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RETURNS TO EDUCATION: AN UPDATE

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1. INTRODUCTION

This report updates the situation reported in Sloane et al. (2003), which surveyed the existing literature at that time and reported some new results for Great Britain and Wales based on the Labour Force Survey up to and including 2001.

In general, it was found that gross rates of return to education had declined somewhat over the period 1993-95 to 1999-2001 for both men and women, but more so for the latter; so that there had been some tendency for returns for particular degrees to converge for men and women. There were, however, substantial differences in the returns to different degree programmes. Returns in Wales overall were similar to those in the rest of Great Britain with higher returns to females relative to males across all degree level qualifications. However, Welsh men received lower returns to particular Higher and First degrees than men in the rest of Great Britain and women slightly higher returns than women elsewhere. Before presenting the new results up to 2003/4 we report the results of some work which has appeared since our original report.

2. SOME FURTHER RESULTS FOR GREAT BRITAIN

A number of authors have used quantile regression to analyse recent cohorts of graduates. Thus Chevalier et al. (2004) report that returns have fallen for the most recent cohort, but this has not been associated with any particular part of the distribution. That is there is no tendency for the downturns to be concentrated at the lower end of the earnings distribution, as one would expect if the less able graduates were concentrated there. They utilised the LFS over the period 1993-2001, dividing their sample into four cohorts, separately for men and women, with the youngest cohort being those born between 1969 and 1977. However, the older part of this cohort would have graduated before the growth in student members had

accelerated in the 1990s. For this reason O'Leary and Sloane (2005) extended the analysis up to the LFS 2003, with the youngest cohort consisting of those born in the 1980s and thus graduating after the substantial growth in student numbers had taken place. In this case there is a significant decline in the lowest quartile between the 1970s and 1980s cohorts of –0.13 log points (see Figure 1). However, since this group will still be in the early years of their careers with relatively little work experience in comparison to a cohort of 2 + A-Level holders, these returns were re-estimated with controls for time with current employer included within the wage equations. This adjustment reduces the size of the effect and renders it statistically insignificant for men. However, for women the decline in degree returns remains sizeable and is statistically significant (Table 1). Walker and Zhu (2005) extended their analysis of the LFS up to 2003. They detect a large fall in the average degree mark-up across cohorts at all percentiles of the distribution for men, but only for the lower quantiles for women (where the expansion of supply has been largest). They then divide their sample into graduate jobs (i.e. SOCs 1 and 2) and non-graduate jobs (other SOCs). Male graduates who fail to get a managerial/professional job in the period 2000-2003 do much worse than earlier cohorts, controlling for age and experience. In contrast there is hardly any decline in returns for men in graduate jobs. For women, however, there was only a modest decline for those in non-graduate jobs. The distribution between graduate and non-graduate jobs in this paper is rather crude.[1] For example, Elias and Purcell (2004) distinguish between traditional graduate occupations, modern graduate occupations, new graduate occupations and niche graduate occupations. Their findings suggest that graduates are assimilated into appropriate jobs within the labour market at different rates depending upon the type of degree

[1] They use this distinction to distinguish graduate over-education. Again, since the LFS as other regular statistical series does not include a question on over-education such as 'is a degree required for the job you currently do?', it is not possible to compare their estimates of over-education with those obtained from special surveys containing such a question.

they study, their degree classification and other factors. But for 1995 graduates compared to 1980 graduates the graduate earnings premium appeared then to be holding up.

In a separate paper O'Leary and Sloane (2005) estimated rates of return by subject of degree and the change in lifetime earnings from a degree relative to 2 + A-Levels for the period 1994-2002. These calculations implicitly recognise the costs of acquiring education in addition to potential benefits (Table 2). For male graduates as a whole they suggest an increase in lifetime earnings (net of tax) of over £140,000 over similar men who completed their education with 2 or more A-Levels. Table 2 presents three scenarios – a regime under which students pay no fees, one under which they pay fees of £1,000 per annum and one where they pay £3,000 per annum (as proposed in England as a maximum contribution). The effects of the fee regimes are to reduce rates of return, though not dramatically, and overall returns are acceptable, especially for women. However, there is considerable variance across degree disciplines and for men undertaking Arts degrees, returns are negative. These lifetime returns are much lower than the figure of £400,000 used in the Department of Education and Skills for earlier cohorts of graduates.[2] Similar figures to our own have, however, been obtained by PricewaterhouseCoopers LLP (2005) who report the average monetary value in today's terms of completing a degree over and above 2 or more A-Levels to be approximately £129,000. In response to a Parliamentary question the Minister of Higher Education provided a figure of £120,000 in present value terms as the average lifetime financial benefit to someone with a degree compared to holders of A-Levels.[3] Given differences in methodology

[2] The methodology used to obtain this figure was crude, so that the earlier figures are non-comparable to our own. The figure of £400,000 is simply the excess of lifetime earnings of a graduate over someone with two or more A-Levels using age earnings profiles (see Greenaway and Haynes, 2000). No adjustment is made for taxation, the fact that earnings in the future should be discounted and that there are foregone earnings. We make appropriate adjustments for all of these and derive our estimates from a formal econometric model.

[3] Hansard Parliamentary Report, 20 June 2005.

these results are reasonably consistent and confirm the fact that a degree remains a sound investment on the assumption that the future replicates the past.

3. RECENT TRENDS IN WALES

Before considering our latest estimates for graduate earnings in Wales it is necessary to put them in context. The Rees Report (2005) points out that in 2002/3 40 per cent of the 120,000 students at the HE level in Wales were part-time students, a much higher figure than found elsewhere in Britain.[4] It is possible, indeed likely, that returns differ between full-time and part-time students, as well as the costs of undertaking a degree, but the Labour Force Survey does not distinguish between graduates who gained a degree on a full-time or a part-time basis. This should be borne in mind when comparing returns to degrees for Welsh residents compared to residents in other regions.

Wales is a 'net importer' of students. In 2003/3 37 per cent of Welsh domiciled first degree full-time students studied in England, while 44 per cent of students at Welsh HEIs were from England. The decision to rebate fees so that students in Wales will pay only £1,200 per annum compared to the likely £3,000 per annum they would face in England will likely cause an overshoot in the WAG goal, outlined in Reaching Higher, of increasing the proportion of all Welsh domiciled full-time students enrolled at Welsh HEIs from 60.1 per cent to 66 per cent by 2010. The effect of this on rates of return will partly be determined by how the affected individuals allocate themselves across disciplines. It should also be noted that Wales has a larger public sector than any other region with over half the NVQ 4 + jobs being in this sector in Wales compared to a figure of less than one quarter in London. Retention of the

[4] In full-time equivalent terms the figure is 18 per cent. Part-time provision includes professional development courses, community-based provision, distance learning and students registered with the Open University (nearly 6,000 Welsh domiciled students).

extra graduates in Wales will be partly dependent on growth of public sector graduate employment. A number of research papers relating to graduate earnings were produced for the Rees Committee, but since the statistical analysis was limited to single cross-tabulations we have not included a detailed discussion of their findings in this report.[5]

In our own analysis we have compared mark-ups across regions in Britain.[6] In Table 3 we examine mark-ups using the LFS 2001-2003 relative to those with no qualifications, with the low paying North of England being the base. The latest figures for Great Britain suggest that, measured in this way, there is now not much difference in the mark-ups between men and women. Thus, at first degree level both genders earn just under 118 per cent more than someone without any qualifications in the Northern region (derived from the approximate 0.78 log points reported in Table 3). There is, however, considerable variability across regions, suggestive of a degree of regional immobility, with the mark-up in London, in particular, being consistently higher for all levels of qualifications than elsewhere for both men and women. Men and women in Wales tend to have lower mark-ups for all levels of qualifications than their counterparts in Britain as a whole. While at degree level the mark-up in Wales is higher for women than for men, the pattern is reversed at lower qualification levels. For men in Wales the mark-up for first degrees is the lowest of any region and the same is true for A-Levels. For women in Wales the first degree mark-up is higher than that of women in six other regions. This confirms the suggestion in our earlier report that women in Wales do rather better than women elsewhere and men somewhat worse with respect to the size of the earnings mark-up.

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[5] These include Briefing Paper No. 2, H. Lauder, M. Egerton and P. Brown, A Report on Graduate Earnings; Theory and Empirical Analysis, February, 2005; Briefing Paper No. 4, J. Sung and D. Ashton, Graduate Pay in Wales, undated, and Briefing Paper No. 5, R. Fevre, An Analysis of 'Graduate Demand, Employment and Income in Wales, December 2004.

[6] Consistent with the methodology used in Sloane et al. (2003), markups will reflect the log point effect of education. The percentage effect that education has upon gross hourly earnings can be calculated using the formula (exp(M)-1)x100, where M denotes the log point effect referred to in the following tables.

However, the above results take no account of differences in the cost of living between regions. To address this issue we use two measures of regional cost of living, one of which includes housing costs and the other which excludes them.[7] If the former index is used to deflate money earnings it under-estimates real earnings since housing is partly an asset and will represent a financial investment which may be realised in later life. A more appropriate measure of imputed housing costs may be interest charges net of expected capital appreciation, but this over-estimates real earnings since housing expenditure may partly be forced savings and housing itself is a rather illiquid and indivisible asset. Hence, a true measure of the difference in regional cost of living is likely to lie somewhere between the two indices used here.

The effect of controlling for cost of living differences that exclude housing costs is relatively minor and the general patterns noted earlier do not change (see Table 4). For example, the return to a first degree for males in Wales, estimated at 93.5 per cent, is still some way below the return in Great Britain generally (103.7 per cent). Likewise, the comparable return for women in Wales (107.3 per cent) still compares favourably to the Great Britain figure (103.8 per cent). However, as shown in Table 5, adjusting earnings to take account of differences in the house prices makes a substantial difference to the regional ordering of the earnings mark-ups. Whereas in Table 3 the mark-up for male first degree graduates was the lowest of any region, in Table 5 it exceeds five of the eleven regions and the mark-up for women with first degrees in Wales is only exceeded by that for women in Scotland. Real earnings mark-ups in London are in some cases the lowest of all, particularly for men. Taking this admittedly generous correction into account suggests that pay may not necessarily be a critical factor in retaining graduates in Wales.

[7] These are published by Reward Regional Surveys Ltd., and follow the change in income required to hold a predetermined standard of living constant were an individual to move from one region to another.

Focusing just on first degrees we examine returns relative to those with 2 or more A-Levels in Northern England in Table 6. For men, the nominal mark-up is lower in Wales than in any other region (16.4 per cent compared to 60.9 per cent in London). Making an allowance for housing costs however makes the return higher than in four other regions (London, South-East, South-West and West Midlands). In the case of women, Wales is ranked sixth in nominal terms and fourth after allowance is made for housing costs.

In Table 7 we estimate lifetime earnings in nominal terms, and implied rates of return measured relative to those with two or more A-Levels in Northern England. Allowance is made for fees payable by the student, set at £3,000 per annum, and foregone earnings, calculated at £30,496 for men and £28,243 for women.[8] For men in Wales the increase in lifetime earnings is estimated at £130,188 (compared to £206,466 for Great Britain) with an annual rate of return of 6.6 per cent (compared to 10.9 per cent for Great Britain). In each case this figure is lower than in any other region. For women the increase in lifetime earnings is £148,217 (compared to £170,602 in Great Britain), with a rate of return of 8.5 per cent per annum (compared to 10.0 per cent per annum for Great Britain). In this case these figures are higher than those in five other regions.

Examining real earnings that make no allowance for housing cost differentials reveals a similar pattern (see Table 8), although in relative terms the returns available to graduates in Wales have increased. As such, the annual rate of return for men in Wales is estimated at 5.4 per cent, and while this is still one of the lowest regional returns (bettering only the 3.7 per

[8] The rate of return is that rate that equates the discounted stream of additional future earnings for graduates with the cost of acquiring their university education. Costs are taken as foregone earnings (net of taxes) and tuition fees. Returns are calculated for a typical three year degree course and for this reason Medicine, Dentistry and Language degrees (which typically have durations longer than three years) have been removed from the rate of return calculations. Likewise, Scottish residents have have also been excluded due to the different nature of the education system in Scotland compared to England and Wales. While this will not perfectly identify those graduates who have attended a Scottish university or not, it will provide a reasonable proxy.

cent per annum found in the West Midlands), it is closer to the 7.9 per cent annual return in Great Britain generally. Meanwhile, the annual return of 7.5 per cent for women in Wales compares favourably with the returns in a number of other regions, being marginally in excess of the 7.3 per cent figure estimated for Great Britain.

Adjusting these returns for housing costs (see Table 9), the implied rate of return for men in Wales is 5.0 per cent (as opposed to 3.1 per cent for Great Britain) which is higher than in six other regions, and 7.3 per cent for women (as opposed to 3.3 per cent for Great Britain), which is higher than in eight other regions. Again, this confirms that once allowance is made for housing costs returns to graduates do not compare unfavourably to those available in other regions of Britain.

Another way in which to consider returns by regions is to assume that graduates are immobile and remain in their region of domicile after graduation. The appropriate comparison in this case is with holders of two or more A-Levels in the particular region, who remain in that region. In Table 10 we assume that fees of £3,000 are imposed across all regions. In this case, the return to men is 4.4 per cent (compared to 8.6 per cent in Great Britain) and is lower than in any other region. For women, the return is 10.3 per cent (compared to 8.9 per cent in Great Britain) and is higher than in any other region. If fees are assumed to be set at £1,200 in line with the WAG proposals for Welsh domiciled students studying at Welsh HEIs the implied returns would rise to 5.4 per cent for men and 12.5 per cent for women, which would result in returns for men in Wales exceeding those in the West Midlands but remaining below average for Great Britain as a whole. The lower deferred payment for fees for Welsh domiciled students studying in Wales does not, therefore, change dramatically the relative rate of return.

4. CONCLUSIONS

Recent work on rates of return for Britain as a whole suggests that these have started to decline, though there is some disagreement over the extent of this decline, which may be a consequence of using different samples of the population and different estimating equations. There is agreement, however, that rates of return have declined for women located in the lowest quantile of the earnings distribution. The latest figures suggest that a degree raises lifetime earnings by between £120,000 and £140,000 for men and by somewhat more for women, but with substantial differences across degree disciplines.

As only three waves of the Welsh boost to the Labour Force Survey are so far available estimating changes over time is more problematical for Wales. It is also important to note that a substantial number of HEI students in Wales study on a part-time basis and there are substantial cross-border flows of students between England and Wales. It is difficult to control for this given the nature of the available statistics. Nonetheless, the evidence in the appendix suggests returns at degree level for women in Wales are declining, while male returns are holding up reasonably well.

The Welsh data suggest that the tendency for women to have higher mark-ups than men remains at first degree level when measured relative to 2 or more A-Levels rather than no qualifications, although this has all but disappeared in Great Britain as a whole. The tendency for women in Wales to do rather better than women elsewhere, and men rather worse, which we found in our earlier report, is also confirmed. Adjusting for differences in house prices presents an entirely different picture, however, and implies that returns in Wales relative to those elsewhere may not be critical in retaining graduates in Wales. Further the effect of

restricting the level of fees in Wales for Welsh students will only have a marginal effect on rates of return.

REFERENCES

Chevalier A, Harmon C., Walker I. And Zhu, Y.,
Does Education Raise Productivity or Just Reflect It?, *Economic Journal*, Vol. 114, No. 449, November, 2004, pp F499-F517

Elias P. and Purcell K.,
Is Mass Higher Education Working? Evidence from the Labour Market Experiences of Recent Graduates, *National Institute Economic Review*, No. 190, October, 2004, pp 60-74

Greenaway D. and Haynes M., *Funding Universities to Meet National and International Challenges*, Nottingham University School of Economics Policy Report, 2000

O'Leary N.C. and Sloane P.J.,
The Return to a University Education in Great Britain, *National Institute of Economic Review*, No. 193, July 2005, pp 4-18

O'Leary N.C. and Sloane P.J.,
The Changing Wage Return to an Undergraduate Education, WELMERC Discussion Paper No. 2005-02, 2005 (a)

PricewaterhouseCoopers LLP,
The Economic Benefits of Higher Education Qualifications, A Report produced for the Royal Society of Chemistry and the Institute of Physics, January 2005

Sloane P.J., O'Leary N.C., Murphy P. and Blackaby D.,
Returns to Education: A Survey of Findings, A Report for the Economic Research Unit, Welsh Assembly Government, May 2003

Walker I. And Zhu, Y.,
The College Wage Premium, Over-education and the Expansion of Higher Education in the UK., unpublished manuscript, University of Warwick, May 2005

Welsh Assembly Government,
Fair and Flexible Funding: A Welsh Model to Promote Quality and Access in Higher Education, Final Report of an Independent Study into the Devolution of the Student Support System and Tuition Fee Regime in Wales (The Rees Review)

Figure 1a
Median Degree Mark-ups in Great Britain by Gender
Relative to 2+ A-Levels: LFS 1993-2003

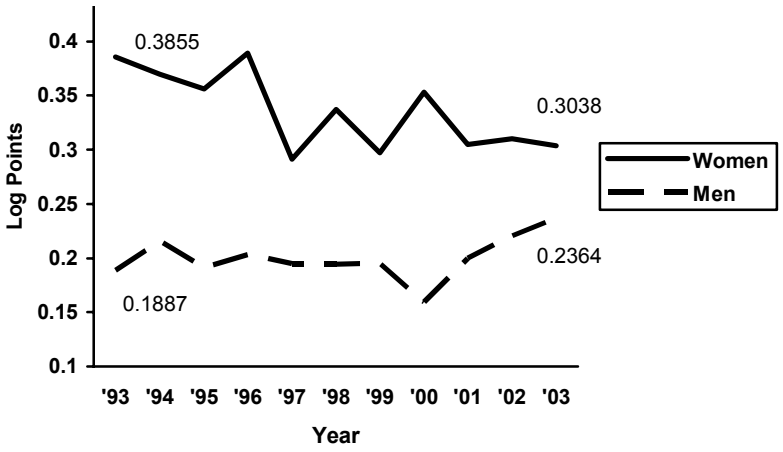

Figure 1b
Lower Quartile Degree Mark-ups in Great Britain by Gender
Relative to 2+ A-Levels: LFS 1993-2003

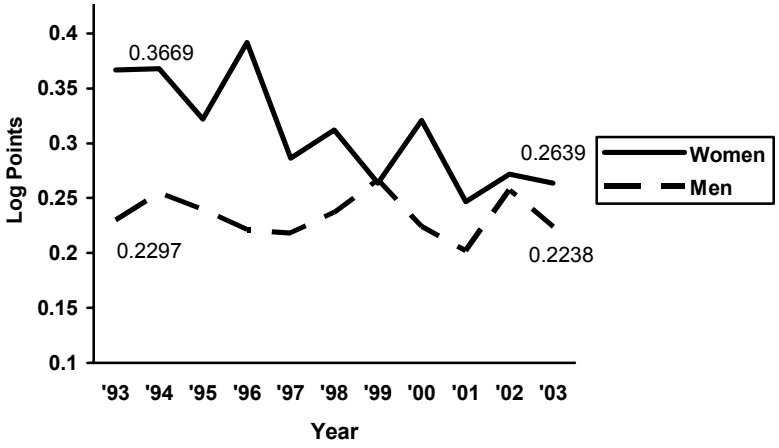

Figure 1c
Upper Quartile Degree Mark-ups in Great Britain by Gender
Relative to 2+ A-Levels: LFS 1993-2003

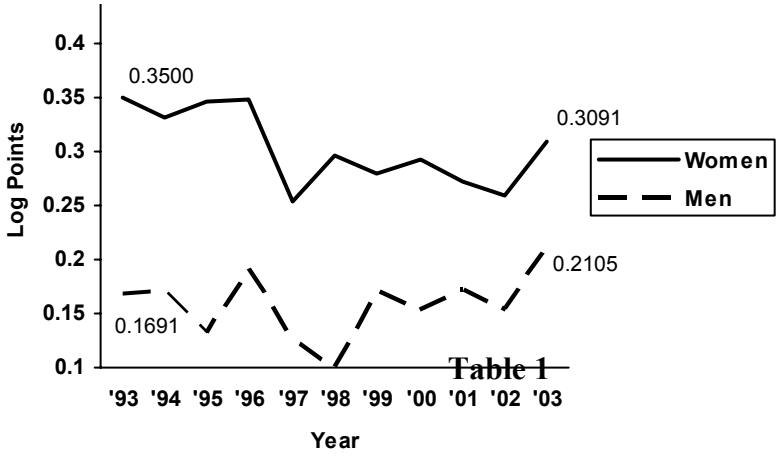

Table 1

Table 1
Degree Mark-ups in Great Britain by Quartile, Gender and Birth Cohort
Relative to 2+ A-Levels: LFS 1993-2003

	Males			Females		
	0.25	**0.5**	**0.75**	**0.25**	**0.5**	**0.75**
1970s	0.2271^{+}	0.2431^{+}	0.1601^{+}	0.2182^{+}	0.2276^{+}	0.2225^{+}
	(0.01785)	(0.02552)	(0.02530)	(0.02292)	(0.02312)	(0.02139)
1980s	0.1455^{++}	0.2034^{++}	0.1868^{+}	0.0953^{+}	0.1446^{+}	0.1350^{+}
	(0.08805)	(0.12458)	(0.08877)	(0.04247)	(0.05438)	(0.05526)
Δ70s-80s	-0.0816	-0.0397	0.0267	-0.1229^{+}	-0.0830	-0.0875

Notes: standard errors in parenthesis;
$^{+}(^{++})$ denotes statistical significance at the 95% (90%) confidence level;
tenure with current employer (months entered as quadratic) included as control.

Table 2
Rates of Return and Increase in Lifetime Earnings by Subject of Degree and Gender
Relative to 2+ A-Levels: LFS 1994-2002

	Males				Females			
	ΔEarnings	**R-0**	**R-1000**	**R-3000**	**ΔEarnings**	**R-0**	**R-1000**	**R-3000**
All Degrees	141,539	10.1	9.0	7.3	157,982	15.0	13.0	10.3
Medical Related[+]	175,108	12.8	11.4	9.3	208,021	22.0	18.5	14.4
Sciences	142,079	10.2	9.1	7.4	151,521	14.7	12.7	10.0
Maths and Computing	222,419	17.3	15.1	12.2	227,939	24.8	20.6	15.9
Engineering and Technology	196,293	14.9	13.1	10.7	165,329	16.6	14.3	11.3
Architecture and Related	88,877	5.5	4.8	3.6	196,838	20.0	17.0	13.4
Social Sciences	145,820	10.3	9.2	7.5	152,158	14.6	12.7	10.0
Business and Finance	155,431	11.1	9.9	8.0	169,322	16.7	14.3	11.3
Arts	22,458	-2.0	-2.3	-3.0	113,185	10.2	8.9	7.0
Education	151,583	11.0	9.8	8.0	244,740	27.7	22.7	17.4
Combined	128,821	9.1	8.1	6.6	131,347	12.2	10.6	8.4

Notes: figures are in January 2002 prices and refer to earnings net of taxes;
rates of return are calculated for a typical 3-year degree course for residents of England and Wales only;
rates of return are calculated for a married individual working full-time and living in the south-east of England (outside London) in 2002;
discount rate assumed of 4%;
foregone (net) earnings of graduates are calculated at £31,643/£34,821 (women/men);
graduates assumed to be in continuous employment from ages 21-59/64 (women/men);
A-Level holders assumed to be in continuous employment from ages 18-59/64 (women/men);
[+] excludes Medicine and Dentistry;
R-*x* refers to the rate of return when annual tuition fees are £*x*.

Table 3a
Returns to Education for Males by Region:
LFS 2001-2003

	N	YH	EM	EA	L	SE	SW	WM	NW	W	S	GB
Higher degree	0.8839	0.7816	0.8893	0.8633	1.0046	0.9340	0.7997	0.7911	0.8544	0.8133	0.8785	0.8768
First Degree	0.6919	0.7332	0.7040	0.7072	0.9550	0.8677	0.7480	0.6717	0.6974	0.6535	0.7601	0.7765
Degree equivalent	0.4420	0.5008	0.5165	0.5849	0.7882	0.6644	0.5233	0.5549	0.4998	0.4816	0.5077	0.5578
A-Level	0,2624	0.2787	0.3056	0.2881	0.5989	0.4752	0.3240	0.3017	0.3024	0.2538	0.2904	0.3451
O-Level	0.2515	0.2534	0.2729	0.3339	0.5195	0.4512	0.3225	0.3299	0.2938	0.2171	0.2054	0.3375
Other	0.0864	0.0938	0.1215	0.1114	0.3901	0.2495	0.1061	0.1648	0.0917	0.1077	0.1226	0.1575
None	**Baseline**	0.0092*	0.0756	0.0771*	0.2520	0.1876	0.0923	0.1063	0.0384*	-0.0004*	0.0293*	0.0896

Table 3b
Returns to Education for Females by Region:
LFS 2001-2003

	N	YH	EM	EA	L	SE	SW	WM	NW	W	S	GB
Higher degree	0.8800	0.9089	0.8893	0.9294	1.0418	0.9368	0.87177	0.8742	0.8675	0.8691	0.8911	0.9113
First Degree	0.6956	0.7155	0.7075	0.6914	0.9827	0.8407	0.7161	0.7037	0.7515	0.7318	0.7397	0.7768
Degree equivalent	0.4580	0.4741	0.4764	0.5460	0.7787	0.6081	0.4965	0.4941	0.4697	0.5037	0.4875	0.5249
A-Level	0.2175	0.2319	0.2410	0.3084	0.5958	0.4371	0.2733	0.2489	0.2698	0.2434	0.2538	0.3129
O-Level	0.2245	0.2314	0.2631	0.2596	0.5379	0.3734	0.2233	0.2427	0.2424	0.2001	0.1901	0.2823
Other	0.0842	0.0822	0.1135	0.1404	0.4140	0.2128	0.0927	0.1163	0.1077	0.0792	0.0897	0.1415
None	**Baseline**	0.0237*	0.0549	0.0763	0.2906	0.1458	0.0425*	0.0129*	0.0406*	-0.0077*	0.0265*	0.0632

Notes: * signifies a mark-up not statistically significant at the 95% confidence level.

Table 4a
Real Returns to Education (Excluding Housing Costs) for Males by Region:
LFS 2001-2003

	N	YH	EM	EA	L	SE	SW	WM	NW	W	S	GB
Higher degree	0.9437	0.7743	0.8432	0.9089	1.0274	0.9505	0.7871	0.7887	0.8480	0.8805	0.8495	0.8119
First Degree	0.7293	0.7066	0.6948	0.7110	0.9945	0.8726	0.7189	0.6460	0.7052	0.6603	0.7224	0.7117
Degree equivalent	0.4606	0.4705	0.4749	0.5619	0.7805	0.6501	0.4910	0.5314	0.4681	0.4781	0.4651	0.4963
A-Level	0.2681	0.2333	0.2643	0.2523	0.5564	0.4343	0.2738	0.2442	0.2642	0.2465	0.2286	0.2838
O-Level	0.2753	0.2123	0.2200	0.3215	0.4767	0.4121	0.2648	0.2886	0.2570	0.2036	0.1433	0.2751
Other	0.0819	0.0408*	0.0674*	0.0691*	0.3296	0.1774	0.0474*	0.1141	0.0543*	0.0862	0.0509*	0.0968
None	**Baseline**	-0.0381*	0.0149*	-0.0088*	0.1747	0.1257	0.0341*	0.0554*	-0.0270*	-0.0141*	-0.0485*	0.0257*

Table 4b
Real Returns to Education (Excluding Housing Costs) for Females by Region:
LFS 2001-2003

	N	YH	EM	EA	L	SE	SW	WM	NW	W	S	GB
Higher degree	0.9114	0.8888	0.8650	0.9010	1.0258	0.9013	0.7686	0.8618	0.8433	0.8884	0.8751	0.8459
First Degree	0.7303	0.6951	0.6662	0.6826	0.9463	0.8084	0.6899	0.6805	0.7403	0.7292	0.7039	0.7119
Degree equivalent	0.4741	0.4288	0.4283	0.5098	0.7164	0.5548	0.4586	0.4502	0.4466	0.5045	0.4325	0.4638
A-Level	0.2339	0.1851	0.1977	0.2772	0.5365	0.3905	0.2327	0.2074	0.2292	0.2266	0.2079	0.2507
O-Level	0.2302	0.1890	0.2163	0.2152	0.4693	0.3127	0.1621	0.1916	0.1978	0.1964	0.1311	0.2199
Other	0.0931	0.0450*	0.0580*	0.0822	0.3475	0.1468	0.0376*	0.0567*	0.0553*	0.0597*	0.0227*	0.0804
None	**Baseline**	-0.0346	-0.0040*	0.0562*	0.2152	0.0860	-0.0176*	-0.0394*	-0.0064*	-0.0170	-0.0359*	-0.0007*

Notes: * signifies a mark-up not statistically significant at the 95% confidence level.

Table 5a
Real Returns to Education (Including Housing Costs) for Males by Region:
LFS 2001-2003

	N	YH	EM	EA	L	SE	SW	WM	NW	W	S	GB
Higher degree	0.8846	0.7298	0.8001	0.7608	0.5721	0.5001	0.5010	0.6347	0.7441	0.7516	0.8424	0.7023
First Degree	0.6933	0.6810	0.6154	0,6037	0.5228	0.4348	0.4499	0.5149	0.5863	0.5925	0.7236	0.6020
Degree equivalent	0.4420	0.4482	0.4294	0.4816	0.3554	0.2314	0.2259	0.3983	0.3887	0.4177	0.4727	0.4091
A-Level	0.2633	0.2269	0.2184	0.1846	0.1661	0.0424*	0.0260*	0.1453	0.1910	0.1904	0.2541	0.2009
O-Level	0.2517	0.2016	0.1863	0.2302	0.0863	0.0185*	0.0248*	0.1740	0.1825	0.1523	0.1693	0.1765
Other	0.0884	0.0413*	0.0355*	0.0084*	-0.0432*	-0.1839	-0.1917	0.0084*	-0.0205*	0.0428*	0.0859	0.0085
None	**Baseline**	-0.0419*	-0.0111*	-0.0246*	-0.1791	-0.2452	-0.2053	-0.0501*	-0.0727	-0.0642*	-0.0073	-0.0572

Table 5b
Real Returns to Education (Including Housing Costs) for Females by Region:
LFS 2001-2003

	N	YH	EM	EA	L	SE	SW	WM	NW	W	S	GB
Higher degree	0.8893	0.8567	0.8003	0.8264	0.6084	0.5038	0.5192	0.7179	0.7571	0.8063	0.8558	0.7298
First Degree	0.6964	0.6633	0.6205	0.5883	0.5511	0.4081	0.4184	0.5472	0.6399	0.6715	0.7034	0.6042
Degree equivalent	0.4591	0.4218	0.3893	0.4427	0.3468	0.1748	0.1985	0.3392	0.3581	0.4418	0.4522	0.3797
A-Level	0.2187	0.1805	0.1538	0.2060	0.1632	0.0042*	-0.0245*	0.0928	0.1579	0.1798	0.2174	0.1607
O-Level	0.2252	0.1792	0.1759	0.1563	0.1056	-0.0594	-0.0740	0.0863	0.1313	0.1362	0.1545	0.1267
Other	0.0840	0.0302*	0.0278*	0.03738	-0.0181*	-0.2196	-0.2049	-0.0407*	-0.0032*	0.0166*	0.0551*	-0.0069*
None	**Baseline**	-0.0280*	-0.0317*	-0.0265*	-0.1426	-0.2870	-0.2543	-0.1435	-0.0709	-0.0732	-0.0095*	-0.0774

Notes: * signifies a mark-up not statistically significant at the 95% confidence level.

Table 6
Nominal Returns to Degrees by Region and Gender:
LFS 2001-2003

	Males		Females	
	Nominal	**Real (incl. housing costs)**	**Nominal**	**Real (incl. housing costs)**
Northern	0.1963	0.1960	0.2905	0.2917
Yorks/Humber	0.2374	0.1834	0.3234	0.2715
East Midlands	0.2114	0.1209	0.3038	0.2172
East Anglia	0.2194	0.1140	0.2982	0.1957
London	0.4754	0.0409*	0.5945	0.1631
South East	0.3750	-0.0599*	0.4427	0.0104*
South West	0.2535	-0.0465*	0.3200	0.0226*
West Midlands	0.1810	0.0222*	0.3089	0.1526
North West	0.2077	0.0947*	0.3526	0.2413
Wales	0.1516	0.0888*	0.3213	0.2615
Scotland	0.2646	0.2261	0.3333	0.2973
GB	0.2836	0.1095	0.3760	0.2093

Notes: all mark-ups measured relative to 2+ A-Levels in Northern England;
* signifies a mark-up not statistically significant at the 95% confidence level.

Table 7
Nominal Rates of Return to Degrees by Region and Gender:
LFS 2001-2003

	Males		Females	
	ΔEarnings	**%pa**	**ΔEarnings**	**%pa**
Northern	153,982	8.0	142,274	8.1
Yorks/Humber	171,255	9.0	152,054	8.7
East Midlands	156,204	8.1	142,675	8.1
East Anglia	183,550	9.7	124,246	6.9
London	393,860	21.6	315,507	19.9
South East	284,402	15.2	210,267	12.6
South West	193,794	10.2	139,503	7.9
West Midlands	136,128	7.0	135,196	7.6
North West	169,201	8.9	160,627	9.3
Wales	130,188	6.6	148,217	8.5
GB	206,466	10.9	170,602	10.0

Notes: all returns measured relative to 2+ A-Levels in Northern England;
returns based on typical 3 year degree (excludes Medicine, Dentistry and Languages);
fees assumed at £3000 per annum;
foregone earnings calculated at £30,496/£28,243 (men/women).

Table 8
Real Rates of Return to Degrees (Excluding Housing Costs)
by Region and Gender: LFS 2001-2003

	Males		Females	
	ΔEarnings	**%pa**	**ΔEarnings**	**%pa**
Northern	163,494	8.1	151,558	8.2
Yorks/Humber	130,000	6.2	122,811	6.3
East Midlands	109,704	5.0	108,877	5.4
East Anglia	145,746	7.1	97,526	4.6
London	314,909	16.1	257,473	14.9
South East	220,973	11.1	164,380	9.0
South West	147,412	7.2	105,882	5.2
West Midlands	88,219	3.7	100,557	4.8
North West	129,469	6.2	133,081	7.0
Wales	116,061	5.4	140,571	7.5
GB	159,992	7.9	137,325	7.3

Notes: all returns measured relative to 2+ A-Levels in Northern England;
returns based on typical 3 year degree (excludes Medicine, Dentistry and Languages);
fees assumed at £3000 per annum;
foregone earnings calculated at £32,624/£30,209 (men/women).

Table 9
Real Rates of Return to Degrees (Including Housing Costs)
by Region and Gender: LFS 2001-2003

	Males		Females	
	ΔEarnings	**%pa**	**ΔEarnings**	**%pa**
Northern	175,999	8.3	164,468	8.5
Yorks/Humber	143,018	6.6	135,637	6.7
East Midlands	92,354	3.6	100,712	4.5
East Anglia	107,157	4.5	70,347	2.4
London	2,665	-7.8	26,616	-1.5
South East	28,030	-1.8	26,086	-1.5
South West	69,34	2.1	51,286	0.9
West Midlands	50,871	0.6	76,131	2.8
North West	131,019	5.9	138,305	6.9
Wales	114,350	5.0	144,380	7.3
GB	83,443	3.1	83,781	3.3

Notes: all returns measured relative to 2+ A-Levels in Northern England;
returns based on typical 3 year degree (excludes Medicine, Dentistry and Languages);
fees assumed at £3000 per annum;
foregone earnings calculated at £34,894/£32,272 (men/women).

Table 10
Nominal Rates of Return to Degrees by Region and Gender:
LFS 2001-2003

	Males		Females	
	ΔEarnings	**%pa**	**ΔEarnings**	**%pa**
Northern	153,982	8.0	142,274	8.1
Yorks/Humber	150,599	7.6	148,933	8.5
East Midlands	160,697	8.4	143,566	8.2
East Anglia	206,778	11.2	136,046	7.8
London	161,244	6.6	193,135	9.5
South East	159,614	7.3	134,670	6.7
South West	165,279	8.4	166,259	10.1
West Midlands	108,903	5.2	158,316	9.5
North West	173,194	9.1	161,106	9.4
Wales	97,376	4.4	170,159	10.3
GB	171,171	8.6	157,957	8.9

Notes: all returns measured relative to 2+ A-Levels in specific region;
returns based on typical 3 year degree (excludes Medicine, Dentistry and Languages);
fees assumed at £3000 per annum;
foregone earnings calculated at £30,492/£28,253 (men/women).

APPENDIX

In this appendix we update the tables for Wales which were contained in our earlier report. The latter compared 1993-1995 with 1999-2001. Here we use the latest Welsh boosts to the LFS to compare the earlier period with 2001-2003. We have, however, chosen to eliminate industry fixed effects from the estimating equations used to derive the mark-ups – namely industrial classification and employment size, as allocation to those particular groups may be one means by which returns to education are derived. This means that the mark-ups for the earlier period will be slightly different than in our earlier report. In fact they are, as anticipated, slightly higher.

Appendix Table 1 can be compared to Table 5 in the earlier report. For men, the mark-ups in Great Britain in 2001-2003 are higher than in 1999-2001 for each level of qualifications apart from Other. For women, the mark-ups for both higher and first degrees are also higher according to the latest figures, but mark-ups for degree equivalent qualifications, A-Levels and O-Levels are slightly lower measured relative to no qualifications. This confirms that male and female mark-ups behave in different ways, but the returns to both first and higher degrees are now very similar for men and women, as measured on the same basis the mark-ups for women fell over this period, while those for men rose.

Appendix Table 2 provides revised mark-ups for degree subjects relative to two or more A-Levels. For men, mark-ups improved in 7 out of 13 disciplines over the period, but for women this was so in only two cases. For both men and women, returns were amongst the highest in Mathematics and Computing and in Law and lowest in the Arts.

Marks-ups across regions in 2003 are given in Appendix Table 3, using the Welsh booster to the LFS. For higher degrees, the mark-up for men in Wales is slightly higher than for Great Britain as a whole, while for women it is slightly lower. At first degree level, both men and women have lower mark-ups than elsewhere. The mark-ups in Wales for degree equivalent qualifications are close to those for Great Britain as a whole. For A-Levels, O-Levels and other qualifications, men in Wales compare favourably with elsewhere, but for women the mark-ups are much lower than in other regions.

In Appendix Table 4 a similar regional analysis is conducted for particular degree disciplines. Men in Wales tend to have lower mark-ups than males elsewhere and females higher mark-ups than females elsewhere.

The mark-up to vocational (NVQ) and 'academic' qualifications are compared in Appendix Table 5. Both in Britain as a whole and in Wales, returns are considerably greater for academic than the equivalent vocational qualifications, suggesting that the treatment of such academic and vocational qualifications as equal may be misguided. However, Welsh women secure considerably higher mark-ups than men for NVQs 4 and 5, but considerably lower mark-ups for NVQs 1, 2 and 3.

Finally, degree mark-ups at unitary authority level are provided in Appendix Table 6 relative to no formal qualifications in the unitary authority of work. The t-statistics are measured relative to the mark-up in Cardiff. While there is considerable variability in returns, for men only in Ceredigion is the mark-up significantly lower than that obtained in Cardiff. For women, the mark-up is significantly lower in Anglesey and

Ceredigion, but significantly higher in Powys, Neath Port Talbot, Rhonnda Cynon Taff and Caerphilly.

Appendix Table 1
Returns to Education in Great Britain by Gender:
LFS 1993-1995 and 2001-2003

	1993-1995		2001-2003	
	Men	**Women**	**Men**	**Women**
Higher Degree	0.7689	0.8913	0.8263	0.8493
First Degree	0.6871	0.7922	0.7209	0.7188
Degree Equivalent	0.5376	0.6381	0.5014	0.4709
A-Level	0.2632	0.2704	0.2741	0.2541
O-Level	0.2656	0.2433	0.2544	0.2120
Other	0.0700	0.1111	0.0691	0.0719

Note: all mark-ups measured relative to no formal qualifications.

Appendix Table 2
Degree Mark-ups in Great Britain by Degree Subject and Gender
Relative to 2+A-Levels: LFS 1993-1995 and 2001-2003

	1993-1995		2001-2003	
	Men	**Women**	**Men**	**Women**
Health	0.3091	0.4970	0.3096	0.4465
Nursing	0.2189	0.4033	0.0533	0.2540
Sciences	0.2048	0.3304	0.1797	0.2783
Maths and Computing	0.2763	0.4142	0.3352	0.4325
Engineering and Technology	0.2191	0.3900	0.2919	0.3275
Architecture and Related Studies	0.1048	0.4612	0,1783	0.3937
Social Sciences	0.1482	0.2683	0.0972	0.2324
Economics, Business and Financial Studies	0.2507	0.3564	0.2981	0.3605
Law	0.2557	0.4577	0.3811	0.4450
Arts	0.0291*	0.2966	0.0108*	0.2112
Languages	0.2430	0.4201	0.1407	0.3256
Education	0.1722	0.4410	0.1030	0.3293
Combined	0.1719	0.3026	0.2069	0.2669

Notes: * signifies a mark-up not statistically significant at the 95% confidence level.

Appendix Table 3
Returns to Education by Region and Gender:
LFS 2003

	GREAT BRITAIN		WALES (Booster)		SCOTLAND		REST OF ENGLAND		SOUTH EAST ENGLAND	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
Higher Degree	0.8365	0.8655	0.8526	0.8471	0.8791	0.9369	0.8200	0.9051	0.8773	0.8096
First Degree	0.7094	0.7187	0.6666	0.6773	0.7414	0.8143	0.6873	0.7061	0.7850	0.7304
Degree Equivalent	0.4904	0.4629	0.4955	0.4575	0.4698	0.5230	0.4794	0.4433	0.5454	0.4753
A-Level	0.2631	0.2411	0.2862	0.1844	0.2395	0.2638	0.2427	0.2190	0.3327	0.2907
O-Level	0.2314	0.2073	0.2308	0.1418	0.1200	0.1739	0.2226	0.2025	0.3042	0.2352
Other	0.0609	0.0674	0.1090	0.0278*	0.0637	0.0760	0.0420	0.0558	0.1113	0.1048

Notes: all returns measured relative to no formal qualifications;
* signifies a mark-up not statistically significant at the 95% confidence level.

Appendix Table 4
Degree Mark-ups by Degree Subject, Region and Gender
Relative to 2+ A-Levels: LFS 2003

	BRITAIN		WALES (Booster)		SCOTLAND		REST OF ENGLAND		SOUTH EAST ENGLAND	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**
Health	0.3957	0.4757	0.4282	0.5076	-	0.8149	0.5391	0.5018	0.2252	0.4777
Nursing	-	0.2514	-	0.3529	-	-	-	0.3368	-	0.1269
Sciences	0.1979	0.3168	0.1891	0.3350	0.4345	0.8072	0.1890	0.3047	0.1718	0.2780
Mathematics and Computing	0.3836	0.4365	0.2230	-	-	-	0.3787	0.3800	0.4004	0.4602
Engineering and Technology	0.2794	0.4113	0.1094	-	0.7168	-	0.3013	-	0.2123	-
Architecture	0.2913	-	0.1873	-	-	-	0.3367	-	0.1990	-
Social Sciences	0.1175	0.2033	0.0483	0.2991	-	-	0.1177	0.1986	0.1795	0.1904
Economics, Business and Finance	0.3058	0.3662	0.1707	0.2879	0.7742	0.5234	0.2797	0.3775	0.3536	0.4269
Law	0.3578	0.5647	0.1830*	0.3331	-	-	0.2879	0.5712	0.4165	0.5649
Arts	-0.0086*	0.2195	-0.0591*	0.2991	-	0.6532	0.0106	0.2027	-0.0227*	0.1926
Languages	0.0837*	0.3346	-	-	-	-	-	0.2472	-	0.3857
Education	0.1444	0.3658	0.1829	0.4594	-	1.0161	0.2193	0.3610	-0.1553*	0.1885
Combined Studies	0.2194	0.2886	0.1036*	0.3184	0.5607	0.8144	0.2035	0.3117	0.2312	0.2083

Notes: all mark-ups measured relative to two or more A-Levels;
- less than 15 observations in the sample;
* signifies a mark-up not statistically significant at the 95% confidence level.

Appendix Table 5
Returns to Vocational and Academic Qualifications by Gender:
LFS 2003

	GB		WALES	
	Men	**Women**	**Men**	**Women**
Higher Degree	0.8369	0.8638	0.8514	0.8446
First Degree	0.7067	0.7157	0.6638	0.6724
Degree Equivalent	0.5371	0.5282	0.5549	0.5267
NVQ 5	0.5530	0.5343	0.4825	0.7059
NVQ 4	0.3810	0.4524	0.4040	0.5234
NVQ 3	0.2905	0.2272	0.2981	0.2154
A-Level	0.2730	0.2801	0.3022	0.2266
NVQ 2	0.1225	0.0950	0.1416	0.0694
O-Level	0.2274	0.2045	0.2259	0.1392
Other	0.0600	0.0723	0.1073	0.0318*
NVQ 1	0.0385*	-0.0645*	0.1236	-0.0445*

Notes: all mark-ups measured relative to no formal qualifications;
* signifies a mark-up not statistically significant at the 95% confidence level.

Appendix Table 6
Degree Mark-ups in Wales by Unitary Authority of Work and Gender: LFS 2003

	Men		Women	
	Return	**T-stat**	**Return**	**T-stat**
Anglesey	0.4670	-1.47	0.3668	-2.08
Gwynedd	0.5706	-1.41	0.6973	0.54
Conwy	0.7024	-0.13	0.6287	-0.16
Denbighshire	0.603	-0.97	0.5985	-0.60
Flintshire	0.8399	1.09	0.6481	-0.12
Wrexham	0.2500	-1.09	0.5856	-0.86
Powys	0.6451	-0.44	0.9532	2.00
Ceredigion	0.3279	-3.27	0.5019	-2.14
Pembrokeshire	0.5572	-1.76	0.5812	-0.71
Carmarthenshire	0.5439	-1.70	0.6984	0.54
Swansea	0.6733	-0.48	0.6770	0.24
Neath Port Talbot	0.5896	-1.45	0.8665	2.15
Bridgend	0.6643	-0.45	0.7189	0.81
Vale of Glamorgan	0.8324	0.99	0.8027	1.31
Rhondda, Cynon, Taff	0.7190	0.05	0.7758	2.03
Merthyr Tydfil	0.6256	-0.49	0.5472	-0.78
Caerphilly	0.8405	1.21	0.8622	2.50
Blaenau Gwent	-0.0776	-14.79	0.7930	0.69
Torfaen	0.7275	0.14	0.7885	1.64
Monmouthshire	0.5651	-1.21	0.7779	1.43
Newport	0.7511	0.46	0.6092	-0.50
Cardiff	0.7140		0.6600	

Notes: all mark-ups measured relative to no formal qualifications in Unitary Authority of work;
robust t-statistics measured relative to mark-up in Cardiff UA.
- denotes no observations available

Appendix Table 7
Classification of Variables for LFS Analysis

Variable	***Variable Description***
Age	Age in years of respondent (entered in quadratic form).
Coloured	Dummy variable indicating that respondent is of an ethnic origin other than white.
Marital status	Dummy variable indicating marital status of respondent. 1: married or cohabitating; 2: single; 3: widowed, divorced or separated.
Region	Dummy variable indicating region of residence of respondent. 1: Northern; 2: Yorkshire and Humberside; 3: East Midlands; 4: East Anglia; 5: Inner London; 6: South East (excluding London); 7: South West; 8: West Midlands; 9: North West; 10 : Wales; 11: Scotland.
Part-time	Dummy variable indicating that respondent works on a part-time basis.
Year	Dummy variable indicating year of interview.
Job years	Dummy variable indicating job tenure with current employer. 1: less than 2 years; 2: between 2 and 5 years inclusive; 3: greater then 5 years.
Hqual	Dummy variable indicating highest educational qualification of the respondent. 1: higher degree; 2: first degree; 3: degree equivalent; 4: A-Level; 5: O-Level; 6: other; 7: none.