# The Labour Market Impact of Adult Education and Training: A Cohort Analysis

**Leon Feinstein**
**Fernando Galindo-Rueda**
**Anna Vignoles**

**Forthcoming in the Scottish Journal of Political Economy**



**January 2004**

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



ISBN 0 7530 1729 6

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 view expressed in this work are those of the authors and do not necessarily reflect the views of the Department for Education and Skills. All errors and omissions remain the authors.

## Executive Summary

Education boosts individuals' productivity and wages. A year of extra schooling increases earnings by around 5-10 per cent. Yet many individuals leave school with minimal skills and qualifications. These individuals go on to be disadvantaged in the labour market, in terms of earnings and employment prospects. Furthermore, having a larger proportion of unskilled workers than many other developed countries puts the UK at a disadvantage economically. It has long been argued that the way for these workers to "catch up" is through lifelong learning. Certainly, the political rhetoric has been in favour of lifelong learning both as a way to enhance individuals' economic and non-economic lives, and as a means of increasing the stock of skills in the labour market, and thereby making the UK more competitive.

Certainly, a significant number of adults are undertaking some form of lifelong learning. For example, the National Institute of Adult Continuing Education (NIACE) 1996 survey suggested that a quarter of adults were currently learning, although estimates do vary. However, recent research suggests that the impact of some types of lifelong learning on earnings at least is minimal. For example, by and large, lifelong learning that leads to a qualification does not boost individuals' earnings. More optimistically however, the same research suggested that there are important employment effects from this form of lifelong learning. Individuals who were not in the labour market, and who undertook lifelong learning leading to a qualification were much more likely to be employed at a later date.

This paper focuses on another distinct type of lifelong learning, namely work related training. Training is an important form of lifelong learning, undertaken by between 14 per cent and 25 per cent of the work force. The literature has suggested a positive impact from training on both individuals' productivity levels and their wages. We too find that work related training has a large positive impact on earnings, but unlike previous studies, we find this to be true for only

certain types of workers. Although on average work related training does give higher wages, this hides the fact that only some workers gain from training. Male workers who undertook work related training in mid career (age 33-42) experienced 4-5 per cent higher wage growth over the period 1991-2000, as compared to similar workers who did not undertake any training. However, workers who are selected to receive training are not representative of all workers. Rather, firms appear to “cherry pick” workers, identifying those most likely to gain from training. When we took account of this, we found that workers who received training gained substantially (12 per cent higher wage growth over the period). However, those workers who did not receive training *would not have* gained higher wages from the training had they done so.

To some extent “firms know best”. Whilst formal qualifications taken in adulthood do not generate higher wages for workers, work related training, which is generally provided by or at least organised by firms, does give a clear wage gain. Firms appear able not only to pick those workers most likely to gain from training but also to provide training that has a positive impact on wages. From a policy perspective however, it would appear that work related training in adulthood is not necessarily a substitute for providing British workers with adequate skills during their initial education. Low productivity workers with few skills are unlikely to gain from a policy to encourage employers to provide training. Instead, firms are likely to train those workers who are more able in the first place, thereby leaving the poorly skilled worker even further behind.

# The Labour Market Impact of Adult Education and Training: A Cohort Analysis

**Leon Feinstein**
**Fernando Galindo-Rueda**
**Anna Vignoles**



The Centre for the Economics of Education is financed by the
Department for Education & Skills

## Acknowledgements

We would like to thank Peter Shepherd for his help in providing the data for this paper.

Leon Feinstein is Research Director for the Centre for the Wider Benefits of Learning at the Institute of Education. Fernando Galindo Rueda is a principal researcher for the Centre for the Economics of Education and the Centre for Economics at the LSE. Anna Vignoles is a senior lecturer at the Institute of Education and a Strand Leader and Research Fellow at the Centre for the Economics of Education

## 1 Introduction

Human Capital theory (Becker, 1964) suggests that individuals and firms invest in education and training in order to boost their earnings and productivity respectively. The wage gain from a year of extra schooling is certainly substantial, around 5-10 per cent gain in earnings per year of education (Card, 1999 and Harmon *et al.*, 2000). Furthermore, in the UK, most formal qualifications, such as A-levels or degrees, attract large wage premiums (Blundell *et al.*, 2001 and Dearden *et al.*, 2002). Despite this, just under half of the current cohort of young people leaves school with few or no qualifications. These individuals go on to be disadvantaged in the labour market, in terms of their earnings and employment prospects (Dearden *et al.*, 2002). Furthermore, having a larger proportion of unskilled workers than many other developed countries puts the UK at a disadvantage economically (Prais, 1995 and Steedman, 1996). One possible way for these unskilled workers to catch up with their more educated colleagues is to undertake lifelong learning, such as adult education (e.g. acquiring a qualification) or training (e.g. on or off the job training). Although there is no agreed definition of what exactly constitutes lifelong learning, there has been a presumption amongst policy-makers that lifelong learning is critically important if the UK is to meet the ever-expanding skill needs of employers.

Yet the evidence on the benefits to the individual from lifelong learning is by no means clear. We start by considering adult education, and in particular the acquisition of formal qualifications later in life. Jenkins *et al.* (2002) suggest that this type of lifelong learning has no measurable impact on individuals' wages. Taking a qualification, such as an A level, in your teens is associated with a substantial wage premium yet taking the same qualification in your thirties and forties does not lead to higher wages. There are many potential explanations for this. Employers may assume that adult education is a signal of lower ability. If you do not take these qualifications when you are young, you may appear less motivated or less able. Alternatively, individuals may take these qualifications in adulthood for non-work related reasons. If the education gives skills that are irrelevant to the person's job, one might not expect to see large wage gains from this kind of adult learning. Rather one might expect an impact on other non-job related aspects of a person's life. Indeed, there is evidence that lifelong learning has substantial non-economic benefits, such as increasing the likelihood of stopping smoking (Feinstein *et al.*, 1993). Nonetheless, these results suggest caution before encouraging individuals to engage in adult education specifically to boost their job prospects.

In this paper we focus on another and quite distinct type of lifelong learning, namely work related training during adulthood. The literature on the impact of training specifically, as opposed to other types of lifelong learning, has suggested a positive impact on both productivity and wages[1]. To preview our results, we find that work related training does have a large positive impact on earnings, but unlike previous studies, we find this to be true for only certain types of workers. Using a different approach from previous work, we find that although on average work related training does give higher wages, this hides the fact that only some workers gain from training. Specifically we find evidence of "cherry picking" by employers. Firms tend to train those workers who will gain the most from the training. For other workers, such training would not necessarily lead to substantial productivity or wage gains.

We start with a brief review of the literature on lifelong learning in general, and work related training specifically. We then cover some of the theoretical issues and set out our preferred model. We then discuss our data and results. We end with some conclusions.

[1] See for example Andrews et al., 1999; Bishop, 1994; Black and Lynch, 1996; Blundell et al., 1999, Green, 1999 – summarised in Machin and Vignoles, 2001.

## 2 Literature

### 2.1 The extent of adult learning

Given the political rhetoric in favour of lifelong learning, just how extensive is adult education and training in the UK? According to some surveys, lifelong learning is a relatively common phenomenon. For example, the National Institute of Adult Continuing Education (NIACE) 1996 survey found that just under a quarter of adults were currently learning (Sargant *et al.*, 1997; Sargant, 2000). However, estimates vary hugely. For example, the National Adult Learning Survey (NALS) uses a broader definition of lifelong learning, which indicates that in 1997 nearly 70 per cent of 16 to 69 year olds had taken part in some kind of learning activity (Beinart and Smith, 1998). On the other hand, the Labour Force Survey (LFS) definition is narrower, including only adults who were either enrolled for part-time study at educational institutions, or undertaking part-time correspondence courses, or who had been involved in vocational training in the last four weeks (Hillage *et al.*, 2000, p 46). On this definition, at the end of 1998, about 13 per cent of all adults were doing lifelong learning (Hillage *et al.*, 2000, p 47).

Given the diversity of estimates of the extent of lifelong learning, perhaps a more appropriate question is whether the trend in participation is up or down for the UK. The NIACE surveys suggest a rise in participation between the mid 1990s and 2001. The LFS too confirms a small rise during the 1990s in the proportion of the workforce participating in adult education and training (from 11 to 13per cent). There is also some evidence that participation in adult learning has been growing elsewhere, both in North America and in other European countries (Field, 2000).

There is more consistency in the estimates of the incidence of adult work related training specifically, ranging from 14 to 25 per cent of the work force (Machin and Vignoles, 2001). The consensus seems to be that there was an increase in training incidence in the 1980s, which levelled off in the 1990s (Machin and Wilkinson, 1995; Green, 1999). Of course, these data imply that at a particular point in time only a relatively small proportion of the work force receive training and furthermore there is evidence that around 40 per cent of the work force have *never* received training (Keep, 1999; National Skills Task Force, 2000). Those on short-term contracts, doing part-time work and working in small/medium sized firms are less likely to receive any work related training, as are older workers (Keep, 2000). Given that higher educated workers, and those in managerial or professional jobs, are far more likely to receive training, training may not be available to the least skilled workers in our economy (Bynner and Parsons, 1997; Keep, 1999; Machin and Wilkinson, 1995). Since firm provided training is obviously also not available to unemployed workers, it is clearly not an “inclusive” policy option.

### 2.2 The benefits of lifelong learning

As has been said, the existing economic evidence on the benefits to the individual from lifelong learning is mixed. Despite the huge literature on the economic value of additional years of schooling or initial education, the literature on the economic benefits of *adult* education and training is quite limited.

In the UK, the literature on the gains from adult *education* has focused largely on mature graduates (e.g. Steel and Sausman, 1997). The main conclusion is that the wage gain for mature graduates from a degree is lower than for those who take these qualifications earlier (Blundell *et al.*, 1997; Egerton, 2001a and 2001b; Steel and Sausman, 1997). Jenkins *et al.* (2002) by contrast found that, on average, acquiring formal qualifications later in life does not yield higher wages. Only for the least qualified individuals did acquiring a qualification in mid-career pay off, i.e. those with no qualifications or just the Certificate of Secondary Education (CSE). In particular, males who left school with only low-level qualifications, who then acquired degrees via lifelong learning, earned significantly more than those who did not do any lifelong learning.

Jenkins *et al.* (2002) also found some positive employment effects from adult education. Those who were out of the labour market at the beginning of the period (1991) were more likely to be in work in 2000 if they had acquired a formal qualification in the interim.

The literature on the wage gains from adult work related *training* is somewhat more substantial, suggesting a positive affect from on- and off-the job training on individuals' wages and their likelihood of employment ((Blundell *et al.*, 1999a and 1999b; Green, 1996 and Green *et al.*, 1996). For example, Arulampalam, Booth and Elias (1997) found that a spell of work related training for a group of British workers in their early 20s, yielded a positive effect of between 7-12 per cent growth in real earnings over the period 1981-1991[2]. Blundell *et al*. (1996) show that for the UK a spell of employer provided training yields a pay-off of around 5 per cent to individuals' real earning growth between the ages of 23 and 33. This paper builds on this literature, using a different approach to modelling the impact of training on wages and focusing specifically on the impact of mid-life work related training, taken between the ages of 33 and 42.

## 3 Theoretical Issues

The main difficulty in estimating the impact of adult work related training on earnings is the fact that firms choose who to train, making the training participation decision endogenous[3]. In other words, firms may pick the best workers to receive training. This generates so-called endogeneity

[2] Blanchflower and Lynch (1992) broadly confirmed this finding, again for the UK but with a different data set.

[3] Measurement error in the training variable can be substantial too (generally biasing estimates of the impact of training on wages downward). Surveys containing good training measures are less common than surveys containing good education measures. Most surveys only ask simple questions about whether the individual received training or not in a given period. This tends to generate an extremely heterogeneous measure of training. In addition, training courses tend to be shorter and workers may forget they have taken them. Training measures may therefore suffer from excessive recall bias.

bias in standard models of the impact of training on wages. For example, more motivated workers may get more training, and co-incidentally earn more. The individual's motivation is likely to be *unoberservable* to the researcher (although observable to the firm) and cannot be dealt with by simply adding observable characteristics to a standard model of wages. If the higher wages one associates with *trained* workers merely reflect the fact that these workers were more motivated in the first place, this will generate upward bias in estimates of the impact of training on wages. To overcome this problem, we apply a model that allows for unobserved characteristics, namely a first difference or change equation.

The first difference strategy is to estimate the impact of work related training on the change in a person's wages between two points in time. If an individual is inherently more able or motivated, these unobserved factors are assumed to be the same at the beginning and the end of the period. Specifically, by focusing on the effect of training on the *change* in wages, any unobserved fixed characteristics cancel themselves out. Suppose that the earnings of individual i at time t ($w_{it}$) can be written:

$$w_{i,t} = a \cdot f_i + b \cdot x_{i,t} + d_t q_i + u_i + v_{i,t}, \text{ for } t=\{1,2\}$$

Earnings depend on observable fixed characteristics ($f_i$), for example, gender, and observable characteristics that may change ($x_{it}$), such as sector of work or whether the person undertook training during the period. We allow for the *impact* of some time invariant variables $q_i$ to change over time, by allowing the coefficient $d_t$ to be time varying. For example, the impact of a person's initial education can vary over the period. Earnings also depend on the individual's unobserved characteristics, with $u$ representing an individual fixed capacity to obtain earnings (productive ability), assumed unchanging over time. $v$ is an unobserved source of heterogeneity in earnings across individuals and time, which is unrelated to any of the other variables.

As has been said, the technical problem is that the unobserved individual specific fixed component (the $u_i$ term) is likely to be correlated with the observable characteristics we want to include as regressors, such as variables measuring whether the person received any training during the period in question. The first differencing technique takes care of this since all the fixed factors drop out of the equation. By first differencing, we obtain an expression for the change in earnings throughout the period.

$$\Delta w_i = b \cdot (x_{i,t} - x_{i,t-1}) + (d_t - d_{t-1})q_i + (v_{i,t} - v_{i,t-1})$$

This expression can be estimated by OLS. We also applied the technique of Instrumental Variables to this model. To be effective, these instruments need to predict training participation but not wages. For example, we used whether the person received work related training in the previous period to predict training in the subsequent period, on the grounds that in our data prior training is unlikely to affect wage growth in the subsequent period. This seems a reasonable assumption, given that in our data prior training is measured over the previous 10-year period, with ample time for the effects of that training to accrue on individuals' wages prior to the start date of our analysis.

However, an IV approach has its limitations. Ideally we want to estimate a model of wages that allows the impact of all characteristics (observed and unobserved) to vary according to whether the person was selected into the trained or the untrained group. This is the central feature of our preferred selection model, derived from the original selection models in Roy (1951) and Willis and Rosen (1979). As shown below, the change in wages for the trained group depends on observed (x) and unobserved factors (v).

$$\Delta w^1{}_i = b^1 \Delta x_i + \Delta n_i^1$$

Similarly, the change in wages for the untrained group depends on observed and unobserved factors[4].

$$\Delta w^0{}_i = b^0 \Delta x_i + \Delta n_i^0$$

Of course, all we observe is whether the person is trained or not, their observed characteristics (x) and the actual change in their wages. We do not observe what the untrained workers would have earned if they *had* received training. Nor do we observe what the trained workers would have earned if they had *not* received training. To overcome this selection problem we start by estimating a first stage model of the probability of a worker receiving work related training, using a standard probit. As shown below the probability of receiving work related training for individual i ($T_i$) is determined by observable characteristics ($z_i$), such as education level or ability, as well as unobserved factors ($e_i$).

$$T_i = 1( l z_i + e_i \geq 0)$$

To identify this model, we used the same variable as we did in the standard first difference IV model, namely prior training between 1981 and 1991. We then used the information generated by this first stage to calculate correction terms for the expected earnings residuals for a) those who received training and b) those who did not. We entered these correction terms into two *separate* standard first difference models of wage growth, one for the trained group and one for the non-trained group, as shown below. As has been said, the wage growth for an individual who received training is given by the expression $\Delta w^1{}_i$, whilst the wage growth for an individual who

---

[4] Note that the coefficient on the observed characteristics is allowed to vary according to whether the person is in the treated ($b^1$) or untreated group ($b^0$).

did not receive training is given by $\Delta w^0{}_i$. The selection terms ($\frac{f(gz_i)}{\Phi(gz_i)}$ and $\frac{f(gz_i)}{1-\Phi(gz_i)}$) take into account the fact that unobserved characteristics that determine training participation may also determine wage growth.

$E[\Delta w^1{}_i \mid x_i, T_i = 1, z_i] = b^1 x_i + s_{1,e} \frac{f(gz_i)}{\Phi(gz_i)}$ for the trained group.

$E[\Delta w^0{}_i \mid x_i, T_i = 0, z_i] = b^0 x_i - s_{0,e} \frac{f(gz_i)}{1-\Phi(gz_i)}$ for the non-trained group.

This approach enabled us to calculate two things. Firstly, we were able to determine whether there is a selectivity problem, i.e. whether observed and unobserved characteristics of workers make them more likely to be trained and also likely to experience higher earnings growth. In other words, we tried to determine whether firms "cherry pick" workers, training only those workers whose characteristics make them likely to gain the most from training. Secondly, we measured the impact of training on the wage growth of the trained group and the expected impact on the non-trained group separately. In other words, we were able to estimate separately an average training effect (ATE) for all workers[5], the impact of training on the trained group (TTE)[6] and the expected impact of training on the wage growth of those who were in the non-trained group (TNTE[7]).

We were not, however, able to consider two possible complications. If training is general, resulting in skills that are transferable across different jobs, standard human capital theory suggests that the worker will pay for the costs of training (directly and with lower wages) and will also reap the economic benefits accruing (higher earnings). If training generates firm specific skills, the worker and firm are likely to

---

[5] $ATE(x_i) = E[\Delta w^1 - \Delta w^0 \mid x_i]$

[6] $TTE(x_i) = E[\Delta w^1 - \Delta w^0 \mid x_i, T_i = 1]$

[7] $TNTE(x_i) = E[\Delta w^1 - \Delta w^0 \mid x_i, T_i = 0]$

share the costs of training (and the benefits). To the extent that training is firm specific, the person's wage will be a poorer measure of the positive impact of training on productivity. Unfortunately, our data does not contain information on whether the training is firm specific or general. The second complication is that our data also does not include information on the costs of the individual's training and thus we cannot calculate the *net* benefit of training.

## 4 Data

This research is based on the National Child Development Study (NCDS). The NCDS is a continuing longitudinal survey of people living in Great Britain who were born between 3 and 9 March 1958. Members of the NCDS cohort have been interviewed six times, the last full survey having been undertaken in 2000. The main advantage of using NCDS data is the richness of the information held about each cohort member, which includes their early attainment (scores on tests taken in reading and mathematics in childhood), school, and family background variables. We focus on the impact of work related training, that occurred between the 1991 sweep of the NCDS (age 33) and the 2000 survey (age 42), on wage growth over the same period.

Our training variable is a simple zero-one dummy variable, with a value of one if the person undertook work related training lasting more than 3 days between 1991 and 2000[8]. Just under half the sample experienced this kind of training over the period (43.7 per cent). Table 1 shows key summary statistics suggesting that males who received work related training had slightly higher wages at the beginning and the end of the period, experienced more rapid wage growth and had higher ability, as measured by scores from tests taken at age 11[9]. In addition, far fewer

[8] The question is "…have you done any work related training provided by an employer that lasted for 3 days or more…"

[9] The cognitive ability index that we use in this paper is derived from reading, mathematics and general ability tests taken at age 11. It is constructed using principle components analysis and can be interpreted as a ranking of the individual's ability. Full details can be found in Galindo-Rueda and Vignoles (2002).

trained males had left school with no qualifications at all. These descriptive statistics do suggest that concerns about endogeneity may be well founded. The workers who received work related training were not representative of the sample as a whole, and were overall more productive and more able. As has been argued previously, workers who are more able are likely to have both higher wages, and to experience more rapid wage growth.

A similar pattern is observed for females (not reported here), although only around one-third of women were in work in both 1991 and 2000. Of this small proportion of women who were in work in both periods, only two-thirds worked full time in both 1991 and 2000. These women were clearly not representative of women in general. The technical difficulties in allowing for the many sample selection issues mean that our wage analysis necessarily focuses only on males. Elsewhere we have also considered the impact of work related training on the likelihood of being in full time work for women, clearly an important but quite different labour market outcome[10].

## 5 Results

Table 2 shows our key results for males, summarising the impact of work related training on wage growth between the age of 33 and 42. Recall that the dependent variable is the (log) change in wages between 1991 and 2000. The first column shows the results of OLS estimation of the standard first difference equation. Work related training undertaken in a person's thirties and early forties appears to have a positive and significant impact on wage growth of around 5 per cent, which is consistent with much of the other training literature[11].

[10] These results will be available as a CEE discussion paper shortly. To preview them, we found a substantial impact from adult work related training on women's attachment to the labour force.

[11] Our results strictly pertain to a specific cohort, i.e. those born in 1958.

Given our concerns about the endogeneity of training, we then estimated the same model using Instrumental Variables (column 2). The excluded instrument is whether the person received training over the previous ten-year period, 1981-1991. The IV estimate is not significantly different from the OLS estimate, and is itself insignificant, suggesting that endogeneity bias is not present. We also investigated other instruments, such as the *number* of spells of training the person received in the previous period, the type of training received and the incidence of training in the individual's industry. Geographical and time constraints may mean that individuals are less likely to undertake training if they live further away from a training provider, such as an FE college. Hence, we also used the distance from the person's home to the nearest FE college as an instrument. Statistical tests suggested that the instrument sets we used were adequate in all cases[12]. Furthermore, when the full instrument set is used, the IV point estimate increased towards the estimate for the trained sample from our preferred selection model (column 4).

The major criticism of the IV approach, however, is that it only identifies the effect of training for those whose behaviour is affected by the particular instrument chosen[13]. For example, the IV estimate in Table 2 is the average effect of training in the 1991-2000 period, for those who also received training in the previous period. It is not clear that the IV method therefore generates an estimate of the "average" training effect. For this reason, we estimated our preferred selection model described in the previous section. This enabled us to get estimates of the wage growth for the trained and non-trained individuals separately, from which we could calculate the impact of

[12] An F test of excluded instruments had a value of 38.66, significant at the 1% level, and a partial R-squared on the excluded instruments of 0.09.

[13] The IV method generates the so-called local average treatment effect. See Card (1999) for a full discussion of these issues.

training for the sample as a whole, and for trained and non-trained workers separately (columns 3-5 of Table 2)[14].

The selection model weakly supports the view that there is some selection into training based on unobservable characteristics (the selectivity terms were significant at the 10 per cent level[15]). Thus, we find that the impact of training does vary across workers, based on both observable and unobservable characteristics, and that it is important to allow for this. The average effect of training, i.e. the expected impact of training across the whole population of workers, is similar to the OLS estimate but is insignificant (column 3). The impact of work related training on the group that actually received training is large and significant (column 4), suggesting that such workers experienced 12 per cent higher wage growth because of the training. Finally, the expected impact of work related training on those workers who were *not* selected to receive the training is insignificant, suggesting that these workers would not have gained from such training (column 5).

Table 2 suggests that a standard OLS regression of wage growth provides a lower bound estimate of the impact from work related training, of around 4 per cent. The IV and selection models both generate higher point estimates, for the sample as a whole and in particular, for the subset of workers who received training. The results from our selection model therefore imply that firms are able to identify and train those workers who are most likely to gain from training. These workers experience more rapid wage growth because of their training. However, simply giving this training to all other workers would not yield large wage (or productivity) gains.

---

[14] Table 3 contains full results from the selection model, including both the first stage regression and the separate first difference regressions for the trained and untrained samples. As with our IV estimates, the instrument in the first stage is prior training, which is highly significant in the first stage.

[15] Note that it is the difference between the selectivity terms in both equations that matters. When we calculated standard errors for the difference between the selectivity terms, it is significant at the 10% level.

This paper suggests that work related training boosts the productivity and wages of those selected by firms to receive it. There is, however, an alternative explanation for this central result. If the most productive firms train their workers more *and* offer faster wage growth, this will generate a positive but not necessarily causal relationship between training and wages. In other words, training may not actually boost workers' productivity levels; but rather the most productive firms may provide more training. This is an important research issue that merits further investigation (Sianesi and Van Reenen, 2000). We can allow for sorting by the most productive individuals into the best firms but cannot take full account of the fact that firms that are more productive also train more. To do this, one would require data on firms' performance, and the characteristics and wages of their workers, over time. However, to the extent that there is some upward bias in our estimates of training, this will actually reinforce our main policy conclusion, which is that training only benefits a subset of workers and thus does not provide a universal policy solution to the problem of the low skill and productivity levels of some British workers.

## 6 Conclusions

There is much talk amongst policy-makers of the need for more lifelong learning. In an era of rising demand for skill from employers, it seems that workers need to update their skills continually via adult education and training. Yet previous work has suggested that acquiring formal qualifications later in life does not yield wage gains for workers (and by implication does not generate big increases in workers' productivity levels). This paper shows that another type of lifelong learning, namely adult work related *training*, only has a positive impact on some male workers' wages.

On average, male workers who undertook work related training in mid career (age 33-42) experienced 4-5 per cent higher wage growth over the period 1991-2000, as compared to similar workers who did not undertake any training. When we investigated further, however, we found that workers who are selected to receive training are not representative of all workers. Rather, firms appear to "cherry pick" workers, identifying those most likely to gain from training. When we took account of this, we found that workers who received training gained substantially, experiencing around 12 per cent higher wage growth over the period. However, those workers who did not receive training *would not have* gained higher wages from the training had they done so.

This evidence suggests that to some extent "firms know best". Whilst formal qualifications taken in adulthood do not universally generate higher wages for workers, work related training, which is generally provided by or at least organised by firms, does give a clear wage gain. Firms appear able not only to pick those workers most likely to gain from training but also to provide training that has a positive impact on wages. From a policy perspective however, it would appear that work related training in adulthood is not necessarily a substitute for providing British workers with adequate skills during their initial education. Low productivity workers with few skills are unlikely to gain from a policy to encourage employers to provide training. Instead, firms are likely to train those workers who are more able in the first place, thereby leaving the poorly skilled worker even further behind.

## References

Aldridge, F. and Tuckett, A. (2001) *Winners and Losers in an Expanding System: The NIACE Survey on Adult Participation in Learning*, Leicester: NIACE.

Andrews, M., Bradley, S., and Upward, R. (1999) "Estimating Youth Training Wage Differentials During and After Training", *Oxford Economic Papers*, 51, pp 517-544.

Arulampalam, S. W., Booth, A.L. and Elias, P. (1997) "Work Related Training and Earnings Growth for Young Men in Britain", *Research in Labour Economics*, 16, pp 119-147.

Beinart, S. and Smith, P. (1998) *National Adult Learning Survey 1997*, DfEE research report number 49, London: Department for Employment and Education.

Bishop, J.H. (1994) "The Impact of Previous Training on Productivity and Wages", ch.6 in Lynch, L. (ed.), *Training and the Private Sector - International Comparisons*, Chicago: University of Chicago Press.

Becker, G. S. (1964) *Human Capital: A Theoretical Analysis with Special Reference to Education*, New York: Columbia University Press for National Bureau of Economic Research.

Black, S.E. and Lynch, L.M. (1996) "Human-Capital Investments and Productivity", *American Economic Review*, 86, 2, pp 263-267.

Blanchflower, D. and Lynch, L. M. (1992) "Training at work: a comparison of US and British youths", Centre for Economic Performance discussion paper number 78, London: London School of Economics.

Blundell, R., Dearden, L. and Meghir, C. (1996) *The Determinants of Work Related Training in Britain*, London: Institute of Fiscal Studies.

Blundell, R., Dearden, L., Meghir, C. and Sianesi, B. (1999) “Human capital investment: the returns from education and training to the individual, the firm and the economy”, *Fiscal Studies*, 20, 1, pp 1-24.

Blundell, R., Dearden, L. and Sianesi, B. (2001) “Estimating the Returns to Education: Models, Methods and Results”, Institute for Fiscal Studies working paper and presented at the RSS Meeting February 27th 2001, London: Institute for Fiscal Studies.

Bradley, S., Andrews, M.J. and Stott, D. (2002) “Matching the demand for and supply of training in the school-to-work transition”, *The Economic Journal*, 112, 478, pp 201-219.

Bynner, J. and Parsons, S. (1997) “Getting On With Qualifications”, in Bynner, J., Ferri, E. and Shepherd, P. (eds.) *Twenty-something in the 1990s: getting on, getting by, getting nowhere*, Hampshire: Ashgate Publishing Ltd.

Card, D. (1999) “The Causal Effect of Education on Earnings”, in O. Ashenfelter, and D. Card, (eds.), *Handbook of Labour Economics*, Amsterdam: Elsevier.

Dearden, L., McIntosh, S., Myck, M. and Vignoles, A. (2002) “The Returns to Academic, Vocational and Basic Skills in Britain”, *Bulletin of Economic Research*, 54, 3, pp 249-274.

Egerton, M. (2001a) “Mature Graduates I: Occupational Attainment and the Effects of Labour Market Duration”, *Oxford Review of Education*, 27, 1, pp 135-150.

Egerton, M. (2001b) “Mature Graduates II: Occupational Attainment and the Effects of Social Class”, *Oxford Review of Education*, 27, 2, 271-286.

Feinstein, L., Hammond, C., Woods, L. & Preston, J. (1993) "The effects of adult learning on health and social capital and cohesion", Wide Benefits of Learning research report number 8, London: Institute of Education.

Green, F. (1996) “Skill, Training, Organisational Commitment and Unemployment: The Economics of a Labour Management Strategy”, Centre for Economic Performance discussion paper number 313, London: London School of Economics and Political Science.

Green, F. (1997) “Review of Information on the Benefits of Training for Employers”, Department for Education and Employment research report number 7, London: Department for Education and Employment.

Green, F. (1999) “Training the workers”, in P. Gregg and J. Wadsworth, eds., *The State of Working Britain*, Manchester: Manchester University Press.

Harmon, C., Oosterbeek, H. and Walker, I. (2000) “The Returns to Education: A Review of Evidence, Issues and Deficiencies in the Literature”, Centre for the Economics of Education discussion paper number 5, London: London School of Economics.

Hillage, J., Uden, T., Aldridge, F. and Eccles, J. (2000) *Adult Learning in England: a Review*, IES Report 369, Sussex: Institute for Employment Studies.

Jenkins, A., Vignoles, A., Wolf, A. and Galindo-Rueda, F. (2002), “The Determinants and Labour Market Effects of Lifelong Learning”, Centre for the Economics of Education discussion paper number 19, London: London School of Economics.

Keep, E. (1999b) “Employer Attitudes Toward Adult Training”, Skills Task Force research paper 15, London: Department for Education and Skills.

Machin, S. and Wilkinson, D. (1995) *Employee Training - Unequal Access and Economic Performance*, London: Institute for Public Policy Research.

Machin, S. and Vignoles, A. (2001) *The Economic Benefits of Training to the Individual, the Firm and the Economy: The Key Issues*, Cabinet Office report, London: The Cabinet Office.

National Skills Task Force (2000b) *Tackling the Adult Skills Gap: Upskilling Adults and the Role of Workplace Learning*, 3rd report of the National Skills Task Force, London: Department for Education and Skills.

Prais, S. (1995) *Productivity, Education and Training,* Cambridge: Cambridge University Press.

Roy, A. (1951) "Some Thoughts on the Distribution of Earnings", *Oxford Economic Papers*, 3, pp 135-146.

Sargant, N., Field J., Francis, H., Schuller, T. and Tuckett, A. (1997) *The Learning Divide: A Study of Participation in Adult Learning in the United Kingdom*, Leicester: NIACE.

Sargant, N. (2000) *The Learning Divide Revisited: A Report on the Findings of a UK-wide Survey on Adult Participation in Education and Learning*, Leicester: NIACE.

Sianesi, B. and Van Reenen, J. (2000) "The Returns to Education: A Review of the Macro-economic Literature", Centre for the Economics of Education discussion paper number 6, London: London School of Economics.

Willis, R. and Rosen, S. (1979) "Education and Self-Selection", *Journal of Political Economy,* 87, 5 part 2, s7-s36.

Steedman, H. (1996) "Measuring the quality of educational output: a note", Centre for Economic Performance working paper, London: London School of Economics.

**Table 1**

| | Some work related training 1991-2000 | | No work related training 1991-2000 | |
|---|---|---|---|---|
| **Variable** | **Mean** | **Std. Dev** | **Mean** | **Std. Dev** |
| ***Males employed in 1991 and 2000*** | | | | |
| Log hourly wage 1991 | 2.287 | 0.385 | 2.153 | 0.451 |
| Log hourly wage 2000 | 2.472 | 0.424 | 2.285 | 0.399 |
| Difference log hourly wage 1991-2000 | 0.184 | 0.304 | 0.132 | 0.299 |
| Cognitive ability index | 0.381 | 0.888 | 0.138 | 0.981 |
| Highest school qualification: No quals. | 0.063 | | 0.149 | |
| Highest school qualification: CSE | 0.153 | | 0.179 | |
| Highest school qualification: <5 O-level | 0.325 | | 0.290 | |
| Highest school qualification: >=5 O-level | 0.174 | | 0.142 | |
| Highest school qualification: A level | 0.285 | | 0.240 | |
| Degree or higher | 0.106 | | 0.126 | |
| **No of observations** | **1038** | | **1153** | |

**Table 2 Summary of male results from models estimating the impact of work related training on wage growth between 1991 and 2000**

| **Dependent variable: change in log wages 1991-2000** | | | | | |
|---|---|---|---|---|---|
| | | | **-----------------Selection model-----------------** | | |
| | **OLS model** | **IV model** | **Effect of training on whole sample (ATE)** | **Effect of training on trained sample (TTE)** | **Effect of training on non-trained sample (TNTE)** |
| **Estimated coefficient on variable: received some work related training 1991-2000** | 0.048 *** | 0.050 | 0.041 | 0.120 *** | -0.030 |
| ***Standard error*** | *0.013* | *0.047* | *0.048* | *0.065* | *0.071* |

**Notes:**
See Table 3 for detailed results.
* = significant at 10%, ** = significant at 5%, *** = significant at 1%

**Table 3 Detailed male results from models estimating the impact of work related training on wage growth between 1991 and 2000**

**Dependent variable: change in log wages 1991-2000**
**Standard errors in italics**

| | | | | | ----------------Selection model---------------- | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **OLS model** | | **IV model** | | **First stage equation~** | | **Wage regression for trained sample** | | **Wage regression for non-trained sample** | |
| Some work related training 1981-1991 | | | | | 0.757 | *** | | | | |
| | | | | | *0.058* | | | | | |
| Some work related training 1991-2000 | 0.048 | *** | 0.050 | | | | | | | |
| | *0.013* | | *0.047* | | | | | | | |
| Cognitive ability index | 0.024 | *** | 0.024 | *** | 0.093 | ** | 0.022 | | 0.025 | * |
| | *0.009* | | *0.010* | | *0.041* | | *0.014* | | *0.013* | |
| CSE grade 2-5 | -0.006 | | -0.007 | | 0.288 | *** | 0.005 | | -0.025 | |
| | *0.024* | | *0.024* | | *0.116* | | *0.041* | | *0.031* | |
| < 5 O levels | -0.014 | | -0.014 | | 0.342 | *** | 0.033 | | -0.015 | |
| | *0.024* | | *0.025* | | *0.110* | | *0.041* | | *0.032* | |
| > 5 O levels | -0.016 | | -0.017 | | 0.272 | ** | 0.028 | | -0.026 | |
| | *0.028* | | *0.029* | | *0.129* | | *0.046* | | *0.038* | |
| A levels | 0.016 | | 0.015 | | 0.402 | *** | -0.008 | | 0.022 | |
| | *0.030* | | *0.031* | | *0.135* | | *0.047* | | *0.043* | |
| Lower vocational | -0.045 | *** | -0.045 | *** | 0.111 | | 0.065 | *** | -0.031 | |
| | *0.018* | | *0.018* | | *0.080* | | *0.026* | | *0.024* | |
| Middle vocational | -0.008 | | -0.008 | | 0.359 | *** | 0.030 | | 0.026 | |
| | *0.020* | | *0.021* | | *0.089* | | *0.029* | | *0.031* | |
| Higher vocational | -0.028 | | -0.028 | | 0.010 | | 0.028 | | -0.035 | |
| | *0.022* | | *0.022* | | *0.097* | | *0.031* | | *0.030* | |
| Degree | -0.003 | | -0.002 | | -0.353 | *** | 0.003 | | -0.005 | |
| | *0.026* | | *0.027* | | *0.108* | | *0.038* | | *0.038* | |
| Selection term for trained group | | | | | | | 0.057 | | | |
| | | | | | | | *0.044* | | | |
| Selection term for untrained group | | | | | | | | | -0.052 | |
| | | | | | | | | | *0.042* | |
| Constant | 0.143 | *** | 0.143 | *** | -0.923 | *** | 0.123 | * | 0.142 | *** |
| | *0.034* | | *0.036* | | *0.154* | | *0.074* | | *0.049* | |
| Sample size | 2183 | | 2183 | | 2183 | | 1034 | | 1149 | |
| R-squared | 0.024 | | 0.024 | | 0.030 | | 0.027 | | 0.025 | |

**Notes:**
All models control for region (results not reported). No coefficient was significant at the 5% level.
The base case is an individual with no qualifications.
* = significant at 10%, ** = significant at 5%, *** = significant at 1%
~ First stage dependent variable: received training between 1991-2000