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**The College Wage Premium, Overeducation, and
the Expansion of Higher Education in the UK^{*}**

Ian Walker

University of Warwick and the Institute for Fiscal Studies
and

Yu Zhu

University of Kent and Centre for the Economics of Education

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Abstract

This paper provides findings from the UK Labour Force Surveys from 1993 to 2003 on the financial private returns to a degree – the “college premium”. The data covers a decade when the university participation rate doubled – yet we find no significant

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Corresponding author: Professor Ian Walker, Dept. of Economics, University of Warwick, Coventry CV7 7AL. UK
Tel +44/0 2476 523054 Fax +44/0 2476 523032 Email i.walker@warwick.ac.uk

evidence that the *mean* return to a degree dropped in response to this large increase in the flow of graduates. However, we do find quite large falls in returns when we compare the cohorts that went to university before and after the recent rapid expansion of HE. The evidence is consistent with the notion that new graduates are a close substitute for recent graduates but poor substitutes for older graduates. There appears to have been a very recent increase in the number of graduates getting “non-graduate” jobs but, conditional on getting a graduate job the returns seem stable. Our results are consistent across almost all degree subjects – the exception being maths and engineering where we find that, especially for women, there is a large increase in the proportion with maths and engineering degrees getting graduate jobs and that, conditional on this, the return is rising.

1. Introduction

The proportion of graduates in the UK labour force has risen from 9% to more than 12% over the last decade. The proportion of cohorts of college age young adults who go to university (college in the US literature) had been stable at approximately 15% for males and 13% for females from the early 1970's to the late 1980's, but rose dramatically to become approximately 30% for males and 35% for females from the mid-1990's onwards. Many papers have noted a *growing* college wage premium but the role of the supply of college graduates in determining changes in the returns to a college education has been explored in only a few papers – mostly for US datasets. Two prominent examples are Katz and Murphy (1992) and Taber (2001). The former assumes a simple trend change in demand and show that variations in the college premium can mostly be explained by variations in the supply of college graduates, while the latter favours an explanation based on an increase in the demand for unobserved skills rather than one based on an increase in the demand for skills accumulated in college. Card and Lemieux (2001) is also notable: they investigate the college premium in the US, Canada and the UK and find that the rise in the premium between 1980 and 1995 is confined to rises for younger workers which they argue is driven by falls in the growth of educational attainment that began with cohorts born in the 1950's.

Existing research on the role of supply is problematic because it relies on the variation in age participation rates associated with changes in demographics, which are inevitably relatively smooth, together with assumptions about the demand side - usually it is assumed that there is some exogenous and fixed rate of skill-biased technical change which increases the relative demand for college graduates over time. In contrast to the USA, recent UK events offer a sharp and sudden change where participation in higher education more than doubled over a period of just five or six years between the late 1980's and early 1990's following the government's removal of quotas on student numbers and the corresponding reduction in the "unit of resource" (the payment from central government for teaching each student) that together encouraged institutions to expand student numbers as long as the marginal revenue provided by the unit of resource exceeded the costs of the marginal student. The suddenness and size of this supply side capacity change is likely to swamp any

changes in the demand side that occurred over this relatively short period and so our results are not likely to be sensitive to assumptions about demand.

The purpose of this paper is to analyse changes in the wage premium associated with a degree using the large UK Labour Force Surveys (LFS). We are interested in how the college premium has varied across time, across subjects studied, across the wage distribution (i.e. not just at the mean) and, in particular, across cohorts. Earlier research in the UK by Harkness and Machin (1999) and Gosling and Meghir (2000) suggests rising returns over time using data from the 1970's to the early 1990's¹. Chevalier *et al* (2004), Walker and Zhu (2003), O'Leary and Sloane (2004, 2005), and McIntosh (2004) use more recent LFS data from 1993 to 2002 and show broadly constant returns on average². It is tempting to conclude that the results are consistent with the growth in the supply of graduates only just keeping pace with the growth in demand. However, Walker and Zhu (2003) and O'Leary and Sloane (2005), noted that the data seemed to show lower returns for the most recent cohorts and it is this aspect that we explore in more detail in this paper with the latest available data.

Figure 1 gives the recent history of official age participation in the UK – the percentage of each cohort currently undertaking higher education³. The position was broadly stable over the 1970's and 1980's but increased quickly from about 15% for men and 12% for women in 1988 to 30% for men and women in 1994 (and subsequently even higher for females), until stabilising in 1996⁴. Almost all UK students who attend higher education do so soon after completing high school at the age of 18 or 19, and almost all study full-time for a three year first degree (Bachelor) course (health, and some other, courses are typically longer). Since the expansion in higher education (HE) began in 1988 this corresponds to the cohort born around 1969 and 1970, and the expansion was completed around 1994 corresponding to the 1975

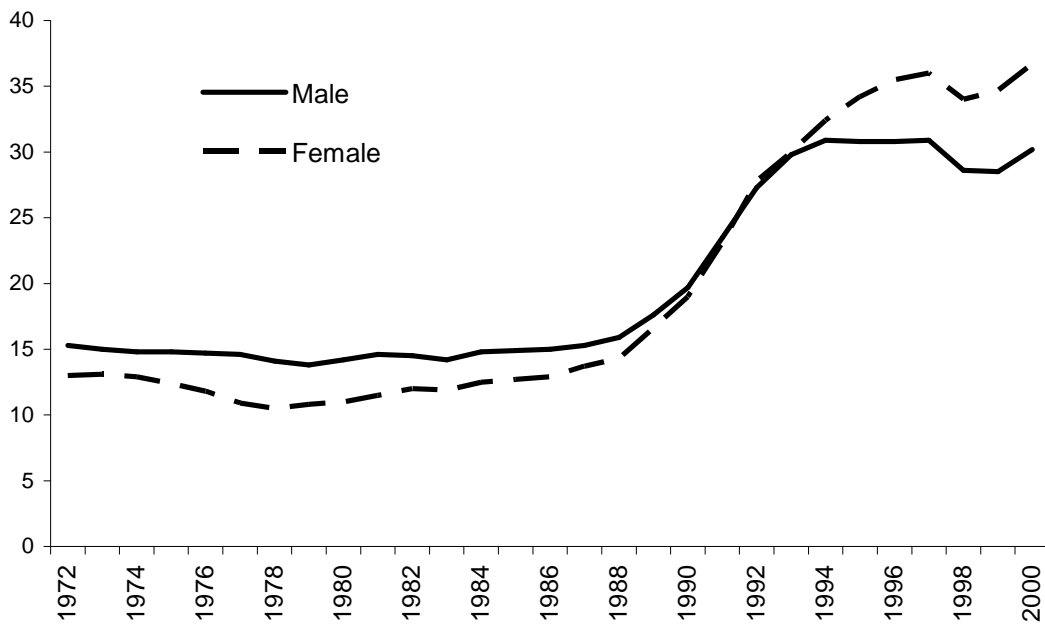
¹ See also Dearden *et al* (2000) who use a single LFS year.

² Sloane and O'Leary (2005) note that returns for women have fallen over time, although this distinction between men and women over this period is more likely to be due to decreases in the male-female wage differential amongst non-graduates than to any change in HE participation.

³ See Greenaway and Haynes (2003) for a review of higher education funding issues which focuses on the UK.

⁴ The proportion of the workforce who are graduates (the stock measure) has, of course, been rising strongly over the period since the mid 1970's because the proportion of retirees who are graduates is considerably less than the flow figure in our graph. See Elias and Purcell (2003) for stock data from the New Earnings Surveys.

Figure 1 Age Participation Index (API) 1972-2000



Source: www.dfes.gov.uk/economicbenefit/docs/Eco_Social%20Text.pdf.

or 1976 birth cohorts. An increasing proportion of graduates go on to take postgraduate courses.

The recent rapid (and the planned further) expansion has given rise to worries on a number of fronts. In particular: has the expansion in higher education so flooded the labour market with highly educated individuals that the wage premium for higher education has been significantly reduced? A related concern is that the expansion in post-compulsory education and, in particular, higher education may have resulted in institutions digging deeper into the distribution of student abilities so that weaker and weaker students are admitted into higher education and that the resulting graduates are, on average, not as productive as was the case for earlier cohorts. Another concern is that the marginal students, admitted after the expansion, were choosing to take (and, perhaps, being offered) less challenging courses that added less human capital than earlier cohorts had, on average. Finally, there is a concern that teaching quality fell along with the diminution of the unit of resource and that this may also be reflected in the average productivity of recent graduates..

Here, we compare the results from simple linear regressions over time, across subjects, across cohorts, and across conditional quantiles of the wage distribution. Our purpose in doing the latter is to examine the idea that the expansion may have resulted in lower returns at the bottom of the wage distribution where less able individuals

might be expected to be concentrated. One worry with our analysis is that there is a lack of common support in the data to make reliable comparisons using unweighted linear methods. That is, graduates may be so different, in their observable characteristics, to non-graduates that unweighted models provide unreliable estimates. Thus, we also provide estimates using propensity score matching methods. This method allows us, under certain assumptions, to compute estimates of the average treatment effect on the treated and on the untreated. This is useful in this context since we are interested in seeing whether the college premium was likely to have been high for the untreated prior to the expansion, as well as being interested in whether the college premium is low for the treated after the expansion. Finally, this paper attempts to explain some of our findings by appealing to the growth of “overeducation”: an increase in the proportion of graduates who work in “non-graduate” jobs. We are especially interested in how overeducation has changed across recent cohorts.

Section 2 explains the selection of our data and describes the characteristics of the sample used in our subsequent analysis. Section 3 describes the methods that we use. Section 4 presents results which are developed and interpreted as overeducation and in Section 5 we conclude.

2. Data

We use the large Labour Force Survey (LFS) data pooled from 1996 to 2003. We drop those living in Scotland and Northern Ireland (which has quite a different education system from England and Wales)⁵; those with zero or missing hours of work or earnings; immigrants (who will mostly have been educated outside the UK); and those aged below 25, who may still be in education, and above 59. Our analysis is all conditional on being employed - we have no reliable data for the earnings of the self-employed and we do not take into account the effect of education on employment (which might be construed as an additional component of the return to education). We compute an hourly wage rate⁶ from the ratio of usual earnings to usual hours (from

⁵ Although LFS does not explicitly record where education took place we also drop those recorded as having Scottish education qualifications.

⁶ We use wave 5 data throughout. From 1997Q1 earnings information became available in wave 1 also.

main job) including paid overtime⁷. We also drop people in the top and bottom 1% of the hourly wage distribution.

Our methodology factors out the variance in wages that arises from differences in age, region of residence, year, decade of birth, having a vocational qualification, having a work-limiting health problem, being non-white, being a union member and marital status⁸. Although we are mainly interested in the return to having a first (Bachelor) degree we include in our sample for analysis all individuals who also have higher academic qualification⁹, together with those that left school, usually at the age of 18, with at least the minimum qualifications required for consideration for admission to university - two A-level qualifications¹⁰. We have 17378 male graduates vs 4007 non-graduates and 14007 female graduates vs 3719 non-graduates who are observed in the LFS between 1996 and 2003, who we split across six cohort groups in two equal sized subsample periods. For the first half of our sample period, i.e. 1996-1999, we have the pre 1954 cohort who will have entered university up to about 1973; the 1955-58 cohort who will have attended university in the mid 1970's; the 1959-1962 who will have attended in the late 1970's; the 1963-66 cohort who will have attended in the early 1980's; the 1967-70 cohort that will have attended university immediately prior to the expansion in the late 1980's; and, finally, the 1971-1974 cohort who will have attended university as part of the expansion in the late 1980's and the early 1990's. We contrast these with the corresponding age balanced birth cohort groups in the subsample period 2000-2003 (i.e. observed four years later than individuals in the subsample period 1996-1999), who were born four years later (i.e. at the same age as their 1996-1999 subsample counterparts).

⁷ Similar results hold using the reported hourly wage in the data. However, only a small proportion of graduates report an hourly wage rate and we prefer the average hourly wage measure even though this is contaminated with measurement error in hours of work.

⁸ We do not consider here the possibility that education and wages might be simultaneously determined. The issue of endogeneity of education has been the concern of Blundell *et al* (2002) and of Harmon and Walker (1995) for the UK. See also the review in Card (2000).

⁹ We did not use LFS94-95, as it did not allow us to have consistent controls for different types of higher academic qualifications in our analysis. The proportion of graduates who also have a higher degree in the UK is significant – at 29% of both male and female graduates – and also shows a steady growth in our sample period, from 27% in 1996 to 31% for males and from 27% in 1996 to 30% for females. Failure to control for any higher qualifications is likely to cause an upward bias in the estimate of the return to first degrees (see Table A4 in the appendix). Excluding this group makes no effective difference to our conclusions (see Table A5 in the appendix).

¹⁰ A-levels, usually in three subjects, are normally taken at the end of a two year post-compulsory spell of schooling and grades in these qualifications are used as a criterion for university entry.

UK first degrees are typically quite specialised and our graduates can be divided into five broad degree individual subject groups plus a sixth group who obtained degrees where more than one subject is studied in depth: health and science; mathematics and engineering; economics, management and law; education and social studies; languages, arts and humanities, and a wide variety of combined degrees¹¹. Sample sizes and simple descriptive statistics for the data are given in Table 1. The proportions of A-level students successfully completing university¹² is broadly consistent with the API because the proportion staying on in post-compulsory schooling also rose steeply over this period. Table 2 shows that the subject mix of students appears to shift but only slightly and only over the last two cohorts: mostly towards education and social studies for women, and towards education and social studies and arts and humanities for men. These subjects probably have the lowest marginal costs and their expansion has been at the expense of maths and engineering where there has been a drop in the popularity at higher secondary schooling.

Table 1 Descriptive Statistics

	<i>Mean Hourly Wage</i>	<i>Std Err</i>	<i>Obs</i>	<i>Share (%)</i>
<i>MEN</i>				
2+ A Levels only	14.08	7.65	4007	18.7
<i>Graduates:</i>				
Health / Science	17.36	8.22	2858	13.4
Math / Engineering	17.67	7.68	3749	17.5
Econ/Business/Law	19.34	9.55	2919	13.7
Education/SocStuds	15.43	6.46	1911	8.9
Arts & Humanities	14.29	7.36	1665	7.8
Combined	16.80	8.15	4276	20.0
Total	16.55	8.19	21385	100.0
<i>WOMEN</i>				
2+ A Levels only	9.36	4.46	3719	21.0
<i>Graduates:</i>				
Health / Science	13.98	6.17	2007	11.3
Math / Engineering	14.49	6.19	557	3.3
Econ/Business/Law	14.75	6.59	1606	9.1
Education/SocStuds	13.47	4.95	3465	19.6
Arts & Humanities	12.68	5.82	2119	12.0
Combined	13.13	5.56	4233	23.9
Total	12.64	5.75	17726	100.0

¹¹ We drop nursing and architecture degrees because both are small and gender segregated.

¹² The drop-out rate (the proportion of entrants who fail to achieve a degree) has been quite low by international standards.

Table 2 Frequency tables by degree subjects and school cohort groups, pre and post (%).

	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
Health & Science	16.84	17.15	16.04	17.82	17.01	17.33	15.64	14.01	15.89	15.25	16.31	15.88
Math & Engineering	21.05	19.58	17.49	20.59	21.91	23.17	25.28	23.28	24.53	22.75	23.26	20.13
Econ/Business/Law	15.29	15.63	19.44	16.56	18.19	15.30	18.17	17.57	18.50	16.17	18.98	17.51
Education/SocStuds	13.26	14.11	12.39	11.37	8.54	9.11	7.27	8.47	8.56	9.50	9.36	9.00
Arts & Humanities	10.18	8.80	9.59	8.95	10.07	8.84	8.14	9.99	8.23	11.17	10.16	13.26
Combined	23.38	24.73	25.04	24.71	24.28	26.26	25.51	26.67	24.29	25.17	21.93	24.22
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	3302	3295	1178	1117	1182	1131	1266	1121	1227	1200	748	611
WOMEN												
Health & Science	12.54	13.19	12.15	14.92	14.24	15.75	15.40	14.66	15.60	14.21	16.29	16.99
Math & Engineering	3.61	3.45	3.70	2.73	4.31	4.08	4.79	5.08	4.84	4.68	4.55	4.83
Econ/Business/Law	6.52	7.10	9.26	9.91	11.00	13.85	14.74	14.96	15.97	13.88	15.53	15.75
Education/SocStuds	29.74	31.39	31.71	26.42	25.35	22.30	21.50	21.90	17.70	20.50	17.42	16.44
Arts & Humanities	17.45	14.33	14.47	14.69	15.32	13.85	16.15	13.10	15.05	15.50	14.90	15.33
Combined	30.14	30.54	28.70	31.32	29.77	30.17	27.42	30.30	30.84	31.23	31.31	30.66
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
N	1994	2351	864	878	927	1054	1065	1023	1096	1239	792	724

In Table 2 we further divide the data into those observed in the 1996-1999 LFS data and those observed in the 2000-2003 data. The reason for doing this is that we want to be able to compare the graduate premium for new graduates in the post expansion period with new graduates in the pre-expansion period. Grouping the data in this way means that we do not need to make parametric assumptions about the effect of tenure on wages – we can simply compare the cohorts with the same amount of time elapsed since graduation. The table shows the percentage of graduates in each subject by cohort and gender in the two sample periods. Bold figures highlight the large recent changes.

3. Econometric Analysis

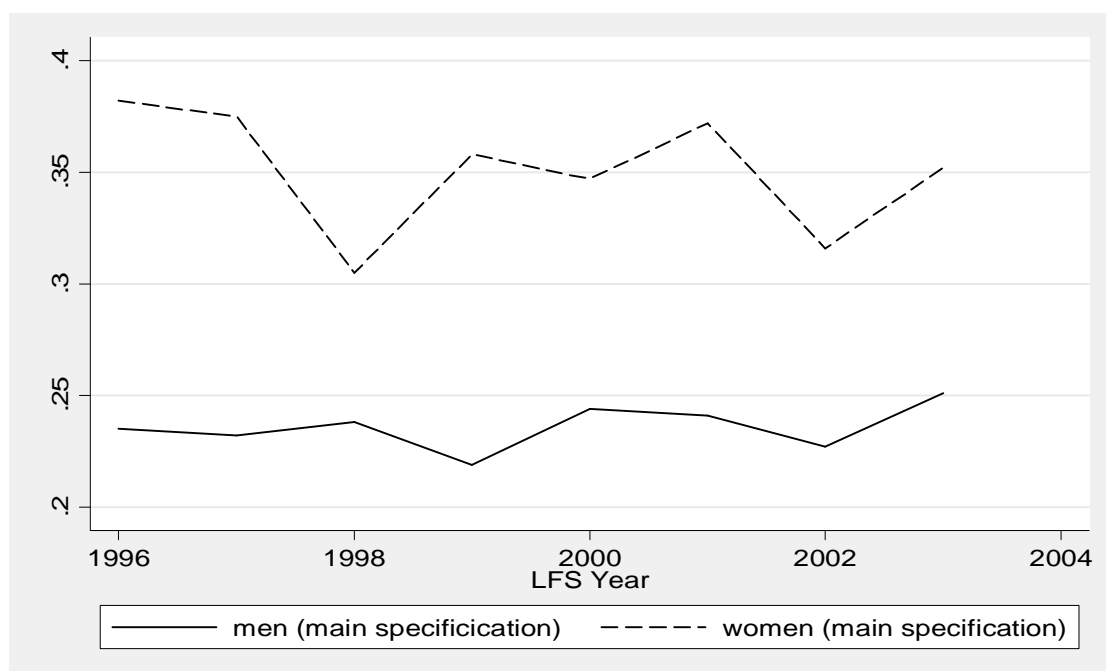
We begin by applying simple linear methods that control for observable characteristics. Figure 2, shows the estimated effect of a degree (on average across all degree subjects) on wages, in each year of the data, *making no allowance for differences in cohort* but controlling for the amount of work experience, region, marital status, ethnic group, and work limiting disability¹³. We confirm the usual results: that the effect of (typically a three-year) college education on wages is large – the college premium averages around 22% for men and 35% for women. The differences between men and women are highly significant and while there are statistically significant year to year differences they are small on average, and there is no statistically significant time trend for either men or women over this period¹⁴. These estimates correspond closely to our earlier research in Walker and Zhu (2003) and work elsewhere for the UK (see, for example, McIntosh (2004))¹⁵.

¹³ Detailed estimates and standard errors, for this and other figures, are in the Appendix. Appendix Table A6 suggests that the return to 2+ A-levels, taken at about age 18, relative to GCSE's, taken at about age 16, has remained quite stable.

¹⁴ Evidence in Gosling and Meghir (2000) show that, in earlier years, there had been a marked rise in education returns over time.

¹⁵ But O'Leary and Sloane (2004, 2005) suggest *falling* returns for women. They drop all graduates who have postgraduate qualification and have more parsimonious specifications. Although the postgraduates are a large and growing group Appendix Table A4 and A5 suggests that dropping them, or failing to control for their higher qualifications makes little difference to our main results.

Figure 2 OLS Estimates of College Premium by year: Men and Women



Note: Table A2 in the Appendix shows returns of having A-levels relative to having GCSEs by cohort.

Table 3 provides a breakdown by cohort and by year of survey by gender. It is clear that the simple analysis portrayed in Figure 2 masks important changes by cohort and gender. The returns have risen for older male graduates across these two periods, hardly changed for older women, and they have fallen dramatically for new women graduates relative to the younger women graduates from around the mid-30's% to the mid-20's% while for the very youngest male graduates relative there has been a large fall (from 21% to 15%). For males this drop is across all subjects, while for females, maths and engineering has been exempt from this fall (see Table A3 in the Appendix).

One concern about our least squares estimates is that they estimate the effect at the mean while policy might be more concerned about the returns at other parts of the distribution (as well as at the mean). In Table 4 we provide estimates of quantile regressions at the median and at the bottom and top 10th and 30th percentiles. The large fall in the average estimated college premium across cohorts noted above seems to have occurred at all percentiles of the distribution for men, but only for the lower deciles for women (where the expansion has been largest).

Table 3 Least Squares Estimates of Returns to First Degree by Time since Graduation

Percentile	Aged 41-59		Aged 37-45		Aged 33-41		Aged 29-37		Aged 25-33		Aged 25-29	
	(pre 54 cohorts in 96-99 or pre 58 in 00-03)		(55-58 cohorts in 96-99 or 59-62 in 00-03)		(59-62 cohorts in 96-99 or 63-66 in 00-03)		(63-66 cohorts in 96-99 or 67-70 in 00-03)		(67-70 cohorts in 96-99 or 71-74 in 00-03)		(71-74 cohorts in 96-99 or 75-78 in 00-03)	
Gender	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Men	0.21 (0.02)	0.27 (0.02)	0.28 (0.03)	0.27 (0.03)	0.24 (0.03)	0.25 (0.03)	0.23 (0.03)	0.21 (0.03)	0.25 (0.03)	0.21 (0.03)	0.21 (0.04)	0.15 (0.04)
Women	0.36 (0.02)	0.36 (0.02)	0.36 (0.04)	0.34 (0.04)	0.36 (0.03)	0.42 (0.03)	0.41 (0.03)	0.37 (0.03)	0.32 (0.03)	0.33 (0.03)	0.25 (0.03)	0.21 (0.03)

Note: Independent variables include first degree, doctorate, Master's degree, other higher degree, postgraduate certificate in education, vocational qualification, gap in schooling, schooling does not match qualifications, age, age squared, married, cohabs, nonwhite, union member, union missing, health problem, and year, quarter and region dummies. Table A3 in the appendix shows corresponding returns by subjects and cohort.

Table 4 *Quantile regression results*

Percentile	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
10%	0.22 (0.04)	0.31 (0.05)	0.35 (0.07)	0.34 (0.06)	0.33 (0.06)	0.31 (0.05)	0.29 (0.06)	0.24 (0.06)	0.27 (0.07)	0.23 (0.06)	0.22 (0.07)	0.13 (0.04)
30%	0.25 (0.03)	0.35 (0.03)	0.32 (0.04)	0.27 (0.04)	0.31 (0.03)	0.29 (0.05)	0.24 (0.03)	0.27 (0.04)	0.28 (0.02)	0.21 (0.04)	0.22 (0.07)	0.21 (0.06)
50%	0.22 (0.02)	0.27 (0.02)	0.25 (0.03)	0.26 (0.03)	0.20 (0.03)	0.23 (0.03)	0.28 (0.03)	0.24 (0.03)	0.30 (0.03)	0.22 (0.03)	0.26 (0.03)	0.14 (0.04)
70%	0.17 (0.02)	0.22 (0.02)	0.23 (0.03)	0.24 (0.04)	0.13 (0.04)	0.23 (0.04)	0.20 (0.04)	0.20 (0.04)	0.27 (0.03)	0.21 (0.05)	0.26 (0.03)	0.14 (0.04)
90%	0.15 (0.03)	0.20 (0.03)	0.19 (0.04)	0.23 (0.08)	0.08 (0.04)	0.18 (0.07)	0.15 (0.03)	0.19 (0.06)	0.25 (0.05)	0.24 (0.04)	0.21 (0.06)	0.14 (0.06)
WOMEN												
10%	0.23 (0.05)	0.33 (0.04)	0.29 (0.07)	0.24 (0.05)	0.32 (0.07)	0.36 (0.07)	0.47 (0.06)	0.36 (0.06)	0.31 (0.05)	0.41 (0.06)	0.29 (0.05)	0.23 (0.05)
30%	0.35 (0.03)	0.43 (0.03)	0.44 (0.04)	0.34 (0.04)	0.39 (0.04)	0.40 (0.04)	0.44 (0.03)	0.40 (0.04)	0.37 (0.03)	0.33 (0.03)	0.26 (0.04)	0.19 (0.03)
50%	0.44 (0.02)	0.44 (0.03)	0.43 (0.04)	0.42 (0.04)	0.41 (0.04)	0.44 (0.05)	0.37 (0.03)	0.43 (0.05)	0.36 (0.03)	0.34 (0.03)	0.24 (0.03)	0.22 (0.04)
70%	0.45 (0.02)	0.39 (0.03)	0.38 (0.04)	0.39 (0.03)	0.36 (0.04)	0.46 (0.03)	0.37 (0.04)	0.35 (0.04)	0.32 (0.04)	0.29 (0.03)	0.21 (0.03)	0.24 (0.05)
90%	0.36 (0.03)	0.37 (0.03)	0.29 (0.07)	0.39 (0.05)	0.27 (0.05)	0.35 (0.04)	0.34 (0.04)	0.30 (0.06)	0.28 (0.04)	0.27 (0.04)	0.17 (0.06)	0.20 (0.06)

Note: See Table 3 notes.

Table 5 *PSM: Kernel matching on the common support*

	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
MEN	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Unmatched	0.20 (0.02)	0.25 (0.02)	0.25 (0.03)	0.27 (0.03)	0.23 (0.03)	0.20 (0.03)	0.22 (0.03)	0.17 (0.03)	0.23 (0.03)	0.23 (0.03)	0.20 (0.04)	0.18 (0.04)
ATT	0.23 (0.03)	0.27 (0.03)	0.28 (0.04)	0.27 (0.04)	0.27 (0.04)	0.24 (0.04)	0.26 (0.43)	0.24 (0.04)	0.25 (0.03)	0.20 (0.04)	0.24 (0.05)	0.17 (0.05)
ATU	0.20 (0.02)	0.27 (0.02)	0.28 (0.03)	0.27 (0.04)	0.21 (0.03)	0.24 (0.03)	0.22 (0.03)	0.20 (0.03)	0.25 (0.03)	0.20 (0.03)	0.19 (0.04)	0.15 (0.05)
WOMEN												
Unmatched	0.46 (0.02)	0.43 (0.02)	0.43 (0.03)	0.39 (0.03)	0.40 (0.03)	0.41 (0.03)	0.41 (0.03)	0.36 (0.03)	0.30 (0.03)	0.35 (0.03)	0.26 (0.03)	0.26 (0.04)
ATT	0.39 (0.02)	0.37 (0.03)	0.39 (0.05)	0.35 (0.04)	0.33 (0.04)	0.42 (0.05)	0.39 (0.03)	0.33 (0.04)	0.34 (0.03)	0.36 (0.04)	0.26 (0.04)	0.22 (0.04)
ATU	0.36 (0.03)	0.34 (0.02)	0.35 (0.04)	0.34 (0.04)	0.37 (0.04)	0.42 (0.04)	0.41 (0.03)	0.38 (0.03)	0.31 (0.03)	0.32 (0.03)	0.25 (0.04)	0.23 (0.04)

Note: See Table 3 notes.

In Table 5, we investigate the issue further with Propensity Score Methods based on kernel matching¹⁶. Our aim here is to see if the college premium differs between treated and untreated individuals. We report unmatched estimates as well as the average effect of the treatment on the treated (ATT) group (graduates) and the average effect that the treatment would have on the non-graduates (ATU). The data seems to suggest that the ATU and ATT are close, except for the oldest cohort, which suggests that selectivity into college is not strongly moderated by ability. The fall in college premia across cohorts seems to be reflected in both the ATT and the ATU estimates. This seems to deny that there has been a reduction in teaching quality since that would be reflected in ATT and not ATU.

4. Overeducation

The previous literature has often referred to overeducation - a phenomenon whereby graduates get employed in jobs that do not require graduate skills.¹⁷ This literature has always struggled to provide convincing empirical evidence to support the existence of overeducation since it requires defining a graduate job or graduate skills in terms of observable variables and it is clear that “graduateness” is determined not simply by observables that some, but not all, graduates possess. Here, although we can not define graduateness either¹⁸, we can at least detect whether this problem has become much worse following the expansion of HE. Table 6 shows the proportion of graduates in managerial/professional jobs (i.e. SOC 1 and 2) by subject studied and cohort. Older graduates are more likely to be in graduate jobs. For women it seems that overeducation is more common at all ages than for men, and that it has become even more common post expansion (with the exception of maths and engineering graduates). However for men it seems that it is only the post expansion cohort, in certain subjects, that have found it more difficult to get graduate work.

Tables 7a and 7b investigates the wages of overeducated graduates compared to those who are not. Male graduates who failed to get a managerial/professional job

¹⁶ PSM estimation is implemented using the STATA module *psmatch2* developed by E. Leuven and B. Sianesi (2003).

¹⁷ See Groot and van den Brink (2000) for an excellent review which suggests that there has been no increase in overeducation. McGuinness and Doyle (2005) is a recent contribution that uses a single cohort of Northern Ireland resident students.

¹⁸ The official classification of occupations (SOC) use objective criteria to classify individuals.

in the first half of our sample (1996-1999) still enjoyed positive returns (with a mean 12% for the youngest cohort), although significantly less than their counterparts who managed to get a graduate job. Conditional on getting a graduate job, the decline in returns for younger cohorts of graduates is less evident and statistically insignificant. Male graduates who fail to get a managerial/professional job in the second half of our sample (2000-2003) did *much* worse than earlier cohorts (with a mean return of 0% for the youngest cohort), controlling for age and experience. However, conditional on getting a graduate job, there seems to be hardly any decline in returns (for younger cohorts of graduates) over our sample period.

Female graduates failing to get a managerial/professional job in the first half of our sample (1996-1999) also enjoyed positive returns (with a mean of 13% for the youngest cohort), comparing to 35% for their counterparts who managed to get a graduate job. Conditional on getting a graduate job, the decline in returns for younger cohorts of graduates is still evident and statistically significant (perhaps because female HE participation increased much faster for earlier cohorts). In contrast to men, female graduates failing to get a managerial/professional job in the second half of our sample (2000-2003) only experienced modest decreases in return (11% vs 13% for the youngest cohort), controlling for age and experience. Conditional on getting a graduate job, there is indeed a small *increase* in returns (for the two youngest cohorts of graduates) over our sample period. Overall, the evidence seems to suggest that the observed large decrease in returns to a degree (for the youngest cohorts) are driven by the fact that a growing proportion of graduates fail to get managerial/professional jobs and a widening gap between successful and unsuccessful graduates (at least for men). Conditional on getting a graduate job, the subject-specific returns (as well as the overall return) hardly change over our sample period, for both men and women.

Tables 8a and 8b show quantile regression results. There seems to be little change in returns across birth cohorts for both successful and less successful graduates at the median within the two subsample periods. Across subsample periods (before/after 2000), the drop in returns to a degree is most evident for all but the lowest quantiles for the less successful graduates, and also applies to the lowest quantile of the more successful graduates.

There also seems to be a recent decrease in returns across birth cohorts for successful female graduates at all but the highest quantile within the two subsample

Table 6 Proportion of Graduates Getting Managerial or Professional Jobs by Subjects and Cohort Groups

	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
Health & Science	85.4	81.6	79.9	80.4	75.6	75.5	71.7	79.6	68.7	66.1	59.8	61.9
Math & Engineering	83.7	84.3	83.5	86.5	80.3	85.1	79.4	77.0	71.1	76.2	64.9	69.9
Econ/Business/Law	82.2	82.9	87.8	80.0	77.7	77.5	76.1	73.1	69.6	66.5	61.3	44.9
Education/SocStuds	88.1	81.9	82.2	80.3	76.2	78.6	75.0	67.4	67.6	66.7	67.1	45.5
Arts & Humanities	82.1	70.7	69.9	64.0	58.8	53.0	58.3	58.9	49.5	47.8	40.8	35.8
Combined	79.9	76.7	73.9	76.8	70.7	73.1	70.3	73.6	60.1	57.6	58.5	60.1
Total	83.3	80.2	79.9	79.2	74.2	75.7	73.2	73.1	65.7	64.3	59.8	55.2
WOMEN												
Health & Science	66.8	54.5	62.9	64.9	61.4	59.0	58.5	60.0	66.1	58.0	49.6	41.5
Math & Engineering	75.0	74.1	62.5	66.7	77.5	69.8	70.6	76.9	69.8	63.8	58.3	74.3
Econ/Business/Law	69.2	66.5	70.0	67.8	71.6	65.8	67.5	66.7	73.1	61.6	56.9	37.7
Education/SocStuds	82.0	79.1	80.3	76.7	76.6	72.8	78.2	76.3	75.3	73.6	76.1	58.8
Arts & Humanities	73.9	64.7	67.2	60.5	59.2	50.0	59.3	56.7	57.6	50.5	44.9	42.3
Combined	71.2	64.8	68.1	57.5	62.3	58.8	61.6	68.4	64.2	57.6	53.6	46.8
Total	74.3	68.4	71.2	65.4	67.0	62.1	65.6	67.5	67.2	60.7	56.3	47.1

Notes: See Table 3 notes.

Table 7a Returns to degree by subject and cohort : Non-graduate jobs

	Aged 41-59		Aged 37-45		Aged 33-41		Aged 29-37		Aged 25-33		Aged 25-29	
	(pre 54 cohorts in 96-99 or pre 58 in 00-03)		(55-58 cohorts in 96-99 or 59-62 in 00-03)		(59-62 cohorts in 96-99 or 63-66 in 00-03)		(63-66 cohorts in 96-99 or 67-70 in 00-03)		(67-70 cohorts in 96-99 or 71-74 in 00-03)		(71-74 cohorts in 96-99 or 75-78 in 00-03)	
MEN	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Health & Science	-0.06 (0.07)	0.14 (0.07)	0.06 (0.11)	0.07 (0.10)	0.07 (0.08)	0.05 (0.09)	0.12 (0.07)	-0.19 (0.10)	0.05 (0.07)	0.04 (0.06)	0.10 (0.09)	-0.14 (0.09)
Math & Engineering	0.08 (0.06)	-0.02 (0.06)	0.19 (0.11)	0.17 (0.10)	0.25 (0.08)	0.05 (0.09)	0.16 (0.07)	0.15 (0.08)	0.23 (0.06)	0.11 (0.06)	0.30 (0.08)	0.10 (0.09)
Econ/Business/Law	-0.02 (0.07)	0.15 (0.07)	0.12 (0.12)	0.28 (0.10)	0.19 (0.09)	0.17 (0.10)	0.23 (0.08)	0.10 (0.08)	0.24 (0.07)	0.08 (0.06)	0.08 (0.08)	0.10 (0.07)
Education/SocStuds	-0.06 (0.09)	-0.07 (0.08)	0.09 (0.13)	0.06 (0.13)	0.15 (0.12)	0.09 (0.14)	0.16 (0.11)	0.01 (0.10)	-0.01 (0.09)	-0.05 (0.08)	0.13 (0.13)	-0.02 (0.10)
Arts & Humanities	-0.20 (0.08)	-0.16 (0.07)	-0.21 (0.11)	0.11 (0.10)	-0.13 (0.08)	0.08 (0.09)	-0.15 (0.08)	0.10 (0.08)	-0.17 (0.08)	-0.09 (0.06)	0.01 (0.09)	-0.04 (0.08)
Combined	-0.01 (0.05)	-0.03 (0.05)	0.10 (0.08)	0.08 (0.08)	0.25 (0.07)	0.04 (0.06)	0.16 (0.05)	0.14 (0.06)	0.12 (0.05)	0.06 (0.05)	0.10 (0.07)	0.04 (0.08)
Total	-0.04 (0.03)	-0.00 (0.03)	0.07 (0.05)	0.12 (0.05)	0.14 (0.04)	0.08 (0.04)	0.12 (0.04)	0.03 (0.04)	0.11 (0.04)	0.06 (0.03)	0.12 (0.04)	-0.00 (0.04)
WOMEN												
Health & Science	0.17 (0.06)	0.21 (0.05)	0.27 (0.10)	0.27 (0.08)	0.23 (0.08)	0.39 (0.07)	0.29 (0.07)	0.19 (0.07)	0.21 (0.07)	0.20 (0.06)	0.21 (0.06)	0.11 (0.06)
Math & Engineering	0.14 (0.12)	0.33 (0.12)	-0.08 (0.20)	-0.13 (0.21)	0.12 (0.17)	0.09 (0.16)	0.37 (0.14)	0.15 (0.15)	0.53 (0.12)	0.14 (0.12)	0.23 (0.12)	0.18 (0.15)
Econ/Business/Law	0.18 (0.08)	0.13 (0.08)	0.34 (0.14)	0.07 (0.12)	0.21 (0.11)	0.36 (0.09)	0.41 (0.09)	0.18 (0.08)	0.16 (0.07)	0.20 (0.07)	0.19 (0.06)	0.19 (0.06)
Education/SocStuds	0.13 (0.06)	0.11 (0.05)	0.09 (0.09)	0.16 (0.09)	-0.00 (0.09)	0.28 (0.08)	0.13 (0.08)	0.06 (0.09)	0.09 (0.09)	0.11 (0.07)	0.07 (0.08)	0.05 (0.06)
Arts & Humanities	0.08 (0.05)	0.00 (0.05)	-0.03 (0.09)	0.00 (0.08)	0.02 (0.08)	0.09 (0.07)	0.09 (0.07)	-0.03 (0.07)	-0.06 (0.06)	0.16 (0.06)	0.05 (0.06)	0.02 (0.06)
Combined	0.05 (0.04)	0.10 (0.04)	0.13 (0.07)	0.03 (0.06)	0.19 (0.06)	0.20 (0.06)	0.24 (0.06)	0.15 (0.06)	0.11 (0.05)	0.19 (0.05)	0.10 (0.05)	0.08 (0.05)
Total	0.11 (0.03)	0.11 (0.03)	0.10 (0.05)	0.07 (0.05)	0.14 (0.04)	0.22 (0.04)	0.24 (0.04)	0.12 (0.04)	0.11 (0.03)	0.18 (0.03)	0.13 (0.03)	0.11 (0.04)

Table 7b Returns to degrees by subject and cohort : Graduate jobs

	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
Health & Science	0.29 (0.03)	0.35 (0.04)	0.31 (0.07)	0.33 (0.06)	0.27 (0.05)	0.35 (0.06)	0.24 (0.05)	0.26 (0.06)	0.29 (0.05)	0.17 (0.05)	0.27 (0.08)	0.31 (0.08)
Math & Engineering	0.32 (0.03)	0.35 (0.03)	0.33 (0.05)	0.27 (0.05)	0.32 (0.05)	0.34 (0.04)	0.31 (0.04)	0.29 (0.04)	0.33 (0.04)	0.38 (0.04)	0.35 (0.06)	0.36 (0.06)
Econ/Business/Law	0.46 (0.04)	0.48 (0.04)	0.43 (0.05)	0.38 (0.06)	0.42 (0.06)	0.40 (0.06)	0.40 (0.05)	0.37 (0.05)	0.40 (0.05)	0.46 (0.05)	0.36 (0.06)	0.35 (0.07)
Education/SocStuds	0.20 (0.04)	0.28 (0.05)	0.25 (0.08)	0.31 (0.08)	0.24 (0.09)	0.15 (0.08)	0.20 (0.08)	0.11 (0.09)	0.23 (0.08)	0.07 (0.07)	0.25 (0.11)	0.23 (0.13)
Arts & Humanities	0.04 (0.04)	0.19 (0.06)	0.25 (0.08)	0.23 (0.09)	0.04 (0.07)	-0.00 (0.10)	0.20 (0.08)	0.11 (0.08)	0.22 (0.08)	0.03 (0.06)	0.18 (0.12)	0.10 (0.10)
Combined	0.28 (0.03)	0.35 (0.03)	0.29 (0.05)	0.37 (0.05)	0.28 (0.05)	0.05 (0.06)	0.23 (0.04)	0.31 (0.04)	0.34 (0.05)	0.28 (0.04)	0.27 (0.07)	0.24 (0.06)
Total	0.28 (0.02)	0.35 (0.02)	0.34 (0.03)	0.32 (0.03)	0.28 (0.03)	0.31 (0.03)	0.28 (0.03)	0.29 (0.03)	0.32 (0.03)	0.30 (0.03)	0.30 (0.04)	0.29 (0.04)
WOMEN												
Health & Science	0.56 (0.05)	0.56 (0.05)	0.56 (0.09)	0.58 (0.07)	0.47 (0.08)	0.55 (0.06)	0.52 (0.06)	0.49 (0.07)	0.45 (0.05)	0.46 (0.06)	0.28 (0.07)	0.32 (0.08)
Math & Engineering	0.47 (0.08)	0.63 (0.08)	0.48 (0.16)	0.62 (0.16)	0.49 (0.12)	0.68 (0.12)	0.50 (0.11)	0.55 (0.09)	0.47 (0.08)	0.61 (0.09)	0.41 (0.10)	0.44 (0.10)
Econ/Business/Law	0.61 (0.07)	0.61 (0.06)	0.75 (0.10)	0.70 (0.08)	0.75 (0.07)	0.73 (0.06)	0.69 (0.06)	0.61 (0.06)	0.59 (0.05)	0.51 (0.06)	0.50 (0.06)	0.49 (0.07)
Education/SocStuds	0.51 (0.03)	0.51 (0.03)	0.49 (0.05)	0.48 (0.05)	0.44 (0.05)	0.52 (0.06)	0.46 (0.05)	0.41 (0.06)	0.39 (0.05)	0.39 (0.05)	0.24 (0.05)	0.36 (0.07)
Arts & Humanities	0.45 (0.04)	0.46 (0.04)	0.43 (0.07)	0.43 (0.07)	0.38 (0.07)	0.42 (0.07)	0.44 (0.06)	0.37 (0.07)	0.26 (0.06)	0.34 (0.06)	0.30 (0.07)	0.30 (0.08)
Combined	0.46 (0.03)	0.51 (0.03)	0.50 (0.06)	0.50 (0.05)	0.42 (0.06)	0.53 (0.05)	0.50 (0.05)	0.47 (0.05)	0.40 (0.04)	0.46 (0.04)	0.34 (0.05)	0.31 (0.05)
Total	0.51 (0.02)	0.53 (0.02)	0.52 (0.04)	0.53 (0.03)	0.49 (0.03)	0.56 (0.03)	0.53 (0.03)	0.53 (0.03)	0.44 (0.03)	0.47 (0.03)	0.35 (0.03)	0.38 (0.04)

Table 8a *Quantile Regression, Non-Graduate Jobs*

Percentile	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
10%	-0.10 (0.06)	-0.02 (0.06)	0.22 (0.11)	0.08 (0.19)	0.20 (0.06)	0.07 (0.07)	0.05 (0.09)	-0.01 (0.06)	0.12 (0.08)	0.07 (0.06)	0.12 (0.15)	0.05 (0.10)
30%	-0.05 (0.05)	0.02 (0.05)	0.11 (0.05)	0.14 (0.08)	0.20 (0.04)	0.11 (0.05)	0.17 (0.05)	0.02 (0.05)	0.12 (0.05)	0.07 (0.07)	0.11 (0.06)	0.04 (0.05)
50%	-0.02 (0.04)	0.02 (0.04)	0.09 (0.07)	0.14 (0.05)	0.16 (0.04)	0.11 (0.03)	0.16 (0.06)	0.04 (0.06)	0.13 (0.03)	0.05 (0.05)	0.12 (0.06)	0.01 (0.21)
70%	-0.01 (0.03)	-0.03 (0.04)	0.07 (0.03)	0.19 (0.08)	0.10 (0.03)	0.05 (0.10)	0.11 (0.07)	0.04 (0.07)	0.15 (0.07)	0.07 (0.04)	0.14 (0.09)	-0.02 (0.26)
90%	-0.02 (0.04)	-0.03 (0.04)	-0.03 (0.14)	0.17 (0.08)	0.04 (0.13)	0.04 (0.09)	0.09 (0.07)	0.04 (0.16)	0.12 (0.09)	0.08 (0.07)	0.16 (0.07)	-0.00 (0.31)
WOMEN												
10%	0.02 (0.05)	0.08 (0.04)	0.07 (0.07)	-0.02 (0.08)	0.16 (0.08)	0.15 (0.10)	0.25 (0.08)	0.17 (0.07)	0.16 (0.07)	0.28 (0.07)	0.22 (0.16)	0.20 (0.07)
30%	0.08 (0.05)	0.10 (0.03)	0.08 (0.05)	0.04 (0.08)	0.18 (0.04)	0.19 (0.05)	0.21 (0.06)	0.20 (0.04)	0.15 (0.07)	0.20 (0.04)	0.16 (0.01)	0.10 (0.05)
50%	0.12 (0.05)	0.12 (0.04)	0.15 (0.08)	0.14 (0.05)	0.15 (0.03)	0.27 (0.04)	0.23 (0.03)	0.15 (0.04)	0.11 (0.06)	0.19 (0.04)	0.14 (0.03)	0.06 (0.05)
70%	0.18 (0.03)	0.16 (0.02)	0.11 (0.13)	0.10 (0.10)	0.15 (0.06)	0.28 (0.05)	0.21 (0.03)	0.11 (0.07)	0.08 (0.03)	0.11 (0.04)	0.10 (0.04)	0.10 (0.05)
90%	0.11 (0.07)	0.13 (0.06)	0.10 (0.19)	0.09 (0.06)	0.11 (0.06)	0.24 (0.06)	0.20 (0.06)	0.07 (0.09)	0.14 (0.07)	0.06 (0.06)	0.03 (0.05)	0.11 (0.07)

Note: See Table 3 notes.

Table 8b *Quantile Regression, Graduate Jobs*

Percentile	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
10%	0.41 (0.04)	0.55 (0.04)	0.52 (0.07)	0.50 (0.06)	0.37 (0.06)	0.39 (0.06)	0.40 (0.06)	0.40 (0.06)	0.42 (0.04)	0.32 (0.04)	0.42 (0.07)	0.34 (0.04)
30%	0.33 (0.02)	0.42 (0.02)	0.41 (0.03)	0.32 (0.03)	0.36 (0.03)	0.37 (0.06)	0.30 (0.03)	0.33 (0.04)	0.38 (0.03)	0.33 (0.04)	0.35 (0.04)	0.37 (0.04)
50%	0.26 (0.02)	0.32 (0.02)	0.32 (0.04)	0.29 (0.02)	0.27 (0.04)	0.30 (0.04)	0.35 (0.03)	0.32 (0.03)	0.36 (0.03)	0.28 (0.04)	0.33 (0.05)	0.30 (0.08)
70%	0.21 (0.03)	0.26 (0.04)	0.28 (0.05)	0.26 (0.04)	0.19 (0.04)	0.26 (0.04)	0.22 (0.03)	0.26 (0.04)	0.34 (0.04)	0.29 (0.04)	0.32 (0.03)	0.23 (0.07)
90%	0.17 (0.03)	0.21 (0.03)	0.24 (0.04)	0.26 (0.07)	0.09 (0.07)	0.25 (0.08)	0.17 (0.04)	0.26 (0.07)	0.23 (0.05)	0.27 (0.08)	0.21 (0.12)	0.19 (0.22)
WOMEN												
10%	0.46 (0.05)	0.59 (0.04)	0.58 (0.04)	0.52 (0.07)	0.56 (0.09)	0.66 (0.07)	0.71 (0.05)	0.64 (0.06)	0.55 (0.06)	0.63 (0.05)	0.48 (0.09)	0.36 (0.13)
30%	0.56 (0.03)	0.64 (0.02)	0.64 (0.04)	0.57 (0.04)	0.59 (0.05)	0.62 (0.04)	0.54 (0.02)	0.57 (0.05)	0.52 (0.04)	0.49 (0.03)	0.38 (0.04)	0.38 (0.04)
50%	0.56 (0.03)	0.57 (0.02)	0.56 (0.03)	0.52 (0.05)	0.53 (0.05)	0.58 (0.04)	0.47 (0.03)	0.52 (0.04)	0.44 (0.03)	0.46 (0.04)	0.32 (0.05)	0.37 (0.03)
70%	0.54 (0.02)	0.48 (0.03)	0.45 (0.06)	0.49 (0.05)	0.46 (0.04)	0.55 (0.04)	0.44 (0.03)	0.43 (0.04)	0.39 (0.04)	0.40 (0.03)	0.35 (0.05)	0.37 (0.04)
90%	0.41 (0.03)	0.43 (0.03)	0.32 (0.08)	0.49 (0.05)	0.36 (0.05)	0.41 (0.05)	0.40 (0.05)	0.38 (0.05)	0.34 (0.04)	0.39 (0.06)	0.28 (0.06)	0.41 (0.13)

Note: See Table 3 notes.

Table 9a Propensity Score Matching: Less Successful Graduates vs 2+ A Level holders

	Graduates Age 41-59 (pre 54 cohorts in 96-99 or pre 58 cohort in 00-03)		Graduates Age 37-45 (55-58 cohorts in 96-99 or 59-62 cohorts in 00-03)		Graduates Age 33-41 (59-62 cohorts in 96-99 or 63-66 cohorts in 00-03)		Graduates Age 29-37 (63-66 cohorts in 96-99 or 67-70 cohorts in 00-03)		Graduates Age 25-33 (67-70 cohorts in 96-99 or 71-74 cohorts in 00-03)		Graduates Age 25-29 (71-74 cohorts in 96-99 or 75-78 cohorts in 00-03)	
Men	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Unmatched	-0.09 (0.03)	-0.06 (0.03)	-0.00 (0.05)	0.05 (0.04)	0.08 (0.04)	0.00 (0.04)	0.08 (0.04)	-0.03 (0.04)	0.09 (0.03)	0.06 (0.03)	0.10 (0.04)	0.02 (0.04)
ATT	-0.01 (0.04)	0.01 (0.05)	0.07 (0.06)	0.12 (0.05)	0.16 (0.06)	0.05 (0.06)	0.12 (0.05)	0.06 (0.05)	0.10 (0.05)	0.03 (0.04)	0.13 (0.06)	0.02 (0.06)
ATU	-0.06 (0.03)	-0.01 (0.04)	0.09 (0.06)	0.09 (0.05)	0.11 (0.05)	0.11 (0.05)	0.13 (0.04)	0.01 (0.05)	0.12 (0.04)	0.06 (0.04)	0.15 (0.05)	0.03 (0.05)
Women												
Unmatched	0.14 (0.03)	0.14 (0.03)	0.16 (0.05)	0.11 (0.04)	0.17 (0.04)	0.20 (0.04)	0.22 (0.04)	0.15 (0.04)	0.11 (0.03)	0.19 (0.03)	0.15 (0.03)	0.15 (0.04)
ATT	0.10 (0.03)	0.12 (0.03)	0.11 (0.06)	0.09 (0.05)	0.13 (0.05)	0.24 (0.05)	0.22 (0.04)	0.13 (0.06)	0.14 (0.05)	0.21 (0.04)	0.15 (0.05)	0.10 (0.04)
ATU	0.10 (0.04)	0.10 (0.03)	0.08 (0.07)	0.04 (0.05)	0.13 (0.04)	0.22 (0.05)	0.24 (0.05)	0.15 (0.05)	0.06 (0.05)	0.15 (0.04)	0.10 (0.04)	0.12 (0.05)

Table 9b Propensity Score Matching: Successful Graduates 2+ A Level holders

	Age 41-59 (pre 54 cohorts in 96-99 or pre 58 cohort in 00-03)		Age 37-45 (55-58 cohorts in 96-99 or 59-62 cohorts in 00-03)		Age 33-41 (59-62 cohorts in 96-99 or 63-66 cohorts in 00-03)		Age 29-37 (63-66 cohorts in 96-99 or 67-70 cohorts in 00-03)		Age 25-33 (67-70 cohorts in 96-99 or 71-74 cohorts in 00-03)		Age 25-29 (71-74 cohorts in 96-99 or 75-78 cohorts in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Men												
Unmatched	0.26 (0.02)	0.33 (0.02)	0.31 (0.03)	0.32 (0.03)	0.28 (0.03)	0.26 (0.03)	0.27 (0.03)	0.24 (0.03)	0.30 (0.03)	0.32 (0.03)	0.27 (0.04)	0.30 (0.04)
ATT	0.29 (0.03)	0.35 (0.02)	0.34 (0.04)	0.31 (0.03)	0.31 (0.05)	0.30 (0.04)	0.31 (0.03)	0.30 (0.04)	0.33 (0.04)	0.28 (0.04)	0.31 (0.06)	0.31 (0.05)
ATU	0.27 (0.03)	0.34 (0.02)	0.34 (0.04)	0.32 (0.04)	0.26 (0.04)	0.30 (0.04)	0.26 (0.03)	0.27 (0.04)	0.32 (0.02)	0.30 (0.03)	0.25 (0.05)	0.29 (0.05)
Women												
Unmatched	0.57 (0.02)	0.57 (0.02)	0.54 (0.03)	0.54 (0.03)	0.51 (0.03)	0.54 (0.03)	0.51 (0.03)	0.46 (0.03)	0.40 (0.03)	0.46 (0.03)	0.35 (0.03)	0.39 (0.03)
ATT	0.49 (0.03)	0.50 (0.03)	0.51 (0.05)	0.48 (0.04)	0.44 (0.04)	0.54 (0.04)	0.49 (0.03)	0.46 (0.04)	0.42 (0.04)	0.46 (0.04)	0.33 (0.04)	0.34 (0.05)
ATU	0.51 (0.03)	0.50 (0.03)	0.52 (0.05)	0.52 (0.04)	0.50 (0.04)	0.56 (0.03)	0.52 (0.03)	0.51 (0.03)	0.43 (0.03)	0.45 (0.04)	0.35 (0.04)	0.38 (0.05)

periods, and this decline tends to be greater at lower quantiles (probably reflecting the fact that expansion in HE participation for women took place earlier than men). Comparing the youngest female graduates across subsample periods (before/after 2000), we observe a drop in returns to a degree for the bottom half and an increase for the top half of the distribution for successful (but not unsuccessful) graduates. For men there is an across the board decrease.

In Table 9a the returns to a degree for less successful graduates more than halved between 1996-1999 and 2000-2003, at least for the 4 youngest cohorts. It seems that the ATT is approximately the same as the ATU for both successful and unsuccessful male and female graduates. In Table 9b, in contrast, we show that the return to a degree conditional on getting a managerial/professional job (i.e. successful) is remarkably stable over the sample period.

5. Conclusion

Our results add texture to earlier UK research, and some research elsewhere. Although there is little evidence that, on average, the college premium has shown any significant trend changes in recent years in the UK, despite the large increase in the flow of graduates into the labour market, we have shown that there seems to have been a marked fall in returns for recent cohorts across almost all subjects for both men and women. Breaking this down further into graduates in high SOC jobs compared to low we see that the fall is entirely confined to the latter. Indeed, we find that for men, and especially for women, there is a large increase in the proportion with maths and engineering degrees getting graduate jobs and that, conditional on this, the return is rising. This would be consistent with the falling numbers in the flow of such graduates.

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Appendix

Table A1 OLS Estimates of College Premium by Year: Men and Women for Figure 2

LFS YEAR	MEN			WOMEN		
	Main Specification	Without controls for Higher Degrees	Excluding All Higher Degree Holders	Main Specification	Without controls for Higher Degrees	Excluding All Higher Degree Holders
1996	0.235 (0.021)	0.233 (0.020)	0.240 (0.021)	0.382 (0.025)	0.396 (0.024)	0.381 (0.026)
1997	0.232 (0.022)	0.235 (0.021)	0.235 (0.023)	0.375 (0.023)	0.388 (0.022)	0.374 (0.024)
1998	0.238 (0.023)	0.239 (0.022)	0.240 (0.024)	0.305 (0.023)	0.335 (0.023)	0.310 (0.024)
1999	0.219 (0.024)	0.227 (0.023)	0.227 (0.025)	0.358 (0.023)	0.358 (0.022)	0.356 (0.023)
2000	0.244 (0.023)	0.251 (0.022)	0.250 (0.023)	0.347 (0.023)	0.367 (0.022)	0.352 (0.024)
2001	0.241 (0.023)	0.253 (0.022)	0.243 (0.024)	0.372 (0.023)	0.395 (0.023)	0.370 (0.024)
2002	0.227 (0.023)	0.236 (0.022)	0.233 (0.024)	0.316 (0.023)	0.341 (0.023)	0.319 (0.024)
2003	0.251 (0.023)	0.274 (0.022)	0.258 (0.024)	0.352 (0.024)	0.380 (0.023)	0.349 (0.025)
TOTAL	0.236 (0.008)	0.244 (0.008)	0.241 (0.008)	0.349 (0.008)	0.368 (0.008)	0.350 (0.008)

Note: Standard errors in parentheses.

Table A2 *Least Squares Estimates of Returns to A Levels (relative to O Levels), by cohorts*

Percentile	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Men	0.32	0.27	0.25	0.32	0.31	0.36	0.36	0.32	0.21	0.20	0.15	0.24
2+ A Level	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
Men	0.23	0.19	0.13	0.21	0.20	0.26	0.23	0.20	0.13	0.14	0.11	0.10
1 A Level	(0.04)	(0.03)	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.06)	(0.07)
Women	0.17	0.17	0.21	0.25	0.29	0.24	0.27	0.26	0.24	0.18	0.17	0.18
2+ A Level	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.04)
Women	0.10	0.10	0.10	0.20	0.16	0.14	0.15	0.14	0.16	0.12	0.06	0.06
1 A Level	(0.02)	(0.02)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.05)

Note: See Table 3 notes.

Table A3 Returns to degrees by subjects and cohorts

	Aged 41-59 (pre 54 cohorts in 96-99 or pre 58 in 00-03)		Aged 37-45 (55-58 cohorts in 96-99 or 59-62 in 00-03)		Aged 33-41 (59-62 cohorts in 96-99 or 63-66 in 00-03)		Aged 29-37 (63-66 cohorts in 96-99 or 67-70 in 00-03)		Aged 25-33 (67-70 cohorts in 96-99 or 71-74 in 00-03)		Aged 25-29 (71-74 cohorts in 96-99 or 75-78 in 00-03)	
	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
MEN												
Health & Science	0.23 (0.03)	0.30 (0.03)	0.26 (0.06)	0.24 (0.05)	0.20 (0.05)	0.25 (0.05)	0.19 (0.04)	0.14 (0.06)	0.20 (0.04)	0.11 (0.04)	0.19 (0.06)	0.12 (0.07)
Math & Engineering	0.27 (0.03)	0.29 (0.03)	0.30 (0.05)	0.25 (0.05)	0.31 (0.04)	0.30 (0.04)	0.27 (0.04)	0.26 (0.04)	0.31 (0.04)	0.30 (0.04)	0.32 (0.05)	0.28 (0.05)
Econ/Business/Law	0.36 (0.04)	0.42 (0.04)	0.38 (0.05)	0.36 (0.05)	0.36 (0.05)	0.34 (0.06)	0.35 (0.04)	0.28 (0.05)	0.35 (0.04)	0.33 (0.04)	0.24 (0.05)	0.22 (0.06)
Education/SocStuds	0.14 (0.04)	0.17 (0.04)	0.20 (0.07)	0.23 (0.07)	0.21 (0.08)	0.14 (0.07)	0.19 (0.07)	0.08 (0.07)	0.12 (0.06)	0.00 (0.06)	0.20 (0.08)	0.06 (0.08)
Arts & Humanities	-0.02 (0.04)	0.05 (0.05)	0.08 (0.07)	0.16 (0.07)	-0.04 (0.06)	0.04 (0.07)	0.02 (0.06)	-0.00 (0.06)	-0.01 (0.06)	-0.03 (0.05)	0.06 (0.08)	-0.01 (0.06)
Combined	0.20 (0.03)	0.26 (0.03)	0.24 (0.05)	0.28 (0.04)	0.27 (0.04)	0.24 (0.04)	0.20 (0.04)	0.25 (0.04)	0.25 (0.04)	0.19 (0.04)	0.18 (0.05)	0.13 (0.05)
WOMEN												
Health & Science	0.41 (0.04)	0.36 (0.04)	0.43 (0.07)	0.44 (0.06)	0.36 (0.06)	0.48 (0.05)	0.42 (0.05)	0.34 (0.05)	0.38 (0.04)	0.34 (0.05)	0.24 (0.05)	0.18 (0.05)
Math & Engineering	0.38 (0.07)	0.54 (0.07)	0.25 (0.13)	0.33 (0.13)	0.38 (0.10)	0.47 (0.10)	0.45 (0.09)	0.45 (0.08)	0.49 (0.07)	0.42 (0.07)	0.33 (0.08)	0.35 (0.09)
Econ/Business/Law	0.44 (0.05)	0.44 (0.05)	0.63 (0.09)	0.49 (0.08)	0.60 (0.07)	0.59 (0.06)	0.61 (0.05)	0.47 (0.05)	0.47 (0.04)	0.38 (0.05)	0.36 (0.05)	0.29 (0.05)
Education/SocStuds	0.42 (0.03)	0.39 (0.03)	0.38 (0.05)	0.37 (0.05)	0.31 (0.05)	0.43 (0.05)	0.37 (0.05)	0.32 (0.05)	0.29 (0.05)	0.28 (0.04)	0.20 (0.05)	0.17 (0.05)
Arts & Humanities	0.33 (0.04)	0.28 (0.04)	0.25 (0.06)	0.21 (0.06)	0.20 (0.06)	0.25 (0.05)	0.29 (0.05)	0.17 (0.06)	0.10 (0.05)	0.25 (0.05)	0.17 (0.05)	0.12 (0.05)
Combined	0.30 (0.03)	0.35 (0.03)	0.35 (0.05)	0.28 (0.05)	0.33 (0.05)	0.38 (0.04)	0.40 (0.04)	0.35 (0.04)	0.29 (0.04)	0.33 (0.04)	0.23 (0.04)	0.20 (0.04)

*Table A4 Least Squares Estimates of Returns to First Degree by Time since Graduation
(As Table 3, but without control for higher degrees)*

Percentile	Aged 41-59		Aged 37-45		Aged 33-41		Aged 29-37		Aged 25-33		Aged 25-29	
	(pre 54 cohorts in 96-99 or pre 58 in 00-03)		(55-58 cohorts in 96-99 or 59-62 in 00-03)		(59-62 cohorts in 96-99 or 63-66 in 00-03)		(63-66 cohorts in 96-99 or 67-70 in 00-03)		(67-70 cohorts in 96-99 or 71-74 in 00-03)		(71-74 cohorts in 96-99 or 75-78 in 00-03)	
Gender	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Men	0.22 (0.02)	0.29 (0.02)	0.28 (0.03)	0.29 (0.03)	0.25 (0.03)	0.25 (0.03)	0.22 (0.03)	0.21 (0.03)	0.24 (0.03)	0.21 (0.03)	0.20 (0.03)	0.16 (0.04)
Women	0.40 (0.02)	0.39 (0.02)	0.39 (0.03)	0.38 (0.03)	0.38 (0.03)	0.43 (0.03)	0.41 (0.03)	0.38 (0.03)	0.31 (0.03)	0.34 (0.03)	0.25 (0.03)	0.22 (0.03)

Note: Independent variables include first degree, vocational qualification, gap in schooling, schooling does not match qualifications, age, age squared, married, cohabits, nonwhite, union member, union missing, health problem, and year, quarter and region dummies.

*Table A5 Least Squares Estimates of Returns to First Degree by Time since Graduation
(As Table 3, but excluding all higher degrees holders)*

Percentile	Aged 41-59		Aged 37-45		Aged 33-41		Aged 29-37		Aged 25-33		Aged 25-29	
	(pre 54 cohorts in 96-99 or pre 58 in 00-03)		(55-58 cohorts in 96-99 or 59-62 in 00-03)		(59-62 cohorts in 96-99 or 63-66 in 00-03)		(63-66 cohorts in 96-99 or 67-70 in 00-03)		(67-70 cohorts in 96-99 or 71-74 in 00-03)		(71-74 cohorts in 96-99 or 75-78 in 00-03)	
Gender	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03	96-99	00-03
Men	0.22 (0.02)	0.28 (0.02)	0.28 (0.03)	0.27 (0.03)	0.23 (0.03)	0.26 (0.03)	0.23 (0.03)	0.22 (0.03)	0.25 (0.03)	0.21 (0.03)	0.21 (0.04)	0.15 (0.04)
Women	0.36 (0.02)	0.36 (0.02)	0.36 (0.04)	0.33 (0.04)	0.35 (0.03)	0.42 (0.03)	0.41 (0.03)	0.37 (0.03)	0.33 (0.03)	0.33 (0.03)	0.24 (0.03)	0.21 (0.03)

Note: Independent variables include first degree, vocational qualification, gap in schooling, schooling does not match qualifications, age, age squared, married, cohabits, nonwhite, union member, union missing, health problem, and year, quarter and region dummies.

Table A6: Least Squares Estimates of Returns to A Levels (relative to O Levels), by Year

LFS YEAR	<i>MEN</i>		<i>WOMEN</i>	
	2+ A Levels	1 A Level	2+ A Levels	1 A Level
1996	0.267 (0.022)	0.210 (0.034)	0.195 (0.021)	0.113 (0.027)
1997	0.288 (0.023)	0.188 (0.033)	0.192 (0.019)	0.129 (0.025)
1998	0.298 (0.023)	0.207 (0.037)	0.254 (0.019)	0.138 (0.026)
1999	0.284 (0.024)	0.149 (0.035)	0.226 (0.019)	0.122 (0.026)
2000	0.296 (0.023)	0.235 (0.035)	0.205 (0.020)	0.157 (0.028)
2001	0.265 (0.024)	0.206 (0.036)	0.193 (0.019)	0.134 (0.026)
2002	0.310 (0.023)	0.193 (0.035)	0.244 (0.020)	0.128 (0.026)
2003	0.293 (0.023)	0.140 (0.039)	0.199 (0.020)	0.096 (0.027)
TOTAL	0.287 (0.008)	0.191 (0.012)	0.215 (0.007)	0.127 (0.009)

Note: Standard errors in parentheses.