111/bjir.12468

Murphy, K., and Zabojnik, J. (2007) Managerial capital and the market for CEOs, *mimeo,* University of Southern California.

Office for Students (2019). Senior Staff Pay https://www.officeforstudents.org.uk/advice-and-guidance/regulation/senior-staff-pay/

Robbins. (1963). Report of the Committee appointed by the Prime Minister under the Chairmanship of Lord Robbins. London: HMSO.

Pfeffer J. and Ross J. (1988). The compensation of college and university presidents. *Research in Higher Education,* 29(1): 79–91. DOI: 10.1007/BF00992144

Soh, L. (2007). The market for vice-chancellors. *Australian Journal of Management,* 32(1): 29–55. DOI: 10.1177/031289

Tarbert, H., Tee K. and Watson R. (2008). The legitimacy of pay and performance comparisons: an analysis of UK university chancellors pay awards. *British Journal of Industrial Relations*, 46(4): 771–805. DOI: 10.1111/j.1467-8543.2008.00689.x

Times Higher Education (1999-2017). Times Higher Education pay survey, accessed 21 June 2019 https://www.timeshighereducation.com/features/times-higher-education-v-c-pay-survey-2018

Walker, J., Greve P., Wood G. and Miskell P. (2019). Because you're worth it? Determinants of Vice Chancellor pay in the UK. *Industrial Relations Journal*, 50 (5–6): 450–467. DOI: 10.1111/irj.12265

Table 1: Pooled OLS Estimates of Log Annual Earnings with Year Dummies and Year Interactions

	No controls	With Controls	No controls, FE	with controls, FE
Constant	11.992 (733.67)	10.594 (78.16)	*na*	*na*
Year Dummies				
2019	0.454 (13.82)	0.342 (12.29)	0.467 (19.92)	0.438 (7.60)
2018	0.495 (16.36)	0.388 (15.26)	0.508 (25.18)	0.481 (8.39)
2017	0.476 (16.65)	0.376 (16.67)	0.491 (29.03)	0.468 (8.79)
2016	0.469 (16.14)	0.368 (15.38)	0.485 (25.41)	0.460 (8.97)
2015	0.444 (15.55)	0.343 (15.82)	0.467 (27.04)	0.434 (8.91)
2014	0.430 (14.37)	0.329 (13.91)	0.446 (24.86)	0.415 (9.21)
2013	0.412 (14.26)	0.313 (14.08)	0.428 (24.40)	0.396 (9.37)
2012	0.378 (14.09)	0.285 (14.09)	0.391 (24.22)	0.362 (9.32)
2011	0.382 (14.14)	0.295 (14.36)	0.394 (24.83)	0.364 (9.87)
2010	0.439 (16.10)	0.358 (17.07)	0.442 (24.91)	0.421 (12.38)
2009	0.456 (18.45)	0.379 (20.53)	0.457 (27.12)	0.429 (13.65)
2008	0.406 (15.86)	0.340 (18.45)	0.407 (26.12)	0.385 (13.55)
2007	0.343 (14.41)	0.279 (16.11)	0.343 (22.75)	0.319 (12.59)
2006	0.314 (15.01)	0.270 (17.34)	0.311 (21.25)	0.299 (13.08)
2005	0.268 (11.84)	0.233 (13.63)	0.268 (15.97)	0.254 (11.84)
2004	0.221 (11.19)	0.196 (12.22)	0.219 (15.05)	0.211 (11.07)
2003	0.160 (9.52)	0.142 (10.33)	0.159 (11.70)	0.156 (9.56)
2002	0.107 (7.86)	0.093 (7.47)	0.104 (9.29)	0.105 (7.77)
2001	0.056 (3.23)	0.044 (2.93)	0.051 (3.55)	0.051 (3.54)
2000	*F*	*f*	*f*	*f*
Year/female interactions				
2019×female	-0.008 (-0.15)	0.036 (1.02)	-0.005 (-0.15)	0.015 (0.53)
2018×female	-0.061 (-1.17)	-0.007 (-0.20)	-0.060 (-1.76)	-0.029 (-1.01)
2017×female	-0.060 (-1.24)	-0.025 (-0.90)	-0.068 (-2.31)	-0.047 (-1.99)
2016×female	0.007 (0.13)	0.020 (0.56)	-0.015 (-0.42)	-0.000 (-0.00)
2015×female	0.007 (0.12)	0.009 (0.25)	-0.047 (-1.62)	-0.033 (-1.29)
2014×female	-0.046 (-0.88)	-0.001 (-0.04)	-0.060 (-1.90)	-0.035 (-1.34)
2013×female	-0.030 (-0.63)	0.010 (0.31)	-0.042 (-1.36)	-0.022 (-0.77)
2012×female	-0.036 (-0.68)	0.013 (0.47)	-0.026 (-0.98)	-0.012 (-0.49)
2011×female	-0.062 (-1.38)	-0.007 (-0.28)	-0.048 (-1.95)	-0.026 (-1.12)
2010×female	-0.086 (-1.44)	-0.016 (-0.35)	-0.031 (-0.61)	-0.026 (-0.54)

	No controls	With Controls	No controls, FE	with controls, FE
2009×female	-0.121 (-2.65)	-0.024 (-1.01)	-0.052 (-2.02)	-0.037 (-1.64)
2008×female	-0.118 (-2.46)	-0.013 (-0.56)	-0.049 (-2.04)	-0.025 (-1.22)
2007×female	-0.076 (-1.37)	0.037 (1.16)	0.003 (0.09)	0.028 (0.83)
2006×female	-0.141 (-2.62)	-0.038 (-1.30)	-0.042 (-1.56)	-0.027 (-1.17)
2005×female	-0.150 (-2.83)	-0.053 (-2.08)	-0.057 (-2.10)	-0.041 (-1.64)
2004×female	-0.183 (-3.20)	-0.074 (-2.21)	-0.080 (-2.45)	-0.059 (-1.93)
2003×female	-0.169 (-2.92)	-0.049 (-1.78)	-0.057 (-1.58)	-0.049 (-1.83)
2002×female	-0.186 (-3.39)	-0.047 (-1.79)	-0.063 (-1.62)	-0.049 (-1.62)
2001×female	-0.204 (-3.27)	-0.077 (-2.82)	-0.047 (-1.28)	-0.039 (-1.33)
2000×female	-0.174 (-3.12)	-0.059 (-2.17)	-0.050 (-1.37)	-0.032 (-1.04)
VC Characteristics				
Age ≥ 61 years		0.012 (0.76)		0.026 (2.11)
Age 56-60 years		-0.009 (-0.78)		0.005 (0.61)
Age ≤ 55 years		*f*		*f*
Tenure ≥ 11 years		0.104 (4.67)		0.111 (7.39)
Tenure 6-10 years		0.041 (4.20)		0.043 (5.43)
Tenure 1-5 years		*f*		*f*
External Appointment		0.022 (1.17)		0.036 (2.45)
Ex Vice Chancellor		0.058 (2.85)		0.054 (3.10)
Ex Pro-Vice Chancellor		-0.019 (-1.18)		-0.006 (-0.44)
Fellow of a Royal Society/Academy		0.081 (2.63)		0.044 (1.86)
Knighthood or equivalent		-0.001 (-0.04)		-0.015 (-0.69)
Previous Work Experience:				
Civil Servant		0.042 (1.52)		0.038 (1.53)
Department for Education		0.041 (1.65)		0.067 (1.86)
Industry		0.017 (0.36)		-0.013 (-0.50)
Career Academic		*f*		*f*
Academic Discipline:				
Engineering		0.047 (1.75)		0.024 (1.50)
Social Science		0.017 (1.18)		-0.008 (-0.66)
Arts		-0.017 (-0.70)		-0.060 (-2.81)

	No controls	With Controls	No controls, FE	with controls, FE
Physical/Natural Science		*f*		*f*
Institution Characteristics				
Prop. of Staff Remunerated> £100k		2.469 (6.80)		0.889 (2.98)
% Students from State Schools (lagged 1 year)		-0.002 (-3.36)		-0.000 (-0.09)
University Age		-0.000 (-2.13)		-0.003 (-0.95)
Russell group university		-0.028 (-1.11)		-0.034 (-1.06)
University Performance Variables (lagged one-year)				
(ln) Research grants & contracts		0.018 (3.56)		-0.002 (-0.27)
(ln) Total Students (FTE)		0.153 (10.14)		0.154 (5.31)
R^2/within-R^2	0.358	0.732	0.623	0.692
adj. R^2	0.347	0.724	0.781	0.819
F	18.96[a]	48.80[b]	41.69[a]	54.25[b]
(prob>F)	(0.000)	(0.000)	(0.000)	(0.000)
N	2300	2300	2300	2300

Notes to table: *t* statistics in parentheses (robust standard errors clustered by VC are used in their computation); *f denotes base category used in estimations; (ln) denotes the natural log operator.[a] F-statistic with df (39, 348), [b] F-statistic with df (60, 348)*

Table 2: Separate Male and Female Estimates

	Male			Female		
	(1) No controls	**(2) Controls**	**(3) Controls + University FEs**	**(4) No controls**	**(5) Controls**	**(6) Controls + University FEs**
Constant	11.992 (735.01)	10.514 (69.47)		11.818 (216.31)	10.755 (42.14)	
Year Dummies						
2019	0.454 (13.87)	0.349 (12.28)	0.435 (5.59)	0.620 (8.79)	0.447 (9.66)	0.406 (3.17)
2018	0.495 (16.42)	0.396 (15.27)	0.478 (6.13)	0.608 (8.46)	0.448 (9.46)	0.408 (3.19)

2017	0.476	0.383	0.465	0.589	0.411	0.384
	(16.70)	(16.42)	(6.34)	(8.40)	(9.80)	(3.15)
2016	0.467	0.376	0.459	0.648	0.451	0.426
	(16.19)	(15.36)	(6.54)	(8.68)	(9.44)	(3.66)
2015	0.444	0.350	0.431	0.624	0.408	0.379
	(15.60)	(14.73)	(6.50)	(8.36)	(9.16)	(3.43)
2014	0.430	0.336	0.413	0.558	0.381	0.362
	(14.41)	(13.91)	(6.80)	(7.74)	(8.09)	(3.53)
2013	0.412	0.320	0.393	0.556	0.375	0.355
	(14.30)	(14.28)	(6.97)	(8.09)	(8.48)	(3.70)
2012	0.378	0.291	0.359	0.516	0.350	0.339
	(14.14)	(14.02)	(6.94)	(7.03)	(8.47)	(4.13)
2011	0.382	0.301	0.360	0.494	0.355	0.334
	(14.19)	(14.46)	(7.39)	(7.30)	(8.76)	(4.48)
2010	0.439	0.365	0.416	0.527	0402	0.383
	(16.15)	(17.17)	(9.34)	(6.98)	(6.99)	(5.35)
2009	0.456	0.387	0.427	0.509	0.407	0.389
	(18.51)	(20.62)	(10.48)	(7.71)	10.04)	(6.54)
2008	0.406	0.347	0.384	0.462	0.375	0.362
	(15.91)	(19.01)	(10.54)	(6.85)	(9.66)	(6.93)
2007	0.343	0.285	0.319	0.441	0.363	0.352
	(14.46)	(16.43)	(9.91)	(5.86)	(7.07)	(6.54)
2006	0.314	0.276	0.298	0.347	0.287	0.284
	(15.06)	(17.54)	(10.47)	(4.99)	(7.16)	(6.60)
2005	0.268	0.238	0.254	0.292	0.247	0.262
	(11.88)	(13.79)	(10.01)	(4.42)	(6..48)	(6.06)
2004	0.221	0.200	0.211	0.212	0.193	0.193
	(11.23)	(12.56)	(9.41)	(3.00)	(4.60)	(5.62)
2003	0.160	0.145	0.158	0.168	0.148	0.129
	(9.55)	(10.64)	(8.41)	(3.81)	(5.35)	(4.30)
2002	0.107	0.096	0.105	0.095	0.105	0.092
	(7.89)	(7.78)	(6.95)	(2.83)	(4.92)	(4.42)
2001	0.056	0.046	0.051	0.026	0.015	0.033
	(3.24)	(3.11)	(3.52)	(0.68)	(0.54)	(1.68)
2000	*F*	*f*	*f*	*f*	*f*	*f*
VC Characteristics						
Age ≥ 61 years		0.023	0.026		-0.034	0.005
		(1.30)	(1.84)		(-1.11)	(0.13)
Age 56-60 years		-0.005	0.002		-0.019	-0.014
		(-0.45)	(0.19)		(-0.94)	(-1.04)
Age ≤ 55 years		*f*	*f*		*f*	*f*
Tenure ≥ 11 years		0.086	0.104		0.167	0.079
		(3.83)	(6.37)		(4.10)	(1.94)

Tenure 6-10 years		0.038	0.045		0.047	0.021
		(3.45)	(5.02)		(2.69)	(1.04)
Tenure 1-5 years		*f*	*f*		*f*	*f*
External appointment		0.003	0.019		0.094	0.168
		(0.17)	(1.12)		(3.53)	(1.24)
Ex Vice Chancellor		0.049	0.047		0.115	0.134
		(2.21)	(2.33)		(2.30)	(1.41)
Ex Pro-VC		-0.010	0.002		-0.029	-0.098
		(-0.58)	(0.11)		(-1.23)	(-1.21)
Fellow of a Royal Society/Academy		0.111	0.065		-0.003	0.050
		(3.13)	(2.15)		(-0.10)	(1.78)
Knighthood or equivalent		-0.005	-0.022		0.053	-0.021
		(-0.17)	(-0.91)		(1.37)	(-0.48)
Previous Work Experience:						
Civil Servant		0.063	0.041		-0.100	-0.000
		(2.08)	(1.35)		(-1.37)	(-0.00)
Department for Education		0.021	0.007		0.160	0.137
		(0.67)	(0.16)		(3.89)	(1.23)
Industry		0.025	0.005		-0.016	0.000
		(0.54)	(0.22)		(-0.38)	(0.00)
Career Academic		*f*	*f*		*f*	*f*
Academic Discipline:						
Engineering		0.034	0.022		0.146	0.000
		(1.27)	(1.32)		(3.89)	(0.00)
Social Science		0.014	-0.012		0.018	0.027
		(0.09)	(-0.78)		(0.63)	(0.29)
Arts		-0.014	-0.066		-0.030	-0.061
		(-0.46)	(-2.53)		(-1.02)	(-1.07)
Physical/Natural Science		*f*	*f*		*f*	*f*
Institution Characteristics						
Prop. of Staff Remunerated> £100k		2.079	0.951		3.390	1.617
		(5.12)	(3.06)		(5.29)	(1.07)
% Students from State Schools (lagged 1 year)		-0.002	0.000		-0.004	-0.002
		(-2.81)	(0.46)		(-2.01)	(-1.70)

University Age		-0.000 (-1.88)	-0.002 (-0.55)		-0.000 (-1.13)	0.004 (0.42)
Russell group university		-0.003 (-0.19)	-0.040 (-1.13)		-0.138 (-2.52)	0.000 (0.000)
University Performance Variables (lagged one-year)						
(ln) Research grants & contracts		0.015 (2.61)	-0.008 (-0.78)		0.030 (3.72)	0.004 (0.43)
(ln) Total Students (FTE)		0.160 (9.72)	0.151 (4.68)		0.128 (5.24)	0.291 (3.96)
R^2/ within-R^2	0.333	0.711	0.688	0.431	0.867	0.673
adj. R^2	0.326	0.705		0.403	0.853	
F	28.56[a]	45.24[b]	54.11[b]	10.06[c]	32.07[d]	108.18[d]
(prob> F)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	1894	1894	1894	406	406	406

Notes to table: *t* statistics in parentheses (robust standard errors clustered by VC are used in their computation); *f denotes base category used in estimations; (ln) denotes the natural log operator.[a] F-statistic with df (19, 284), [b] F-statistic with df (40, 284), [c] F-statistic with df (19, 63), [d]F-statisitic with df(40,63).*

Table 3: Gelbach Decomposition of the Gender Wage Gap

	Whole Period (2000-2019)	*2000-2009*	*2010-2019*
a) Without university fixed effects			
Raw Gap	-.055 (1.44)	-.120 (2.68)	-.033 (0.89)
Adjusted Gap	-.015 (0.86)	-.023 (1.26)	.001 (0.03)
Difference	-.041 (1.26)	-.097 (2.51)	-.034 (1.08)
Of which:			
Demographics	-.015 (2.16)	-.027 (2.55)	-.015 (1.22)
Institution	-.004 (0.56)	-.011 (1.72)	-.002 (0.16)
Lagged Performance	-.046 (2.05)	-.083 (2.68)	-.022 (1.01)
Year Dummies	.025 (2.10)	.023 (1.65)	.005 (1.78)
b) With university fixed effects			
Raw Gap	-.055 (1.44)	-.120 (2.68)	-.033 (0.89)
Adjusted Gap	-.026 (1.94)	-.059 (3.72)	.013 (0.61)
Difference	-.030 (0.75)	-.060 (1.30)	-.046 (1.15)
Of which:			
Demographics	-.017 (2.63)	-.020 (2.08)	-.012 (0.97)
Institution (time-varying)	.040 (0.47)	-.024 (0.16)	-.078 (0.17)
HE Fixed Effects	-.055 (0.57)	-.019 (0.12)	.050 (0.11)
Lagged Performance	-.029 (1.70)	-.023 (1.08)	-.017 (0.95)
Year Dummies	.031 (1.96)	.025 (1.62)	.011 (1.20)

Notes: (1) Based on regressions with robust estimator. Decompositions use STATA command b1x2. (2) t-statistics in parentheses (3) Demographics: VC age (2 dummies); tenure (3 dummies); external appointment; previously been VC elsewhere; previously been a pro-VC; Fellow of Royal Society/Academy; knighthood or equivalent; previously worked in civil service; previously worked in Department of Education; previously worked in industry; previously worked as academic; academic discipline arts; academic discipline physical science; academic discipline social science; academic discipline engineering. Institution: geographic location (12 dummies); age (continuous); type of university (Russell Group); percentage of students from State schools (lagged); proportion of staff earning >£100k. Lagged performance: log of N FTE students (lagged); log research grants and contracts (lagged). Years: dummies (19). HE Fixed effects: dummies (115).

Table 4: Within University Wage Differentials When a Female VC Replaces a Male VC or Vice Versa

	Whole period 2000-2019	*2000-2009*	*2010-2019*
Panel (a): Without Controls			
Switch to Female	-.074 (2.97)	-.088 (2.69)	-.077 (2.01)
Switch to Male	-.031 (0.85)	-.017 (0.42)	-.021 (0.49)
Year	.024 (22.71)	.050 (29.33)	.010 (4.95)
N VC-year obs.	2,300	1150	1150
N HE institutions	115	115	115
F (3,114)	172.42	287.99	10.11
Prob > F	0.000	0.000	0.000
Within R^2	0.513	0.718	0.070
Panel (b): With controls			
Switch to Female	-.046 (1.95)	-.067 (2.08)	-.040 (1.20)
Switch to Male	-.022 (0.69)	-.010 (0.21)	.010 (0.28)
Year	.021 (5.24)	.042 (8.05)	-.004 (0.27)
N VC-year obs.	2,300	1150	1150
N HE institutions	115	115	115
F (14,114)	71.81	90.78	9.23
Prob > F	0.000	0.000	0.000
Within R^2	0.587	0.747	0.179

Note: (1) HE institution FE models run with xtreg, fe command (2) Panel (b) incorporates controls for VC demographics, time-varying institutional effects and lagged university performance. (3) T-stats in with robust standard errors clustered by institution in parentheses

Figure 1: Real Earnings Over Time Among Men and Women

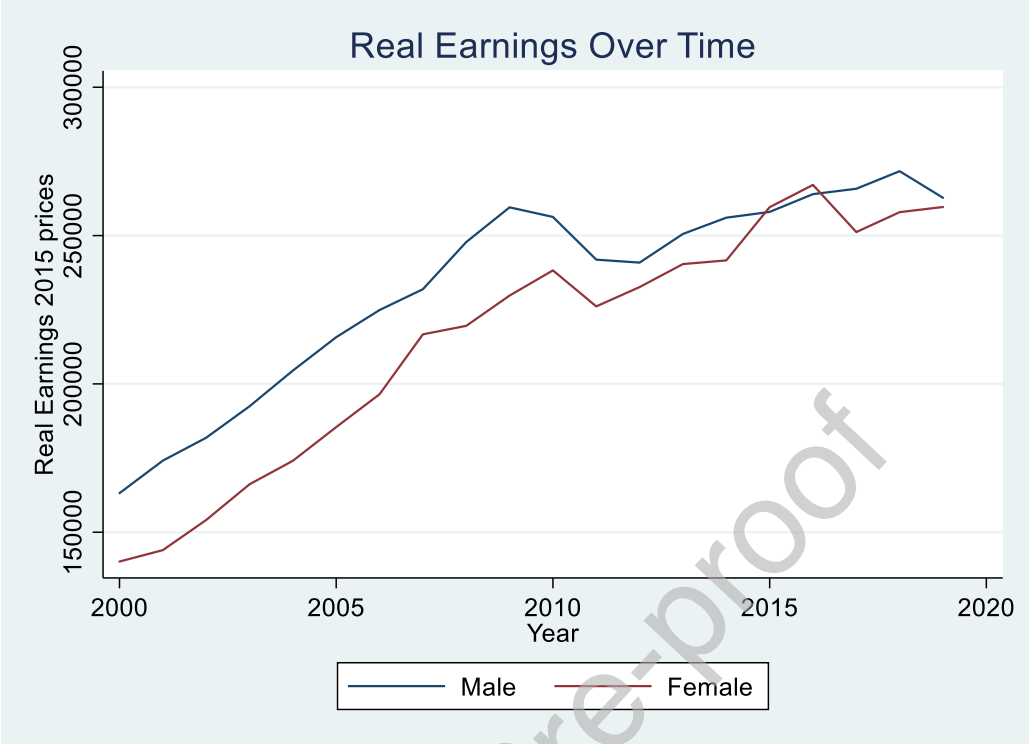


Figure 2: Real Earnings Growth Among Men and Women

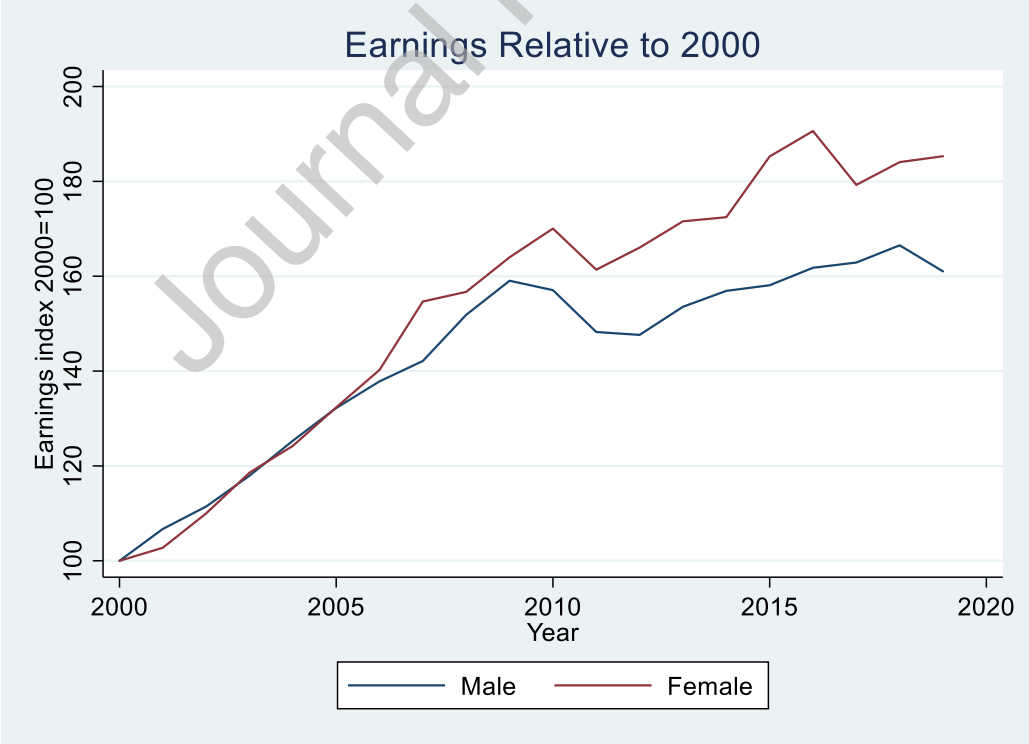
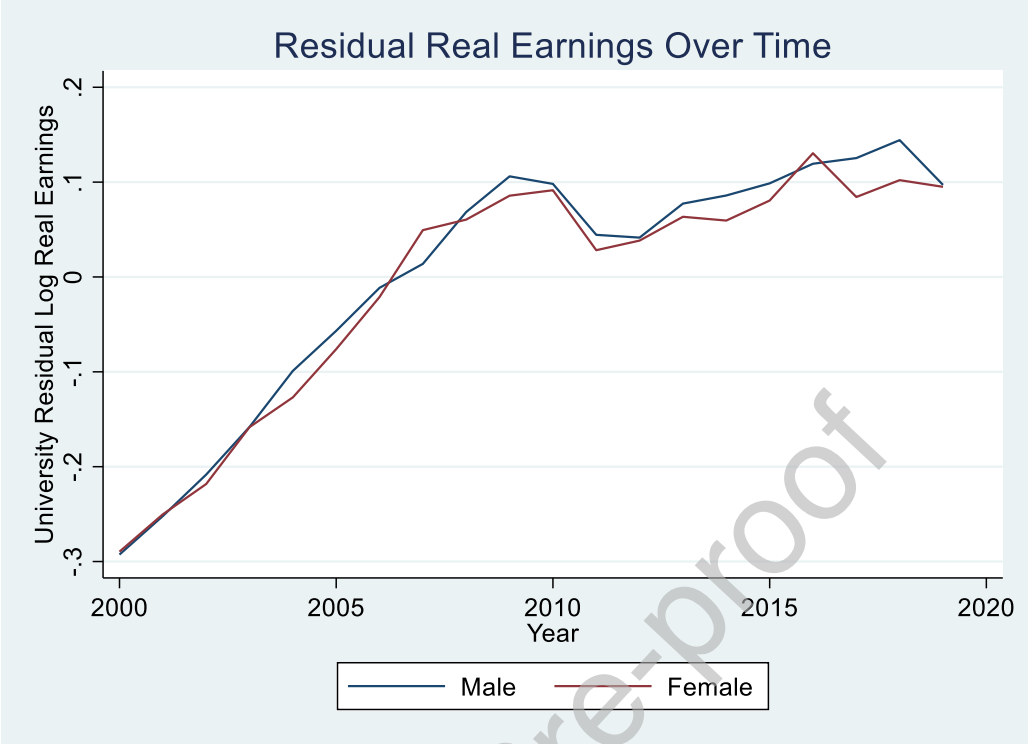


Figure 3: Residual Real Earnings Paid by Universities with Male and Female VCs



Appendix Table A1: Summary Statistics [a]

	All VCs	Male	Female	t/z [b]
VC Pay				
Real Pay (£s, 2015=100)	230,243	232,126	221,455	3.22
	(60,705)	(59,637)	(64,819)	
(ln) Real Pay (2015=100)	12.313	12.322	12.267	3.86
	(0.263)	(0.257)	(0.288)	
VC Characteristics				
Female	0.176	n/a	n/a	n/a
Age (years)	58.422	58.393	58.557	-0.66
	(4.530)	(4.624)	(4.064)	
Age ≥ 61	0.335	0.339	0.318	0.82
Age 56-60	0.410	0.399	0.461	-2.28
Age ≤ 55	0.255	0.262	0.221	1.69
$\chi^2_2 = 5.64$ [0.059] [c]				
Tenure (years)	5.60	5.74	4.96	3.59
	(3.99)	(4.09)	(3.47)	
Tenure 1-5	0.567	0.554	0.628	-2.74
Tenure 6-10	0.321	0.326	0.298	1.11
Tenure ≥ 11	0.112	0.120	0.074	2.67
$\chi^2_2 = 10.40$ [0.006] [c]				
External Appointment	0.803	0.801	0.810	-0.41
Ex Vice Chancellor	0.125	0.136	0.076	3.28
Ex Pro-Vice Chancellor	0.703	0.687	0.778	-3.79
Fellow of a Royal Society/Academy	0.084	0.084	0.084	0.01
Knighthood or equivalent	0.113	0.109	0.133	-1.37
Previous Work Experience				
Civil Servant	0.061	0.060	0.064	-0.29
Department for Education	0.013	0.014	0.010	0.70
Industry	0.053	0.062	0.010	4.28
Academic	0.873	0.864	0.916	-2.91
$\chi^2_3 = 16.59$ [0.001] [d]				
Academic Discipline				
Engineering	0.114	0.130	0.037	5.41
Social Science	0.452	0.425	0.581	-5.78
Arts	0.100	0.090	0.148	-3.54
Physical Science	0.334	0.355	0.234	4.73
$\chi^2_3 = 69.56$ [0.000] [d]				
Institution Characteristics				
Prop. of Staff Remunerated> £100k	0.015	0.016	0.013	1.87
	(0.020)	(0.020)	(0.020)	
% Students from State Schools (lagged 1 year)	89.232	88.964	90.485	-2.16
	(11.055)	(11.056)	(10.797)	
University Age	74.306	76.367	64.692	1.48
	(144.167)	(140.713)	(159.127)	
Russell Group University	0.185	0.204	0.095	5.22

University Performance Variables, 2015=100 (Lagged one year)				
Total Students (FTE)	13,695	14,007	12237	4.87
	(6,676)	(6,493)	(7,306)	
(ln) Total Students (FTE)	9.353	9.388	9.189	5.89
	(0.623)	(0.597)	(0.714)	
(ln) Research grants & contracts (£000s)	8.918	9.057	8.267	7.02
	(2.082)	(1.989)	(2.367)	
N	2,300	1,894	406	

Notes to table

a) Standard deviations reported in parentheses below continuous variables.

b) Z-scores used to test differences in proportions between gender, and t-tests used to test differences in means. The relevant critical value at 0.05 level for a two-tailed test is ±1.96.

c) Chi-squared statistic with 2 df used to test the assumption of independence in the sets of categorical variables for VC age and tenure across gender. Probability value reported in parentheses.

d) Chi-squared statistic with 3 df used to test the assumption of independence of VC academic discipline and work experience categories across gender. Probability value reported in parentheses.

Appendix Table A2: Variable Definition

Variable Name	***Description***
VC Characteristics	
Age ≥ 61	= 1 if VC age is 61 or over at time of observation, = 0 otherwise.
Age 56-60	= 1 if VC age is 56-60 at time of observation, = 0 otherwise.
Tenure = 6-10 years	= 1 if VC tenure is 6-10 years at time of observation, = 0 otherwise.
Tenure ≥ 11 years	= 1 if VC tenure is 11 years or above at time of observation, = 0 otherwise.
Externally Appointed	= 1 if VC externally appointed, =0 otherwise.
Ex Vice Chancellor	= 1 if VC held a previous position as Vice Chancellor /Principal /Rector / Directors /Provosts /President of a UK or overseas university, = 0 otherwise.
Ex Pro-Vice Chancellor	= 1 if VC held a position as Pro-Vice Chancellors, Assistant Principals /Directors /President of UK and overseas universities, = 0 otherwise.
Fellow of a Royal Society or Academy	=1 if VC granted fellowship of Royal Society or British academy at time of observation, = 0 otherwise.
Knighthood	= 1 if VC bestowed a Knighthood or made a Dame at time of observation, = 0 otherwise.
Previous Work Experience (VCs recent employment history (ten years prior to current appointment) by type of employment).	*Civil servant* = 1 if VC previously employed in civil service, excluding Dept. of Education, = 0 otherwise; *Education*= 1 if VC previously employed by official public education bodies e.g. DfES, HEFC, QCA etc., = 0 otherwise; *Industry*= 1 if VC previously employed in the private sector with managerial/research responsibility, = 0 otherwise; *Academia*= 1 if VC previously employed as an academic in the HE sector, = 0 otherwise.
Academic Discipline	*Engineering* = 1 if VC is an engineer or experience in related disciplines (e.g. urban planner or computer technologist), = 0 otherwise; *Social Science* = 1 if VC is an historian, philosopher, geographer, sociologist, economist (or from business/finance), lawyer, psychologist or educationalist, = 0 otherwise ; *Art* = 1 if VC is if: fine/modern artist, musician, dramatist, linguist or language scholar, = 0 otherwise; *Physical Science* = 1 if VC is a biologist, chemist, physicist, geologist, mathematician, statistician or with a background in medical/veterinary related disciplines, = 0 otherwise.
University Characteristics	
Prop. of Staff Remunerated > £100k	Proportion of staff earning over £100,000 p.a. in year of observation.
University Age	Time since the institutions received their Royal Charter in year of observation.
Russell Group University	= 1 and comprises of research intensive institutions that received the Royal Charter prior to 1992, = 0 otherwise.

% Students from State Schools	Percentage of students from state schools in year of observation, lagged one year.
University Performance (lagged one-year)	
Total Students (FTE)	Total students include students enrolled on undergraduate and postgraduate programmes of study (including PGCE) and other HE courses (e.g. HND and Foundation degrees) in year of observation. FTE refers to full-time equivalent.
(ln) Total Students (FTE)	Natural logarithm of total number of student enrolled in each year.
Research Grants and Contracts	Income from externally sponsored research, income from research councils covered by the Office of Science and Technology (OST), income from UK based charities, central government bodies, hospital and local authorities and income from the British Council, Royal Society, British Academy and non-UK sources.

Appendix Table A3: Universities

Pre-1992 (universities formed prior to the Further and Higher Education Act 1992)
Russell Group: Birmingham; Bradford; Bristol; Cambridge; Cardiff; Durham[$$]; Edinburgh; Exeter[$$]; Glasgow; Imperial College; King's; Leeds; Liverpool; LSE; Manchester; Newcastle; Nottingham; Oxford; Queen's Belfast[$]; Queen Mary and Westfield College[$$]; Sheffield; Southampton; UCL; Warwick; York[$$]. *Non-Russell Group*: Aberdeen; Aberystwyth; Aston; Bangor; Bath; Birmingham; Brunel; City; Dundee; East Anglia; Essex; Goldsmiths; Heriot-Watt; Hull; Keele; Kent; Lancaster; Leicester; Loughborough; Reading; Royal Holloway; Sheffield Hallam; SOAS; St Andrews; Salford; Stirling; Strathclyde; Surrey; Sussex; Swansea; Ulster
Post-1992 (universities formed after the Further and Higher Education Act 1992 predominantly former Polytechnics)
Abertay; Anglia Ruskin; Bedfordshire; Birmingham City; Bournemouth; Brighton; Cardiff Met; Central Lancashire; Coventry; De Montfort; Derby; East London; Glasgow Caledonian; Gloucestershire; Greenwich; Hertfordshire; Huddersfield; Kingston; Leeds Becket; Lincoln; Liverpool John Moores; London South Bank; Manchester Metropolitan; Middlesex; Napier; Northampton; Northumbria; Nottingham Trent; Oxford Brookes; Plymouth; Portsmouth; Robert Gordon; South Wales; Staffordshire; Sunderland; Teesside; West of England; West London; West Scotland; Westminster; Wolverhampton.
Post-2003 (universities formed after 2003 predominantly former colleges of higher education)
Bishop Grosseteste; Bolton; Buckingham New University; Canterbury Christ Church; Chester; Chichester; Edge Hill; Glyndwr University; Liverpool Hope; Harper Adams; Newman; Queen Margaret University; Roehampton; Solent; Trinity St David; Winchester; Worcester; Writtle University College; York St John.

[$] joined Russell Group in 2008, [$$]joined Russell Group in 2012,