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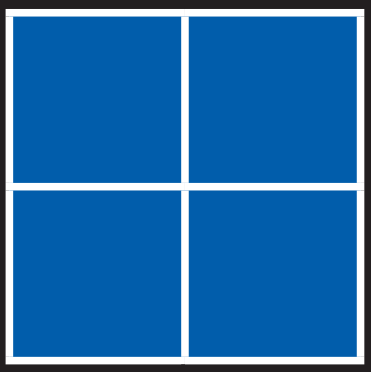

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Bachelor's and Short Degrees in the UK and US: New Social Rates of Return and Non-Market Effects on Development

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Abstract

This paper estimates the social rates of return and the value of the wider benefits of learning, beyond earnings arising from expanding access to bachelor's degrees and to short degrees in the UK and the US. The term 'short degrees' is used here as a user-friendly term to refer to Associate Degrees in the US and to sub-baccalaureate level 4 higher education qualifications in the UK, even though some of the UK programmes are not technically certified with 'degrees'. 'Short degrees' does not refer here to 'accelerated' courses. Bachelor's Degrees is a commonly used term in both countries. Updated 'narrow' social rates of return based only on earnings are calculated by the full method using institutional unit costs and distributed lags based on the full age-earnings profile. This approach results in some new insights. It also estimates the value of the private and social non-market benefits beyond earnings. The calculations correct for net ability bias, consider the time spent acquiring each qualification, and include social rates of return at basic education, Masters, and PhD levels. Transitory effects from the recession are considered.

Non-market private and social benefits beyond earnings are estimated based on a systematic analysis of existing studies. This is not a literature review but instead builds on the best that has been done to go the next step of estimating the economic value of the non-market benefits by avoiding overlap, standardizing, and averaging independent studies. Since graduates spend about twice as much time using their human capital in the home or in the community as on the job it is not surprising that the estimated value of the non-market outcomes turns out to be significantly larger than the earnings benefits. The paper concludes with implications of these non-market outcomes for regional economic development.

Policy implications follow from the fact that poor information about the non-market private and social benefits, which are above and beyond earnings, appears to be contributing to market failure in higher education markets and under-investment in higher education. Short degrees are also a less costly route for increasing access for bright students from lower-income families, and offer opportunities for improving the quality of the first two years of college. New total social rates of return indicate that there are opportunities for greater overall economic efficiency that are conducive to faster development.

Contents

Introduction

Currently 38% of young adults aged 20-29 in the UK and 40% in the US are enrolled in higher education. Both participation rates are relatively low compared to the 55% in Canada, Japan, and South Korea as well as in 12 other OECD countries where these enrolment rates are above 40% (OECD 2009). So the UK and the US are falling behind.

Sub-baccalaureate level 4 qualifications in the UK taken as a group will be referred to as 'short degrees' for brevity, even though they include some programmes that are not technically certified with 'degrees', because 'short degrees' is a more user-friendly term and can also be used to refer to US Associate Degrees. 'Short degrees' does not refer here to 'accelerated' courses. Defined in this way, short degrees constitute 24.7% of all undergraduate qualifications obtained in the UK (HEFCE 2007/8 and HESA 2007/8, Tables 0 and 14). As a proportion of total higher education enrolments, total sub-baccalaureate level 4 enrolments are about half what they are in the US, where 48% of all degrees awarded are two-year Associate Degrees, and students in Community Colleges are now 49% of all US undergraduates (NCES, 2009, Tables 6 and 8).

Current national policies seek higher enrolment and completion rates. A 50% participation rate is sought in England and Wales, although Scotland is not planning to increase enrolments beyond their present levels. In the US, a doubling of need-based Pell Grants is proposed by the Administration as part of the national effort to support enrolments and reverse the severe economic plight of those with a secondary education or less. This paper presents evidence relevant to these issues by developing new social rates of return to investment in education in both countries computed by identical methods, together with estimates of the value of the non-market private and social benefits beyond earnings, which are also relevant to economic development. The focus is on the returns to sub-baccalaureate qualifications and bachelor's degrees in the UK, but also on short degrees and bachelor's degrees in the US, although social rates of return to basic education and to Masters and PhD programmes are computed for comparison. Special attention is given to short degrees, and not just to the bachelor level, because for students who use short degrees to proceed to bachelor's programmes these can significantly lower the cost to the government, as well as to the student, of finishing bachelor's

programmes, especially if ways are used to strengthen the quality and increase the general education content which lowers the costs. For those who leave higher education after acquiring a short degree, there are lifetime earnings and additional non-market private benefits, but also a significant contribution to regional development, given that these graduates disproportionately remain in or near their local communities where they contribute to the region's development.

The method used for earnings-based social rate of return calculations is the 'full method' for calculating a pure internal rate of return, in contrast to familiar Mincer regression methods. This makes it possible to take the specific institutional unit costs of each programme into account, leading to a true social rate that is more relevant to public policy than Mincer returns, which typically ignore differences in institutional and other public costs. But equally important, the age-earnings data and the institutional unit costs entering into a social rate of return calculation offer new insights, as will be seen, that are not revealed by Mincer regressions. This paper builds upon and extends the substantial analysis in Dearden, McIntosh, Myck, and Vignoles (2002), and the follow-up by McIntosh (2002); both papers have also contributed significantly to what follows. By using different methods, but using UK Labour Force Survey data for a later year, this paper finds some of the same effects they report, but also reveals some differences. For example, this paper finds a larger return to short degrees for students that have prior vocational qualifications, and a smaller or no return for students coming from prior A-levels, whereas Dearden et al do not find this. There are other useful existing studies that will be cited where relevant, such as Swailes and Roodhouse (2004), Powdthavee and Vignoles (2006), Jenkins, Greenwood, and Vignoles (2007) and Walker and Zhu (2008). The first is a review but the others are all focused on market returns using Mincer regressions. This paper differs in using the 'full method', but is drastically different from prior work in presenting comparisons with reasonably comparable US social rates of return at bachelor's and short degree levels, and also in the specific estimates of non-market private and social benefits of these degrees and their relation to regional development.

The analysis corrects for net ability bias, net of measurement error, in the rates of return to general education and to programmes leading to vocational qualifications in the UK. This is important to do because of sorting that occurs in the ability levels of students entering each. The

paper also develops the unit cost per FTE student for sub-baccalaureate and bachelors degrees, data hard to come by in the UK. Many short degrees are pursued at Further Education Colleges, as are Associate Degrees at Community Colleges in the US, although in the UK some are in cooperation with universities. Unit cost data is readily available in the US, and interesting insights arise from considering the unit costs of short degrees relative to bachelors. There is a rich prior literature, within which Mincer returns have sometimes been calculated by academic discipline. This paper raises questions about using these for policy purposes, suggesting that there are differences across disciplines in institutional unit costs as well as non-market outcomes.

This paper considers sub-baccalaureate level 4 qualifications in the UK taken as a group because they cover a range of courses that are very similar to covered by US Associate Degrees offered by Community Colleges. The courses are not identical (although components like the Foundation Degree are closest), but UK level 4 courses do contain things that are included in US Associate Degrees, such as practical nursing programmes and the components of Higher National Diplomas (HNDs). The latter are quite similar to the programme taken by US students planning to transfer, and in both cases a significant percentage of these students go on for bachelor's degrees. The sub-baccalaureate level 4 qualifications are not identical within England, Wales, Scotland, and Northern Ireland, but the cycle costs of these programmes can and will be corrected for a weighted average of their length. That is, the UK offers the following separate programmes which in the US are the same types of things that are grouped within the Associate Degree, plus a few other Community College offerings, so that the UK package taken as a whole is at the same level and is similar to what is found in the US. Specifically, sub-baccalaureate level 4 qualifications in the UK and in the Labour Force Survey data used include the:

Foundation Degree
Higher National Diploma,
Higher National Certificate
BTEC
Diploma in Higher Education
Nurses' Training
Teacher Training
And other sub-baccalaureate level 4, a tiny category.

Most will have been completed at Further Education Colleges, and some in partnership with universities, but some include credits for on-the-job training or experience. Virtually all of the above are typical of US Associate Degrees as well, including some credits for on-the-job training. However, they will more commonly be listed by major or by subject field such as 'business', 'agriculture', 'English', 'computer science', or 'nursing' majors rather than as the comparable but separate and free-standing programmes found in the UK. In the US, as well as in the UK, these programmes accommodate quite a few older students of 'non-traditional ages'. In the US, Community Colleges do not tend to offer courses franchised by universities as do some UK Further Education Colleges. The Community Colleges are separately accredited, and their quality monitored and sustained by State-level Community College Boards that are also responsible for about 50% of their funding. Students in these colleges, and in US high schools, do not graduate based figuratively on a certificate of attendance but instead receive academic grades in each course along the way. Their grade point average must be sufficient, and they must have met the major's and distribution course requirements, or they do not graduate. That is, there is not one exam at the end of the year or the programme (with the possibility that a lot of time is wasted in the early years), but instead there are many grades in each subject each semester all along the way. Their rank in the high school class plus the nationwide ACT and College Board test scores determine which of the more selective bachelor's institutions they are able to enter.

So there are differences between the systems, but there are also almost overwhelming similarities. It is important to be aware of differences but not get so preoccupied with the details of differences within the UK or between the UK and the US that the forest is obscured by the trees. Some perspectives on components such as Foundation Degrees will be offered, but these are relatively new and constitute only a small proportion of total undergraduates (4.8%). So Foundation Degree graduates are not far enough along in their life cycle for data to be available on earnings at older ages, which is necessary for meaningful social rates of return to be calculated. In the US it is only since 1995 that it has been possible to calculate meaningful social rates of return for Associate Degrees, when the Census/BLS data includes enough graduates from the 1960's when Community Colleges first began to expand.

Finally, this study is unique in extending the analysis to include estimates of the economic value of the non-market private and social annual benefits per graduate from short degrees and bachelor's programmes in both the UK and US. These estimates are based on studies in the existing literature which are standardized so independent studies of the same effect can be averaged. Private non-market benefits beyond earnings are those that contribute to the graduate's better health, increased longevity, better spousal and child health, increased child education, the child's cognitive development, more efficient household purchasing, higher saving rates, better management of saving, and happiness. These are aspects of the quality of life beyond earnings and included in measures of regional development. Social non-market benefits beyond earnings are contributions to civic institutions, democracy, and good governance, greater political stability, lower crime rates, lower public health, welfare and prison costs, increased trust and social cohesion, and major contributions to the adaptation of new ideas benefiting future generations. Including estimates of the value of non-market development makes a true social rate of return possible and appraisals of the potential impacts on development more complete and meaningful.

I. Background and Conceptual Framework

In both the UK and the US, the relative plight of those with less education has worsened since 1980. This has affected tax revenues and spawned other symptoms that provide the background against which an analysis using the concepts of human capital formation generating earnings and non-market benefits over the life cycle and endogenous development offer new insights.

Background

A squeezing of the majority of the population, worsening the plight of those who have secondary education or less, has been going on in both the UK and US since 1980. In the US, for example, those with a high school education or less who are 64% of the population, have seen no increase in their real earnings since 1980, and have seen declines since the onset of the current recession, whereas those with a college degree have enjoyed a 48% increase in real earnings during this same period (McMahon 2009). In the UK the same pattern of a widening advantage for those who have completed college-level qualifications appears but the percentage in the population

with a secondary education or less is larger. In both countries inequality has been continuing to increase. In both countries there is growing discontent, disillusionment with 'the establishment', and growing calls for protectionist measures.

Against this background, as technology and automation continue, the occupations where jobs are growing tend almost exclusively to be those that require skills involving two or four years of college. For example, in the US, the 30 occupations where demand is forecast to continue rising the fastest in the all now require two years of college or more, except for home health care workers, and the occupations expected to decline are heavily concentrated in the low-skilled occupations (CEA 2009; McMahon 2009, pp.76-82). Home health care workers face rising demand because of an ageing population in both countries, but even there, there are calls for increased professionalism requiring sub-baccalaureate level 4 training of practical nurses.

The theoretical and empirical context is that it has long been known that a premium is earned by the college educated in the job market due to the advantage they have in working with new technologies (Bartel and Lichtenburg 1987). But it is also well known that those with more general education especially have more peaked age-earnings profiles, largely because they are more flexible and can change jobs and even move to new careers, responding to where the bottlenecks in the labour market are. This advantage of those with better education appears to be increasing as lower-skilled manufacturing jobs are displaced by automation, international outsourcing, and immigration, and has been increasing even more sharply since the onset of the current recession. If college graduates find it more difficult to get employment in the middle of a recession, it is important to put this in perspective and recognize that recessions are always much harder on those with only secondary education or middle-school level skills. Investment in human capital is a very long-term investment that yields returns over the approximately 45 years remaining in the labour force. Students seem to know this, and first-time full-time enrolments are up 5% in the UK during the current recession (although part-time enrolments are down, probably because of a cut in funding). In the US two-year college enrolments have increased by about 11%. But this is transitory, related to the business cycle, and over the period since 1980, the background point basic to this analysis is that the overall pattern in the US and the UK is that

those with a senior secondary education or less are falling behind both economically and socially, and discontent is rising as their condition becomes increasingly acute.

Conceptual Framework for the Estimates

The conceptual framework for the estimates of earnings benefits and of private and social non-market benefits is that of investment in human capital formation that yields returns throughout the remainder of the life cycle. These returns are both market-measured, in the form of earnings or GDP per capita, and in the form of non-market benefits as graduates use their human capital productively at home or in the community. Time spent on the job generates market earnings. Time spent in household production at home generates private non-market benefits, and time spent in the community generates social benefits to others, including others in future generations. So estimates of these three types of benefits can be added together, assuming appropriate statistical controls are used in regression estimates to prevent overlap. In particular, it is important to avoid double-counting by not including both the effect of education on final outcomes and the effects of education on behaviours that contribute to those outcomes in the calculations.

The life cycle framework illustrated in Figure 1 also helps explain the dynamics of the process and the flow of causation. The investment of time and resources comes first, from E to G in Figure 1, and the benefits come later, in the form of a 'college net earnings differential' over 45 years or so, and non-market private and social benefits over the 60 years or so remaining in the average life span. The logical flow of causation is clear from investment first to benefits later. There is a lag of about 20 years on average before the peak 'college earnings differential' and the peak non-market benefits are reached. There is of course a distributed lag, and not just a 20-year lag. But regression methods used to estimate the non-market returns to education later do not normally estimate the weights on lags of different lengths in order to avoid unmanageable complexity. The lag is shorter for some outcomes and longer for others, but an average of 20

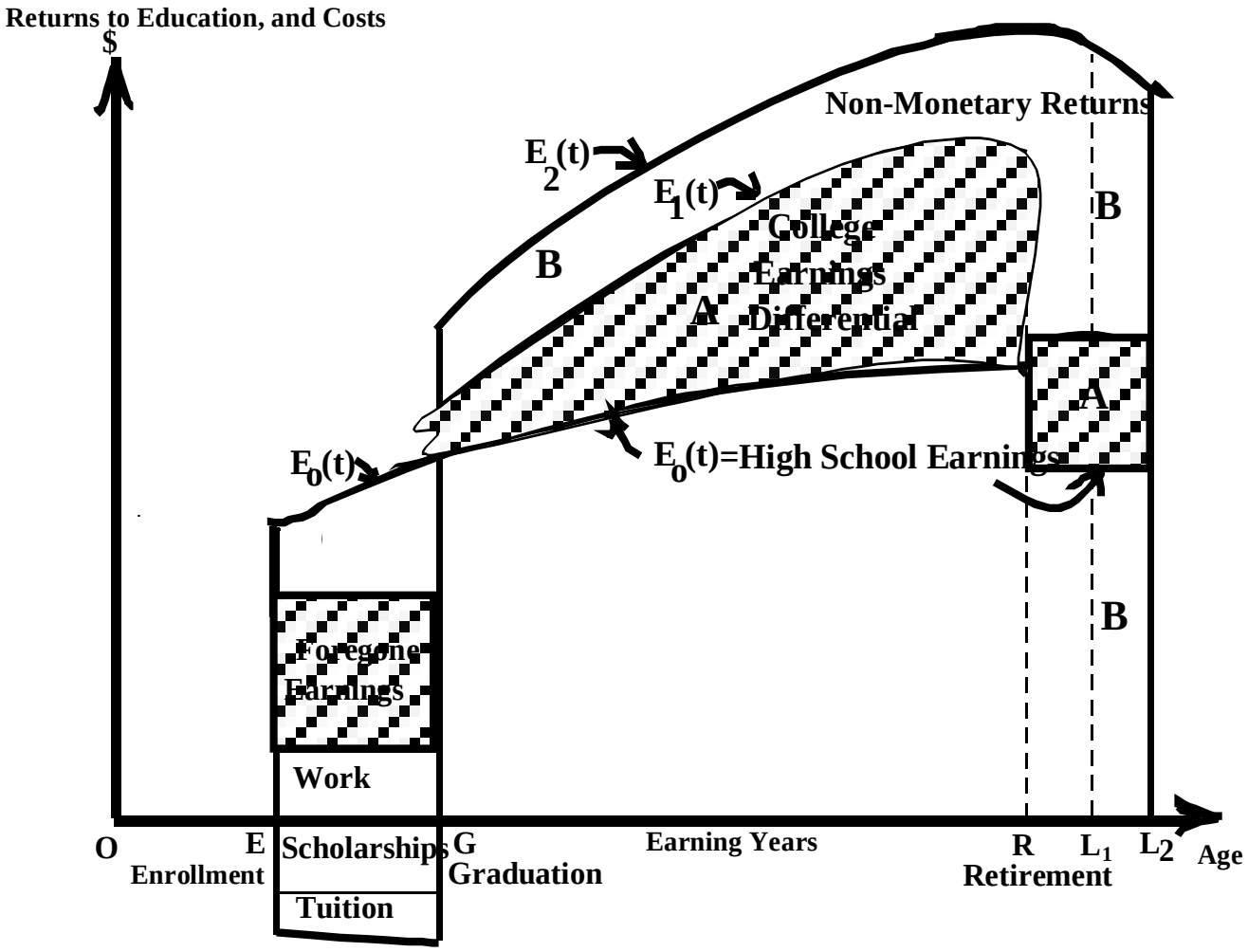


Figure 1: Investment in Human Capital Followed by Earnings and Non-Market Benefits Over the Life Cycle

years is typical. A single lag can also be interpreted as indexing an upward or downward shift in the whole age-earnings profile. For the earnings benefits only, using the 'full method' however allows the details of the distributed lag to be taken into account. When one or more lags appear, this alone means that the model is dynamic.

So, for the first portion of the conceptual framework used for calculating the social rates of return (an IRR) by the 'full' method, the 'college earnings differential' shown in Figure 1 is

obtained by subtracting the earnings at the next lower level of education (e.g. either senior secondary or vocational level 3) from the earnings of college graduates at each age. Earnings for the UK are from the Labour Force Survey (LFS) and for the US are from the Census/BLS Current Population Survey (CPS) as shown on two spreadsheets that can be downloaded at McMahon (2010b) (i.e. https://netfiles.uiuc.edu/wmcmahon/www/) with all of the necessary formulas. The social rate of return is found by numerical methods as that rate that equates the discounted present value of this stream of net 'college earnings differentials' at each age to the investment costs. The latter consist of direct institutional costs, which would include publicly subsidized tuition plus foregone earnings costs which are borne for most undergraduates largely by the parents as they pay room, board, and tuition costs. The result is the 'narrow' social rate of return, 'narrow' because it is based only on earnings. The social rate uses earnings before taxes, includes part time earnings, and explicitly includes institutional unit costs.

With respect to short degrees, in both the UK and the US these typically involve higher proportions of older adults than do Bachelor degrees. Some return after a period of employment to upgrade their qualifications. The earnings discounting for these begins at the older age at which the individual enrols, which shortens the number of years during which market and non-market benefits are generated. These older students have not been sorted out in this study in either the UK LFS data or the US CPS data; older students are included in the breakdowns for whatever age cohorts they are in for both countries alongside people of the same age who acquired qualifications earlier in their lives. So the rates of return will be lower for these older workers, tending to reduce the earnings at earlier ages and the average rates of return for short degrees in both countries.[1]

The second aspect of the theoretical framework draws on endogenous growth (e.g. Lucas, 1988, 2008) and endogenous development (e.g. McMahon 2002, 2007) theory and empirical work. Beyond the market benefits discussed above that are captured in the production function used in both, there is a household production function that is a part of endogenous development within which the same human capital is used almost twice as long or about 72 hours each week (when not sleeping) in 'household production', either at home or in the community, producing final satisfactions (Becker 1965; 1976). Analogous to the Lucas (1988) production function, which

includes externalities measured by the average level of education in the community, this household production function for each non-market outcome can also include education externalities. The externalities term in the production function increasing the returns to scale is the theoretical basis for the external social benefits of education. Lucas' (2008) recent paper goes a step farther in seeking to make 'new ideas' endogenous by making them dependent on past investment in human capital. This is no more than an extremely brief sketch. But it illustrates steps toward a better explanation of 'technical progress' and has certainly helped to define the basis for both knowledge-based economies and social benefit externalities from higher education.

The estimates reported below of the private and social non-market benefits from higher education are based on regressions dealing with each non-market outcome which also contain lags from the time the investment in education is made (or is increased) and the time when the effects are detectable. With respect to the estimates of the size of the impacts, if each individual's human capital is used in combination with market goods on average more than twice the amount of time spent working at home producing private non-market satisfactions (e.g., from reading) and in the community producing social benefits (e.g. through service to charitable organizations or on boards and juries), it is plausible that these non-market outcomes may be substantial. Beyond this, Figure 1 calls attention to the fact that non-market private and social outcomes are also generated after retirement at R. Those with college live longer, so there are additional non-monetary returns that are valuable from L_1 to L_2, the end of life.

The dynamics of the conceptual framework, however, suggest caution in interpreting estimates of the size of all education outcomes, since with the lags mentioned in the short-term dynamics of the process, the benefits can be shown to be larger as more time passes. The outcomes in each period set the stage for each new round of growth and development as time passes (McMahon, 2007, Oketch 2006, Appiah and McMahon 2002, McMahon 2002).

II. 'Narrow' Social Rates of Return

Social rates of return to investments in human capital leading to short degrees and bachelor's degrees in the UK and US are considered below. For UK 'sub-baccalaureate NVQ4 qualifications' in the LFS, called short degrees even though many receive diplomas, apprenticeship training credits, or other qualifications that are technically not 'degrees', the qualifications taken as a group are quite similar to what is included in US Associate Degree offerings. Recent changes, such as the greater transferability of credits and a 2-year standard in Foundation Degrees, make this component even more similar. Before considering insights offered by age-earnings profiles, costs, and social rates of return, the Labour Force Survey 'sub-baccalaureate NVQ4' and bachelor's categories will be considered further.

UK Sub-Baccalaureate Level 4 Qualifications

Between 1988 and 1996 in the UK higher education enrolments including short degrees rose by 93% while in the US it rose by only 15% (Walker and Zhu, 2008). During this period there was little or no reduction in the college premium for men and a 10% rise in the college premium for women (Walker and Zhu, 2008, p.708). A portion of this enrolment increase in the UK has come in sub-baccalaureate level 4 qualifications. But as indicated these are a much smaller 24.7% of all undergraduates in the UK compared to the 49% of all undergraduates in the US in Associate Degree programmes.

The age-earnings profile data encompass persons whose completion dates go back up to 49 years, approximately the amount of time individuals are typically in the labour force. So the following description cannot apply only to what exists at the present; it must take into account education levels and programmes that were common in the past. 'Sub-baccalaureate level 4' qualifications in the UK Labour Force data as indicated earlier include Foundation Degrees, Higher National Diplomas, Higher National Certificates, BTEC Higher National Certificates, Diplomas in Higher Education, Certificates of Higher Education, Nurses Training, teacher training, RSA Higher Diplomas, and Other Higher Education below Bachelor's Level. These programmes are offered separately in the UK, but generally included as curricular offerings or majors as part of Associate Degrees in US Community Colleges. 'Other Higher Education below (Bachelor's) Degree Level' will be excluded because it is not clear what it includes, and is a very

small category (4.8% of the total). It could also be somewhat similar to the US 'college 1-3 years' category which will not be included in the US analysis. In the UK about 57% of these students are part time, and in the US 59% in Community Colleges are part time (HESA, 2009, Table 14, 2007/8, and NCES 2008, Table 192 respectively). For the US, the mean earnings of all workers which includes part time from the BLS/Census Current Population Survey are used for the tables and the calculations, which is the correct concept because if the education results in only part time work, these are the earnings that represent the true return to education. For the UK, only hourly wage rates are reported, so this is converted to annual earnings of all workers based on hours actually worked, which includes part-time workers. This has not been done in those prior studies which use hourly wage rates that therefore report Mincer returns that are biased upward. Specifically, the average hours actually worked per year in the UK are estimated at 1669 hours (OECD 2008, Table F, p. 262). There is a difference between males and females since 9.9% of the work by males and 38.8% by females is part time (OECD, 2008, Table E , p. 261). This is used to compute the average hours actually worked by males as 1,881 hours per year and by females 1,534 hours per year in the UK. These are multiplied by their average hourly wages to obtain their mean annual earnings shown below and used for the computations.

In the UK most of the sub-baccalaureate level 4 higher education qualifications are obtained in Further Education Colleges (FEC's), of which there are 326 in England, 48 in Scotland, 24 in Wales, and 6 in Northern Ireland. For comparison, the US sample data is drawn from graduates obtaining Associate Degrees offered in 1,195 Community Colleges. As a ratio to the population, there are about twice as many FEC's in the UK as there are Community Colleges in the US. So the latter on average are larger and have economies of scale unit cost advantages.

Many students in HND and Foundation Degree programmes go on for bachelor's degrees, and some in practical nursing and teacher training do as well. But the transfer of credits especially to other universities with which the FEC is not partnered is more difficult, which is different for US Associate Degrees. However, improvements have been made in this regard with the newer Foundation Degrees which were designed to facilitate transfer of up to 240 credits. But in practice each Foundation Degree course has to have a specific named university prepared to accept its graduates. This is a limiting factor.

Another aspect relevant to costs, improving higher education status and quality, and to gaining wider acceptability of short degrees, is that on average sub-baccalaureate level 4 programmes have a larger proportion of vocational courses and fewer general education courses. In the US those Associate Degree students who plan to transfer generally have 100% of their credits in general education courses, and those in vocational programmes have about 25% in general education. The latter are not prevented from changing to transfer programmes if they wish. But they may lose the transferability of some of their vocational education credits. The preparation for transfer to bachelor's degree programmes is the basis for the role of short degrees in higher education. In the US, 71% of beginning Community College students in 1989-90 anticipated earning a bachelor's degree when asked, and 38% of all students enrolled eventually did transfer (NCES 2001, pp. vii, ix). The percentage of UK students expecting to go on to further study is not known for most sub-baccalaureate level 4 students. The typical US general education curriculum taken by transfer students is English (2 courses), Maths (1), Social Sciences (3), Humanities (3), Physical and Biological Sciences (2), plus proficiency in one language other than English. The general education components are less costly, as considered later, and also offer greater flexibility when graduates change jobs.

Age-Earnings Profiles

Age earnings profiles are shown in Figure 2 for male graduates in the UK completing short degrees (level 4 sub-baccalaureate), bachelor's degrees, senior secondary general sometimes including A-levels, and vocational qualifications at the secondary level 3. The results are revealing.

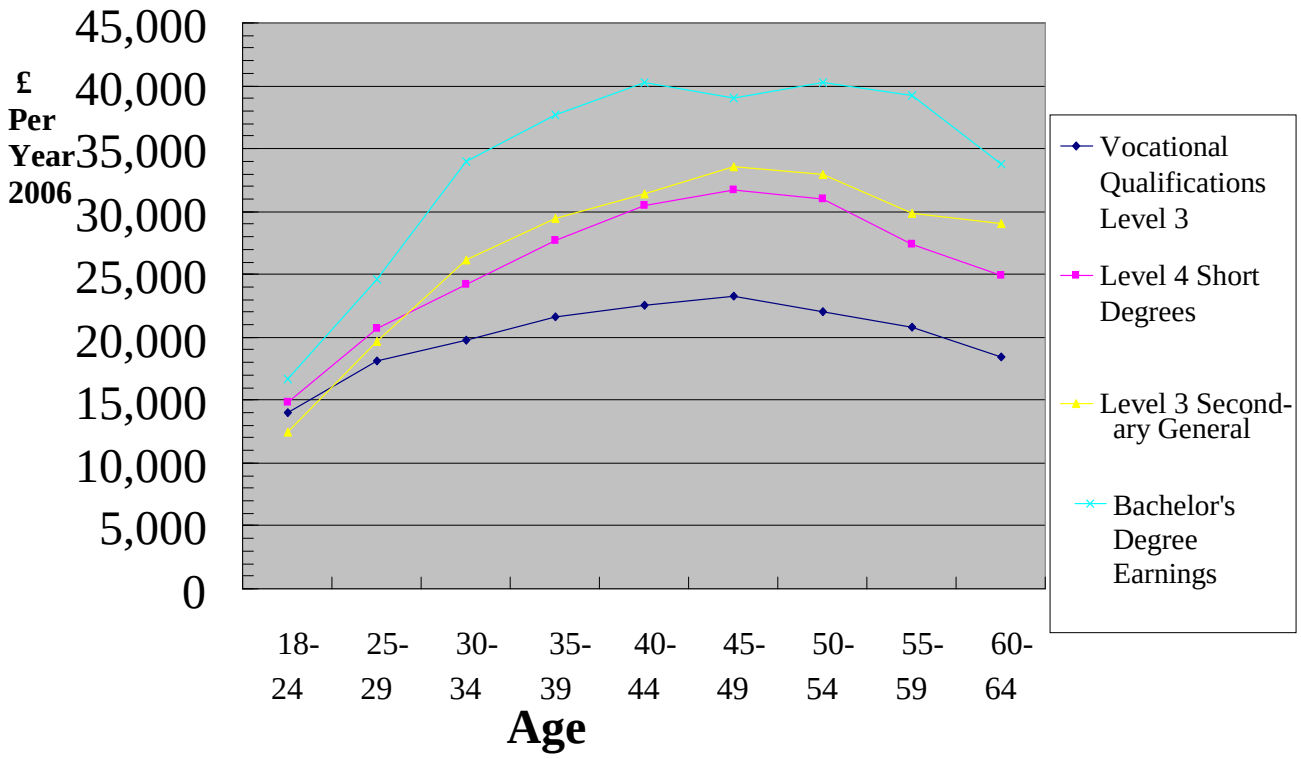
UK age-earnings profiles

For those who complete a bachelor's degree there is a large positive earnings differential above all other lower qualifications at all ages. Second, and remarkably, those who complete sub-baccalaureate level 4 programmes and those who enter the labour force after upper secondary general programmes do about equally well. That is, there is no economic advantage on average for those who complete upper secondary general and A-levels going on for a short degree. Third, many who complete short degrees do so as part time students and are mature adults as is true in

the US. Short degree earnings at younger ages in Figure 2 will not include these graduates and therefore will be a bit lower because of this. But the rest of the average age-earnings profile is unlikely to be much affected by late starters (even though their rates of return will be a bit lower because of the smaller number of years left in the labour force).

Fourth, the most remarkable thing is that the age-earnings profiles of those with vocational qualifications at level 3 are much lower than secondary general graduates who do not go on. They also tend to be almost flat after about age 32. Those with more general education and those who go on to complete short degrees have age-earnings profiles that are higher and decidedly more peaked. Some of this is due to net ability-bias (i.e. ability-bias net of measurement error) since the earnings due to education of those with upper secondary general level 3 are overstated by about 7.7% due to net ability bias (as measured by achievement tests). Similarly the earnings of those with level 3 vocational qualifications would be about 5% higher if corrected for net ability bias. This correction is explained further below, and is made when calculating social rates of return. But this net ability bias is not large enough effect to explain the gap seen in Figure 2. A

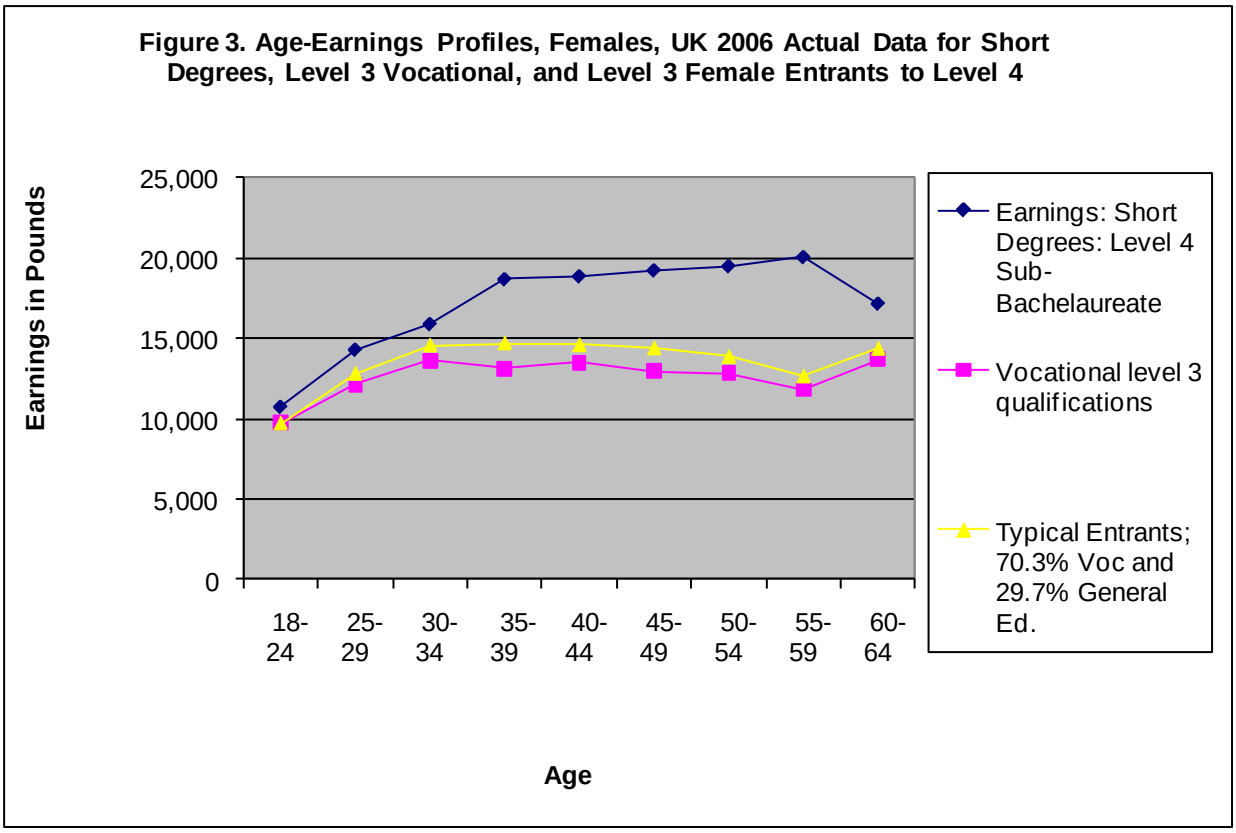
Figure 2: Age Earnings Profiles, Males, UK 2006, Actual Data (No correction for net ability bias)



gap between the earnings at older ages of those with more general education and those with vocational training is a widely observed phenomenon. The standard explanation is that vocational skills tend to be less flexible as career changes become more common, and as technical change and automation occur.

The age earnings profiles for females in the UK are shown below in Figure 3. For females they are remarkably flat after age 30 for those females having level 3 vocational qualifications as well as for "typical" females entering sub-baccalaureate level 4 programmes (about 70% coming from prior vocational qualifications and 30% from prior general education). Many of the females enrolling in teacher training have had general education and many of those enrolling in nursing have vocational backgrounds. Nevertheless, Figure 3 shows clearly that whether the prior background is vocational or 'typical', for females pursuing sub-baccalaureate level 4 short degrees is particularly advantageous.

Figure 3. Age-Earnings Profiles, Females, UK 2006 Actual Data for Short Degrees, Level 3 Vocational, and Level 3 Female Entrants to Level 4



Implications of prior background for short degree programmes

These differences in prior educational backgrounds make an enormous difference to the earnings increments from short degrees and hence must be taken into account as social rates of return are calculated. This difference and differences by sex relevant to calculations by the full method was not found in earlier studies. But the earlier studies were limited to the HNC/HND components and do not apply to all sub-baccalaureate level 4, reporting no difference in the Mincer return as between students in these programmes who had prior A levels and others who had prior ONC/OND vocational qualifications (Dearden, L. S. McIntosh, M Myck, and A. Vignoles, 2002, p.14)[2]

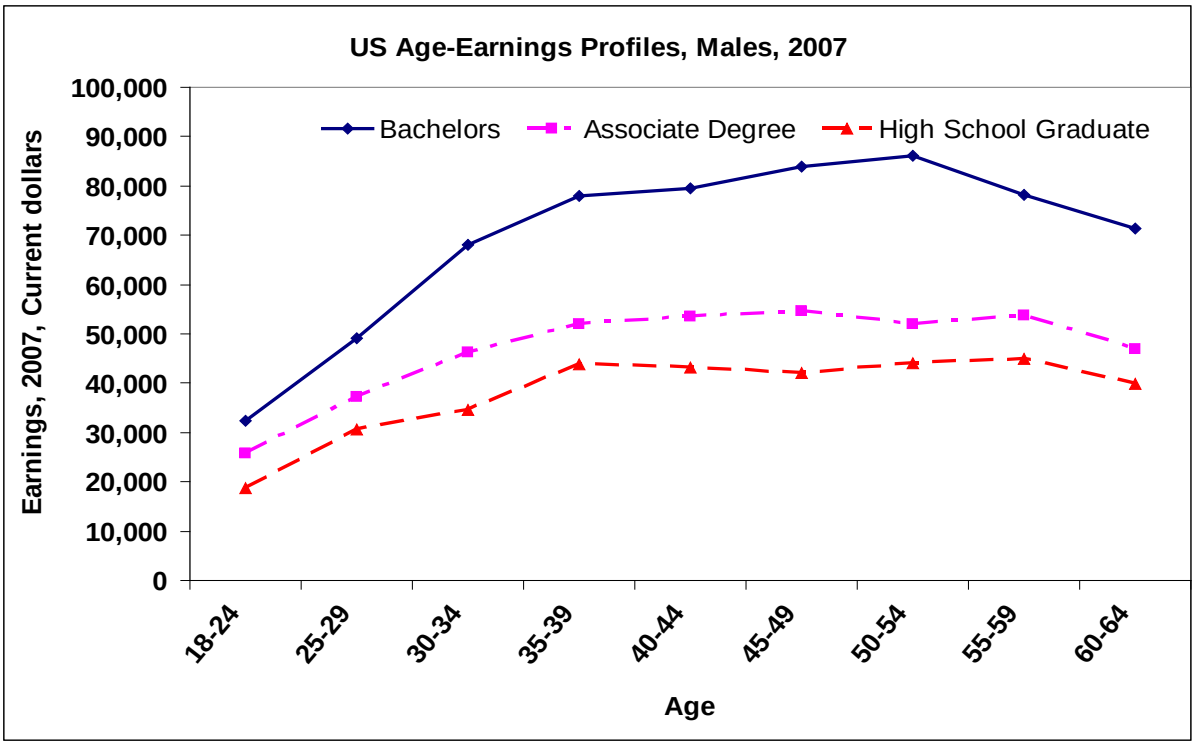
For those who have prior vocational qualifications a level 4 'short degree' is very advantageous. This is true for both males and females who enjoy large earnings increments as can be seen in Figures 2 and 3. Their foregone earnings costs are also slightly lower as can be seen, so higher earnings increments and lower costs will raise the social rate of return for these students dramatically. However males who have finished upper secondary general education programmes and A-levels gain no advantage by entering sub-baccalaureate level 4 programmes. Their expected earnings are no higher than those with general education that enter the labour force directly (see Figure 2). For females with general education the lack of benefit is less pronounced, especially for females entering nursing and teaching programmes.

To obtain a social rate of return typical for UK level 4 short degrees taken as a group, the earnings at the prior level 3 of education used to calculate both the college earnings differential and the typical student's foregone earnings place a weight for males of 36.6% on prior general education earnings and 63.4% on prior vocational level 3 earnings. These are based on the calculation of the weighted averages shown in Appendix A, Table A-1. For females the prior level of education earnings weights are 29.7% general and 70.3% vocational. This kind of a procedure is not necessary when calculating US Associate Degree social rates of return because all entering students will have graduated from senior secondary schools and will have had a substantial number of general education courses, or will have passed high school equivalency exams. About 70% of US high school students who took some vocational courses in 2000 subsequently enrolled in post-secondary education (NCES 2008, p. viii).

US age-earnings profiles

As in the UK, the earnings of males with a bachelors degree in the US as seen in Figure 4 are higher and more peaked after age 40 than earnings of those with short degrees. The latter are farther above the earnings of high school (i.e. senior secondary general)

Figure 4

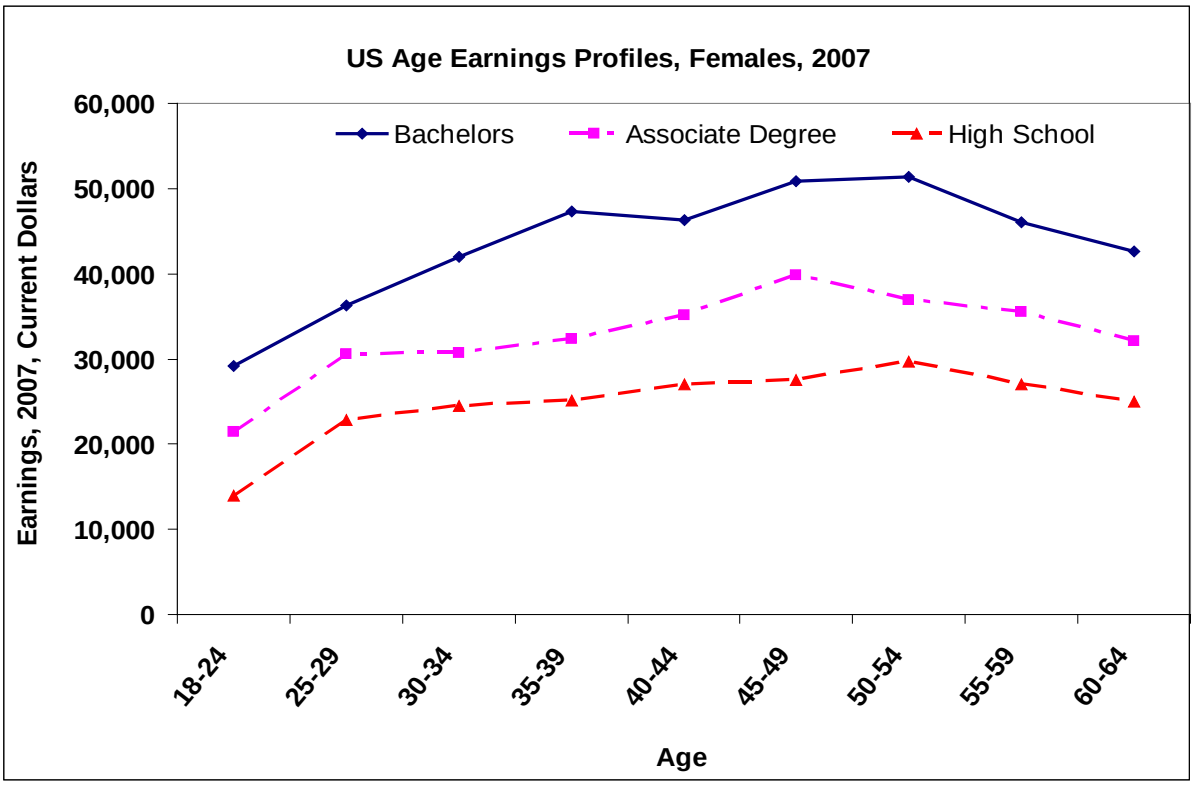


graduates. The same can be seen for females in Figure 5, although the level of earnings and the increments are not as large. The absolute level of earnings for males is again higher than for females (Figures 4 and 5). The increment for Associate Degrees is more comparable to that in the UK for students coming from earlier vocational qualifications. For short degree students in the US who start their training later as adults, their age-earnings profile at younger ages will not reflect this additional training and will be a bit lower.

Comparing the earnings of US high school and UK upper secondary graduates, absolute earnings in the US after age 30 for males and females average £22,000 in pounds, about the same as those completing vocational qualifications at level 3 in the UK (at $1.548= £1 PPP). In both countries

since about 1980 real earnings of secondary level graduates have not risen, and this depressed condition of those with less than a college education is also reflected in the nearly flat age-earnings profiles that also mean reduced life chances. Upper secondary general graduates with A-levels in the UK are doing better on average than high school graduates in the US, which may partly reflect the fact that A level holders constitute an elite group among UK secondary school leavers.

Figure 5



Unit Costs per FTE Student

Costs enter the calculation of the social rate of return, since as indicated earlier it is that rate that equates the total investment cost of the human capital formation to the discounted present value of the net earnings increments. The total investment cost is the sum of the annual institutional unit cost per student plus the annual forgone earnings costs (which is the amount the student could have earned with the next lower level of education) for the number of years that the student is in the program. These again are shown in detail on the spreadsheets for the UK and US at https://netfiles.uiuc.edu/wmcmahon/www/ so that all calculations can be replicated. The age-

earnings profiles are in effect a distributed lag by age (estimated from cross section data), so there is in effect a control for age, as well as for sex, and as explained shortly for ability bias.

In the UK unit institutional costs at secondary and higher education levels are not well known and are hard to come by. The estimates here are based on the National Statistics Bulletin (DES, May 2005, Table B-1) and HEFCE (2000) in such a way that the cost concepts are as comparable as possible to these levels in the US. In the US "educational and general expenditures per FTE student at public 2-year, public 4-year, and private 4-year degree granting institutions" from NCES (2005 Tables 39, 37) include expenditures on instruction, research, public service, academic support, and operation and maintenance, but exclude expenditures on auxiliary enterprises, hospitals, loans, and capital expenditures. Although there are no research expenditures at US 2-year colleges (just as there are none at UK FEC's), there are modest amounts at the undergraduate level in 4-year institutions as is also true for the data described below for the UK. The NCES quit publishing unit costs per FTE for private institutions during the Bush Administration so projections from prior years are used.[3] From these NCES sources, US public 2-year college unit costs per FTE student in 2007 were $11,029 (£6,479 at ppp), public 4-year were $25,495 (£16,470), and private 4-year were $34,290 (£22,151) per year.

To compare these to approximately the same levels in the UK, the unit costs per FTE primary student in the UK are £3,157 (in 2006 prices), £3,415 per FTE at the middle school level, and £4,526 at the upper secondary school level.[4] For higher education the single unit cost from the same source is £5,962, which is totally unsatisfactory because it is averaged across short degrees, bachelor's, and postgraduates. It is mentioned here for use only as a rough cross check. Instead, for separate unit costs per FTE student for short degrees and bachelor's degrees, the Higher Education Funding Council for England (HEFCE, 2000) reports public resources for teaching plus "assumed resources" which includes tuition and fees for each institution, and also the number of FTE students by institution. This excludes grants for capital investment and ancillary enterprises such dormitories and hospitals which is comparable to the expenditure concept mentioned in the US. For this paper unit costs are then calculated by dividing the public resources for teaching plus assumed resources by the number of FTE students for each institution. This was converted to 2007 prices using the UK Consumer Price Index (121 for

2007, 2000 = 100) and then averaged separately for Universities, Specialist Institutions (like LSE and IOE, which have many postgraduates), General Colleges, and Further Education Colleges (FEC's). Short degrees (and Associate Degrees) do not have research components, which is true for the many FEC's and the few General Colleges in the HEFCE data. Foundation Degrees are often awarded by Universities in partnership with the FEC's, but these are a tiny fraction of all sub-baccalaureate level 4 programmes.

So given the dominant role of the 270 FEC's in the sub-baccalaureate level 4 qualifications, their average unit costs per FTE student of £4,395 per year is a reasonable estimate of the annual institutional unit cost of UK short degrees. This is extremely close to £4,466 per year unit costs at the 17 General Colleges who also award these qualifications. Neither have postgraduates, but the FEC's do have some students studying at lower basic skill levels 1, 2, and 3. But seeking comparability, this is also true of Community Colleges in the US. This result is not a perfect measure of the unit costs of sub-baccalaureate level 4 qualifications because some qualifications were obtained in other ways. But they are a reasonable approximation and may be the closest estimate of the annual unit costs of short degree programmes overall, and of Foundation Degrees, that exists. At the bachelors level the unit costs/FTE are estimated to be £5,238 per year which is the average unit cost on average for all universities in England in 2007 not including Specialist Institutions from the same source.[5] The institutional unit costs for a UK bachelors is this annual cost compounded over three years, and for a Masters is this same unit cost compounded over 2 years.[6]

Comparing unit costs in the UK to those in the US, short degrees are £4,395 per year for 2006 in the UK and £6,479 in the US for 2007. So UK unit costs are lower, but this may be misleading. And at the Bachelor's level UK costs of £5,238 per year are dramatically lower than the £16,470 in the US at public 4-year institutions, not to speak of the still higher unit costs of £22,151 per year at US private 4-year institutions. In the UK institutional costs per bachelor's student are therefore one third to a quarter of what they are in the US! This may be because in the US bachelor's level costs contain a somewhat larger research component and also reflect somewhat higher salaries (at PPP), all financed by relatively more resource recovery from tuition and fees paid by wealthier parents and more student loans accompanied by tuition waivers and Pell Grants

for lower income students. But the more important point for the purposes of this paper is that UK short degree unit costs are a high 84% of what they are at the bachelor's level, whereas in the US the same ratio is half that (43% of bachelor's level costs). One reason for this may be that FEC's operate on smaller scale than the typical US Community College. But it is almost surely is because of fewer general education courses in the typical UK short degree. States in the US estimate the average unit cost of vocational courses to be 1.75 times the unit costs of general education courses largely because faculty have better outside job options. The unit costs in US nursing short degree courses are 2.4 times the unit costs in general education courses for the same reason.

Foregone earnings costs in the UK and the US are based on the mean earnings of persons in the 18-24 age group at the next lower level of education. For sub-baccalaureate level 4 programmes in the UK this is £18,702 per year for males and £9,745 for females, a weighted average of the earnings for level 3 vocational and senior secondary general school graduates. The weights as discussed earlier for males are .63 vocational and .36 general, and for females .707 vocational and .297 general prior education. This compares in the US for Associate Degrees to a somewhat lower £12,131 ($18,779) for males and £9,004 ($13,938) for females. This reflects the fact that US high school graduates are doing relatively less well in the labour market. There have for some time been some major problems in US high schools, and the current recession has made the plight of those without a college education much worse. Foregone earnings costs in both the UK and US are reduced by 25% because students normally are not in school during the summers. For bachelor's degrees in the UK, a majority of students have had upper secondary A-levels, so their foregone earnings costs (and increments to earnings) both start from the earnings of upper secondary general A-level graduates with a 100% weight. In the US, it is the same at the bachelor's level as in the UK; that is, all students will have graduated from upper secondary general high schools so these earnings have a 100% weight.

The number of FTE years it takes to complete each degree affects the total investment in human capital formation and hence the social rates of return. At level 4, the higher education level, in the UK, the weighted average for sub-baccalaureate short degrees is computed as shown in Table A-2 in Appendix A to be 1.54 years for males and 1.74 years for females. The difference is

largely because more females are enrolled in 2-year nursing programmes. (See HEFCE 2008 for further details.) This UK average is shorter than for US Associate Degrees which are typically 2 year programmes. The result will be that the earnings increments after graduation are lower for the shorter time-on-task in the UK, but the degree completion costs are also over a shorter period of time. So the social rate of return which is a rate of return per year of total FTE investment-cost will not be affected. In Table A-2 the computation of the weighted average to get the length of the short degrees for males and females in the UK is shown, as are the sources. A number of programmes such as the HNC and HND average 1.25 years FTE whereas other programmes such as nursing, teacher training, and Foundation Degrees are more typically 2 years. Bachelor's degrees in the UK are 3 years except for Scotland where they are 4 years, and in the US they are 4 years with the total investment costs handled in the same way. Masters Degrees average 2 years past the bachelor's, and PhD Degrees 5 years past the bachelor's, but in these cases the explanation of costs is more complex and the primary focus is not on these levels.[7]

At the primary and secondary education levels, which are not the focus of this paper but shown for comparison, the number of years of costs at each level are straight forward in the US but more complex in the UK. This is why it is much more useful to use the Labour Force Survey classifications which are a national standard within England but also for Scotland, Wales, and Northern Ireland. As illustrated in Table A-3 Appendix A, the patterns for schooling differ among localities just within England. By far the most common is 7 years for Nursery plus 6 for primary (or infant plus junior) schools. This is assumed to be roughly equivalent to the Labour Force Survey NVQ1 qualifications. When one reads what skills are covered and programmes included in NVQ2 (e.g. O levels) these are roughly what is produced by the 3 years in junior secondary (or middle) school. Analogously, NVQ3 is assumed to reflect senior secondary school which includes for many students the two years for sixth form or A levels. In order to keep the number of years that the earnings increments reflect related to the number of years of investment in human capital formation, study at the senior secondary level 3 is assumed to average 3 years for the typical LFS respondent. However all of this only affects the number of years of investment costs in the calculations for the pre-college years, which if slightly larger lowers the social rate of return at that level but only slightly. These pre-college levels are also not the primary focus of this paper.

'Narrow' Social Rates of Return

The social rates of return based on the earnings increments and total investment costs per student discussed above are shown below for the US in Table 1A and for the UK in Tables 1B and 1C. The UK rates of return are corrected for net ability bias, whereas there is no need to do this for the US rates. This is because UK students pursuing bachelor's degrees in the past generally have had a general education background through A levels so they will generally have higher test scores than those that have vocational qualifications at the secondary level 3 who enrol for level 4 sub-baccalaureate short degrees. This needs to be taken into account when calculating and comparing social rates of return for short degrees to the rates for bachelor's.

In the US this is not a problem because all students entering both Associate and Bachelors degree programmes in the US will be senior secondary school graduates.[8] There is some sorting in that more with lower grades in high school may go to Community Colleges rather than on into bachelor's programmes directly, but it is not as pronounced.

There is a second kind of ability bias introduced by self selection bias that could be a factor, that between those who choose to go on, including into Further Education Colleges and Community Colleges, and those who do not. But the mainstream judgment of specialists on this point has long been that this ability bias clearly exists, but that it is approximately (up to about 6%) offset by the measurement error that is introduced in the data as respondents exaggerate their educational achievement. This conclusion that ability bias is approximately offset by measurement error that was reached long ago by Griliches and Mason (1988) is consistent with the same conclusion reached in recent studies of large samples of identical MZ twins by Rouse (1999) and also by Behrman and Rosenzweig (1999), so we will rely on it here.

The Correction for Net Ability Bias

By 'net ability bias' is meant ability bias net of measurement error, some of which remains in the UK level 4 data. Part of the increment in bachelors' honours degree earnings is not due to the additional schooling but instead to innate ability, motivation, and family factors to the extent they are collectively measured by achievement test scores. These students have normally been

admitted based on test scores, whereas this is less true for those in sub-baccalaureate level 4 predominantly vocational programmes. The size of the ability bias in the earnings within pairs of identical twins is estimated by Rouse (1999, p. 152) to be 29% and by Behrman et al (1999, p. 166) to be 12%. It is estimated in the UK based on Dearden, McIntosh, Myck, and Vignoles (2002) to be 24% (ibid., Table 1, dividing the education coefficients for partial controls by those with full controls including test scores). Although the latter is not based on data for identical twins, this paper will use this 24% estimate of ability bias because it is specific to UK bachelor's degrees and also because it is not too much different from what is found by Rouse and by Behrman et al using very powerful controls for innate ability bias in their within-identical-MZ-twin pairs.[9]

Turning from baccalaureate to sub-baccalaureate, a different ability bias applies. Many of the students coming from level 3 qualifications, for females, for example, 70% from vocational and 30% from prior general education for example, had lower GCSE grades D through G in recent years, or earlier may have done less well in the 11+ exam which did exist over most of the 49+ years in the LFS age-earnings data, or are older persons who came from a time when they didn't have access to any qualifications. Basing the size of this correction for ability bias on Dearden et al (2002, p. 20 Table 1), it is estimated to be +15.7%.[10] By raising the proportion of the earnings reported that are attributable to education, a smaller percentage of earnings for those with lower ability than others in the level 3 group is due to ability and family factors and a larger percentage to education than the raw data suggest.

However, measurement error still must be netted out. This error is estimated by Rouse (1999, Table 2, Cols 7 and 8, p. 152) to be 19.6% of the earnings due to education, or 68% of the ability bias. Behrman (et.al. 1999, p.166) find it to be 6.9% of the total variation in earnings but do not express it as a percent of ability bias. So Rouse's estimate is used, and the ability bias is reduced by 68% to correct for measurement error. The result is that UK bachelors net earnings differentials are reduced by 7.7% to remove the net ability bias [24% less 68% (24%) = 7.7%]. And UK short degree earnings increments are increased by 5% [i.e., 15.7%-.68(15.7) = 5.0%], thereby correcting the UK social rates of return for ability bias net of measurement error.

UK and US Social Rates of Return

Tables 1A and 1B indicate that the social rates of return for bachelor's degrees in the UK and US countries are about the same. They are a bit higher for males in the US (12.4%) but a bit higher for females in the UK (11.2%). But for all graduates, male and female, the average is the same, 11% in real terms per year. Of course this does not include important non-market private and social benefits to be discussed shortly. These are lower than what have been found for academic qualifications in other studies (e.g. Dearden et.al. 2002, Tables 9-11 and p.13). But the latter are for earlier years and even more important are Mincer returns which gets higher rates in those regressions that are not corrected for ability bias and do not take the full costs to society including institutional costs into account.

For short degrees, the social rates of return in the UK are a relatively high 10.6% for males and 10.4% for females in 2006 as shown in Table 1C, and an even higher 13.6% for both males and females in the US in 2007 in Table 1A. In the US this is the highest social rate of return relative to other levels. In both countries the return on investing in short degrees is larger than it is for those who stop with secondary school (7.3 % for Males and 4.6% F in the UK, and 10.6% M and 12.6% F in the US). The US secondary school rates include no drop outs; only those who have completed 4 years with a grade point average high enough to receive a diploma or its equivalent. The returns, both market and non-market, to preventing secondary school drop outs before age 18 are enormous (e.g. Levin, 2006), as UK policy has explicitly recognized.[11] The lowest returns in the US are to those without high school diploma, which are very low at 5.0% for males and 2.9% for females.

From a public policy perspective, the level that is most advantageous to expand the fastest in both the UK and the US is investment in short degrees, and in the UK, also investment at the bachelor's level. Expanding enrolment in short degrees is a much less expensive way for the government and for the student to expand the number of bachelor's graduates since many of those with short degrees will choose to go on later to study for bachelor degrees. In the US, annual institutional unit costs for Community College student FTE's are 43% of the unit costs at the bachelor's level at public 4 year institutions. In the UK annual unit costs for short degree FTE students are 84% of those at the bachelor's level. If more general education courses were

included, these could be lowered further. In the US 30% of the graduates at the University of California at Berkeley started at Community Colleges, and nationwide 25% of all Associate Degree students transfer to bachelor's programmes. Those graduates who do not transfer and enter the labour force directly do well, tend to remain in their local communities, and contribute to regional development.

In the UK, those with purely vocational qualifications at the lower levels do not do well. At the NVQ2 City/Guilds, RSA, GNVQ level the social rates of return are 0.1% for males and -0.5% for females, and at the NVQ3 vocational OND/ONC/RSA (approximately secondary) level they are a not much better 6.1% for males and 2.8% for females. These are all after an upward 5% correction for net ability bias. Vocational qualifications at these lower levels are not earning as large a premium when technologies change as are higher-level qualifications, and the supply at these lower skill levels is relatively larger than the demand. From a policy perspective, younger students should be encouraged not to stop at these lower vocational levels, and investment should be reduced and diverted for younger students to the level 2 general education and level 3 general education programmes where the returns are higher. Other studies have found this same thing, e.g. Dearden et al, (2002, Tables 9-12) find negative Mincer returns for NVQ levels 1 and 2 (p. 13), and at level 3 they find higher returns for academic than for vocational ONC/OND programmes (p.14). These extremely low social rates of return on investment for NVQ2 vocational qualifications after the net ability bias correction are unacceptable. In higher technology, knowledge-based economies, greater flexibility is needed. Vocational qualifications lock young people into low earning occupations for life with inflexible skills that do not adapt to changing demands and thus lead to flat age-earnings profiles. A majority of vocational qualifications at lower levels were abolished in the US many years ago

TABLE 1A: US		TABLE 1B: UK		TABLE 1C: UK	
SOCIAL RATES OF RETURN By Level Of Education and Sex Year 2007		**SOCIAL RATES OF RETURN** By Level Of General Education and Sex, UK, Year 2006		**SOCIAL RATES OF RETURN** By Level of Vocational Education and Sex, UK, Year 2006	
Foregone Earnings for Degrees are High School Earnings	r* (%)	Foregone Earnings for Bachelors are Senior Secondary General Earnings	r*(%)	Foregone Earnings for Short Degrees are 63% Voc. & 36% Gen. Sec. Earnings	r*(%)
9th to 12th GRADE, No Dip. M	5.0%	NVQ2 General, Approx O-levels, M	6.8%	NVQ2 Voc., GNVQ, RSA, City/Guilds, M	.1%
9th to 12th GRADE, No Dip. F e	2.9%	NVQ2 General, Approx O levels, F	4.8%	NVQ2 Voc. GNVQ, RSA, City/Guilds, F	-0.5%
HIGH SCHOOL GRAD, Male	10.6%	Sr. Secondary General, NVQ3, 3Yr M	7.3%	NVQ3 Vocational , OND/ONC, RSA level 3, M	6.1%
HIGH SCHOOL GRAD, F.	12.6%	Sr. Secondary General, NVQ3, 3, F	4.6%	NVQ3 Vocational, OND/ONC, RSA level 3, F	2.8%
ASSOCIATE DEGREE(2yrs) M	13.6%			Short Degrees, Sub-Bach. Level 4, M	10.6%
ASSOCIATE DEGREE (2yrs) F.	13.6%			Short Degrees, Sub-Bach. Level 4, F	10.4%
COLLEGE 1-3 (1.5) Male	8.8%				
COLLEGE 1-3 (1.5) Female	8.9%				
BACHELORS, (4 yrs) M.	12.4%	BACHELORS DEGREE (3 yrs), Male	10.1%		
BACHELORS (4 yrs) F.	9.7%	BACHELORS DEGREE (3 yrs), F	11.2%		
MASTERS (1.5 Yrs past BA) M	9.9%	MASTERS (1.5 Yrs past BA) M	6.3%		
MASTERS (1.5 Yrs Past BA) F	12.4%	MASTERS (1.5 Yrs Past BA), F	8.7%		
DOCTORATE DEGREE, M	6.3%	DOCTORATE DEGREE, Male	3.2%		
DOCTORATE DEGREE, F	7.7%	DOCTORATE DEGREE, Female	4.6%		
PROFESSIONAL DEGREE, M	11.6%	PROFESSIONAL DEGREE, Male	NO UK DATA		
PROFESSIONAL DEGREE, F	8.3%	PROFESSIONAL DEGREE, Female			

as these programmes were moved up into short degrees in Community Colleges. However, for those UK persons who have lower level 2 and level 3 vocational qualifications, lifelong learning programmes at the Further Education Colleges and short degrees have quite respectable social rates of return from a public policy viewpoint, and so transferring to higher-level courses for these individuals is still a viable path.

Masters and PhD absolute earnings in both countries are much higher than at any other level of education. But the 'narrow' social rates of return are somewhat lower at these levels. This is because advanced degree candidates are incurring higher foregone earnings costs, and many enter academic and government employments where earnings tend to be lower than in business. Beyond money earnings, many may contribute significantly to new ideas and their adaptation, which is a social benefit. There are also other non-market benefits that will be considered later.

In light of the severity of the current recession in the UK and US, where jobs especially for the less skilled are hard to come by, a mini-experiment was performed by reducing foregone earnings costs to zero and re-computing all social rates of return. This overestimates the true reduction in forgone earnings costs, but nevertheless if students would otherwise be unemployed their social rates of return for short degrees are doubled and sometimes tripled! This helps to explain the (temporary) surge in enrolments in the US and UK. It also suggests that policy makers should consider the higher temporary returns to investment and try to reduce the erosion of skills that normally occurs when there is less learning on the job during periods of unemployment.

Summary: What Do Earnings Profiles and 'Narrow' Social Rates of Return Reveal?

The analysis above noted that a large percentage of the US and UK population that have only secondary or lower levels of skills are not benefiting from the fruits of economic growth or freer trade. The current recession has reduced their condition further. Inequality in the distribution of income is both greater and has been rising since 1980 in both the UK and US in relation to the 10 leading OECD countries (Hill, 2010). Much of this is due to the education system.

The problems are revealed by the flat age-earnings profiles of those that were in vocational programmes at level 3 or below, as well as the negative and/or social rates of return to investment

in these programmes. The perpetuation of vocational programmes at levels 1 and 2 locks holders of these qualifications into low and flat age-earnings profiles at high initial costs to the state that are larger than the returns. It contributes to inequality as well as costly state welfare and income redistribution programmes later. Those who go on for short degrees have a way out. But many are too old and cannot do so. There is a problem in the US as well, with too few going on to short degrees and to bachelor's programmes resulting in a national skill shortage as indicated by the market signals and relatively high social rates of return since 1980.

III. Private and Social Non-Market Benefits Beyond Earnings

The non-market benefits impact standard measures of economic development beyond growth such as better health, better government, and a better life for others and future generations. Investment in human capital with returns later is a dynamic process in which the education of each generation generates non-monetary benefits beyond earnings that benefit each family over the life cycle but also benefits charitable organizations and civic institutions in ways that help set the stage for each new round of economic growth. This process occurs within each family over their life cycle and over several generations in ways that lead to different life chances among families. For larger groups of families the result is per capita development within regions as well as within nations. So considering the non-market outcomes of education also means considering the effects on future economic growth. Considering non-market outcomes has implications for curriculum design when it is realized that it is not only do vocationally-oriented job skills contribute indirectly to earnings, jobs, and pure economic growth but they also contribute to better health, child development, better English, the rule of law, civic institutions, and even social harmony.

Regional Development

Short degrees are particularly important for regional economic development because the evidence shows that most short degree graduates tend to remain and work near the locality where they went to school. Bachelor's graduates are more likely to move within regional and national job markets. Those with postgraduate degrees may contribute to nationwide development but they tend to take jobs where their opportunities are best in higher income centres that are close to the technological frontier such as London or Edinburgh in the UK and the Eastern and Western seaboards in the US.

So they contribute the most to economic development there, and not in the regions and rural areas. In the UK only 29% of those with short degrees moved between the ages of 23 and 33 for example, whereas 45% of those with a bachelor's degree moved. 88% of those with Masters and PhDs moved outside of the locality where they were born (Performance and Innovation Unit, 2002, p. 9). In the US 94.7% of those with Associate Degrees do not move in any given year. Their likelihood of moving is only .23 (t = 7.0) in any year, whereas it is .58 (t = 15.0) for bachelor's. The probability is even higher than this that postgraduates will move 500 miles or more (US Census, 2004, Table B p. 4, Table D p.9, and p.10).

Within the EU this same kind of pattern of geographic mobility has been observed. Increasing years of education are found to be a key predictor of increased mobility by Bonin et al (2008, p. 82) even though their probit regression contains many occupation and sector dummies that could eliminate the effect of education. Similarly Machin et al (2008, p. 24) conclude that 'One (additional) year of education increases the annual mobility rate by 15%' based on Norwegian data. Finally, and most important to regional development, Aghion, Boustan, Hoxby, and Vandenbussche (2006, pp.3-4 and 35-6) find that within the US, where internal migration is possible (as it is within the UK), the returns to investment in research-type higher education raises a state's per capita growth rate by .27 percentage points if it is at the technological frontier where job opportunities are better for these graduates but by only .09 percentage points if it is far from the frontier. At the same time, the same amount of spending on two-year post secondary education raises the at-the-frontier state's per capita growth rate by only .055 percentage points whereas it raises the far-from-the frontier state's per capita growth rate by .474 percentage points. That is, far-from-the-frontier states derive much greater benefit from investment in short degree programmes than close-to-the-frontier states do, and the latter benefit the most per dollar spent from high quality bachelor's and research-type higher education. This is consistent with but expands upon the work by Vandenbussche, Aghion, and Meghir (2006 p. 121-2) who deal with problems of endogeneity primarily by instrumenting levels of human capital using lagged public expenditure on education and find that among OECD countries more highly educated labour has a higher growth-enhancing effect between 1960 and 2000 in the higher per capita income countries that are closest to the technological frontier. Generalizing from this, there are exceptions to this within countries of course since research-trained PhD's do go to regional colleges. The two studies

extending the work on endogenous growth by focusing on the composition of human capital do suggest that just as within the US expansion of short degrees in Further Education Colleges that are numerous and widely scattered is most likely to contribute the most to regional development outside the largest cities. Postgraduates make major contributions but a larger part of their impact it is likely to be in urban centres or wherever most of them are employed.

Measuring and Valuing Non-Market Benefits; the Conceptual Framework

Non-market benefits arise primarily as human capital used on the job is carried home and used to increase the productivity of time in household production of final satisfactions or used in the community in public service and other activities. As indicated this means that there is essentially little or no overlap with job benefits that result in market earnings because the individual's human capital cannot be used more than one place at a time. It does require that proper statistical controls be employed when measuring non-market benefits by including per capita income as a control variable. This eliminates the market benefits of education since the additional earnings generated are included in income, resulting in a measure of the non-market benefits beyond earnings. The typical individual spends about 72 waking hours using his or her human capital and at home or in the community, so it is not surprising that the value of the non-market benefits is substantial.

To go the next step and estimate the monetary value of these non-market benefits, the Haveman and Wolfe (1984) method is used, as in Wolfe and Haveman (2003), with the other methods for valuation discussed in McMahon (2009, Ch. 4) used as a cross check. To measure the value of a short degree in improving own health, for example, it can be asked how much will one year of college improve own health on a scale of 1 to 10, and then ask how much income would it take to achieve the same outcome. Consider a regression typical of the kind that is found in these studies that are used to measure the net effect of more schooling at this level, S, on the non-market outcome, Z, own-health:

(1) $\mathbf{Z = \alpha Y + \beta S + .. + u.}$

This paper requires that there be a control for per capita income, **Y**, for the reason mentioned so there will also be an income coefficient, $\boldsymbol{\alpha}$. The education coefficient, $\boldsymbol{\beta}$, will also be known, and there will also be controls for other variables that are identified in McMahon (2009, Appendices C and E and in spreadsheets available at https://netfiles.uiuc.edu/wmcmahon/www/). It is a standard

proposition in economics used by the Haveman-Wolfe method that decisions by individuals or families on average will approximately equate the ratios of the marginal products of inputs to their values. The marginal product of education in household production is **β** in Eq. (1), and the marginal product of all other goods represented by income is **α** . Rearranging the ratios of these marginal products to their respective values, or prices, this standard proposition becomes:

(2) $P(S) = \boldsymbol{\beta}/\boldsymbol{\alpha}\ P(\mathbf{Y})$.

P(S) is the value of the additional education in producing better health that is sought. The amount of income needed to produce one unit of better health, basically a 10% improvement in health, can be estimated to be the cost of 3 doctor's visits plus the drugs prescribed which is about $1,000 in the US. As a cross check the amount of additional income necessary to produce one unit of own health using the regressions cited is also about $1,000. Other values reported in Table 2 are based on this same methodology, although for the social benefits of education in the lower half of the table, the numeraire is the increase in per capita income that was required to produce the average annual improvement within the OECD between 1975 and 2005 in the outcome in question such as the degree of democratization as measured by Freedom House (2009). The implicit assumption is that this is the amount of expenditure the citizens in the OECD were willing to support, or vote for candidates who would support this improvement in civic institutions.

The Private Non-Market Benefits From UK and US Degrees

Estimates of the private non-market benefits generated per year by the typical UK and US short degree and bachelor's graduates are shown in the top half of Table 2, and of the social benefits in the bottom half. All values are in UK pounds at 2007 prices with the conversion done at purchasing power parity rates (£1 = $1.548). The average annual earnings increase over the life cycle for each type of degree is shown at the bottom of the table, just before the private non-market, social non-market, and earnings benefits are added up.

The estimated value of the total private non-market benefits is 121% of the average annual net earnings benefits in the US and 132% of the market benefits in the UK for both short degrees and bachelor's degrees. This is because the average work week is shorter in the UK, leaving more time to generate non-market private and social benefits. The actual time worked on average for males and females is 1669 hours per year in the UK and 9% more than that or 1804 hours per year in the

US according to the OECD (2008). This also serves to illustrate how the size of the non-market benefits are estimated for the UK by scaling them to relate to the size of the earnings benefits. This seems reasonable since the time spent in courses is creating human capital used to generate both types of outcomes later. The absolute level of the net earnings benefits and hence the non-market benefits are somewhat lower in the UK than in the US largely because the hours worked per year after graduation are smaller and the length of the degree programmes are also shorter in the UK, 1.64 for short degrees and 3 years for bachelors in the UK, and 2 years and 4 years respectively for these levels in the US.

Specific Private Non-Market Benefits

Better health

The estimated of the annual contributions to better own-health from a short degree in the UK, £2,125, to better spousal health, £242, and better child health, £549 are important outcomes frequently overlooked and also substantial. The 13 underlying studies on which these estimates are based are cited in Table A-4 in the appendix with additional data and computations on the website cited that allow this and every other number in Table 2 to be replicated. These private health benefits also have an additional social benefit spill over; among the social benefits in the lower half of the table can be seen a contribution to lower public health costs, £69 per year per short degree graduate, and £126 per year per bachelor's degree in the UK. For each short degree holder, for example, these health benefits alone total £2,985 which are over half of the £3,647 earnings benefits from short degrees (the latter shown at the bottom of Table 2).

There are analogous health benefits from completing short degrees and bachelor's programmes in the US as shown. But the estimated value of the health benefits in the UK may be somewhat lower than the estimates shown because typical UK health care costs, public plus private, are less than half what they are in the US. At the same time the social benefit from better health may be somewhat larger because a larger proportion of health care costs are covered publicly in the UK.

Child education and cognitive development

There are many studies of the effects of parents' further education on the child's educational attainment and cognitive development. Here we estimate this effect by taking an average

Table 2: Value of Private and Social Non-Market and Market Benefits, 2007

UK and US SHORT DEGREES and BACHELOR'S DEGREES, in £ (£1 = $1.548 ppp)

Sources: Appendix A, Table A-4 Private, and A-5 Social Non-Market Benefits

Type of Return To Investment	Short Degrees UK Sub-Baccalaureate 1.64 Yrs; US Associate 2 Yrs		Bachelor's Degrees UK 3 Yrs & US 4Yrs	
PRIVATE NON-MARKET BENEFITS BEYOND EARNINGS	UK Private Non-Market Benefits/Yr Per Graduate	US Private Non-Market Benefits/Year per Grad. in £	UK Private Non-Market Benefits/Year Per Graduate	US Private Non-Market Benfits/Year per Grad. in £
Better Self Health	£2,125	£ 3.006	£3,883	£10,853
Better Spousal Health	£242	£343	£443	£1,238
Better Child Health	£549	£776	£1,003	£2,804
Better Child Education & Cognitive Development	£998	£1,412	£1,824	£5,098
Greater Longevity	£276	£390	£504	£1,408
Smaller Family Size	£196	£277	£359	£1,002
Greater Happiness	£+	£+	£+	£+
Consumption and Saving Efficiencies	£430	£608	£786	£2,197
Job, Location Amenities	£+	£+	£+	£+
Lifelong Learning Access	£+	£+	£+	£+
TOTAL PVT NON-MARKET BENEFITS	£4,817	£6,812	£8,802	£24,600
SOCIAL NM BENEFITS	Social NM Benefits/ Yr	Social NM Benefits / Yr	Social NM Benefits / Yr	Social NM Benefits/ Yr.
Better Civic Institutions	£232	£327	£423	£1,182
Greater Human Rights	£362	£513	£662	£1,851
Political Stability	£735	£1,040	£1,344	£3,755
Greater Life Expectancy	£292	£413	£534	£1,491
Poverty Reduction	£393	£556	£719	£2,009
Lower Crime Rates	£714	£1,010	£1,305	£3,648
Lower Health Care Costs	£69	£97	£126	£351
Cleaner Water	£17	£24	£31	£88
Less Air Pollution	£187	£265	£343	£957
Less Deforestation	£505	£714	£923	£2,578
Increased Social Capital				
TOTAL SOCIAL NON-MKT ANNUAL BENEFITS	£3,823	£4,959	£6,409	£17,910
AV. EARNINGS INCR.	£3,647	£5,623	£6,665	£20,302
TOTAL BENEFITS/YR.	£12,287	£12,333	£21,876	£62,812

of results from eleven studies that derive significant coefficients on per capita income (cited in Table A-4 in the Appendix). The value of this outcome of a short degree in the UK is estimated to be £998 per year, taking an average of the value of the child going farther in school and the improved cognitive development of the child as measured by test scores. These two items are not added together because there is likely to be overlap. There are even larger estimated benefits at the bachelor's level, £1,412 in the UK and £5,098 in the US. This major benefit lowers the intergenerational transmission of poverty and increased the intergenerational transmission of well being, generating additional social benefits shown farther down in Table 2 in the form of lower public costs for the alleviation of poverty and lower crime rates reducing costs in the criminal justice system.

Longevity

The evidence is substantial that increased education contributes to behaviours that significantly lower the probability of death at a given age and lower the likelihood of health problems related to mortality such as cancer from smoking and coronary heart disease (Grossman 2006). But it is not possible to use these as a basis for the estimates in Table 2 either because they relate to a small segment of the population such as persons at a given age, or to persons who are ill, or do not include income as a control. The Grossman (1975) study based on the NBER-Thorndike sample however is superior because it focuses on overall mortality and controls for health status in high school so the longevity effect is due to only to each additional year of higher education. This result works out to about 1.2 additional years of life for each additional year a UK or US student spends in college. The estimated value of this is £276 per year for a short degree and £390 for a bachelor's in the UK. To estimate this on a per-year basis, the additional years of potential earnings were spread over the life cycle. Since the value of additional years after retirement were not added, this is a conservative estimate.

Reduced poverty, and increased efficiency in household management

Each additional year of education especially of females reduces family size, an effect that persists from primary school up through the PhD. The effect of smaller family size in raising per capita income within the family, and hence reducing poverty, is estimated to be £196 for UK short degrees and £277 for bachelor's as shown above and in Appendix A. But beyond this, household

purchasing is more efficient, and household assets are managed in ways that earn a better return, together with an estimated value of £430 for a short degree and £608 for a bachelors based on the sources cited. Together these offset the effects of some of the welfare state retrenchments during the 1990's (Backman, 2009).

Total non-market private benefits

The total of the private non-market benefits alone each year for those completing short degree in the UK comes to £4,817 and for those finishing a bachelor's degree is £6,812, both 121% of the earnings benefits as mentioned. To the extent that there is widespread lack of awareness of these benefits beyond earnings to individuals and their families it is a source of market failure in the education markets potentially leading to substantial under-investment and the skill deficits mentioned earlier in both the UK and the US.

Social Non-Market Benefits

Improved civic institutions

It is not just that with more years in college people vote more regularly and are better informed voters. They also volunteer more of their time and contribute more financially at each income level than those with just a high school education as shown in both UK and US tracer studies that follow up college graduates (e.g. Bynner et.al. 2004, Dee 2004). But in addition to these findings in micro data in both the UK and US, cross country regressions explaining the degree of democratization as measured by Freedom House find that after controlling for per capita income and expenditures on the military as a percent of government budgets, education enrolment rates with a lag are highly significant determinants of improvements in civic institutions ands the degree of democracy. The latter are variables whose average level move slowly over time so it is difficult to measure using cross section data within countries that have reasonably homogeneous institutions or by using micro data. So using inter-country regressions, additional years of education contribute to the improvement of democratic civic institutions in ways that lead to the estimated value of £235 per year for each short degree and £327 for each bachelor's. Beyond this there is a contribution to civic institutions related to the judicial system and human rights of £362 for each short degree, and a £735 contribution to political stability. It is not so much that democratization contributes to economic growth over time, but political stability does, and democratization and human rights both

contribute to political stability as suggested by the regressions (McMahon 2002). A study by Acemoglu et.al (2008) finds insignificant effects from education on democratization, but the approach may be based on static assumptions (McMahon, 2010a). On the other side of this issue, Shafiq (2009) uses micro survey data to show that 'support for democracy is a social benefit of education in Jordan, Lebanon, and Pakistan' (ibid, p. 1). Indonesia which is the key remaining country in his data that was not a democracy has moved to full democracy although Shafiq's attitudinal data earlier for 2005 did not pick this up.

Social benefits and costs of rising life expectancy

The social benefits of the effects of education in increasing life expectancy is important in poor countries where many die and leave the labour force early. In the UK and US, to the extent that students come from low income families there may be some of this effect there as well. But with aging populations in OECD countries there are both negative effects on per capita growth due to higher health care and social security costs and benefits from more years spent after retirement (McMahon 2009, Appendix D). The net benefit is estimated to be a relatively small £292 per year from each short degree and £413 from each bachelor's in the UK. This is after subtracting the negative externality from longevity-related social security programmes due to the drag they place on growth as shown in Appendix A-5.

Lower poverty, crime, and health care costs

There should be a social benefit if expanded access to short degrees in the UK were to reduce growth in inequality, thereby increasing trust and social capital. The regressions in the basic research are not in a form that makes it possible to estimate the value of this. However, an estimate can be made of the effect of increased access in reducing poverty, £393 per year for each short degree in the UK in Table 2 and £719 for an Associate Degree in the US based on the regressions cited in Appendix A Table A-5. There are additional social benefits from lower criminal justice system costs (£714) and lower public health costs (£69) each year from each additional short degree in the UK.

The environment and happiness

The effects on the environment of having more college graduates are indirect through the effects of more education on lower population growth and more economic capacity to support conservation and parks. Values of the benefits of each short degree are estimated to be £17 per year from cleaner water, £187 from reduced air pollution, and £505 from less deforestation which reduces human impacts on global warming and also protects wildlife. The values of the social benefits for each of these outcomes from a bachelor's degree are about twice that.

The contributions of college to greater happiness are not possible to estimate at this time. Rising income resulting from a college education clearly does contribute to happiness but only up to about £51,000 a year for a family of 4 after which the additional happiness benefits are flat (Layard, 2006). But Table 2 above refers only to non-market benefits that are above the earnings benefits, and the studies cited in Table A-5 on subjective well being either fail to control for income or over-control in ways that largely wipe out any net education effects.

Caveats, and the Sceptics

The estimates presented in Table 2 are based on a large literature and are the first that are comprehensive. They are first approximations with implicit standard errors and should not be interpreted as precise point estimates. There are gaps in the literature, which hopefully Tables A4 and A5 help define. But with these caveats this is what is possible given the state of the art.

Sceptics tend to be most dubious about the external benefits from higher education, sometimes even denying that they exist. A common assertion is that external social benefits cannot exist because the earnings benefits are so high. But this is thoughtless, as will be apparent after considering the points below. Some are unable to find any contribution from higher education to economic growth, in which case there can be no external benefits. But these are not in the mainstream, since there are also many studies that do find very significant contributions of higher education to per capita economic growth. Several are summarized and cited in Table A-5 (Cont) in the Appendix.

To find higher education externalities:

- ***A dynamic process is involved.*** Some current earnings are the result of the education of prior generations that benefits others in the current generation. Analogously, current graduates generate benefits that flow in part to future generations. These are benefits to "others", the basic definition of externalities. A number of these are listed in Table 2 above.
- ***There are many benefits from higher education that are indirect, and these can not be ignored.*** Indirect effects operate through intervening variables. For example, to the extent that education contributes to the rule of law and political stability, there are feedbacks from this stability that aid growth, and these are externalities that benefit others. Also they are not anticipated by the family and student who invest (Lucas 1988). Skeptics generally do not address this issue. But there are many non sceptics who do (e.g. Breton, 2008).
- ***Most sceptics ignore all non-market benefits.*** Non-market private and social benefits need to be identified, valued, and counted. The total returns to higher education are larger than those measured only by earnings or GDP alone. Studies by those sceptics that claim there is 'over-education' for example ignore both the private and the social non-market benefits.
- ***Sceptics normally take a static perspective.*** They may be unfamiliar with short term dynamics and estimating systems of non-linear difference equations followed by simulation. But even more basically they typically eliminate the effects from undefined technical change. This is done whenever time-dummies are included in the regressions. They leave the so-called technical change undefined and unexplained, eliminating for example the build up of dynamic effects from education over time as new ideas are embodied in college graduates who disseminate the new technologies. Lucas (2008) suggests that there is a huge class of highly-educated people that spend all day every day adapting, developing, and exchanging ideas. Other sceptics suggesting 'over-education' often do not consider that the graduates they study may be undereducated 30 or 40 years after graduation when they are still in the labour force. The technical coefficients in their manpower requirements planning models change dynamically over time.
- Some sceptics still adhere to the strong assumptions of the 'screening hypothesis' or job market signalling that holds that human capital produced by education is not productive. This group has always been a minority. But they must now consider a thoughtful new analysis by Lange and Topel (2006, p. 462) who conclude that 'there is little convincing evidence for an important role for job market signalling'.

Space does not permit a review of a separate literature that seeks to estimate aggregate externalities (but see McMahon 2010a). This paper uses a different approach that identifies and measures specific market and non-market outcomes from higher education and seeks to place a value on each. It starts out with the life cycle of earnings and non-market benefits that occur with lags after the investment in education occurs. This leads into a short term dynamic process including interaction among the market and non-market outcomes over time (McMahon 2002, 2007). Emerging work on the endogeneity of new ideas by Lucas (2008) and Jones and Romer (2009) suggest an exciting new addition to the growth models that eventually can only strengthen the case for higher education as part of a dynamic process of human capital formation leading to sustained growth.

IV. Summary of Conclusions, and Policy Options

This paper has developed new social rates of return for the UK and US. The 'narrow' social rates of return based only on earnings increments finds these rates to be almost exactly equal as between the UK and US at the bachelor's level, 11% in real terms on average for males and females in both countries for 2006/7. For short degrees (sub-baccalaureate level 4 qualifications in the UK), they are a lower 10.5% for males and females, and for Associate Degrees in the US they are 13.6% for both males and females for a nearly equivalent package of programmes.

Insights from Earnings Benefits, and from Costs

These 'narrow' social rates of return of 11% for a bachelor's are lower than the Mincer returns in the UK reported in prior studies of 10-28% for males and 21-26% for females (e.g. Dearden et al, 2000, p.16). This is primarily because the new rates take the full institutional and public unit costs per student into account for the first time by the full method. It is also because the UK net earnings are corrected for net ability bias which reduces earnings by 7.7% for those in the academic track; prior studies have often corrected for ability bias, but not all regressions in each study have done so with the result that some of the rates are higher. Prior studies also have used the hourly wage which does not include the effects of part time employment or of a shorter number of hours

worked per year in the UK than in the US. The latter lowers annual money earnings increments in the UK by about 9%.

Any social rate of return is a pure number, comparable across programmes and across countries. They are independent of the length of each program since the latter is taken into account in the computation. They should be interpreted as the real rate of return on the full investment cost per year per FTE student, or simply the real rate of return per £ invested.

Several insights are revealed by the age-earnings profiles in the UK and US that enter into the computation. For bachelor and short degree graduates, and for holders of academic secondary school qualifications, earnings rise until about age 53, whereas for holders of vocational qualifications especially at level 2 and level 3 they peak at age 30 and after that are flat. This has important implications. First, it is very advantageous for those with lower vocational qualifications to go on for short degrees, since the increments to their earnings are substantial. But if they already have academic secondary school qualifications such as A-levels, there is no advantage to them in the form of increased earnings. They are just as well off if they go into the labour force directly. In contrast in the US those who go on for a 2-year Associate Degree earn consistently more than those who stop after high school.

Another insight is consistent with prior studies. They also have found negative Mincer returns to investment in NVQ1 and NVQ2 vocational qualifications and low Mincer returns to vocational NVQ level 3 (Dearden et al, 2004; Dickerson 2005, McIntosh 2004, Powdthavee and Vignoles 2006 pp. 14-15). In this paper we find for NVQ2 vocational qualifications that the return is .1% for males and -.5% for females. This is to be compared to the general education level 2 of 6.8% for males and 4.8% for females. At NVQ level 3 social rates of return are relatively low at 7.3% for males and 4.6% for females. One response to this evidence might be that most of the primarily vocational programmes at levels 2 and 3 in the UK should be moved upward into short degrees as was done in the US about 45 years ago, and younger students should be encouraged to enrol in level 2 general education and level 3 general education programmes which are not only better for those who go on to college but are shown by our data to yield a higher social rate of return even for students who do not go on and enter the labour force directly. However, vocational courses at these

levels can potentially serve as important stepping-stones to higher-level study for older persons who left school with few qualifications of any kind. Furthermore, some level 3 vocational courses are useful in the secondary schools alongside a strong general education core, and apprenticeships do offer a means of up-to-date skills acquisition. For apprenticeship skills that are not firm-specific and hence that the employer will not finance some have argued that public support continues to be needed and should be strengthened (Ryan and Unwin, 2001). Therefore, it would be wrong to generalize too broadly about level 3 vocational qualifications on the basis of our analysis. However the overall cost-ineffectiveness of public support for lower-level vocational qualifications, most especially when they are firm-specific where firms can privately capture the benefits, suggests that younger students should be encouraged to choose the general education tracks until they reach the post-secondary short degree level where most vocational education now resides.

We note also that there are problems in the US as well at the secondary level and with short degrees. US high schools do not perform as well as UK upper secondary schools for various reasons, and now 'No Child Left Behind" is being augmented with an emphasis on all high school graduates prepared for college. US high school graduates are actually shown in the paper to currently earn less, although this difference would be reduced a bit if UK upper secondary graduates' earnings were reduced by 7.7% for net ability bias. And at the Associate Degrees level, the completion rate is significantly lower in the US than for UK short degrees. The social rates of return apply only to those who have completed their programmes in both the US and the UK data. But with more dropouts in the US there is more wastage at this level, a problem that the US Federal Administration is seeking to address (Parry and Fischer 2009).

Private and Social Non-Market Benefits

The substantial non-market benefits from short degrees as well as from bachelors degrees developed in this paper have several implications. With private non-market benefits estimated to be about 132% beyond earnings in the UK, and external social benefits another 104%, there is a general lack of awareness of this that has contributed to market failure in higher education markets. This has lead to underinvestment and national skill deficits in the UK and US that are discussed in the paper. It puts into serious question the Mincer returns that have been computed in

prior studies by academic field because some fields may have high non-market returns even though the market returns are relatively low. There has been no attempt to break down non-market returns by discipline in this paper, a vibrant field for future research. But the very fact that techniques are available to estimate the value of different kinds of non-market outcomes as in Table 2 above casts doubt on the practice of using Mincer returns by discipline for policy purposes.

Similarly, this paper has shown substantial non-market social benefits to short degrees and bachelor degrees. Some benefits such as improved operation of civic institutions, human rights, and political stability contribute to the rule of law which in turn is known to contribute to pure economic growth. There are also contributions from some disciplines in which the earnings benefits are low to international trade or to lower public health and welfare costs, for example, which in turn contribute to pure economic growth. So considering these indirect benefits as well as the direct benefits to others of living in a society with better civic institutions, greater social cohesion, and a larger flow of new ideas that benefit others and future generations raises further questions about computing Mincer returns by discipline that ignore these wider benefits of learning.

Policy Options

- *Increased Enrolment in Short Degree Programmes in the UK and in the US is an Economically Efficient Investment.* Even if there is no reform, expansion of access to short degrees in the UK yields a 10.5% return on the investment and in the US a 13.6% return. For UK short degrees, the return including only *private* non-market benefits becomes 24%, and then adding external social benefits the total social rate of return is estimated to be 35.3% ! [12] This represents a very good investment indeed for families and the society, well above the typical 10% benchmark average real return on, say, mutual fund shares or other alternative use of the resources. For US Associate Degrees, when the value of the non-market private and social benefits is included this raises the true social rate of return to 42%. This means that public and private investment in expanding access to short degree programmes pays for itself in the UK over again about once every three years, and in the US about once every 2 ½ years! At the bachelor's level, the true total social rate of return

including the value of non-market benefits beyond earnings comes to 37% in the UK and to 34% in the US. It is a bit higher in the UK because the non-market benefits reflect the fact that a smaller number of hours is spent per year at work.

This is the best economic criterion that exists. Market signals indicate there is a skill deficit and for overall economic efficiency investment both by families and by the government supporting greater access to higher education should be increased. The balance between government and private investment need not change. As public support for increased enrolment increases, private investment automatically increases because enrolment induces private family investment in the form of earnings forgone and tuition and fees. There has been an increase in enrolment in short degrees during the recent recession (11% in the US, but less in the UK because of cuts in student financial aids), but this is transitory. What is more important is the zero increase in real earnings since 1980 for the majority of the population in both countries that have a secondary education or less, with a 48% or so increase in real earnings for those with a college education. In the UK in spite of the large increases in supply of first degree graduates since 1985, there has been no change in the average return to a year of schooling (Powdthavee and Vignoles 2006, p. 20)[13]. So considering the value of the contribution of the non-market benefits, the case for increased enrolments in the UK and US is strong. Where possible, budgetary pressure to cap higher education enrolments should be resisted.

- *There is a Cost Advantage to Using Short Degrees.* In a time of tight budgets encouraging a larger proportion of students to start with a short degree is a way to lower the cost for the student and for the government since many subsequently transfer to earn bachelor's degrees. The annual institutional unit cost per FTE student of short degrees in the UK is about £4,395 (compared to about £5,238 at the bachelor's level). This could easily be lowered farther by including more general education courses in the typical short degree, and by realizing better economies of scale in the Further Education Colleges. In the US the cost of vocational courses is estimated to be about 1.75 times the cost of general education courses (with nursing at 2.4 times). The capacity to live at home and/or work at a part time job also makes post-secondary education far less costly for the student and his or her

family. This increases access dramatically to both short degrees and bachelor's degrees for able students from poor families. A recent survey of experimental research shows lower unit costs and a simplified transparent system is more effective in attracting able students from low income families (Deming and Dynarski, 2009).

The potential exists for doing this by systematically accrediting the 270 Further Education Colleges in England and the 40 in Scotland, for example, to award Foundation Degrees. This and the funding of other higher education programmes in Further Education Colleges is discussed extensively in a recent HEFCE report (HEFCE 2009). The evidence is extensive that students can and do vote with their feet, gravitating to courses and occupations in the job market where demand and earnings are high. That suggests that it would be helpful to provide greater flexibility in changing majors (or qualifications) within a more unified short degree that allows them to do so. It also suggests further attention to increasing the transferability of credits to other universities when those completing short degrees wish to pursue a bachelor's degree. The 19.3% or so of all undergraduates in the UK in short degree programmes is far below the 64% of all undergraduate students in the US that are now in Community Colleges.

- *A Tool for Regional Development.* A final policy option worth stressing is the relevance of short degrees to regional development. The Further Education Colleges are widely distributed throughout the provincial cities of England, Scotland, Wales and Northern Ireland, just as US Community Colleges are located in cities throughout all the states, with roles as discussed by Parry (2006). This paper has developed the point that graduates with short degrees tend disproportionately to remain in or near the locality where they went to school. Sweden's experience with decentralization offers additional evidence relevant to the dispersed impacts of higher education programmes (Andersson et. al. 2009, Bonin et.al. 2008). The important additional point developed in this paper is that it is not just the job and earnings-related impacts. It is the additional effects on standard measures of development in the regions such as better health, child development, greater longevity, better civic and judicial institutions, and even a greater degree of creativity that are involved. It is suggested that education policies be designed with these factors in mind.

APPENDIX A

TABLE A-1. Percent of Sub-Baccelauriate Students With General vs Voc. Prior Qualifications

	ENROLLMENT (		PERCENT		% PRIOR		WEIGHTED AV. (BELOW)			
	Male	Female	Male	Female	Gen.	Voc.	M-Gen	M-Voc	F-Gen	F-Voc
Foundation Degree			12.6	10.5	34%	66%	4.3	8.3	3.6	6.9
Higher National Diploma					34%	66%				
Higher National Certificate										
BTEC HNC	3,710	2,572	55.2	48.1	34%	66%				
Diploma in Higher Ed.			61.8	34.0	34%	66%	21.0	40.8	11.6	22.5
Certificate of Higher Ed.					34%	66%				
Nursing, Teacher Training	1,664	1,668	30.4	38.0						
Teacher training			13.4	15.7	80%	20%	10.7	2.7	12.6	3.1
Nursing, RSA Higher			10.5	36.3	5%	95%	0.5	10.0	1.8	34.5
Other higher, below degree	96	151	1.8	3.4	5%	95%	0.1	1.7	0.2	3.3
TOTAL NVQ4 (in LFS)	5,470	4,391	100.0	100.0			36.6	63.4	29.7	70.3
TOTAL, ALL LEVELS	45,706	24,325			Sum 36.6+63.4		=100,	29.7+	70.3	=100
TOTAL ALL LEVELS (HESA)			100.0	100.0						

Sources: % Prior from HESA (2007/8,Table 7,Qualifications Obtained ..in HE Courses at HEI's in the UK)
Columns 1-4 LFS frequencies and percentages.
Teacher Training and Nursing prior qualifications based on Google searches of sample institution
Percent General for HND/HNC from Dearden, et al (2002, p.14). Percent vocational is their 32% p
the remaining 34% who are assumed to have prior vocational experience.
Prior Qualifications for Teacher Training (80% General and 20% Voc.) are based on the Teacher Development Agency for Schools requirements of GCSE in English, Math, and Science at grade C or above. Most NVQ4 programs also require 30 hours of teaching practice

TABLE A-2. Years of FTE Study by Programme & Weighted Average

Sub-Baccelauriate NVQ4 Programs	Yrs of Study	% of Enrollment Male	% of Enrollment Female	Yrs, Weighted Male	Yrs, Weighted Female
Foundation Degree	2.00	12.6	10.5	0.25	0.21
Higher National Diploma	2.00				
Higher National Certificate	1.00				
BTEC HNC	1.25	61.78	34.02	0.77	0.43
Diploma in Higher Ed.(Est	1.25				
Cert.of Higher Ed.(Est.)	1.25				
Nursing, Teacher Training	2.00				
Teacher training		13.36	15.70	0.13	0.16
Nursing, RSA Highe	2.00	10.50	36.33	0.21	0.73
Other higher, below degree	2.00	1.76	3.43	0.04	0.07
TOTAL NVQ4 (in LFS)		100.00	100.00	Weighted Average Years of Study	
				1.40	1.59

Source for FTE Years of Study by Program:
Dearden, McIntosh, Mych, and Vignoles (2000), Tables 3,4,7, 8, and. 11-13, pp. 22-8. See also HEFCE (2008)

Table A-3. Common Types of Schools in England, and Labour Force Survey Levels

Age	Year	Curriculum	Schools			LFS Qualifications	
1-Sep			Vast Majority		A Few Areas	Approx.relation to school Levels	
3	Nursery		Nursery school			**General**	**Vocational**
4	Recep'on	Foundation				**NVQ1 (Primary, 7Yrs)**	
5	Year 1					CSE at or below	GNVQ
6	Year 2	Key Stage 1	Infant school			grade 1	GSVQ
7	Year 3						RSA Dip.
8	Year 4				First school	CGSE below	City & Guilds
9	Year 5					grade C	BTEC at
10	Year 6	Key Stage 2	Junior school	Primary			level 1
11	Year 7					**O-levels**	**NVQ2**
12	Year 8				Middle school	GCSE	GNVQ, RSA
13	Year 9	Key Stage 3				Grade A-C	Guilds, BTEC
14	Year 10	Stage 4				**Level 3**	**NVQ3**
15	Year 11	/GCSE	Secondary school	Secondary school with sixth form		Sec. Gen.	OND/ONC
16	Year 12	6th form				Scot 6 Yr.	BTEC/Scot.
17	Year 13	/A levels	Sixth form college		Upper school	A-levels	GNVQ

Source: http://locatesharepoint.co.uk/Content/School.aspx
See also Wikopedia "Education in England".

TABLE A-4

VALUE OF PRIVATE NON-MARKET RETURNS, UK and US BACHELORS AND SHORT DEGREES

Regression: Non Market Benefit Z =αY + βS +..+ u

Value of Non Market Benefit P(S) = β/ α (ΔY), £1 = $1.548 in 2007 Purchasing Power Parity.£1 =1.6469 at current exchange rates)

Details of standardization of α and β across studies are in McMahon (2009, Appendix C). Significance of α and β: * =.01, ** =.05, and *=.10**

Private Non-Market Benefits Beyond Income	Value/Year After US Bachelors	NM Ben- efits as % Earn.Incr	Value/Yr Following US Assoc	US Assoc. Benefits in £ £1=$1.548	Value UK Short Degree NM Pvt Ben.	Basis for Income-Equivalent Valu Income Coef. α	Educ. Coef. β	Sources, See Reference List in McMahon (2009)	NM Bachl'rs in £ UK Pvt NM	US B /1.549 /1.549
Own Health Benefits	**$16,800**	53%	**$4,653**	**£3,006**	**£2,125**	This is the mean of the eight studies li		(1975)	**£3,883**	**£10,853**
Self Rated Health (US)	Higher education effects only									
Equation 5 (p.176)	$14,400	46%	**$3,988**	£2,576	**£1,821**	.167***	.019**	NBER-Thorndike	**£3,329**	£9,302
Equation 6 (p.176)	$14,967	48%	**$4,145**	£2,678	**£1,893**	.146***	.012**	Longitudinal Sample,	**£3,460**	£9,669
Equation 7 (p.176)	$18,778	60%	**$5,201**	£3,360	**£2,375**	.147***	.012**	9,700 males	**£4,341**	£12,130
Self Rated Health (US)								Grossman (1972)		
All whites p. 71	$29,977	95%	**$8,302**	£812	**£3,792**	.086*	.018**	Income is divided into four	**£6,929**	£19,365
Insurance Control (p.68)	$25,315	81%	**$7,011**	£4,529	**£3,202**	.111**	.028**	variables so α ' is too small	**£5,852**	£16,353
Self Rated Health (Germany)	$6,853	22%	**$1,898**	£1,226	**£867**	.059**	.073**	Erbsland et. al. (1995)	**£1,584**	£4,427
Self Rated Health (US)	$19,578	62%	**$5,422**	£3,503	**£2,476**	Lee(1982) in 2007 p		Wolfe & Haveman (2003: 117)	**£4,526**	£12,647
Self Rated Health (Sweden)	$4,536	14%	**$1,256**	£812	**£574**	-.019***	-2.46*	Bolin et.al(2002).Value low due	**£1,049**	£2,930
Low Health, 1=low,0=other								to controls for '80 & '96 health		
Contributing Factors	**$0**							These overlap overall health		
Smoking Cessation (OLS)	$2,160	7%	**$598**	£386	**£273**	.091***	.178***	De Walque (2004. p.24)	**£499**	£1,395
Smoking Cessation (IV)	$2,808	9%	**$778**	£502	**£355**	.086***	0.219	Cessation in or after college	**£649**	£1,814
Longevity/Mortality	**$2,179**	7%	**$603**	£390	**£276**	1.12 years of life expectancy added per year of college			**£504**	**£1,408**
Life Expectancy	$1,322	4%	**$366**	£237	**£167**	.00021***	.0483***	Appendix D, Mod ii, Sec only	**£306**	£854
Life Expectancy	$1,672	5%	**$463**	£299	**£211**	.00026***	,0504**	Appendix D, Mod. I, HE only	**£386**	£1,080
Life Expectancy (LEXP)	$3,541	11%	**$981**	£634	**£448**	Higher Educ. effects on		By Grossman (1975)	**£819**	£2,287
Lower Mortality Rate	$0							Deaton and Paxson (2001)[1]		
Child Health	**$4,340**	14%	**$1,202**	£776	**£549**	Due to Mother's education			**£1,003**	**£2,804**
Child Health,age 4-8,Canada	$1,341	4%	**$371**	£240	**£170**	.182**	.135**	Currie & Stabile (2003,p.1819)	**£310**	£866
Child Health, age 4-8, US	$7,339	23%	**$2,033**	£1,313	**£928**	.156**	.322**	Case et.al (2002, p.1313)	**£1,696**	£4,741
Vaccinations, weight better						Overlaps above		Haveman and Wolfe (2007)	**£0**	
Child Education & Cog. Dev.	**$7,892**	25%	**$2,186**	£1,412	**£998**	Mean of Child Education and Cogniti			**£1,824**	**£5,098**
Child Education Mean	$5,606	18%	**$1,553**	£1,003	**£709**	Due to Mother's higher education			**£1,296**	£3,621
Child's Years of Schooling	$6,556	21%	**$1,816**	£1,173	**£829**	0.187**	0.218**	Ermisch (2000), UK	**£1,515**	£4,235
Child's Years of Schooling	$4,657	15%	**$1,290**	£833	**£589**	$835/yr due to Grandfather's Educ.		Wolfe(2001) from Blau (1999)	**£1,077**	£3,008
Child Cognitive Dev. Mean	$10,178	32%	**$2,819**	£1,821	**£1,287**	Quality, rather than quantity of education			**£2,353**	£6,575
Cognitive Development	$1,323	4%	**$366**	£237	**£167**	Wolfe & Haveman		Angrist and Levy (1996)	**£306**	£855
Cognitive Development	$5,143	16%	**$1,424**	£920	**£651**	Haveman et. al.		Murnane (1981,p.249)	**£1,189**	£3,322
Cognitive Development	$5,256	17%	**$1,456**	£940	**£665**	1.96	11.49**	Murnane (1981,p.249)	**£1,215**	£3,395
Cog.Dev. One parent family	$2,637	8%	**$730**	£472	**£334**	1.31	3.85**	Murnane (1981, p.249)	**£610**	£1,703
Cognitive Development (IQ)	$22,660	72%	**$6,276**	£4,054	**£2,866**	Haveman et. al. (1984 p. 396)		Edwards & Grossman (1979)	**£5,238**	£14,638
Cognitive Development (IQ)	$16,637	53%	**$4,608**	£2,977	**£2,104**	Haveman et.		Shakotko, et.al.(1980)	**£3,846**	£10,747
Cognitive Development (IQ)	$16,848	54%	**$4,666**	£3,014	**£2,131**	.288**	.986**	Shakotko, et.al.(1980, p.18)	**£3,895**	£10,884
Cog.Dev: Reading, Math	$18,856	60%	**$5,222**	£3,374	**£2,385**	.271**	.942**	Shakotko, et.al.(1980, p.18)	**£4,359**	£12,181
Cog. Dev: Parents Valuation	$2,250	7%	**$623**	£403	**£285**			Haveman and Wolfe (2007)	**£520**	£1,453
Contributing Factors	$0					These overlap child education and cognitive			**£0**	
Husband's Health	**$1,917**	6%	**$531**	£343	**£242**	.146***	.180***	Grossman (1975, Eq 6,p.176)	**£443**	**£1,238**
Fertility & Family Size Lower	**$1,551**	5%	**$430**	£277	**£196**	75% allocated to secon		Michael and Willis (1976)	**£359**	**£1,002**
Happiness (Well-Being)										
Contribution to Happiness	Insignificant		many controls that are reflecting education.					Helliwell (2003, 2005)		
Contribution to Happiness	positive							Witter et. al.(1984)		
Lower Unemployment	positive		Related to education after controlling for income					McMahon (2002)		
Social Capital:Trust	positive		Related to education after controlling for income					McMahon (2009)		
Better Government	positive		Related to education after controlling for income					McMahon (2002)		

TABLE A-4 Continued

Consumption and Saving	**$3,401**	11%	**$942**	£608	**£395**	50% allocated to secondary		**£786**	**£2,197**
Consumption Efficiency	$6,358	20%	**$1,761**	£1,138	**£738**	$290/year in 1972 dollars		**£1,470**	£4,107
Consumption Efficiency	$1,350	4%	**$374**	£242	**£157**			**£312**	£872
Higher Return on Assets	$9,954	32%	**$2,757**	£1,781	**£1,155**	$895/year in 1980 dollars	Solomon[1]	**£2,301**	£6,430
Higher Saving Rate	$9,552	30%	**$2,645**	£1,709	**£1,108**	.0793*** .0955***	Solomon[1]	**£2,208**	£6,171
Job & Location Amenities									
Better Working Conditions	positive								
Amenities from Location	positive								
Lifelong Learning									
Less Obsolescence of HC									
Consumption Benefits	positive								
Improved Tastes	$0					Overlaps final outcomes; these lead to non-market benefits			
TOTAL VALUE OF PRIVATE						**Sums items in bold to avoid overlaps**			
NON-MARKET BENEFITS	**$38,080**	**121%**	**$10,546**	**£6,813**	**£4,419**			**£8,803**	**£24,599**
EARNINGS INCR.,US, M, BA	**$31,428**		**$31,428**	**£20,302**		Mean for males, average over their life c	**UK, M+F=**	**£6,665**	**£20,302**
EARN. INCR., US,M, Assoc.	**$8,704**		**$8,704**	**£5,623**		Mean for males plus females, life cycle average			
EARN. INCR.UK, Short Deg,M+F					**£3,647**	Mean for males plus females, life cycle average			
PRIVATE NON-MARKET BENEFITS AS A						Above line assumes HS 50% Voc & 50% Gen.			
% OF EARNINGS INCREASE	**121%**		**121%**	**121%**	**121%**				

1.Solomon does not present any regressions that include both income and a straightforward measure of the education level. However, his regressions in Table 10.5 Panel B show clearly a higher propensity to save (saving as a function of income) among those with 4 years of college (.1748, t =11.28) than among those with a high school education or less (0.079, t = 3.85). Here this is interpreted as an increment in the propensity to save following a 4 year college education that controls for income. The income equivalent value of the college education effect above is $1,204 in 1959 prices, or $9,552 in 2007 prices.

2 The earnings increments are the increment of college graduates' earnings over secondary earnings averaged from graduation to age 65. US data is from th US Census, Current Population Survey, adjusted to 2007 prices using the Consumer Price Index, and UK data from the Labour Force Survey..

Table A-5
Direct Social Benefits Beyond Earnings From US and UK 2-Year Degrees

Value of Benefits Income Equivalent Method, Dependent Variable	US, Value/ Yr, Social Benefits Bachelors	US Social NM Benefits as % of Earn Increments	US Assoc. Degree Value/Yr in US $	US Assoc. Degree Value/Yr in UK £	UK Short Degree, NM Social Benefits/Yr	Reported Coef.[1] of Educ. β	Reported Coef.[2] of Income	Sources See Reference List in McMahon (2009) for items cited.	UK 3-Yr. Bachl's Social Benefits	US 4 Yr. Bachl's Social Ben,in £
Political Institutions	**$1,830**	**6%**	**$507**	**£327**	**£232**				**£423**	**£1,182**
Democratization	$994	3%	**$275**	£178	£126	0.018 ***	0.372 *	McMahon (2002)	£230	£642
Democratization	$1,726	5%	**$478**	£309	£218	0.0101 *	0.05 ***	McMahon(2009),App.D,OECD;HE	£399	£1,115
Democratization	$2,771	9%	**$767**	£496	£350	0.0114 ***	0.05 **	McMahon(2009)App.D,OECD,Sec.	£641	£1,790
Democratization	$59,982	191%	**$16,612**	£10,731	£7,587	0.00917 ***	0.032	Keller (2006)[3]	£13,865	£38,748
Democratization								N. Shafiq (2009)[9]		
Civic Institutions	**$2,865**	9%	**$793**	**£513**	**£362**				**£662**	**£1,851**
Human Rights	$2,865	9%	$793	£513	£362	0.006 *	0.194 ***	McMahon (2002)	£662	£1,851
Political Stability	**$5,813**	18%	**$1,610**	**£1,040**	**£735**				**£1,344**	**£3,755**
Political Stability	$8,625	27%	$2,389	£1,543	£1,091	0.0793 ***	0.00025 ***	McMahon (2002;107)	£1,994	£5,572
Political Stability	$4,041	13%	$1,119	£723	£511	0.0423	4.7E-04 ***	McMahon(2009),App.D,OECD;HE	£934	£2,610
Political Stability	$3,001	10%	$831	£537	£380	0.0849 **	4.1E-04 ***	McMahon(2009)App.D,OECD,Sec.	£694	£1,939
Life Expectancy	**$2,308**	7%	**$639**	**£413**	**£292**				**£534**	**£1,491**
Positive Benefits	$3,344	11%	$926	£598	£423	0.0504 **	2.61E-04 ***	McMahon(2009),App.D,OECD;HE	£773	£2,160
Negative Growth	$590	2%	$163	£106	£75			McMahon(2009)App.D,OECD,LEXP	£136	£381
Positive Benefits	$2,452	8%	$679	£439	£310	0.0483 ***	2.11E-04 ***	McMahon(2009)App.D,OECD,Sec.	£567	£1,584
Negative Growth	$537	2%	$149	£96	£68			Barro et.al(1995;425,(2))[10]	£124	£347
Reduced Inequality	**$3,110**	10%	**$861**	**£556**	**£393**				**£719**	**£2,009**
Greater Opportunity	+	0%	$0	£0	£0	US Only		Leslie & Brinkman (1988)[4]		
Reduced Inequality	- (OECD)	0%	$0	£0	£0	0.0015 **		McMahon(2009)App.D,OECD,HE[5]		
Poverty Reduction,Sec	$3,110	10%	$861	£556	£393	-1.41 ***	-5.6 *	McMahon(2002;115) Model 2	£719	£2,009
Lower Crime	**$5,647**	18%	**$1,564**	**£1,010**	**£714**				**£1,305**	**£3,648**
Homicide	$719	2%	$199	£129	£91	-15.9 ***	1447 ***	McMahon (2002;144)	£166	£464
All Other Crime	$4,928	16%	$1,365	£882	£623	-974 ***	22612 ***	McMahon (2002;148)	£1,139	£3,183
Lower Public Costs	**$544**	2%	**$151**	**£97**	**£69**				**£126**	**£351**
Lower Health Costs	$544	2%	$151	£97	£69			Muennig (2000, p.28)[4]	£126	£351
Lower Prison Costs			$8,704		£3,975			Lochner & Moretti (2002)[9]		
Higher Tax Receipts								Included in Market benefits		
Environment: Indirect	**$5,609**	18%	**$1,553**	**£1,003**	**£709**	Effects from less Pop. Growth & Poverty, More Democracy			**£1,297**	**£3,623**
Cleaner Water	$136	0%	$38	£24	£17	-3,202 **	7.79 ***	McMahon (2002)	£31	£88
Less Air Pollution	$1,482	5%	$410	£265	£187	-1.32 **	-1E+00 **	McMahon(2002;137)HE,[6]	£343	£957
Less Deforestation	$3,991	13%	$1,105	£714	£505	9.9E-05 *	6.7E-07 **	McMahon (2002) [6]	£923	£2,578
Happiness										
Social Capital	+ (?)					Effect above $20,000		Helliwell (2005) [7]		
New Ideas and R&D	++							Jones and Romer (2009)		
TOTAL SOC. BENEFITS	**$27,726**		**$7,679**	**$4,960**	**£3,823**			Direct Effect Externalities	**£6,409**	**£17,911**
Earnings Increment	**$31,428**	**US 2-Yr.:**	**$8,704**	**£5,623**	**UK: £3,647**	Average earnings increment over the life cycle, Males and Females			**£3,982**	**£20,302**

Notes to Table 1:

[1] Gross Enrollment Rate includes replacement investment (65% of total)

[2] GDP Per Capita

[3] **Definitions of Control Variables: (For data sources see article or book cited)**

Y = GDP Per Capita
I = Investment in Phys.Cap.as % of GDP
M = Military Expenditure as % of Govt Budget
T = Trade Openness:exports+ imports as % of GDP
P= Primary Gross Enrollment Rate lag 10 Yrs.
PS = Political Stability, International Risk Guide
S = Sec.Gross Enrollment Rate lagged 10 Yrs.
Y(70) = Initial GDP per capita in 1970
H = Higher Education Gross Enrollment Rate
lnY = log of GNP Per Capita
D= Democratization, Freedom House (2007)
PV = Poverty Rate
G = Government Consumption as % of GDP
p = Population Growth Rate
U = Unemployment Rate lagged two years
GI = GINI Coefficient: inequality in the distribution of income

[4] No regression in the survey.

TABLE A-5 Continued

[5]Not included in average because income coefficient is not significant.

[6] Not included in average because education coefficient is not significant.

[7] Helliwell has many controls, some correlated with education.

[8] To get the effects of only higher education when only a secondary education coefficient is available and when there is no control for higher education, the assumptions are made that this secondary education coefficient captures both, and that four years

[9] Strong evidence from micro data. However coefficients are not in a form for value estimation.

[10] Government consumption (reflecting social security and aging) as a percent of GDP

Table 1B (Supplement). Contribution of Education to Economic Growth; Recent Estimates From Growth Equations

Economic Growth		Educ.Coef.	Sources: See McMahon (2009)
$28,672		7.20E-03 ***	Barro (1998)
$18,919		0.05 *	Barro & Martin(1995;426)
$13,274		0.005 *	Oliva & Rivera-Batiz (2002)
$28,379		0.075 ***	Keller (2006;24),globally
$35,568		0.094 **	Keller(2006;30),HE,OECD
$9,843		0.047 ***	App. D,OECD,HE
$0			Benhabib& Spiegel(1994)
$0			Pritchett (2006)
Average All Studies	**$16,832**	**This is smaller than estimates based on micro data above. But it averages in the last two studies.**	

References

Acemoglu, D., Johnson, S., Robinson, J. and Yared, P. (2008) 'Income and Democracy,' *American Economic Review*, 98, pp. 808-842.

Aghion, P., Boustan, L., Hoxby, C. and Vandenbussche, J. (2006) 'Exploiting States' Mistakes to Identify the Causal Impact of Education on Growth,' NBER Working Paper, National Bureau of Economic Research, Cambridge.

Andersson, R., Quigley, J. and Wilhelmsson, M. (2009) 'Urbanization, Productivity, and Innovation: Evidence from Investment in Higher Education', *Journal of Urban Economics*, 66, 1 pp. 2-15.

Appiah, E. and McMahon, W. W. (2002) 'The Social Outcomes of Education and Feedbacks on Growth in Africa,' *Journal of Development Studies*, 38, 4, pp. 27-68.

Backman, O. (2009) 'Institutions, Structures, and Poverty – A Comparative Study of 16 Countries, 1980-2000,' *European Sociological Review*, 25, 2, pp. 251-64.

Bartel, A. P., and Lichtenberg F. R. (1987) 'The Comparative Advantage of Educated Workers in Implementing the New Technology,' *Review of Economics and Statistics*, 69, pp. 1-11.

Becker, G. S. (1965) 'A Theory of the Allocation of Time,' *Economic Journal*, 75, 299, reprinted in G. Becker, ed. (1976) *The Economic Approach to Human Behaviour*, University of Chicago Press, Chicago, pp. 89-130.

Becker, G. (1976) *The Economic Approach to Human Behaviour*, The University of Chicago Press, Chicago.

Behrman, J. R., and Rosenzweig, M. R. (1999) 'Ability Bias in Schooling Returns and Twins: a Test and New Estimates', *Economics of Education Review*, 18, 2; pp. 159-167.

Bonin, H. et al (2008) 'Geographic Mobility in the European Union: Optimizing its Social and Economic Benefits', IZA Research Report 19, NIRAS Consultants, Swedish National Labour Market Board.

Breton, T. R. (2008) 'Schooling and National Income: How Large are the Externalities?' *Education Economics*, 18, 1, pp. 67-92.

Bynner, J., Dolton, P., Feinstein, L., Makepeace, G., Malmberg, L., and Woods, L. (2004) *Revisiting the Benefits of Higher Education*, Bedford Group for Life Course Statistical Studies, Institute of Education, University of London, London.

CEA (2009) 'Preparing the Workers of Today for the Jobs of Tomorrow', Council of Economic Advisers, Office of the President, July 2009.

Dearden, L.s., McGrananahon, L., Sianesi, B. (2004) 'An In-Depth Analysis of the Returns to Vocational Qualifications Obtained at Level 2', Centre for Economics of Education Discussion Paper No. 46, London School of Economics, London.

Dearden, L. S., Myck, M., and Vignoles, A. (2002) 'The Returns to Academic and Vocational Qualifications in Britain,' *Bulletin of Economic Research*, 54, pp. 249-274.

Dearden, L. S., Myck, M., and Vignoles, A. (2000) 'The Returns to Academic and Vocational Qualifications in Britain,' Centre for the Economics of Education, London School of Economics, London

Dee, T. (2004) 'Are There Civic Returns to Education?', *Journal of Public Economics*, 88, pp. 1697-1720.

DES (2005) 'Statistics of Education', *National Statistics Bulletin*, Department of Education and Statistics, UK Government, London.

Deming, D, and Dynarski, S. (2009) 'Into College, Out of Poverty? Policies to Increase the Post-Secondary Attainment of the Poor', NBER Working Paper 15387, National Bureau of Economic Research, Cambridge, MA.

Dickerson, A. P. (2005) 'A Study on Rates of Return to Investment in Level 3 and Higher Qualifications', Warwick Institute for Employment Research, University of Warwick, MS.

Freedom House, (2009, and earlier issues). *Freedom in the World*, Freedom House, New York.

Griliches, Z. and Mason, W. M. (1988) 'Education, Income and Ability.' in Z. Griliches (ed) *Technology, Education and Productivity*, Basil Blackwell, New York, pp. 182-212.

Grossman, M. (1975) 'The Correlation Between Health and Schooling.' in N. Terleckyj (ed) *Household Production and Consumption*, Columbia University Press, New York, pp. 147-311.

Haveman, R. and Wolfe, B. (1984) 'Schooling and Economic Well Being: the Role of Non-Market Effects', *The Journal of Human Resources*, 19, 3, pp. 377-407.

Hill, J. (2010) *An Anatomy of Economic Inequality in the UK*, The National Equality Panel, Commissioned by Harriet Harman, London School of Economics.

HEFCE (2009) *Supporting Higher Education in Further Education Colleges: Policy, Practice, and Prospects*, Higher Education Funding Council for England, London.

HEFCE (2008) 'Foundation Degrees; Key Statistics 2001/2-2007/8', Higher Education Funding Council for England, Publications, 2008, www.hefce,ac.uk/pubs/hefce/2008/08_16/.

HESA (2007/8) 'Higher Education Qualifications Obtained in the UK', Higher Education Statistics Agency Ltd, London.

HEFCE (2000) '1999-2000 Resource Comparisons', Higher Education Funding Council for England (see also 'Recurrent Grants for Academic Year 2008-09'), UK Government, London.

Jenkins, A., Greenwood, C. and Vignoles, A. (2007) 'The Returns to Qualifications in England: Updating the Evidence Base on Level 2 and Level 3 Vocational Qualifications.' Centre for the Economics of Education, London School of Economics, London.

Jones, C. I. and Romer, P. M. (2009) 'The New Kaldor Facts: Ideas, Institutions, Population, and Human Capital', NBER Working Paper 15094, National Bureau of Economic Research, Cambridge, MA.

Lange, F. and Topel, R. (2006) 'The Social Value of Education and Human Capital', in E. Hanushek and F. Welch (eds) *Handbook of the Economics of Education.* Elsevier, Amsterdam, pp. 459-510

Layard, R. (2006) 'Happiness and Public Policy: a Challenge to the Profession', *Economic Journal*, 116 pp. C24-C33.

Levin, H. (2006) 'The Social Costs of an Inadequate Education,' Symposium Summary, Teachers College, New York. http://www.tc.columbia.edu/i/a/3082_socialcostsofinadequateEducation.pdf

Lucas, R. E. (2008) 'Ideas and Growth', NBER Working Paper 14133, National Bureau of Economic Research, Cambridge, MA.

Lucas, R. E. (1988) 'On the Mechanics of Economic Development,' *Journal of Monetary Economics*, 22, 1, pp. 3-42.

Machin, S., Pelkonen, P. and Salvanes, K. (2008) 'Education and Mobility', CEE Discussion Paper 100, Centre for the Economics of Education, London School of Economics, London.

McIntosh, S. (2004) 'The Returns to Apprenticeship Training,' Centre for Economic Performance, London School of Economics, MS.

McIntosh, S. (2002) 'Further Analysis of the Returns to Academic and Vocational Qualifications', Research Report 370, Centre for Economic Performance, London School of Economics, London.

McMahon, W. W. (2010b) Webpage at https://netfiles.uiuc.edu/wmcmahon/www/.

McMahon W. W. (2010a) 'The External Benefits of Education.' in D. J. Brewer and P. J. McEwan (eds) *Economics of Education*, Elsevier, Amsterdam. Also in *International Encyclopaedia of Education*, Elsevier, Oxford.

McMahon, W. W. (2009) *Higher Learning, Greater Good: The Private and Social Benefits of Higher Education*, Johns Hopkins University Press, Baltimore, at: http://www.press.jhu.edu/cgi-n/bipshow.cgi?db_field=jhup_sc&qry=D01+D02.

McMahon, W. W. (2007) 'An Analysis of Education Externalities with Applications to Development in the Deep South,' *Contemporary Economic Policy,* 23, 3, pp. 459-82.

McMahon, W. W. (2002) *Education and Development: Measuring the Social Benefits*. Oxford University Press, (Paperback Edition 2002), Oxford and New York.

NCES (2009) *Postsecondary Institutions and Price of Attendance in the United States: Fall 2008, Degrees and Other Awards Conferred: 2007-08, and 12-Month Enrolment: 2007-08, First Look.* L. G. Knapp, J. E. Kelly-Reid, and S. A. Ginder, National Center for Education Statistics, US Department of Education, Washington, DC.

NCES (2008) *Career and Technical Education in the US, 1990-2005.* Statistical Analysis Report, National Center For Educational Statistics, US Department of Education, Washington, DC.

NCES (2005) *Projection of Education Statistics to 2014.* National Center for Education Statistics, US Department of Education, Washington, DC.

NCES (2001) 'Community College Transfer Rates to 4-year Institutions Using Alternative Definitions of Transfer,' Research and Development Report, 197, E. Bradburn, D. Hurst, and S. Peng, National Center for Education Statistics, US Department of Education, Washington, DC.

NCES (2000) *Projection of Education Statistics to 2010*, National Center for Education Statistics, US Department of Education, Washington. DC.

OECD (2009) *Education Today: The OECD Perspective*, Organization for Economic Cooperation and Development, Paris.

OECD (2008) *Employment Outlook 2007*, Organization for Economic Cooperation and Development, Paris

Oketch, M. (2006) 'Determinants of Human Capital Formation and Economic Growth in African Countries,' *Economics of Education Review*, 25, pp. 554-564.

Parry, M. and Fischer, K. (2009) 'How Obama's $12 Billion Dollar Plan Could Change 2-year Colleges,' *The Chronicle of Higher Education*, 20 July 2009, Washington, DC.

Parry, G. (2006) 'The Higher Education Role of Further Education Colleges,' Working Paper, University of Sheffield.

Powdthavee, N. and Vignoles, A. (2006) 'Using Rate of Return Analysis to Understand Sector Skill Needs,' Centre for the Economics of Education, London School of Economics, London.

Rouse, C. E. (1999) 'Further Estimates of the Economic Return to Schooling from a New Sample of Identical Twins,' *Economics of Education Review*, 18, 2, pp. 149-57.

Ryan, P. and Unwin, L. (2001) 'Apprenticeship in the British 'Training Market',' National Institute Economic Review, 178, pp. 99-114.

Shafiq, M. N. (2009) 'Do Education and Income Affect Support for Democracy in Muslim Countries? Evidence from the Pew Global Attitudes Project,' *Economics of Education Review*, 2009.

Swailes, S. and Roodhouse, S. (2004) 'Vocational Qualifications and Higher Education: Some Policy Issues,' *Policy Futures in Education*, 2, 1, pp. 31-52.

US Census Bureau (2004) 'Geographic Mobility,' by J. Schachter, in *Population Characteristics, Current Population Reports*, US Department of Commerce, Washington, DC.

Vandenbussche, J., Aghion, P. and Meghir, C (2006), 'Growth, Distance to Frontier and Composition of Human Capital,' *Journal of Economic Growth*, 11, pp. 97-127.

Walker, I. and Zhu, Y. (2008) 'The College Wage Premium and the Expansion of Higher Education in the UK,' *The Scandinavian Journal of Economics*, 110, 4, pp. 695-709.

Wolfe, B. L., and Haveman, R. H. (2003) 'Social and Non-Market Benefits from Education in an Advanced Economy.' in Y. Kodrzycki (ed) *Education in the 21st Century*, Federal Reserve Bank of Boston, Boston.

Notes

[1] It is possible to use the average age of the students of non-traditional ages to re-calculate a rate of return starting at that older age to get an estimate of the effect of serving an older age group in both the UK and US.

[2] This would appear to contrast with the conclusion reached by Dearden et. al . (2000, p.14) who found no difference in the Mincer return depending on the general vs. vocational type of prior qualifications. This could be due to the fact that their analysis is limited to HND/HNC level 4, or due to the effects of some of the many control variables, or both. Table 11 is difficult to interpret because it is not clear which are dependent variables ("the highest qualification") and which are control variables.

[3] Specifically, the ratio of private to public 4-year unit costs per FTE in the year 2000 from NCES (2000 Table 46) is used to estimate private college and university unit costs in 2007.

[4] Specifically, all unit costs per FTE in 2003-4 pounds are converted to 2006 prices by multiplying by 1.10 from the UK CPI so they correspond to the year for the earnings data. At the primary level for example unit costs therefore are £2,870 x 1.10 converted to 2006 prices for the first 7 years, approximately equivalent to NVQ1. At the secondary level after primary and junior schools in most jurisdictions, there is secondary school with sixth form in most jurisdictions, but Middle School and Upper School or High School in others. So to correspond as closely as possible with the LFS levels 1, 2, and 3 (NVQ1-3) nationwide earnings data the secondary average costs reported are split between middle school and senior secondary using the ratio of junior to senior secondary costs in the US. This is not very satisfactory but the secondary level social rate of return calculations easily can be refined when better estimates become available.

[5] There generally is relatively little variation in unit cost across all universities in the average, (although Imperial College is high at £9,000). So the average was not weighted by each institution's enrolment. The raw data used to compute the average is in the sources given or available from the author on request.

[6] Some UK Masters are one year degrees, but also some theses drag on. If the time were lowered below 2, it would raise slightly the social rate of return in the UK at the Masters level. This level however is not the focus of this paper.

[7] However, exactly how all costs, earnings increments, and rates of return for all education levels are calculated is fully transparent by studying the formulas underlying each cell in the UK and US spreadsheets available on the website cited. For the primary and secondary levels, and their relation to the NVQ1-3 levels, see also footnote 4.

[8] A tiny percentage will have dropped out of high school and then later passed high school equivalency exams.

[9] The ratio of the coefficient in the "No controls" (OLS) Specification 1 (.135) to the "full controls" specification 4 (.100) in Dearden et/al (2002) gives a gross ability bias of 35%. But this is too large because the "full controls" specification contains may additional control variables (at least 9) that reduce the education coefficient in ways that OLS does not whereas Spec 3 has many of the same control variables but omits test scores. All specifications use the large National Child Development Study (NCDS) sample (n = 1,533).

[10] This is based on 1 minus the ratio of the coefficient for "sub-degree quals" of .118 in specification 3 to the coefficient .140 with full controls in specification 4 in Dearden et.al (op. cit.). As further evidence of this effect, the incremental returns to lower ability individuals are higher in vocational programmes than for high ability individuals comparing "full controls" Specification 4 to "no controls" Specification 1. (ibid, p. 15 and Table 1 Cols 4 vs. 1).

[11] In the UK, the Education and Skills Act of 2008 makes schooling participation compulsory for 17 year olds beginning in 2013 and for 18 year olds effective in 2015.

[12] This 35.3% for short degrees in the UK is the sum of the 10.5% narrow rate based on earnings for males and females from Table 1 plus the value of private non-market benefits estimated to be 13.8% which is 132% of the market benefits from Table 2, plus 11% which is 88% of the market benefits also based on Table 2. Other total social rates are computed in an analogous fashion, except in the US the non-market private benefits are 121% and the social non-market benefits are 88% of earnings because (% more waking hours per year are spent on the job.

[13] Between 1999 and 2003 there is some evidence that returns to first degrees fell somewhat for those in the youngest age groups and rose for those over age 41. However 2000-2002 were recession years, and this could have been a transitory effect on new job market entrants.

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