# Motivation, Expectations and the Gender Pay Gap for UK Graduates

Arnaud Chevalier

April 2004

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**Arnaud Chevalier**
*University College Dublin,*
*LSE and IZA Bonn*

# ABSTRACT

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Focussing on recent UK graduates, a wage gap of 12% is found. The unexplained component of the gap is small and a large fraction of the gap can be explained by subject choice, job characteristics, motivation and expectation variables. Motivation and expectations account for 44% of the explained gap, thus most studies over-estimate the unexplained component of the gender wage gap. Following stereotypes, women tend to be more altruistic and less career oriented than men, character traits that are less rewarded by employers. The principal component of the gender wage gap is expectations about childrearing. These conservative attitudes affect women's wages even at an early stage of their career. Without a change in attitude, the gender wage gap is likely to remain.

Arnaud Chevalier
Institute for the Study of Social Change
University College Dublin
Dublin 4
Republic of Ireland
Tel.: +353 1 716 8240
Fax: +353 1 716 1108
Email: arnaud.chevalier@ucd.ie

## I. Introduction

Despite the introduction of equal opportunity legislations in the Sixties and Seventies, women are still paid between 20% and 40% less then men (see Altonji and Blank, 1999 or Blau and Kahn, 2000, for recent surveys or Weichselbaumer and Winter-Ebmer, 2001, for a meta-analysis). Recent estimates for the UK are in the magnitude of a 20% gender wage gap (Harkness, 1996; Blackaby et al. 1997; Lissenburgh, 2000, Swaffield, 2000). Part of the gap can be explained by differences in the observed characteristics of both genders, such as education and experience but even accounting for these factors affecting productivity a substantial gap is left unexplained. This unexplained gap stems from either employer discrimination or non-observed productivity differential.

Becker (1971) articulates a model in which an employer's utility is a function of the workforce composition rather than purely due to profit maximisation. Employers with a taste for discrimination pay men a premium in order to avoid hiring women. Similarly, employers with a taste for discrimination may not promote women to more senior positions[1]. Discriminating employers do not maximise employees' output and thus forgo profits. In a competitive market, discriminating employers would be driven out of business by profit maximising employers but empirically, the sex ratio of a firm is not linked to its profits nor survival (Hellerstein et al, 2002), even so discriminatory behaviours exist (Goldin and Rouse, 2000)[2].

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[1] The lower promotion of women may not follow from employers' discrimination but from gender differences in non-market opportunities causing women to invest less in the specific human capital required to be promoted (Lazear and Rosen, 1990).

[2] Discriminatory behaviours are typically difficult to observe. Using a unique panel of applicants to jobs at 11 symphonic orchestras in the US and detailed information on the hiring process, the authors find that "blind" auditions, in which the gender of the candidate is not revealed to the jury, result in an increased probability of a woman obtaining the job.

Discrimination can also stem from fellow workers and customers. Women may then select themselves in female dominated occupations therefore depressing wages in these specific occupations. Occupational crowding may also generate from social pressure.

Alternative hypotheses explaining the gender wage gap are numerous. As women traditionally take career breaks for child rearing reasons, they may choose occupations with flatter wage profile (Polachek, 1981) or work in the public sector for beliefs that equal opportunity/family friendly policies would be better implemented. More generally, women may trade off wages for characteristics of the job improving their family life (shorter commuting, hours flexibility), thus the gender wage gap can be seen as a compensating differential (Killingsworth, 1987).

To summarise, men and women are not perfect substitute, this unobserved heterogeneity accounts for as much as 50% of the gender wage gap (Polachek and Kim, 1994). Gender heterogeneity can be traced to differences in educational choice (Polachek and Kim, 1994, Chevalier, 2002) and career expectations (Swaffield, 2000, Vella, 1997).

This empirical analysis uses a unique dataset that allows controlling for a large set of characteristics usually unobserved such as motivation and lifetime expectations. This data set of young UK graduates; a homogenous population that has been on the labour market for a maximum of 42 months, has also the advantage of limiting participation selection, career interruption, or discouraged workers phenomena. The dataset includes detailed education variables such as grade and subject as well as career history but its main advantage is to include twenty variables on career and life expectations; thus offering a unique opportunity to unveil some of the components of gender's heterogeneity. The gender wage gap is then decomposed to estimate the relative effect of subject of degree, occupational choice and motivations.

Men and women do differ substantially in the career and life expectations, and conforming to stereotypes, we find that male tend to be more career oriented whilst women care about the usefulness of their job. The main difference is nevertheless in the expectation about childrearing duties, were 30% of women strongly agree that they expect to take a career break but only 2% of male graduates do. Job values and expectations are important components of the gender wage gap, accounting respectively for 26% and 18% of the explained gap. In this full model, 85 % of the gender wage gap is explained. The single most important contributor to the gap is the expectation on career break. Policies to reduce the gender wage gap should therefore concentrate on changing these expectations by enforcing more family friendly policies.

The paper is organised as follow: the next section explains various decomposition techniques. Section 3 reviews the literature on the effect of subject choices, occupational choices and character traits on wages, and when possible relates it to gender differences in these variables. The data on graduates is described in section 4 and the results of the decomposition are presented in section 5.


**II methodology**


As in the bulk of the literature, we estimate separately for both genders (g) a log wage equation.

$$\ln w_{ig} = X_{ig}\beta_g + \varepsilon_{ig} \qquad\qquad g = m, f \qquad\qquad (1)$$

Individual characteristics are included in a vector $X_{ig}$. $\beta_g$ is the vector of the gender-specific returns to characteristics and $\varepsilon_{ig}$ is an individual error term. The average gender gap in earning is decomposed between the mean difference in observed characteristics and the difference in the returns to these characteristics (Oaxaca, Blinder decomposition).

$$\Delta = \overline{\ln w_m} - \overline{\ln w_f} = (\overline{X_m} - \overline{X_f})\beta_g + (\beta_m - \beta_f)\overline{X_{1-g}} \tag{2}$$

where variable means are denoted with a bar. (2) can be expressed at the mean characteristics of men (g=m) or women (g=f). The first term of (2) is the part of the gender pay gap that can be explained by the differences in the observed characteristics of both groups. The second part, the unexplained component, is the portion of the gap that is due to differences in the returns to characteristics between the two groups. If all the determinants of earnings were observed, this term would measure discrimination. As typically not all the determinants of (2) are observable, we will refer to this term as the unexplained component of the gender wage gap. The choice of a reference group to decompose (2) is not innocuous but since neither wage function ($\beta_g$) would exist in the absence of discrimination, both choices lead to biased estimates of the explained wage gap. Rather than giving a weight of one to the wage function of one group and zero to the other, Cotton (1988) advocates the use of population weight. The wage function that would prevail in a post-discrimination world ($\beta^*$) can be approximated as a weighted average of the one currently faced by both genders. Thus, the gap can be expressed into three components:

$$\Delta = (\overline{X_m} - \overline{X_f})\beta^* + (\beta_m - \beta^*)\overline{X_m} + (\beta^* - \beta_f)\overline{X_f}$$

$$\text{where,} \quad \beta^* = \frac{n_f}{N}\beta_f + \frac{n_m}{N}\beta_m \tag{3}$$

and $N = n_f + n_m$ $\qquad$ $n_g$ : number of individuals of gender g

The first term in (3) is the explained wage gap measured at the non-discrimination wage. The unexplained component is divided into two parts: the advantage of men (extra returns compared to what should be observed in a non-discriminatory world) and the disadvantage of women. Neumark (1988) refutes that the wage function in the absence of discrimination would simply be the weighted average of the current wage functions. Instead,

he advocates the use of pooled estimates to approximate $\beta^*$. The final decomposition remains similar to the one presented in (3). Neumark's decomposition is used throughout this paper.

The decomposition of the gap between explained and unexplained component is complemented by an analysis of the fraction of the wage gap that can be attributed to differences in returns. Starting from the first term in (2):

$$\Delta_g = (\overline{X}_m - \overline{X}_f)\beta_g \tag{4}$$

$\Delta_g$ reflects the increase in female wages estimated at the price of gender g if the endowment differential were eliminated. However, such measure is not independent of the metrics used. For example, a dummy variable would have opposite effect on the wage differential when the base category is fixed at one group rather than the other. To avoid these metric problems, Brown and Corcoran (1997) advocate the use $\Delta$ defined as:

$$\Delta = \Delta_m - \Delta_f \tag{5}$$

Eliminating the endowment differential for variable X, would lead to a pay increase of $\Delta$ if estimated at the male prices rather than the female prices. $\Delta$ is small if either the difference in endowment is small or the differences in the returns are small, thus $\Delta$ provides a measure of the contribution of a specific variable to the wage gap, incorporating differences in endowment and returns.


**III literature**

3.1 Subject effects

The choice of subject at university has an impact on labour market experience and earnings. Subject choice impacts on earnings directly and indirectly. A small literature on the returns to higher education by subject exists. For the UK specifically, large variation in the returns by subjects is found with scientific majors usually at providing the largest returns and Arts, Languages and Social Sciences offering the lowest returns (Chevalier et al., 2002, for a

review). For all subjects, the returns are higher for women than for men and the differences are the largest for Arts and Education graduates. This does not indicate that female graduates earn more than their male counterparts, but mostly reflects that higher education reduces the gender wage gap.

While participation to higher education is nearly at parity for the cohort of interest, there are marked differences in the choice of subjects (see Table 1). Based on the university records, students segregate themselves by gender with scientific subjects being male dominated while Arts/Humanities based subjects have a higher female participation. A measure of segregation, such as the Duncan index suggests that around 30% of women would have to change their subjects to make the distribution of majors identical between both genders[3]. Despite large changes in attendance to higher education and to the gender mix, there is no evidence that subject segregation by gender has been reduced over the 1985-95 period, as the indices of segregation are of similar magnitude. Subjects most popular with women are associated with lower grades (McNabb et al., 2002), higher risk of unemployment and over-education and lower average pay in general (Chevalier, 2002).

[Table 1 around here]

Montmarquette et al (2002) note that for men but not for women, the choice of subject is based on the financial returns of this decision. Men take more risks of failing for higher returns while women are more risk adverse, and chose the subject with the greatest prospects of success and possibly for which they have the highest affinity. Since the choice of university majors appears to have a gender component, it may be important to include it in the wage decomposition. Including subject of graduation typically increases the explained component of the gender wage gap by 6 to 17 percentage points and a staggering 35% for Brown and

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[3] The Duncan index (Duncan and Duncan, 1955) is simply defined as $D = 1/2 * \sum_{i=1}^{k} \left| p_{mi} - p_{fi} \right|$, where $p_{mi}$ ($p_{fi}$) is the share of the male (female) sample observed in subject i, and k is the number of subjects.

Corcoran (1997) using the NLS72. Machin and Puhani (2003) also test whether subject aggregation matters. With the most detailed subject specification (124 and 71 subjects respectively for the UK and Germany), the increased in the part of the explained wage gap due to subject dummies doubles for the UK while the increase is less substantial in Germany[4].

3.2 Occupation effects

Women choose different type of occupation and sector of activity. Figure 1 plots the proportion of graduates employed in the public sector, six months after graduation, in 1993[5]. Almost all graduates from Medicine and to a lower extent from Education work in the public sector. What is more remarkable is the statistically significant difference in the proportion working in the public sector by gender; 37% of female graduates work in the public sector 6 months after graduations but only 23% of males do so. This gender gap in public sector employment is observed for most subjects and the highest differences are found for graduates from studies allied to Medicine, Education, Librarianship and Social Sciences.

[Figure 1: around here]

Socialisation affects occupational behaviour in three ways (Corcoran and Courant, 1985). First, socialisation affects character traits and therefore occupational choice. Second, children internalise sex-roles and reproduce them in their occupational choices; third, socialisation influences the values attached to activities. This concentration of women in a limited number of occupations, which could also be due to discrimination, has a negative effect on wages (Backer and Fortin, 1999). The penalty for working in a female dominated occupation is larger for women than men (Brown and Corcoran, 1997) but this finding is not

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[4] The high disaggregation of subjects may bias the results of the decomposition. For subjects with a large gender imbalance and a small number of observations, the subject estimates in the wage equation for the "minority" gender are imprecise and are multiply by the mean gender difference in participation (which is large) in order to calculate the explained component of the differential.

[5] This graph is based on the First Destination Survey, a survey of the universe of UK students conducted 6 months after graduation.

universal and others reckon that wages are lower for the minority gender in a given occupation.

### 3.3 Character traits effects

Recently, economists have integrated character traits as determinants of wages. Leadership, motivation and self-esteem but also aggression, beauty and cleanness are among the traits positively correlated with wages (see Bowles et al., 2001, for a survey). Even for traits that appear unrelated to human capital, the effect on wages can be quite large. For example, increasing beauty from below average to above average increases the hourly wage of male American lawyers by 14% (Hamermesh and Biddle, 1994). The impact of these characteristics also differ by gender; in high occupation status, Osborne (2001) using the UK National Child Development Study estimates that a one standard deviation change in aggression increases the earnings of men by 20% but reduces those of females by 14%. Due to socialisation, character traits differ by gender, with women being more altruistic and men selfish and competitive. However, the main attitudinal difference between men and women concerns childrearing role.

Most of the literature on the gender wage gap has stressed the importance of career interruptions and family responsibilities, but only a few have incorporated a measure of the attachment to the labour force. Vella (1994) uses an attitude index to divide the population of young Australian between modern and traditional relative to the role of women and report a large effect of modernity on female educational attainment (moderns are 10 percentage points more likely to attend university). Swaffield (2000) builds a similar index for the British working population and conclude that work motivation is a significant determinant of wages and since women are less career oriented, the omission of motivation reduces the explained gender wage gap

**IV Data**

The empirical evidence is based on a recent cohort of UK graduates thus limiting the effect of maternity, and discrimination on the career development of women. Individuals who graduated in June 1996 from a representative sample of 33 UK tertiary education institutions (Elias et al., 1998) were contacted by their Alumni office and sent a postal survey. The survey includes a complete history of the 42 months elapsed since graduating. Mature students and individuals with disabilities are excluded and only individuals graduating with a first degree are kept, leaving a sample of 7,640 graduates. The survey includes a wealth of information on university attainment and current employment. One of the drawbacks of the survey is that the annual gross wage is reported in category, and more importantly, the number of hours worked per week is not reported. Since, women work on average less than men, the gender wage gap using annual wage is biased upward. To limit this bias, only full-time employees are kept; this proportion is identical for men and women (85%) thus selection effects should not bias the estimated wages. Finally, we drop individuals who did not report their current wage or occupation, not living in the UK and with missing values on the variables of interest; this leaves us with a sample of 5187 graduates.

This dataset is unique as it includes 20 questions on character traits, motivation and expectations, divided into two sets, with answers coded on a 5 points scale from very important (1) to unimportant (5)[6]. The first set deals with job values while the second set contains career expectations. The distributions of answers to these questions are reported separately by gender in Tables 2A and 2B.

[Tables 2A and 2B around here]

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[6] In order to avoid dropping another 9% of the sample, we recoded individuals with a missing statement to not sure. Dropping these individuals from the analysis did not change any of the conclusions.

Apart from the importance of status and respect, leisure and concern with current affair, the long-term values of graduates are gender differentiated. Men are more likely to state that career development and financial rewards are very important long-term values, while women put forwards, personal development, job satisfaction, being valued by employer and doing a socially useful job. On the latter the gender difference is large, 50% of women agree that a socially useful job is important or very important, but only 33% of men make the same statement and 35% of them think that it is not important or unimportant. This difference in the type of jobs wanted may explain the high feminisation of jobs such as teacher and nurse. Women are also more likely to be concerned by local issues and ecology. The gender differences in long-term values are rather consistent with the stereotypes: men being less altruistic than women.

This is backed up with the findings on career expectations; with men being 10 percentage points more likely to strongly agree that they are extremely ambitious. The only other gender differences in career expectations concern career breaks. Despite improvements in family friendly policies, 66% of women still expect to take breaks for family reasons (agree somewhat or strongly) and only 17% expect their partner to do so. Men favours this arrangement with 40% of them expecting their partner to take a career break for family reasons and only 12% of them expecting to do it themselves. Furthermore, rejoining the labour market may not be a priority with a third of women not expecting to work until retirement.

[Table 3: around here]

Indices summarising the information on these statements are constructed[7]. The two indices are significantly correlated (0.17) but clearly measure different characteristics of the

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[7] The indices are constructed by allocating points to the answers, 5 for strongly agree to 1 for strongly disagree, after adjusting the questions for career orientations, thus personal development, job satisfaction, socially useful job, concern in local issue, ecology and current affairs were inverted. Similarly, the statements concerning fulfilment from work, I work to live and expect to take career breaks, that are negative values as far as career are concerned were inverted to calculate the career expectations index. The two indices are then normalised.

individuals. Women have character traits that show lower career expectations and long-term values that are less driven by career success. Other relevant variables are reported in Table 3, most have statistically different means for men and women. Women have higher academic credentials pre and post-university. Whilst both genders graduate from the same university type, they do so in different subjects. Conform to evidence from the First Destination Survey the gender imbalances are the greatest in Engineering, Education, Arts and Mathematics. Job characteristics variables are also significantly different by gender with women more likely to work in the public sector, in a smaller firm, in a professional or clerical occupation and with more female co-workers. Women are also younger and more likely to be white. The distribution of wages is reported in Figure 2. The mean pay in 1998 is £18,500 for women and £21,200 for men, but these mean characteristics hide differences in the distribution of pay between genders. The distribution is shifted to the left for women whilst the distribution of wages for men has a larger upper tail.

[Figure 2 around here]


## V results

The pay gap is decomposed into the difference in observed characteristics between men and women and the differences in the returns to characteristics by gender; the latter terms reflecting the unexplained part of the differential. A large share of the wage gap is usually left unexplained. We argue that gender differences in the educational choices, career choices and expectations, typically not included in the decomposition, may account for some of the unexplained components of the gender wage gap. These characteristics may themselves be the results of discrimination and socialisation, so we will not infer on gender discrimination.

Since, the population of interest is rather homogenous and at an early career point, variations in wages are limited and the raw gender gap in yearly gross wage is lower than in

nationally representative sample and stands at 12.4%. This gap can be decomposed between a component due to gender differences in the mean observed characteristics and two components reflecting the disadvantage of women and the advantage of men compared to an "average" individual in a non-discriminating world.

Table 4 summarises our findings for different specifications. The base model is estimated with a parsimonious specification including a quadratic in labour market experience, and dummies for graduating after the age of 24, being white and region of residence. This specification is similar to the one used in most studies decomposing the gender wage gap. Due to the homogeneity of the population, this base model explains only 10% of the wage gap suggesting that in the early months of graduates' careers, the endowment in these observed variables is similar and that variation in early wages are due to usually unobserved variables.

[Table 4 around here]

The second specification includes various measures of educational achievement such as A-level score, degree results, institution type and post-graduate achievements which broadly speaking are correlated with ability. These variables account for 60% of the explained wage gap and their inclusion double the proportion of the gender wage gap that can be explained by the differences in endowment to 20%. The additional inclusion of controls for subject of graduation (model 2') increases the explained gap to 48% of the raw gap but eliminates the explanatory powers of the educational variables. The wage gap for graduates does not originate from differences in educational attainment but from subject segregation, with women graduating from subjects with lower financial returns. Model 2 findings therefore stem from the differences in A-level achievements, probability of gaining first honours and institution type by subjects, rather than gender differences in these characteristics. Subject of graduations alone account for almost 90% of the explained wage gap, raising concerns on the

conclusions of empirical work where this variable is not included. The origins of subject segregation are unclear but can be found in socialisation, discrimination and character differences so that the explained component of the gender wage gap could be due to some type of discrimination. Politics to reduce the gender wage gap should therefore tackle these differences in human capital investment.

The base model is now enriched with characteristics of the work place (size, sector), type of contract and feminisation[8] of the occupation. These variables account for 90% of the explained wage gap, which rises to 56% of the raw gap. Typically, differences in firm type, contracts and feminisation by gender are large. It is unclear whether these differences stem from employer's discriminatory behaviour or from women's choices.

Specification 3' also adds dummies for occupational group. Whilst occupation can be considered an endogenous variable, its inclusion allows to control for glass ceiling and the concentration of women in jobs at the bottom of the socio-economic ladder. Since, the observed graduates have been in the labour market for 42 months, differences in promotions are likely to be reduced and the current positions occupied mostly reflects the point of entry. The inclusion of these variables has no (even negative) effect on the explained wage gap, suggesting that early on in their career, there is no gender difference in the occupational attainment of graduates[9].

Models 4 and 4' extend the base model by adding information on the character of the individuals, respectively, the character scores or the 20 individual character traits. Both models lead to similar conclusions with the full model having more explanatory power. The model including all character traits explains 64% of the raw gap and is therefore the model explaining the highest proportion of the gender wage gap. The 12 job-values account for 52%

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[8] This is constructed at the 2-digit occupational code level from the 1996 Labour Force Survey, quarter 3, for all employees aged 16-59. Backer and Fortin (1999) state that results on the effect of feminisation on the gender wage gap are sensitive to the level of aggregation of the feminisation variable. Two-digit level is the most detailed level of aggregation attainable with the graduate dataset.

[9] This result could also stem from the broad definition of social group used here (Kidd and Shannon, 1996).

of the explained gap and career expectations for another 39%. Thus, character traits and expectations differences between genders are an important determinant of the wage gap, which is usually overlooked in the literature. The origin of these differences are difficult to determine, but as stated by Corcoran and Courant (1985) "socialization may directly affect workers' skills and personality traits (p275)", thus policies reducing the gender wage gap could only be effective in the long-run after attitudes and expectations have been adjusted, which is consistent with the observations that after the rapid reduction of the wage gap when equal opportunity laws were introduced, progress has been much slower. One should nevertheless be concerned with the endogeneity of some of the expectations and job value characteristics since they are measured concomitantly to wages and could therefore be affected by reverse causality. For example, individuals with lower wages may justify them by claiming not to be ambitious. In this paper we only highlight the importance of character traits as determinants of the gender wage gap and cannot solve the endogeneity problems.

Model 5 and 5' include all the covariates of models 2, 3 and 4 and respectively 2', 3' and 4'. Model 5 explains 77% of the wage gap, mostly from the job specific characteristics. The education variables have a marginal effect on the explained component of the gap whilst job value and career expectations account for about 40% of the explained gap. The influence of these variables does not disappear in a model including job characteristics, hence these expectations are not perfectly correlated with current career prospect, and may not be as endogenous as first suspected.

The full model (5') explains 84% of the wage gap, with the advantage of men and disadvantage of women being almost equal at around 1% of the raw wage. Degree subject, job characteristics and job values each account for about a quarter of the explained gap. The explanatory power of job characteristics is halved compared to the previous model suggesting that subject of degree accounts for a large part of the differences in feminisation of job,

employer type and employer size. Socialisation affects the educational and occupational choices of young graduates as well as their job and career expectations, but these variables are not perfectly correlated and should all be included in a wage gap analysis. A substantial proportion of the pay gap can be explained by subject choice and job values which are determined prior entering the labour market. It is primordial to determine how these choices are made in order to introduce policies that would be efficient at reducing the gender wage gap.

[Table 5: around here]

In order to assess in more details the factors responsible for the wage gap, we now reports the wage estimates for our preferred specification (5') in Table 5. The base model variables are assessed first. Due to the young age of the population the experience profile is inverted for the first 18 months. Accounting for labour market experience, workers aged 26-29 earn 6% more than younger graduates. As expected graduates living in the tighter and more costly labour markets are paid a premium (not reported in Table) and there is no ethnic-specific discrimination. For these base-model variables no gender variation in the returns is found, but since men have 8% more work experience than women (Table 3), an equalisation of men and women's characteristics would have some effect on the gender wage gap (Delta is reported in Table 5, using (5)). The total effect of experience is marginal since both terms cancel each other out. The sum of the $\Delta$ for the base model is nil. Since, the base model accounts for less than 5% of the explained wage gap, it is not surprising that an equalisation in the endowment and returns to these variables for both genders would have no significant effect on closing the gender wage gap.

The type of institution attended has a substantial effect on returns for both genders, older institutions providing either more able graduates or a network effect. The premium to attending an older institution rather than a 60's university is larger for men. Since, there is no

gender differences in the type of institution attended, reducing the difference in returns has no effect on delta. Other signals of ability also provide important returns; a first class honour increases wages by 5 to 12% compare to other grades and the premium compared to an upper second honour is significantly larger for women. Since women are also more likely to obtain a 2/1, a levelling to the men's standard would penalise women. Since women tend to outperform men in education characteristics and gender variations in returns are limited, the education variables contribute little to the wage gap. An equalisation of the endowment would penalise women ($\Delta$=-0.003).

Arts graduates have the lowest returns to tertiary education; returns are 18% lower compared to female graduates in Maths or Medicine; the wage gap penalty for graduating from Arts rather than those subjects is even larger for men. Returns to subject tend to be gender specific. Since choice of degree is also gender specific, these variables contribute largely to the gender wage gap; Maths, Medicine and Engineering all have $\Delta$ above .005. All in all, these variables contribute to the male advantage ($\Delta$=0.008).

Women are more likely to work in small firms, possibly for convenience reasons, since as small firms are more evenly spread, the commuting to work is shorter. Another view is that women are constrained in their job search by the match realised by their partner. Alternatively, differences in confidence and ambitions may explain the gender differences in firm choice. It is well known that smaller firms pay lower wages, but the penalty is lower for women. Female graduates work in an occupation with 50% more female workers and the wage penalty associated with working in a female occupation is twice as large as for men; a reduction of these differences would substantially affect the gender wage gap ($\Delta = -0.013$). Women are as likely as men to get a permanent contract (80%) but men's returns to a permanent contract are 70% higher. In contradiction with other evidence concerning graduates' pay in the public sector, early on in their career, working in the public sector is

associated with a wage premium.  Since women are twice as likely to work in the public sector than men, sector of work contributes to the gender wage gap. Differences in the job characteristics and the returns to these characteristics by gender are important, and the $\Delta$ for these variables reaches (-0.004).

At the level of aggregation used, the distributions of occupations are rather similar for both genders, but the returns do vary; men are more penalised than women for not being in a managerial position.

As seen in Tables 2A and 2B, large variations in the expectations of men and women are observed.  These measures of motivation are also rewarded differently on the labour market.  Women who are motivated by financial rewards, status and international experience are rewarded while those favouring career development suffer from a pay penalty.  Men concern with ecological issue and doing a socially useful job, two female traits, are penalised, while these character traits had no significant effect on female wages.  This could reflect that men with non-traditional motivation are discriminated against.  Like women, men who are motivated by financial rewards or international experience are paid more, but the returns are somewhat larger for men.  An equalisation of the job values would have a substantial effect on the wage gap ($\Delta$=0.020).

Ambitious workers are paid 3.6% to 4% more than others. Furthermore, men with a traditional attitude regarding the family (expecting their partner to take a break in her career for family reasons) are also paid 3% more.  The data does not allow us to differentiate between a reward for being traditionalist and reverse causality, where richer men can support their family and expect their partner to have a traditional role.  These results on attitude towards family roles are in contradiction with Vella (1994) who reports that modern attitude affects women's wages positively and has no effect on male wages.  Differences in attitudes

towards family role are the main single determinants of the gender wage gap and the total effect of career expectation leads to $\Delta=0.028$.

Whilst job value and career expectations are the main contributors to the gender wage gap, it can be argued that these variables are endogenous. We argue that career break expectations, one of the main determinants of the wage gap are less likely to be biased by reverse causality than other values since fertility decisions are typically taken at an older age.; for this cohort, the average of mothers at the birth of their child was 28.5 in 1995.

**Conclusion**

Looking at a homogenous population of recent UK graduates a wage gap of 12% is found. The dataset is rich in covariates usually not available, which allows us to control not only for typical human capital variables but also for the subject of degree, occupation and character traits. These character traits include attitudes towards childrearing. We found significant gender differences in the subject of graduation, the sector of employment and feminisation of the job, but also conforming to the stereotypes, we found that women are more altruistic and men more selfish and career driven. The omission of these variables seriously underestimates the proportion of the gender wage gap that can be explained. Whilst some of these variables are likely to be endogenous, we believe that this is less of an issue for the childrearing expectations.

Conform to socialisation and self-selection models of the gender wage gap, women invest in a different type of human capital, are more likely to work in the public sector and female dominated occupations. These differences remain even when accounting for motivation and expectations. With this extended specification, 84% of the gender wage gap can be explained, so it would appear that discrimination is limited (at least for this population of recent graduates). However, the differences in subject and occupation choice or characters

may be due to some discrimination and social pressure. Despite the recent expansion and increasing feminisation of universities, the gender imbalance in subject choice has remained constant. Policies to reduce the gender wage gap would have therefore to be focused on pre-labour market decisions and the reduction of gender segregation in degree choices.

A large proportion of the wage gap originates from attitudes towards childrearing; 2/3rd of women agree that they expect to take career breaks for family reasons while only 12% of men do so.  Men also expect their partner to cater for childrearing responsibilities.  These attitudes are the most single important determinant of the gender wage gap. Since change in attitude may be slow, the gender wage gap is likely to persist.  Policies to eliminate the gender wage gap should reduce the disturbance of childrearing duties on women and improve family friendliness of firms as well as access to childcare services. Such policies would have a direct effect as well as a long-term effect on career expectations leading to a reduction in the gender differences in educational, occupational choices and character traits.

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**Table 1: Distribution of subject by gender.**

| Year | 1985/86 | | | 1990/91 | | | 1993/94 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Diff | Male | Female | Diff | Male | Female | Diff |
| Medicine and dentistry | 7.03 | 6.88 | 0.15 | 6.04 | 6.45 | 0.41 | 5.33 | 5.51 | 0.18 |
| Studies allied to medicine | 1.51 | 4.35 | 2.84 | 1.65 | 4.67 | 3.02 | 1.76 | 5.29 | 3.54 |
| Biological sciences | 6.04 | 9.80 | 3.76 | 6.20 | 10.02 | 3.82 | 6.45 | 10.70 | 4.25 |
| Veterinary science, agriculture and related studies | 1.95 | 1.90 | 0.05 | 1.43 | 1.51 | 0.08 | 1.13 | 1.41 | 0.29 |
| Physical sciences | 13.03 | 5.83 | 7.20 | 11.55 | 5.76 | 5.79 | 11.46 | 6.35 | 5.10 |
| Mathematical sciences | 8.19 | 4.33 | 3.86 | 9.35 | 3.92 | 5.43 | 9.28 | 3.61 | 5.66 |
| Engineering and technology | 18.64 | 2.25 | 16.38 | 17.93 | 3.07 | 14.86 | 16.99 | 3.34 | 13.65 |
| Architecture and related studies | 1.67 | 0.76 | 0.91 | 1.67 | 0.67 | 0.99 | 1.98 | 0.63 | 1.35 |
| Social sciences | 14.19 | 16.55 | 2.36 | 14.12 | 16.03 | 1.91 | 14.39 | 15.26 | 0.87 |
| Business and financial studies | 4.66 | 3.87 | 0.79 | 5.53 | 4.64 | 0.90 | 5.21 | 4.33 | 0.88 |
| Librarianship and information science | 0.05 | 0.34 | 0.28 | 0.11 | 0.27 | 0.16 | 0.22 | 0.43 | 0.21 |
| Languages and related studies | 5.64 | 18.92 | 13.28 | 5.41 | 16.43 | 11.03 | 6.18 | 16.94 | 10.76 |
| Humanities | 6.23 | 7.89 | 1.66 | 6.42 | 7.31 | 0.89 | 7.27 | 8.40 | 1.14 |
| Creative arts | 1.27 | 2.27 | 1.00 | 1.21 | 2.29 | 1.08 | 1.18 | 2.24 | 1.06 |
| Education | 0.57 | 2.62 | 2.05 | 0.76 | 3.18 | 2.41 | 0.69 | 3.10 | 2.41 |
| Multi-disciplinary studies | 9.31 | 11.44 | 2.13 | 10.62 | 13.79 | 3.17 | 10.48 | 12.42 | 1.94 |
| Total | 100 | 100 | | 100 | 100 | | 100 | 100 | |
| Duncan index | | | 29.36 | | | 27.97 | | | 26.649 |

Note: Source First Destination Survey

**Table 2A: As far as long-term values are concerned, how important are the following?**

| | Female | | | | | Male | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Very Important | Important | Not sure | Not important | Unimportant | Very Important | Important | Not sure | Not important | Unimportant |
| Career development | 43.0 | 48.4 | 5.7 | 2.4 | 0.5 | 51.8 | 41.9 | 4.4 | 1.7 | 0.3 |
| Personal development | 66.7 | 31.5 | 1.6 | 0.2 | 0.0 | 64.1 | 32.9 | 2.7 | 0.2 | 0.1 |
| Job satisfaction | 77.0 | 22.3 | 0.5 | 0.1 | 0.0 | 68.2 | 30.0 | 1.4 | 0.2 | 0.1 |
| Financial reward | 14.4 | 59.0 | 13.3 | 12.3 | 1.0 | 24.5 | 55.7 | 10.3 | 8.7 | 0.8 |
| Status and respect | 15.8 | 53.9 | 17.5 | 11.7 | 1.2 | 16.8 | 51.3 | 17.3 | 11.8 | 2.8 |
| Valued by employer | 55.7 | 41.1 | 2.9 | 0.4 | 0.0 | 43.5 | 49.8 | 4.7 | 1.5 | 0.5 |
| Socially useful job | 16.5 | 35.3 | 29.8 | 15.9 | 2.5 | 7.5 | 24.8 | 32.5 | 25.0 | 10.2 |
| International experience | 7.0 | 18.7 | 23.1 | 32.5 | 18.7 | 10.1 | 23.9 | 23.9 | 26.7 | 15.3 |
| Rewarding leisure | 22.5 | 35.0 | 18.4 | 16.5 | 7.7 | 20.7 | 35.9 | 18.9 | 16.8 | 7.7 |
| Involvement in local issues | 3.3 | 21.4 | 31.2 | 32.8 | 11.3 | 2.2 | 11.9 | 26.0 | 35.2 | 24.6 |
| Concern with ecology | 5.0 | 23.7 | 29.4 | 29.9 | 12.0 | 4.1 | 20.6 | 27.0 | 26.7 | 21.6 |
| Concern with current affairs | 5.5 | 34.5 | 28.9 | 22.6 | 8.4 | 8.1 | 35.8 | 24.6 | 20.0 | 11.4 |

Source: Graduate 1995, obs Women: 2967, Men: 2220

**Table 2B: How far do you agree/disagree with the following statements?**

| | Female | | | | | Male | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Agree strongly | Agree somewhat | Not sure | Disagree somewhat | Disagree strongly | Agree strongly | Agree somewhat | Not sure | Disagree somewhat | Disagree strongly |
| I am extremely ambitious | 16.8 | 53.7 | 10.3 | 16.6 | 2.6 | 27.9 | 50.0 | 9.1 | 11.1 | 1.9 |
| I do not expect to get main fulfilment from work | 11.7 | 40.2 | 14.1 | 28.2 | 5.7 | 13.9 | 39.9 | 16.6 | 24.0 | 5.7 |
| I live to work | 1.3 | 10.6 | 9.1 | 41.4 | 37.5 | 1.8 | 12.9 | 10.9 | 38.6 | 35.7 |
| I work to live | 24.7 | 49.8 | 9.5 | 12.2 | 3.7 | 24.7 | 49.0 | 10.4 | 11.9 | 4.1 |
| I expect to work continuously until retirement | 8.3 | 23.8 | 30.4 | 25.5 | 11.9 | 21.5 | 34.8 | 22.1 | 14.3 | 7.2 |
| I expect to take career breaks for family reasons | 29.1 | 37.2 | 24.7 | 6.0 | 3.0 | 2.0 | 10.0 | 41.2 | 30.8 | 16.1 |
| I expect my partner to take career breaks | 2.9 | 14.2 | 47.2 | 24.3 | 11.5 | 10.0 | 29.1 | 44.1 | 10.7 | 6.1 |
| I expect to change career several times | 8.5 | 26.6 | 30.7 | 22.6 | 11.6 | 10.8 | 30.2 | 29.6 | 20.1 | 9.4 |

Source: Graduate 1995, obs Women: 2967, Men: 2220

### Table 3: Summary statistics- Mean (standard deviation)

| | Women | Men | | All | | Women | Men | | All |
|---|---|---|---|---|---|---|---|---|---|
| Gross pay | 18477.93 (6112) | 21210.59 (7668) | * | 19647.49 (6953) | | | | | |
| **Education characteristics** | | | | | **Job chracteristics** | | | | |
| Alevel score | 9.12 (3.81) | 8.49 (4.38) | * | 8.85 (4.08) | Experience | 16.39 (13.09) | 18.2 (13.67) | * | 17.17 (13.37) |
| No A level | 0.11 | 0.17 | * | 0.13 | Size <10 | 0.05 | 0.04 | | 0.05 |
| First-class honours | 0.06 | 0.08 | | 0.07 | Size 10-24 | 0.11 | 0.06 | * | 0.09 |
| Upper second | 0.52 | 0.44 | * | 0.49 | Size 25-49 | 0.10 | 0.07 | * | 0.09 |
| Second honours | 0.34 | 0.36 | | 0.35 | Size 50-249 | 0.19 | 0.19 | | 0.19 |
| Other honours | 0.07 | 0.13 | * | 0.09 | Size 250-499 | 0.07 | 0.08 | | 0.07 |
| Arts | 0.15 | 0.08 | * | 0.12 | Size 500+ | 0.47 | 0.56 | * | 0.51 |
| Humanities | 0.10 | 0.06 | * | 0.08 | Manager | 0.23 | 0.24 | | 0.23 |
| Languages | 0.07 | 0.02 | * | 0.05 | Professional | 0.38 | 0.35 | * | 0.36 |
| Law | 0.04 | 0.04 | | 0.04 | Associate professional | 0.20 | 0.22 | * | 0.21 |
| Social science | 0.14 | 0.12 | * | 0.13 | Clerical | 0.14 | 0.09 | * | 0.12 |
| Math & computing | 0.04 | 0.10 | * | 0.07 | Other occupation | 0.06 | 0.10 | * | 0.07 |
| Natural science | 0.11 | 0.12 | | 0.11 | % female in occupation | 50.23 | 34.63 | * | 43.55 |
| Medicine | 0.08 | 0.04 | * | 0.06 | Permanent contract | 0.81 | 0.83 | * | 0.82 |
| Engineering | 0.02 | 0.21 | * | 0.10 | Public sector | 0.27 | 0.13 | * | 0.21 |
| Business | 0.10 | 0.12 | * | 0.11 | **Personal characteristics** | | | | |
| Education | 0.10 | 0.02 | * | 0.06 | Age 26-29 | 0.37 | 0.41 | * | 0.39 |
| Other vocational | 0.04 | 0.05 | | 0.05 | White | 0.95 | 0.92 | * | 0.93 |
| Interdisciplinary | 0.02 | 0.02 | | 0.02 | **Character traits** | | | | |
| Old university | 0.41 | 0.41 | | 0.41 | Job value | -0.16 | 0.22 | * | 0.00 |
| 60's university | 0.10 | 0.11 | | 0.11 | | (0.96) | (1.01) | | (1.00) |
| 90's university | 0.38 | 0.43 | * | 0.40 | Career expectation | -0.31 | 0.42 | * | 0.00 |
| College of HE | 0.12 | 0.04 | * | 0.08 | | (0.96) | (0.89) | | (1.00) |
| Post Grad certificate | 0.21 | 0.12 | * | 0.17 | Observation | 2967 | 2220 | | 5187 |
| Professional qualification | 0.15 | 0.15 | | 0.15 | | | | | |
| Master | 0.09 | 0.11 | | 0.10 | | | | | |
| Ph.D | 0.02 | 0.02 | | 0.02 | | | | | |

Source 1995 cohort- * denotes a statistically significant difference at the 95% confidence level.

**Table 4: Decomposition of wage gap**

| Model | 1 | 2 | 2' | 3 | 3' | 4 | 4' | 5 | 5' |
|---|---|---|---|---|---|---|---|---|---|
| Raw gap | | | | | 0.124 | | | | |
| Explained gap | 0.010 | 0.024 | 0.060 | 0.071 | 0.064 | 0.060 | 0.080 | 0.096 | 0.105 |
| | (0.003) | (0.004) | (0.006) | (0.005) | (0.006) | (0.005) | (0.007) | (0.007) | (0.007) |
| Disadvantage of women | 0.049 | 0.043 | 0.027 | 0.022 | 0.026 | 0.027 | 0.018 | 0.012 | 0.008 |
| | (0.004) | (0.005) | (0.005) | (0.004) | (0.004) | (0.004) | (0.003) | (0.003) | (0.002) |
| Advantage of men | 0.065 | 0.057 | 0.036 | 0.023 | 0.034 | 0.036 | 0.025 | 0.016 | 0.011 |
| | (0.005) | (0.004) | (0.004) | (0.005) | (0.005) | (0.005) | (0.004) | (0.004) | (0.003) |
| % explained by education variables | | 59.6 | 1.7 | | | | | | 1.0 |
| % explained by subject | | | 88.3 | | | | | | 23.2 |
| % explained by job characteristics | | | | 91.5 | 94.0 | | | 65.6 | 28.2 |
| % explained by occupation | | | | | -4.6 | | | | -1.2 |
| % explained by job value | | | | | | | 51.9 | 28.0 | 26.0 |
| % explained by career expectations | | | | | | | 38.9 | 10.6 | 18.2 |

Note: Neumark (1988) decomposition is used. Standard errors in parentheses
Model 1: Base model, experience, experience squared, age dummy 25-29, white, regional dummies
Model 2: Base + A-level score, type of institutions, degree grade, other qualification dummies
Model 2': As 2 + 13 subject of degree dummies
Model 3: Base + firm size, public sector, type of contract, feminisation
Model 3': As 3 + 8 dummies for occupation
Model 4: Base + indices of job value and career expectation
Model 4': Base + job value and career expectations dummies
Model 5: Model 2 + model 3 + model 4
Model 5': Model 2' +model 3' +model 4'

**Table 5: Wage functions and Differences in coefficients * differences in means**

| Variable | Women | Men | All | Delta |
|---|---|---|---|---|
| Experience | -0.005 (2.95) | -0.008 (3.71) | -0.006 (3.68) | -0.005 |
| Experience$^2$ | 0.000 (3.74) | 0.000 (4.64) | 0.000 (4.70) | 0.005 |
| Age 26-29 | 0.061 (5.99) | 0.064 (4.41) | 0.061 (7.68) | 0.000 |
| White | 0.035 (1.57) | 0.028 (1.41) | 0.028 (1.74) | 0.000 |
| A-level | 0.005 (1.77) | 0.009 (1.92) | 0.007 (2.25) | -0.003 |
| No A-level | 0.035 (0.90) | 0.065 (1.23) | 0.046 (1.25) | 0.002 |
| 60's university | -0.028 (1.27) | -0.043 (2.34) | -0.034 (2.16) | 0.000 |
| 90's university | -0.066 (3.62) | -0.073 (2.69) | -0.073 (4.05) | 0.000 |
| college of HE | -0.088 (4.78) | -0.095 (2.59) | -0.095 (6.21) | 0.001 |
| Degree class 2/1 | -0.082 (4.02) | -0.052 (2.77) | -0.067 (5.14) | -0.003 |
| Degree class 2/2 | -0.120 (6.24) | -0.121 (5.04) | -0.117 (8.71) | 0.000 |
| Degree class 3 | -0.095 (2.71) | -0.108 (4.25) | -0.097 (4.14) | 0.000 |
| Diploma | -0.024 (1.63) | -0.039 (1.87) | -0.027 (2.67) | 0.001 |
| Professional qual | 0.027 (1.51) | -0.024 (1.37) | 0.001 (0.06) | 0.000 |
| Masters | -0.062 (3.58) | -0.035 (1.71) | -0.050 (3.63) | 0.000 |
| Ph.D | -0.039 (1.01) | -0.052 (1.80) | -0.049 (2.25) | 0.000 |
| Humanities | 0.009 (0.59) | 0.069 (1.90) | 0.024 (1.67) | -0.002 |
| Languages | 0.084 (4.01) | 0.006 (0.13) | 0.073 (5.19) | 0.004 |
| Law | 0.061 | 0.140 | 0.098 | 0.000 |
| Social sciences | 0.047 (3.45) | 0.105 (3.43) | 0.064 (4.34) | -0.001 |
| Maths & computing | 0.180 (7.84) | 0.273 (7.20) | 0.232 (8.90) | 0.005 |
| Natural science | 0.020 (1.10) | 0.067 (2.49) | 0.040 (2.63) | 0.001 |
| Medicine & related | 0.196 (6.52) | 0.342 (5.02) | 0.232 (7.16) | -0.006 |
| Engineering | 0.139 (4.23) | 0.168 (5.95) | 0.148 (7.91) | 0.006 |
| Business studies | 0.133 (7.99) | 0.163 (5.19) | 0.145 (8.74) | 0.001 |
| Education | 0.059 (2.81) | 0.051 (0.76) | 0.068 (3.29) | 0.000 |
| Other vocational | 0.072 (2.40) | 0.094 (2.82) | 0.072 (3.36) | 0.000 |
| Interdisciplinary | 0.098 (2.96) | 0.082 (1.67) | 0.087 (3.03) | 0.000 |
| Firm size 10 - 24 | 0.053 (1.97) | 0.063 (1.31) | 0.056 (2.24) | -0.001 |
| Firm size 25 - 49 | 0.063 (2.57) | 0.020 (0.41) | 0.046 (2.02) | 0.002 |
| Firm size 50 - 249 | 0.063 (2.63) | 0.075 (1.84) | 0.060 (2.42) | 0.000 |
| Firm size 250 - 499 | 0.067 (2.20) | 0.123 (3.24) | 0.091 (3.52) | 0.001 |
| Firm size 500 or more | 0.129 (5.39) | 0.173 (4.44) | 0.147 (5.99) | 0.004 |
| % Female | -0.002 (5.71) | -0.001 (2.90) | -0.002 (7.05) | -0.013 |
| Permanent job | 0.091 (5.31) | 0.158 (7.19) | 0.114 (7.64) | 0.002 |
| Public sector | 0.078 (3.27) | 0.100 (3.34) | 0.090 (4.86) | 0.001 |
| Professional | 0.024 (1.01) | -0.024 (1.21) | -0.000 (0.01) | 0.001 |

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Associate | -0.017 (0.74) | -0.042 (2.51) | -0.033 (2.29) | -0.001 |
| Clerical | -0.066 (2.09) | -0.145 (3.91) | -0.095 (4.33) | 0.004 |
| other | -0.089 (3.00) | -0.142 (6.57) | -0.117 (6.38) | -0.002 |
| Career development | -0.028 (3.00) | 0.002 (0.13) | -0.017 (1.90) | 0.004 |
| Personal development | 0.008 (0.68) | 0.012 (0.80) | 0.008 (0.75) | 0.000 |
| Job satisfaction | 0.002 (0.13) | -0.004 (0.31) | -0.002 (0.20) | 0.001 |
| Financial reward | 0.041 (6.87) | 0.056 (6.12) | 0.048 (8.66) | 0.003 |
| Status and respect | 0.018 (2.97) | 0.002 (0.38) | 0.012 (2.85) | 0.001 |
| Valued by employer | 0.000 (0.00) | -0.002 (0.10) | 0.001 (0.07) | 0.000 |
| Socially useful job | -0.010 (1.55) | -0.021 (2.50) | -0.017 (3.40) | 0.006 |
| International experience | 0.010 (1.96) | 0.018 (2.43) | 0.014 (4.07) | 0.002 |
| Rewarding leisure | 0.004 (0.87) | 0.012 (1.70) | 0.006 (1.63) | 0.000 |
| Concern: local issues | -0.010 (1.49) | -0.007 (0.69) | -0.010 (2.02) | 0.000 |
| Concern: ecology | -0.008 (1.72) | -0.023 (2.65) | -0.017 (3.53) | 0.003 |
| Concern: c. affairs | 0.004 | 0.009 | 0.009 | 0.000 |
| Ambitious | 0.036 | 0.041 | 0.037 | 0.001 |
| Fulfilment from work | 0.005 | -0.009 | -0.001 | -0.001 |
| I live to work | 0.000 | 0.007 | 0.004 | 0.001 |
| I work to live | 0.002 | -0.001 | 0.002 | 0.000 |
| Work til retirement | -0.027 | -0.026 | -0.028 | 0.001 |
| Career breaks | -0.003 (0.58) | -0.009 (1.05) | -0.013 (2.97) | 0.008 |
| Partner take breaks | -0.006 (1.64) | 0.030 (3.79) | 0.016 (4.71) | 0.019 |
| Career change | 0.000 (0.10) | -0.008 (1.49) | -0.004 (0.99) | -0.001 |
| Constant | 9.686 (130.16) | 9.703 (87.15) | 9.701 (140.69) | |
| Observations | 2967 | 2220 | 5187 | |
| R-squared | 0.37 | 0.41 | 0.39 | |

Note: Also include dummies for region of residence. The base individual is aged less than 26, graduated in Arts from an old university with a 1st class honour degree, works as a manager in a firm of less than 10 employees. T-statistics are reported in parentheses. Standard error are corrected for clustering at the institution level.

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**Figure 1: Employment in Public Sector by Subject of degree and Gender**
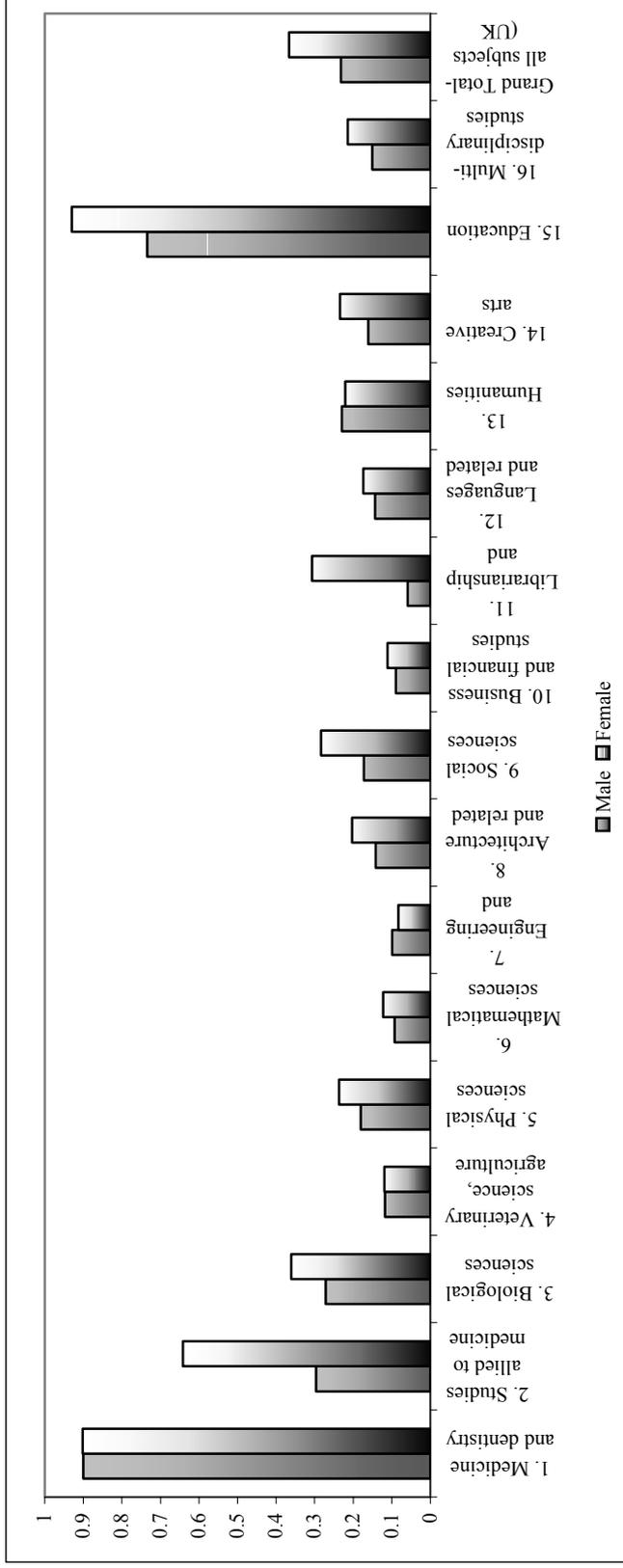


Source: First Destination Survey 1993/94

**Figure 2: Yearly wage distribution by gender- Cohort 1995**