Too many graduates? An application of the Gottschalk-Hansen model to young British graduates between 2001-2010

By Nigel O'Leary[a] and Peter Sloane[b]

a Department of Economics,Swansea University, Swansea SA1 8EN, NILS Flinders University, SERC, and WISERD; e-mail: n.c.oleary@swansea.ac.uk
b Swansea University, NILS Flinders University,and IZA Bonn

Abstract

A model of supply and demand is applied to UK data over the period 2001-2010 to define graduate jobs in terms of the proportion of graduates and/or the graduate earnings mark-up within occupations. Within such a framework it is found that there has been an upward shift in the likelihood of young British university graduates being employed in non-graduate jobs over the course of the past decade. Such a period has coincided with a continued (and rapid) expansion of the UK higher education sector and the findings presented here highlight the need for government policy in this area to be set in consideration of labour market needs.

JEL Codes: I20, J01, J30

1. Introduction

Within the empirical literature that deals with the employment of graduates in the UK, two distinct strands have developed that are inextricably linked. The first strand is the literature on over-education, which suggests that a substantial proportion of the working population is mismatched in the sense that individuals have higher qualifications than are necessary either to obtain or perform their current job. Stemming from what is popularly referred to as the over, required, under (ORU) model of Duncan and Hoffman (1981), it has been well-established that those whose educational attainment does not match with that required to perform their job suffer a wage disadvantage i.e. those in jobs for which they are over-qualified earn less than those who have the same education level but who are in jobs that require that level of education (see for example Mavromaras *et al*., 2010). As a labour market phenomenon, substantial incidence of mismatch has been identified by a raft of existing studies. For example, Felstead *et al*. (2007) estimated that for the whole working UK population the proportion over-educated rose from 30% in 1986 to 40% in 2006. The extent of over-education has tended on the whole to be higher at lower levels of qualifications, with degree level over-education rising from 20% in 1986 to 30% in 2006 according to their data. Further, there is evidence that much of the over-education is a long-run phenomenon (see Sloane *et al*., 1999 and Battu *et al*., 1999).

It should be cautioned, though, that interpretation of the concept of over-education is not straightforward. There is, for example, a distinction between *qualification* mismatch and *skill* mismatch which some authors have attempted to disentangle (see Allen and van der Velden, 2001 as a good example) , with a considerable part of the effect of educational mismatch being attributed to skill heterogeneity (Levels *et al*., 2014). Meanwhile, Chevalier (2003) adopted a measure of over-education which combines occupations and satisfaction with the job match. Hence, there are three categories of graduate according to this classification: those who are matched in a graduate occupation; those who are not in a graduate occupation but who are satisfied with the match (`apparently' over-educated); and those who are not in a graduate occupation and are dissatisfied with the match (`genuinely' over-educated). Further, Green and Zhu (2010) have distinguished between real over-qualification and formal over-qualification according to whether or not over-qualification is accompanied by under-utilisation of skills. They concluded that while formal over-qualification has increased over time, real over-qualification has been steady or rising only slowly. We avoid having to define over-education in the analysis that follows by using a model which does not require us to measure it.

The second strand of the literature that has emerged has been concerned with estimating the wage return to being a graduate. Invariably such returns have been estimated relative to those who were qualified to enter higher education (by obtaining the equivalent of two or more A-Levels within the UK education system) but who for one reason or another chose not to do so (see for instance O'Leary and Sloane, 2005). Studies such as those of Elias and Purcell (2004) and Walker and Zhu (2008) suggest that graduate earnings have remained high and the graduate pay premium remains high by international standards. More recent studies from Walker and Zhu (2011), which analysed returns in the UK up to 2009 and O'Leary and Sloane (2011), which provided estimates up to 2006, have also confirmed such findings. However, O'Leary and Sloane (2011) counsel that the returns for the most recent cohort in their study, those born after 1979 and graduating in the period after 2001, had moderated.

What inextricably links these two strands of the literature is a policy of higher education expansion in the UK that has been magnified over the past quarter century and has seen the supply of graduates rise rapidly. Indeed, Elias and Purcell (2003) reported that between 1990/91 and 2000/01 the number of male graduates increased by over a third and the number of female graduates almost doubled, and from Figure 1 we can clearly see that this trend has continued. Showing a time series from 1994/95 (the earliest year a consistent set of data are available) through 2001/02 to 2010/11 (the sample used in the empirical investigation that follows), the total number of enrolled undergraduate students in UK higher education institutions increased from 1.23 million, through 1.61 million in 2001/02, to 1.91 million. While the expansion in student numbers in the decade 2001/02 to 2010/11 has not been as great as the preceding decade, this still represents an increase of 187,615 undergraduates (or nearly 12% of the 2001/02 stock). Measured from 1994/95, this represents 571,852 more undergraduates, an increase of over 46%.

[insert Figure 1 here]

Against the backdrop of such a rapid increase in supply, we would expect, *ceteris paribus*, a downward influence to be exerted on the graduate pay premium. While an increase in the supply of graduates can be expected to reduce graduate wages if demand has not changed, skill-biased technological change (see Machin and Van Reenen,1998 *inter alia*) provides a ready explanation for an increase in the demand for graduate labour. Thus, technological change has progressed at such a rate that the increase in the supply of graduates has not managed to reduce graduate wages and so declines in the graduate pay premium have not been observed.

While the concept of over-education and skill mismatch is clearly a complex and multi-faceted issue, the theoretical framework developed by Gottschalk and Hansen (2003) provides an appealing way to combine these disparate strands of the literature and provides a measure of occupational assignment that does not need to distinguish between either education or skill mismatch and, therefore, neatly side-steps any measurement problem. The model is one of relative supply and demand with a change in one or the other impacting on wages in a framework which allows graduates to be employed in either graduate or non-graduate sectors and changes in the proportion of graduates over time in each sector will impact on graduate earnings. Specifically, their allocation mechanism classified occupations as graduate or non-graduate based upon the occupational wage premium offered, and this was allowed to vary temporally. Underpinned by heterogeneity in preferences, it is therefore possible for graduate workers to obtain a higher wage than they could in the graduate sector if they obtain a job at the top of the pay distribution in the non-graduate sector. Thus, equally productive workers can be found in both graduate and non-graduate jobs and optimal matching across occupations will result from utility-maximising behaviour. Within such a framework, Gottschalk and Hansen noted that there had been growing wage inequality in the US (as is also the case in the UK) and this was true for both college and non-college educated workers. Using US data from 1983 to 1996, they showed that the proportion of college-educated workers in non-college occupations declined over this period, a result which stands "in stark contrast to those in previous studies" (page 450). This result is consistent with the substantial increase in the college wage premium observed over the same period. In an analysis of the labour market in Portugal over a comparable period (1986-1999), Cardoso (2007) found remarkably similar results to those of Gottschalk and Hansen for the US. Both of these studies, though, use data which pre-date those used here.

In light of the substantial shifts that affected the graduate labour market, partly driven by policy and partly repositioning within a global context, this current work applies the framework of Gottschalk and Hansen to the UK and examines the early career outcomes of graduates whose career choices and labour market outcomes are likely to be most keenly affected by growth in graduate supply. This is done using the UK Labour Force Survey, a large scale micro dataset, over the years 2001 to 2010 (as determined by the most recently-available run of data that allows a consistent definition of occupational attachment). This has been a time which saw a substantial increase in graduate numbers, but it also coincided with a period where traditionally-held views of what constitutes a graduate job have changed and where the nature of jobs themselves is changing, whether that be driven by exogenous considerations or by the abilities of the workers now performing these tasks.

That is, one must consider the possibility that the proportion of graduates at the lower end of the ability distribution may have increased or the proportions selecting particular disciplines (e.g. STEM and non-STEM subjects) may have altered. The methodological framework adopted in what follows allows for such possibilities, where the relative forces of demand and supply play out on the wages that both graduate and non-graduate workers are able to receive. Given relative wage changes, which will be driven by compositional and demand-side movements, this will determine the proportion of graduates who work in non-graduate jobs.

2. Model

The Gottschalk and Hansen model examines supply and demand conditions for both graduate (subscript *g*) and non-graduate (subscript *ng*) workers. Considering first the demand side, assume firms belong to either the graduate (superscript *G*) or non-graduate (superscript *NG*) sector. Firms in each sector produce output (*Q*) using capital (*K*) and labour (*L*) inputs according to the following production functions:

$$Q^G = f^G(K^G, \beta_g^G L_g^G + \beta_{ng}^G L_{ng}^G) \quad [1]$$

$$Q^{NG} = f^{NG}(K^{NG}, \beta_g^{NG} L_g^{NG} + \beta_{ng}^{NG} L_{ng}^{NG}) \quad [2]$$

The number of graduate workers employed in each sector is described by L_g^S, where *S* denotes the sector, while L_{ng}^S is equal to the number of non-graduates employed in each sector. Both types of labour are assumed to be perfect substitutes,[1] although the efficiency of labour (β) is likely to vary, with graduates being more productive in the graduate sector. We then define the non-graduate sector by imposing the condition:

$$(\beta_g^{NG}/\beta_{ng}^{NG}) < (\beta_g^G/\beta_{ng}^G) \quad [3]$$

That is, we assume the productivity of graduates is more similar to that of non-graduates in the non-graduate sector than in the graduate sector. Assuming profit maximisation and denoting the sectoral wage on offer as W^S, this will imply that the first order conditions are such that $W_g^S = \beta_g^S f^{S\prime}$ and $W_{ng}^S = \beta_{ng}^S f^{S\prime}$ and so the graduate pay premium in either sector will therefore be related to the efficiency parameter β as follows:

[1] This assumption seems reasonable in the context of the over-education literature when workers can and do move between sectors.

$$(W_g^S/W_{ng}^S) = (\beta_g^S/\beta_{ng}^S) \quad [4]$$

Given the assumption given in equation [3] that the efficiency of graduates and non-graduates is more similar in the non-graduate sector, this implies that the graduate wage premium will also be smaller in the non-graduate sector than in the graduate sector. A non-graduate occupation can therefore be defined as one that offers a low graduate premium, which is true of those occupations in the non-graduate sector.

In terms of the supply side, workers are assumed to have heterogeneous preferences in their decision over which sector to work in and they will base this decision on the relative wage offered to them in each sector in addition to an exogenous parameter α. So, for example, the decision of graduates and non-graduates to choose employment in the graduate sector will be formulated by the following considerations:

$$lnL_g^G = \alpha_g + \gamma_g ln(W_g^G/W_g^{NG}) \quad [5]$$

$$lnL_{ng}^G = \alpha_{ng} + \gamma_{ng} ln(W_{ng}^G/W_{ng}^{NG}) \quad [6]$$

Thus, any rise in wages offered in the graduate sector will encourage non-graduate sector workers to relocate and vice versa. The equilibrium condition, therefore, depends on the sector specific wage premium offered to graduates and the relative wage between sectors. Consequently, it will be optimal for some graduates to choose employment in the non-graduate sector. Any change in wages across sectors will then influence the allocation of graduates between the two sectors. For instance, if there is a skill-biased technological change in the graduate sector then the efficiency parameter β_g^G will increase as graduates become more productive in the graduate sector . This in turn increases the premium paid to graduates in the graduate sector (see equation [4]), which encourages graduates in the non-graduate sector to move there and so reduces the proportion of graduates in non-graduate occupations. In contrast, an increased supply of graduates may cause graduate workers to move from the graduate sector to the non-graduate sector if relative wages decrease more quickly in the graduate sector than in the non-graduate sector. Under such a scenario, the observed graduate premium will also fall and will lead to more graduates being employed in non-graduate jobs. We proceed to examine if this is the case for graduates in Britain over the course of the previous decade.

3. Data and Methodology

The first stage of the analysis is to classify occupations as graduate or non-graduate, which requires the estimation of wage equations to determine whether there is a significant graduate wage premium. The second stage is to determine whether the probability of graduates being employed in graduate or non-graduate jobs is changing over time. To do this we use individual level data from the UK Labour Force Survey (LFS) between 2001 and 2010. Such a time period represents the most contemporary time period over which a consistent occupational classification, namely on the basis of SOC 2000 codings, is available.[2] The LFS is a nationally-representative household survey that is administered by the UK Office for National Statistics and has been conducted on a quarterly basis since 1992. Over the course of the survey respondents are interviewed on five separate occasions, commencing in the quarter they enter the survey and then once more in each of the subsequent four quarters. Following their fifth interview respondents are replaced by a new cohort. However, we ensure that we select respondents only once during their participation within the survey and we do this by selecting only those individuals who are in their first wave of interviews.

The sample consists of both men and women in full-time or part-time paid employment (the LFS does not collect earnings data for the self-employed) who are less than 35 years of age at time of interview[3] and whose highest educational qualification is at least two or more A-Levels. This level of educational attainment is typically the entrance requirement set by universities and so the sample will contain both university graduates and those with the qualifications necessary to have attended university but who either chose not to do so or who failed to get a place. To ensure sufficiently large sample sizes to enable a greater number of occupational classifications to be isolated, each year of the data is merged with the previous and succeeding year.

If there has been a movement away from the traditional route into university after studying A-Levels then the choice of those with two or more A-Levels as the reference group as has conventionally been used in the existing literature might be questionable. We can shed light on this issue with the figures from Table 1, which show the breakdown of the second highest educational qualification achieved by our degree-holding respondents over the pooled years 2001-2003 to 2008-2010. Given

[2] From 2011, the LFS classifies occupations as defined by SOC2014 codings. Immediately prior to 2001, SOC90 codings were used and while such coding frames are broadly comparable they cannot be combined to provide a wholly consistent set of occupational classifications.

[3] This age restriction is imposed to allow us to focus upon the early labour market experiences of graduates while at the same time retaining a sufficient number of observations to construct meaningful occupational classifications. With such a cut off at 35 years of age, 97.6% of graduates in the sample have 15 years or less potential labour market experience.

our use of the highest qualification to identify degree holders, taking their second highest qualification will describe the qualification held immediately prior to this if we assume linearity in qualification attainment. In most cases this would seem an entirely plausible standpoint. However, because the LFS does not provide the dates when qualifications were obtained it is not possible to identify a precise timeline of qualifications, but the figures in Table 1 will nevertheless provide an accurate indicator for the majority of degree holders. Having said that, we cannot distinguish between the qualifications of those who enter university for the first time and gain an undergraduate degree from those who already possess a degree and gain a subsequent postgraduate qualification: the underlying data from which Table 1 is constructed will report both as a degree-level qualification. Hence, approximately one in ten report their second highest qualification as a degree.

[insert Table 1 here]

Notwithstanding such caveats, for consistently well over two thirds of degree holders the second highest qualification that they possess, and by extension we can assume that this is what they had on entry into university, is A-Levels (or their equivalent). This has fallen from a high of 70.3% in 2001-2003 to 66.3% by 2008-2010, but such movements are marginal at best. Similarly, if we condition on those with two or more A-Levels the trend is virtually identical, being 62.2% in 2001-2003 and 60.5% in 2008-2010. Interestingly, and in contrast, there has also been an increase in those with only minimal qualifications (equivalent to GCSE level or below) on entry to university, with the proportion rising from 1.9% in 2001-2003 to 6.3% by 2008-2010. Despite the data not being able to perfectly identify qualifications at point of entry into university, we are nonetheless confident that our chosen reference group is appropriate. Even though there is evidence of an increasing proportion of students with modest educational attainment entering university, it is still the case that the majority have studied A-Levels beforehand (and gained two or more) and this proportion has changed little over the sample period.

We begin the analysis by classifying each occupation as either graduate or non-graduate. In aggregating occupations defined at the SOC 2000 4-digit level, those with at least 30 graduates and 30 non-graduates are classified as separate occupations, while those with less are merged with a related occupation.[4] In addition, occupations where 90% or more of employees are graduates are automatically classified as graduate occupations and are retained as unique 4-digit occupations,

[4] Gottschalk and Hansen (2003) used a minimum cell count of 50 to classify occupations but we chose 30 to increase the number of occupations classified. However, when the analysis is repeated with an increased minimum of 50 graduates and non-graduates in each occupation the underlying trend discussed in section 5 is unaltered.

while those with 10% or less are classified as non-graduate occupations and similarly retained at the 4-digit level. By merging LFS years over a three-year moving window it is possible to isolate 134 occupational categories subject to these criteria. A full list of the occupations used is presented in Appendix Table A1.

Using the occupational classifications described above, a wage equation is estimated for each year and each occupation:

$$LnY_{it} = \rho_0 + \rho_1 X_{it} + \rho_2 Degree_{it} + \rho_3 Higher_{it} + \varepsilon_{it} \quad [7]$$

where Y_{it} are the gross hourly earnings (in constant January 2011 prices) of individual *i* in year *t*, X is a vector of personal and job related characteristics that influence earnings, ε is a random error term and the terms in ρ are estimated regression coefficients. The two remaining controls, entered as dummy variables, denote educational attainment: the variable Degree takes the value of 1 if individual *i* has an undergraduate university degree, and 0 otherwise; the variable Higher takes the value of 1 if a degree holder has a higher degree (Masters or PhD), and 0 otherwise.[5] Within such an estimation framework, the estimated coefficient on ρ_2 will represent the premium that a (first) degree holder will enjoy over the excluded baseline of an individual with two or more A-Levels and this estimated premium is subsequently used to determine whether an occupation is classified as graduate or non-graduate: where there is an insignificant premium or a coefficient less than 0.1 is estimated (or where 90% or more of employees are non-graduates), then such occupations are non-graduate; graduate occupations are defined as those with a significant degree coefficient of 0.1 or above (or where 90% or more of employees are graduates). This method allows the classification of occupations to change over the sample time period.

4. Occupational Classification

Occupations are classified as either graduate or non-graduate by estimating a wage regression as described above separately for each occupation and each three-year window. While it is impractical to present all wage equation estimates by occupations and by year, Table 2 shows a pooled sample over all of these dimensions and the results presented here would accord with our *a priori*

[5] While the focus of the analysis is upon those with a university degree, this encompasses those with both undergraduate and postgraduate qualifications. Were we to retain those with undergraduate degrees only this would bias our degree premium estimates if we suppose (plausibly) that those who continue onto postgraduate study are not randomly selected. Therefore, we retain such graduates but include a dummy variable to denote the possession of postgraduate qualifications which are associated with higher earnings. In the sample, 22.5% of those who have a first degree also possess a postgraduate qualification.

expectations: hourly earnings increase with potential labour market experience (though at a decreasing rate), and working on a part-time basis, being non-white, or being of a marital status other than married are all associated with lower earnings, *ceteris paribus*; there are large regional variations in wages, with the highest wages being found in London and the South East and the lowest in Wales; and earnings increase with higher educational qualifications.[6] Relative to the comparator group of someone whose highest educational qualification is two or more A-Levels, young (first degree) graduates receive a substantial hourly earnings premium (an estimated coefficient of 0.321). There is also an additional benefit derived from possessing a higher degree (0.085) over and above the substantial premium already identified for undergraduate degrees.[7, 8]

[insert Table 2 here]

To provide some background detail on how degree returns have evolved over time, Figure 2 plots the trend in the estimated degree premium between 2001 and 2010. These are derived from an identical wage specification as used in Table 2 but estimated separately for each individual year. Over the ten year period the estimated degree premium declines marginally from 0.317 in 2001 to 0.303 in 2010, ranging from a high of 0.347 (in 2003) to a low of 0.276 (in 2008).[9] The magnitude of these estimates is in keeping with those of O'Leary and Sloane (2005), who also used LFS data for 1994 to 2003, and found a degree mark-up of around 20 per cent for men and 35 per cent for women. However, while such a recent trend confirms results for the UK by O'Leary and Sloane (2011), it is in contrast to the US findings of Gottschalk and Hansen (2003) and results for Portugal by Cardoso (2007), who found increasing graduate wage returns over time. However, both of these studies analysed periods well before the beginning of the time period for the data used here, during

[6] The estimated returns for individual occupations also exhibited the same general pattern and there were no instances where degree premiums were significantly negative. This might occur if graduates are effectively penalised in some occupations for having time out of the labour market.

[7] The sample is restricted to employed workers only and so potentially there is the possibility of selection effects affecting the estimated premiums. We investigated such a possibility by estimating selectivity adjusted wage equations via a conventional Heckman two-step procedure using family structure as an identifying variable within a participation equation. While the magnitude of the wage premia was affected marginally, the qualitative nature of the results and the trends identified did not change.

[8] Some information is provided within the LFS by a proxy respondent and for earnings data this could potentially be problematic. Due to sample size concerns we were reluctant to drop all such proxy respondents but we tested whether their inclusion influenced the results. While a dummy variable picking up proxy responses was significantly negative in the wage equations, the estimated degree premia were not significantly different and the qualitative conclusions drawn later about the likelihood of entering non-graduate employment were similarly unaffected. However, we recognise that this is not an ideal way to deal with the problem and as noted by a referee interacting the proxy dummy with the other measures of human capital might be a more attractive way to deal with proxy responses. As found previously, such an approach did not affect the qualitative nature of the results.

[9] A simple linear regression of these estimates shows a marginally negative trend over time, with a slope parameter of -0.004 being statistically significant at the 95% confidence level.

which times there were also increasing educational returns in the UK (see for example Gosling *et al*., 2000).

[insert Figure 2 here]

When each occupation is classified as graduate or non-graduate using the method outlined above, the distribution of occupations between the two designations by year is shown in Table 3. So, for example, in 2001-2003 59 occupations are classified as graduate occupations and 22 as non-graduate.[10] By 2008-2010, the number of graduate occupations has decreased to 53 and the number of non-graduate occupations has increased to 30.[11] Thus, 75.6% of graduates are in jobs classified as graduate occupations in 2008-2010 as compared to 84.6% in 2001-2003. This decrease in the number of graduate occupations is predominantly due to falling wage premia within occupations. Classified solely on this criterion, the proportion of graduates in graduate jobs falls from 44.2% to 36.3% and the proportion of graduates in non-graduate jobs increases from 14.7% to 21.3%. While there are fluctuations around the estimates for each of the years, the same general pattern is routinely exhibited: it is occupations changing classification due to changes in the estimated degree premium that are the driver behind changes in the incidence of graduate occupations and not the proportion of graduates within them.

[insert Table 3 here]

Finally, it should also be noted that the occupational degree premium and the average graduate wage are positively but not necessarily strongly correlated. As shown in the bottom row of Table 3, while there is variation in the coefficient of correlation across years, it is typically between 0.41-0.55. This reflects the fact that some occupations pay only a small graduate premium but offer relatively high wages to all workers, and vice versa.

[10] A crucial feature of the framework is that there is constancy in the occupational classifications, but it still allows for a different number of occupations due to the 10%/90% threshold criteria. Thus, occupations such as SOC 1152 (office managers in financial institutions) are classified as graduate occupations in all years (to ensure a consistent classification system) and this occupation is observed in each and every year. However, SOC 2215 (dental practitioners) is also deemed to be a graduate occupation but it does not appear in 2 out of the eight years presented in Table 3. Thus, while the number of combined occupational categories from which degree premiums are derived is constant, the number of 4-digit occupations that are classified depending upon the proportion of graduates in them are not. There is therefore no need for the total number of occupations to sum to 132 in any year (which in itself represents an absolute maximum) and there is similarly no need for the total number of occupational groups to be equal across years.

[11] Eight fewer occupations have an estimated degree premium less than 0.1 and an additional four see the degree premium rising to 0.1 or above. Of the occupations no longer deemed to be graduate in nature, SOC 114 (quality and customer care managers) and SOC 116 (managers in distribution, storage and retailing) are interesting examples but ones that are entirely consistent with the notion that it is not the descriptor of management that defines the nature of a job but rather the duties performed.

5. The Probability of Graduate Employment

Having classified occupations as graduate or non-graduate, the probability that graduates will be employed in non-graduate occupations over time is estimated by merging all years of the data. Restricting the sample to graduates only, equation [8] is estimated using a logit model such that:

$$N_i^* = \theta_0 + \theta_1 Time_i + \theta_2 Time^2_i + \theta_3 Male_i + \gamma_4 Nonwhite_i + \theta_5 Parttime_i + \theta_6 Unemp_i + \mu_i \quad [8]$$

$$N_i = \begin{cases} 1 \text{ if } N_i^* > 0 \\ 0 \text{ otherwise} \end{cases}$$

where N_i represents the realisation of a latent variable (N_i^*) capturing whether graduate *i* is employed in a non-graduate occupation and the quadratic in Time is a time trend (measured in years deviation from 2001) that captures changes in the probability of graduates being employed in non-graduate jobs over time. In addition, dummy variables to denote male graduates (Male), those from a non-white ethnic minority group (Nonwhite) and those employed on a part-time basis (Parttime) are also included. A measure of the unemployment rate (Unemp) is included to capture the influence of the macroeconomic environment and μ is a conventionally defined random error term.[12]

The marginal effects from the logit estimation are presented in Table 4 which contains a baseline specification (column 1) and a number of alternative specifications to provide robustness checks of the results. Starting with the baseline specification contained in column 1, the degree premium threshold for defining graduate occupations is taken at 0.1 which is deemed statistically significant at the 5% level.[13] While no significant difference is found in the likelihood of non-graduate employment along the lines of gender, those in part-time employment (0.023) and those from a non-white ethnic background (0.043) are more likely to be in a non-graduate job. Unemployment also exerts a positive influence (0.011), indicating that as unemployment rises young graduates are more likely to be found in non-graduate occupations, in line with prior expectations. Meanwhile, the marginal effect of the linear component of Time is significantly positive (0.122), indicating that the probability of a graduate being employed in a non-graduate occupation has increased, *ceteris paribus*, and the negative effect on the quadratic term of Time (-0.013) would imply that this increase has occurred at

[12] More specifically, the unemployment rate is entered as a gender-specific measure within the standard region of work. These unemployment rates are available from the Office for National Statistics and their inclusion is in contrast to both Gottschalk and Hansen (2003) and Cardoso (2007) who used only gender-adjusted unemployment rates. As an alternative, age-adjusted unemployment rates by gender were also incorporated but these did not qualitatively affect the nature of the results reported here.

[13] This is the same threshold level that has been adopted in all previous discussion up until this point.

a diminishing rate. So, with the 134 occupations defined and a premium threshold of 0.1 marking the distinction between graduate and non-graduate jobs, it is clear that there has been a movement towards greater graduate employment in non-graduate occupations over the 10 year period between 2001 and 2010.

[insert Table 4 here]

The remaining columns of Table 4 examine the sensitivity of these findings and in all instances the results are robust to specification and assumption changes. In columns 2 through 5 the threshold for denoting a graduate occupation is adjusted: in columns 2 and 3, the wage premium threshold is raised to 0.2 and 0.3 respectively (at the same 5% significance level); in columns 4 and 5, the significance level is changed to 10% and 1% respectively (using the 0.1 premium as in the baseline specification). For the first two of these (columns 2 and 3), all marginal effects are signed as previously but whereas the influence of gender was statistically insignificant it is now significant in both instances. In contrast, the marginal effect of unemployment fails to achieve significance when the graduate premium threshold is set at 0.2. Likewise, unemployment also has an insignificant effect when the significance level is raised to the 1% level (column 5) but tellingly across none of the columns does the sign and significance of the time trend change.

In column 6, the same baseline is used as in column 1 to address the issue of the grouping of occupations and whether the level of aggregation adopted influences the results. As such, a series of additional controls are entered into the logit equation where 4-digit SOC codings have been merged.[14] While the estimated marginal effects on the included aggregation controls are significant and positive, indicating that the combining of 4-digit occupational categories increases the likelihood of it being defined as a non-graduate occupation, the direction and influence of the time trend is unaffected, even if some of the other controls are affected. For instance, the effect of gender is now significantly negative, implying that male graduates are less likely to be in a non-graduate occupation. The implication of this would be that men are more likely to be in an occupation which is aggregated across 4-digit SOC codes.

Column 7 relaxes the assumption of a quadratic functional form on Time and includes a higher polynomial term. As before, the implications from the estimated marginal effects are unaltered. As an alternative, we also experimented with entering the time trend as a series of yearly dummy

[14] The aggregation dummies used in column 6 refer to 4-digit occupations grouped within the same 3-digit occupation, 4-digit occupations grouped across 3-digit occupations, and an aggregation below the 3-digit level. These are all measured relative to the case where no aggregation has taken place.

variables.[15] As with the two functional forms already presented in Table 4, this approach also identified a demonstrable increase in the probability of employment in non-graduate jobs over the course of the decade. However, this more flexible trend allows for the impact of the 2008 Financial Crisis to be isolated. From the beginning of the sample period, graduates were 29.0% more likely to be in a non-graduate job in 2007 but at the beginning of the crisis in 2008 this probability jumped to 36.6%. Subsequently, the calculated probability reverted back to levels seen in 2007 (at around 28%). While the underlying story does not change with the way in which the time trend is modelled, it is interesting to note that the Financial Crisis of 2007/08 did have an impact (albeit temporarily) upon graduate destinations.

Finally, column 8 investigates whether the results are sensitive to the exclusion of part-time workers (who are themselves more likely to be in non-graduate employment). While the results would suggest that the inclusion or exclusion of such workers has little effect upon the estimated marginal effects, the issue of part-time employment for graduates is clearly an interesting one, particularly over the period studied here. For some, part-time employment might well be a choice but for others it might be assumed to represent some form of under-employment and there is concerted evidence to show that the financial crisis and subsequent recession from late 2007 onwards saw an increase in the incidence of part-time graduate employment. Such a trend is clearly shown in Table 5 (row 1), where the percentage of graduates working part-time stayed relatively stable between 2001-2003 (at 9.6%) and 2006-2008 (at 9.9%). However, coinciding with the onset of the financial crisis and recession, part-time employment increased in 2007-2009 (12.3%) and through to 2008-2010 (13.6%). Even more striking, the proportion of such part-time workers identified as being in non-graduate jobs increased markedly (Table 5, row 2). While such figures are based upon modest sample sizes and need to be interpreted with a degree of caution, there is a noticeable step up in the proportion of part-time workers in non-graduate jobs from 2006-2008 onwards. While approximately one third of part-timers were in non-graduate jobs in 2005-2007, as indeed they were for most of the pre-recession period, 58.4% of them were in non-graduate jobs during the 2007-2009 period. Although slightly lower in 2008-2010 (at 51.7%), this is still nearly 20 percentage points higher than in 2005-2007. To put such figures into context, the comparable percentages for full-timers workers are shown in parenthesis. While these figures also describe an increasing proportion of non-graduate workers, the spike around the latter years of the sample is far less pronounced. Indeed, in the years between 2001-2003 and 2005-2007 the proportion of non-graduate jobs is comparable between full-time and part-time workers, but from 2006-2008 onwards it is

[15] These results are not presented but are available on request.

substantially lower for full-timers. It would be implausible to think that changing preferences were behind this shift in part-time employment, which leads to the conclusion that constrained choices have affected graduate employment opportunities during the most-recent recession and such opportunities have forced graduates into non-graduate jobs. However, while such trends are clearly dramatic, they do not drive the conclusion that there has been an increased likelihood of graduates being employed in non-graduate jobs. While there has been an increase in the proportion of graduates working part-time and an increase in part-timers who are employed in non-graduate jobs, part-time employment still only makes up a minor part of total graduate employment.[16]

[insert Table 5 here]

As for the question of what is behind this reduced likelihood of graduate employment, Table 6 shows that with a fixed classification of graduate occupations there would be very little change in the proportion of graduates in graduate jobs. These counterfactual figures have been constructed from the actual distribution of graduates across occupations in each year but on the assumption that the assignment of occupations to graduate and non-graduate status is held constant as defined in 2001-2003. While there is a slight dip in the proportion of graduates in graduate occupations around the recessionary years of 2006-2009, the decline is very modest and certainly less than the figures discussed previously in Table 3. Outside of this, the counterfactual proportion in 2008-2010 has fallen to just 83.1% from 84.6% at the beginning of the time period.[17] This figure is over 7 percentage points higher than the proportion when the occupational classification is allowed to vary over time. Thus, it is not a changing distribution of graduates across occupations that drives our central finding, but rather it is the fall in the graduate premium. Over the decade from 2001 there has been an ever increasing number of university qualified entrants to the labour market and the returns available to such qualifications have been moderated for young graduates over this period.

[insert Table 6 here]

Such conclusions raise important issues. There are obvious demand and supply issues at work and while our analysis is based upon a population of graduates there is undoubted heterogeneity in this stock. It may be that the quality of graduates has changed over the period in question, caused by both sorting into higher education and as a result of difficult labour market conditions. While it is not possible to address such issues directly with the data at hand, we can shed some light on them by looking at the composition of the graduate stock by subject of study and how this has changed over

[16] The results reported in Table 5 are also unaffected by changing the comparison group to those with any number of A-Levels. While some of the other control variables might change, the magnitudes and directions of the time trend are virtually identical.

[17] As a check, the counterfactual simulation has also been calculated with the graduate premium threshold raised to 0.3. The results are shown in the bottom row of Table 6. While the proportion of graduates in graduate jobs is naturally lower, the same flat trend between 2001-2010 is observed if the occupational classification is held constant.

time (see Table 7). The key drivers from this are Business & Financial Studies and Arts & Humanities, which are the two largest single subject groupings and have both seen sizeable increases in the proportion of graduates in non-graduate jobs. The proportion in the former has remained largely stable over the decade, but by the latter years over a half of all such degree holders are in non-graduate jobs. For those with degrees in Arts & Humanities, the proportion in non-graduate jobs is equally high, although it has been consistently higher over the entire period. However, this is a subject area that has seen the largest increase in student numbers and increasingly graduates with these degrees have been employed in non-graduate jobs. Interestingly, this is also the subject area identified as having the lowest lifetime financial returns by O'Leary and Sloane (2005). Sciences and Combined subjects are also notable as both have also experienced a substantial increase in graduates in non-graduate jobs. While Combined studies have become less popular, those in Sciences have increased, perhaps driven in part by recent Government focus upon STEM subjects.[18]

[insert Table 7 here]

6. Concluding Comments

The graduate wage premium remains, on average, high and it is still the case that some three-quarters of graduates will take up employment in graduate occupations where their skills and abilities are suitably used. However, this paper departs from earlier work in the UK by classifying occupations as graduate and non-graduate on the basis of the graduate earnings premium. Using recent data available from the LFS between 2001 and 2010 to define a consistent set of occupations, it has been shown that young university graduates in Britain have been more likely to find employment in occupations which are classified as non-graduate. Recognising that the framework adopted in this analysis is built upon the idea of utility maximisation, it should be remembered that such occupational choices do not necessarily represent disequilibrium outcomes. However, to the extent that the continued expansion of the UK higher education sector has seen a moderation of the wage premiums available to university graduates in recent years, it would appear that, on average, graduates are to a greater extent taking up jobs that do not realise any significant wage advantage in the labour market.

Crucially, the classification of occupations is allowed to vary over time and this has important implications for observed trends in employment in non-graduate jobs. With a fixed measure of what

[18] An alternative avenue to have pursued would have been to look at student quality and the type of institution attended (e.g. traditional versus new universities) but such data is not readily available in the LFS. However, information on degree classification is available part way through 2005 and we were able to test whether such an indicator of ability affected the likelihood of non-graduate employment. While higher degree outcomes were negatively associated with non-graduate jobs in 2005-2007, there were no significant effects in any other period.

graduate and non-graduate occupations are, there is no appreciable change in patterns of graduate employment over the sample period analysed here. However, recognising the nature of the job performed and the skill-set that graduates bring to the labour market allows for an introspective measure of the duties undertaken and a more accurate representation of whether skills are being utilised. Failure to do so paints an incomplete and misleading picture of the prospects facing some of the most recent graduates to leave university. Indeed, we note the increasing number of students who have gained degrees in Arts & Humanities subjects and the noticeably higher number of these who have ended up in non-graduate jobs. As highlighted in counterfactual estimations, such findings are not driven by changes in the distribution of graduates across occupations but rather that the occupations they are going into offer no wage advantage to them. The adoption of the flexible classification framework utilised here is crucial for identifying such structural changes in the graduate population. Such consideration will be ever more relevant if continued expansion of the higher education sector leads to increasing heterogeneity in the graduate stock.

As a closing caveat, we note that the trend identified in the previous analysis is only observed over the course of one decade and it may be that extending the time frame over a longer horizon allows an alternative conclusion to be drawn. As more data become available within the LFS this will be possible. The evidence presented here, coupled with the increasing phenomenon of over-education and the noted moderation in premiums for the most recent cohorts of graduates as identified in existing sources, is compelling though. There is certainly no evidence that the outcomes of young graduates in Britain have continued to improve in spite of the increasing supply of highly educated labour. However, this is not to say that graduates do not still receive substantial rewards for their skills.

It would be interesting to examine the dynamics of occupational choice of graduate workers but the panel data required for such an investigation are beyond the scope and capabilities of the current data source. This would provide an interesting and informative avenue for future research. Indeed, Stops (2014) has suggested that occupational mobility is a feature of the working population and the occupational assignment identified in our own work might be a temporary response to changing labour market conditions. However, de Grip *et al.* (2008) caution that there are implications for those who do not find a good job match and such scarring effects are not a temporary phenomenon. Such findings, coupled with our own, continue to have implications for the continued expansion and funding of higher education in the UK.

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Appendix Table A1
Aggregation of Occupations using SOC 2000 Codings

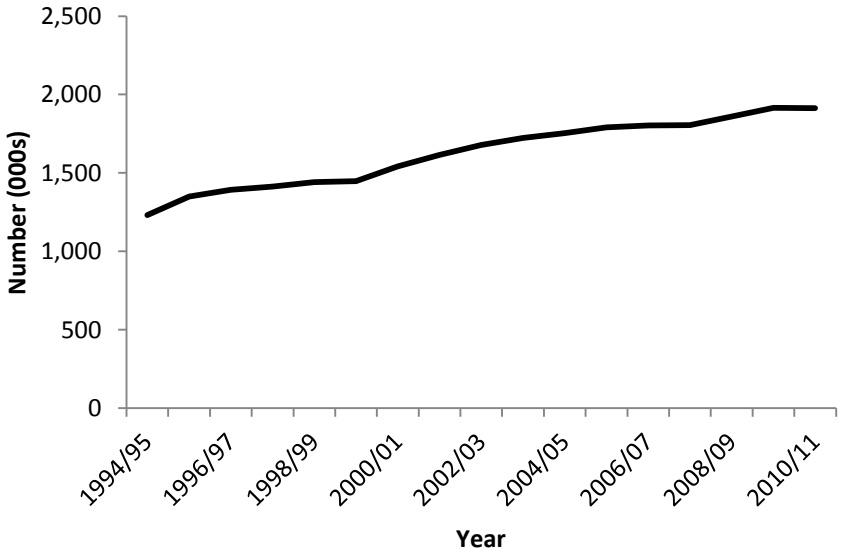
4-digit SOC	Occupation
111 (rem), 112	Corporate managers and senior officials; production managers
1114	Senior officials of special interest organisations
1131,1132	Financial managers and chartered secretaries; marketing and sales managers
1133,1134, 1135,1136, 1137	Purchasing managers; advertising and public relations managers; personnel, training and industrial relations managers; information and communication technology managers; research and development managers
114,1151	Quality and customer care managers; financial institution managers
1152	Office managers in financial institutions
116	Managers in distribution, storage and retailing
117,1181, 1184,1185, 123 (rem)	Protective service officers; hospital and health service managers; social services managers; residential and day care managers; managers and proprietors in other service industries
1182	Pharmacy managers
1211,1219, 122	Farm managers; managers in animal husbandry, forestry and fishing nec; managers and proprietors in hospitality and leisure services
1212	Natural environment and conservation managers
1233	Hairdressing and beauty salon managers and proprietors
2111,212	Chemists; engineering professionals
2112	Biological scientists and biochemists
2113	Physicists, geologists and meteorologists
213	Information and communication technology professionals
2212	Psychologists
2213	Pharmacists/pharmacologists
2214	Ophthalmic opticians
2215	Dental practitioners
2216	Veterinarians
2311	Higher education teaching professionals
2312	Further education teaching professionals
2313,2317, 2319, 244 (rem), 2451,323	Education officers, school inspectors; registrars and senior administrators of educational establishments; teaching professional nec; public service professionals; librarians; social welfare associate professionals
2314	Secondary education teaching professionals
2315	Primary and nursery education teaching professionals
2316	Special needs education teaching professionals
2321	Scientific researchers
2322,242	Social science researchers; business and statistical professionals
2329	Researchers nec
2411	Solicitors and lawyers, judges and coroners
2419	Legal professionals nec
2431	Architects
243 (rem), 312,3421	Architects, town planners, surveyors; draughtspersons and building inspectors; graphic designers
2443	Probation officers
2452	Archivists and curators

311	Science and engineering technicians
313	IT service delivery occupations
3212	Midwives
3214	Medical radiographers
3215	Chiropodists
321 (rem), 3229	Health associate professionals; therapists nec
3221	Physiotherapists
3222	Occupational therapists
3223	Speech and language therapists
3311	NCOs and other ranks in protective service occupations
331 (rem)	Protective service occupations
3412	Authors, writers
341 (rem), 3422,343, 344	Artistic and literary occupations; product, clothing and related designers; media associate professionals; sports and fitness occupations
3514	Train drivers
351 (rem), 3543,3544	Transport associate professionals; marketing associate professionals; estate agents, auctioneers
352, 3535, 3536,3537, 3539	Legal associate professionals; taxation experts; importers, exporters; financial and accounting technicians; business and related associate professionals nec;
3531,3532, 3533,3534	Estimators, valuers and assessors; brokers; insurance underwriters; finance and investment analysts/advisers
3541,3542	Buyers and purchasing officers; sales representatives
3551	Conservation and environmental protection officers
3561,3562	Public service associate professionals; personnel and industrial relations officers
3563,3564, 3566,3567, 3568,3552	Vocational and industrial trainers and instructors; careers advisers and vocational guidance specialists; statutory examiners; occupational hygienists and safety officers; countryside and park rangers
3565	Inspectors of factories, utilities and trading standards
4111,4112	Civil service executive officers; civil service administrative officers and assistants
4113,4114	Local government clerical officers and assistants; officers of non-governmental organisations
412	Administrative occupations in finance
4131	Filing and other records assistants/clerks
4132,4133, 4134	Pension and insurance clerks; stock control clerks; transport and distribution clerks
4135,4136, 4137	Library assistants/clerks; database assistants/clerks; market research interviewers
414,415	Administrative occupations in communications; general administrative occupations
5212	Moulders, core makers, die casters
5213	Sheet metal workers
5214	Metal plate workers, shipwrights, riveters
5215	Welding trades
5216	Pipe fitters
5221	Metal machining setters and setter-operators
5223	Metal working production and maintenance fitters
5231	Motor mechanics
5232	Vehicle body builders and repairers

5233	Auto electricians
5234	Vehicle spray painters
5241	Electricians, electrical fitters
5243	Lines repairers and cable jointers
5311	Steel erectors
5312	Bricklayers, masons
5313	Roofers, roof tillers and slaters
5314	Plumbers, heating and ventilating engineers
5315	Carpenters and joiners
5316	Glaziers, window fabricators and fitters
5321	Plasterers
5322	Floorers and wall tilers
5323	Painters and decorators
5411	Weavers and knitters
5413	Leather and related trades
5422	Printers
5431	Butchers, meat cutters
5434	Chefs, cooks
5494	Musical instrument makers and tuners
5 (rem)	Skilled trades occupations
6113	Dental nurses
611 (rem), 613	Healthcare and related personal services; animal care services
6121	Nursery nurses
612 (rem), 621,6232, 6291	Childcare and related personal services; leisure and travel service occupations; caretakers; undertakers and mortuary assistants
6221	Hairdressers, barbers
6222	Beauticians and related occupations
6231	Housekeepers and related occupations
6292	Pest control officers
711, 712 (rem)	Sales assistants and retail cashiers; sales related occupations
7124	Market and street traders and assistants
721	Customer service occupations
8112	Glass and ceramics process operatives
8116	Plastics process operatives
8117	Metal making and treating process operatives
8118	Electroplaters
8121	Paper and wood machine operatives
8123	Quarry workers and related operatives
8125	Metal working machine operatives
8126	Water and sewerage plant operatives
8132	Assemblers (vehicles and metal goods)
8134	Weighers, graders, sorters
8135	Tyre, exhaust and windscreen fitters
8136	Clothing cutters
8137	Sewing machinists
8141	Scaffolders, stagers, riggers
8211	Heavy goods vehicle drivers

8216	Rail transport operatives
8217	Seafarers (merchant navy); barge, lighter and boat operatives
8221	Crane drivers
8222	Fork-lift truck drivers
8223	Agricultural machinery drivers
8 (rem), 9 (rem)	Process plant and machine operatives; elementary occupations
9131	Labourers in foundries
9141	Stevedores, dockers and slingers
9232	Road sweepers
9239	Elementary cleaning occupations nec
9244	School mid-day assistants
9245	Car park attendants

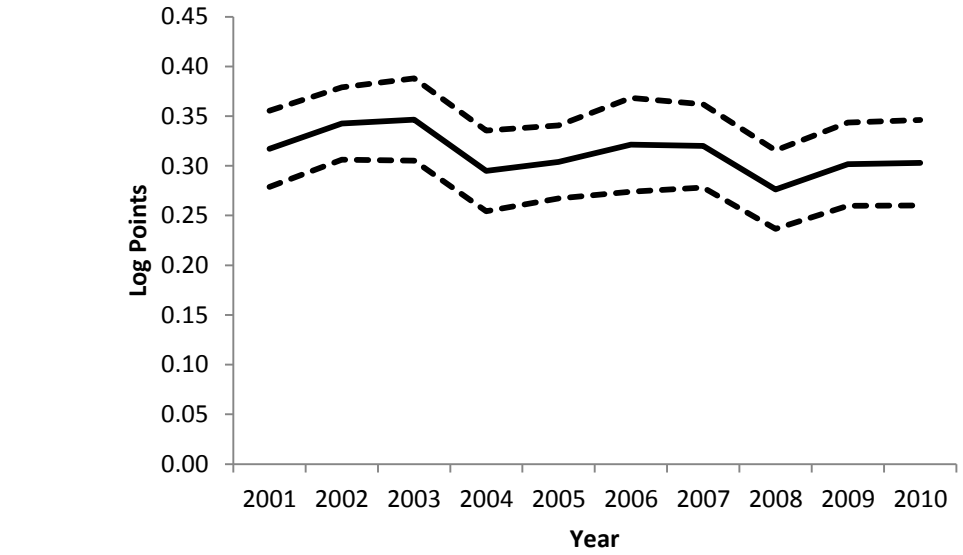
Figure 1



Source: Higher Educations Statistics Agency

Total Number of Undergraduate Students Enrolled in UK Higher Education Institutions, 1994/5 – 2010/11

Figure 2



point estimates
95% confidence intervals

Earnings Premiums and 95% Confidence Intervals for Graduates Relative to 2+ A-Levels by Year

Table 1
Percentage Breakdown of Second Highest Qualification held by Degree Holder
LFS 2001-2003 – 2008-2010

	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-20
Degree level qualification	8.7	9.6	10.5	10.7	11.1	1
HE qualification below degree	17.4	16.8	15.7	15.6	15.4	1
A-Levels	70.3	69.7	69.4	68.2	66.3	6
(2+ A-Levels)	(62.2)	(61.3)	(60.6)	(59.8)	(59.4)	(59
Other secondary	1.1	1.3	1.4	1.7	1.9	
Access or equivalent	0.0	0.1	0.2	0.5	0.6	
GCSE or below	1.9	1.9	2.1	2.9	4.3	
Other	0.6	0.6	0.6	0.5	0.5	

Table 2
Wage Equation Estimates: LFS 2001q1-2010q4

	Coef	t-stat
Potential experience	0.091	72.68
Potential experience squared	-0.003	-44.31
Non-white	-0.015	-1.82
Marital status: married	(E)	
Marital status: single	-0.092	-26.20
Marital status: widowed/divorced/separated	-0.062	-5.28
Part-time work	-0.191	-32.78
Male	0.099	30.15
Region: North	(E)	
Region: Yorkshire and Humberside	0.014	1.61
Region: East Midlands	0.035	3.80
Region: East Anglia	0.024	2.15
Region: London and South East	0.221	28.55
Region: South West	0.035	3.92
Region: West Midlands	0.029	3.23
Region: North West	0.026	3.07
Region: Wales	-0.012	-1.21
Region: Scotland	0.044	5.06
Qualification: 2+ A-levels	(E)	
Qualification: degree	0.321	64.22
Qualification: higher degree	0.112	20.59
Constant	1.734	176.17
R^2	0.379	
Observations	44,759	

Notes: dependent variable is the log of hourly earnings; (E) denotes an excluded reference category: 11 controls for year of interview are included but not presented; t-statistics reported are calculated with heteroscedastic robust standard errors.

Table 3
Classification of Graduate and Non-Graduate Occupations:
LFS 2001-2003 – 2008-2010

	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-200
No. of graduate occs	59	61	57	55	53	5
% of workers	84.6	89.3	82.4	81.2	77.4	71
No. of graduate occs (>90%)	34	33	33	33	33	3
% of workers	40.3	41.7	40.4	38.6	43.3	37
No. of graduate occs (>0.1*)	25	28	24	22	20	1
% of workers	44.2	48.1	42.1	42.6	34.2	34
No. of non-graduate occs	22	24	24	28	34	3
% of workers	15.5	10.2	17.6	18.8	22.6	28
No. of non-graduate occs (<10%)	11	16	13	14	18	2
% of workers	0.9	2.0	2.1	1.6	2.0	2
No. of non-graduate occs (<0.1*)	11	8	12	14	16	1
% of workers	14.7	8.2	15.5	17.2	20.5	26
Average earnings/ premium correlation	0.444	0.422	0.470	0.380	0.409	0.46

Table 4
Marginal Effects of Graduate being in a Non-Graduate Occupation: LFS 2001-2010

	column 1	column 2	column 3	column 4	column 5	column 6	
threshold	0.1	0.2	0.3	0.1	0.1	0.1	
significance	5%	5%	5%	10%	1%	5%	
time	0.122	0.118	0.099	0.120	0.157	0.086	
	(18.30)	(17.78)	(16.57)	(18.67)	(23.12)	(12.27)	
time2	-0.013	-0.014	-0.014	-0.014	-0.018	-0.007	
	(-14.39)	(-15.30)	(16.19)	(-15.51)	(-19.20)	(-7.72)	
time3	-	-	-	-	-	-	
male	0.011	0.045	0.080	-0.012	0.060	-0.029	
	(0.76)	(2.82)	(5.33)	(-0.85)	(3.76)	(-1.96)	
non-white	0.043	0.065	0.071	0.020	0.044	0.025	
	(2.44)	(3.56)	(4.29)	(1.23)	(2.41)	(1.42)	
parttime	0.023	0.123	0.055	0.009	0.034	0.028	
	(1.64)	(8.47)	(4.10)	(0.65)	(2.27)	(1.89)	
unemp	0.011	0.005	0.010	0.013	-0.002	0.004	
	(2.08)	(1.00)	(1.87)	(2.64)	(-0.28)	(0.84)	
aggregation controls	No	No	No	No	No	Yes	
observations	12,835	12,835	12,835	12,835	12,835	12,835	

Notes: all columns measure the robustness of results *ceteris paribus* in comparison to the baseline specification given in colum
threshold is adjusted; in column 6, aggregation controls are introduced to account for the grouping of occupations c
functional form of the time trend is changed; in column 8, part-time workers are excluded.

Table 5
Distribution of Part-Time Graduate Workers by Year:
LFS 2001-2003 – 2008-2010

	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008
% Part-time Workers	9.6	9.1	9.5	10.8	10.4	9.9
% Part-time (Full-time)Workers in Non-Graduate Jobs	23.3 (18.8)	25.9 (26.1)	34.3 (36.0)	28.2 (35.7)	34.7 (36.8)	47.0 (36.8)

Table 6
Counterfactual Estimation of Graduate Employment in Graduate Jobs: LFS 2001-2003 – 2008-2010

	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-200
Predicted probability	84.6	89.3	82.4	81.2	77.4	71
Constant occupation structure – 0.1	84.6	84.2	84.1	84.3	84.7	82
Constant occupation structure – 0.3	52.2	53.9	52.7	50.3	54.3	48

Table 7
Breakdown of Stock of Degree Subject by Year:
LFS 2001-2003 – 2008-2010

	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010
Medicine & Related	11.4 (11.5)	10.7 (11.9)	10.4 (14.1)	9.9 (13.4)	9.7 (51.2)	9.6 (49.4)	9.6 (15.1)	9.5 (9.7)
Sciences	10.3 (15.4)	11.2 (21.8)	11.9 (34.2)	12.6 (33.2)	12.8 (34.4)	13.0 (36.4)	13.3 (47.7)	13.4 (41.9)
Maths & Computing	5.5 (18.3)	5.1 (17.2)	5.5 (23.9)	5.5 (57.0)	5.9 (54.2)	6.1 (24.6)	6.2 (32.8)	6.3 (63.8)
Engineering & Technology	6.0 (9.5)	5.8 (16.9)	5.5 (27.2)	5.3 (35.3)	5.4 (37.0)	5.4 (23.8)	5.5 (68.2)	5.3 (32.9)
Architecture & Related Studies	2.1 (10.4)	2.1 (9.4)	2.1 (17.4)	2.1 (26.4)	1.9 (24.4)	1.9 (15.4)	2.0 (21.4)	2.2 (18.0)
Social Sciences	10.2 (28.5)	10.1 (31.7)	10.0 (35.6)	10.1 (36.3)	10.1 (33.5)	10.4 (42.1)	10.6 (38.9)	11.2 (39.1)
Business & Financial Studies	11.7 (24.0)	12.3 (31.0)	12.4 (51.8)	12.7 (35.6)	12.8 (37.1)	12.4 (42.8)	12.0 (48.3)	11.7 (51.6)
Arts & Humanities	13.4 (30.8)	14.2 (40.3)	15.3 (48.1)	16.4 (44.1)	17.2 (40.3)	17.6 (51.1)	17.2 (54.9)	17.5 (53.6)
Languages	1.0 (21.6)	1.1 (39.4)	1.1 (50.5)	1.3 (41.9)	1.2 (38.3)	1.1 (39.6)	1.1 (47.0)	1.1 (52.1)
Education	6.3 (9.8)	6.3 (11.4)	6.1 (11.1)	5.5 (9.0)	6.0 (11.5)	6.5 (13.9)	7.0 (13.2)	7.4 (13.8)
Combined	22.3 (19.8)	21.2 (27.9)	19.8 (38.8)	18.6 (37.6)	17.2 (41.0)	16.2 (43.3)	15.6 (44.7)	14.6 (43.3)

Notes: figures exclude unemployed degree holders; figures in parenthesis denote the percentage of graduates in non-graduate jobs.