Employee Training, Wage Dispersion and Equality in Britain

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Abstract.

We use British panel data to explore the returns to training incidence and intensity (duration) for 6924 employees. We find that the returns differ greatly depending on the nature of the training (general or specific); who funds the training (employee or employer); and the skill levels of the recipient (white or blue collar). Using decomposition analysis, we further conclude that training is positively associated with wage dispersion in Britain; with general training events (either funded by the employee or by their employer) creating a virtuous circle of wage gains for white-collar employees.

Keywords: training, wage compression, performance.

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1. Introduction

Training is a key factor in the economic performance of all countries. It is a major tool for increasing productivity and living standards (Ok and Tergeist, 2002). Concentrating training amongst workers who perform complex tasks and have high levels of formal education may create a virtuous cycle for high skill workers resulting in higher wages, further training opportunities, longer tenure and greater social status (Gershuny, 2005). In contrast, workers who are disadvantaged in the education process may be less likely to receive training, inducing a vicious cycle for low skill workers and further increasing their risk of unemployment and social exclusion (Keep et al, 2002). Simply ensuring equity of training opportunity may not, however, be sufficient to assure a reduction in wage inequality among workers if individuals with different characteristics obtain different benefits from the same training scheme. The British Government is increasingly concerned with the potentially contradictory implications of training policy for equity and efficiency, namely redirecting training investment towards groups that receive less training or towards groups of workers where expected returns are larger (Department of Trade and Industry, 2005).

In the seminal Becker (1962 and 1964) competitive model, employees support the costs of their general training by accepting a wage below their potential current marginal product during the training period. They then reap the full return from their investments through higher wages after the training period, even if there is job turnover. Thus, in the post-training period, the age-wage profile is steeper and in line with the level of productivity. Firms will not finance this general type of training with its probable negative poaching externalities. The training level reached, as a result, corresponds to the socially optimal condition and underinvestment in general training occurs if workers face wage inflexibility or are liquidity constrained. Employees are predicted to invest wisely according to their own expected rates of return.

In contrast, recent imperfect competition models reveal how market frictions may transform general training into de-facto specific training if the wage level is lower than marginal product in the post-training product (Stevens, 1994; Acemoglu and Pischke, 1998, 1999a, and 1999b). In such an environment, firms have an incentive to finance general training and to distribute these training opportunities amongst employees, thereby introducing issues of allocation. Furthermore, since the wage level is below marginal product and there is

uncertainty concerning labour turnover, a negative poaching externality may occur, leading the firm to under invest and the equilibrium training level to be below the socially optimum level.

This paper concentrates on the relationship between training and wages. We seek to address three fundamental questions. Do different types of training have similar impacts on both wage levels and wage dispersion? Is general training a key tool for reversing wage inequality between high skill and low skill workers? And finally, in line with the recent imperfect competition models, what is the contribution of employer financed training to wage inequality in Britain?

In the process of seeking answers to these questions, it is important to estimate the individual employee's rates of wage return to training. Relevant empirical studies are not easy to locate; indeed, Frazis and Loewenstein (2005) recently conclude "we are aware of few studies that attempt to estimate rates of return to training". Usually due to data constraints, most of the relevant studies that do exist estimate average returns for all training recipients, ignoring that the provision and returns to training across employees may differ according to gender, age, education level, occupation and sector of employment. Using longitudinal data on households and individuals (the British Household Panel Survey, BHPS), we can address many of these issues.

2. Modeling wage returns

The relationship between investment in training on the level and pattern of life-cycle wages have been explored decisively by Becker (1962 and 1964), Ben Porath (1967) and, of course, Mincer (1958, 1962, 1970 and 1974) with the development of the well known Mincer wage regression.

In subsequent years, several authors have increased the number of explanatory variables included in the regression: initially with the introduction of tenure, as a proxy for specific training investment, and later with the addition of variables capturing individual, job and firm characteristics (for a recent review see Chiswick 2003). In this augmented framework, training may be considered to be inherently heterogeneous and it is legitimate to expect that the size of the wage returns could differ according to the nature and the type of the training

program. Several limitations have been identified in the research of wage return to training associated with methodological questions; with database quality; and with the mixed continuous-discrete nature of training variables. In particular, Leuven (2004: 19) highlights that "the literature has ignored the presence of heterogeneous returns, something which seems particularly relevant in the case of on-the-job training which is heterogeneous by nature". We will return to discuss these issues further below.

Following in the tradition of this literature, and in particular Lowenstein and Spletzer (1998), we estimate the wage return from different types of training using the following Mincer wage regression:

$$\ln W_{ijt} = X_{ijt}'\beta + Y_t\delta + T_{it}'\alpha + \mu_i + \upsilon_{ij} + \varepsilon_{ijt} \qquad (1)$$

Where W_{ijt} is the natural logarithm of the real (1998 prices) hourly wage of individual i in job j at time t; X_{ijt} is a vector of individual, job and workplace characteristics; T_{ij} represents different measures of training accumulated by the worker and Y_t is a vector of year-specific dummy variables. Unobserved characteristics are decomposed into an individual fixed effect μ_i, an unobserved job match specific component v_{ij} and a transitory shock ε_{ijt}. The individual effect μ_i is considered as an omitted measure of time invariant characteristics such as ability, motivation, and ambition or career commitment. Unobserved individual μ_i and v_{ij} become a problem for the consistency of estimates if they are in some way correlated with the regressors. Following Lowenstein and Spletzer (1998), we address this problem by estimating the model with fixed effects and approximating v_{ij} by a binary variable accounting for employer change.

3. Data

We use data from the British Household Panel Survey (BHPS) which is a nationally representative sample of private British households. The BHPS was launched in 1991. Each year, individual adult members of households are interviewed over a broad range of socioeconomic topics resulting in a rich and relevant data set.

The BHPS questionnaire was extended in (and continuously from) wave 8, conducted in 1998, to include information on the type and the duration of the three most recent training courses attended since September of the previous year; how these courses were financed; and where they took place.

Our sample is an unbalanced panel of employed and self-employed individuals in Britain, in the 18 to 65 age bracket (that are original, temporary or permanent BHPS sample members). We exclude those individuals working in Agriculture, Fishing Service, Mining and Quarrying sectors and those missing relevant training information. Our final sample contains 20,538 training observations over four years (1998 to 2001), from 6,924 individuals, half of which are men (52%). Information from previous waves of the BHPS is also included for these individuals. In total, we use BHPS data collected between 1991 and 2001, inclusively.

Concise variable definitions and summary statistics are presented in Table 1. Means and standard deviations are presented in columns one and two for the full sample, and in columns three and four for those workers trained. We next consider some of these variables in more detail.

Training measures

The BHPS questionnaire asks individuals to choose one of the following five non-mutually exhaustive options about "… the training schemes or courses [they] have been on since September …" of the previous year:

1 - Was this training to help you get started in your current job?
2 - To increase your skills in your current job?
3 - To improve your skills in your current job?
4 - To prepare you for a job or jobs you might do in the future?
5 - To develop your skills generally?

Based on the answers to this question, we define three different categories of training for the construction of our dichotomous and continuous variables related to the incidence and intensity (duration) of training respectively. The first is the widest category including any of

the five options and is defined simply as *training*. It may include either specific and/or general training components, and may improve the worker skills either in their current job or in any other job.

We define the second category as *general training*. In this category, the interviewees have chosen the fourth and/or the fifth options, and recognize that the training events include general components and may improve post training skills outside the actual job or workplace.

To construct our third category we include additional information concerning four non-mutually exclusive options for the financing of training[1]. We define this third category as *employer-financed general training*, or simply *financed general training*, and construct a binary indicator variable that allows us to identify if the general training event (option 4 and/or 5 above) was also financed by the employer. This variable is set equal to one if trained workers recognize that fees were paid by the employer or they respond that there were "no fees". As Booth and Bryan (2006) highlight, individuals may reveal a certain economic naivety if they respond that nobody has covered direct or indirect training costs. In our sample, for more than 72% of courses attended in the employer workplace or in the employer training centre, the workers involved reported no fees.

The proportion of employees responding that they had received training in Britain is 31% during the period from 1998 to 2001 inclusively (column1, panel 1 of Table 1). On average, and in contrast with the results obtained using British workplace data (Almeida-Santos and Mumford, 2005)[2], women have a higher rate of participation than do men (34% and 29% respectively). A similar training incidence (31%) has been found by Booth and Bryan (2005) using the BHPS database for a shorter time period (1998-2000).

Amongst the specific group of trained individuals, 87.6% (1.21 against 1.06) of the courses attended include components that improved their general skills; however, only 72.7% of

[1] The question is: Which statement or statements on this card describe how any fees were paid, either for the course or for examinations? The non-mutually exclusive answers for this question are: 1 – No fee; 2 – Self/family; 3 – Employer/future emp.; 5 – New Deal Scheme; 6 – Training for work/Youth/Emp Training/TEC; 7 - Other Arrangement;

[2] Findings for other countries can be found in Almeida-Santos and Mumford 2004, Bassini and Brunello (2003), and Brunello (2001).

courses increased their general skills and were additionally financed by the employers. On average, trained workers participated in 2.96 training courses over the four years.

The average intensity (or duration) of training events attended over the period was approximately 15.09 days. Not surprisingly, general training courses and financed general training events both tend to be of shorter duration. Booth and Brian (2006) argue that induction training (that is training that allows the worker to be prepared in his/her current job) is *ceteris paribus* associated with a higher intensity than is general training.

Individual and Job Characteristics

Amongst the group of variables measuring individual and demographic characteristics, are several measures of individuals' aptitude and opportunity which may be related to wages and training outcomes, such as: labour market work experience; highest formal education level achieved; the possession of a vocational qualification; current job tenure; gender; and race.

Rather than using a proxy for potential lifetime work experience (such as the commonly used age minus years of schooling), we construct a continuous variable for the years of actual labor market work experience using the individual's employment history since first leaving full-time education (via combining information available in wave 2 (1992) and the subsequent waves of the BHPS). We follow Swaffield (2000) and adopt a linear spline instead of the common quadratic form. We find that, in 71% of the cases, workers have more than 20 years of experience and in only 5% of the cases do they have less than three years of work experience. In our sample, untrained workers typically have more work experience than trained one (20.33 years on average against 17.8 years).

Table 1 also reveals that trained workers have more years of formal education and less years of tenure in their current job. Employees have on average almost 5 years of tenure in their current job. This value is not out of line with approximate values for current job tenure in Britain found in other studies (Almeida-Santos and Mumford, 2005; Melero, 2004; Mumford and Smith, 2004). The relationship between current job tenure and training is, however, not clear theoretically. For example, employees with higher current job tenure

may have a shorter expected future employment period (before retirement) for the employer to reap the return in training investment. On the other hand, long tenure may represent a higher quality match between firm and employee, and therefore a greater incentive to finance training.

It is important when investigating the relationship between training and wages to consider relationships that may otherwise limit the efficiency and/or consistency of training estimates. First, it is important to separate training accumulated in the current job from that accumulated in previous jobs. This will also allow us to test the joint hypothesis of no depreciation and that training is transferable across employer. As discussed above, our measures of training incidence and intensity should capture the amount of training accumulated over the working life because it is the stock of human capital accumulated via training, and not just by the most recent flow, that affects wages.

We only, however, have data on the cumulated events of training acquired in the period 1998 to 2001. The stock of human capital accumulated before this period may be captured by current job tenure and previous work experience at the beginning of the period. Using cumulated events allows for greater flexibility and reduces potential bias due to errors in self-reported training (Ariga and Brunello, 2002; Frazis and Loewenstein, 2005; and Melero, 2004). We use lagged variables as instruments, reducing the risk of bias if cumulated training events and wages are simultaneously determined, or if the measure of training is correlated with any omitted variable. We also consider alternative econometric specifications in order to test a range of hypotheses; both for the incidence and the intensity of training[3].

A further complication when calculating the return to training is related to promotions. It is possible that employees are offered training prior to being promoted and before increasing their job responsibilities; this potential correlation between job-related training receipt and future promotions also needs to be addressed (Melero, 2004: page 14). The descriptive statistics in Table 1 indicate that individuals with longer working hours, current union

[3] For the intensity of training, the individuals provide information on the duration of the event in days, weeks or months, since the 1st of September from the previous year. We convert all the answers in to days.

membership, full time employment status, vocational qualifications[4], and who were promoted last year are more likely to be trained. We will return to consider the relationship between training and promotion below.

Amongst the occupational groupings, Managers and Administrators; Professional Occupations; and Associated Professional and Technical Occupations are more likely to participate in a training program compared to those employed in Sales; Plant and Machines Operators; and Other occupations. Suggesting that the likelihood to be trained may also increase with the task's complexity and the responsibility required for the job. To further explore this possibility, the sample will also be divided into white and blue-collar workers.

We define the white-collar group of employees to be the: managerial, professional, associate professional and technical occupations. The blue-collar group consists of: clerical and secretarial, personal service, sales, craft and related, plant and machine operatives, and other semi-skilled and unskilled occupations.

It is assumed that high skill workers are allocated to occupations where tasks are more complex and job responsibilities higher. White-collar workers usually enjoy faster wage growth, they are better educated, more able to perform intellectually complex work related tasks (Bishop, 1997) and consequently are predicted to generate a higher rate of return from training. In our sample, blue-collar workers receive fewer training events over the period (less 33%) and have shorter training spells than do their white-collar counterparts (on average less 2 days) (see Table 1).

Workplace and market characteristics

Whilst non-work attributes may have a significant impact on training and productivity, the work environment characteristics beyond the control of employees may also inhibit ability and motivation to perform activities (Clifton, 1997). Several measures are included in the empirical analyses below to control for some of these characteristics such as: region of residence; economic sector; firm type; and firm size. The definitions and summary statistics

[4] Having a vocational qualification is expected to be positively related to training as it signals success in previous training programs.

for these workplace and market characteristics are included in the lower panels (panel 2) of Table 1.

4. Results

Table 2 reports the instrumental variable estimates of our three training measures from the fixed effect model (FE/IV) for training incidence (upper panel) and intensity (lower panel). Though only selected results are reported in Table 2, the independent variables include the individual-level control variables listed in Table 1 and discussed in section 3, such as age, marital status, gender, hours worked, union membership and education, plus the more aggregate level controls such as economic sector, workplace characteristics, and region. A full list of the controls is provided in the endnotes to Table 2 (and Table 3).[5]

All the results presented in Table 2 (and Table 3) are based upon robust standard errors[6]. The overall test of the explanatory power of the regressors is clearly significant for all the regressions and whilst the goodness of fit measures is not high, they are comparable with those found in other studies of training (see Leuven, 2002). Overall, the parameter estimates are generally well defined and have the expected sign.

Several alternative functional forms were also considered with training measures entering quadratically; as a logarithm; a cubic root; and incorporating interaction terms. However, neither robust results[7] nor higher goodness of fit measures were obtained compared to the results reported in Table 2. (These additional results are available from the authors on request).

[5] Due to space constraints, the complete results are not presented; they are available upon request.

[6] Serial correlation in the idiosyncratic errors in the linear panel-data model were tested for (Wooldridge, 2002) and (Drukker, 2003). The null hypothesis is that there is no autocorrelation of first order from the regressions. According to the Wald test (1, 2782) and the critical values obtained using the *xtserial* command in STATA namely 0.115, 0.120 and 0.118 respectively, the null hypothesis of no first order autocorrelation is not rejected.

[7] The set of interaction terms considered in the model and found to be statistically insignificant are: training* years of school; training*female; training*tenure; training*tenure2; training*part-time; training*log hours; training*promoted and training*several occupation measures reveal. The inclusion of a quadratic term of the cumulated events for the different training measures is statistically insignificant (at a level of 15%) and equal to zero.

As discussed above, cumulated training events and wages may be simultaneously determined and/or correlated with omitted variables. The possible endogeneity of cumulated training events is considered via a Hausman test. The hypothesis that the cumulated training variables are exogenous is rejected[8]. The validity of using lagged cumulated training measures as instruments is considered with a Sargan test of over-identifying restrictions for a panel data fixed effects regression via instrumental variables estimated previously. The null hypothesis is not rejected[9] and the lagged cumulated training variables are accepted as valid instruments.

The relationship between training and wages may vary across types of employees. To consider this possibility more fully, fixed effect wage regressions with instrumental variables are estimated for the full sample of employees (columns 1, 2 and 3 of Table 2) and for two separate worker groups: white-collar (columns 4, 5 and 6) and blue-collar (columns 7, 8 and 9). Columns 1, 4 and 7 present the 'base' results for training incidence (upper panel) and training intensity (lower panel). Columns 2, 5 and 8 report the estimated wage return to cumulated training events when the promotion measure is included in the base model. In columns 3, 6 and 9 cumulated training measures (with both the current and the previous employer) are also added to the model.

Training incidence

Beginning with the full sample of employees (columns 1, 2 and 3 of Table 2), and controlling for individual, job, workplace, and market characteristics (see endnotes to Table 2), the IV estimates for wage returns to training courses are lower than 1% and statistically significant (at a level of 5 %, see column 1 and 2 of Table 2). Training courses that include general components are associated with a higher wage. The incidence of training (ignoring the components that the course may include) is associated with an increase of 0.96% in

[8] Estimates obtained with a fixed effect 2SLS model where the variable for cumulated training events (endogenous variable) are modelled as a function of lagged cumulated events and the leaded cumulated events (used as instruments), and with a regression model with the fixed effects within estimator. The Hausman test statistics [$\chi^2(45)$] obtained are 227.76 for the widest category of training, 227.58 for general training and finally, 225.45 for financed general training.

[9] The null hypothesis is that the instrumental variables are uncorrelated with idiosyncratic residuals in equation (1), and therefore they are valid instruments. This test results are 1.635, 2.581 and 0.792 respectively, which are smaller than the 5% critical value in the Chi-square distribution with one degree of freedom; 3.84.

wages (column 1), whilst the wage return to general training is associated with an increase of 1.37% or 1.32% if the general training course is financed by the employer.

Controlling for unobservable time invariant heterogeneity significantly reduces the training estimates. In the pooled OLS model, estimates for the different cumulated training events are twice as high (at more than 2%[10]) than in the fixed effect model. As discussed above, the Hausman test rejects the hypothesis that the two sets of estimates are not significantly different, supporting a greater reliance on the more consistent fixed effect results.

Several authors have obtained similar estimates of wage returns to training, for example, Lynch (1992a and 1992b) and Veum (1995) using the American National Longitudinal Survey of Youth Cohorts (NLSY); and Schøne (2004) using the Norwegian Survey of Organisations and Employees (NSOE)). Arulampalam *et al* (2004), using the European Community Household Panel Series (ECHP), state that "Britain, Denmark and Finland – are also amongst the countries with the lowest returns, of approximately one percent per event".

Our estimated wage returns to training are relatively low compared to those obtained by Booth and Bryan (2006) and Melero (2004) using the same database (BHPS) for the period of 1998 to 2000 and for the period of 1991 to 2002, respectively. They obtain respectively 1.6% and 1.9% wage increases from each training event. There are some important differences between our approach and these earlier studies that may help to explain our lower estimates. In particular, we consider employees aged 18 to 65 (they included 16 to 65 year olds); we do not include employees in Mining and Quarrying; our sample period is longer; we control for the possible endogeneity of training events using instrumental variables (they use current period training); we control for a larger set of independent variables; and, perhaps most importantly, we use different definitions of training (for example, Booth and Bryan include induction training).

As predicted by the classical model, specific and general training components included in the same training category are associated with a lower wage return than do exclusively general training courses (either financed by employers or not). This point may be seen by

[10] More precisely, the IV estimates from the pooled OLS model are 0.0220 for cumulated training events, 0.0215 for cumulated general training events and 0.0256 for cumulated financed general training events. All of the IV estimates are statistically significant at a level of 1%.

comparing the estimates for both types of training events in columns 1, 4 and 7 of Table 2. However, our broadest measure training is only statistical significant (at a level of 5%) for the full sample.

The IV estimates for training remain unchanged after the inclusion of the promotion measure in the set of explanatory variables (column 2). Nevertheless, throughout the full sample results, promotion has a significant and a positive relationship with wages. Employees can expect their wage to rise by 4% when they are promoted.

The estimated return to general training for the full sample is comparatively higher than the return obtained from firm financed training; this finding is consistent with recent imperfect and non-competitive training models. According to the Acemoglu and Pischke (1998, 1999a, 1999b) model, the employer needs to obtain rents by, for example, offering wages below marginal product in the post-training period in order to have an incentive to finance general training.

Dividing training events into those with the current or previous employer (column 3 of Table 2), it becomes apparent that training events (incidence) with the previous employer do not have a statistically significant relationship with current wages in the full sample estimates[11]. This finding may be consistent with the classical model if, for example, skills received from training have depreciated and/or training is not transferable. Further dividing training with previous employer into (i) general training and (ii) firm financed general training (reading down column 3 in panel 1), there is no indication that general training or firm financed general training with previous employers has any systematic relationship with wages for the full sample of British employees.

Considering white collar only employees (column 5), the wage returns associated with training are quite similar in size to those found for the full sample with the exception of the larger returns from firm financed general training. Cumulated training events with specific and general components appear to have an insignificant relationship with wages. In contrast, cumulated general training events and cumulated employer-financed general training events have a positive and significant contribution to wage dispersion. This is especially true for

[11] Loewenstein and Spletzer (1998) and Booth and Bryan (2006) reach different conclusions, perhaps because they do not control for endogeneity in cumulated training events.

the group of workers performing more complex tasks with greater responsibilities: firm financed general training is associated with a 1.62% return and 1.33% for the full sample, *ceteris paribus*, and both IV estimates are significant at the 5% level.
For the blue-collar sample, the wage return related to employer-financed training is comparatively lower than that found for white-collar workers; it is also statistically insignificant at a level of 15%. This finding may be inconsistent with the predictions of recent imperfect and non competitive models but still consistent with classical human capital theory in the presence of long-term labour contracts (Lazear and Oyer, 2003).

Similarly, cumulated training events with previous employers are found to have a considerably stronger association with wages than does training periods with the current employer (2.97% compared to 1.34% for general training and 3.03% compared to 1.46% for firm financed general training in the full sample), however, they are statistically insignificant at a level of 15%. Other studies (Loewenstein and Spletzer, 1998; Booth and Bryan, 2005) have found the potential impact of training received in previous employment to be several times higher than training with the current employer, although they find this relationship to be statistically significant.

To reiterate, for blue-collars workers, training events do not have a significant association with wages for any of the three training measures considered. This is also true for training events with the previous employer or with the current employer. The potential impact of training on productivity and wages therefore appears to differ according to the occupation (white or blue collar) of the group of workers that participates in the training program. In the case of white-collar employees, general training (either financed or not) is positively associated with wage increases. This is clearly not the case for blue collars employees who are not found to derive a wage benefit from participating in training events.

Training intensity

The estimates of the fixed effects model with instrumental variables (FE/IV) for training intensity (duration) are reported in the lower panel of Table 2. The results for the full sample (columns 1 to 3) are consistent with those found for training intensity. All three of the training measures are associated with wage increases (column 1); promotion is

positively related to wage increases of 4% but controlling for promotion does not change the estimates of the wage return from training; and it is training with the current employer that is associated with wage growth. There is no significant evidence that training intensity with previous employers is related to wage rates for the full sample of British employees.

Dividing the workers into white and blue collar, the results again reveal that training is only significantly related to wage changes for white-collar employees (columns 4 to 6). For white-collar employees the cumulated days of training (training intensity) has a significant and positive relationship with wages (0.08% in column 4), even after controlling for promotion (0.08% in column 5). An employee undergoing a training program (which includes general components) lasting for 20 days, with their current employee, may expect a wage increase of 1.6%, *ceteris paribus*. The results further support the finding that training with previous employers has an insignificant association with wage, in contrast to cumulated training days with the current employer.

The intensity of general training events financed by the employer appears, however, to be insignificant for white-collar employees in contrast to the results found for training incidence (comparing the final 4 rows in panel 1 with the final 4 rows in panel 2).

For blue-collar workers (columns 7 to 9), consistent with the results obtained previously, training intensity does not have a statistically significant relationship with wages, either for training courses attended with the current employer or with the previous employer. These results, combined with a similar finding for training incidence, suggest that training may contribute to virtuous circle of wage gains for white-collar employees and a vicious circle for blue-collar workers.

To reiterate, our results indicate that wage returns differ according to the nature and the type of the training program and by the type of employee (white or blue-collar). Equal access to training programs may not reverse wage inequality in favor of low skilled employees. Indeed, blue-collars employees do not to derive any apparent wage benefit from participating in training. Whilst, the nature of the components included in the training programme are related to differing wage returns for white-collar employees. The implications of these findings may be further explored by concentrating analyses on the returns to training for workers within skill and age bands.

5. Wage Returns to training within groups

The white and blue-collar groups considered in Table 2 are subdivided into three different age groups: lower than thirty; between thirty and forty five, and older than forty-five (i.e. 30<; 30-45; and >45). Table 3 presents the IV estimated wage returns from cumulated training events for these white-collar and blue-collar age groups. The models presented in Table 3 are directly comparable to those in Table 2 and are subjected to the same battery of diagnostic testing. Independent variables controlling for individual, job, workplace, and market characteristics are also included (see endnotes to Table 3).

A striking result is found when analysis is concentrated on the different age bands of white and blue-collar employees. Cumulated training events (incidence), independent of the nature of components that they may include, are not statistically significantly related to wages for either white or blue-collar workers who are younger than thirty.

Considering white-collar employees in more detail, general training (and especially financed general training) with the *previous* employer has a positive and statistically significant relationship with wages for white-collar workers older than 45 (at a level of 10%). Within the 30 to 45 year age band, however, cumulated training events with the *current* employer are found to be significantly related to wage increases for white-collar employees.

A possible explanation for these results may be that workers younger than 30 may have lower expected tenure; they may have a lower quality employer job match and consequently have a higher probability of leaving. Analogously, older workers may also represent a high risk of short tenure to employers limiting the opportunity of those who finance training to reap all the returns from such investment.

For blue-collar employees, only training events with previous employers are associated with wage growth and this is true only for blue-collar employees aged between 30 and 45 (at a level of 15%). The size of these relationships for these workers is notable: prior cumulated training days with previous employers are associated with 11.21% wage growth; 12.84% if

this training is general in nature; and 16.52% if the training was financed by the previous employer.

Turning to consider training intensity (duration) in the lower panel of Table 3, the results are similar for the white-collar employees. High skill (white-collar) workers, aged 30 to 45, typically obtain significant wage returns to cumulated training events with the current employer; whilst employees from the same skill group who are older than 45 typically gain from cumulated general training events with previous employers[12]. Surprisingly, however, for white-collar employees who are less than 30 years old, cumulated training intensity with previous employer is now found to have a negative and a significant impact (at a level of 10%) on wage. It may be job turnover after training is treated as a negative signal of potential employment stability by future employees of young white-collar workers.

Point estimates for training duration are in most cases insignificant (at a level of 15%) for the group of blue-collar workers. The only exceptions are the point estimates obtained for general training for the 30 to 45 year age bracket (column 7 of Table 3).

The results above reveal that the impact of training incidence and intensity on implied productivity level and wage is far to be uniform during the working life of an employee. Consequently, the impact of training policy may be distinct and may have even opposite impacts with respect to the age and the occupation of the recipients.

6. Training and Wage Dispersion between groups

In section 4, it was found that high-skill employees allocated to high paid jobs have higher training incidence and intensity than low-skill workers, creating a virtuous circle for white-collar employees and a vicious circle for blue-collar employees. It appears that training may have a non negligible role in wage inequality amongst workers in Britain. We next evaluate the contribution of different types of training to wage dispersion during the time period of 1998 to 2001, giving special attention to the contribution of (a) general training and (b) general training that is financed by the employer.

[12] The estimated wage return from cumulated training events with a prior employer is 0.04% and it is also highly significant (at levels of 1%).

To obtain a framework for analysing wage decomposition, we begin with the reduced form wage equation usually attributed to Mincer (1974):

$$\ln W_i = X_i\beta + \varepsilon \qquad (2)$$

Where W_i is the real hourly wage, X_i a vector which includes individual, job, market, workplace characteristics and a variable for the cumulated training events. The error term is $e \sim N(0,\sigma^2)$.

Most wage gap modeling has used the decomposition proposed by Oaxaca (1973) and Blinder (1973). According these authors, the gross wage gap between white collar and blue collar groups is defined as:

$$G_{wb} = \frac{W_w}{W_b} - 1 \qquad (3)$$

Where W_w represents the wages of the white-collar group (advantaged group) and W_b represents the wages of the blue-collar group (disadvantaged group).

Using logs, equation 3 is equivalent to:

$$\ln(G_{wb} + 1) = \ln(\overline{W}_w) - \ln(\overline{W}_b) \qquad (4)$$

where $(\overline{W}_w)$ and $(\overline{W}_b)$ are the average hourly wages for each group. To decompose the raw wage gap it is necessary to make an assumption concerning the price vector that reflects the remuneration of the characteristics in the absence of discrimination. Therefore, we use the price vector of white-collar group[13] is adopted as the non-discriminating wage structure:

$$\ln(\overline{W}_b{}^0) = \overline{X}_b\hat{\beta}_w . \qquad (5)$$

13 In practical terms, the use of blue-collar wage structure as the equity standard structure may create problems of implementation related to legal restrictions and worker morale (see Oaxaca and Ransom, 1994).

Using equation (4) and equation (5), the standard wage decomposition is:

$$\ln(G_{wb}+1) = \left[\ln(\overline{W}_w) - \ln(\overline{W}_b{}^0)\right] - \left[\ln(\overline{W}_b{}^0) - \ln(\overline{W}_b)\right] \qquad (6)$$

According to equation (6), the wage gap can be decomposed by terms. The first term, $\ln(\overline{W}_w) - \ln(\overline{W}_b{}^0)$, indicates by how much the average wage of white collar employees exceeds the average hypothetical wage for blue collar counterparts in the absence of discrimination. The second term, $\ln(\overline{W}_b{}^0) - \ln(\overline{W}_b)$, highlights the gap between the hypothetical wage for the blue collar group in the absence of discrimination and their actual average.

Using equation (2) and equation (4), equation (6) can be rewritten as:

$$\ln(\overline{W}_w) - \ln(\overline{W}_b) = \left[(\overline{X}_w\hat{\beta}_w) - (\overline{X}_b\hat{\beta}_w)\right] - \left[(\overline{X}_b\hat{\beta}_w) + (\overline{X}_b\hat{\beta}_b)\right] \qquad (7)$$

This is equal to:

$$\ln(\overline{W}_w) - \ln(\overline{W}_b) = \left[\underbrace{\hat{\beta}_w(\overline{X}_w - \overline{X}_b)}_{\text{endowment effect}} + \underbrace{\overline{X}_b(\hat{\beta}_w - \hat{\beta}_b)}_{\text{remuneration effect}}\right] \qquad (8)$$

The first term of equation (8) presents the "justified" part of the wage gap, usually called the endowment effect, between white-collar and blue-collar employees. It occurs due to differences in the average characteristics between the groups. The second term is interpreted as a measure of discrimination because it is the difference in remuneration to the characteristics, assuming that white and blue-collar employees have the same characteristics at the mean.

This decomposition method presents a well known limitation: the "index number problem" (Oaxaca, 1973). The choice of the group for the price vector adopted as the non-

discriminating wage structure (in our case this is the wage of the white-collar employees), affects the results produced by the endowment and remuneration effects. To overcome this difficulty, Oaxaca and Ransom (1994) suggest that letting β^* reflect the non-discriminatory wage structure, the mean wage gap can be written as:

$$\ln W_w - \ln W_b = \underbrace{\underbrace{(\bar{X}_w - \bar{X}_b)\hat{\beta}^*}_{\ln(Q_{wb}+1)}}_{\text{Explained Part (E)}} + \underbrace{\underbrace{\bar{X}_b(\hat{\beta}^* - \hat{\beta}_b)}_{\ln(\partial_{w*}+1)} + \underbrace{\bar{X}_w(\hat{\beta}_w - \hat{\beta}^*)}_{n(\partial_{b*}+1)}}_{\text{Un exp lained Part (U)}} \quad (9)$$

Where $\ln(Q_{wb}+1)$ continue to be the endowment effect and $\ln(D_{wb}+1) = \ln(\delta_{w*}+1)+\ln(\delta_{b*}+1)$ is the remuneration or the discrimination effect. δ_{w*} and δ_{b*} are respectively the blue collar's wage disadvantage and white collar's wage advantage due to the discrimination. β^* is a set of benchmark coefficients equal to:

$$\beta^* = \Omega\hat{\beta}_w + (I - \Omega)\hat{\beta}_b \quad (10)$$

and represents a matrix of relative weights of the estimated vector of coefficients and the identity matrix (I). Other choices have been suggested for the weighting matrix Ω (Oaxaca and Ransom (1994); for example, Cotton (1988) sets $\Omega=\alpha_w I$ where α_w is the proportion of white collar employees; Reimers (1993) adopts $\Omega=1/2I$; and Neumark (1988) suggests $\Omega= (X'X)^{-1}(X'_wX_w)$ where $X'X= X'_wX_w+X'_bX_b$ which is equivalent to using the coefficients from the pooled sample of workers.

Another limitation with the original Oaxaca and Blinder (1973) approach is that wage gap is measured at the mean, thereby ignoring potential differences in the form of the entire wage distribution[14]. Several techniques have been developed to overcome this limitation: the use of quantile regressions method in the Oaxaca-Blinder model and model proposed by Juhn, Murphy and Pierce (1993) allow for the decomposition of the wage gap at different points of the wage distribution. In our particular example, we believe that the Oaxaca and Blinder model continues to be a valid and a pertinent approach. Arulampalam *et al* (2004) highlight

[14] Dolton and Makepeace (1987) and Munroe (1988) were the first to point out such a limitation.

that in Europe training investment yields similar percentage returns across the conditional wage distribution and considerable differences in mean returns to training.

Table 4 reports the white-collar/blue-collar wage decompositions based on previous empirical results presented in Table 2 and based on the means presented in Table 1. The estimated coefficients for those regressors that are time invariant were recovered, in a second stage, using an OLS estimation of the residuals of the FE/IV estimation over those time invariant regressors.

Table 4– Wage Gap Decomposition

		Training	General Training	Financed General Training
	Wage Gap ***(ln G_{wb}+1)***	**0.532**	**0.532**	**0.532**
	$\hat{\beta}_w$ - estimated coefficient for training (white-collar group)	0.009	0.013	0.016
	$\hat{\beta}_b$ - estimated coefficient for training (blue-collar group)	0.002	0.004	0.001
Ω=1	***Due to endowment*** ***(ln Q_{wb}+1)***	**-0.064**	**-0.040**	**-0.037**
	Due to discrimination ***(ln D_{wb}+1)***	**0.587**	**0.578**	**0.578**
	Overall Training contribution	**0.013** (2.50%)	**0.021** (4.04%)	**0.019** (3.55%)
	Endowment effect of Training	0.007	0.011	0.009
	Discrimination effect of Training	0.006	0.010	0.010
Ω=0.5	***Due to endowment*** ***(ln Q_{wb}+1)***	**-0.019**	**0.004**	**0.005**
	Due to discrimination ***(ln D_{wb}+1)***	**0.542**	**0.533**	**0.536**
	Overall Training contribution	**0.013** (2.50%)	**0.021** (4.04%)	**0.019** (3.55%)
	Endowment effect of Training	0.004	0.007	0.005
	Discrimination effect of Training	0.009	0.014	0.014
Ω=0	***Due to endowment*** ***(ln Q_{wb}+1)***	**0.026**	**0.048**	**0.046**
	Due to discrimination ***(ln D_{wb}+1)***	**0.497**	**0.489**	**0.495**
	Overall Training contribution	**0.007** (1.32%)	**0.021** (4.04%)	**0.019** (3.55%)
	Endowment effect of Training	0.002	0.003	0.001
	Discrimination effect of Training	0.012	0.018	0.018

Source: British Household Panel Survey, 1998 - 2001

The gross logarithmic wage differential across the time period is 70.2%[15] for the time period. When the group of blue-collar workers is taken as the standard competitive (*Ω=0*) the portion of the measured wage gap due to coefficients differentials is smaller and the portion due to endowments differentials larger compared to using the white collar wage structure (*Ω= 1*). Even in this case, however, most of the wage differential is explained by measured productivity differentials among white and blue-collar workers.

[15] The wage gap: G =[Exp(0.532)-1]*100

It is clear from these results that training is associated positively with wage dispersion. The extent of this contribution varies according to the method of decomposition adopted: the method that adopts the blue-collar wage structure ($\Omega=0$) estimate a smaller contribution for training relative to the white wage structure adoption.

Our results suggest that the type of training is itself of little relevance for wage dispersion: our widest category of training and general training contributes little more than 1-2.5% of the overall wage differentials. However, cumulated general training events either financed by the employers or not, whatever the method we adopt, reveal a much higher contribution. Therefore, these results do not suggest that training may be a tool to reverse the wage inequality among workers. On the contrary, it seems that training is a contributor to the wage dispersion across high and low-skill workers, even though politicians guarantee equal access to the employees in training programmes that include general components.

7. Conclusion

We use British panel data from 1998 to 2001 to explore the wage returns to training (both incidence and intensity) undertaken by 6924 individuals between 1998 and 2001. We find that (after controlling for individual, job, workplace, and market characteristics) the returns differ greatly depending on the nature of the training (general or specific); who funds the training (employee or employer); the skill levels of the recipient (white or blue collar); and the age of the employee.

Our estimated wage returns to training courses are small at less than 1%. Although, training courses that include general components are associated with a higher wage as are training courses undertaken with previous employers.

The potential impact of training on productivity and wages is found to differ according to the occupation (white or blue-collar) and the age of the group of workers that participates in the training programme. In general, we find that high-skill employees allocated to high paid jobs have higher training incidence and intensity than low-skill workers, creating a virtuous circle for white-collar employees and a vicious circle for blue-collar employees.

Using decomposition analysis, we further conclude that unequal remuneration to different skill groups due to training contributes positively to wage inequality between white and blue-collar employees in Britain. These results imply that merely promoting equal access to training programmes will not be sufficient to reverse wage inequality in favor of low-skilled workers. Indeed, it may exacerbate the wage inequality.

Our results may be seen as a further empirical investigation of the determinants of training (for both the firm and employee) and the potential returns from this training which helps to fill the gap in a still unresolved area of research (Pischke, 2001: 543, Leuven, 2002: 34).

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Table 1 Variable definitions and means

	ALL				WHITE-COLLAR				BLUE-COLLAR			
			With Training				With Training				With Training	
	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)
(1) Individual employee characteristics												
Less than 3 years of experience	0.05	0.23	0.06	0.24	0.04	0.20	0.05	0.21	0.06	0.24	0.07	0.26
3 and less than 8 years of experience	0.07	0.26	0.09	0.28	0.06	0.24	0.07	0.26	0.08	0.27	0.10	0.30
8 and less than 15 years of experience	0.09	0.29	0.10	0.30	0.09	0.29	0.10	0.30	0.09	0.29	0.10	0.30
15 and less than 20 years of experience	0.07	0.26	0.08	0.27	0.08	0.27	0.09	0.28	0.07	0.25	0.07	0.26
More than 20 years of experience	0.71	0.45	0.67	0.47	0.72	0.45	0.69	0.46	0.70	0.46	0.66	0.47
Age	38.54	11.56	37.17	11.01	39.56	10.80	38.61	10.44	37.90	11.96	35.84	11.34
Married	0.57	0.49	0.55	0.50	0.59	0.49	0.57	0.50	0.56	0.50	0.53	0.50
Female	0.48	0.50	0.52	0.50	0.46	0.50	0.52	0.50	0.50	0.50	0.53	0.50
White	0.96	0.18	0.96	0.19	0.96	0.19	0.96	0.19	0.97	0.18	0.97	0.18
having a children under 18	0.40	0.49	0.39	0.49	0.37	0.48	0.35	0.48	0.42	0.49	0.42	0.49
Years of school	10.68	3.15	11.49	2.84	12.27	2.90	12.62	2.67	9.69	2.89	10.44	2.59
Years of tenure	4.94	6.18	3.99	5.29	4.62	5.80	3.89	5.08	5.14	6.41	4.07	5.48
Log Hours	3.49	0.40	3.53	0.35	3.57	0.31	3.57	0.29	3.44	0.44	3.49	0.39
Temporary job	0.06	0.24	0.05	0.22	0.06	0.24	0.05	0.22	0.06	0.24	0.05	0.23
Part time	0.19	0.39	0.16	0.36	0.13	0.33	0.12	0.32	0.23	0.42	0.19	0.40
Have a Vocational Qualification	0.39	0.49	0.40	0.49	0.39	0.49	0.39	0.49	0.38	0.49	0.42	0.49
Trained in previous 12 months	0.31	0.46	1.00	0.00	0.39	0.49	1.00	0.00	0.26	0.44	1.00	0.00
Number of training course – cumulated events 98-01	1.21	1.90	2.96	2.19	1.68	2.25	3.35	2.40	0.92	1.59	2.59	1.90
Number of general training courses-cumulated events 98-01	1.06	1.74	2.58	2.07	1.45	2.05	2.90	2.27	0.81	1.46	2.29	1.83
Number of general training courses financed by the employer – cumulated events 98-01	0.88	1.60	2.14	2.05	1.22	1.89	2.43	2.22	0.66	1.34	1.88	1.83
Days of training – cumulated events 98-01	15.09	51.37	35.74	75.27	19.06	58.50	36.61	77.76	12.63	46.21	34.93	72.89
Days of training in a course with general components – cumulated events 98-01	13.58	48.92	32.10	71.82	16.82	54.77	32.20	72.68	11.56	44.79	32.01	71.01
Days of training in a course with general components financed by the employer – cumulated events 98-01	8.57	35.92	20.16	53.20	11.09	41.54	21.09	55.00	6.99	31.83	19.30	51.45

Table 1 (Cont.)

	ALL				WHITE-COLLAR				BLUE-COLLAR			
			With Training				With Training				With Training	
	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)
Union member	0.26	0.44	0.33	0.47	0.28	0.45	0.36	0.48	0.25	0.43	0.30	0.46
Changed employer in the last year- either for a better job or was dismissed	0.04	0.20	0.04	0.20	0.04	0.19	0.04	0.19	0.04	0.20	0.05	0.22
Promoted in the last year	0.03	0.18	0.05	0.23	0.05	0.22	0.07	0.26	0.02	0.14	0.04	0.19
Occupations												
Managers and Administrators	0.16	0.36	0.17	0.37	0.41	0.49	0.35	0.48	0.00	0.00	0.00	0.00
Professional Occupations	0.11	0.31	0.15	0.36	0.28	0.45	0.32	0.47	0.00	0.00	0.00	0.00
Assoc. Prof and Technic Occup	0.12	0.32	0.16	0.37	0.31	0.46	0.33	0.47	0.00	0.00	0.00	0.00
Cleric and Secret. Occup	0.17	0.38	0.17	0.38	0.00	0.00	0.00	0.00	0.28	0.45	0.34	0.47
Craft and Related Occup	0.12	0.32	0.09	0.28	0.00	0.00	0.00	0.00	0.19	0.39	0.17	0.37
Personal and Protect. Serv. Occup	0.10	0.30	0.11	0.32	0.00	0.00	0.00	0.00	0.17	0.37	0.22	0.41
Sales Occup	0.07	0.26	0.05	0.21	0.00	0.00	0.00	0.00	0.11	0.32	0.09	0.29
Plants and Machines Operat.	0.09	0.28	0.06	0.23	0.00	0.00	0.00	0.00	0.14	0.35	0.11	0.31
Other Occup.	0.07	0.25	0.04	0.20	0.00	0.00	0.00	0.00	0.11	0.31	0.08	0.27
(2) Workplace and Market characteristics												
Economic Sectors												
Manufacturing	0.12	0.33	0.12	0.33	0.10	0.31	0.10	0.29	0.13	0.34	0.14	0.35
Electricity, gas and water	0.03	0.16	0.02	0.14	0.01	0.11	0.01	0.11	0.04	0.19	0.03	0.16
Construction	0.06	0.23	0.03	0.18	0.03	0.18	0.02	0.15	0.07	0.25	0.05	0.21
Wholesale and retail trade	0.06	0.23	0.04	0.19	0.03	0.16	0.02	0.15	0.08	0.26	0.05	0.22
Hotels and restaurants	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Transport, storage and communication	0.09	0.29	0.06	0.25	0.06	0.25	0.05	0.22	0.11	0.32	0.08	0.27
Financial intermediation	0.09	0.29	0.07	0.26	0.06	0.25	0.05	0.21	0.11	0.31	0.10	0.30
Real state, renting and business activities	0.03	0.17	0.02	0.12	0.01	0.10	0.01	0.07	0.04	0.20	0.02	0.15
Public Administration and Defense	0.04	0.20	0.04	0.20	0.03	0.17	0.03	0.18	0.05	0.22	0.05	0.23
Education	0.15	0.35	0.16	0.37	0.21	0.41	0.20	0.40	0.11	0.31	0.12	0.32
Health and Social Work	0.01	0.08	0.01	0.08	0.01	0.09	0.01	0.09	0.00	0.07	0.01	0.07
Other Community, Social and Personal service .	0.17	0.37	0.22	0.41	0.22	0.41	0.25	0.43	0.13	0.34	0.18	0.39
Private Households with employed persons	0.15	0.36	0.20	0.40	0.20	0.40	0.25	0.43	0.12	0.32	0.16	0.36
Extra-territorial organizations and bodies	0.01	0.10	0.01	0.09	0.01	0.07	0.00	0.06	0.01	0.11	0.01	0.11

Table 1 (Cont.)

	ALL				WHITE-COLLAR				BLUE-COLLAR			
			With Training				With Training				With Training	
	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)	Mean (1)	Std Dev (2)	Mean (3)	Std Dev (4)
Regions												
London	0.10	0.30	0.10	0.30	0.12	0.33	0.11	0.32	0.08	0.27	0.09	0.28
Type of Organizations												
Public organization	0.25	0.43	0.33	0.47	0.33	0.47	0.39	0.49	0.21	0.40	0.28	0.45
Private organization	0.72	0.45	0.62	0.48	0.62	0.49	0.55	0.50	0.77	0.42	0.69	0.46
Non-profitable organization	0.03	0.18	0.05	0.21	0.06	0.23	0.07	0.25	0.02	0.14	0.03	0.16
Size												
fewer than 25 employees	0.34	0.47	0.30	0.46	0.31	0.46	0.28	0.45	0.35	0.48	0.31	0.46
25-49 employees at the establish	0.14	0.35	0.14	0.35	0.14	0.34	0.14	0.35	0.15	0.35	0.15	0.35
50-99 employees at the establish.	0.12	0.32	0.12	0.33	0.11	0.32	0.12	0.33	0.12	0.32	0.12	0.33
100-199 employees at the establish.	0.10	0.31	0.10	0.29	0.11	0.31	0.09	0.29	0.10	0.30	0.10	0.30
200-499 employees at the establish.	0.13	0.33	0.13	0.34	0.12	0.32	0.13	0.33	0.13	0.34	0.14	0.34
500-999 employees at the establish.	0.07	0.25	0.07	0.26	0.07	0.26	0.08	0.27	0.06	0.25	0.07	0.26
1000+ employees at the establish.	0.11	0.31	0.13	0.34	0.14	0.34	0.15	0.36	0.09	0.28	0.12	0.32
Real Wage and Wage Compression measures												
log real (1998 prices) wage	3.47	0.57	3.57	0.55	3.82	0.51	3.83	0.49	3.26	0.50	3.34	0.50
Number of employees	**6.924**		**3,593**		**3,136**		**1,769**		**4,939**		**2,168**	
Number of observations	**20,538**		**6,436**		**7,869**		**3,099**		**12,669**		**3,337**	

Table 2 – Wage effects of training incidence using different specifications (FE/IV)

Dependent Variable: Log of real hourly wage	All			White-Collars			Blue-Collars		
Training Incidence	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Training (cumulated events)	**0.0096*** **	**0.0099*** **	__	**0.0089**	**0.0091**	__	**0.0017**	**0.0019**	__
Promoted	__	**0.0390**** **	**0.0392*** **	__	**0.0362** **	**0.0368** **	__	**0.0372* **	**0.0374* **
Training in the current employer (cumulated events)	__	__	**0.0088** **	__	__	**0.0089**	__	__	**0.0020**
Training in the previous employer (cumulated events)	__	__	**0.0256**	__	__	**0.0348**	__	__	**0.0186**
General Training (cumulated events)	**0.0137**** **	**0.0140**** **	__	**0.0129** **	**0.0133** **	__	**0.0037**	**0.0038**	__
Promoted	__	**0.0397**** **	**0.0393**** **	__	**0.0370** **	**0.0375** **	__	**0.0374* **	**0.0375* **
General Training in the current employer (cumulated events)	__	__	**0.0134**** **	__	__	**0.0135** **	__	__	**0.0040**
General Training in the previous employer (cumulated events)	__	__	**0.0297**	__	__	**0.0346**	__	__	**0.0297**
Financed General Training (cumulated events)	**0.0132*** **	**0.0136*** **	__	**0.0159*** **	**0.0162*** **	__	**0.0010**	**0.0011**	__
Promoted	__	**0.0388**** **	**0.0390**** **	__	**0.0370** **	**0.0373** **	__	**0.0371* **	**0.0373* **
Finance General Training in the current employer (cumulated events)	__	__	**0.0146**** **	__	__	**0.0165*** **	__	__	**0.0041**
Finance General Training in the previous employer (cumulated events)	__	__	**0.0303**	__	__	**0.0330**	__	__	**0.0393**
Training Intensity	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Training (cumulated events)	**0.0009**** **	**0.0009**** **	__	**0.0008** **	**0.0008* **	__	**0.0004**	**0.0004**	__
Promoted	__	**0.0387**** **	**0.0392**** **	__	**0.0363** **	**0.0373** **	__	**0.0358* **	**0.0353* **
Training in the current employer (cumulated events)	__	__	**0.0010**** **	__	__	**0.0010** **	__	__	**0.0006**
Training in the previous employer (cumulated events)	__	__	**0.0002**	__	__	**0.0003**	__	__	**0.0002**
General Training (cumulated events)	**0.0010**** **	**0 .0011**** **	__	**0.0008* **	**0.0008* **	__	**0.0006**	**0.0006**	__
Promoted	__	**0.0386**** **	**0.0392**** **	__	**0.0368** **	**0.0378** **	__	**0.0348* **	**0.0341* **
General Training in the current employer (cumulated events)	__	__	**0.0011**** **	__	__	**0.0009* **	__	__	**0.0008**
General Training in the previous employer (cumulated events)	__	__	**0.0003**	__	__	**0.0003**	__	__	**0.0004**
Financed General Training (cumulated events)	**0.0007* **	**0.0007* **	__	**0.0005**	**0.0004**	__	**0.0004**	**0.0004**	__
Promoted	__	**0.0382**** **	**0.0384**** **	__	**0.0354** **	**0.0357** **	__	**0.0362* **	**0.0358* **
Finance General Training in the current employer (cumulated events)	__	__	**0.0009*** **	__	__	**0.0007**	__	__	**0.0006**
Finance General Training in the previous employer (cumulated events)	__	__	**0.0003**	__	__	**0.0004**	__	__	**0.0011**

Source: British Household Panel Survey, 1998 - 2001.
Notes: Each entry in columns (1) to (9) contains marginal effects. *Statistically significant * at 85%, ** at 90%, *** at 95%, and **** at 99%. All results presented are based upon robust standard errors. Controls are also introduced for: experience, age, marital status, gender, race, having children, years of school, tenure, hours worked, having temporary job, having a part time job, having vocational qualifications, being a union member, have left the employer, year, occupation, economic sector, region, type and size of workplaces.

Table 3– Wage effects of training incidence and training intensity among groups of workers

FE/IV	White-collars				Blue-collars			
	All	***<30***	***[30-45]***	***>45***	***All***	***<30***	***[30-45]***	***>45***
Dependent Variable: Log of real hourly wage	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Training INCIDENCE								
Training *(cumulated events)*	**0.0091**	**0.0112**	**0.0138***	**0.0073**	**0.0019**	**- 0.0186**	**-0.0004**	**0.0079**
Training in the current employer (cumulated events)	0.0089	0.0067	0.0134*	0.0118	0.0020	0.0031	-0.0022	0.0052
Training in the previous employer (cumulated events)	0.0348	0.0482	0.0265	0.0731*	0.0186	-0.0848	0.1121*	0.0420
General Training *(cumulated events)*	**0.0133****	**0.0060**	**0.0201*****	**0.0077**	**0.0038**	**-0.0135**	**-0.0021**	**0.0139**
General Training in the current employer (cumulated events)	0.0135**	0.0041	0.0206***	0.0136	0.0040	0.0074	-0.0044	0.0112
General Training in the previous employer (cumulated events)	0.0346	0.0471	0.0262	0.0731*	0.0297	-0.0602	0.1284*	0.0405
Financed General Training *(cumulated events)*	**0.0162*****	**0.0255**	**0.0211*****	**0.0109**	**0.0011**	**-0.0182**	**-0.0006**	**0.0131**
Financed General Training in the current employer (cumulated events)	0.0165***	0.0233	0.0211***	0.0177	0.0041	0.0098	0.0015	0.0080
Financed General Training in the previous employer (cumulated events)	0.0330	0.0761	0.0223	0.0910**	0.0393	-0.0897	0.1652*	0.0337

FE/IV	All	<30	[30-45]	>45	All	<30	[30-45]	>45
Dependent Variable: Log of real hourly wage	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Training INTENSITY								
Training	**0.0008***	**-0.0003**	**0.0008***	**0.0024**	**0.0004**	**-0.0007**	**0.0012**	**0.0003**
Training in the current employer (cumulated days)	0.0010**	0.0001	0.0008*	0.0028	0.0006	-0.0009	0.0014	-0.0005
Training in the previous employer (cumulated days)	0.0003	-0.0005**	-0.0017	0.0004****	0.0002	0.0002	0.0010	0.0012
General Training	**0.0008***	**-0.0004**	**0.0008***	**0.0020**	**0.0006**	**-0.0007**	**0.0013**	**0.0005**
General Training in the current employer (cumulated days)	0.0009*	0.0000	0.0008*	0.0023	0.0008	-0.0011	0.0015*	-0.0004
General Training in the previous employer (cumulated days)	0.0003	-0.0005**	-0.0020	0.0004****	0.0004	0.0003	0.0305***	0.0012
Financed General Training	**0.0004**	**-0.0005**	**0.0019*****	**-0.0004**	**0.0004**	**-0.0006**	**0.0011**	**0.0010**
Financed General Training in the current employer (cumulated days)	0.0007	-0.0002	0.0020***	-0.0003	0.0006	0.0000	0.0013	-0.0041
Financed General Training in the previous employer (cumulated days)	0.0004	-0.0005**	-0.0002	0.0004****	0.0011	0.0026	0.0243	0.0011
observations	**7869**	**1646**	**3768**	**2455**	**12669**	**3760**	**5232**	**3677**

Source: British Household Panel Survey, 1998 - 2001.
Notes: Each entry in columns (1) to (8) contains marginal effects.

*Statistically significant * at 85%, ** at 90%, *** at 95%, and **** at 99%. All results presented are based upon robust standard errors.
Controls are also introduced for: experience, age, marital status, gender, race, having children, years of school, tenure, hours worked, having temporary job, having a part time job, having vocational qualifications, being a union member, have left the employer, year, occupation, economic sector, region, type and size of workplaces, and promotion.