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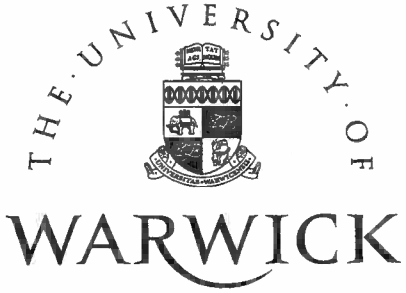

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WORK-RELATED TRAINING AND EARNINGS GROWTH FOR YOUNG MEN IN BRITAIN*

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Abstract

This paper uses the data from the National Child Development Study (NCDS) to examine the impact of vocational education and training received over the period 1981 to 1991 on the wages growth of young men in employment in both 1981 and 1991. Issues of sample selectivity and of training endogeneity are also addressed. In particular, the paper examines the durability and transferability of work-related training and educational courses received over the period 1981 to 1991, and estimates the extent to which employer-provision, job mobility and certification of courses affect individual productivity, as proxied by wages growth in a fixed effects model.

I. INTRODUCTION

A highly skilled workforce is regarded as crucial for the national goals of improving competitiveness and economic growth in the 1990s and beyond. Governments in Britain and abroad have increasingly been emphasising the importance of employer-provided training in achieving these goals.[1] An aim of this paper is to estimate the impact of both education and work-related training on productivity growth for young men, and to test whether the impact of work-related training on earnings growth decays over time. We also examine the transferability of various types of skills between employers and the extent to which qualifications increase skill transferability. To achieve these aims, we use longitudinal data from the National Child Development Study (NCDS), a cohort of individuals living in Britain and all born in one week in 1958. We estimate the impact of both education and work-related training received over the period 1981-1991 on wages growth over the same period.[2] The 5th Sweep of the NCDS, conducted when cohort members were 33 years old, is a remarkably rich source of information about qualifications associated with training or education in the ten years prior to 1991. The survey also provides a wealth of other information relevant to wage determination, such as education and training received prior to the 4th Sweep in 1981, individual characteristics, employer attributes, and family background.

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1 The presumption is that training is best left to the market to determine, and that individual firms and agents know best how much to invest in human capital, what form it should take, and who should receive it. Such an approach ignores the possibility that there may be market failures associated with training provision, an issue that is explored in Booth and Snower (1995) and chapters therein. Such an approach also ignores issues of equity in skills acquisition; for example, many studies have shown that there is evidence of discrimination in the provision of private sector training. We explore these issues further in Arulampalam, Booth and Elias (1995).

2 For studies estimating the impact of private sector training on earnings using British data, see inter alia Blanchflower and Lynch (1995), Booth (1991, 1993), Dolton et al (1994), Green et al (1995), Greenhalgh and Stewart (1987), and Nickell (1982).

Human capital theory predicts that the amount of any training investment should be greater the longer is the post-training period over which the investment can be amortised. However, in times of rapid technological change, the post-training period may be shortened, owing to the speedy obsolescence of work-related training. If training does become obsolete, we would expect agents to make training investment decisions on the basis of a short time horizon, and empirical work measuring the impact of work-related training on earnings growth should show a rapid decay of the training impact. If work-related training is characterised by rapid obsolescence, earlier years' events may have a smaller impact on earnings growth than recent events. We test for this in our empirical work by utilising dated training events.

Education and work-related training are often regarded as having complementary roles in human capital formation. The presumption is that education imparts general skills that are of value to a variety of firms, whereas work-related training is specific to the employer providing the skills. A prediction of orthodox human capital theory is that pure general training or education will be financed by the individual, whereas pure specific training may be financed by both the individual and the firm.[3] Therefore, a unit of general training will involve a larger boost to earnings growth than specific training ceteris paribus, since with general training the worker gets all the returns, while with specific training the returns are shared and a wedge is thereby driven between marginal productivity and earnings.

But this distinction between general and specific training may be misleading, since many forms of education and work-related training involve a mixture of specific and general elements, as is emphasised in the recent work of Stevens (1994). To deal with this issue, we

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[3] In practice, the state usually finances the major part of general education.

investigate the extent to which various work-related training courses are transferable across employers, which gives a measure of their generality.

We also investigate the extent to which any transferability depends on qualifications received. The impact of qualifications on wages growth is an important issue, since accreditation of training may be a means of overcoming market failure in training provision where there is asymmetry of information about the value of firm-provided training. When firms are ill-informed about the attributes of the training provided by their competitors, workers' skills that are potentially applicable in many alternative jobs become poorly transferable. In the process, workers lose some of their incentive to bear the cost of training by accepting lower wages during their training period, since they would have difficulty capturing the reward for this training if they switch firms. An implication is that certification of employer-provided training courses will provide other employers with information about training, thereby increasing their transferability and making workers more willing to pay the costs. Empirical testing of this hypothesis in this paper takes the form of dividing training courses into those with qualifications and those without, to see if they have a differential impact on earnings growth when workers change firms after undertaking training. The formal qualification associated with some forms of work-related training may be a means of conveying to non-training firms the value of firm-provided general training.

Any econometric model estimating the impact of education and training on earnings growth must confront several problems. First, there is the issue of sample selection, since estimation of earnings growth requires observations for earnings in the two latest sweeps of the birth cohort, 1981 and 1991. Secondly, there is the issue of endogeneity or self-selection into

education and training. This self-selection problem arises if individuals characterised by unobservables such as motivation or perseverance are both more likely to acquire further skills and more likely to receive higher earnings. In Section II of the paper, the econometric model chosen to deal with these problems is elaborated. The data are described in Section III where we also outline the theoretical framework we have used in our analyses. Section IV presents and discusses the estimates for male earnings growth over the period 1981 to 1991. Several model extensions are presented and discussed in Section V. The final section summarises the principal results and spells out the policy implications.

II. THE ECONOMETRIC SPECIFICATION AND ESTIMATION

In order to estimate the impact of education and training on earnings, we need to address at least two important econometric problems that are widely recognised in the applied literature. The first problem concerns the possible correlation of the education and training variables with the unobservables in the earnings equation, resulting in possible endogeneity of these variables in the earnings equation. The second problem arises because estimation of the impact of education and training on earnings requires a sample of individuals who are employed at a particular point in time; this gives rise to sample selection issues.

Consider the following log-linear earnings equations:

$$y_{i1} \equiv \ln(Y_{i1}) = x_{i1}\beta_1 + v_i + u_{i1} \qquad (1)$$

$$y_{i2} \equiv \ln(Y_{i2}) = x_{i2}\beta_2 + T_i\alpha + v_i + u_{i2} \qquad (2)$$

where time period 1 refers to 1981 and 2 to 1991; y_{it} is the natural logarithm of earnings at time t for individual i; x_{it} is a vector containing the usual observable variables on both

individual as well as firm characteristics which can be either fixed or time-varying; T_i is a vector of the various vocational training dummies, the definitions of which are given in Section III; β_1, β_2 and α are vectors of parameters; v_i is an individual specific error term capturing the effects of unobservable characteristics such as "motivation"; and u_{i1} and u_{i2} are the equation error terms. For ease of exposition, for the moment, we assume that the effects of training are constant.[4]

Now assume that training participation variables are determined by the following specification:

$$T_{ij} = z_i \delta_j + \varepsilon_{ij} \qquad j=1,....,k \qquad (3)$$

and

$$T_{ij} = 1 \quad \text{iff} \quad T_{ij}^* > 0$$

$$= 0 \quad \text{else,}$$

where the subscript j denotes various training incidents; and z_i is the vector of explanatory variables determining training receipt, and δ_j is the vector of associated parameters to be estimated. We make the standard assumption that all the random errors have zero means and are distributed independently across individuals. In addition, we also assume that the unobservables u and ε are uncorrelated with the observable characteristics x and z .

The Endogeneity Issue

The issue of endogeneity arises when participation in a training programme is not random. The earnings of untrained workers do not provide a reliable estimate of what trained workers would have received had they not participated in training. For example, suppose that

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[4] The way we relax this is discussed in section III of the paper.

individuals receiving training are more motivated than non-participants, and motivation is unobservable. If highly motivated individuals also receive higher earnings, the error terms in equations (2) and (3) will be correlated. Hence OLS estimation of (2) will produce inconsistent parameter estimates.

To address this problem, assumptions have to be made about the correlations between the error terms. As indicated in Section III below, the various hypotheses we wish to test regarding the effects of training on earnings necessitate the inclusion of many different elements in the vector T . If we were to allow for the correlation between the error terms in equations (2) and (3), not only would we need to make the assumption that the ε_{ij}s are independent of one another, we would also need to find sufficient instruments to be able to estimate the earnings equation parameters. To keep the estimation equation manageable, we therefore assume that ε s are only correlated with the v s and not with the u s. An example of where we might find correlation between the ε s and the u s is if individuals receive less training during a temporary slump, when their wages might also be lower.[5] The ruling-out of such correlations in our model may result in possible bias in the estimated parameters. But there is no reason to expect these biases to be more serious than those resulting from making allowance for this correlation but assuming independence of the ε_{ij} s and perhaps choosing inappropriate instruments.

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[5] Blundell, Dearden and Meghir (1994) allow for such a correlation. Although they have many training dummy variables in their earnings equation, they aggregate all these variables into two categories in their specification of the training participation equation, and assume independence between the error terms of these two equations. There are also no compelling theoretical arguments to explain why individuals get less training in a slump and lower wages, see Felstead and Green (1995).

The assumption that ε_{ij} s are correlated with the v_i s (and not with the u_i s) allows us to estimate the parameters of interest by taking first differences of the earnings equation, since this eliminates the fixed effects v_i . Subtraction of equation (1) from (2) produces a first-differenced earnings equation, whose regressors will be uncorrelated with the equation error term by assumption. Thus the training dummies can be treated as weakly exogenous in the estimation of our parameters of interest which are the βs . The equation that is estimated is, therefore,

$$y_{i2} - y_{i1} = x_{i2}\beta_2 - x_{i1}\beta_1 + T_i\alpha + u_{i2} - u_{i1} \qquad (4)$$

Note that since the earnings are in logarithms, the first difference of this variable can be interpreted as measuring approximate earnings growth over the period.

Sample selection issues

The estimation procedure described above requires a sub-sample of individuals in employment in both 1981 and 1991, since earnings are only available for individuals employed in both periods. It is therefore necessary to address the issue of possible endogeneity of employment status. To account for this, we model the probability of being in employment in the two observation periods 1981 and 1991 as a bivariate correlated probit function, using Heckman's two-step method to estimate the first-differenced wage equation.[6]

III. THE DATA AND THE THEORETICAL FRAMEWORK

[6] The equations for these corrections can be found in Greene (1992). The models are estimated using LIMDEP (v6.0); see Greene (1992).

The data come from the National Child Development Study (NCDS), a longitudinal study of all children born in the week of 3-9 March 1958 and living in Britain. The data were collected on each individual at birth, and at five follow-ups at ages 7, 11, 16, 23 and 33.[7] All immigrants arriving in Britain in the period 1958-74 and born in the week 3-9 March were added to the survey sample. The analysis in this paper is confined to young men who were in employment in 1981 and 1991. (Women are not examined in this present paper, as their participation decision would then need to be modelled). This data set contains information about a number of variables that are potential determinants of earnings and earnings growth. These include the usual human capital variables, plus controls for individual attributes and firm characteristics. The training and education data used in our analysis refer to training and education prior to the 4th Sweep of the NCDS conducted in 1981 and also distinguish separately the training and education received between the 4th and 5th Sweeps of the NCDS, over the period 1981 to 1991. The earnings data used are usual gross hourly earnings from employment received at the survey dates of 1981 and 1991, deflated to a common point in time using the Consumer Price Index.[8]

The advantages of using the NCDS for analysis of the impact of employer-provided training on earnings growth are as follows. First, the fifth sweep of the NCDS provides wages information before and after training and education received over the period 1981-1991. Thus, it is possible to estimate the impact of human capital acquired between the two sweeps on wages growth. Secondly, the NCDS provides information relevant to wage determination, such as education and training received prior to 1981, individual characteristics, employer attributes, and family background. Thirdly, since the data come from a specific cohort of

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7 For further details of this study and the various sweeps, see Shepherd (1985 and 1993).

8 An algorithm for cleaning the 1991 earnings data we used was obtained from Heather Joshi of the City University, to whom we are very grateful.

individuals who were aged 23 in 1981, problems of unobservable cohort effects (that are found in surveys of individuals from a variety of age groups) are not present. Finally, the NCDS Sweep 5 is a remarkably rich source of information about qualifications associated with training or education in the ten years prior to 1991.

The two main hypotheses that we wish to test are as follows:

1. The durability of education and training courses; As noted in the Introduction, conventional human capital theory predicts that investment in skills acquisition should be greater the longer the post-training period over which the investment can be amortised. However, during periods of rapid technological change, work-related skills may become obsolete quickly, and as a result the post-training period over which the investment can be recouped may be very short. Since it is often argued that the decade of the 1980s was characterised by rapid technological change, we test the hypothesis that there may be a rapid decay of the impact of work-related training courses on productivity growth as proxied by earnings. To do this, we include in our wage growth regressions a variable measuring the elapsed time since the completion of the work-related training or education course.[9] If it is the case that work-related training is on average characterised by rapid obsolescence, we would expect the earlier years' events to have a smaller impact on earnings growth than recent years' events.

2. The transferability of work-related training and in particular whether accreditation increases transferability; According to the orthodox human capital approach, if human capital is

[9] The actual form this variable takes in our analyses is discussed further in the results section.

specific, worker and firm will share in the training costs and also share in the returns. But if it is general, the worker pays all the costs and reaps all the returns. So wages growth will be lower ceteris paribus for human capital that is specific rather than general. Moreover, if a worker has been specifically trained and has changed jobs, we should expect the training event to have no impact on his earnings growth. For this reason, we hypothesise that if work-related training is specific it will have no impact on earnings growth if the worker changes jobs after training. We test for the specificity or transferability of work-related training by including as an explanatory variable an interaction between whether the person changed jobs after the training event and the most recent training event.

When firms are poorly informed about the attributes of the training provided by their competitors, workers' skills that are potentially applicable to many alternative jobs become poorly transferable. In the process, workers lose some of their incentive to bear the cost of training by accepting lower wages during their training period, since they have difficulty capturing the reward for this training if they switched firms. An implication is that certification of employer-provided training courses will provide other employers with information about training, thereby increasing their transferability and making workers more willing to pay the costs. Empirical tests of this hypothesis takes the form of dividing training courses into those with qualifications and those without, to see if they have a differential impact on earnings growth when workers change firms after undertaking training.[10] The hypothesis is that training without certification does not affect labour market outcomes apart from in the current job.

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[10] Booth and Satchell (1995) use the NCDS4 to see if apprenticeship training with and without qualifications affects job mobility for young men.

These hypotheses are premised on the view that wages are competitively determined. Should there be imperfections in the labour market, for example if trade unions set wages to extract a larger share of the surplus, employer incentives to provide training may be low.[11] And if there are imperfections in the labour market such that the wage is less than marginal productivity, worker incentives to undertake training may also be low. For these reasons, we include controls for union membership status, job sector, firm size and occupation.

The structure of the education and work-related training courses used in estimation of earnings growth is as follows:

Education and training received prior to 1981: The education variable used is the highest educational qualification obtained by the survey date of March 1981, as reported in the 4th sweep of the NCDS.[12] The information on whether the individual's highest qualification is a degree or Advanced Level or Ordinary Level secondary qualification is coded into a set of dummy variables. We also record information on whether the individual has any vocational qualification. With regard to the training information, we include data indicating whether the individual has completed an apprenticeship programme, whether he has had any training provided by his employer in his 1981 job which was more than just showing what the job was about and, for those who have had more than one job, whether their first employer had provided any training. Thus, if any of the training received prior to 1981 resulted in any

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[11] On the other hand, unions are in some circumstances cooperative, and are sometimes associated with improvements in worker morale and organisation at the workplace, and thereby increase training and productivity. Ultimately it is an empirical question as to whether unions are associated with an increase or decrease in training leading to increases in wages and productivity growth. Most empirical evidence for Britain to date suggests that union workers receive more training than nonunion workers. See for example, Booth (1991), Tan et. al (1992), and Greenhalgh and Mavrotas (1992). Tan et. al. (1992) used sweep 4 of the NCDS.

[12] The same question regarding the highest educational qualification for the period prior to 1981 was also asked at the 5th sweep of the survey. We have chosen not to make use of this information because of possible recall errors.

qualifications, this would be picked up by the highest qualification dummies. This should be borne in mind in the interpretation of the effects of these variables on wages growth. The descriptive statistics for these and other variables are presented in Table 1 and in the appendix. 54% of our sample members have had some sort of training in their 1981 job.

Education and training received over the period 1981-1991: The 5th Sweep of the NCDS is a rich source of data on education and training received over the period 1981 to 1991. These data were elicited by two principal types of questions. First, the survey asks respondents "Since March 1981 have you been on any courses that were meant to lead to qualifications?" If the respondent answered in the affirmative, the number of such courses was requested, and details were obtained of up to two courses designed to lead to the highest qualifications. Secondly, the survey asks "Since March 1981 have you been on any training courses designed to help you develop skills that you might use in a job (apart from any courses you have already told me about)". If the respondent had been on any courses lasting at least 3 days in total, detailed information was obtained for the three most recent training courses. Thus, the questions were so structured that information on the courses leading to the highest qualifications was obtained from the first type, while information about the most recent work-related training courses was obtained from the second type. For both types of courses, information was obtained about whether or not the course was provided by the employer at the time and also whether or not the respondent changed job after completing the course. With respect to the educational courses that were meant to lead to qualifications, additional information was obtained on whether the individual completed the course and obtained any qualifications. Details on the three most recent training courses that were accredited are also available in the data set.

Table 1 gives definitions of the dummy variables that were created, along with their means for the sub-sample used in the wages growth model. Although 28% of sample members have had more than two training incidents over the 10 year period, 25% have had only one or two training incidents and just under 50% of sample members have never had any training during this period. The median elapsed time since the most recent training event for sample members (i.e. those employed in both 1981 and 1991) is around 15 months. With regard to educational qualifications, 29% have followed at least one course during this period and the median time since they had completed the course is around 4 years.

Table 1 also shows the average gross hourly real wage in 1981 prices for men who are employed in both periods. The gross hourly real wages have grown by about 40% over this ten year period.

The other controls that were used in our reduced form bivariate probit model of employment in 1981 and 1991 and the wages growth model are as follows:[13,14]

1. Time-invariant individual and family background variables: these include the socio-economic background of the individual's father, plus measures of individual performance in standard ability tests taken by cohort members at age 11 years and the individual's ethnic background. We also have measures of the highest educational qualification achieved by the

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[13] The other variables which were used and found not to have significant effects in the wages growth models are current tenure, the age at which the individual left school, and labour market experience variables such as the, number of previous jobs the individual had held, and an indicator variable to capture any effects of having experienced a previous spell of unemployment.

[14] Obviously, we are assuming that all the variables included are weakly exogenous for the estimation of the parameters of interest in our models presented in this paper.

individual by the 1981 survey date, as discussed earlier in Section III, along with indicator variables for whether the individual attended a private, direct-grant or a grammar school.

2. Time varying individual characteristics: these include demographic characteristics which may change over time such as, marital status, number of children, region of residence, whether the individual had a disability which affected the type of work he normally did, the type of job he usually did and union status. Since we have no reason to expect a change in any of these characteristics to have the same effect regardless of the direction in which the change takes place, we have chosen to enter these variables in terms of the changes.[15] For example, in our models, an individual who was not a union member in 1981 and but then became a union member in 1991 is allowed to have a different expected wages growth from that of a man who changed his union status in the other direction.

3. Attributes of the firm where the individual was employed in 1981 and 1991: Attributes of the firm that may be associated with higher earnings are firm size and whether or not the firm is in the private sector.

4. Local supply-demand conditions: We use regional unemployment rate as a proxy for local supply-demand imbalances in the labour market.

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[15] For example, see Haberfeld (1994) for an illustration of the problems that can be caused in these models.

IV. THE RESULTS

Our hypotheses about the durability of training and education courses, and about their transferability, are tested by estimating separate wage growth equations (controlling for sample selection). The bivariate probit estimates of the probabilities of employment in 1981 and in 1991 used for sample selection correction purposes are presented in the Appendix. The estimates of the durability or decay of courses are given in Table 2, while estimates of the transferability are given in Table 3. We shall explore some extensions to these models in Section V. The sample size for the bivariate probit includes all observations with no missing information who were in employment or who were unemployed in 1981 and 1991. We have also excluded men who reported that they were doing some 'temping' jobs for agencies, which represents a very small percentage. The sample used for the wages growth equation consists of male cohort members who were in employment in both 1981 and 1991 and for whom we had no missing information for the variables used in our analyses.

Our basic model, as presented in column 1 of Table 2, looks at the impact of training and education courses the individual had undertaken over the period 1981 to 1991, in addition to controls for individual attributes and job characteristics. There are a number of interesting results. First, looking at the results in column 1 of Table 2, we find that some forms of education received prior to 1981 have a significant positive effect on expected earnings growth, ceteris paribus. For example, men who have a degree are estimated to experience an 20% increase in expected earnings growth and those with only 'A'-levels an increase of about 15% relative to those with no qualifications at all. The wage benefit for those men with the highest education qualification of only one or more 'O'-levels is only estimated to be

significant at 10% significance level and, possessing a vocational qualification is not estimated to provide any significant wage benefit to these men in our sample.

Second, the estimated effects of the union status variables are also striking. Men who were union members in both 1981 and 1991, and men who were union members in 1981 but not 1991, have significantly lower earnings growth than do men who were not in a union in either 1981 or 1991. The negative coefficient can be interpreted in several ways. One interpretation is that unions are associated with flatter age-earnings profiles. A second interpretation is that the anti-union industrial relations legislation of the 1980s reduced the power of trade unions, and thus union membership in both 1981 and 1991 is associated with negative wage growth relative to men who were non-union at both dates.

Third, with regard to firm attributes, most of the effects were insignificantly different from zero, with the exception of two effects which were only significant at 10%. These were, (i) a positive effect of about 6% on expected wages growth from moving to a larger firm from a smaller firm[16] and a negative effect of 7% from moving to a privately owned firm from a public one.

Fourth, the type of job was found to have a large effect. In particular, Professional, Managerial and Admin workers are estimated to have had an expected wages growth of 19%, whilst for an individual who has moved into this type of job, the estimated effect is slightly lower at 16%. Fifthly, in terms of the region of residence, we estimate a significant positive expected wage growth of about 12% for those men who have moved out of London over the

[16] We also allowed the effects of changes in firm size to be different according to the size of the firm from which the individual moved but, could not find any significant effects.

sample. Given the prevalence of London weighting, these results are curious but perhaps moves involve promotions. These findings are quite robust to different specifications estimated. Finally, it is also interesting to note that men moving from marriage to single state have 16% lower earnings growth.[17]

Now consider the estimated impact of training and education courses received over the period 1981 to 1991. It is striking that only work-related training courses significantly increase wages growth: men experiencing at least one work-related training course have significantly higher expected wages growth of approximately 7%. In contrast, the impact on wages growth of one or more educational courses over this period is insignificant. But, these estimates conceal some novel results about the durability and transferability of training and education courses, which we examine below.

In columns 2 and 3 of Table 2, we test our hypothesis regarding possible decaying effects of the training and education variables on earnings change. The elapsed time (in months) since the individual (i) completed the most recent training course, and (ii) obtained the highest educational qualification, are used for this purpose. In column 2, a linear two spline model, with an empirically determined threshold at, (i) 60 months for the most recent training course and, (ii) 12 months for the highest educational course, are used to capture any changes in the effects of these education and training variables.[18] Column 3 of Table 2 uses a linear time variable for comparison.[19] The spline model is our preferred specification, as it allows the effects to vary over time without imposing any particular restriction on the form of the change,

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[17] Only significant at 10%.

[18] This is a restricted version of a general model which allowed for 6 monthly splines spread over a period of 4 years.

[19] A quadratic time trend did not produce any significant results and thus not reported here.

unlike the linear or a quadratic time trend. Considering the results in column 2 of Table 2, men who have experienced some training event over the sample period are estimated to have had a wage growth which is about 11.4% higher than someone who has had no training at all, ceteris paribus. Although this effect is about 65% higher than the effect as estimated from our basic model which does not allow for possible decaying of the effect of training over time, we also find that this effect starts to decay after about 5 years at the rate of about 0.44% per month.[20] The linear time trend model, which imposes one continuous decline from the beginning, estimates the initial increase to be about 12.5% and then the decaying effect to be around 0.23% per month but starting from the time of completion of the course.

Another interesting finding is that there is a significant positive effect of about 0.21% per month on expected wages growth from having followed an educational course during this period, which starts to benefit the individual after about a year from the completion of this course. This is as estimated from the spline model. The corresponding figure from the linear time trend model is slightly lower at 0.19% per month.

Finally, note that both sample-selection correction terms have an insignificant impact on earnings growth. This suggests that there are no strong sample selection effects in the earnings growth equation.

The results from the model estimation dealing with the problem of transferability of work-related training, and in particular whether accreditation increases transferability, are presented in Table 3. The relevant means of the training and education variables that are used are also provided in the same table. We present only the estimates of the effects of these training and

[20] 5 years is approximately the 85 the percentile value.

educational variables on wages growth, as the impact of other variables was found to be robust across different specifications. For those respondents who went on a course, either a training or an educational course, a distinction was made as to whether the course was employer-provided[21], whether or not a qualification was obtained at the end of the course, and whether or not the respondent changed jobs on completion. Approximately 8% of the sub-sample of young men went on employer-provided training courses which resulted in qualifications, and of these roughly one quarter changed jobs between the time the course ended and the survey date. The most common form of employer provided training event seems to involve no accreditation.[22] 84% of those men who had experienced a recent employer provided training event had been on a course which was not accredited. The percentage of young men who went on training courses that were not employer provided was about 4.3%.

Approximately 33% of men in our sample had followed an educational course during this ten year period and about 60% of these men had said that the course was provided by their employer. With regard to the qualifications obtained from the course, as discussed earlier, the survey asks information on courses that were meant to lead to some sort of qualification. Thus it is not surprising to find that a very high proportion of men did obtain some qualification from this course. In our analysis, we have coded an individual as not having obtained a qualification from a course if he (i) is still studying for it, (ii) he has completed the course but has failed to obtain the qualification, or (iii) he has not completed the course (i.e.

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[21] Although the survey asks whether the fee was paid by the employer and where the course was held, we do not make use of this information in our definition of 'courses provided by the employer'.

[22] Five men in our sample did not obtain any qualification after having started on a training course which was meant to lead to a qualification. The reason for this was either because they did not complete the course or because they completed the course but failed to achieve a qualification. Given the small numbers involved, we have included these men with those who had followed a course which was not meant to lead to a qualification.

left the course early). In our sample, 47 men did not obtain a qualification. Of these, 3 were still studying, 20 had failed and 26 had left the course early. Because of the small cell sizes involved, we only present results which do not make a distinction between these categories. Any interpretation given to the effects of courses without any qualification should be made with caution because of the two possibly heterogeneous groups of individuals in this class.[23] Of those who went on an educational course, approximately 84% (28 out of 33) obtained some sort of qualifications at the end of the course.

Regardless of whether or not a training course provided by the employer is certified, the impact of the training is estimated to be positive on the expected wages growth for those who did not change jobs after experiencing the training event and negative for those who did change jobs. A significant 12% increase in expected wages growth is estimated for those men who had stayed on with the employer who had provided them with an uncertified training[24], ceteris paribus. Non-employer provided work-related training events are not estimated to have a significant impact on expected wages growth.

As with the effects of work-related training events, we find that educational courses which are employer provided have a significant impact on expected wages growth. In particular, given that these are the courses that were meant to lead to some sort of qualifications, the effect of such courses on the wages growth is estimated to be around 10% for those men who change their jobs after the course.

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[23] Initially a distinction was made between these categories in our analysis but we did not get any significant results from these and thus have omitted them from the results presented here.

[24] As discussed earlier, except for a few handful of cases, all those men who followed a training course that were meant to lead to a qualification received a qualification at the end of the course. Thus, 'no qualification' training course refers to those courses that were not accredited.

V. MODEL EXTENSIONS

In this section we look at some additional issues, by building on the basic model in Column 1 of Table 2, which examined the impact of training and educational events on wages growth. In particular, the basic model is extended by an examination of how the rewards to training and education events vary according to whether or not the events (i) are employer-provided; (ii) are accredited for training or result in qualifications for education; and (iii) are followed by a job change. We explore the extent to which the above interacts with the number of training and educational events experienced by our sample members. This is followed by Table 5, where we look at the extent to which pre-1981 educational attainment interacts with training and educational courses received over the period 1981 to 1991 to affect wages growth. Pre-1981 educational attainment may be thought of as a measure of "ability". To the extent that higher quality training courses are offered to workers of higher "ability" as proxied by pre-1981 educational attainment, then it might be expected that the returns to various forms of training will vary according to this ability proxy. In both Tables 4 and 5[25] we focus only on the impact of the training and education variables, since the other estimated effects are robust across the different specifications.

Initially consider the results in Table 4, which reveal a number of interesting features. First, all the significant rewards to training or education are to men with multiple experiences of these events. Men who have had three or more work-related training courses have a significantly higher expected wage growth, ceteris paribus. This effect is large at 14%. In addition, those men who have followed two or more educational courses are estimated to have

[25] In Tables 4 and 5 we are unable to interact the, numbers of course and pre-1981 qualifications, with combinations of employer-provision, accreditation/qualification, and job change, owing to the very small cell sizes for these combinations of variables.

had a significant 9% increase. Second, considering the impact of employer-provision, the estimates in Column 2 show that a man with 3 or more training experiences, with the most recent being employer-provided, experiences 12.5% wages growth ceteris paribus. But for a man with 2 or more educational courses, and for whom the highest qualification course was employer-provided, the impact is lower, at 9.4%. Third, we consider the impact of accreditation of courses. The estimates in Column 3 of Table 4 show that, for men experiencing three or more training courses, the most recent non-accredited course is associated with wages growth of 13.9%. However, the impact from an accredited course is insignificant. For men who took 2 or more educational courses, the attainment of a qualification for the highest qualification course was associated with significant wages growth of 7.6%. Fourth, in Column 4 of Table 4 we consider the impact of changing jobs after the most recent course. For men with three or more training courses, not changing jobs after the most recent course significantly increases wages growth by 13.9%. For men who move, the training impact is zero. Conversely, for men with 2 or more educational courses, only men who changed jobs after completing the highest qualification course were significantly rewarded, with an estimated wages growth of 8.4%.

In Table 5 we examine the interactions between the highest pre-1981 educational qualifications, and the most recent post-1981 training course or the highest qualification post-1981 educational course. The estimates in Column 1 of Table 5 show that employer-provision of training courses has the largest significant positive effect on wages growth for young men with no educational qualifications prior to 1981, with an estimated effect of 11.3% ceteris paribus. Employer-provision of the post-1981 highest educational qualification course has a significant impact of nearly 12% for men with A-levels and above prior to 1981, as compared

with about 8% for men with only O-levels prior to 1981, and no impact for men with only vocational qualifications or no qualifications in 1981. In Column 2 of Table 5 we consider the interaction of pre-1981 qualifications with accredited courses received over the period 1981-1991. The most recent accredited training course matters only for young men who had no qualifications in 1981, but only at the 10% level. Non-accredited training courses, however, result in significant wages growth of 12.8% only for men with A-levels and above prior to 1981. The attainment of a qualification for the highest post-1981 educational course has a significant positive effect (at 10%) only for men with O-level equivalents in 1981.[26] In Column 3 of Table 5, we consider the impact of job change after the most recent training course or highest educational qualification. The impact is significantly positive for men who did not change jobs after the most recent training course, an effect found across all pre-1981 qualifications apart from the Vocational Qualification category. We also find that the impact of the highest educational course is significantly positive only for men who subsequently changed jobs, provided that pre-1981 they had at least an O-level equivalent.

In summary, the results in Tables 4 and 5 indicate that, for men experiencing some form of training or educational courses over the period 1981-91, employer-provision of the most recent course has a large significant impact on earnings growth. Non-employer provision has no effect. To the extent that wages growth proxies productivity growth, this finding lends some credence to the view that employers are best placed to offer the most relevant courses. In addition, the estimates show that qualifications associated with educational courses have a significant positive effect on wages growth, and non-accredited training courses have no significant effect. This is likely to arise because of the fact that the educational courses were

[26] The significant positive effect of the interaction of pre-1981 vocational qualification with post-1981 education.

meant to lead to further qualifications and therefore obtaining a qualification at the completion of the course sends a positive signal to employers. Finally, the estimates show that, workers who change jobs after their most recent training course fare worse than workers who stay, while in contrast, workers who move after completing an educational course fare better than those who stay. This finding lends support to the view that the training content of the educational courses experienced by the men in our sample is more general than that of the training courses.

VI. CONCLUSION

This paper estimates the impact of both education and work-related training on productivity growth for young men in Britain. In particular, we examine the transferability of various types of employer-provided skills across employers, and the extent to which qualifications increase skill transferability, and the degree to which any training impact decays over time. The impact of qualifications on wages growth is an important issue, since accreditation of training may be a means of overcoming market failure in training provision where there is asymmetry of information about the value of employer-provided training.

Our data source is the National Child Development Study (NCDS), a cohort of individuals born in Britain in 1958. The richness of the training and education information in the NCDS has allowed us to test hypotheses about the durability and transferability of training, which has not been possible in previous studies. We estimate a bivariate probit model of the probability of being in employment in both 1981 and 1991, and use these results to correct for sample selection effects in a fixed effects model of earnings growth over the period 1981-1991. Our

results show no evidence of sample selection effects in the earnings growth equation. The main empirical findings are as follows:

- Young men who have experienced at least one training event over the 10 year period 1981-1991 have had an increase of about 11% in their expected wages over this period, ceteris paribus. This effect is estimated to decrease at about 0.44% per month after the first 5 years of completing the training event.
- For men who have followed an educational course over this period, an increase in wages of 0.2% per month is estimated to take effect 12 months after completing the course.
- For men experiencing some form of training or educational courses over the period 1981-91, employer provision of the most recent course is found to have a large significant impact on earnings growth. Non-employer provision has no effect. This lends some credence to the view that employers are best placed to offer the most relevant courses.
- Workers who change jobs after their most recent training course are found to fare worse than workers who stay, while in contrast, workers who move after completing an educational course are found to fare better than those who stay.
- A significant 12% increase in expected wages growth is estimated for those men who had stayed on with the employer who had provided them with uncertified training, ceteris paribus.

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Table 1: Means and standard deviations of the variables used in the wages growth equations
(Sample members (878) were employed both in 1981 and 1991)

Variable - Dummies	Mean (s.d)	Variable	Mean (s.d.)
Highest qualification obtained prior to 1981		**Fixed individual characteristics**	
		Ethnicity - white	0.99
Degree	0.06	Maths score below average	0.51
Advanced Level (A.L.)	0.12	Reading score below average	0.43
Ordinary Level (O.L.)	0.40	School - private	0.02
Vocational	0.17	- direct grant/grammar	0.12
Training received prior to 1981		**Individual characteristic in 1981**	
Apprenticeship completed	0.28	Has a disability which affects work	0.03
Employer provided training in		**Individual characteristic in 1991**	
current job in 1981	0.54	Has a disability which affects work	0.03
Employer provided training in		**Changes across period 1981-1991**	
first job if current job not first job	0.35	Trade union membership	
Education and Training received		Non member to a member	0.07
over the period 1981-1991		Member to a non member	0.21
One training incident only	0.16	Member to a member	0.42
Two training incidents only	0.09	Regional changes - residence	
Three or more training incidents	0.28	London to outside	0.07
One educational course only	0.16	Outside to London	0.01
Two or more educational courses	0.13	London to London	0.04
		Firm type	
Time elapsed since most recent		Private to Public	0.09
training course ended - months		Public to Private	0.15
Men with at least one training event	25.5(27.5)	Private to Private	0.56
		Firm size	
(median duration = 15 months)		to larger	0.29
		to smaller	0.30
		Job type	
		Professional/Managerial/Admin to	
Time elapsed since the highest		other	0.05
qualification course ended-months		Other to Prof/Manag/Admin	0.20
Men with at least one course	49.4(33.3)	Stayed within Prof/Manag/Admin	0.18
		Marital status	
(median duration = 45 months)		not married to married	0.43
		married to not married	0.03
		married to married	0.40
Regional unemployment rate - %			
1981	11.3 (2.7)	1981 gross hourly pay £	2.72 (0.88)
1991	7.9 (1.2)	1991 gross hourly pay 1981 £	4.24 (2.07)
		Approximate earnings growth	0.40 (0.41)

Table 2 - Approximate Earnings Growth 1981 - 1991 (dependent var=ln(wage$_{91}$)-ln(wage$_{81}$))
Bivariate Probit Sample Selection Model Estimates - (std. errors)

Variable	(1)	(2)	(3)
Intercept	0.833 (0.19)**	0.881 (0.18)**	0.881 (0.18)**
Fixed individual characteristics			
Ethnicity - white	-0.377 (0.14)**	-0.420 (0.14)**	-0.415 (0.14)**
Maths score below average	-0.024 (0.04)	-0.027 (0.04)	-0.028 (0.04)
Reading score below average	0.006 (0.04)	-0.003 (0.04)	-0.003 (0.04)
School - private	0.125 (0.10)	0.130 (0.10)	0.127 (0.10)
- direct grant/grammar	0.049 (0.05)	0.037 (0.05)	0.036 (0.05)
Individual characteristic in 1981			
Has a disability which affects work	0.264 (0.10)**	0.236 (0.09)**	0.241 (0.09)**
Individual characteristic in 1991			
Has a disability which affects work	-0.245 (0.16)	-0.236 (0.16)	-0.238 (0.16)
Changes across period 1981-1991			
Trade union membership			
Non member to a member	-0.068 (0.05)	-0.074 (0.05)	-0.073 (0.05)
Member to a non member	-0.124 (0.04)**	-0.121 (0.04)**	-0.122 (0.04)**
Member to a member	-0.132 (0.03)**	-0.136 (0.03)**	-0.136 (0.03)**
Regional changes in residence			
London to outside	0.119 (0.05)**	0.108 (0.05)**	0.108 (0.05)**
Outside to London	0.043 (0.15)	0.055 (0.15)	0.040 (0.15)
London to London	0.018 (0.07)	0.025 (0.07)	0.024 (0.07)
Firm type			
Private to Public	0.060 (0.05)	0.069 (0.05)	0.070 (0.05)
Public to Private	-0.073 (0.04)*	-0.071 (0.05)*	-0.071 (0.04)*
Private to Private	-0.019 (0.04)	-0.011 (0.04)	-0.011 (0.04)
Firm size			
to larger	0.055 (0.03)*	0.050 (0.03)*	0.049 (0.03)*
to smaller	-0.008 (0.03)	-0.006 (0.03)	-0.006 (0.03)
Job type			
Prof./Manag/Admin to other	0.023 (0.06)	0.004 (0.06)	0.005 (0.06)
Other to Prof/Manag/Admin	0.162 (0.04)**	0.162 (0.04)**	0.162 (0.04)**
no change at Prof/Manag/Admin	0.191 (0.04)**	0.181 (0.04)**	0.179 (0.04)**
Marital status			
not married to married	0.038 (0.06)	0.055 (0.06)	0.051 (0.06)
married to not married	-0.158 (0.08)*	-0.127 (0.08)	-0.131 (0.08)
married to married	0.032 (0.06)	0.053 (0.06)	0.050 (0.06)
Regional unemployment rate - %			
1981	-0.002 (0.01)	-0.003 (0.01)	-0.003 (0.01)
1991	-0.010 (0.02)	-0.013 (0.02)	-0.014 (0.02)
Highest qualification obtained prior to 1981[(@)]			
Degree	0.196 (0.07)**	0.203 (0.07)**	0.201 (0.07)**
Advanced Level (A.L.)	0.147 (0.05)**	0.148 (0.05)**	0.147 (0.05)**
Ordinary Level (O.L.)	0.065 (0.04)*	0.068 (0.04)*	0.067 (0.04)*
Vocational	0.024 (0.04)	0.022 (0.04)	0.020 (0.04)
Training received prior to 1981			
Apprenticeship completed	-0.027 (0.03)	-0.030 (0.03)	-0.030 (0.03)
Employer provided training in current job in 1981	-0.045 (0.03)*	-0.050 (0.03)*	-0.049 (0.03)*
Employer provided training in first job if current job # first job	-0.025 (0.03)	-0.031 (0.03)	-0.031 (0.03)

Table 2 - continued

Education and Training received over the period 1981-1991			
Training courses			
One or more	0.069 (0.03)**	0.114 (0.03)**	0.125 (0.03)**
Time elapsed since most recent training course- **Splines**			
< 61 months		-0.0015(0.001)	
> 60 months		-0.0044(0.002)**	
Time elapsed since the most recent training course - **Linear**			-0.0023(0.001)**
Educational courses			
One or more	0.036 (0.03)	-0.027 (0.10)	-0.059 (0.04)
Time elapsed since the highest qual course - **Splines**			
< 13 months		-0.0017(0.010)	
>12 months		0.0021(0.001)**	
Time elapsed since the highest qual course - **Linear**			0.0019(0.001)**
Employment Sample Selection			
1981 employment eq. correction	-0.272 (0.32)	-0.139 (0.31)	-0.147 (0.31)
1991 employment eq. correction	0.198 (0.33)	0.228 (0.33)	0.218 (0.33)
χ^2 test of the joint significance-2 d.f	1.028	0.653	0.636
Estimated correlation with			
1981 employment eq. error	-0.864	-0.580	-0.595
1991 employment eq. error	0.737	0.742	0.722
Adjusted R-squared	0.226	0.241	0.242
Std. error	0.391	0.370	0.370
Selected Sample contains - # of cases[+]	878	878	878
Full sample contains - # of cases[+]	1025	1025	1025

Notes: (i) Mean of dep. var=0.404.
(ii) [@] The base category is a man with no educational qualifications.
(iii) ** Coefficient significant at 5% significance level.
(iv) *Coefficient significant at 10% significance level.
(v) [+] The selected sample refers to those who were employed in both periods and full sample includes all those who had been unemployed in either or both of the time periods.

Table 3 - Approximate Earnings Growth 1981 - 1991 (dependent var=ln(wage$_{91}$)-ln(wage$_{81}$))
Bivariate Probit Sample Selection Model Estimates - (std. errors)

Education and Training received over the period 1981-1991	**Mean**	(1)
Training course (Most recent course)	**0.521**	
employer provided / accredited / changed job afterwards	0.017	-0.083 (0.09)
employer provided / accredited / did not change job	0.061	0.071 (0.05)
employer provided / non-accredited / changed job afterwards	0.089	-0.039 (0.04)
employer provided / non-accredited / did not change job	0.311	0.116 (0.03)**
non-employer provided / accredited / changed job	0.008	0.031 (0.13)
non-employer provided / accredited / did not change job	0.004	-0.322 (0.17)*
non-employer provided / non-accredited / changed job	0.010	-0.005 (0.12)
non-employer provided / non-accredited / did not change job	0.021	0.074 (0.08)
Educational course (Highest qualification course)	**0.327**	
employer provided / quals obtained / changed job afterwards	0.086	0.097 (0.04)**
employer provided / quals obtained / did not change job	0.084	0.015 (0.04)
employer provided / no quals / changed job afterwards	0.010	0.243 (0.12)**
employer provided / no quals / did not change job	0.017	0.113 (0.09)
non-employer provided / quals obtained / changed job	0.069	0.029 (0.05)
non-employer provided / quals obtained / did not change job	0.037	-0.124 (0.06)
non-employer provided / no quals / changed job	0.013	0.181 (0.10)
non-employer provided / no quals / did not change job	0.011	0.014 (0.11)
Employment Sample Selection		
1981 employment eq. correction		-0.101 (0.29)
1991 employment eq. correction		0.170 (0.32)
χ^2 test of the joint significance-2 d.f		0.375
Estimated correlation with		
1981 employment eq. error		-0.444
1991 employment eq. error		0.575
Adjusted R-squared		0.252
Std. error		0.353

Notes:
(i) See notes to table 2. All the other controls used in table 2 models were included here as well.
(ii) The selected sample contains 929 out of 1076. To preserve a reasonable sample size we have included here all those who were excluded from the results presented in table 2 because they had a missing value for the variable which recorded the elapsed time since the courses ended.
(iii) The base category is a man who had not experienced any training events and also had not followed any educational courses during 1981 - 1991.

Table 4 - Approximate Earnings Growth 1981 - 1991 (dependent var=ln(wage$_{91}$)-ln(wage$_{81}$))
Bivariate Probit Sample Selection Model Estimates - (std. errors)

Education and Training received over the period '81-91	**Mean**	(1)	(2)	(3)	(4)
Number of Training courses					
One only:	**0.149**	0.012 (0.04)			
(Most recent course)					
employer provided	0.129		0.035 (0.04)		
non-employer provided	0.019		-0.062 (0.08)		
accredited	0.037			0.043 (0.06)	
non-accredited	0.112			0.016 (0.04)	
changed job after course	0.052				-0.060 (0.05)
no change in job	0.097				0.061 (0.04)
Two only:	**0.088**	0.011 (0.05)			
(Most recent course)					
employer provided	0.080		-0.008 (0.04)		
non-employer provided	0.009		0.048 (0.13)		
accredited	0.019			-0.108 (0.08)	
non-accredited	0.069			0.027 (0.05)	
changed job after course	0.029				-0.090 (0.07)
no change in job	0.059				0.039 (0.05)
Three or more:	**0.284**	0.138 (0.03)**			
(Most recent course)					
employer provided	0.270		0.125 (0.03)**		
non-employer provided	0.014		0.096 (0.10)		
accredited	0.034			0.038 (0.07)	
non-accredited	0.250			0.139 (0.04)**	
changed job after course	0.043				0.034 (0.06)
no change in job	0.241				0.139 (0.03)**
Number of Educational courses					
One only:	**0.178**	-0.006 (0.03)			
(Highest qual course)					
employer provided	0.101		0.051 (0.04)		
non-employer provided	0.076		-0.013 (0.05)		
quals obtained	0.150			0.008 (0.03)	
no quals obtained	0.028			0.094 (0.07)	
changed job after course	0.095				0.052 (0.04)
no change in job	0.083				-0.022 (0.04)
Two or more:	**0.149**	0.093 (0.04)**			
(Highest qual course)					
employer provided	0.096		0.094 (0.04)**		
non-employer provided	0.053		0.044 (0.05)		
quals obtained	0.126			0.076 (0.04)**	
no quals obtained	0.023			0.095 (0.08)	
changed job after course	0.083				0.084(0.04)**
no change in job	0.066				0.068 (0.05)
Employment Sample Selection					
'81 employment eq.correction		-0.259 (0.32)	-0.168 (0.30)	-0.189 (0.30)	-0.183 (0.30)
'91 employment eq.correction		0.199 (0.33)	0.206 (0.32)	0.215 (0.32)	0.222 (0.32)
χ^2 test of the joint sig- 2 d.f.		0.987	0.693	0.803	0.812
Estimated correlation with					
1981 employment eq. error		-0.843	-0.644	-0.701	-0.694
1991 employment eq. error		0.739	0.713	0.748	0.764
Adjusted R-squared		0.239	0.249	0.251	0.255
Std. error		0.386	0.367	0.371	0.370

Notes: (i) See notes to table 3.

Table 5 - Approximate Earnings Growth 1981 - 1991 (dependent var=ln(wage$_{91}$)-ln(wage$_{81}$))
Bivariate Probit Sample Selection Model Estimates - (std. errors)

Pre 1981 Highest Educational Qualification	**Mean**	(1)	(2)	(3)
'A'. Level and upwards	**0.195**			
Most recent training course:				
employer provided	0.129	0.099 (0.06)*		
non-employer provided	0.008	0.135 (0.14)		
accredited	0.009		-0.111(0.14)	
non-accredited	0.128		0.128 (0.06)**	
changed job after course	0.041			-0.011 (0.08)
no change in job	0.096			0.172 (0.06)**
C.S.E. and 'O'.Level equivalents	**0.396**			
Most recent training course:				
employer provided	0.205	0.041 (0.04)		
non-employer provided	0.019	0.029 (0.09)		
accredited	0.042		0.009 (0.06)	
non-accredited	0.182		0.047 (0.04)	
changed job after course	0.042			-0.130 (0.06)**
no change in job	0.182			0.076 (0.04)*
Vocational qualification	**0.169**			
Most recent training course:				
employer provided	0.270	0.063 (0.06)		
non-employer provided	0.014	-0.300 (0.16)*		
accredited	0.033		-0.061 (0.08)	
non-accredited	0.007		0.078 (0.06)	
changed job after course	0.008			-0.013 (0.09)
no change in job	0.032			0.056 (0.06)
No Educational qualifications	**0.240**			
Most recent training course:				
employer provided	0.071	0.113 (0.05)**		
non-employer provided	0.010	-0.021 (0.12)		
accredited	0.017		0.166 (0.09)*	
non-accredited	0.064		0.081 (0.05)	
changed job after course	0.023			0.087 (0.08)
no change in job	0.058			0.108 (0.06)*
'A'. Level and upwards				
Post 1981 highest qual. educat. course:				
employer provided	0.043	0.116 (0.07)*		
non-employer provided	0.044	0.004 (0.07)		
quals obtained	0.075		0.068 (0.06)	
no quals obtained	0.012		0.032 (0.11)	
changed job after course	0.066			0.101 (0.06)*
no change in job	0.022			-0.090 (0.09)
C.S.E. and 'O'.Level equivalents				
Post 1981 highest qual. educat. course:				
employer provided	0.090	0.078 (0.05)*		
non-employer provided	0.061	0.076 (0.05)		
quals obtained	0.129		0.073 (0.04)*	
no quals obtained	0.023		0.099 (0.08)	
changed job after course	0.071			0.098 (0.05)**
no change in job	0.081			0.063 (0.05)
Vocational qualification				
Post 1981 highest qual. educat. course:				
employer provided	0.036	0.038 (0.07)		
non-employer provided	0.009	-0.115 (0.13)		
quals obtained	0.039		-0.027 (0.07)	
no quals obtained	0.005		0.346 (0.16)**	
changed job after course	0.024			0.006 (0.08)
no change in job	0.021			0.040 (0.09)

Table 5 continued

No Educational qualifications				
Post 1981 highest qual. educat. course:				
employer provided	0.028	0.031 (0.07)		
non-employer provided	0.015	-0.136 (0.10)		
quals obtained	0.032		-0.043 (0.07)	
no quals obtained	0.011		0.036 (0.11)	
changed job after course	0.017			-0.023 (0.09)
no change in job	0.026			-0.029 (0.08)
Employment Sample Selection				
1981 employment eq. correction		-0.185 (0.30)	-0.221 (0.30)	-0.187 (0.30)
1991 employment eq. correction		0.098 (0.32)	0.189 (0.32)	0.150 (0.32)
χ^2 test of the joint significance-2 d.f		0.452	0.825	0.578
Estimated correlation with				
1981 employment eq. error		-0.606	-0.759	-0.655
1991 employment eq. error		0.445	0.701	0.585
Adjusted R-squared		0.243	0.244	0.251
Std. error		0.359	0.375	0.362

Notes: (i) See notes to table 3.

APPENDIX

Bivariate Probit Estimates of Employment in 1981 and 1991 (std. errors)

Variable	1981 eq.	1991 eq.	Mean (s.d)
Intercept	1.59 (0.32)**	1.42 (0.41)**	
Ethnicity-white	0.31 (0.25)	0.37 (0.27)	0.98
Father is non manual	-0.00 (0.12)	0.19 (0.14)	0.24
Father is skilled manual	0.15 (0.10)	0.09 (0.11)	0.63
Father left school under 16	0.03 (0.10)	0.05 (0.12)	0.78
Attended a private school	0.06 (0.23)	0.25 (0.36)	0.03
Attended a grammar/direct grant school	-0.06 (0.12)	0.37 (0.18)**	0.12
Maths score below average	-0.20 (0.09)**	-0.22 (0.10)**	0.50
Reading score below average	-0.12 (0.09)	-0.37 (0.10)**	0.43
Has a disability affecting work-'81	-0.32 (0.18)*		0.03
'91		-1.20 (0.14)**	0.04
Married/living as married - '81	0.38 (0.08)**		0.40
'91		0.65 (0.10)**	0.78
Number of kids - '81	-0.27 (0.07)**		0.16
'91		-0.10 (0.04)**	1.11
Regional unemployment rate-%-'81	-0.06 (0.01)**		11.2 (2.7)
'91		-0.07 (0.04)*	7.9 (1.2)
Estimated Correlation coefficient between the two equations	0.33 (0.06)**		
Maximised log-likelihood	-1451.2		
Sample size	2494		

Notes: (i) **Coefficient significant at 5% significance level.
(ii) *Coefficient significant at 10% significance level.
(iii) Joint Relative Frequency Table for the dependent variable:

		1991	
		not employed	employed
1981-	not employed	0.029	0.082
	employed	0.063	0.826