Gender Disparities In Horizontal Mismatch Penalties: An Examination of Professional' Degrees in the UK (2007 – 2015)

Dr Christopher Lalley[1, 2], John Houston[3] and Anne Gasteen[4]

Abstract

We quantify the returns to higher education for degree disciplines, namely 'professional' degrees, Medicine/Dentistry, Law, Accountancy and Psychology, within the UK from 2007 to 2015. We estimate the returns to education in the form of employment and wage premia associated with each subject. Our analysis contributes to the existing literature on the topic of horizontal mismatch by estimating the wage premia in different occupational settings and identifying the penalty associated with horizontal mismatch in each field, and relative to all other graduates. We identify how wage premia vary between employment outcomes when individuals with professional degrees are employed inside, as opposed to outside, their professional sector. A distinct difference in mismatch penalties between male and female graduates was found. Male mismatch penalties are isolated to law graduates, while female mismatch penalties appear, and persist within all fields across the duration of a female graduate's career.

JEL Classification Codes: I2, I26, J21, J24

Keywords: Higher Education, Human Capital, Earnings, Employment, Horizontal Mismatch

[1] Corresponding Author Email Address: christopher.lalley@ntu.ac.uk
[2] Corresponding Author Address: Nottingham Trent University, 50 Shakespeare Street, Nottingham, NG1 4FQ
[3] Co-Author's Address: University of Strathclyde, 130 Rottenrow, Glasgow, G4 0GE
[4] Co-Authors' Address: University of Stirling, Stirling, FK9 4LA

Introduction

A significant amount of research has been dedicated to estimate the value of higher education qualifications. The value of education is expressed in both monetary returns (i.e. the wage premium of a specific qualification) and the extent to which obtaining a particular qualification affects an individual's probability of gaining employment. Research that focusses on monetary returns commonly applies a broad methodological approach that does not consider the value associated with specific degree subjects. Recent research that has ventured into the analysis of specific degree returns is also inherently limited, in the sense that all forms of employment are treated equally, with no attempt to analyse how occupation may influence the returns associated with a given subject. Some research in the field of horizontal mismatch has attempted to estimate the wage premia differences between subject/occupation mismatch, but such studies are limited both in their scope and by the degree of subjectivity applied in their methodological approach. This paper extends the existing literature by estimating the returns associated with specific degree disciplines while also considering the value of specific degrees in different occupational settings. The disciplines under examination are 'professional' degrees directly linked to specific vocations: Law, Medicine, Dentistry, Psychology and Accountancy. These degrees are normally regarded as the entry points to their associated professions, to be followed by formal training, assessment and experience gathering, then full qualification. At this point, the holders become fully-fledged professionals, and able to practise as such, should they choose to do so. We account for individuals' employment outcomes, differentiating between 'professional' and 'general' occupations, where 'professional' refers to the situation where the holder of a professional degree chooses to work in the relevant professional sector[5] and

[5] An example of a professional working in the sector would be a law graduate working as a lawyer. All law professions identified within the data set will be included within this category. The same approach is applied with respect to each professional discipline.

'general' where they work outside that profession[6]. The focus is on whether or not this choice accrues significantly higher premia to the holder.

The paper is structured as follows: firstly, there is a discussion of the literature on returns to education. We then present our methodology, including a full discussion of the data and the econometric methods used, then our findings. This is followed by a discussion of these findings, their potential policy implications and concluding remarks.

Previous Work

The value associated with qualifications, expressed in terms of their ability to increase a graduate's earning potential, represents a significant area of interest in which a considerable amount of empirical research continues to be conducted. In the context of this research area, the 'value' associated with a qualification is expressed in terms of the extent to which the qualification marginally increases the graduate's employability and/or their wage, taking into account demographic variables such as age, gender and geographical location, etc. DAVIES, et al. (2013) highlighted the importance prospective students attach to the potential wage premium associated with their degree, thereby amplifying the importance of expected wage returns in the course selection decision process.

Research (O'LEARY and SLOANE (2005); STRAUSS and DE LA MAISONNEUVE (2009); KELLEY et al (2010); CHEVALIER (2011); CARNOY et al (2012); HALLSTEN (2012); and WALKER and ZHU (2011)) in multiple regions has sought to estimate wage returns associated with specific degree disciplines. and found, to varying degrees, positive returns associated with higher education within their labour markets. LINDLEY and MCINTOSH (2015) also found that there is a growing wage inequality between graduates in different disciplines. The approaches of these studies differ in so far as their analysis quantified the returns associated

[6] An example of a professional working outside the sector would be a law graduate working in any profession other than law.

with specific degrees or fields of study, rather than a broad analysis of qualifications, irrespective of the field to which they apply. Such research is a first step towards quantifying the value of specific degrees. A caveat regarding these studies is that wage returns are calculated on the basis of *general* employment. In applying this approach, they fail to take into account any wage differentials caused by different employment outcomes. Even more recent studies, such as FREIER et al. (2015) who examine Law degrees, fail to account for the potential impact of employment setting on returns.

Attempts to address the generalities of the prominent methods of returns to education literature exist in the form of the horizontal mismatch literature. WOLBERS (2003) estimates mismatch penalties among school leavers using cross sectional data from 13 European countries. Wolbers finds that mismatched school leavers achieve a lower status within their occupation, are more likely to be dissatisfied with their job, and as such are more likely to engage in on the job search, while also being more likely to pursue vocational training opportunities. Early contributions to this area of study focusing on degrees highlights the importance of attaining a match between occupation and field of study among university graduates. ROBST (2007) uses a survey of US science graduates and estimates a mismatch penalty of an 11% difference in wages between matched and mismatched. Research which followed (NORDIN et al, 2010; BENDER and HEYWOOD, 2011) estimated the extent to which mismatch penalties differ by gender. Using Swedish data, NORDIN et al (2010, op-cit) find that mismatch among males can lead to a 20% difference in wages, while mismatch among females leads to a 12% difference. BENDER and HEYWOOD (2011, op-cit), find that severe mismatch among their sample of US science graduates leads to a 10.8% wage penalty for males and a 13.9% penalty for females. ZHU (2014) estimates mismatch penalties for early career college graduates in China in part to observe if mismatch penalties differ in a developing country as the majority of earlier

research has been conducted in developed countries. Zhu's findings reveal a monthly horizontal mismatch penalty of only 1.3%, far smaller than that found in earlier horizontal mismatch studies. VERHAEST et al (2017) uses data from Europe and Japan in an attempt to determine if differences in institutions and labour markets will yield different horizontal mismatch penalties. The incidences of horizontal mismatch penalties alone are less prevalent in countries with stronger employment protection, greater unemployment benefits, and more selective educational programmes. The above literature, in addition to other contributions (NORDIN et al, 2008; BENDER and ROCHE, 2013; DOMANDENIK et al, 2013; LEMIEUX, 2014) has sought to estimate the disparity in wage premia given a mismatch between a graduate's subject studied and their eventual occupational. The general findings are the presence of a wage 'penalty' for those who experience a mismatch between their degree subject and their occupation. While this literature has provided a significant contribution to our understanding of mismatch penalties, the existing literature suffers in two keys aspects. Some of the studies referenced suffer from their small scale as in some cases the literature examines no more than one year's worth of data. Secondly, their methodological approach is at times rather imprecise and potentially subjective, identifying mismatch on a broad basis, focusing on degree subjects where the identification of either a match or mismatch is open to a wide degree of interpretation. In some instances, the literature only focuses on mismatch within a specific sector, thereby potentially limiting the wider application of the findings.

Methodology

In terms of its scope, the analysis is limited necessarily to examining the returns to Medicine/Dentistry, Law, Accounting and Psychology graduates whose degrees are directly aligned with specific professions. Other degree subjects are less clearly aligned with specific professions; e.g. it is not really possible to identify a single specific professional occupation for

an Economics, Engineering or Natural Science graduate, etc. in the same manner as for the above *professional* degrees. In this sense, we overcome the perceived issue of subjectivity associated with existing mismatch literature where a less stringent approach is employed in identifying what constitutes a match/mismatch. Our analysis of professional degrees is not exhaustive in that it does not account for all possible professional degrees. Those that have been selected were chosen based in part on the availability of appropriate data. Degree subjects were also selected based on the potential impact of the existence of a mismatch penalty. For example, Law, Medicine, Dentistry and Accountancy represent courses, which carry a high entry tariff attracting some of the strongest applicants. A severe and persistent mismatch penalty within these disciplines would represent a significant and potentially long-term cost for highly able individuals who may have otherwise pursued an alternative degree subject if they had been made aware of the potential for mismatch beforehand. While entry to Psychology programmes in the UK requires a lower grade tariff, the subject still attracts a large number of applicants with Psychology and Sports Psychology appearing 4th and 8th respectively in The Complete University Guide's (2017) ranking of most popular courses studied in the UK. With such large numbers attending, and relatively few ending up in employment within the sector, a mismatch penalty could yield substantially different wage outcomes for a large number of graduates.

The Probability of Employment in the Graduate Labour Market

We assume that graduates form two groups: 'Professional' and 'General'. Holders of professional degrees have opportunities for employment in both their particular specialist professional market as well as the general (graduate) labour market. General graduates are only able to obtain work in the general (graduate) labour market; they cannot gain employment in the professional markets we examine as they do not have the appropriate prerequisite

degree[7]. Wages may be institutionally-set in some professional graduate labour markets, for instance in Medicine and Dentistry. Moreover, the demand for professional graduate entry-level jobs is limited at any one time, and is assumed to be less than the supply of professional graduates as not all professional graduates who desire to work in the profession aligned with their degree, attain employment within their professional sector. Any excess supply of professional graduates will have to look for work in the general graduate labour market together with a number of their professional graduate peers who have decided that their particular profession is 'not for them'. There are of course other reasons beyond excess supply as to why a professional graduate would choose not to work within their professional sector. Work-life balance, wages, proximity to home and family life represent a number of the possible reasons as to why one may opt to pursue a general occupation despite holding a professional degree. This paper cannot address this issue of mismatch based on choice as the data does not survey respondents on this point, and so approaches the topic from an over-supply perspective. Mismatch arising from choice is addressed in BENDER and ROCHE (2017), as they use a survey of US Science graduates which asks respondents who identify as mismatched for the reason they believe they are mismatched. The issue of reasons for mismatch is also explored in ROBST (2007, op-cit) using an earlier version of the same data employed by BENDER and ROCHE (2017, op-cit),

The probability that a Professional Graduate will be employed in graduate-level work (p_p) is:

$$p_p = \frac{n_p + n_{pg}}{N_p}, \qquad \left[0 \le p_p \le 1\right]$$

[7]Of course, both groups could seek employment in the non-Graduate Market, though as we demonstrate later in the paper, the employment returns there are probably insufficiently attractive to them.

Where n_p is the number of professional graduates obtaining professional employment, n_{pg} is the number of professional graduates obtaining general employment and N_p is the total number of professional graduates supplied.

General graduates are, perforce, ineligible for entry into the Professional sector, and have to rely completely on the General sector. Thus, the probability that a General Graduate will be employed (p_g) is:[8]

$$p_g = \frac{n_g}{N_g + N_p}, \qquad [0 \leq p_g \leq 1]$$

Were n_g is the number of general graduates obtaining employment, N_g is the total number of general graduates supplied and N_p' is the total number of professional graduates, who are free to compete with general graduates having not attained employment in their professional sector.

Given that the Professional Graduates have two opportunities to obtain graduate-level work, while their General counterparts have only one, we might expect that $p_p > p_g$ especially if they have 'first refusal' of general graduate jobs. The premise of 'first refusal' or, more specifically, the potential preference for professional graduates over general graduates, is predicated on the fact that professional degrees have higher entry standards than general degrees, suggesting their holders to be inherently more capable, talented individuals. We can express the probability that someone is employed in any given capacity Y (where $Y = 1$), given their observed characteristics (e.g. qualifications, age, location), using a standard Probit model:[9]

$$\rho(Y = 1 \mid X) = \Phi(X'\beta)$$

where X' is a matrix of observed, independent variables and β a vector of parameters to be estimated. The variables of particular interest are the degree dummy variables, to estimate the impact on employment (as opposed to non-employment) of holding a specific qualification.

[8] This general rate (p_G) is lowered by the presence of the Professional 'refugees' due to the reduced demand for professional graduates.
[9] '1' signifies in employment, '0' not in employment, in this case.

These record individuals' qualification (Medical, Accounting, Law, Psychology, with General degree as the excluded category). Also included are Age (and Age^2), Gender-degree and Public Sector-degree interactions and year dummy variables.

Wage Rate Determination in the Graduate Labour Market

Threshold entry qualifications to professional degree programmes in UK HE are higher than those for other subjects, this being particularly true of Medicine/Dentistry and Law. *Ceteris paribus*, this would suggest that better school-qualified individuals enter these degree programmes, and this, in itself, is an indication of higher ability and productivity, and potentially higher future wages than general graduate. This suggests that there will be three different graduate wage rates:

(i) w_p is the wage rate of a professional graduate employed in their respective profession

(ii) w_{pg} is the wage rate of a professional graduate employed in the general graduate labour market and

(iii) w_g is the wage rate of a general graduate

It might therefore be expected that $w_p > w_{pg} > w_g$. To test this empirically, this version of the human capital wage model developed by Mincer (1974) is estimated:

$$\ln(w_i) = \alpha + \rho D_i^{'} + \gamma X_i^{'} + \lambda_t + \varepsilon_i$$

Where the (log) hourly wage rate (w_i) is a function of:

-combined degree and occupation dummies (D_i) comprised of pairs of dummies for each respective profession (one each for in-profession and out-of-profession) and a dummy for general graduates (the latter again, being the excluded category)

- other relevant observed variables ($X_i^{'}$), Age and Age^2 , tenure and location variables

- time-based dummies.

The log specification of the dependent variable (an individual's hourly rate of pay) allows for ρ to be interpreted as the percentage change in an individual's wage rate based on their qualification and occupational status as defined by the model's degree/employment dummy variables. A separate model is estimated for males and females to capture the distinct differences in their employment outcomes and to determine the degree to which mismatch varies between genders. Literature that has previously sought to estimate degree wage returns has done so relative to non-graduates, thereby highlighting the graduate wage premia. Given the consistency of the finding that graduates command a wage premia relative to non-graduates, we investigate further, examining premia variation between graduates of different subjects, i.e. professional graduates relative to all other graduates. Individuals without an undergraduate degree are dropped from the sample. This decision to drop non-graduates yields an arguably more homogenous sample of individuals. Their comparable level of education infers a greater likelihood of comparable consistencies in their demographic and background characteristics. In the analysis, this potentially diminishes differences in wages driven by unobserved factors.

Data

The UK's Quarterly Labour Force Survey (QLFS) data for the period January 2007 to December 2015 are used. Individuals between 25 and 60 years of age are included. The number of observations for each model varies, given that separate models are estimated for males and females, and given the inherent variation in sample sizes based on the nature of dependent variable. Employment models commonly consist of more observations than wage models as respondents are generally less inclined to report their salary with surveys such as the LFS. The wage model consists only of full-time observations in an attempt to control for the inherent differences in working patterns between men and women. By removing part-time employees, we can reasonably exclude the assumption that mismatch penalties may be a

function of the greater propensity for women to work part-time. Self–employed observations are not included within the wage model, as self-employed individuals do not report a wage within the LFS. As such, they cannot be included, leading to a potential downward bias on wage estimates in older observations. It is the case that older professional graduates whom are more likely to be self-employed in the later stages of their career having established a reputation and contacts within their field. A breakdown of the rate of self-employment rates (ONS, 2018) across the professional degree disciplines is summarised in **Table 1**[10]. The rate of self-employment across disciplines is relatively consistent and in each case is representative of only a minority of the population, with the vast majority being not self-employed[11].

Table 1
Professional Graduate Rate of Self-Employment

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2007 - 2015 Average**
Law	30%	31%	28%	31%	27%	27%	26%	28%	30%	29%
Medicine/Dentistry	24%	19%	22%	20%	19%	20%	21%	22%	21%	21%
Psychology	-	-	-	-	-	-	13%	-	14%	14%
Accountancy	21%	15%	17%	16%	11%	16%	13%	11%	16%	15%
- Indicates where there was an insufficient sample for a reliable estimate to be made										

With regards to the estimation of match and mismatch penalties, observations holding one of the four aforementioned professional degrees are defined as matched or mismatched using four-digit SOC (Standard Occupational Classification) codes. An observation is matched if their occupation code perfectly aligns with their degree, in that without this degree one cannot take part in this occupation. Observations are mismatched for any other occupational code that does not align with their degree[12,13]. This does not exclude the notion that there may be similarities between the nature of skills a degree involves and a mismatched occupation. For

[10] Table A.1 and A.2 in the Appendix summarises rates of self-employment across professional degree disciplines by gender

[11] Where no data is provided the ONS state a reliable estimate of self-employment within the discipline could not be made

[12] Tables B.1 and B.2 in the Appendix provides a full summary of mismatched and mismatched SOC codes across the four professional degree disciplines, broken down by gender

[13] Tables C.1 to C.8 summarises the percentage of graduates working within out of profession occupations summarised by degree discipline, age and gender

example, the numeracy skills developed by an accountancy degree may crossover to what we have defined as the mismatched occupation of Financial and Investment analyst. The crossover in skills does not suffice to define this combination as matched, as it is not necessary to study accountancy to become a Financial or Investment analyst, compared to the necessary study of accountancy to become an accountant. An equivalent sentiment applies to the notion of match and mismatch across all other degree disciplines.

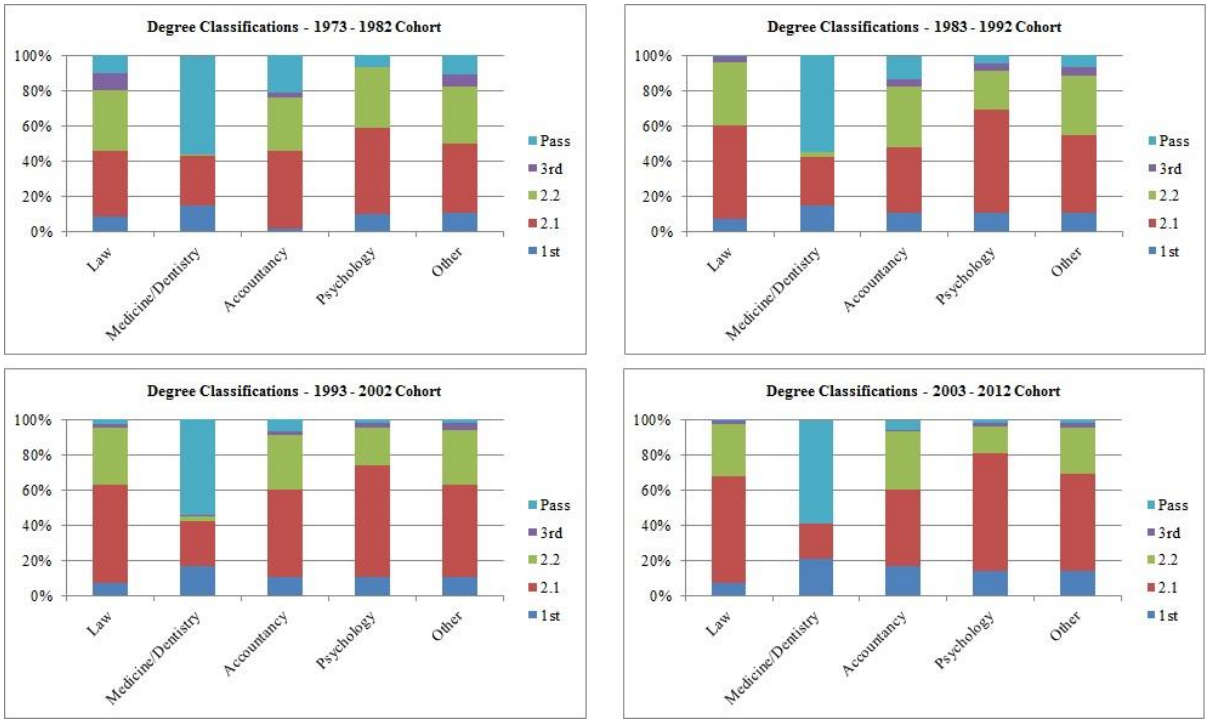
In an attempt to control for ability bias the sample consists only of those who have attained 2 or more A-levels, or for Scottish students, 3 or more SQA Highers. This excludes those who have failed to attain an 'acceptable' standard of attainment at secondary school but who somehow may have attended university. A further attempt to control for ability bias is made by dropping observations that attained a degree classification of less than a 2.1. This ensures that we are left with a relatively homogenous sample whereby the individuals included have achieved comparable results in their respective fields; thereby as much as possible, reducing concerns that some form of ability bias may adversely affect the results. The decision to limit the sample to graduates with a 2.1 or better yields a comparative group of higher calibre graduates. There is a tendency in the interpretation of mismatch estimation results to believe that those subject to a mismatch penalty are actually simply weaker graduates being paid less relative to their stronger counterparts. Given that we focus only on those who attain the highest classification levels addresses the concern that any wage disparity is a consequence of poor graduate quality, rather than a genuine mismatch penalty. The approach we have applied to correcting for ability bias was popularised by CARD (1999) and is used consistently in returns to education literature. The notion that it is indeed a mismatch penalty and not a consequence of poor graduate quality is clearer when one observes the data in our sample detailing the distribution of graduates employed within and outside the professional sector based on the classification they obtained. If the allocation of employees within the professional jobs

favoured perceived higher quality candidates then one might observe the majority of these jobs being dominated by graduates with a 1st class classification, with jobs outside the professional sector dominated by graduates with lower classifications. As tables D.1 to D.4 in the Appendix illustrates this is not the case. While there is a greater presence of 1st class graduates in professional occupations they are in the minority with few exceptions to this case, such as those observed among medics and dentists working in their professional field.

In limiting the sample based on degree classification, we must consider any potential implications associated with grade, or in this case, degree classification inflation over time. Grade inflation refers to the premise that over time there has been a progressive increase in the proportion of graduates attaining higher degree classifications thereby diminishing the value of attaining such higher classifications over time (JOHNES AND JOHNES, 2007). There may also be an inherent concern that despite the explained logic behind removing those with less than a 2.1 classification, that in the process, we may be excluding those who attained a 2.2 classification in older cohorts, which due to grade inflation over time, holds equivalent value as a 2.1 classification today. While possible, this should not be of concern given the comparisons between graduates that this paper aims to evaluate. The underlying premise of the analysis is not to compare the earnings or employability of younger versus older graduates, but rather to purely compare the earnings and employability of graduates, of the same discipline, within the same age bracket, relative to all other graduates of the same age. In this sense, even in the presence of some degree of grade inflation, it is applicable to all graduates to the same general extent within their given age group. Furthermore, upon reviewing the distribution of the classifications of the graduates within our data set, as presented in **Figure 1** we find that while 2.2 and 3rd class degrees are less prevalent through time, the modal classification category across all cohorts remains consistent at a 2.1 classification. One minor point to consider when analysing Figure 1 is concerning the interpretation of medicine and

dentistry graduates. In the case of medics, their degrees are not classified in the traditional 1st, 2.1, etc framework, but rather as a pass at either a merit or distinction level. This explains why the largest portion of medics report their degree as a pass, which in the case of the other degree reported refers to the lowest classification one can attain. The medics who report their degree class as 1st or 2.1 have likely self-selected into this category based on their own interpretation of where their pass falls in to the standard degree classification framework. Given the nature of this data anomaly, a decision was made to include Medics and Dentists declaring their degree as a pass within the data as such individuals will in all likelihood constitute valid observations given the restrictions outlined earlier.

Figure 1 Degree Classification by Graduation Cohort



Additional approaches to correcting for ability bias exist, but unfortunately, we are restricted by the data in this instance, as no such information exists in the LFS, therefore attempts to correct for ability bias are limited to those employed. The concerns regarding controlling for ability bias while using the LFS were more recently highlighted by MCINTOSH

and MORRIS (2016). McIntosh and Morris highlight the difficulty in controlling for endogeneity while using the LFS, insisting that in the absence of appropriate measures, the most suitable approach is to make control and treatment groups as similar as possible to allow for a plausible analysis to be processed. McIntosh and Morris reference several publish studies using the LFS which have applied this perspective in their analysis (DEARDEN ET AL, 2002; DEARDEN ET AL, 2004; DICKERSON and VIGNOLES, 2007; JENKINS ET AL, 2007). Relating specifically to horizontal mismatch, ZHU (2014, op-cit) endorses a similar approach of diminishing the potential effects of ability bias by conducting estimates using as homogenous a sample as possible. Zhu goes on to discuss how the estimation of horizontal mismatch penalties generally does not lend itself well to methods used to correct for ability bias and that no method exists that allows for consistent and accurate control of potential ability bias.

It is useful to have some idea of the level of apparent retention within each profession, that is, the percentage of graduates with degrees in Medicine/Dentistry, Accounting, Law and Psychology who actually work in their associated profession. **Table 2** indicates the percentages that do so, by Age Group[14].

[14] Age brackets define the assumed early (25 to 35) middle (36 to 45) and late (46 to 60)stages of an observation's career

Table 2 % of Professional Graduates working in and outside their respective Profession							
Profession	**Male N**	**Female N**	**Age Group**	**Male In Profession**	**Female In Profession**	**Male Out of Profession**	**Female Out of Profession**
Medicine & Dentistry	199	298	All	83%	85%	17%	15%
	60	148	25 to 35	93%	88%	7%	12%
	69	83	36 to 45	84%	87%	16%	13%
	70	67	46 to 60	74%	75%	26%	25%
Accountancy	190	156	All	35%	37%	65%	63%
	92	86	25 to 35	43%	41%	57%	59%
	60	52	36 to 45	32%	33%	68%	67%
	38	18	46 to 60	26%	28%	74%	72%
Law	282	451	All	46%	45%	54%	55%
	136	253	25 to 35	50%	46%	50%	54%
	71	134	36 to 45	55%	42%	45%	58%
	75	64	46 to 60	31%	47%	69%	53%
Psychology	125	435	All	15%	20%	85%	80%
	48	233	25 to 35	2%	21%	98%	79%
	44	115	36 to 45	25%	19%	75%	81%
	33	87	46 to 60	21%	22%	79%	78%

Unsurprisingly, the vast majority of Medical/Dental graduates of all ages are observed working in their respective professions. It is within professions such as medicine and dentistry that the exclusion of graduates aged under 25 seems most appropriate as it is unlikely that many would be classed as in-profession at this age given the time it takes to be suitably qualified to practice as a doctor or dentist. Entering into the mid-career age bracket, we observe a consistent decline in the number of individuals working within the profession for males, while the comparable numbers for females stays relatively consistent until the late career stage. This may occur for a variety of reasons. We observe within the data an increase in the number of male individuals with medical degrees working in medical management professions i.e. individuals who likely worked as practitioners in the past migrating to management roles later in their careers. Individuals may be retiring early given the high income they have attained throughout their career or, potentially, may become self-employed via establishment of their own private

practices. Comparing the *In* and *Out* of profession figures for medicine and dentistry relative to all other disciplines, one might conclude that the intake into Medical Schools is more closely matched to the market demand, than for other professions as a vastly greater proportion of medics and dentists end up employed within their profession compared with the other professionals. Given that the UK's National Health Service (NHS) is a virtual monopsonist, that works closely with the HE funding agencies and Universities' Medical Schools, and the high level of pre-entry screening, the length and arduousness of the training, the high level of reward (both pecuniary and non-pecuniary), this relatively close match is to be expected.

Contrast this with Psychology graduates, of whom only 2% of males and 21% of females work in the profession between the ages of 25 and 35. This dispersion of psychology graduates in and out of the profession is relatively consistent as approximately a fifth of graduates within any age group work within the profession, presumably acquiring experience and qualifications in the early stages of their career and then eventually working as qualified and licensed practitioners in the later age groups. The remaining 80% are consistently employed in general professions. This clearly reflects the generalist appeal of such degrees and the multiplicity of career paths that those graduates wish to pursue. Anecdotally, many go into general business and management, particularly into areas such as marketing and human resource management.

Between Medicine/Dentistry and Psychology, lie Law and Accounting, where a medium to large minority (35 – 46%) can be seen working in both professions. Similar to Psychology perhaps, the employer demand for such graduates is relatively diffused and funding agencies are content to finance University places with only a vague eye on underlying employer demand. That said, both professions have Statutory Professional Bodies (Law Society, Bar Council, Chartered Accountancy Institutes, etc), who set high standards for their various levels

of professional membership[15]. It might be concluded that the effect of these Bodies is to limit the numbers entering those professions, with a consequent displacement into the general graduate market. There will also be those who never intended gaining full professional accreditation, but valued the degree for its inherent challenge and general employability potential. We can also detect some drifting out of the Law and Accounting professionals in the late career stage. The gender disparity in this outcome is most pronounced among late career law graduates as 29% of male graduates remain in the sector compared to 47% of females. As with medics and dentists, the fall in graduates operating within the sector may reflect the migration of more experienced lawyers from employee to self-employed status. What is not evident within the table is anecdotal evidence that there is currently a UK-wide shortage of Legal Apprenticeships (ALDRIDGE, 2011; 2012). This lack of apprenticeships might be apparent if the sample included individuals aged under 25, thereby capturing law graduates in the early stages of their career when their employment is dependent upon holding an apprenticeship. A general decline in the presence of accountants within that sector is less drastic and is not characterised by a gender disparity comparable to that of law. The explanation for the decline may again be a function of increased self-employment rates.

Employment Premia to Professional Degrees

The average employment premia associated with possession of a degree in each professional discipline across both genders are plotted in **Figures 2 and 3** with two-standard error bands indicated (General Graduates are the excluded category)[16]. Upon review of the male employment model we find that, with the exception of Medics and an inconsistent effect for Accountants, there appears to be no employment premia associated with holding a professional degree rather than a general degree. This finding is partially mirrored in the female version of

[15] While the data set does not provide information on professional body membership, it is safe to assume that all graduates working within such professions will be a member of their respective professional body as this is a requirement to practice as a lawyer or psychologist
[16]The full results are shown in **Tables E.1 and E.2** in the Appendix.

the employment model. Female medics attain a consistent employment premia throughout the duration of their careers, with the effect being most pronounced in their mid-career age bracket. This may be a function of female medics taking fewer and shorter family career breaks relative to other graduates. No other profession exhibits a consistent pattern such as that observed with female medics and dentists.

Wage Rate Premia to Professional Degrees

We now consider the extent to which a graduate's wage rate (i.e. implied hourly wage) is affected by possession of a degree in a particular discipline. Someone with a professional degree may not wish (or be otherwise permitted) to follow a career in the associated profession. We consider graduates from the four professional disciplines located either in the Professional or General sectors and whether there is evidence that the employment location choice has a significant impact on their wage rate. **Figures 4 and 5** summarise the average (log) wage rate premia accruing to the professional degrees inside and outside their associated professions for males and females respectively when compared with general graduates.[17,18]

[17]The full results are shown in **Table F.1 and F.2** in the Appendix.
[18] Separate estimates have been conducted using a median regression and are presented in **Table G.1 and G.2** in the Appendix.

Figure 2 Female Employment Premia: Professional Degrees

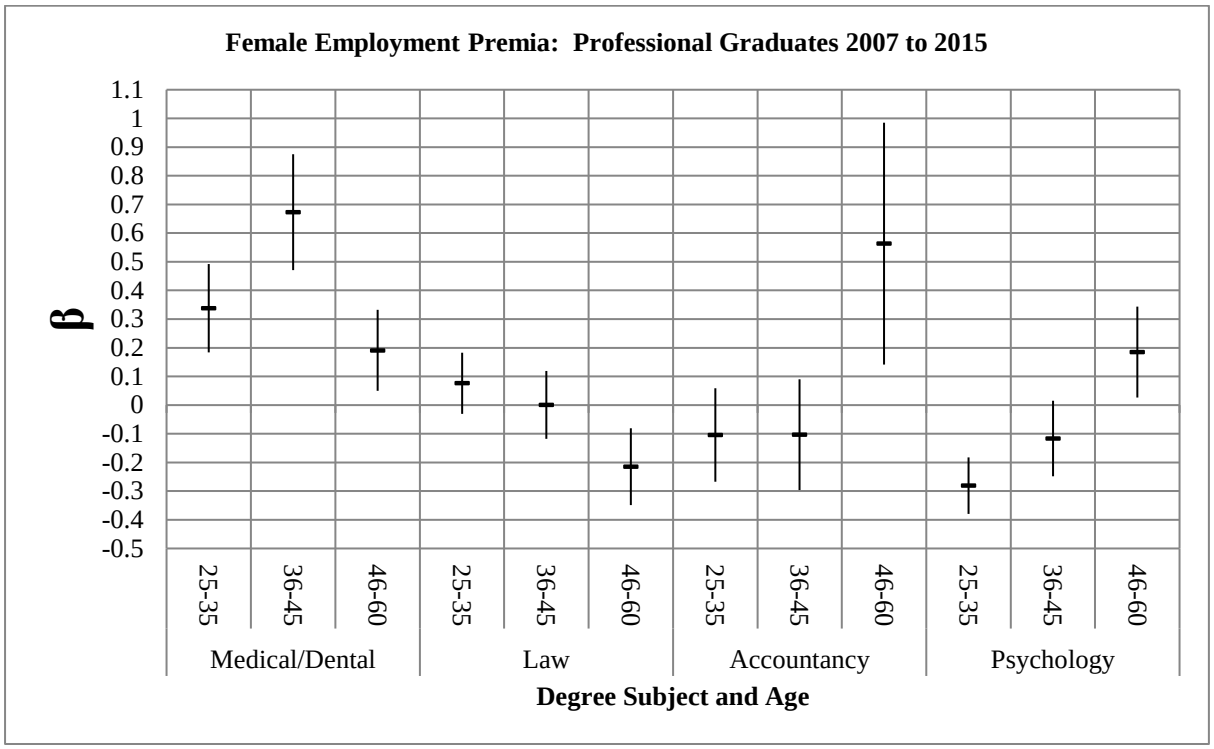


Figure 3 Male Employment Premia: Professional Degrees

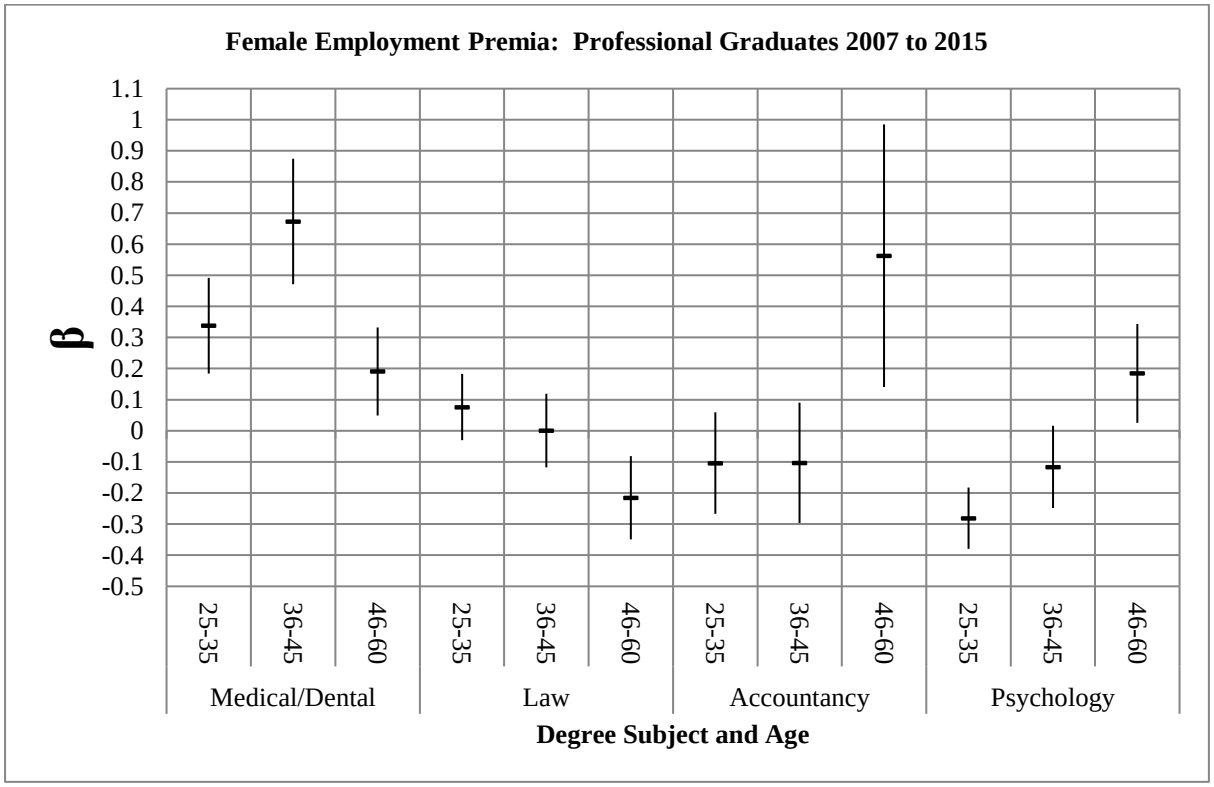


Figure 4 Female Wage Rate Premia: Professional Graduates Working In/Out of their Professional Sector

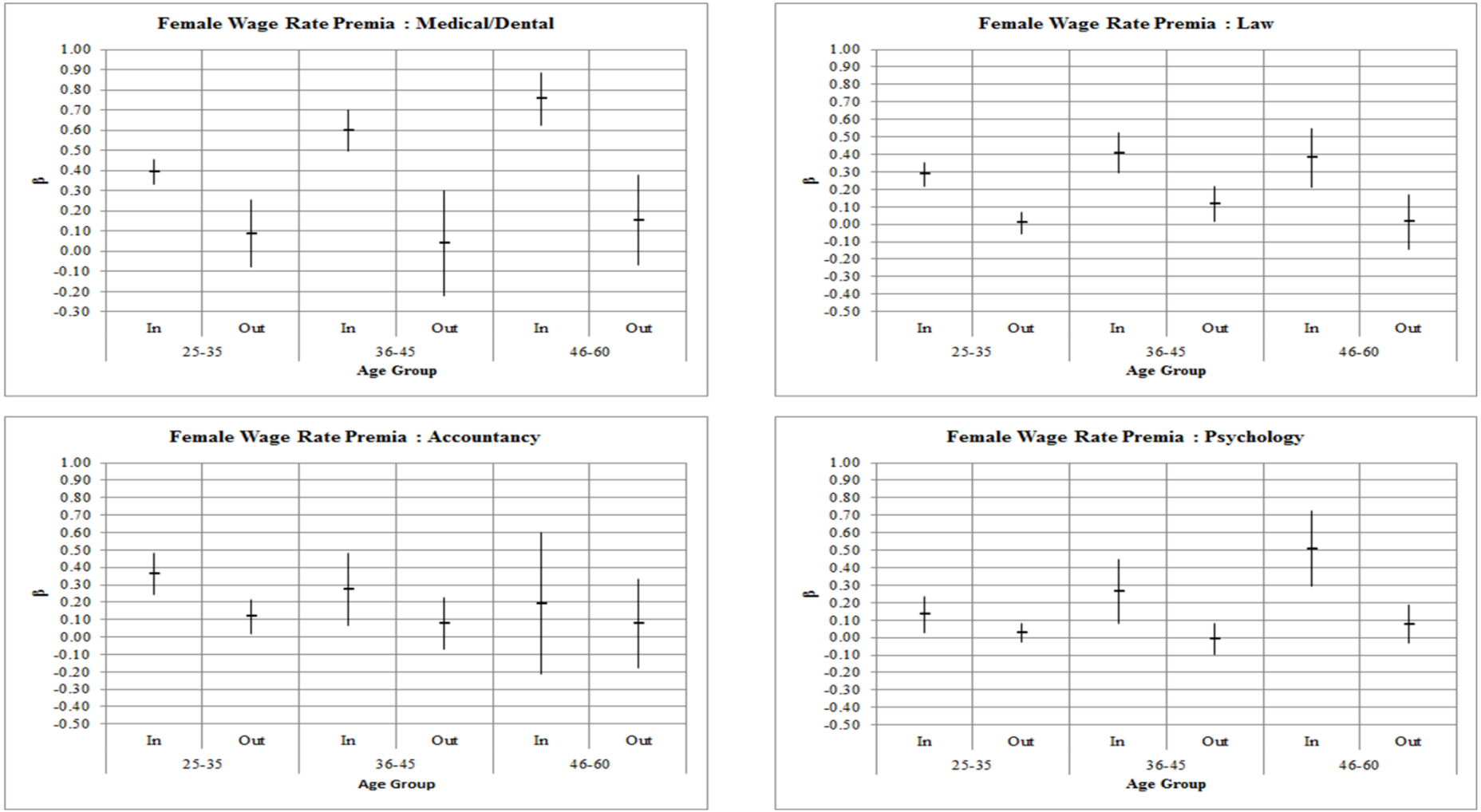
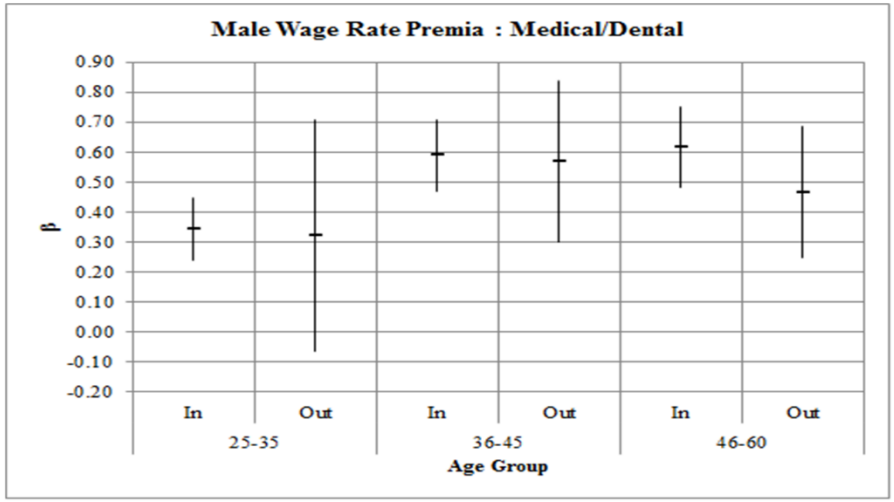
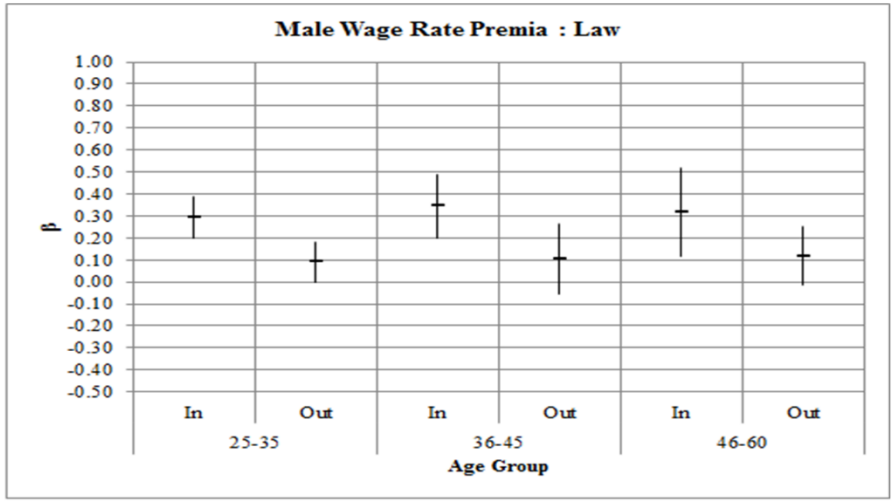
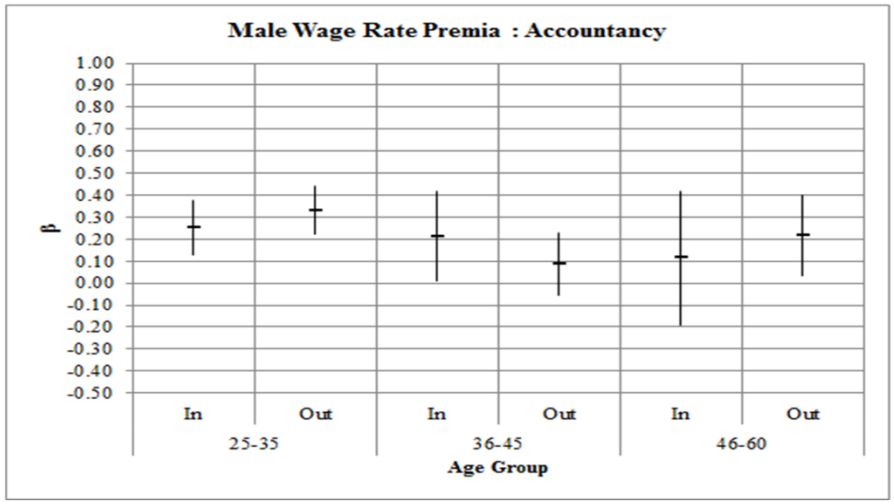
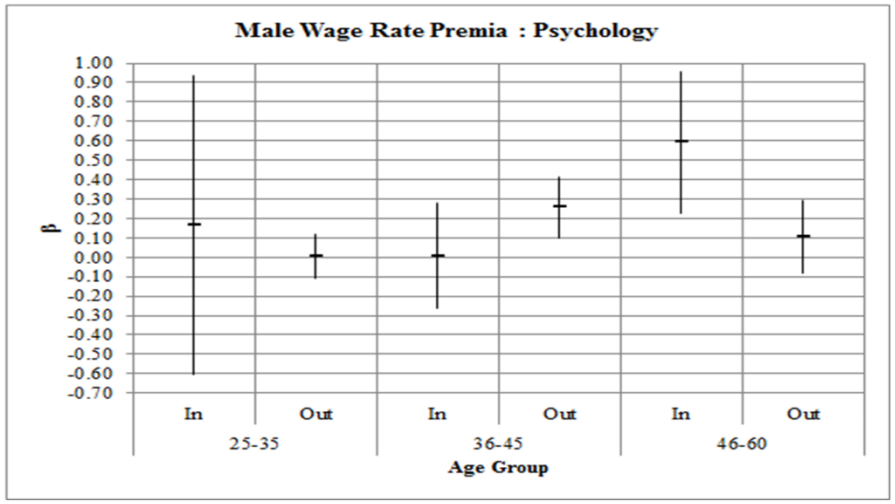


Figure 5 Male Wage Rate Premia: Professional Graduates Working In/Out of their Professional Sector









Male Wage Rate Premia to Professional Degrees – Relative to All Other Graduates

The findings of the male wage model reveal consistently high wage premiums for graduates of medicine/dentistry or law who have managed to gain employment within their professional sector. The premia for medics and dentists is consistently significantly greater than that attained by all other graduates and rises throughout a male individual's working life. A similar pattern is observed amongst law graduates who work as practicing lawyers, though their wages do not reach the peak obtained by medics or dentists. The experiences of male accountancy graduates working within the sector are less consistent. Accountants outperform the all other graduates category in the early stages of their career, but this difference is erased in the mid and late stages of their career. This may not be driven by a diminishing value of accountancy graduates working in the profession but rather may reflect all other graduates 'catching up' as they become more established in their careers, progressively eroding the wage premia advantage that young accountants held over hem earlier in their career. The experiences of male psychologists working within their professional sector are less optimistic. Across early and mid-age groups, their graduate wage premia is equivalent to that experienced by all other graduates. They only attain a statistically significant premium in the late stage of their careers

In general, the wage premia experienced by male professional graduates who attain work outside their sector is not significantly different from that accruing to all other graduates. Only mid and late stage career medicine and dentistry graduates achieve consecutive periods of statistically significant higher returns relative to all other graduates. While early career accountants and psychologists respectively experience a significantly higher wage premia than general graduates, there is no consistent pattern over their working lives.

Female Wage Rate Premia to Professional Degrees – Relative to All Other Graduates

Similar to their male counterparts, female graduates of medicine and dentistry working within the profession consistently outperform all other graduates. Their wage premia is high and rises throughout the duration of their careers. Female law graduates working in law experience consistently higher premia than all other graduates, mirroring that of their male law graduates counterparts. Female psychologists working in psychology consistently experience returns above those of all other graduates. Similar to medics and dentists, female psychologists see their earnings rise throughout their career. Female accountants working in accountancy achieve a higher wage premia than all other graduates in their early and mid-career phases. Similar to male accountants, their premia become insignificantly different from general graduates during the late career stage between the ages of 46 to 60. Again, this may reflect the possibility that all other graduates have gradually caught up with the professional accountants in their career development, and in the process have narrowed the wage gap between the two groups, rather than an absolute decline in returns to older female accountants.

For female professional graduates working outside of their professional sector, we universally observe that, regardless of subject or career stage, they obtain a wage rate that is equivalent to that of all other graduates.

Horizontal Mismatch Penalties

The existence and extent of any horizontal mismatch penalties between graduates of the same subject, based on their eventual occupation are now examined. Having estimated the respective wage models for males and females, we can take the coefficients for a graduate within and out with their professional sector and calculate linear combinations using STATA. The linear combinations reveal whether the difference between the two coefficients is

statistically significant, and, thereby, indicate the presence and extent to which a horizontal mismatch penalty exists between graduates of the same discipline working in different occupational sectors.

The linear combinations results are summarised in **Tables 3 and 4** reveals a stark contrast between the mismatch penalties experienced by females and males. The coefficients presented are the differences in the coefficients between specific groups of graduates as estimated in the main wage estimates. These differences are the percentage differences between the wages of the two groups under examination. The female linear combinations indicate that, with the exception of late career accountants, there is a statistically significant difference between the wages of a graduate with a professional degree who is employed within the associated profession, compared to a graduate with the same degree who has gained employment within any other sector. The implication is that significant, career length mismatch penalties exist for the majority of female professional degree graduates working outside their professional sector.

Conversely, in general, for male professional degree graduates, the disparity between the wage rate of those inside and outside of their respective sector is consistently insignificant. This suggests that for men, there is no discernible premia experienced by professional degree graduates who attain employment directly related to their field of study comparted to those who attained the same degree and work in an unrelated field. The one minor exception is Law graduates. Male law graduates who work within a law occupation attain a statistically significant wage premia relative to their fellow law graduates who work outside the profession in their early career stage. This penalty is only marginally significant in the mid-career phase, and is insignificant by the time male graduates reach the final phase of their career.

Table 3 Female Wage Model – Linear Combinations (By Age Group)
Age 25-35

Subject	Coefficient	S.E.	t	P>|t|
Medic/Dentist in Medic/Dentist Job - Medic/Dentist in Other Job	0.304	0.088	3.46	0.001
Law in Law Job - Law in Other Job	0.276	0.044	6.24	0.000
Accountancy in Accountancy Job - Accountancy in Other Job	0.243	0.076	3.17	0.002
Psychology in Psychology Job - Psychology in Other Job	0.104	0.056	1.84	0.065
Age 36-45				
Medic/Dentist in Medic/Dentist Job - Medic/Dentist in Other Job	0.557	0.140	3.98	0.000
Law in Law Job - Law in Other Job	0.289	0.075	3.81	0.000
Accountancy in Accountancy Job - Accountancy in Other Job	0.197	0.128	1.54	0.124
Psychology in Psychology Job - Psychology in Other Job	0.272	0.102	2.65	0.008
Age 46-60				
Medic/Dentist in Medic/Dentist Job - Medic/Dentist in Other Job	0.601	0.128	4.68	0.000
Law in Law Job - Law in Other Job	0.364	0.114	3.18	0.001
Accountancy in Accountancy Job - Accountancy in Other Job	0.115	0.240	0.48	0.630
Psychology in Psychology Job - Psychology in Other Job	0.430	0.121	3.35	0.000

Table 4 Male Wage Model - Linear Combinations (By Age Group)

Age 25-35				
Subject	**Coefficient**	**S.E.**	**t**	**P>|t|**
Medic/Dentist in Medic/Dentist Job - Medic/Dentist in Other Job	0.023	0.200	0.12	0.907
Law in Law Job - Law in Other Job	0.206	0.066	3.12	0.002
Accountancy in Accountancy Job - Accountancy in Other Job	-0.080	0.081	-0.99	0.325
Psychology in Psychology Job - Psychology in Other Job	0.158	0.390	0.41	0.685
Age 36-45				
Medic/Dentist in Medic/Dentist Job - Medic/Dentist in Other Job	0.020	0.147	0.14	0.891
Law in Law Job - Law in Other Job	0.239	0.106	2.24	0.025
Accountancy in Accountancy Job - Accountancy in Other Job	0.128	0.124	1.03	0.304
Psychology in Psychology Job - Psychology in Other Job	-0.249	0.156	-1.60	0.110
Age 46-60				
Medic/Dentist in Medic/Dentist Job - Medic/Dentist in Other Job	0.150	0.129	1.17	0.242
Law in Law Job - Law in Other Job	0.199	0.120	1.65	0.099
Accountancy in Accountancy Job - Accountancy in Other Job	-0.102	0.177	-0.58	0.565
Psychology in Psychology Job - Psychology in Other Job	0.488	0.205	2.38	0.017

Conclusions

The employment and earnings' returns to the four Professional degree subjects - Medicine/Dentistry, Law, Accounting and Psychology - that permit entry into associated professional occupations were estimated and compared with those accruing to General graduates. We have added to the analytical approach commonly found in the literature, by considering earnings returns to degrees as a function of not just the subject an individual studied, but also their employment outcome and in the process identified the horizontal mismatch penalty associated with failing to attain an appropriate education and occupation match. Our findings identify differences in employment premia among Professional degree holders and show how their earnings' premia vary according to whether or not they choose to pursue a career in their associated professional field or in the wider General graduate labour market. Horizontal mismatch penalties are not equally experienced by male and female graduates. There is a clear gender disparity to the extent that the female sample is characterised by persistent mismatch penalties across all disciplines and almost all age brackets. For male graduates, mismatch penalties only appear among law graduates.

Despite pre-conceived notions of an intrinsic value attached to professional degrees, our findings indicate that with respect to employability, a professional degree does not consistently yield a greater likelihood of employment compared to a general degree, except in medicine and dentistry, where both male female graduates experience an employment premium relative to all other graduates. Beyond this, there are no consistent patterns of significant employment premia associated with professional degrees across both genders and age groups.

The existence of horizontal mismatch penalties is observed consistently amongst female professional degree graduates working outside their associated profession. With the temporal exception of Law, the absence of mismatch penalties among male professional graduates

indicates that men are generally not penalised in the labour market for failing to attain employment in their associated professional sector. Thus, for men, failure to attain employment within the professional sector does not appear to convey a negative signal to the labour market that employers might respond to by offering a lower wage. However, the same is not true in the female professional graduate market. Here, there is a statistically significant difference between the wages of female professional graduates working within their associated sectors compared to those who work outside, with the former receiving a higher wage. This suggests that when a female professional degree graduate fails to attain employment within the associated sector, a negative signal is sent to the labour market, resulting in a lower wage rate. The factors driving this disparity in the presence of mismatch penalties seem unclear at this time. A potential explanation may lie in other mismatch literature (ROBST, 2007 op-cit; BENDER and ROCHE, 2017 op-cit) whereby the data used includes variables indicating an individual's belief for the primary reason why they feel they are mismatched. One of the most significant factors in explaining this belief of mismatch among females' centres around family reasons, where the female may seek out mismatched employment to pursue a more even balance between work and family life. It is a conscious decision such as this, which may lead fewer women to pursue more demanding professional jobs and as a result settle for job that is more personally suitable, but which ultimately yields a mismatch penalty. Beyond this point, generally addressing the topic of the gender mismatch disparity we have identified requires further research to test the consistency of this finding across other professional degrees, and over time with a larger sample of professional graduates

The commonly held perception that professional degrees make for 'good' general degrees, endowing their holders with relatively more favourable employment and earnings returns in the General graduate labour market is open to question given our findings. Whilst this appears to be the case for males, the same effect is not present for females. From an employment

perspective, only medicine and dentistry appear to yield the assumed employment premium that prospective students anticipated when selecting their degree. Given the investment that students make in undertaking their degrees, it would not be unreasonable to assume that they pursue such in order to attain a profession with stable employment prospects that is both financially rewarding and intellectually stimulating. Indeed, this is often reflected in the attitude of students when interviewed. In order to make optimal degree choices, students need to be better-informed about the realities of the labour market they intend entering. Whilst universities cannot be expected to provide a complete analysis of the employment and wage prospects associated with their courses (in part due to a lack of available information), there is an inherent incentive to continue to promote 'value myths' in order to continue to attract students and subsequently funding, via fees and/or state support. It is therefore incumbent upon various other stakeholders, primarily governments via academic research, to improve the dissemination of information to prospective students and the sources they rely upon, be it academic advisors, industry professionals or their family. Not to do so, may be detrimental to labour market efficiency as highly able, qualified candidates become funnelled into fields over-supplied with graduates. As a result, they then have to seek employment outside the profession associated with their degree, only to find, that their probability of employment is no greater or worse than that of other graduates, (who, arguably, may have studied far less rigorously demanding subjects). Furthermore, the higher wage premia value of their degree relative to other graduates is only truly experienced by those fortunate enough to gain employment within the associated profession.

APPENDIX: Supplementary Tables and Detailed Regression Results

Table A.1
Female Professional Graduate Rate of Self-Employment

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2007 - 2015 Average
Law	18%	14%	16%	15%	17%	16%	15%	13%	12%	15%
Medicine/Dentistry	11%	10%	10%	-	-	13%	14%	7%	13%	11%
Psychology	-	-	-	-	-	-	-	-	-	-
Accountancy	-	-	-	-	-	-	-	6%	9%	7%

Table A.2
Male Professional Graduate Rate of Self-Employment

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2007 - 2015 Average
Law	41%	45%	37%	45%	35%	38%	35%	40%	43%	40%
Medicine/Dentistry	31%	25%	26%	27%	23%	28%	27%	31%	27%	27%
Psychology	-	-	-	-	-	-	-	-	-	-
Accountancy	23%	16%	15%	16%	15%	22%	19%	15%	20%	18%

Table B.1 Female Out of Occupation Classification and Codes		
Degree Subject	**SOC Codes and Categories**	
	In Profession	**Out of Profession***
Medicine/Dentistry	2211, 2215 Medical Practitioner, and Dental Practitioner	1181, 2112, 2218 Hospital and Health Service Managers, Biological Scientist, Podiatrist
Law	2411, 2412, 2413, 2419 Occupational codes cover Judges, Lawyers, Barristers, Solicitors, Advocates, Officers of the Court and any other category of Legal Professional	2311, 2443, 3562 Higher Education Teaching Professionals, Probation Officer, Personnel and Industrial Relations Officer
Psychology	2212 Psychologists	2315, 2316, 3545 Primary and Nursery Education Teaching Professionals, Special Needs Education Teaching Professional, and Community Marketing Management
Accountancy	2421, 2422 Chartered and Certified Accountants, and Management Accountants	1131, 3534, 4122 Financial Managers and Chartered Secretaries, Finance and Investment Analyst/Advisor, and Financial Clerks
***Out of profession codes and categories limited to codes/categories accounting for 10% or more of the sample, and/or the top 3 occupational codes/categories**		

Table B.2 Male Out of Occupation Classification and Codes		
Degree Subject	**SOC Codes and Categories**	
	In Profession	**Out of Profession***
Medicine/Dentistry	2211, 2215 Medical Practitioner, and Dental Practitioner	1171, 1181, 2311 Officers in Armed Forces, Hospital and Health Service Managers, and Higher Education Teaching Professionals
Law	2411, 2412, 2413, 2419 Occupational codes cover Judges, Lawyers, Barristers, Solicitors, Advocates, Officers of the Court and any other category of Legal Professional	1131, 1132, 2311 Financial Managers and Chartered Secretaries, Marketing and Sales Managers and Higher Education Teaching Professionals
Psychology	2212 Psychologists	2311, 2315 , 3543 Higher Education Teaching Professionals, Primary and Nursery Education Teaching Professionals, and Marketing Associate Professionals
Accountancy	2421, 2422 Chartered and Certified Accountants, and Management Accountants	1131, 3534, 4122 Financial Managers and Chartered Secretaries, Finance and Investment Analyst/Advisor, and Financial Clerks
***Out of profession codes and categories limited to codes/categories accounting for 10% or more of the sample, and/or the top 3 occupational codes/categories**		

Table C.1 Female Law Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Higher Education Professional	4%	0%	6%	9%
Probation Officer	5%	0%	4%	3%
Personnel and Industrial Relations Officer	3%	0%	1%	0%
Other	88%	100%	89%	88%

Table C.2 Female Medicine/Dentistry Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Hospital and Health Service Managers	4%	6%	0%	6%
Biological Scientist	7%	6%	0%	12%
Podiatrist	9%	6%	18%	6%
Other	80%	82%	82%	66%

Table C.3 Female Psychology Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Primary and Nursery Education	7%	6%	10%	3%
Special Needs Education	5%	3%	2%	13%
Community Marketing Management	3%	4%	3%	1%
Other	85%	87%	85%	83%

Table C.4 Female Accountancy Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Financial Manager and Chartered Secretary	12%	6%	26%	0%
Finance and Investment Analyst/Advisor	4%	4%	6%	0%
Financial Clerks	19%	27%	9%	15%
Other	65%	63%	59%	85%

Table C.5 Male Law Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Financial Manager and Chartered Secretary	7%	4%	13%	8%
Higher Education Professional	7%	6%	6%	6%
Marketing and Sales managers	5%	4%	3%	12%
Other	80%	86%	78%	74%

Table C.6 Male Medicine/Dentistry Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Officers in Armed Forces	15%	0%	9%	22%
Hospital and Health Service Managers	12%	0%	9%	17%
Higher Education Professional	15%	0%	9%	22%
Other	58%	100%	73%	39%

Table C.7 Male Psychology Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Higher Education Professional	6%	0%	6%	12%
Primary and Nursery Education	5%	11%	0%	0%
Marketing Associate Professionals	6%	7%	6%	4%
Other	84%	92%	88%	84%

Table C.8 Male Accountancy Graduates Out of Profession Occupation Summary				
Occupations	**Age**			
	All	**25-35**	**36-45**	**46-60**
Financial Manager and Chartered Secretary	40%	23%	44%	64%
Finance and Investment Analyst/Advisor	7%	15%	2%	0%
Financial Clerks	7%	12%	5%	0%
Other	46%	50%	49%	36%

Table D.1 Professional Graduate in Professional Employment - Summary of Degree Subject by Age and Degree Classification (Female Sample)								
	Law		Medicine/Dentistry		Accountancy		Psychology	
	1st	2.1	1st	2.1	1st	2.1	1st	2.1
25 to 35	13%	87%	50%	50%	37%	63%	21%	79%
36 to 45	9%	91%	32%	68%	41%	59%	9%	91%
46 to 60	10%	90%	40%	60%	20%	80%	6%	94%
Average	11%	89%	41%	59%	33%	67%	12%	88%

Table D.2 Professional Graduate in Other Employment - Summary of Degree Subject by Age and Degree Classification (Female Sample)								
	Law		Medicine/Dentistry		Accountancy		Psychology	
	1st	2.1	1st	2.1	1st	2.1	1st	2.1
25 to 35	10%	90%	33%	67%	29%	71%	13%	87%
36 to 45	8%	92%	0%	100%	9%	91%	20%	80%
46 to 60	6%	94%	27%	73%	23%	77%	16%	84%
Average	8%	92%	20%	80%	20%	80%	16%	84%

Table D.3 Professional Graduate in Professional Employment - Summary of Degree Subject by Age and Degree Classification (Male Sample)								
	Law		Medicine/Dentistry		Accountancy		Psychology	
	1st	2.1	1st	2.1	1st	2.1	1st	2.1
25 to 35	15%	85%	46%	54%	13%	88%	100%	0%
36 to 45	5%	95%	56%	44%	16%	84%	18%	82%
46 to 60	17%	83%	35%	65%	10%	90%	57%	43%
Average	12%	88%	45%	55%	13%	87%	58%	42%

Table D.4 Professional Graduate in Other Employment - Summary of Degree Subject by Age and Degree Classification (Male Sample)								
	Law		Medicine/Dentistry		Accountancy		Psychology	
	1st	2.1	1st	2.1	1st	2.1	1st	2.1
25 to 35	12%	88%	100%	0%	23%	77%	13%	87%
36 to 45	9%	91%	67%	33%	17%	83%	18%	82%
46 to 60	27%	73%	25%	75%	14%	86%	27%	73%
Average	16%	84%	64%	36%	18%	82%	19%	81%

Table E.1 Female Employment Premia – Probit Model Standard errors in parentheses * p<.05, ** p<.01, *** p<.001				
	(1)	**(2)**	**(3)**	**(4)**
	Probit	**25-35**	**36-45**	**46-60**
Degree Variables				
Medicine and Dentistry	0.373*** (0.0456)	0.338*** (0.0771)	0.673*** (0.102)	0.191** (0.0708)
Law	-0.0118 (0.0338)	0.0764 (0.0534)	0.000402 (0.0593)	-0.215** (0.0670)
Psychology	-0.135*** (0.0352)	-0.282*** (0.0492)	-0.116 (0.0659)	0.185* (0.0795)
Accountancy	-0.0297 (0.0592)	-0.104 (0.0817)	-0.104 (0.0969)	0.563** (0.212)
Other Variables				
Age	0.0260*** (0.00417)	0.489*** (0.0535)	-0.268** (0.0907)	0.596*** (0.0514)
Age^2	-0.000522*** (0.0000492)	-0.00847*** (0.000889)	0.00334** (0.00112)	-0.00621*** (0.000486)
London	-0.175*** (0.0185)	-0.156*** (0.0333)	-0.293*** (0.0328)	-0.0835** (0.0311)
Rest of the UK	-0.0623*** (0.0180)	-0.104** (0.0324)	-0.0391 (0.0323)	-0.0522 (0.0300)
2007	-0.132*** (0.0203)	-0.110** (0.0349)	-0.184*** (0.0360)	-0.138*** (0.0357)
2008	-0.130*** (0.0197)	-0.149*** (0.0340)	-0.182*** (0.0345)	-0.0731* (0.0349)
2009	-0.121*** (0.0196)	-0.114*** (0.0343)	-0.139*** (0.0348)	-0.133*** (0.0338)
2010	-0.139*** (0.0194)	-0.196*** (0.0335)	-0.151*** (0.0346)	-0.0920** (0.0336)
2011	-0.146*** (0.0197)	-0.0982** (0.0353)	-0.214*** (0.0348)	-0.153*** (0.0333)
2012	-0.0992*** (0.0193)	-0.130*** (0.0340)	-0.0923** (0.0344)	-0.0982** (0.0327)
2013	-0.0876*** (0.0194)	-0.0483 (0.0347)	-0.102** (0.0341)	-0.121*** (0.0327)
2014	-0.0371 (0.0195)	-0.0608 (0.0345)	0.00778 (0.0347)	-0.0607 (0.0327)
Constant	1.189*** (0.0869)	-5.405*** (0.800)	6.680*** (1.826)	-12.87*** (1.356)
Diagnostics				
N	122651	48534	37603	36514

Table E.2
Male Employment Premia – Probit Model
Standard errors in parentheses * p<.05, ** p<.01, *** p<.001

	(1)	(2)	(3)	(4)
	Probit	25-35	36-45	46-60
Degree Variables				
Medicine and Dentistry	0.297***	0.286*	0.401**	0.270***
	(0.0573)	(0.127)	(0.141)	(0.0734)
Law	0.0221	-0.121	0.165	0.0949
	(0.0490)	(0.0758)	(0.117)	(0.0775)
Psychology	-0.177*	-0.261*	-0.306*	0.105
	(0.0737)	(0.117)	(0.126)	(0.141)
Accountancy	0.447***	0.438**	0.542*	0.400**
	(0.0918)	(0.141)	(0.218)	(0.147)
Other Variables				
Age	0.222***	0.562***	0.179	0.802***
	(0.00508)	(0.0730)	(0.141)	(0.0552)
Age^2	-0.00285***	-0.00847***	-0.00227	-0.00831***
	(0.0000591)	(0.00122)	(0.00174)	(0.000517)
London	0.0455	0.0660	-0.0519	0.0822*
	(0.0247)	(0.0445)	(0.0553)	(0.0354)
Rest of the UK	-0.00543	0.0557	-0.0465	-0.0244
	(0.0240)	(0.0435)	(0.0544)	(0.0341)
2007	-0.0710**	0.00366	-0.0863	-0.113**
	(0.0268)	(0.0494)	(0.0616)	(0.0380)
2008	-0.0605*	0.0157	-0.214***	-0.0390
	(0.0262)	(0.0483)	(0.0573)	(0.0376)
2009	-0.168***	-0.101*	-0.325***	-0.137***
	(0.0254)	(0.0468)	(0.0555)	(0.0366)
2010	-0.146***	-0.120**	-0.306***	-0.0914*
	(0.0255)	(0.0465)	(0.0555)	(0.0367)
2011	-0.164***	-0.221***	-0.232***	-0.0987**
	(0.0259)	(0.0463)	(0.0578)	(0.0374)
2012	-0.0982***	-0.106*	-0.199***	-0.0516
	(0.0256)	(0.0467)	(0.0569)	(0.0366)
2013	-0.0584*	-0.0650	-0.205***	0.0117
	(0.0259)	(0.0473)	(0.0570)	(0.0372)
2014	-0.00853	-0.00269	-0.0626	0.00801
	(0.0262)	(0.0478)	(0.0598)	(0.0370)
Constant	-2.409***	-7.511***	-1.520	-17.68***
	(0.107)	(1.081)	(2.844)	(1.466)
Diagnostics				
N	108406	36407	32470	39529

Table F.1 Female Wage Regressions Standard Errors in Parentheses * p<.05, ** p<.01, *** p<.001				
	(1)	(2)	(3)	(4)
	OLS	25-35	36-45	46-60
Degree/Employment Setting Variables				
Medic/Dentistry Degree – Medic/Dentist Job	0.531*** (0.0261)	0.392*** (0.0311)	0.596*** (0.0515)	0.756*** (0.0651)
Medic/Dentistry Degree – Other Job	0.0935 (0.0607)	0.0871 (0.0827)	0.0384 (0.131)	0.155 (0.111)
Law Degree – Law Job	0.332*** (0.0291)	0.284*** (0.0327)	0.407*** (0.0582)	0.380*** (0.0838)
Law Degree – Other Job	0.0395 (0.0263)	0.00708 (0.0303)	0.118* (0.0494)	0.0155 (0.0787)
Psychology Degree – Psychology Job	0.251*** (0.0440)	0.133** (0.0508)	0.265** (0.0926)	0.509*** (0.108)
Psychology Degree – Other Job	0.0289 (0.0223)	0.0280 (0.0260)	-0.00743 (0.0453)	0.0778 (0.0554)
Accountancy Degree – Accountancy Job	0.317*** (0.0546)	0.362*** (0.0595)	0.274** (0.105)	0.192 (0.205)
Accountancy Degree – Other Job	0.0996* (0.0415)	0.119* (0.0493)	0.0768 (0.0735)	0.0761 (0.127)
Other Variables				
Age	0.0746*** (0.00252)	0.198*** (0.0242)	0.144** (0.0553)	0.0879* (0.0365)
Age^2	-0.000812*** (0.0000303)	-0.00270*** (0.000401)	-0.00174* (0.000685)	-0.000882* (0.000348)
London	0.135*** (0.00999)	0.166*** (0.0139)	0.187*** (0.0188)	0.0420* (0.0201)
Rest of the UK	-0.0372*** (0.00954)	-0.0235 (0.0133)	-0.00530 (0.0178)	-0.0820*** (0.0191)
Public Sector	-0.0254*** (0.00544)	0.0125 (0.00711)	-0.0966*** (0.0102)	0.00404 (0.0119)
Tenure Less Than 1 Year	-0.222*** (0.00850)	-0.150*** (0.0106)	-0.271*** (0.0166)	-0.238*** (0.0211)
Tenure 1 to 5 Years	-0.134*** (0.00614)	-0.0712*** (0.00823)	-0.181*** (0.0115)	-0.137*** (0.0138)
2007	-0.0675*** (0.0112)	-0.0449** (0.0145)	-0.0620** (0.0218)	-0.107*** (0.0240)
2008	-0.0314** (0.0108)	0.0108 (0.0144)	-0.0589** (0.0208)	-0.0668** (0.0228)
2009	-0.0304** (0.0109)	-0.00189 (0.0145)	-0.0509* (0.0207)	-0.0400 (0.0231)
2010	-0.0426*** (0.0108)	-0.00179 (0.0144)	-0.0614** (0.0206)	-0.0758*** (0.0224)
2011	-0.00765 (0.0110)	0.0104 (0.0148)	-0.00559 (0.0208)	-0.0345 (0.0226)
2012	-0.0137 (0.0107)	-0.00580 (0.0145)	-0.0242 (0.0205)	-0.0145 (0.0219)
2013	-0.0112 (0.0110)	0.00415 (0.0150)	-0.0286 (0.0208)	-0.0124 (0.0226)
2014	-0.00987 (0.0106)	0.00905 (0.0144)	-0.0194 (0.0199)	-0.0267 (0.0218)
Constant	1.264*** (0.0522)	-0.816* (0.362)	0.00216 (1.112)	0.806 (0.953)
Diagnostics				
R^2	16.14%	19.66%	12.14%	7.16%
N	24852	10272	7598	6982

Table F.2 Male Wage Regressions Standard Errors in Parentheses * p<.05, ** p<.01, *** p<.001				
	(1)	(2)	(3)	(4)
	OLS	25-35	36-45	46-60
Degree/Employment Setting Variables				
Medic/Dentistry Degree – Medic/Dentist Job	0.519*** (0.0346)	0.345*** (0.0524)	0.589*** (0.0596)	0.618*** (0.0673)
Medic/Dentistry Degree – Other Job	0.475*** (0.0757)	0.321 (0.193)	0.569*** (0.135)	0.467*** (0.111)
Law Degree – Law Job	0.312*** (0.0388)	0.297*** (0.0471)	0.345*** (0.0721)	0.318** (0.101)
Law Degree – Other Job	0.0969** (0.0359)	0.0899 (0.0471)	0.105 (0.0794)	0.119 (0.0671)
Psychology Degree – Psychology Job	0.221* (0.101)	0.165 (0.387)	0.00849 (0.135)	0.593** (0.182)
Psychology Degree – Other Job	0.107* (0.0430)	0.00650 (0.0567)	0.258** (0.0784)	0.105 (0.0946)
Accountancy Degree – Accountancy Job	0.213*** (0.0532)	0.252*** (0.0614)	0.214* (0.103)	0.115 (0.152)
Accountancy Degree – Other Job	0.217*** (0.0402)	0.333*** (0.0538)	0.0857 (0.0703)	0.217* (0.0913)
Other Variables				
Age	0.116*** (0.00286)	0.185*** (0.0307)	0.132* (0.0598)	0.0973** (0.0373)
Age^2	-0.00121*** (0.0000338)	-0.00221*** (0.000508)	-0.00141 (0.000739)	-0.000980** (0.000354)
London	0.162*** (0.0125)	0.183*** (0.0192)	0.175*** (0.0230)	0.125*** (0.0228)
Rest of the UK	-0.0382** (0.0122)	-0.0334 (0.0188)	-0.0429 (0.0225)	-0.0375 (0.0221)
Public Sector	-0.141*** (0.00654)	-0.0955*** (0.00999)	-0.185*** (0.0120)	-0.146*** (0.0119)
Tenure Less Than 1 Year	-0.111*** (0.0101)	-0.0992*** (0.0138)	-0.124*** (0.0192)	-0.0982*** (0.0218)
Tenure 1 to 5 Years	-0.0539*** (0.00706)	-0.0429*** (0.0104)	-0.0274* (0.0123)	-0.0903*** (0.0145)
2007	-0.0976*** (0.0128)	-0.0440* (0.0189)	-0.130*** (0.0232)	-0.120*** (0.0245)
2008	-0.0525*** (0.0124)	0.00329 (0.0184)	-0.0795*** (0.0223)	-0.0811*** (0.0236)
2009	-0.0487*** (0.0125)	-0.0220 (0.0186)	-0.0794*** (0.0226)	-0.0448 (0.0237)
2010	-0.0314* (0.0125)	-0.0183 (0.0187)	-0.0477* (0.0225)	-0.0217 (0.0236)
2011	-0.0262* (0.0127)	-0.0236 (0.0190)	-0.0441 (0.0227)	-0.00542 (0.0240)
2012	-0.0353** (0.0125)	-0.00197 (0.0189)	-0.0447* (0.0223)	-0.0557* (0.0234)
2013	-0.0231 (0.0128)	0.00359 (0.0191)	-0.0473* (0.0230)	-0.0263 (0.0240)
2014	-0.0154 (0.0124)	0.00347 (0.0186)	-0.0391 (0.0224)	-0.0129 (0.0229)
Constant	0.442*** (0.0606)	-0.760 (0.462)	0.168 (1.206)	0.828 (0.978)
Diagnostics				
R^2	22.51%	24.09%	12.32%	7.46%

N	21801	7572	6928	7301

Table G.1 Female Median Wage Regressions Standard Errors in Parentheses * p<.05, ** p<.01, *** p<.001				
	(1)	(2)	(3)	(4)
	OLS	25-35	36-45	46-60
Degree/Employment Setting Variables				
Medic/Dentistry Degree – Medic/Dentist Job	0.522*** (0.0268)	0.338*** (0.0335)	0.614*** (0.0514)	0.704*** (0.0592)
Medic/Dentist Degree – Other Job	0.0270 (0.0617)	-0.0184 (0.0867)	0.0617 (0.125)	0.0541 (0.0990)
Law Degree – Law Job	0.308*** (0.0298)	0.291*** (0.0348)	0.451*** (0.0581)	0.242** (0.0757)
Law Degree – Other Job	0.00473 (0.0270)	-0.0179 (0.0325)	0.116* (0.0493)	0.0694 (0.0712)
Psychology Degree – Psychology Job	0.210*** (0.0449)	0.0889 (0.0542)	0.289** (0.0910)	0.577*** (0.0965)
Psychology Degree – Other Job	-0.00168 (0.0228)	0.00523 (0.0280)	-0.0706 (0.0453)	0.0287 (0.0505)
Accountancy Degree – Accountancy Job	0.368*** (0.0556)	0.356*** (0.0632)	0.356*** (0.103)	0.0926 (0.168)
Accountancy Degree – Other Job	0.226*** (0.0424)	0.194*** (0.0526)	0.219** (0.0729)	0.00917 (0.112)
Other Variables				
Age	0.0786*** (0.00259)	0.176*** (0.0260)	0.183*** (0.0556)	0.102** (0.0335)
Age^2	-0.000852*** (0.0000312)	-0.00230*** (0.000432)	-0.00221** (0.000688)	-0.00100** (0.000319)
London	0.117*** (0.0103)	0.135*** (0.0150)	0.155*** (0.0188)	0.0361* (0.0184)
Rest of the UK	-0.0272** (0.00980)	-0.0262 (0.0144)	-0.00448 (0.0179)	-0.0422* (0.0175)
Public	0.00327 (0.00559)	0.0331*** (0.00766)	-0.0697*** (0.0103)	0.0398*** (0.0109)
Tenure Less Than 1 Year	-0.207*** (0.00873)	-0.140*** (0.0114)	-0.264*** (0.0167)	-0.228*** (0.0193)
Tenure 1 to 5 Years	-0.118*** (0.00631)	-0.0667*** (0.00886)	-0.155*** (0.0115)	-0.137*** (0.0126)
2007	-0.0787*** (0.0115)	-0.0536*** (0.0156)	-0.0797*** (0.0219)	-0.0999*** (0.0220)
2008	-0.0465*** (0.0111)	-0.00841 (0.0155)	-0.0711*** (0.0209)	-0.0784*** (0.0209)
2009	-0.0421*** (0.0112)	-0.0247 (0.0156)	-0.0749*** (0.0208)	-0.0508* (0.0211)
2010	-0.0317** (0.0111)	-0.00841 (0.0155)	-0.0565** (0.0207)	-0.0582** (0.0205)
2011	-0.0000751 (0.0113)	0.00723 (0.0159)	-0.0217 (0.0209)	-0.00900 (0.0207)
2012	-0.0176 (0.0110)	-0.0180 (0.0157)	-0.00252 (0.0206)	-0.0182 (0.0201)
2013	-0.000708 (0.0114)	0.00100 (0.0162)	-0.0137 (0.0209)	-0.00694 (0.0207)
2014	-0.00883 (0.0109)	-0.00624 (0.0155)	-0.00959 (0.0200)	-0.0205 (0.0200)
Constant	1.168*** (0.0536)	-0.488 (0.390)	-0.795 (1.117)	0.358 (0.874)
Diagnostics				
R^2	10.22%	12.00%	6.19%	3.47%
N	24852	10272	7598	6982

Table G.2
Male Median Wage Regressions
Standard Errors in Parentheses * p<.05, ** p<.01, *** p<.001

	(1)	(2)	(3)	(4)
	OLS	25-35	36-45	46-60
Degree/Employment Setting Variables				
Medic/Dentistry Degree – Medic/Dentistry Job	0.528***	0.339***	0.602***	0.666***
	(0.0371)	(0.0623)	(0.0672)	(0.0653)
Medic/Dentistry Degree – Other Job	0.575***	0.390	0.627***	0.605***
	(0.0803)	(0.201)	(0.147)	(0.107)
Law Degree – Law Job	0.312***	0.297***	0.427***	0.198*
	(0.0416)	(0.0562)	(0.0809)	(0.0972)
Law Degree – Other Job	0.119**	0.0885	0.104	0.178**
	(0.0385)	(0.0561)	(0.0875)	(0.0656)
Psychology Degree – Psychology Job	0.307**	0.153***	0.0461	0.627***
	(0.106)	(0.0239)	(0.147)	(0.167)
Psychology Degree – Other Job	0.0558	0.0214	0.336***	0.0729
	(0.0460)	(0.0673)	(0.0877)	(0.0917)
Accountancy Degree – Accountancy Job	0.217***	0.283***	0.140	0.104
	(0.0568)	(0.0728)	(0.114)	(0.143)
Accountancy Degree – Other Job	0.230***	0.333***	0.100	0.232**
	(0.0431)	(0.0640)	(0.0779)	(0.0887)
Other Variables				
Age	0.112***	0.159***	0.175**	0.119**
	(0.00307)	(0.0368)	(0.0679)	(0.0368)
Age^2	-0.00115***	-0.00177**	-0.00194*	-0.00116***
	(0.0000363)	(0.000609)	(0.000838)	(0.000350)
London	0.152***	0.153***	0.183***	0.116***
	(0.0135)	(0.0230)	(0.0261)	(0.0224)
Rest of the UK	-0.0259*	-0.0339	-0.0234	-0.0104
	(0.0132)	(0.0225)	(0.0255)	(0.0217)
Public	-0.130***	-0.0857***	-0.172***	-0.155***
	(0.00704)	(0.0120)	(0.0136)	(0.0117)
Tenure Less Than 1 Year	-0.0993***	-0.0833***	-0.0896***	-0.119***
	(0.0109)	(0.0165)	(0.0218)	(0.0216)
Tenure 1 to 5 Years	-0.0476***	-0.0343**	-0.0117	-0.0922***
	(0.00759)	(0.0125)	(0.0139)	(0.0143)
2007	-0.101***	-0.0639**	-0.140***	-0.128***
	(0.0138)	(0.0227)	(0.0263)	(0.0241)
2008	-0.0699***	-0.0236	-0.0853***	-0.121***
	(0.0134)	(0.0221)	(0.0254)	(0.0233)
2009	-0.0603***	-0.0380	-0.0917***	-0.0597*
	(0.0135)	(0.0222)	(0.0257)	(0.0234)
2010	-0.0367**	-0.0189	-0.0464	-0.0519*
	(0.0134)	(0.0224)	(0.0255)	(0.0233)
2011	-0.0334*	-0.0328	-0.0518*	-0.0125
	(0.0136)	(0.0228)	(0.0257)	(0.0237)
2012	-0.0423**	-0.0355	-0.0565*	-0.0454*
	(0.0134)	(0.0226)	(0.0253)	(0.0230)
2013	-0.0227	-0.0197	-0.0492	-0.0384
	(0.0137)	(0.0229)	(0.0261)	(0.0237)
2014	-0.0307*	-0.0167	-0.0698**	-0.0358
	(0.0133)	(0.0223)	(0.0255)	(0.0226)
Constant	0.520***	-0.350	-0.737	0.202
	(0.0651)	(0.554)	(1.369)	(0.965)
Diagnostics				
R^2	13.98%	14.22%	7.2%	4.27%

N	21801	7572	6928	7301

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