

CEE DP 70

**Using Rate of Return Analyses to Understand Sector
Skill Needs**

Nattavudh Powdthavee

Anna Vignoles

**CENTRE FOR THE
ECONOMICS OF
EDUCATION**

July 2006

Published by
Centre for the Economics of Education
London School of Economics
Houghton Street
London WC2A 2AE

© Nattavudh Powdthavee and Anna Vignoles, submitted January 2006

July 2006

ISBN 07530 2017 3

Individual copy price: £5

The Centre for the Economics of Education is an independent research centre funded by the Department for Education and Skills. The views expressed in this work are those of the author and do not reflect the views of the DfES. All errors and omissions remain the authors.

Executive Summary

Policy-makers in almost all countries agree on one thing: namely on the importance of education and skills to ensuring future economic prosperity. A fruitful line of research has focused on determining the impact that acquiring education or training has on an individual's labour market productivity and earning prospects: this is known as rate of return analysis. The CEE has undertaken extensive research in this area and provided evidence on the returns to a variety of qualifications in the UK (CEE Discussion Papers 4, 6, 35 and 47). The CEE has also investigated specific issues such as the return to basic skills (CEE DP 3), returns to the marginal learner (CEE DP 45), returns to NVQ2 (CEE DP 46), the returns to qualifications acquired in adulthood (CEE DPs 19 and 39) and the returns to training (CEE DP 36). In addition the CEE has researched the range of methodological issues pertaining to rate of return analysis (see CEE DP 5 and 16).

In this paper we summarise current understanding on the returns to qualifications, focusing specifically on differences in the economic values of qualifications by sector. First we explain what we mean by rate of return analysis in section 2. In section 3 we then discuss how rates of return estimates might be useful for policy-makers, and in particular how those who are trying to understand and meet the skill needs of different sectors of the economy might use such information. In section 4 we describe how rates of return are actually calculated in practice, before going on to summarise the evidence base. We start with a discussion of aggregate supply and demand in section 5, before focusing on the rate of return to specific qualifications and types of education in section 6. We conclude with an analysis of what the empirical evidence implies for policy-makers working on sector skills issues (section 7).

A complex picture emerges from the evidence base.

- In the UK there has been a massive expansion in the supply of qualified labour. This expansion has not led to a fall in the average return to a year of schooling in the UK, suggesting that the demand for qualifications in the UK is still sufficiently high to justify further expansion.

- Qualifications that are supposedly tailored to employers' skill needs, such as NVQs, are actually valued less highly in the labour market. On the ground, it is the traditional vocational qualifications and academic qualifications that have the greater economic value.
- Newer vocational qualifications (particularly NVQ2) yield a zero or minimal return in the labour market, although they do increase an individual's likelihood of being in employment.
- The return to lower level vocational qualifications varies substantially across sectors. More research is needed on the ground to understand why NVQs have been successful in some sectors and less so in others.
- NVQ qualifications yield a respectably high return if they are acquired through a modern apprenticeship.
- Rapid expansion of the supply of graduates has resulted in much more variation in graduate outcomes. Although the overall return to a degree has not declined, it does appear that some types of more recent graduates are seeing a small decline in the return to their degree.
- Much of the apparent fall in the return to a degree for very new graduates is concentrated specifically on graduates who fail to get graduate level jobs.
- There is substantial variation in returns across different degree subjects, and by implication across different sectors of the economy.
- In particular, the return to arts and humanities degrees for very recent graduates appears to have fallen to zero.

Using Rate of Return Analyses to Understand Sector Skill Needs

Nattavudh Powdthavee

Anna Vignoles

1. Introduction	1
2. Some Theory	1
3. Using Rates of Return in Policy-Making	3
4. Measuring the Return to Education	6
5. What is Happening to Aggregate Supply and Demand?	8
6. The Evidence Base: Returns to Education and Training in the UK	10
Returns to staying on post compulsory schooling	11
The return to UK qualifications	12
Returns to National Vocational Qualifications (NVQ)	13
Returns to apprenticeship	16
Returns to higher education	17
7. Discussion and Policy Implications	20
References	23
Appendix	25

Acknowledgments

Nattavudh Powdthavee is a Research Officer at the Bedford Group for Lifecourse and Statistical Studies, Institute of Education. Anna Vignoles is a Reader in Economics of Education at the Bedford Group, Institute of Education, a Research Associate at the Centre for Economic Performance, London School of Economics and Deputy Director of the Centre for the Economics of Education.

This literature review was financed by the Sector Skills Development Agency and will be appearing in a SSSA book in 2006, in a slightly modified form. The views expressed in this paper are those of the authors and not necessarily those of the Sector Skills Development Agency nor the Department for Education and Skills.

1. Introduction

Policy-makers in almost all countries agree on one thing: namely on the importance of education and skills to ensuring future economic prosperity. Certainly we know that countries with higher levels of education and skill, on average have higher levels of productivity and economic growth (Machin and Vignoles, 2005). However, proving that there is a causal relationship between education and skill, and economic growth, at a country level has proved quite problematic, not least because countries vary in so many dimensions, not just their levels of education and skill (Sianesi and Van Reenen, 2000). Yet despite the difficulties in this research area, policy-makers still need to quantify the impact of education and skill if they are to justify continued investment in education and skill development. A more fruitful line of research has focused on determining the impact that acquiring education or training has on an individual's labour market productivity and earning prospects: this is known as rate of return analysis. This type of analysis tends to, by necessity, focus largely on qualifications, rather than skill acquisition per se.

Nonetheless rate of return analyses can still be useful in informing sector skill issues, as we shall show in this paper. First we explain what we mean by rate of return analysis in section 2. In section 3 we then discuss how rates of return estimates might be useful for policy-makers, and in particular how those who are trying to understand and meet the skill needs of different sectors of the economy might use such information. In section 4 we describe how rates of return are actually calculated in practice, before going on to summarise the evidence base. We start with a discussion of aggregate supply and demand in section 5, before focusing on the rate of return to specific qualifications and types of education in section 6. We conclude with an analysis of what the empirical evidence implies for policy-makers working on sector skills issues (section 7).

2. Some Theory

In rate of return analyses, education is analysed as an investment, which involves individuals and the state incurring costs now (lost income or direct costs of tuition), in order to reap gains in the future (higher income). So how does education and training actually enhance individuals' earnings? Human capital theory suggests that when individuals invest in education and training they make themselves more productive in the labour market, and this

then leads them to have higher earnings. This assumes that the labour market is fully competitive so that wages will fully reflect the productivity of workers, and that any gain in productivity due to education will subsequently result in higher earnings for the worker. Of course one can question these assumptions. Signalling theory (Spence, 1973) for example, hypothesizes that individuals acquire education merely to signal their already superior productivity to potential employers, and that the education itself is not necessarily productivity enhancing. Equally there are a number of theoretical reasons as to why wages may not reflect an individual's true productivity². However, the bulk of the empirical evidence on this issue is broadly supportive of a human capital perspective (Machin and Vignoles, 2005).

Based on the human capital theory framework, one can use rate of return analyses to evaluate the economic value of education and training, and this information can be used to guide policy makers on two crucially important questions, namely:

- 1) How much education or training and what types of education or training should individuals invest in?
- 2) How much education or training and what types of education or training should society invest in?

Of course if individuals reap the benefits of investment in education and training, in the form of higher earnings, one might ask why the state is involved in the process at all. There are a number of market failures that potentially justify state involvement. Firstly, if education or training has knock on effects to other people and organisations in society, i.e. if there are externalities, then leaving investment decisions purely to individuals will tend to lead to underinvestment. This is because individuals only take into account their personal gain from the investments they are making. Thus if a graduate not only becomes more productive as a result of her degree, but also causes others in her team to work more productively, then there is a positive externality from her education that she will ignore when deciding whether to take a degree or not. In this instance, the state should intervene to encourage her to invest (by subsidising the education or giving a grant), so that our level of investment in education is optimal from the perspective of society as a whole. A second important market failure is that individuals may lack the resources to make education or training investments and may be

² For example, this might be the case in the public sector where there is no profit motive and wages are less likely to reflect true productivity.

unable to borrow what they need, i.e. they are credit constrained. Thus poorer families may be unable to send their children to school because of they cannot meet the costs of schooling. This is certainly the case in many developing countries. A number of other market failures may exist, including information failure. Individuals may not help their children invest in education to the optimal level because they do not know of the full economic value of education. By and large these arguments for some state intervention in education have long been accepted by most societies, as is evident from the fact that primary and secondary education is state funded in all developed countries.

Equally however, it should be recognized that where governments do intervene in the market for education and training, they often fail to provide the socially optimal amount of education/training. This can be because governments invest on the basis of voters' preferences, which may encourage disproportionate investment in some types of education (higher education) and less investment in others (special needs education). Another important reason why state investments may be inefficient is simply that policy-makers do not know where they should be investing. It is therefore essential that policy-makers have access to methodologically robust and accurate rate of return analyses to inform them of where they may expect the highest social or private rate of return to education and training. Only if policy-makers act on the basis of accurate information about the economic value of different forms of education and training investment is it likely to be the case that state intervention actually overcomes the market failures we described above.

3. Using Rates of Return in Policy-Making

So what can rates of return actually tell us? Information on private rates of return³ can inform individuals as to which type of education or training investment will yield them the highest return, i.e. the highest future gain in wages. Or more specifically, private rates of return can inform individuals as to the average rate of return experienced by individuals who have made that kind of investment in the past.

Social rates of return can inform policy-makers of what they might expect to get back from investments made by the state, i.e. higher income levels and by implication higher

³ Private rates of return take into account private direct and indirect costs of investment and the private benefit, i.e. the net earnings gain accruing to the individual as a result of his or her educational investment.

productivity. Social rates of return take into account the social gain from the investment, generally measured as higher pre-tax earnings although sometimes including financial estimates of other wider benefits such as lower crime and better health. On the cost side, social rates of return take into account any investments made by the state in the education or training, such as subsidies.

One can then identify where private rates of return are very high relative to social rates of return, which would suggest that some of the burden of the costs of the investment could be shifted from the state to the individual thereby reducing the gap between the private and social rate of return. An example of where rates of return have been used in this way is in higher education. The private rate of return to higher education in the UK is extremely high, as we shall see below, and by most accounts much higher than the social rate of return. This implies that individuals would still invest in their own higher education, even if the state did not subsidise it as much as it does. This argument was indeed used in the late 1990s to shift some of the burden of the costs of HE on to individuals via the introduction of tuition fees.

Equally high social rates of return can be used to justify additional resources being allocated to education and training at the expense of other types of investment, for example investments in transport. An example of where social rates of return to education is used in this manner is in the government's Comprehensive Spending Review, during which each government department puts forward its estimates of the rate of return on its various proposed investments. In the case of the Department for Education and Skills, rate of return analyses have been used to justify a range of educational investments, including support for improving basic skills and the Government's "Skills for Life Strategy".

Some caution is required however. As will be evident from the next section, estimates of the rate of return to a particular type of investment tend to be based on retrospective data. In other words, one estimates the rate of return to education by looking at the current labour market earnings of individuals who acquired different levels of education in the past. However, this will not necessarily predict the future labour market value of education acquired today. Thus rates of return are inherently backward looking and one needs to take care not to use them too prescriptively. For example, in the 1980s and 1990s there was much discussion of the need for more language graduates to meet the challenge of globalisation. Rates of return analyses at that time suggested a relatively high return to language degrees and policy-makers attempted to boost the number of individuals taking that subject. Some

years later the rate of return to a language degree is on the low side (particularly for women)⁴, and concern has shifted to shortages in other subject areas. In some sense this is what one would like to see happen. As the supply of language graduates expands so the return to that degree should fall somewhat. The point is however, that while rate of return analyses can be used effectively to signal trends in the supply and demand for different types of skill, more detailed manpower planning on the basis of specific rate of return estimates is fraught with difficulties.

Another limitation is that rate of return analyses generally focus on the rate of return to specific qualifications or training investments. Yet what determines individuals' actual level of productivity is the level and appropriateness of their skills. Skills are acquired in a number of different ways, of which arguably the most important is on the job experience and training. Much of this form of skill acquisition is ignored in the rate of return literature.

With those caveats in mind, what can rate of return analyses tell us about sector skills needs specifically? Those seeking to understand and meet the skill needs of particular sectors need more information. They need to understand what is happening to the supply of different qualifications and skills in their sector, as well as the demand for different types of skill by employers in that sector. Rate of return analyses can help on two levels. Firstly, they add to our understanding of what is going on in the market for skills nationally, and in doing so highlight trends that may cause problems in a particular sector. For example, very high returns to a particular degree subject suggests either high demand or low supply or both, which may be very pertinent information for sectors that make high use of graduates from that discipline.

Equally rate of return analyses that are conducted on a sector-by-sector basis can inform policy-makers of labour market conditions within a particular sector. One might of course ask why the value of a particular qualification varies from sector to sector. Surely if the market is working properly individuals who have a NVQ3 and work in car manufacturing, for example, will simply start working in another sector if they see that workers with NVQ3 qualifications are higher paid there. However, the reality is that apparently similar qualifications still differ enormously in terms of content and applicability to the job, and therefore can vary in terms of labour market value across different sectors. This is especially the case with many vocational qualifications. Thus estimating rates of return to different qualifications by sector can not

⁴ See Table 1 in the Appendix.

only inform policy-makers as to relative supply and demand conditions in that sector but can also potentially inform policy-makers of the effectiveness of different types of qualifications across different sectors. In other words it can tell us the extent to which a particular qualification, such as an NVQ2 in hairdressing, is genuinely valued by and valuable to employers, as compared to an NVQ2 in construction for example.

4. Measuring the Return to Education

Although we will not spend long on the technical details of how rates of return are actually calculated, a brief explanation will aid the reader in interpreting the evidence base. Regression analysis is most commonly used to estimate or approximate the return to education. Information is generally collected on a cross section of individuals working in the labour market⁵, including data on their earnings, education and training, work experience or age and other personal characteristics, such as gender. A statistical model of wages is then estimated which relates individuals' current wages to their education and training, as well as their other characteristics. This is shown below, where

W_i indicates individuals' earnings

S_i represents each individual's years of schooling or training

X' represents individuals' personal characteristics, such as gender

$$\log W_i = w_i = \beta_0 + \beta_1 S_i + X' \gamma + \varepsilon_i,$$

The equation therefore indicates that an individual's wages⁶ are determined by their schooling and personal characteristics. The impact of an additional year of schooling on wages is given by the coefficient β_1 . Thus if the coefficient β_1 takes a value of 0.1, this implies that a person with an additional year of schooling (or increment of training) has earnings that are around 10% higher than their counterpart that is similar in all other respects but who does not have the additional year of schooling. Another way of estimating this

⁵ Although longitudinal data has been used to estimate robust estimates of the rate of return to education. See for example Dearden et al. 2002.

⁶ The Mincerian wage function is expressed in terms of the logarithm of wages.

equation is not to include years of schooling but to use indicators of whether the person has got a particular type of qualification, such as O levels or an NVQ3. The principle however is the same. The coefficients on these indicator variables will then indicate the approximate wage premium associated with that particular qualification, as compared to individuals who have no qualifications at all.

Most of the UK literature on rates of return analyses uses this methodology, which provides an estimate of the private return or wage premium associated with a year of schooling or a particular type of qualification. This approach does take into account the indirect costs of education, i.e. the lost income due to taking initial schooling. However, to properly calculate the rate of return to education one must also take account of the direct costs of the educational investment, such as tuition fees. Most of the estimates of presented in this paper focus only on the wage gain from education and training, including opportunity costs of investment but not direct costs. We also said that theory suggests we should be interested in two types of returns. Firstly, private returns that accrue to the individual, and secondly social returns that accrue to the state. In practice, most of the UK estimates are private returns or at best gross returns (which indicate the pre-tax income gain due to education rather than net income gain). There are far fewer robust estimates of the true social rate of return to education and training, and even fewer quantified estimates of the wider benefits of education and training, such as better health and lower crime (noteable exceptions are papers by Feinstein, 2002). Despite these limitations however, the evidence base on the private returns to education and training is still potentially very important in helping policy-makers determine the right skill strategies, as will become apparent below.

Before we review the empirical evidence, it is worth noting the major methodological problem in this area of work, namely that it is difficult to separate out the impact of education on individuals' wages from the impact of individuals' inherent ability. Thus if more able and productive individuals tend to acquire more education, it is hard to determine whether their higher wages (and by implication their productivity) are really down to the education itself. The most robust evidence in this field has tackled this issue in a number of different ways (Harmon and Oosterbeek 2000) and has at least partially overcome this particular problem. One simple way that has been used by a number of UK researchers (Dearden et al. 2002) is to include measures of ability in the model described above. In other words, one can attempt to separate the impacts of education and inherent ability by including test scores from early

childhood in the model, alongside variables measuring an individual's education. Other econometric methods have also been used, including the method of instrumental variables. We do not discuss the methodologies in detail but merely note that it is an issue to be aware of, and one that we will need to return to when we discuss the evidence base on the value of vocational qualifications specifically.

5. What is Happening to Aggregate Supply and Demand?

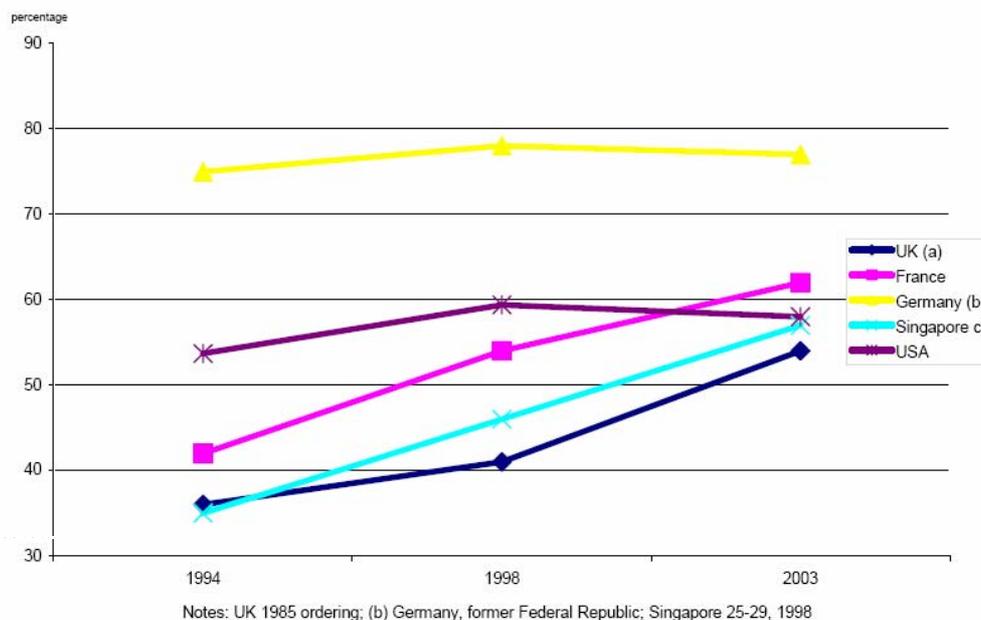
Even before we start discussing the economic value of specific qualifications, there is a more fundamental policy question: what has the large expansion in the supply of qualifications over recent decades done to the UK labour market? Economic theory suggests that a large expansion in the supply of qualified workers should have lowered the price for skilled labour, all other things equal. In other words, a large increase in the number of qualified workers should reduce the rate of return to qualifications. However, we also know that technology is causing firms to upgrade their skill requirements (Machin and Van Reenen, 1997), and it is conceivable that the supply of more qualified labour has expanded and yet still not kept supply with an even larger increase in demand. In this instance, we would expect a rise in the 'price' of skilled labour, in other words a rise in the rate of return to qualifications.

So what has happened in practice? Certainly we have expanded the supply of qualifications. This is illustrated below with data from the recent update to the UK skills audit. The supply of younger workers with qualifications at level 3 or above has risen dramatically in recent years, albeit to levels that are still below that of many of our international competitors.

Figure 2 below also indicates that Great Britain and Northern Ireland have very high returns to schooling⁷. For example, the rate of return to a year of schooling in Great Britain and Northern Ireland is second only to the rate of return in the Philippines. Workers with one more year of schooling in Great Britain earn around 13% more in terms of wages. This compares to West

⁷ See also Table 2 in the Appendix.

Figure 1 The Supply of 25-28 Years Old at Level 3 or Above



Source: Steedman et al. 2004 <http://www.dfes.gov.uk/research/data/uploadfiles/RR548.pdf>

Germany, for example, where the additional year of schooling is worth only 4%. Other studies confirm that, using the most robust methodologies and allowing for the ability bias problem⁸ we described earlier, the return to education in the UK is between 10-15% for an additional year of schooling⁹. This implies a relatively high demand and/or low supply of more educated workers. Given that we know the supply of more qualified labour has increased so much, it seems likely that the real factor driving the high return to schooling in Great Britain and Northern Ireland is in fact very high demand.

The figure below considers the average return to a year of schooling during the period 1985-1995, the period during which there was a significant expansion in the supply of skilled labour. Of course what policy-makers would like to know is whether the rate of return is falling during this period and beyond. Trostel et al. (2002) suggest that rates of return over time have been relatively stable for both Great Britain and Northern Ireland. Other evidence supports this (Dearden et al. 2002; Dearden et al. 2004a; Dickerson, 2005¹⁰). In aggregate

⁸ That more able individuals get more education and it is hard to distinguish the effect of education from the effect of inherent ability.

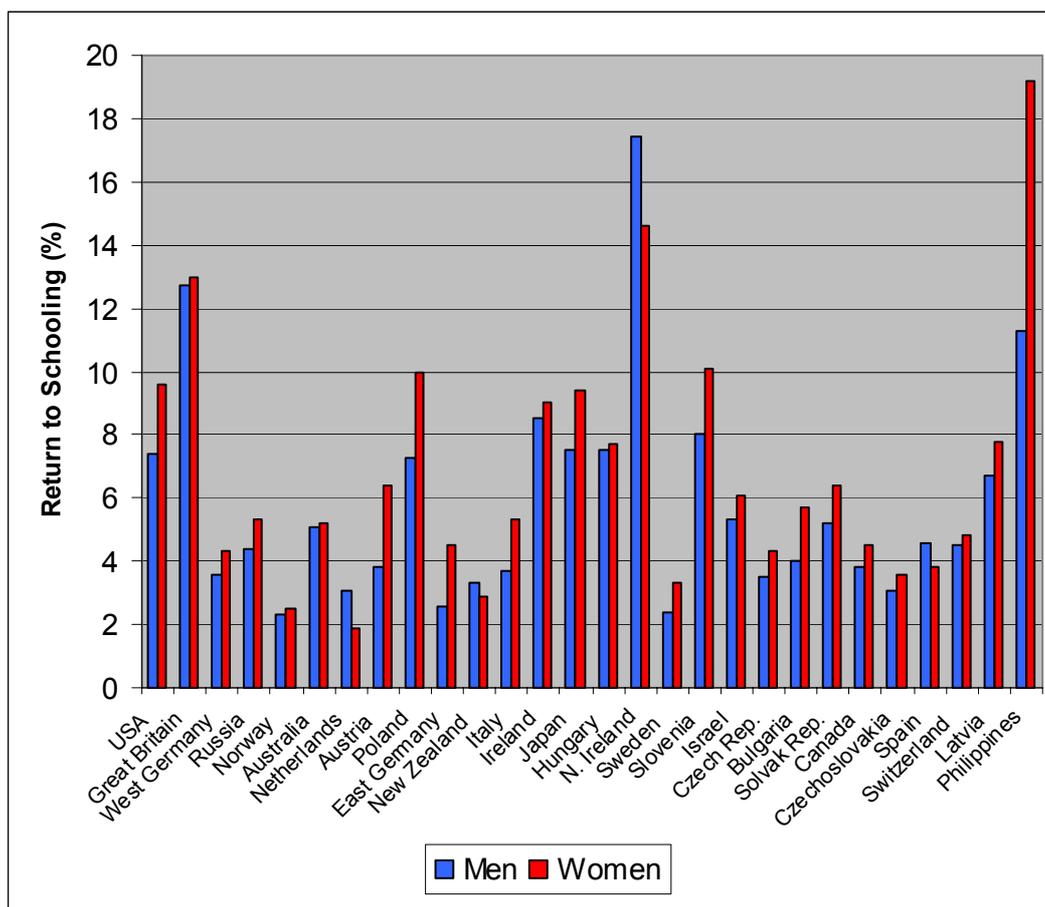
⁹ See Table 4 in the Appendix.

¹⁰Dearden, L., McIntosh, S., Myck, M. and Vignoles, A. (2002) 'The Returns to Academic, Vocational and Basic Skills in Britain', *Bulletin of Economic Research*, vol 54, no. 3, pp. 249-274.

Dearden, L; McGranahan, L; Sianesi, B. (2004a). "Returns to Education for the 'Marginal Learner': Evidence from the BCS70", Centre for Economics of Education Discussion Paper No. 45.

therefore, there appears to be no major oversupply problem yet. However, as we discuss later in this paper, this does not mean that the return to education is stable for all types of education investment and for all types of individuals.

Figure 2 International Comparisons of the Returns to Schooling (1985-1995)



Source: Trostel *et al* (2002)¹¹.

6. The Evidence Base: Returns to Education and Training in the UK

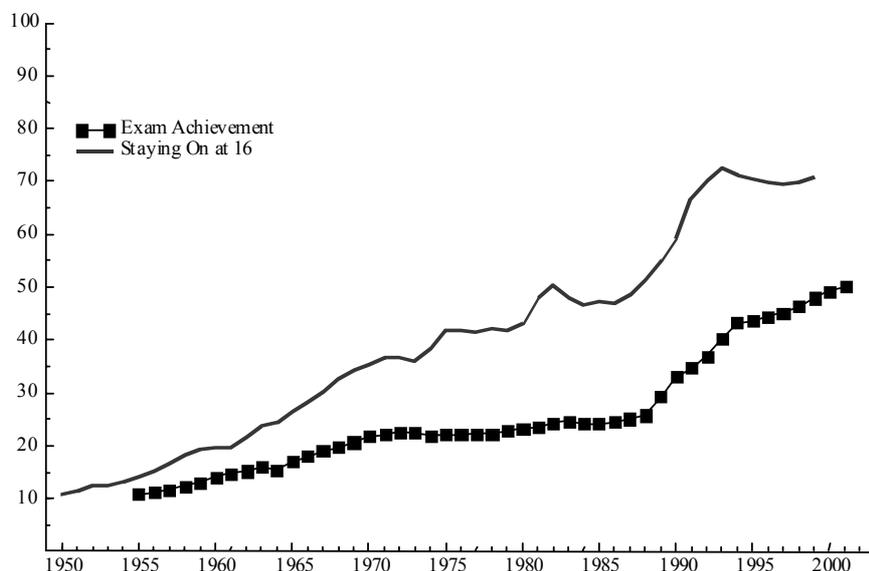
The previous section suggested that the return to a year of education in the UK is between 10 and 15%. However, for policy-makers this is not particularly useful information. There are many different forms of education and training investments, and we need to understand the

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

¹¹Trostel, P.; Walker, I.; Woolley, P. (2002). "Estimates of the Economic Return to Schooling for 28 Countries", *Labour Economics*, 9, 1-16.

relative economic value of each of these. In this section we summarise the evidence base on rates of return to different qualifications and types of education, starting with the return to staying on in school.

Figure 3 Staying On at School and Exam Achievement



Source: Clark, Conlon and Galindo-Rueda (2005)

Notes: Staying on is defined as the percentage of pupils staying on after the compulsory school leaving age. The exam achievement series measures the percentage of school-leavers achieving five or more higher grade GCSE (or O level) passes. Data for 1994-2000 comes from DfES Statistical Bulletins. Before 1994, data are taken back using a series very kindly provided by Duncan McVicar (see McVicar and Rice, 2001, for details).

Returns to staying on past compulsory schooling

The UK has historically had a major problem with a long tail of under achievers. This is illustrated in Figure 3 below which shows the exam success rate at age 16, i.e. the proportion of

the cohort achieving the equivalent of 5 or more grades A*-C at GCSE. The proportion succeeding in their examinations at age 16 remained stagnant from around 1970 to the mid 1980s. Thus in the 1980s not only were around half the cohort leaving full time education altogether after the age of 16 but they were leaving with no qualifications. More than two thirds of the cohort did not achieve examination success at age 16 and therefore entered on the labour market with minimal academic qualifications at all.

Given these policy concerns, it is important to consider the economic value of persuading more young people to stay on in school past the compulsory school leaving age. Evidence from Dearden et al. (2004a) suggests that boys who stay on in school for an additional year at

age 16 earn around 11-12% more than boys who drop out at that age. For women the return to staying on is much higher, around 18%. This suggests that there is a sizeable economic return to enabling more young people to stay on in school for longer and raises the question as to why more young people do not stay on, given that they could expect to get such a high return from doing so. One possibility is that students are credit constrained. This possibility motivated policies such as the Education Maintenance Allowances scheme, which provides a cash subsidy to poor students to encourage them to stay on in school past the compulsory school age of 16.

The return to UK qualifications

Most of those who stay on past the age of 16 end up getting a qualification of some kind, whether academic or vocational. Understanding the relative economic value of these different qualifications is also important. Table 1 below gives a summary of the return to a number of different academic and vocational qualifications in the UK.

The figures in Table 1 represent additive wage premiums. To calculate the return to the usual route to a degree one must sum returns to O levels, A levels, and a Degree. This table neatly illustrates a number of important findings in the literature. Firstly, the returns to many UK qualifications, particularly higher level ones, are high. For example, males with a degree earn up to 67% more than an unqualified worker. Secondly, the returns to academic qualifications

Table 1 Summary of Returns to Specific Qualifications

Qualification	Men	Women
O levels – GCSE	12-21%	10-19%
A levels	15-18%	18-23%
Degree	10-28%	21-26%
Level 1-2 NVQ/BTEC First	Nil	Nil
Level 3-5 NVQ	6-9%	1-5%
C&G Craft	4-7%	Nil
C&G Advanced	7-10%	Nil
OND/OND/BTEC National	7-12%	8%
HNC/HND	6-22%	3-12%

Source: Dearden et al. 2002.

Table 2 Annualised Earnings Premiums to Different UK Qualifications

Men		
NQF level:	Typical qualification	Annualised return
Academic level 3	2+ A levels	7.1%
Academic level 4	First Degree	7.1%
Academic level 5	Higher Degree	6.4%
Academic level 3	ONC/OND	4.6%
Academic level 4	HNC/HND	8.5%
Academic level 5	Other degree/CA	7.4%
Women		
NQF level:	Typical qualification	Annualised return
Academic level 3	2+ A levels	6.7%
Academic level 4	First Degree	7.2%
Academic level 5	Higher Degree	6.7%
Academic level 3	ONC/OND	2.6%
Academic level 4	HNC/HND	7.7%
Academic level 5	Other degree/CA	9.5%

Source: Dickerson, 2005. Data from LFS 2000-2004.

are significantly higher than the returns to vocational qualifications. For example, the return to O levels/ GCCSE is between 10 and 20%, as compared to nil return to NVQ level 1-2. Thirdly, individuals with the ‘newer’ vocational qualifications do particularly poorly in the labour market. Thus even NVQ3-5 yields relatively low returns, particularly for women, as compared to A levels or degrees. Some caution is required here however. Many vocational qualifications take less time to acquire and therefore an annualised return is needed, i.e. the return to an additional year of study for a given qualification. Dearden et al. 2002 found that when the time taken to acquire qualifications was taken into account, the value of vocational qualifications moved much closer to the value of academic qualifications. Dickerson 2005 confirms this and his results are summarised in Table 2:

Nonetheless, the evidence is clear that there are extremely low or even nil returns to lower level and newer vocational qualifications. We consider why this might be next.

Returns to National Vocational Qualifications (NVQ)

A number of studies have found negative returns to NVQ level 1 and 2, for both men and women (Dearden et al, 2004b; Dickerson, 2005, McIntosh, 2004a), along with low returns to NVQ level 3. Negative returns imply that individuals with these qualifications earn less than individuals who have no qualifications at all. How can undertaking a qualification actually

lead to lower earnings? Part of the explanation is that individuals who take NVQ2 qualifications tend to be of lower ability than individuals who do not take any qualifications at all, although the difference is small (Dearden et al. 2004b). This is not the whole story however, since the same work suggests that even for high ability workers, NVQ 2 qualifications do not give a positive wage premium. This raises the question as to whether there is a signalling problem here. Workers, regardless of their actual ability, may be considered by employers to be less able or motivated if they take lower level NVQ qualifications. Certainly the returns to NVQ2 depend on where the qualification was obtained. The return is highest if the qualification was obtained via an employer and lowest (negative) if the qualification was obtained through government training (Dearden et al. 2004b). Since most of the individuals taking NVQ2 via government training were previously unemployed, this too hints at a signalling problem. If employers perceive that less motivated/less able and unemployed workers tend to take NVQ2 qualifications, they will offer lower salaries to workers with this qualification, since on average their expectation is that these workers will not be very productive. The negative signal that comes from having a NVQ2 will then cause even higher ability workers with NVQ2 qualifications to be paid less (at least initially). This is just one potential explanation for the poor performance of these newer vocational qualifications however.

What is also noticeable is that the return to other older Level 2 vocational qualifications (i.e. apprentices, City & Guilds and BTEC) is generally very positive. For example, males with City and Guilds qualifications at Level 2 earn 19% more than workers with no qualifications. Again there is some evidence that part of the explanation for this is that individuals who take these more traditional Level 2 qualifications are of higher ability. However, the difference in ability between workers with newer NVQs and those with older qualifications is relatively small. So perhaps the most likely explanation for the low value-added of the NVQ2, for example, is that individuals actually learn less through an NVQ2 course than through other level 2 vocational training. This is somewhat difficult to prove. However, we do know that the return to NVQs varies by sector (see Figures 4a and 4b), although they remain by and large negative or zero. For example, the return to NVQ 2 is positive and significant for men in Energy & Water Sector (12% in 1996-2001, and 3% in 2000-2004). The return to NVQ2 is positive and significant for women in Public Administration, Education and Health (3%) in 1996-2001. Returns to higher level NVQs also tend to be greater in the private sector, than in the public sector.

This would suggest that where the content of these apparently similar qualifications differs, so does the economic value of the qualification. It is equally possible therefore, that the difference in returns between newer NVQs and the more traditional vocational qualifications is down to genuine differences in content and perceived value by employers.

Figure 4A Returns to NVQ2 by Sectors for Men

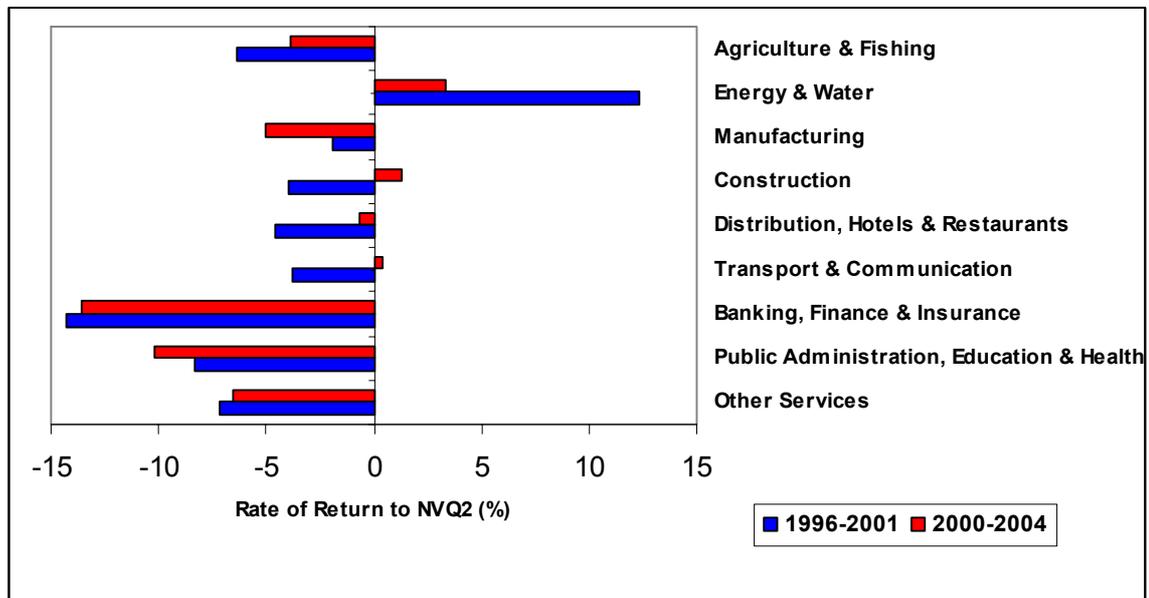
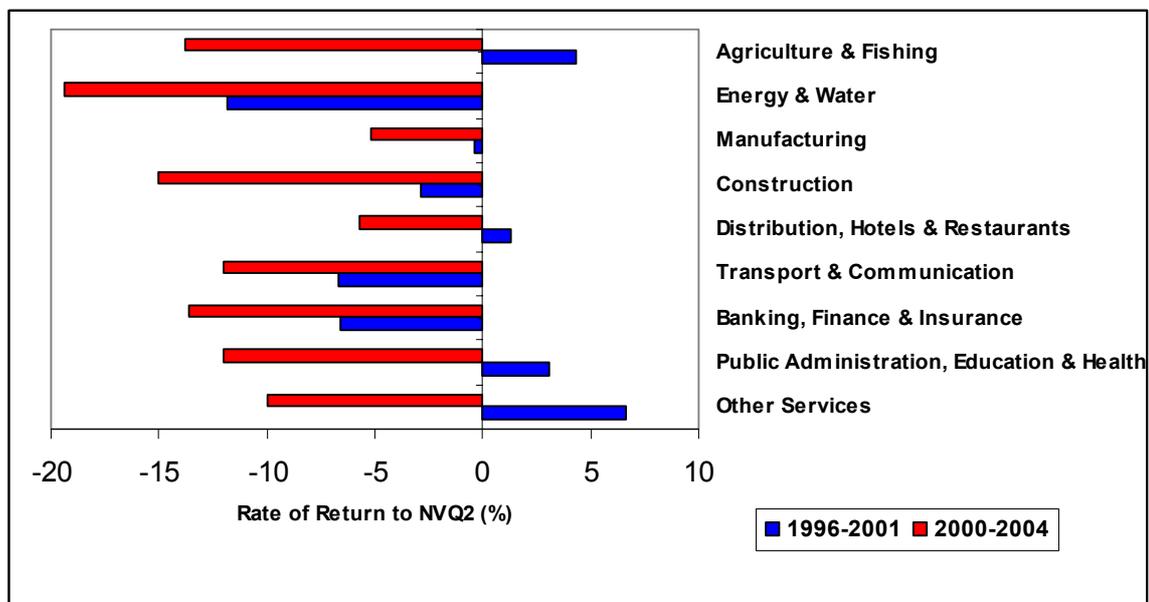


Figure 4B Returns to NVQ2 by Sectors for Women



Source: Dearden *et al* (2004b); Dickenson (2005)¹².

¹² See also Table 3 in the Appendix.

There is some good news about NVQs however. Although there is little hard evidence that taking a NVQ2 helps individuals to achieve higher qualifications later on, there is evidence that NVQs (even at Level 2) do help individuals to find and remain in employment. For example, workers with NVQ2 qualifications are 7 percentage points more likely to be employed if they are male, and 15 percentage points more likely if they are women who left school with no formal qualification (McIntosh, 2004a). At Level 3 the effect is even more impressive. Workers with NVQ3 qualifications have employment rates that are 10 percentage points higher for males and 17 percentage points higher for females. Furthermore, women are more likely to re-enter the labour market if they take an NVQ2 qualification (Jenkins, 2005). One must not underestimate the importance that these qualifications may have in assisting individuals into work or helping them stay the labour market. However, the low wage returns to NVQ2 remains of significant policy concern.

Returns to apprenticeship

We established that the economic value of lower level NVQs varies according to how the individual acquired the qualification. NVQs acquired via an employer had higher returns than those obtained via other routes. This suggests that where employers and employees identify a need for a particular NVQ qualification it yields a higher return. One would therefore expect that more structured training that results in NVQ certification would also yield higher returns. One route of particular interest to those addressing sector skill needs is the Modern Apprenticeship. Empirical evidence is somewhat mixed however. The return to an apprenticeship (with or without qualifications) is around 7% for men, but zero for women (McIntosh, 2004b). Interestingly, the return to an apprenticeship for men is doubled (from 7% to approximately 14%) if combined with an NVQ qualification at level 3 or above. At NVQ2 level, if the qualification is acquired as a result of an apprenticeship, the return is around 7%. So apprenticeships that do not lead to qualifications still have some economic value for males, particularly in manufacturing. However, apprenticeships combined with higher-level NVQ qualifications yield a much higher return. This implies that where vocational training leading to an NVQ is delivered jointly by employers and by learning providers, it has greater economic value in the labour market. The fact that apprenticeship is not working so well for women may be a sector rather than a gender bias issue. Women are concentrated in particular sectors of work and if apprenticeship is not so effective in these sectors this would explain the results. Further investigation of this is needed to be sure however.

Returns to higher education

As is well known, there has been a particularly large expansion of higher education in the UK, resulting in many more individuals having both degrees and other types of level 4 qualifications, such as HNCs and diplomas. Thus it might be in this area that we would expect to see falls in the return to education, even though in section 5 we concluded that there had been no aggregate fall in the rate of return to education. On average, compared to having level 3 qualifications or below, men with some higher education earn 18-21% more, whilst women earn 25-27% more (Dearden et al. (2004a)). However the more interesting question is what has happened to the return over time? Figures 5a and 5b show the return to a first degree for men and women by age at two points in time. The return to a first degree clearly varies across the life-course, peaking between the ages of 37 and 45 for males and the ages of 33 to 41 years for women. Generally the figures suggest that there has not been much change in the return to a first degree across the two time periods (1996-1999 and 2000-2003). The exception being that the youngest age groups that appear to be earning a lower return to their first degree in 2000-2003, as compared to 1996-1999. Since it is the youngest age groups that will be most affected by the increase in the supply of graduates coming on to the labour market, this might be indicative evidence that the return to a first degree is falling.

Figure 5A Returns to First Degree by Time since Graduate for Men

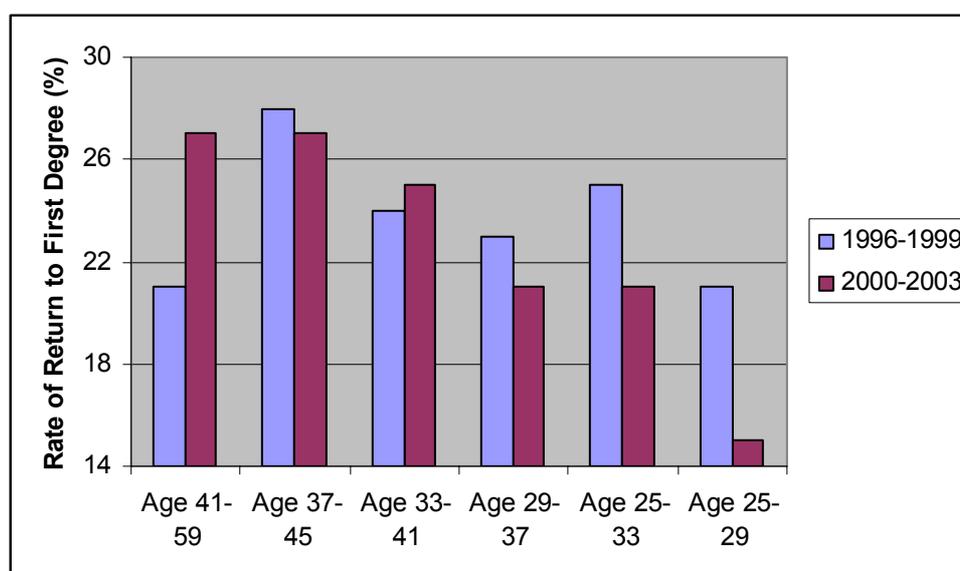
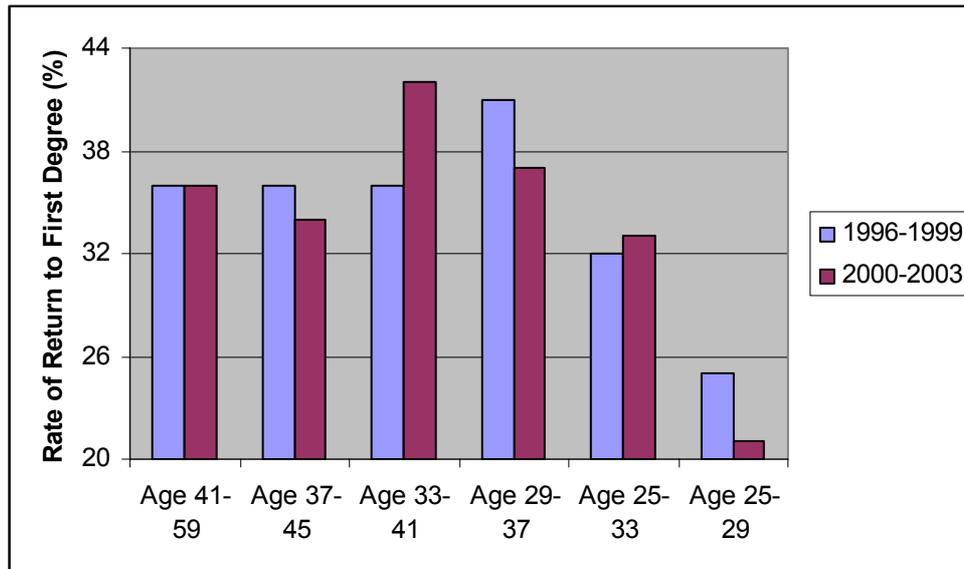


Figure 5B Returns to First Degree by Time since Graduate for Women



Source: Walker and Zhu, 2005.

Note: Least squares estimation on Labour Force Survey data, controlling for first degree, doctorate, Master's degree, other higher degree, postgraduate certificate in education, vocational qualification and a range of individual characteristics.

Some caution is required however. It could be that individuals are taking longer to integrate into the labour market, and there is some evidence that they are more likely to spend some time in a non-graduate job than was previously the case. Around one third of new graduates are finding it more difficult to make the transition into the labour market, ending up in non-graduate level jobs and earning less as a result (Dolton and Vignoles, 2000; Green et al. 2002). This is particularly a problem for graduates with certain degree subjects, such as arts and humanities. It does not necessarily mean however, that these individuals will not eventually end up in graduate jobs earning a high return to their degree. In fact, the evidence in Table 3 suggests that for graduates who do secure a graduate level job, there has been hardly any decline in the returns to a degree. It appears that the value of a degree is falling somewhat only for those who fail to secure graduate level employment.

Furthermore, it may not be the case that all young graduates face the same downturn in the return to their degree. As the number of graduates has increased, so has the heterogeneity of the graduate group. This is reflected in the larger variation in returns of a first degree. For example, Chevalier and Conlon (2003) find that male graduates from prestigious universities can expect to earn up to 6% more than those from Modern universities. Furthermore, as Table

4 illustrates, the returns to a degree vary hugely by subject of degree¹³. This in turn reflects the variation in the returns to a degree across different sectors and types of work.

Table 3 Returns to Degrees by Job Types – in percentage (%)

Non-graduate jobs	Men		Women	
	96-99	00-03	96-99	00-03
Age 41-59	-4	0	11	11
Age 37-45	7	12	10	7
Age 33-41	14	8	14	22
Age 29-37	12	3	24	12
Age 25-33	11	6	11	18
Age 25-29	12	0	13	11
Graduate jobs	96-99	00-03	96-99	00-03
Age 41-59	28	35	51	53
Age 37-45	34	32	52	53
Age 33-41	28	31	49	59
Age 29-37	28	29	53	53
Age 25-33	32	30	44	47
Age 25-29	30	29	35	38

Source: Walker and Zhu, 2005.

Table 4 indicates that in certain subjects, such as economics, business and law, there has been little change in the return to a first degree across the two time periods, at least for males. Nonetheless, the overriding trend is downward for the youngest cohort. Furthermore, although the return to most subjects is still very high by international standards, in some subject areas and for some individuals it has collapsed to zero (arts and humanities for men). Thus although the demand for graduates still outstrips the supply and so there is still a significant payoff for possessing higher educational qualifications (Blundell, Dearden and Sianesi, 2005; McIntosh, 2005), this recent evidence does suggest a slight fall in the wage premium for very recent graduates in particular subjects (Purcell et al. 2005; Sloane and O’Leary, 2004; Walker and Zhu, 2005). In particular, very recent arts and humanities graduates have seen a fall in the immediate return to their degrees to zero.

¹³ See also Table 1 in the Appendix for the returns to narrower subject areas.

Table 4 Returns to Degrees by Subjects for Recent Graduates – in percentage (%)

	Age 29-37		Age 25-33		Age 25-29	
	96-99	00-03	96-99	00-03	96-99	00-03
Men						
Health & Science	19	14	20	11	19	12
Math & Engineering	27	26	31	30	32	28
Econ/Business/Law	35	28	35	33	24	22
Education/SocStuds	19	8	12	0	20	6
Arts & Humanities	2	0	-1	-3	6	-1
Combined	20	25	25	19	18	13
Women						
Health & Science	42	34	38	34	24	18
Math & Engineering	45	45	49	42	33	35
Econ/Business/Law	61	47	47	38	36	29
Education/SocStuds	37	32	29	28	20	17
Arts & Humanities	29	17	10	25	17	12
Combined	40	35	29	33	23	20

Source: Walker and Zhu, 2005.

7. Discussion and Policy Implications

This paper sets out to describe how rate of return analyses could be used to determine how much education or training and what types of education or training individuals and the state should invest in. A complex picture emerges from the evidence base.

Certainly, in the UK there has been a massive expansion in the supply of qualified labour, even if we still lag behind our international competitors in some regards. This expansion of supply has not lead to a fall in the average return to a year of schooling in the UK¹⁴, suggesting that the demand for qualifications in the UK is still sufficiently high to justify the expansion. A national policy to continue to expand the supply of more educated (and by implication more skilled) labour is therefore in line with aggregate labour market evidence. Further state investment to expand the supply of qualified labour would appear to be a sensible strategy overall. However, we have highlighted some particular issues of concern.

¹⁴ See Table 4 in the Appendix for robust estimates of the return to a year of schooling, using instrumental variables.

Firstly, whilst the return to academic and older vocational qualifications has remained high, newer vocational qualifications (particularly NVQ2) yield a zero or minimal return in the labour market. Research suggests that lower level NVQs can assist those individuals who are out of the labour market back into work, so they do have some economic value. However, the evidence seems to suggest that the content and hence the real value of these qualifications to employers, varies substantially across sectors. More research is needed on the ground to understand why NVQs have been successful in some sectors and less so in others. We know that qualifications do not equate to skill and perhaps NVQs in some sectors are not providing individuals with the skills that employers need. We also need to inform individuals about the variable and low returns to these newer vocational qualifications so that they can make optimal decisions about what type of education and training to invest in. For example, many of these NVQ qualifications yield a respectably high return if they are acquired through a modern apprenticeship. This is the type of vital information that a young person needs when making his or her career decisions.

At the other end of the scale, rapid expansion of the supply of graduates has resulted in much more variation in graduate outcomes. Although the overall return to a degree has not declined, suggesting sufficient demand for the kinds of skill developed in higher education, it does appear that some types of more recent graduates are seeing a small decline in the return to their degree. Much of the apparent fall in the return to a degree for very new graduates is concentrated specifically on graduates who fail to get graduate level jobs. Around one third of new graduates are ending up in non-graduate level jobs and earning less as a result. Furthermore, the likelihood of not being able to get a graduate job is higher for graduates with particular degree subjects, namely those subjects that also have very low returns, such as arts and humanities. Certainly there is increasing diversity of the graduate group, with larger variation in returns across different degree subjects, and by implication across different sectors of the economy. The strength of the demand for different degree subjects obviously varies and for some subjects, it appears we already have sufficient supply. In particular, the return to arts and humanities degrees for very recent graduates appears to have fallen to zero. This evidence has important implications for the higher education sector, given that the introduction of higher and variable tuition fees is likely to focus students' minds on the return to their choice of degree subject. By shifting some of the costs of HE on to students, it is likely that more students will seek to choose subjects that better reflect the demands of the labour market. One would expect therefore a decline in the numbers taking certain subjects that are already showing signs of oversupply.

What all this means in policy terms is that we need to be doing more to understand how well different qualifications meet the needs of employers, particularly in terms of their curriculum content. It is an interesting fact that qualifications that are supposedly tailored to employers' skill needs, such as NVQs, are actually valued less highly in the labour market. Employers may demand certain specific skills that are indeed encapsulated in NVQs but on the ground, it is the traditional vocational qualifications and academic qualifications that have the greater economic value. In this context, there is still much to be done in terms of rethinking our vocational strategy and ensuring that our vocational qualifications really do develop the range of skills that employers need. Of course, the evidence presented here is very much looking backwards, showing the current labour market value of qualifications that were introduced some time ago. It cannot tell us about the likely economic value of the newer vocational qualifications, such as vocational GCSEs. What we can conclude however is that a policy of expanding the aggregate supply of skills is not sufficient. What is needed is an expansion of the supply of the right kind of skills. For this to happen, employers, individuals and policy-makers need robust up to date information on the real labour market value of different qualifications, in order to help them navigate through the increasingly complex education system and make the optimal kinds of investment decisions.

References:

1. Blundell, R., Dearden, L., and Sianesi, B. (2005). “Evaluating the effect of education on earnings: models, methods and results from the National Child Development Survey”, *Journal of the Royal Statistical Society: Series A*, Vol. 168, No. 3, pp. 473-512.
2. Chevalier, A., and Conlon, G. (2003). “Does it Pay to Attend a Prestigious University?”, IZA Discussion Paper No. 848.
3. Clark, D., Conlon, G. and Galindo-Rueda, F. (2005). “Post Compulsory Education and Qualification Attainment”, in *The Economics of Education in the United Kingdom*, G. Conlon, S. Machin and A. Vignoles (eds). Princeton University Press: Princeton and Oxford.
4. Dearden, L., S. McIntosh, M. Myck and A. Vignoles (2002) The Returns to Academic and Vocational Qualifications in Britain, *Bulletin of Economic Research*, 54, 249-274.
5. Dearden, L; McGranahan, L; Sianesi, B. (2004a). “Returns to Education for the ‘Marginal Learner’: Evidence from the BCS70”, Centre for Economics of Education Discussion Paper No. 45.
6. Dearden, L; McGranahan, L; Sianesi, B. (2004b). “An In-depth Analysis of the Returns to National Vocational Qualifications Obtained at Level 2”, Centre for Economics of Education Discussion Paper No. 46.
7. 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, manuscript.
8. Dolton, P. and Vignoles, A. (2000) 'The Incidence and Effects of Overeducation in the Graduate Labour Market', *Economics of Education Review*, Vol. 19, pp.179-198.
9. Feinstein, L. (2002) Quantitative estimates of the social benefits of learning, 1: crime, Wider Benefits of Learning Research Report No.5.
10. Feinstein, L. (2002) Quantitative estimates of the social benefits of learning, 2: health (depression and obesity), Wider Benefits of Learning Research Report No.6.
11. Green, F., McIntosh, S., and Vignoles, A. (2002) “The Utilization of Education and Skills: Evidence from Britain”, Vol. 70, No.6, pp.792-811.
12. Harmon, C. and Oosterbeek, H. (2000) ‘The Returns to Education: A Review of Evidence, Issues and Deficiencies in the Literature’, CEE Discussion Paper No. 5. <http://cee.lse.ac.uk/cee%20dps/CEEDP05.pdf>

13. Machin, S. and Van Reenen, J. (1997). 'Technology and Changes in Skill Structure: Evidence from Seven OECD Countries', *Quarterly Journal of Economics* (November 1998) CXI, 113, 1215-44.
14. Jenkins, A. (2005). "Women, lifelong learning and employment", CEE Discussion Paper No. 39, <http://cee.lse.ac.uk/cee%20dps/ceedp39.pdf> .
15. McIntosh, S. (2004a). "The Impact of Post-school Vocational Qualifications on the Labour Outcomes of Low-achieving School Leavers in the UK", Centre for Economics Performance, London School of Economics, manuscript.
16. McIntosh, S. (2005) Skills & Labour Market Outcomes, London School of Economics mimeo.
17. McVicar, D., & Rice, P. (2001). Participation in Further Education in England and Wales: an Analysis of Post-War Trends. *Oxford Economic Papers*, 53, 47 - 66.
18. Machin, S. and Vignoles, A. (2005) *What's the Good of Education?: The Economics of Education in the UK*, Princeton University Press: Princeton and Oxford.
19. McIntosh, S. (2004b). "The Returns to Apprenticeship Training", Centre for Economics Performance, London School of Economics, manuscript.
20. Purcell, K., Elias, P., Davies, R., Wilton, N. (2005) *The Class of '99: A study of the early labour market experiences of recent graduates*, Department for Education and Skills Research, www.dfes.gov.uk/research
21. Sloane, P.J., and O'Leary, N.C. (2004). "The Return to a University Education in Great Britain", IZA Discussion Paper No. 1199.
22. Sianesi, B. and VanReenen, J (2000) 'The returns to education: a review of the macro literature', London School of Economics: CEE Discussion Paper No. 20, <http://cee.lse.ac.uk/cee%20dps/CEEDP06.pdf> .
23. Spence, M. (1973) Job Market Signalling, *Quarterly Journal of Economics*, 87, pp. 355-374.
24. Trostel, P.; Walker, I.; Woolley, P. (2002). "Estimates of the Economic Return to Schooling for 28 Countries", *Labour Economics*, 9, 1-16.
25. Walker, I, and Zhu, Y. (2005). "The College Wage Premium, Overeducation, and the Expansion of Higher Education in the UK", IZA Discussion Paper No. 1627.

Appendix

Table 1A Percentage Returns to Narrow First Degree Subjects for Men (1994-2004)

Men	Mark-up
Accountancy	42.15
Electrical engineering	40.73
Maths and computing	37.23
Mechanical engineering	33.71
Medicine and related	32.06
Engineering and technology	31.85
Civil engineering	29.25
Economics	28.57
Law	28.04
Education	26.47
Business and financial studies	26.53
Sciences	25.22
Geography	23.42
Combined	22.41
Architecture and related	20.97
Languages	19.22
Psychology	18.66
Biology	15.87
Politics	15.70
Nursing	14.39
Social sciences	14.20
History	11.69
English	10.84
Sociology	10.83

Table 1B Percentage Returns to Narrow First Degree Subjects for Women (1994-2004)

Women	Mark-up
Accountancy	37.12
Medicine and related	27.52
Law	23.97
Education	22.40
Electrical engineering	19.04
Architecture and related	18.70
Maths and computing	18.10
Business and financial studies	14.34
Nursing	13.93
Mechanical engineering	13.84
Civil engineering	13.70
Engineering and technology	13.54
Social sciences	13.45
Economics	9.68
English	6.65
Sociology	6.50
Sciences	6.13
Combined	5.58
Geography	4.34
Languages	3.30
Psychology	1.98
Biology	1.60
History	0.95
Politics	-0.91

Note: All returns are measured relative to an Arts degree.

Source: Sloane and O'Leary (2004)

**Table 2 International Comparisons of the Returns to Schooling
(1985-1995) – in percentage (%)**

	Men	Women
USA	7.4	9.6
Great Britain	12.7	13
West Germany	3.6	4.3
Russia	4.4	5.3
Norway	2.3	2.5
Australia	5.1	5.2
Netherlands	3.1	1.9
Austria	3.8	6.4
Poland	7.3	10
East Germany	2.6	4.5
New Zealand	3.3	2.9
Italy	3.7	5.3
Ireland	8.5	9
Japan	7.5	9.4
Hungary	7.5	7.7
N. Ireland	17.4	14.6
Sweden	2.4	3.3
Slovenia	8	10.1
Israel	5.3	6.1
Czech Rep.	3.5	4.3
Bulgaria	4	5.7
Slovak Rep.	5.2	6.4
Canada	3.8	4.5
Czechoslovakia	3.1	3.6
Spain	4.6	3.8
Switzerland	4.5	4.8
Latvia	6.7	7.8
Philippines	11.3	19.2
Pooled	4.8	5.7

Table 3 The Returns to NVQ2 by Sectors for Men (%)

	1996- 2001	2000- 2004
Agriculture & Fishing	-6.4	-3.9
Energy & Water	12.3	3.3
Manufacturing	-1.9	-5
Construction	-4	1.3
Distribution, Hotels & Restaurants	-4.6	-0.7
Transport & Communication	-3.8	0.4
Banking, Finance & Insurance	-14.3	-13.6
Public Administration, Education & Health	-8.3	-10.2
Other Services	-7.2	-6.5

Table 3B: The Returns to NVQ2 by Sectors for Women (%)

	1996- 2001	2000- 2004
Agriculture & Fishing	4.3	-13.8
Energy & Water	-11.8	-19.4
Manufacturing	-0.4	-5.2
Construction	-2.9	-15
Distribution, Hotels & Restaurants	1.3	-5.7
Transport & Communication	-6.7	-12
Banking, Finance & Insurance	-6.6	-13.6
Public Administration, Education & Health	3.1	-12
Other Services	6.6	-10

Table 4 Instrumental Variables (IV) Estimates of the Return to Schooling for the UK

	OLS	IV	Instruments
NCDS Men Dearden (1998)	4.8%	5.5%	Family composition, parental education
FES 78-86 Men Harmon and Walker (1995)	6.1%	15.2%	Changes in school leaving age
GHS 92 Men Harmon and Walker (1999)	4.9%	14.0%	Changes in school leaving age and educational reforms
NCDS Men Harmon and Walker (2000)	5.0%	9.9%	Family background
Twins research (Women) Bonjour et al (2003)	7.7%	10.4%	Smoking at 16 on identical twins data