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The Gender Wage Gap Among University Vice Chancellors in the UK

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Abstract

The gender wage gap has closed gradually in the United Kingdom, as in other countries, but convergence is slower among top earners. 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 substantial 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 attributes of male and female VCs and the universities they lead - in particular, the financial performance of universities employing female VCs. The unexplained component of the gap is small and explains none of the convergence in the gap. A "new starter" wage penalty women faced in the early 2000s disappeared. However, women continued to receive 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. .

Keywords: gender wage gap; vice chancellors; higher education; decompositions; linked employer-employee data

JEL Codes: J16; J31; J44;

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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)[3] 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

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[3] 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.

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).

In the next section of the paper 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.

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 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 accounted for by observed differences between male and female VCs and the universities employing them. The gap was much smaller from 2010 and, again, was accounted for by observed differences in VCs and the

universities they ran. The unexplained component of the gap was small and statistically non-significant throughout. 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 disappeared. However, women continued to receive 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.   The 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.

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.[4] Universities have now made 'widening participation' a focus of their mission.

2.1 Literature on Vice Chancellors' Pay

The small literature 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) when examining the determinants of VC pay. 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

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[4] 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).

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 latter studies also find that VC age, tenure, academic specialism, previous VC or pro-VC appointments, previous work experience outside the university sector and public honours had a significant influence on pay. The results also point to the importance of university characteristics such as university size, type, income and internal pay structures (measure by the presence of highly paid staff in the institution) as determinants of pay.

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 for pre-1992 universities, and changes in the total number of students for 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[5] 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.

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[5] 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.

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 the studies conducted by Bachan and Reilly (2015, 2018) confirm the importance of the role played by VC 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 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 experience) and university characterises (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[6]

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

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

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]

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

First, using standard 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.[7] In the case of VCs this might imply those 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. Four-fifths (80%) of new appointees were external appointees from outside the university, whether they were women or men. 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

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[7] 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.

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).

Second, an alternative to the hypothesis that attributes may have shifted in women's favour is the proposition that the 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, do men and women differ in their returns to tenure in the job, or 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

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.[8] 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

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[8] 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'.

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.

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 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 their affiliation to university associations.[9] 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 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 and as noted earlier 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 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

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[9]These are the Russell Group, the University Alliance group, the MillionPlus group, the GuildHE and non-aligned universities (see section 4.2 for details).

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.

A large proportion of VCs have an academic specialism in the social sciences (45.2%) and physical (or pure) 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). We also note significant differences by gender with more female VCs having an arts or social science background and more males with an engineering or science background.

A large number of VCs have been bestowed public honours during their time in office. These award bring a certain amount of esteem to the institutions they run and may also reflect the VCs social capital. We might therefore expect a positive association between VC pay on the one hand and the bestowment of a Knighthood on male VCs or a Damehood on female VCs on the other. 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 employment 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 their 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.

4.2   University characteristics

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

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 in excess of £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.

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[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.

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 than their modern counterparts and attract high levels of international students and academics with international recognition. We 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.

We classify universities according to the university groups to which they are currently associated.[11] These groups are: the Russel Group (research-intensive universities) comprising universities that were established prior to 1992; the University Alliance which includes universities with a focus on 'applied' research that were established around 1992; the MillionPlus universities which is a coalition of 'modern' universities that were also established around 1992; and the Guild of Higher Education that includes universities that were formed in or after 2003. The Russell Group universities comprise just under one-fifth of the sample and more male VCs tend to lead these institutions than females (20.5% compared to 9.5%). On the other hand, more women tend to lead universities aligned to the Guild of Higher Education (20% compared to 7%). However, a large proportion (45%) of universities are not currently aligned to any of these groups.[12]

As noted previously '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

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[11] We argue that these groups give a more homogenous set of universities and tend to reflect their international reputation in terms of research and their general mission.

[12] Several universities joined the Russell Group during the span of our data and the 1994 university group, which included other pre-1992 universities that were not part of the Russell Group, was dissolved in 2013. Several post 1992 universities were/are joint members of the University Alliance, the MillionPlus and the Guild of Higher Education. In these cases, we classify them according to the group they initially joined. Universities are classified by their affiliation in 2018.

state run schools (89%). We also note that women tend to run universities that cater for students from state schools compared to their male counterparts.[13]

4.3   University Performance

As noted earlier, 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 funding councils, student fees, and research grants and contracts as our measures of financial performance. We note that male run universities tend to attract more income from these sources than female led institutions.

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 changed in favour of women relative to men over time. Third, women may have been more successful over time in entering HE institutions 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 the following decompositions.

[TABLE 1]

Table 1 decomposes the GWG using a standard Oaxaca-Blinder decomposition. Following Jann (2008) we compute a two-fold decomposition based on coefficients from a pooled model over both male and female VCs incorporating a dummy variable

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

identifying female VCs. Column 1 presents the decomposition over the whole period, while columns 2 and 3 present them for the first and second decades respectively.

The raw gap of 5.5 log points across the period 2000-2019 is wholly accounted for by the explained portion of the gap, that is, the observed differences in the attributes of VCs and the universities they led (column 1).[14] Differences in VC characteristics accounted for 1.1 log points of the gap, while the lagged performance of universities accounts for another 2.0 log points but the biggest contributor was the characteristics of the universities run by men and women: they accounted for 3.2 log points of the gap (58% of the overall gap). The year dummies are negative and statistically significant, indicating that the GWG was converging at a rate that is not wholly captured by the changes in these observed VC and university traits. None of the gap was associated with differential returns of men and women to their attributes or the universities employing them. The unexplained component of the gap, sometimes interpreted as a rough proxy for potential discrimination, was not statistically significant.

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 GWG was 12 log points. Once again, differences in the attributes of male and female VCs and the institutions employing them appear to account for all 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 (9.8 log points). The unexplained component of the gap was not statistically significant.

The GWG is considerably smaller (3.3 log points) in the years after 2009 and is only on the margins of statistical significance (column 3). The gap is wholly accounted for by differences in the characteristics of male and female VCs and the institutions they ran. But the lagged performance of universities is small and statistically non-significant. The decline in the contribution of lagged university performance is notable: the coefficient in the second decade is less than one-tenth the size of the coefficient in the first decade.

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[14] The pooled regression underpinning this decomposition accounts for almost three-quarters of variance in VC wages (the adjusted r-squared is 0.73).

Once again, gender differences in the returns to those attributes do not contribute to the size of the GWG.

It appears from the Oaxaca-Blinder decompositions in Table 1 that it is differences in the observed characteristics of VCs and the institutions employing them that account for the GWG, and that there is no role for any unexplained component arising from differential returns for the same sets of observed characteristics. This is the case in the initial period through to 2009 and the period post-2009.

[TABLE 2]

In Table 2 we use Gelbach's (2016) decomposition method to shed further light on the factors underlying the GWG. As in the case of the Oaxaca-Blinder decomposition in Table 1 we present decompositions for the whole period and separately for the first and second decades. The Gelbach technique nests the Oaxaca-Blinder decomposition (Gelbach, 2016), so it is unsurprising that the results in Table 2 panel (a) are nearly identical to those presented in Table 1.[15] However, we use the Gelbach technique 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).[16]

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[15] Note that there is a switch in the signs attached to sets of covariates between the Oaxaca-Blinder decomposition in Table 1 and the Gelbach decomposition in Table 2 (a). This is simply a matter of presentation. The Oaxaca-Blinder decomposition attaches a positive sign to sets of variables that increase the size of the raw wage gap between women and men. So, a positive (negative) sign means a bigger (smaller) GWG. In the case of the Gelbach decomposition, the wage gap between men and women is expressed from the perspective of women as negative. Those factors that account for the difference between the raw and covariate adjusted gaps are identified as contributors with a negative sign, whilst those closing the gap are designated positive.

[16] There has been some debate regarding the appropriateness of incorporating organization fixed effects into a Oaxaca-Blinder decomposition (Heitmueller, 2005).

The university fixed effects estimates are presented in Table 2 panel (b). With their introduction we are capturing the gap in earnings that exists between men and women *within* universities.[17]

The fixed effects estimator relies on wage variance in the subset of institutions which employed both male and female VCs over the period. The fixed effects themselves are not jointly statistically significant in accounting for the size of the GWG in either period. However, in contrast to the estimates that exclude university fixed effects there is a sizeable and statistically significant wage penalty for women VCs in the period through to 2009 of 6.2 log points (panel b, column 2) which turns positive but non-significant in the second decade.[18] The implication is that the GWG that existed within HE institutions employing men and women as VCs early in the Century disappeared in the second decade.

It is perhaps unsurprising to find that, with the inclusion of university fixed effects, university performance plays no significant role in the GWG. Nor do time-varying aspects of institutions. However, there is one interesting difference between the results in panels (a) and (b): in the absence of university fixed effects demographic differences between men and women VCs contribute to the GWG in both decades, although the size of the effect halves from 2.9 to 1.5 log points. However, within universities, demographic differences only contribute to the size of the gap in the first period and become statistically non-significant after 2010.

We can 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 employed in higher paying universities. We depict this in Figure 3 which shows the

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[17] 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.

[18] The other advantage of comparing OLS and university fixed effects models using the Gelbach decomposition is that, unlike other decomposition methods, it is not sensitive to the sequence in which blocks of variables are incorporated. 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.

average real earnings paid by universities employing men and women VCs over the two decades covered in our data. The figure shows trends in residual real earnings for universities employing men and women. These are computed as the mean real earnings offered to VCs in each university having stripped out the influence of VC characteristics.[19] Although the red line depicting the mean residual earnings in universities employing women is a little below 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 VC GWG and do not account for the closure of that gap in later years.

[INSERT FIGURE 3]

We can account more precisely for changes over time in the GWG, and the role played by various factors, using the Juhn-Murphy-Pierce (henceforward JMP) procedure (Juhn et al., 1993).[20] This permits for a more formal decomposition in the contribution of each factor between the first and second decades of the 21st Century. This is presented in Table 3. The closure in the raw gap from 12 log points in 2000-2009 to 3.3 log points from 2010 to 2019 is as per the decompositions above. Columns 2 and 3 confirm that the 8.7 log point closure in the GWG is almost exclusively accounted for by changes in what JMP term the "predicted gap"[21], which is due to changes in men's and women's observed endowments ("quantity" effects) and the returns to those endowments (what JMP refer to as the "observed prices") as captured in the coefficients attached to those attributes. Changes in the residual gap (which might arise from changes in unobserved prices or unobserved quantities) play no role: these are decomposed into quantity and price effects at the bottom of the table but, since they are so small, we do not discuss them further.

[INSERT TABLE 3]

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[19] The residual earnings are the residuals from a log real earnings equation incorporating workplace fixed effects and the demographic characteristics of VCs.
[20] The STATA procedure is jmpierce2.
[21] The predicted gap is the equivalent of the explained gap in Oaxaca-Blinder terminology.

Instead we focus on the sizeable reduction in the predicted wage gap of 8.6 log points. We decompose the predicted gap into its two parts – that related to changes in the distribution of observed endowments between men and women (the quantity effect) and that related to changes in the returns, or prices, attached to those attributes between men and women (the price effect). The closure in the predicted GWG is largely accounted for by the former, namely quantity effects. Changes in the endowments across men and women account for 6.2 of the 8.5 log point closure in the predicted gap (roughly three-quarters). Remarkably, 5.6 log points of this closure in the predicted gap arises from quantity effects due to a single variable, namely the tuition fees universities receive. The implication is that most of the closure in the GWG over the period is due to the fact that female VCs are increasingly likely to work in universities with substantial incomes arising from tuition fees. Universities' financial performance in procuring higher tuition fees also accounts for the majority of the reduction in the predicted gap arising from changes in prices (1.2 of the 2.4 log point closure), suggesting women are seeing increasing wage returns for the tuition fees their universities charge, compared with men. By contrast, individual VC traits, such as time spent in the job, contribute very little to changes in the GWG.

[TABLE 4]

Finally, we turn to the issues of 'starter' wages and returns to tenure. 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 stick with 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. When universities appoint a new female VC their wages are 8.2 log points lower than the previous male incumbent (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).

[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, but that women continued to receive a wage penalty relative to the male VCs they replaced when universities switched from a male to a female VC, but that male VCs replacing females faced no such penalty.

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, accounted for the bulk of the GWG. However, the GWG did not converge because women were increasingly able to enter 'higher paying' universities: university fixed effects did 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.

That gender differences in returns to VC attributes were largely absent over the period 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. However, women continued to receive 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.

The JMP decomposition of the change in the GWG over time indicated that the convergence in the GWG was wholly attributable to changes in observed traits of VCs and their universities. By far the biggest contributor was the increased likelihood of female VCs working in universities with bigger tuition fee income. This effect is independent of the number of students at the university because this is already accounted for in the model. Precisely why this change took place is worthy of further research.

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.

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Table 1: Oaxaca-Blinder Decomposition of the Gender Wage Gap

	Whole Period	*2000-2009*	*2010-2019*
Predicted log male wage	12.32 (2084.94)	12.22 (1583.24)	12.43 (1643.23)
Predicted log female wage	12.27 (859.02)	12.10 (594.86)	12.40 (820.23)
Difference	.055 (3.59)	.120 (5.50)	.033 (1.95)
Explained:			
Year dummies	-.014 (3.27)	-.022 (2.39)	-.004 (1.66)
Demographics	.011 (4.43)	.020 (4.49)	.010 (2.25)
Institution	.032 (4.60)	.048 (5.06)	.022 (2.05)
Lagged Performance	.020 (3.80)	.050 (5.07)	.004 (1.30)
Total	.048 (3.58)	.104 (5.41)	.039 (2.82)
Unexplained:			
Year dummies	-.006 (1.67)	-.034 (1.36)	-.007 (0.17)
Demographics	.130 (0.91)	.113 (0.79)	.197 (0.77)
Institution	-.047 (0.15)	-.454 (1.07)	.972 (1.68)
Lagged Performance	.144 (0.48)	.323 (0.93)	-.458 (0.72)
Constant	-.233 (1.10)	.007 (0.02)	-.707 (2.13)
Total	.008 (1.01)	.016 (1.64)	-.006 (0.52)

Notes: (1) Based on regressions with robust estimator. N=2,300 VC-year observations. Decompositions use STATA command Oaxaca. The categorical sub-command is used to transform categorical variables such that the decomposition is invariant to the choice of reference categories. (2) z-stats in parentheses. (3) Demographics: VC age (continuous; 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, Alliance, MillionPlus, Guild of Higher Education, Post-1994); log of N FTE students; percentage of students from State schools (lagged); proportion of staff earning >£100k. Lagged performance: log tuition fees (lagged); log research grants and contracts (lagged).

Table 2: Gelbach Decomposition of the Gender Wage Gap

	Whole Period (2000-2019)	*2000-2009*	*2010-2019*
a) Without university fixed effects			
Raw Gap	-.055 (3.59)	-.120 (5.51)	-.033 (1.95)
Adjusted Gap	-.008 (0.99)	-.016 (1.59)	.006 (0.50)
Difference	-.047 (3.61)	-.104 (5.47)	-.039 (2.84)
Of which:			
Demographics	-.015 (4.94)	-.029 (5.75)	-.015 (2.70)
Institution	-.032 (4.67)	-.048 (5.04)	-.023 (2.23)
Lagged Performance	-.020 (3.78)	-.050 (5.15)	-.004 (1.21)
Year Dummies	+.020 (3.85)	+.022 (2.40)	+.004 (1.66)
b) With university fixed effects			
Raw Gap	-.055 (3.59)	-.120 (5.51)	-.033 (1.95)
Adjusted Gap	-.026 (2.93)	-.062 (4.84)	+.014 (0.71)
Difference	-.030 (1.92)	-.058 (2.41)	-.047 (2.12)
Of which:			
Demographics	-.017 (4.89)	-.017 (2.96)	-.010 (1.33)
Institution (time-varying)	-.165 (1.00)	+.023 (0.11)	-.435 (0.95)
HE Fixed Effects	+.140 (0.87)	-.086 (0.41)	+.393 (0.87)
Lagged Performance	-.011 (1.87)	-.001 (0.08)	-.004 (0.77)
Year Dummies	+.023 (3.49)	+.024 (2.33)	+.009 (1.32)

Notes: (1) Based on regressions with robust estimator. Decompositions use STATA command b1x2. (2) t-statistics in parentheses (3) Demographics: VC age (continuous; 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, Alliance, MillionPlus, Guild of Higher Education, Post-1994); log of N FTE students; percentage of students from State schools (lagged); proportion of staff earning >£100k. Lagged performance: log tuition fees (lagged); log research grants and contracts (lagged). Years: dummies (19). HE Fixed effects: dummies (115).

Table 3: Juhn Murphy Pierce Decomposition of Gender Wage Gap Over Time

	Raw Gap	Quantity Effect	Residual Gap
2000-2009	.120	.128	-.008
2010-2019	.033	.042	-.009
Difference in (components of) differentials:			
	Δ in differential	Δ in predicted gap	Δ in residual gap
Total	-.087	-.086	-.000
Decomposition of difference in predicted gap:			
	Δ in predicted gap:	Quantity effect:	Price effect:
Total	-.086	-.062	-.024
Contribution of individual covariates:			
VC age	-.001	-.002	.002
Tenure (ref.: <6 yrs)			
5-10 yrs	.001	-.000	.001
10+ yrs	.005	.002	.004
External appointment	.000	.000	.000
Ex-VC	-.004	.003	-.007
Previously pro-VC	.006	-.002	.007
Fellow of a Royal Society/Academy	-.010	-.006	-.004
Knighthood or equivalent	-.000	.004	-.005
Previous work experience (ref.: academic)			
Civil service	-.002	-.008	.006
Department of Educ	.000	.001	-.000
Industry	-.009	-.000	-.008
Academic discipline (ref.: Physical science)			
Engineering	-.001	-.001	.000
Social Science	-.007	-.006	-.001
Arts	.002	.006	-.004
FTE students (log)	.017	-.000	.017
% staff earning >£100k	-.014	.001	-.014
% FT undergrads from state schools, lagged	.001	.003	-.002
Age of university (years)	.003	.004	-.000
University type (ref.: non-aligned)	-.004	-.000	-.004
Russell Group	.000	-.000	.001
Alliance	-.001	-.001	-.001
MillionPlus	-.002	-.002	-.000
Guild of Higher Educ	-.003	-.002	-.001
Post-1994			
Log real total tuition fees, lagged (2015 prices)	-.069	-.056	-.012
Log real research grants and contracts, lagged (2015 prices)	.004	.004	-.000
Decomposition of difference in residual gap:			
	Δ in residual gap	Quantity effect	Price effect
Total	-.000	.002	-.003

Table 4: Within HE Institution Wage Differentials When A Female VC Replaces a Male VC or Vice Versa

	Whole period 2000-2019	2000-2009	2010-2019
Switch to Female	-.082 (3.83)	-.088 (3.69)	-.077 (3.18)
Switch to Male	-.031 (1.19)	-.017 (0.50)	-.021 (0.75)
Year	.024 (47.98)	.050 (51.14)	.010 (8.31)
Constant	-36.109 (35.78)	-88.819 (44.96)	-8.103 (3.26)
N VC-year obs.	2,300	1150	1150
N HE institutions	115	115	115
F	(3,2182) = 769.01	(3,1032) = 874.16	(3, 1032) =26.62
Prob > F	0.000	0.000	0.000

Note: (1) HE institution FE models run with xtreg, fe command (2) T-stats in parentheses

Figure 1: Real Earnings Over Time Among Men and Women
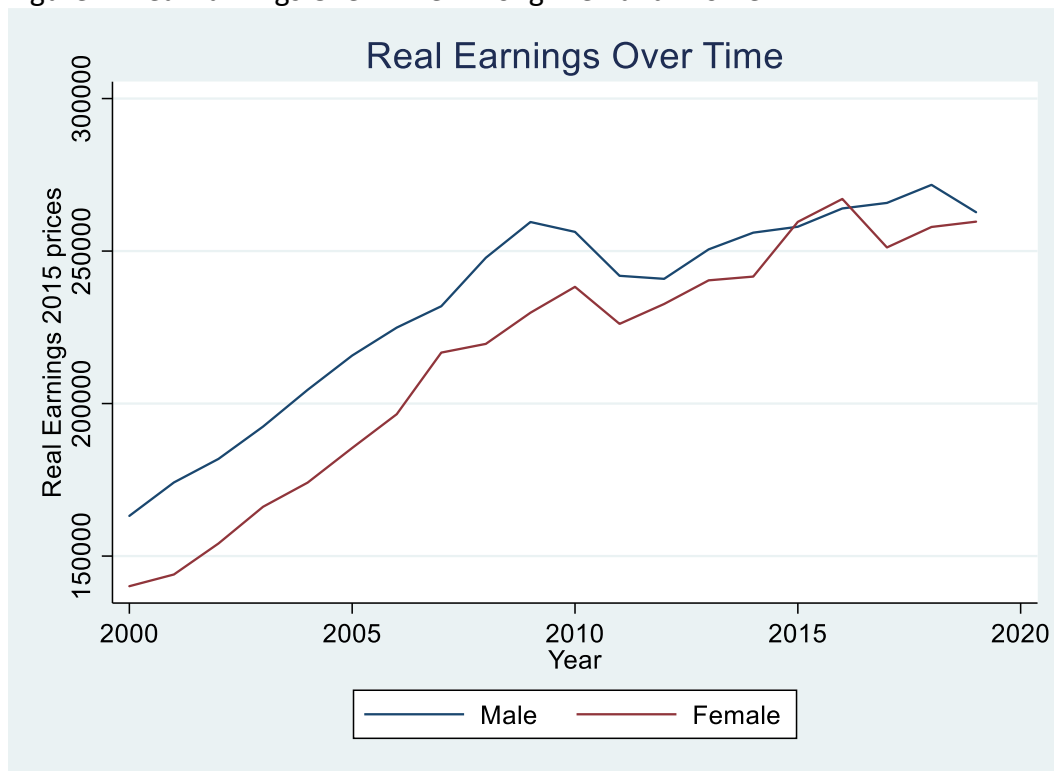

Real Earnings Over Time

Figure 2: Real Earnings Growth Among Men and Women
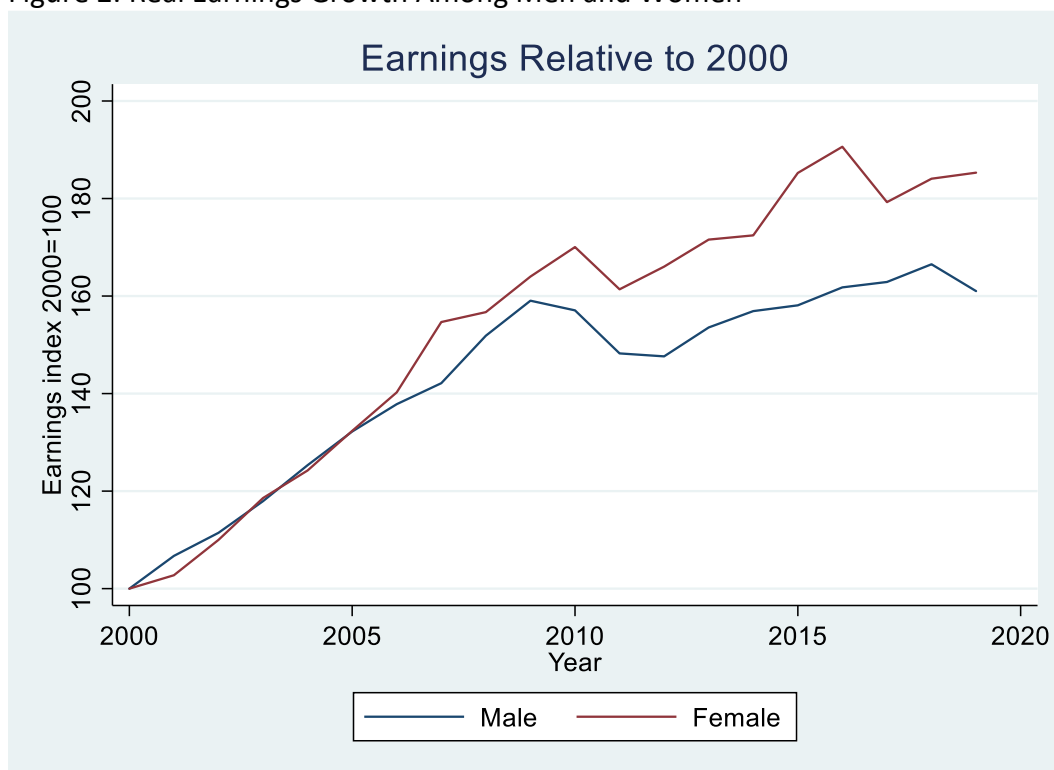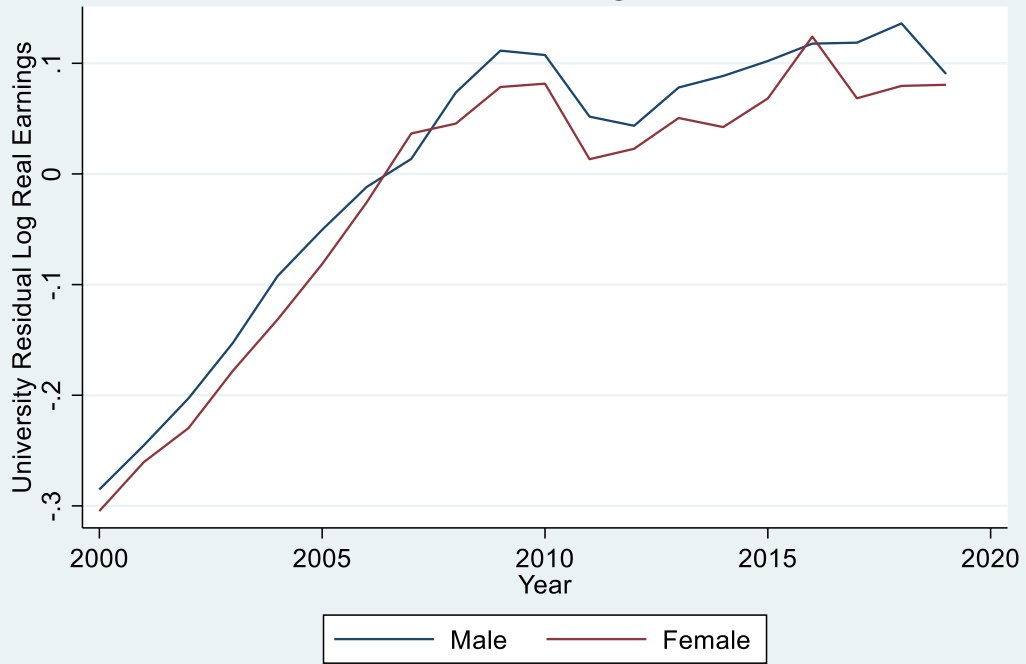

Earnings Relative to 2000

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

Residual Real Earnings Over Time

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	58.422	58.393	58.557	-0.66
	(4.530)	(4.624)	(4.064)	
Age^2	3433.403	3430.842	3445.355	-0.51
	(525.605)	(535.993)	(475.575)	
Tenure (years)	5.60	5.74	4.96	3.59
	(3.99)	(4.09)	(3.47)	
Tenure 1-10 years	0.321	0.326	0.298	1.11
Tenure > 10 years	0.112	0.120	0.074	2.67
Externally Appointed	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	-3.65
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	4.29
Academic	0.873	0.864	0.916	-2.91
$\chi^2_3 = 16.59\ [0.001]$ [c]				
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
$\chi^2_3 = 69.56\ [0.000]$ [c]				
University Characteristics				
Total Students (FTE)	13,695	140,007	12237	4.87
	(6,676)	(6,493)	(7,306)	
(ln) Total Students (FTE)	9.371	9.406	9.206	5.92
	(0.623)	(0.014)	(0.035)	
Prop. of Staff Remunerated> £100k	0.015	0.016	0.013	1.87
	(0.020)	(0.020)	(0.020)	
University Age	74.306	76.367	64.692	1.48
	(144.167)	(140.713)	(159.127)	
% Students from State Schools (lagged 1 year)	89.232	88.964	90.485	-3.01
	(11.055)	(11.056)	(10.797)	
University Group				
Russell	0.185	0.205	0.095	5.24
Alliance	0.139	0.139	0.140	-0.08
MillionPlus	0.130	0.125	0.155	-1.63
Guild of Higher Education	0.096	0.073	0.201	-8.14
Non-aligned	0.450	0.459	0.409	1.84
$\chi^2_4 = 84.62\ [0.000]$ [d]				

University Performance Variables, 2015=100 (Lagged one year)				
(ln) Funding Council Grants (£000s)	10.683	10.740	10.420	6.85
	(0.860)	(0.828)	(0.958)	
(ln) Tuition fees, education grants & contracts (£000s)	10.794	10.834	10.608	4.39
	(0.947)	(0.905)	(0.055)	
(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 3 df used to test the assumption of independence of VC academic discipline and work experience categories across gender. The significance levels for these tests reported in parentheses.

d) Chi-squared statistic with 5 df used to test the assumption of independence in the sets of categorical variables for university group across gender. Probability value reported in parentheses.

Appendix Table A2: Variable Definition

Variable Name	Description
VC Characteristics	
Age	VC age in years at time of observation.
Tenure 1-10 years	= 1 if VC tenure is 10 years or below at time of observation, = 0 otherwise.
Tenure > 10 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	
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.
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.
University Group	*Russell Group* = 1 and comprise of research intensive institutions that received the Royal Charter prior to 1992, = 0 otherwise; *University Alliance* = 1 and comprise technical and professional universities with a focus on 'applied' research, that received the Royal Charter in 1992, = 0 otherwise; *MillionPlus* = 1 and is a coalition of 'modern' universities that received their Royal Charter after 1992;

	Guild of HE = 1 is a coalition of universities that received their Royal Charter in and after 2003 that are largely teaching intensive, = 0 otherwise. _Non Aligned_ = 1 if the university is not a member of the above groups and includes members of the 1994 group that ceased to exist in 2013, = 0 otherwise.
% Students from State Schools	Percentage of students from state schools in year of observation, lagged one year.
University Performance (lagged one-year)	
Funding Council Grants	Grants from all UK funding councils: HEFCE, HEFCW, SCHEFC and DENI, and includes block grants for teaching and research, and capital grants (buildings and equipment)
Tuition fees, education grants and contracts	Fees charged for full-time/part-time, degree and sandwich degree, diploma and other HE credit-bearing courses for UK and non-UK domiciled students. Also included are fees for non-credit bearing courses and other fees (e.g. for adult or continuing education).
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

Russell Group
Birmingham; 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.

Alliance
Brighton; Central Lancashire; Coventry; Greenwich; Hertfordshire; Kingston; Leeds Becket; Liverpool John Moores; Manchester Metropolitan; Nottingham Trent; Oxford Brookes; Portsmouth; Salford; South Wales; Teesside; West of England.

MillionPlus
Abertay; Anglia Ruskin; Bedfordshire; Bolton; Canterbury Christ Church; East London; Glasgow Caledonian; London South Bank; Middlesex; Napier; Staffordshire; Sunderland; West London; West Scotland; Wolverhampton.

Guild
Bishop Grosseteste; Buckingham New University; Chichester University; Harper Adams; Newman; Plymouth; Solent; Winchester; Writtle University College; Worcester; York St John.

Non-Aligned
Aberdeen; Aberystwyth; Aston; Bangor; Bath; Birmingham City; Bournemouth; Bradford; Brunel; Cardiff Met; Chester; City; De Montfort; Derby; Dundee; East Anglia; Edge Hill; Essex; Gloucestershire; Glyndwr University; Goldsmiths; Heriot-Watt; Huddersfield; Hull; Keele; Kent; Lancaster; Leicester; Lincoln; Liverpool Hope; Loughborough; Northampton; Northumbria; Queen Margaret University; Edinburgh; Reading; Robert Gordon; Roehampton; Royal Holloway; Sheffield Hallam; SOAS; St Andrews; Stirling; Strathclyde; Surrey; Sussex; Swansea; Trinity St David; Ulster; Westminster.

Note: the affiliations in this table are those for 2018, see text for further details.