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New Evidence for British Men and Women

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ABSTRACT

Who Pays for General Training? New Evidence for British Men and Women*

We use important new training information from waves 8-10 of the British Household Panel Survey to document the various forms of work-related training received by men and women over the period 1998-2000, and to estimate their impact on wages. We initially present descriptive information about training: we find that most work-related training is viewed by its recipients as general, that the longest training courses are for induction purposes, that the vast majority of training takes place either at the workplace or at the employer's training centre, and that most training is paid for by employers. We then estimate the impact of training – controlling for its financing method – on wages levels and wages growth. We find that employer-financed training increases wages both in the current and future firms, with some evidence that the impact in future firms is larger, especially for accredited training. These results are inconsistent with orthodox human capital theory with no credit constraints, but consistent with the relatively recent training literature on training in imperfectly competitive labour markets. They are also consistent with the hypothesis that firms offer credit-constrained workers binding training contracts whereby firms pay for general training and workers repay the 'loan' by receiving a post-training wage below their marginal product.

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I. Introduction

Investment in work-related training is a key element of human capital formation. As such, it has received considerable attention in the economics literature and also in policy circles where it seen as a way of raising the productivity and living standards of less skilled workers. Theoretical work has analysed the nature of the investment decision, the division of the costs and benefits, and conditions under which the level of training may be sub-optimal. Empirical studies have investigated the extent and impact of work-related training, and have typically used large individual-level data sets to estimate reduced-form determinants of training and the gross returns in terms of increased wages, both cross-sectionally and over time. However more detailed analysis has often been hampered by very limited information about the duration, type and financing of individual training events.[1] Our aim in this paper is therefore to investigate the degree to which rich new training data from the three most recent waves of the British Household Panel Survey (BHPS) can shed light on current debates about work-related training.

These new BHPS training data enable us to test the predictions of several different models of training and the labour market. The standard human capital model predicts that, in a perfectly competitive labour market, firms will not finance investment in *general* training, essentially owing to a hold-up problem (Becker, 1964). Instead workers will finance general training themselves, through lower wages during training and/or by paying the cost directly. In both cases individual wage profiles should be steeper for workers who

[1] Most individual data sets do not provide this sort of information. For Britain a notable exception is the National Child Development Survey (NCDS), analysed by, inter alia, Arulampalam, Booth and Elias (1997), Arulampalam and Booth (2001) and Blundell, Dearden and Meghir (1996). However the NCDS - while important - analyses only a very specific cohort - those born in the first week of March 1958. For the USA, the National Longitudinal Survey of Youth (NLSY) 1988-1991 contains information on the location of training and who paid for it (Loewenstein and Spletzler, 1998). It does not, however, provide information on the number of courses received or whether or not these led to a qualification.

receive general training, with their higher post-training wages reflecting their increased productivity arising from their training investment. In contrast, if training is *specific*, contract enforcement problems will typically ensure that the costs and benefits are shared (Hashimoto, 1981). In summary, the theory predicts that firms will not pay for general training, and wage profiles of individuals who have been specifically trained should be flatter than those of generally trained individuals. It is interesting that Bishop (1997), in his survey of North American studies, remarks on the conspicuous absence of evidence that on-the-job wage growth is substantially raised by training. He conjectures that there are institutional barriers in the US labour market which prevent firms and workers from sharing the costs.

Recent theoretical models that assume an imperfectly competitive labour market identify conditions under which firms may finance general training - notably if wages are "compressed" relative to productivity (Katz and Ziderman, 1990; Stevens, 1994, 1996; Loewenstein and Spletzer, 1998; Acemoglu and Pischke, 1999; Booth and Zoega, 1999). In this case, not only should observed on-the-job wages of trained workers rise more slowly than productivity (a prediction in common with the specific training model under perfect competition), but training should also be transferable across jobs (a contrary prediction to the pure specific training model).

Our data show that employers do indeed pay for training that is general. We have several pieces of evidence for this. First, from the raw data we know that most work-related training is viewed by its recipients as general and that most is paid for by employers.[2]

[2] Of course respondents might not have any conception about wages being used as a means of inducing sharing in training investments, so it may be that some of the training they report as employer-financed is actually training in which both parties have shared. On the other hand, a substantial proportion of individuals reports *no fees* yet it is most unlikely that any training activity is truly costless. As we note later in the paper,

Second, we have evidence from our wage equations that employer-financed training has a statistically significant positive impact on wages in the subsequent job conditional on changing job, even after controlling for unobservable heterogeneity and training selectivity. The fact the employers pay for training that is transferable across employers is inconsistent with orthodox human capital theory, but consistent with the relatively recent training literature based on the assumption of imperfectly competitive labour markets. It is also consistent with the hypothesis that firms offer credit-constrained workers binding training contracts whereby firms pay for general training and workers repay this 'loan' by receiving a post-training wage below their marginal product.

In our analysis we also distinguish between training that leads to qualifications (and which we term accredited training) and training that does not. It is sometimes argued that accreditation of training is an important means of overcoming market failure where there is asymmetry of information about the value of firm-provided training (for example where the firm providing the training knows its value but other firms do not). A formal qualification associated with a training course is a means of conveying to outsiders the value of the employer-provided general training. We find that employer-financed accredited training has a large impact on wages in future jobs, whereas non-accredited training has no effect. There is no evidence that self-financed training affects wages in the current or future jobs.

The remainder of our paper is set out as follows. In the following section, we describe the data and provide a picture of the various forms of work-related training that take place in Britain. We use simple probits as a descriptive tool to estimate the principal characteristics of the various types of training. We find that most work-related training is

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it is likely that individuals who do not pay for training themselves - and who do not see any visible evidence of the employer paying - actually report that no-one pays.

viewed by its recipients as general, that the longest training courses are for induction purposes, that the vast majority of training takes place either at the workplace or at the employer's training centre, and that most training is paid for by employers. Just under half of training events lead to qualifications and these events tend to be longer. Section III investigates the impact on wages of training incidence, the number of training courses, and the intensity of training. We focus in particular on the types of training in which we are most interested from a theoretical perspective – employer-financed training to increase or improve skills in the current job, and accredited training. The final section summarises and draws conclusions.

II. The Data

The BHPS is a nationally representative random-sample survey of private households in Britain. The first wave was launched in 1991 and panel members have been followed where possible ever since. Although information on work-related training was collected in the first 7 waves, it was fairly limited, and focused on training receipt, type and total duration in the previous year.[3] However, in wave 8 and subsequently, the training questions were expanded. Respondents are now asked how many training schemes or courses they started in the past year, and detailed information is then collected on the three longest events (or all events if there were fewer than three). These data shed new light on the nature of each event as a human capital investment. First, we know the length, and therefore potentially the opportunity cost, of each event. Second, we know its type/purpose (defined by the same categories as in previous waves) and where it took place. Third,

individuals are asked how the event was financed, enabling us to identify who pays the explicit costs. Finally, we know whether or not the event led to a qualification and if so if the qualification is from the group of the most widely recognised qualifications - including the General National Vocational Qualifications (GNVQ) that are intended to designate recognised industry specific and general skills. We do not, however, know the date at which the training event occurred, or the wages an individual received during training. We have wages data only for the survey points.

We use these new data from waves 8 to 10 of the BHPS for individuals who are either original members of the panel or who joined the panel subsequently. Our sample consists of private sector full-time employees aged between 16 and 65 years with valid information on our main variables and who did not report more than a calendar year of training.[4]

Our analysis covers any training (whether employer-provided or not) received by individuals, and excluding spells of full time education (only 2.1% of our final sample had undergone any full time education in the previous year). Respondents were specifically asked to exclude leisure courses**.** We drop observations where there is missing information on the place, type, duration or financing of the training event or on whether it led to a qualification (330 training events were dropped). This leaves us with 8316 person-years, for which training was received in 31% of cases and as 4317 distinct events.

The precise form of the new training questions is given in Appendix A. Individuals were asked to report the total number of training courses/events in the past 12 months, and

[3] Respondents were also asked - in a separate body of questions not explicitly linked to training - about any new qualifications they had obtained.

then questioned in detail about the three most important. Panel A of Table 1 shows that, for each of the available waves, roughly 30% of individuals received training. The mean number of training events is 2.06. Over half those receiving training (52%) experienced one event only, 24% participated in two events, 12% in three events and 12% in more than three events. Since our detailed information is limited to the three most recent events there is some truncation of the training history data for these individuals.

Training Type

What *types of training* do individuals report? Respondents are asked to specify the purpose of each event experienced in the past 12 months, using 5 non-mutually exclusive categories: (i) to help them get started in the current job, (ii) to increase their skills in the current job, (iii) to improve their skills in the current job, (iv) to prepare for future job(s), and (v) to develop general skills.[5] We redefine the first category as *induction training*[6]. Since it is difficult to see any distinction between categories (ii) and (iii) other than differences of interpretation, we combine training to increase/improve skills in the current job into a single type - *skills in the current job*. Panel D of Table 1 shows the proportions in each of the four categories.[7] Unsurprisingly induction training is relatively infrequent,

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[4] We exclude public sector workers from our analysis. In preliminary training provision and wage equations estimated for public and private sector workers, we rejected the hypothesis that the two sectors could be pooled.

[5] Note that 'current job' might be interpreted by respondents as being for either the current employer or the current set of duties or 'job' at a single employer. Hence a change of 'job' might be construed by respondents either narrowly as a change of duties at the one employer, or more broadly as a change of employer.

[6] Median job tenure for induction training events is 6 months. The event counts show that 72% of individuals receiving induction training undergo only one spell of induction, whereas for training as a whole 52% of individuals receive only a single spell.

[7] The question on training type was also asked at waves prior to wave 8 – although in a different part of the questionnaire. For full-time private sector workers, average training incidence for men was 35.0% in waves 1-7 (with a standard error (SE) of 1.0 percentage point) and for women was 35.0% (SE=1.3), as compared to 30.0% (SE=1.2) for men and 32.7 (SE=1.7) for women in waves 8-10. The difference appears statistically significant for men. This reported decrease may be due to a change in the order of the questions: in waves 8-10 the training questions follow those about education much more closely and respondents are specifically asked to exclude previously mentioned full-time educational courses. For these reasons we recommend

being reported for only 12% of events. Training events are viewed as increasing/improving current skills in nearly 85% of cases and future skills in 59% of cases. Some 85% of events are viewed as improving general skills. There is comparatively little variation in these figures across gender.

There are several problems to be considered before using these data. First, there is some overlap of the training categories; in particular for *training for skills* and *general training*, where the correlation coefficient between these two categories is 0.75. Only 6.7% of events are described as general training only (i.e. with no other categories cited). So it is not possible to construct meaningful separate variables for each of these types, since respondents typically view their training as falling into a number of different categories, as Table A.1 in the Appendix reveals.[8] For this reason we drop the separate general training indicator in our subsequent analyses, although we would remind the reader that 85.4% of *training for skills* is viewed by respondents as general.

A second potential problem relates to respondents' interpretation of the question. Campanelli et al (1994) note, from a study of both linguistic and survey data, that the interpretation of the term "training" varies across groups in the population, in particular employers, employees, and training researchers.[9] They emphasise that individuals in the general population typically interpret training as referring to "that which happens in formal courses" (page 92). This is our focus of interest in the present study, rather than on less

caution is using the training data to examine questions of human capital formation across all waves 1-10 without taking proper account of this.

[8] Table A.1 shows that the modal combination is training for current and future skills (40% overall, or 44% of non-induction training) followed by training for current skills only (36% overall). Within induction training, 63% of events are also intended to develop skills for future jobs.

[9] Barron, Berger and Black (1997) use US data from a matched survey to compare the employer's response about training with the responses of the worker who received the training. They find substantial measurement error in the training variables, and that firms tend to report more training than workers.

formal training that is harder to measure. Inspection of the BHPS questions provided in Appendix A reveals that the training data elicited in the BHPS is of this more formal nature. In this paper we are principally interested in training to increase or improve skills in the current job – both of which we view as providing measures of different forms of formal work-related training.

Training location

Panel E of Table 1 reports the proportions of training events taking place at different locations, of which we distinguish six – the current or former workplace[10]; the employer's training centre; a private training centre; a higher or further education college, adult education centre or university; at home; and other unspecified locations. Some 36% of training takes place in the workplace, and a further 37% in a training centre (either employer-based or private), whilst 17% is college-based. Women are less likely to train in private training centres and more likely to train in college. Cross-tabulations of training type and location, shown in Appendix Table A.2, show that there is little difference between the location patterns of induction and current skills training, with nearly 80% taking place in workplaces or training centres and 14% in colleges. On the other hand, training for future skills is less likely to occur in workplaces or in training centres (70%) whilst nearly a quarter takes place at college (21%) or at home (3.6%).

Training finance

Panel F of Table 1 shows four non-mutually exclusive reporting categories for financing of training: no fees; the respondent or their family paid; the (future) employer paid; or it was financed in some other way. Because of the small number of cases of training financed by the such schemes as the New Deal and Training for Work, we combine

them with the residual category of 'other' training. These raw figures indicate that women are half as likely again as men to finance their own training (10.7% of their courses are self-financed compared to 7.6% for men). For both genders, the employer is reported as financing just over 60% of events.

The substantial proportion of individuals reporting *no fees* is interesting, and may suggest economic naivety on the part of respondents since it is most unlikely that any training activity is truly costless. At a minimum there will be some loss of production while individuals are in training courses (in the absence of pure learning-by-doing, which is anyway not captured in the BHPS training questions). It seems likely that individuals who are not paying for training themselves, and who do not see any visible evidence of the employer paying, may report that no-one pays. In Table A.3 of Appendix A evidence is presented that individuals tend to report no fees when training is internal to the employing organisation and that in fact the costs are borne by the employer. In our multivariate analysis we therefore combine the *no fees* and *employer finance* categories, which together account for nearly 90% of training finance.[11]

In Table A.4 of Appendix A we report cross-tabulations of financing method for induction, current skills and future skills training. Induction and current skills training are financed in a similar fashion – mainly by the employer (some 90%, including 'no fees').

[10] Only 5% of workplace based events took place in the former rather than the current workplace

[11] In the multivariate equations analysing the association of training characteristics with training type and intensity, as well as in the wage equations, we also tested in an expanded specification for differences between the *no fees* and *employer finance* categories by including them as separate regressors. The evidence was mixed: for men (but not women), the *no fees* category was somewhat less strongly associated than was *employer finance* with a training event being for current skills. Both categories had a similar association with training intensity, for both men and women. In the wage equations, only when training was measured by event counts (rather than by incidence or intensity) was there evidence that *employer financed* training had a different - and larger - effect on wages than *no fees* training. On balance the two categories of training - *no fees* and *employer finance* - seemed to have comparable effects. We therefore maintained our combined category in our reported estimates. This also has the advantage of alleviating the problems of small cell size in the wage equations.

For future skills training the balance is marginally tilted away from employer finance (85%) towards self financing (11%).

One implication of human capital theory is that the firm and workers may share the cost of training. Whilst these raw data do not tell us whether there is indirect sharing in the form of lower training wages, they will reveal any direct sharing. Table A.5 in Appendix A shows that there is very little sharing, for example for those events paid for by the individual or their family, only 3.4% were also financed by the employer.

Qualifications and accredited training

We noted in the Introduction that where there is asymmetry of information about the value of firm-provided training – for example where a firm knows its true worth but other firms do not - the award of a qualification upon completion of a training course is potentially important. This is because the qualification may signal to alternative employers the value, and verify the receipt, of newly acquired human capital. We might therefore expect such transferable training to be organised and financed in a different way to more firm-specific training. In the BHPS questionnaire, individuals were asked if each training event was intended to lead to (part of) a qualification and if so whether any of a list of recognised qualifications had actually been obtained in the previous year. This latter measure of accredited training will of course be subject to right censoring when training is in progress but the qualification not yet obtained. Panel G of Table 1 shows that women are more likely to undertake training leading to qualifications than men. Table A.6 of Appendix A shows that 17% of accredited training courses are self-financed, compared to only 3% of

courses which do not lead to qualifications. Nevertheless, it is striking that 78% of accredited courses are still paid for by the employer (including the 'no fees' category).

Correlation between Training Measures

As a means of further describing the data, we report in Table 2 the marginal effects from some simple probits showing the *ceteris paribus* association between the characteristics discussed above and the type of training (conditional on training being received). The marginal effects show the increase in the expected probability relative to the base case of training financed by a scheme or 'other' means, occurring in an 'other' place, and not leading to qualifications. Thus for men, if training includes an element of induction it is 10 percentage points more likely to takes place in the workplace or at an employer's training centre than in the base category of another place. For men induction training is also positively associated with gaining qualifications. For women, on the other hand, induction training typically does not follow a systematic pattern, with the exception of being less likely to be self-financed. (Of course very little induction training, 5%, is self financed). For both men and women, current skills training is strongly associated with employer financing (an 11-13 point increase) and negatively associated with self-financing (an 11-16 point decrease). Training which leads to qualifications is much more likely to be for future skills (14 points for men, 19 points for women) and less likely to be for current skills.

Training Intensity

Training intensity is reported in Panel C of Table 1. Respondents are asked for the total time, in hours, days, weeks or months, devoted to training since 1st September of the previous fieldwork year. We converted the responses to days. Mean intensity for men is 12.4 days and for women 13.1 days. Figure 1 in Appendix A graphs the distribution of

intensity (conditional on receiving training and truncated at 30 days) for the three types of training.

Table 3 reports the estimates from simple regressions of intensity on the various training characteristics.[12] They show that that compared to the base category is purely 'general' training not leading to qualifications, financed by a scheme or 'other' means, and occurring in an 'other' place. Compared to this base, induction training is *ceteris paribus* associated with a statistically significant increase in expected intensity of nearly 8 days for both men and women. Similarly, training for future skills is associated with a 3-4 day increase in intensity, whilst training for current skills does not significantly affect intensity relative to the base case. Turning to training location, both college and home training are associated with much higher intensity (14-29 days). It should of course be stressed that training at home accounts for only 3% of events. For men the finance dummies all have large, negative and significant coefficients, reflecting the relatively long duration of training financed by official schemes (in the base case), though the effect is not particularly evident for women. Finally, training which leads to qualifications is associated with about a 13 day increase for men and women.

Summary

The picture of work-related training emerging from our analysis is as follows. Most recipients view it as general, and it takes place at the workplace or a training centre. Small proportions of training events are for induction purposes, or take place at college or at home. However, they are among the longest events. The direct costs of most training are

[12] Since the characteristics are only defined if training actually occurs, the estimates show the associations between them and training intensity *conditional* on training taking place. An OLS rather than a tobit estimator is therefore appropriate.

paid exclusively by employers. About 40% of training events lead to qualifications and these events tend to be longer.

We now turn to our estimates of the impact of training on wages. We focus in particular on employer-financed training to increase/improve skills in the current job, and investigate the transferability of such training across employers. We also investigate the degree to which accredited training is more transferable than non-accredited training.

III. Wage Levels

The new training data enable us to test the predictions of several different models of training and the labour market. The standard human capital model due to Becker (1964) predicts that firms never finance investment in *general* training, owing to a hold-up problem. If firms were to pay for general training, to recoup the training cost they would have to pay a wage below marginal productivity after training was complete, and in a competitive labour market workers could then leave and earn their full marginal product with a rival employer. The model predicts that workers will finance general training themselves through lower wages during training or by paying the cost directly. In both cases individual wage profiles should be steeper for workers who train, reflecting their rising productivity.

In contrast, both firms and workers have an incentive to invest in *specific* training, and here contract enforcement problems will generally mean that the costs and benefits are shared (Hashimoto, 1981). Wage growth should then be flatter than that due to general training.

More recent models (Stevens, 1994; Loewenstein and Spletzer, 1998; Acemoglu and Pischke, 1999; Booth and Zoega, 1999) identify necessary (but not sufficient) conditions under which firms might invest in general training - notably if wages are compressed relative to productivity.[13] In this case, too, not only should observed on-the-job wages rise more slowly than productivity, but training should be portable across jobs. Indeed, in the contracting model of Loewenstein and Spletzer (1998) there may be a greater return to training in future jobs than in the current job depending on whether or not a minimum wage guarantee binds in the current job. If it does bind, the employer can extract rents from providing general training. The survey by Bishop (1997) remarks on the conspicuous absence of evidence that on-the-job wage growth is substantially raised by training or that wages are lower during the training period. He conjectures that there are institutional barriers in US labour market which prevent firms and workers from sharing the costs.

The descriptive statistics presented in the previous section already allow a partial evaluation of these models. They indicate that a large majority of training (85%) is regarded by recipients as general, that an even larger proportion (89%) is employer-financed and that there is almost no explicit cost sharing. These figures cast doubt on the predictions of the simple human capital model that assumes a competitive labour market. We further explore the implications of the different models by investigating the effect of training incidence, the number of training events and intensity on wages in a multivariate framework. Most studies simply examine the impact of training incidence (and sometimes intensity) on wages, but not the number of events.[14]

[13] The intuition is that, if productivity is increasing in general training intensity at a faster rate than are wages, firms' profits are increasing in training over some range. Thus they might be willing to finance the training.
[14] Exceptions are Lillard and Tan (1992), Arulampalam and Booth (2001) and Blundell et al. (1999). While Lillard and Tan (1992) note the importance of multiple training occurrences, they treat these as exogenous when examining the impact of training on economic outcomes. They also note (p.31) that multiple training

Let the hourly wage be determined by:

$$w_{ijt} = x_{ijt}'\beta + T_{it}'\alpha + \gamma_t + \mu_i + \upsilon_{ij} + \varepsilon_{ijt} \qquad (1)$$

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 and job characteristics influencing the wage and associated with parameter vector β; T_{it} is a vector containing various measures of the amount of training accumulated from the start of the sample period in wave 8, and is associated with parameter vector α; and γ_t are year-specific dummy variables. Unobservable characteristics which affect the individual's wage are decomposed into a permanent effect μ_i, an employer match specific component υ_{ij} and a transitory effect ε_{ijt}.

We divide the variables into training undertaken with the *current* employer (including training received in the past year) and training undertaken with *previous* employers. Including training accumulated with *previous* employers allows us to test the joint hypothesis of no depreciation, constant returns and that such training is transferable across employers.[15] The three types of relevant training – employer financed current skills training, self-financed current skills training and a residual category of other forms of training- enter the equation separately.

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occurrences within a period are typically not known from US survey data. The NLS data for young men, for example, contain training information for every survey period, but multiple sources of training are not known within each period; data about sources and types of training are available only for the longest event. Thus Lillard and Tan use as their "events" measure of training the accumulated sum of all training events, where there is only one event measured at each wave.

[15] Thus training events with previous employers might have an insignificant effect on current wages if (i) the training were received such a long time ago that skills have depreciated due to obsolescence; or (ii) the training was not transferable, or (iii) if there are diminishing returns to the number of courses. We attempted to test the depreciation aspect by including lags in a preliminary specification, but found these were insignificant.

In another specification we distinguish between training which leads to qualifications (and which we term accredited training) and that which does not. We do this because a formal qualification associated with a training course is a means of conveying to outsiders the value of the employer-provided general training. In the BHPS data, we know if each training event leads to a qualification, and if so, whether it has been obtained at the interview date. However, there is unfortunately no follow-up information on accredited training for which the qualification has yet to be acquired at the interview date. Since we do not know whether these events are ongoing or ended in either success or failure, we risk misclassifying them. If we classify them as accredited training, then the category will include longer, ongoing spells of training which did lead to qualifications, but also events which ultimately ended in failure. On the other hand, if we classify them as non-accredited training, then our accredited training category only includes completed accredited events, but we conflate some events which did eventually lead to qualifications with events never intended to. There are merits in both approaches, but we chose to include all training leading to qualifications, whether or not obtained, in the accredited category. We experimented with the alternative classification and the results were qualitatively the same.

The difficulty in separating incomplete from complete spells of training also means we cannot directly test one prediction of the orthodox human capital model, that wages are lower during training. The prediction has been contested by Bishop (1997). Moreover Loewenstein and Spletzer (1998) find little evidence in favour of it using NLSY data. In addition, a severe selectivity problem arises because unobservable ability is likely to raise starting wages and affect the amount of training provided. Ideally, one would like to observe two identical individuals starting the same job and receiving different amounts of

training. Sicilian (2001) presents a partial solution to the problem using data on pairs of individuals starting the same or similar jobs, and finds that training does reduce starting wages. We performed a rough test by including training to be received in the *next* year in our equations. Whilst the fixed-effect framework solves the problem of (time-invariant) unobserved ability, the test does assume that the current wage is the same as that to be paid during next year's training spell and that next year's training is not a response to a current unobserved productivity shock (which would not be removed by the estimation procedure). Notwithstanding these caveats, if wages are lower during training, the coefficient on the additional regressor should be negative. In fact the estimate was positive though insignificant.

A natural concern with the specification of (1) is that the variables included in T_{it} may be correlated with the permanent unobserved effect μ_i, leading to biased estimates of β. This is because μ_i may capture, for example, some aspect of individual ability or motivation which reduces the cost of training and will therefore be positively associated with the receipt of training. Furthermore, μ_i will also reflect the stock of training acquired in the pre-sample period. If past and future training are correlated (either negatively or positively – see the discussion in Loewenstein and Spletzer, 1998: p160) then T_{it} will again be correlated with μ_i. We address this concern by specifying (1) as a fixed-effects (FE) model. Since the estimator for β then relies on within-individual variation the permanent effect is removed.

The employer match effect υ_{ij} is also likely to be correlated with variables in T_{it}. First, both the measures of training obtained with the current and previous employers and υ_{ij} change whenever the employer changes. Second, where the employer match is good,

more training may occur since expected tenure will be longer. We do not explicitly model υ_{ij} in our individual fixed-effect framework. Instead, we approximate υ_{ij} by an employer-specific effect υ_j which is constant across individuals, by including a step dummy variable taking the value one for the duration of a new job (if an individual changes jobs), and the value zero otherwise; and another similar dummy capturing a second new job (a maximum of two job changes can be observed). The base case is the first job observed in the panel. This is similar to the approach of Loewenstein and Spletzer (1998) in their analysis of the returns to training between jobs.

The effect of training on wages may depend on how much training has already been received (in particular, there are likely to be diminishing returns to training). As noted by Arulampalam and Booth (2001), it may only be the first event that matters for wages; at the other extreme, all training events may have the same impact. Similarly, the return to training may or may not be in proportion to the length of the event. Furthermore the skills acquired may depreciate (particularly in a period of rapid technological change). We therefore investigated the appropriate functional form for the cumulative training measures T_{it} by estimating an equation for wage growth between waves 8 and 10 in which the training received in each wave was entered separately.[16] Three alternative measures of training – incidence, event counts and total intensity per wave - were tried, with counts and intensity entering linearly, quadratically, and as logs and square roots. We were unfortunately unable to obtain robust results which clearly distinguished between the different models, apparently for two reasons. First, the cell sizes of the disaggregated

[16] To our knowledge, little previous work has been done into the functional form of training in wages equations. An exception is Frazis and Loewenstein (1999).

training measures were rather small.[17] Second, measurement error in the training variables is likely be more important when they are disaggregated, resulting in more downward bias of their coefficient estimates.

Because of the difficulty in determining functional form with any precision we simply define the elements of T_{it} as the cumulative total of training received since wave 8 according to the three different measures: incidence, event counts and intensity. Assuming that measurement error is uncorrelated over training events and years, the cumulative variable will be a cleaner indicator of training received and its coefficient estimate subject to less downward bias. We estimate separate equations for incidence, event counts and intensity. The results reported below are qualitatively similar for all three measures, suggesting some robustness to possible mis-specification of functional form.

As already noted, permanent effects on individual wages are removed during estimation of β. This includes any time-invariant unobservables correlated with those affecting a woman's participation in the labour market: insofar as this endogenous selection is only determined by permanent unobservables, selection bias in the estimates is also eliminated. Since permanent differences between their wages are controlled for in the FE model, we tested the hypothesis that observations on men and women could in fact be pooled in the estimation of (1). The test yielded an F statistic with an implied p-value of 0.36. Therefore (1) was estimated on the pooled sample of men and women.

[Insert Table 4 near here]

[17] For example, only 50 individuals were observed to receive training in wave 9 before changing employers. In addition, the estimates of the 2-year wage growth equation only used observations on the first and last wave (except for the training variables). By contrast, the fixed effects model (1) estimated below to derive the main results used observations from all three waves.

For our sample of individuals with valid information on all variables in the wage equation (1), Table 4 reports the number of individuals (men and women combined) receiving each type of training over the sample period. The first row shows the number who had training during any of their observed jobs at different employers. So 1269 individuals received employer-financed training at some point during the three waves and similarly 127 undertook self-financed training. The second row shows the number observed to undertake training and then change employers. In order to identify the effect of training in previous jobs it is clearly important to have a reasonable number of such observations.[18] Because of the tiny number of individual observations on self-financed training with previous employers, we combine the current and previous employer event counts. The third to the sixth rows distinguish accredited and non-accredited training. Since there are too few observations on residual training with previous employers, we combine accredited and non-accredited training for this group. The remaining training type is employer-financed current skills training where we have observations on over 70 individuals in all categories. The relatively small cell sizes should be borne in mind when interpreting our more disaggregated results. The penultimate row in the table reports the mean number of events accumulated by individuals over the sample period, conditional on receiving at least one such event. The final row shows the conditional mean accumulated intensity. So individuals who received any employer-financed training received on average 2.4 events, which lasted a total of 22.7 days.

[18] The total variation is greater than suggested by the table since some individuals change jobs more than once.

Training incidence and event counts

[Insert Table 5 near here]

The key coefficient estimates of the fixed effect model when training is measured by incidence and event counts are reported in Table 5. Typical estimates (from the specification of column (3)) of the remaining coefficients are shown in Table C.1 of Appendix C. Definitions of the variables are given in Appendix B. The specification of column (1) in Table 5 includes both incidence and count variables for all our categories of training, to allow at least some flexibility of functional form: the first training event can have a different effect to the others. The estimated coefficients and their *t*-ratios suggest that only employer-financed current skills training affects wages, mainly through the incidence of training with previous employers, which increases expected current wages by nearly 10%. However, one drawback is that by construction the incidence and count variables are highly correlated.[19] Columns (2) and (3) present the estimated coefficients when the incidence and count variables are included separately. Both sets of results tell a similar story: employer-financed skills training received with former employers appears to raise current wages more than training undertaken with the current employer, though both have a statistically significant effect. For example, having received any employer-financed current skills training with previous employers is associated with 7.5% higher expected wages, whereas incidence of training with the current employer is expected to increase wages by only 2.4% (the difference is significant at the 5% confidence level). Furthermore, the results from both specifications indicate that training in the residual category ("other

[19] The correlation coefficient of incidence and counts of employer-paid skills training is 0.78 for training with the current employer and 0.88 for training with the previous employer.

training") also increases wages, but only when it was received with previous employers. There is no evidence that self-financed training has any effect on wages.

Column (4) reports the estimates when employer-financed current skills training is disaggregated according to whether it is accredited or not and is entered into the equation as event counts. The results indicate that only accredited training has an effect which is statistically significant at the 5% level. Again the point estimate for training acquired with previous employers is substantially larger than for that received with the current employer (although the difference is just statistically insignificant at the 5% confidence level). An additional accredited training event with a previous employer raises wages by 5.3%, whereas a similar event with the current employer raises wages by 1.9%.

The estimated coefficients on the "employer match" dummy variables indicate that an employer change is generally associated with an improved unobserved match of 2.5-3.0%. It was argued earlier that this match component is likely to be correlated with the measures of previous employer training. We therefore re-estimated the equations omitting the two match dummies. The coefficients on the previous employer training variables were larger and much more precisely estimated, for example an event of previous accredited training is expected to increase wages by 6.4% (t = 3.62), compared to 5.3% (t = 2.91) when the dummies are included (reported in Table 5). Controlling for job mobility therefore appears to matter when estimating the returns to training with previous employers, as might be expected.

Training intensity

The estimates of the model when intensity (in days) is used as the training measure are reported in Table 6, and show a similar pattern to that of Table 5. The results in column (1) indicate that time spent training with previous employers has more than twice the effect on current wages as time spent training with the current employer (though the difference is just insignificant at the 5% confidence level). Thus a trainee undergoing the sample mean of about 12 days (per year) of training could expect to receive a wage boost of nearly 1.5% with a future employer, *ceteris paribus*. Column (2) shows the estimates when training is distinguished by accreditation status. One explanation of the higher return to accredited training over non-accredited training, shown in Table 5, is that accredited events are longer (as noted in section II and illustrated in Table2). The results in Table 6 show that even after controlling for intensity, accredited training still has a higher return (the return to non-accredited training is not statistically significant). Again, accredited training received with previous employers has a larger effect than that received with the current employer (the difference is significant at the 8% confidence level).

Discussion

In line with the notion of implicit cost sharing in the orthodox human capital model, our results suggests that training which is explicitly financed by the employer is also associated with rising wages in the current firm. Unfortunately we cannot determine from our data whether or not wages rise as fast as productivity, but this British evidence does not wholly support Bishop (1997), who argues that firms and workers are unable to share the costs and benefits of training. However, we also find that such employer-financed training received with previous employers has a statistically significant positive impact on wages

paid by the current employer, even after controlling for unobservable heterogeneity, training selectivity and the returns to job mobility. [20] Furthermore, this effect appears larger than the impact of training on current wages.

As noted in the Introduction, the fact the employers pay for training that is transferable across employers is inconsistent with orthodox general human capital theory, but consistent with the relatively recent training literature based on the assumption of imperfectly competitive labour markets.[21] The evidence that the returns to training between employers exceed the returns with the current employer is consistent with the model of Loewenstein and Spletzer (1998), in which training is determined within long-term contracts, including minimum wage guarantees, in an environment of uncertainty. If the wage guarantee binds, the employer can earn rents by providing general training, and the worker can only receive the full return by switching employers. Our results from the British labour market corroborate theirs, particularly since we have more detail on individual training spells, including whether training is accredited, and given the higher frequency of training in Britain (almost three times that of the USA).

Our findings that the returns to training at future employers exceed the returns with the current employer also fit two alternative explanations. First, Hart and Ritchie (1999), in the context of returns to tenure, suggest that returns to general experience are assessed at the point of job change, whereas the returns to firm-specific performance occur throughout the lifetime of a job.[22] In the context of our paper, individuals' training experiences might

[20] Indeed, since any specific component of training will be lost when a worker moves between employers, our estimates may well be a lower bound on the returns to training across employers.
[21] In these models, a necessary (but not sufficient) condition for firms to pay is that productivity is increasing in training at a faster rate than are wages. Since we have no direct measure of productivity we cannot test for whether or not this is the case.
[22] Hart and Ritchie argue that this occurs because it is more efficient to evaluate the returns to general training at the point of job change. The reason is that it (i) simplifies performance-assessment processes (lowering

be translated into higher earnings predominantly at periodic points of evaluation (such as at internal or external promotion procedures or job changes). Second, if workers cannot borrow freely on the capital markets and binding training contracts (such as apprenticeships) are possible, then firm financing of general training may act as a loan to workers which is repaid by setting the post-training wage below their marginal product. In this case, although the firm merely acts as a banker to workers, it still finances training whilst it takes place. On termination of the contract workers are free to earn their full marginal product with a rival employer.

We also find that accredited employer-financed training has a bigger impact on wages with both the current and future employers than non-accredited training, and that only accredited training is transferable between employers. This result perhaps vindicates the policy initiatives of various governments to encourage accreditation of training where appropriate (for example the NVQs in Britain). The fact that employers pay for highly portable accredited training is again inconsistent with simple human capital theory.

Finally, there is no indication that self-financed training to develop current skills (which is in any case relatively uncommon) has any effect on wages. This is consistent with the view that firms, and not individuals, are better placed to evaluate the returns to training.

costs), (ii) provides scale economies because filling vacancies or processing promotions offers involves groups of individuals, and (iii) simplifies within-job wage assessment by confining attention only the job-specific elements.

IV. Conclusion

Our analysis shows that employers do indeed pay for training that is general. We have several pieces of evidence for this. First, from the raw data we know that most work-related training is viewed by its recipients as general and that most is paid for by employers. Second, we find that that employer-financed training increases wages both in the current and future firms, with evidence that the impact in future firms is larger, especially for accredited training.

What are the implications of our results for theory? The fact the employers pay for training that is transferable across employers is inconsistent with orthodox human capital theory with no credit constraints. However, it *is* consistent with the relatively recent training literature based on the assumption of imperfectly competitive labour markets. It is also consistent with the hypothesis that firms offer credit-constrained workers binding training contracts whereby firms pay for general training and workers repay this 'loan' by receiving a post-training wage below their marginal product.

Table 1: Attributes of Work-related Training, BHPS 1998-2000

	All [1]	Men [2]	Women [3]
A. Any training			
1998	0.307	0.296	0.326
1999	0.303	0.297	0.316
2000	0.318	0.307	0.339
B. Number of training events	2.050	2.067	2.021
C. Training Intensity	12.64	12.37	13.07
D. Training Type:			
Induction	0.123	0.122	0.126
Current skills	0.864	0.868	0.859
Future skills	0.589	0.587	0.592
General skills	0.845	0.848	0.842
E. Location[a]:			
Workplace	0.363	0.362	0.364
Employer training centre	0.173	0.173	0.172
Private training centre	0.198	0.222	0.160
College	0.173	0.153	0.205
Home	0.030	0.029	0.031
Other	0.063	0.061	0.068
F. Financing Method:			
None	0.267	0.272	0.260
Self	0.088	0.076	0.107
Employer	0.617	0.624	0.605
Other (inc New Deal and TEC)	0.037	0.038	0.036
G. Accreditation:			
Proportion qualified	0.420	0.405	0.443
Proportion accredited	0.225	0.222	0.229
N	8316	5379	2937

Notes: a See Table A.2, Appendix A for a breakdown of training location by training type.

Table 2
Training types and other training characteristics – probit analysis

	Induction training		Current skills training		Future skills training	
	Men	Women	Men	Women	Men	Women
	(1)	(2)	(3)	(4)	(5)	(6)
Workplace	0.096***	0.013	0.052**	-0.009	-0.016	0.023
	(2.75)	(0.37)	(2.08)	(0.25)	(0.39)	(0.44)
Employer training centre	0.105***	0.032	0.032	-0.010	0.010	0.047
	(2.63)	(0.80)	(1.19)	(0.24)	(0.22)	(0.86)
Private training centre	0.057	0.055	0.055**	-0.041	0.024	-0.013
	(1.57)	(1.32)	(2.21)	(0.98)	(0.55)	(0.23)
College	0.050	0.023	0.006	-0.046	0.065	0.045
	(1.27)	(0.57)	(0.23)	(1.11)	(1.35)	(0.78)
Home	0.031	-0.074	-0.023	0.017	0.140**	-0.091
	(0.58)	(1.30)	(0.56)	(0.31)	(1.97)	(1.03)
Employer paid	-0.043	-0.046	0.107***	0.132***	-0.072	-0.202***
	(1.24)	(1.01)	(3.11)	(2.84)	(1.34)	(2.95)
Self/family paid	-0.062*	-0.081**	-0.166***	-0.110**	-0.015	-0.126
	(1.95)	(2.12)	(3.95)	(2.24)	(0.23)	(1.51)
Accredited	0.065***	0.007	-0.052***	-0.045**	0.137***	0.186***
	(4.53)	(0.37)	(3.62)	(2.40)	(6.37)	(6.82)
Observations	2689	1628	2689	1628	2689	1628
R-squared	0.02	0.01	0.12	0.10	0.03	0.04

Notes: (1) Asymptotic *z*-statistics in brackets. (2) *significant at 10% confidence level; ** significant at 5% confidence level; *** significant at 1% confidence level

Table 3
Training intensity (days) and training characteristics – OLS estimates

	Men	Women
Induction	7.872***	7.618***
	(4.43)	(3.17)
Current skills	-1.689	-0.093
	(0.93)	(0.04)
Future skills	3.245***	4.089**
	(2.70)	(2.45)
Workplace	0.564	3.715
	(0.22)	(1.12)
Employer training centre	-1.757	0.355
	(0.65)	(0.10)
Private training centre	-3.996	1.504
	(1.52)	(0.42)
College	14.793***	14.362***
	(5.09)	(3.89)
Home	16.244***	29.720***
	(3.84)	(5.40)
Employer paid	-20.080***	-7.484*
	(6.42)	(1.73)
Self/family paid	-19.363***	-0.326
	(5.32)	(0.07)
Accredited	12.201***	13.541***
	(9.24)	(7.53)
Constant	23.653***	4.747
	(5.81)	(0.88)
Observations	2689	1628
R-squared	0.15	0.15

Table 4: Individual receipt of training

No. of trainees (N=3333)	Emp-paid	Self-paid	Other
All jobs at different employers	1269	127	425
Previous employers	152	12	60
Accredited training – all employers	629	109	283
Accredited training – previous employers	78	11	44
Non-acc. training – all employers	877	22	169
Non-acc. training – previous employers	88	1	20
Mean accumulated events	2.41	1.36	1.42
Mean accumulated intensity (days)	22.7	35.3	29.4

Table 5: The effect of training incidence and events on wages: fixed effects estimates

Variable	Mean	(1)	(2)	(3)	(4)
Dependent variable: ln (wage)	1.771				
Employer financed, current skills training – incidence and counts					
Current emp – incidence	0.327	0.0122	0.0240**		
		(0.97)	(2.28)		
Current emp – count	0.694	0.0079*		0.0104***	
		(1.70)		(2.69)	
Previous emp – incidence	0.028	0.1014**	0.0779***		
		(2.51)	(3.38)		
Previous emp – count	0.051	-0.0117		0.0243**	
		(0.65)		(2.41)	
Employer financed, current skills training, by accreditation status – counts					
Current emp– accredited	0.231				0.0191**
					(2.55)
Current emp– non accredited	0.463				0.0075*
					(1.66)
Previous emp– accredited	0.021				0.0529***
					(2.91)
Previous emp– non accredited	0.030				0.0115
					(0.94)
Self-financed, current skills training – incidence and counts					
Curr and prev emp – incidence	0.031	0.0168	0.0245		
		(0.35)	(0.80)		
Curr and prev emp - counts	0.040	0.0041		0.0148	0.0142
		(0.13)		(0.72)	(0.69)
Other training – incidence and counts					
Current emp – incidence	0.100	-0.0045	0.0227		
		(0.16)	(1.33)		
Current emp – counts	0.133	0.0221		0.0190*	0.0189*
		(1.27)		(1.77)	(1.76)
Previous emp – incidence	0.011	0.0754	0.0759**		
		(1.22)	(2.22)		
Previous emp – counts	0.016	0.0019		0.0408**	0.0396**
		(0.05)		(2.08)	(2.02)
Other characteristics					
Employer match 1	0.090	0.0202	0.0170	0.0295**	0.0287**
		(1.49)	(1.26)	(2.24)	(2.18)
Employer match 2	0.010	0.0537**	0.0470*	0.0660***	0.0646***
		(2.18)	(1.92)	(2.73)	(2.67)
Observations		7167	7167	7167	7167
Number of individuals		3333	3333	3333	3333
R-squared – within		0.16	0.15	0.15	0.15
R-squared – between		0.07	0.07	0.07	0.06
R-squared – overall		0.05	0.05	0.05	0.05

Notes: (1) *t*-statistics in parentheses (2) * Significant at 10%; ** significant at 5%; *** significant at 1%. (3) Other controls: experience and experience squared, tenure and tenure squared, local unemployment rate and dummies for charity sector, 1 digit industry, region, marital status, firm size, fixed and temporary contracts, trade union coverage, highest educational qualification, 1 digit occupation.

Table 6: The effect of training intensity (days) on wages: fixed effects estimates

Variable	Mean	(1)	(2)
Dependent variable: ln (wage)	1.771		
Employer financed, current skills training			
Current employer	6.48	0.0005***	
		(2.75)	
Previous employers	0.41	0.0012**	
		(2.34)	
Employer financed, current skills training, accreditation status			
Current emp– accredited	4.75		0.0005***
			(2.74)
Current emp– non accredited	1.72		0.0002
			(0.38)
Previous emp– accredited	0.31		0.0015***
			(2.70)
Previous emp– non accredited	0.10		-0.0028
			(1.21)
Self-financed, current skills training			
Curr and previous employers	1.02	0.0005	0.0005
		(1.10)	(1.10)
Other training			
Current employer	2.73	0.0001	0.0001
		(0.44)	(0.42)
Previous employers	0.52	0.0009*	0.0009*
		(1.94)	(1.88)
Other characteristics			
Employer match 1	0.09	0.0322***	0.0348***
		(2.64)	(2.83)
Employer match 2	0.01	0.0716***	0.0765***
		(3.15)	(3.33)
Observations		7167	7167
Number of individuals		3333	3333
R-squared – within		0.15	0.15
R-squared – between		0.06	0.06
R-squared – overall		0.05	0.05

Notes: (1) *t*-statistics in parentheses (2) * Significant at 10%; ** significant at 5%; *** significant at 1%. (3) Other controls: experience and experience squared, tenure and tenure squared, local unemployment rate and dummies for charity sector, 1 digit industry, region, marital status, firm size, fixed and temporary contracts, trade union coverage, highest educational qualification, 1 digit occupation.

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Appendix A.: Form of Training Questions in the BHPS, Waves 8-10

(Apart from the full-time education you have already told me about) Have you taken part in any other training schemes or courses at all since September 1st 1997 or completed a course of training which led to a qualification? Please include part-time college or university courses, evening classes, training provided by an employer either on or off the job, government training schemes, Open University courses, correspondence courses and work experience schemes.
EXCLUDE LEISURE COURSES
INCLUDE CONTINUING COURSES STARTED BEFORE SEPTEMBER 1st 1997

D69. How many training schemes or courses have you done since September 1st 1997, including any that are not finished yet?
EXCLUDE FULL-TIME COURSES ALREADY MENTIONED
WRITE IN NUMBER

I would like to ask some details about all of the training schemes or courses you have been on since September 1st last year, (other than those you have already told me about), starting with the most recent course or period of training even if that is not finished yet.

Where was the main place that this course or training took place? (Write in place.)

Was this course or training. . .
To **help** you get started in your current job?.....
To **increase** your skills in your current job for example by learning new technology?.....
To **improve** your skills in your current job?.....
To **prepare** you for a job or jobs you might do in the future?.....
To **develop** your skills generally?.....

Since September 1st last year how much time have you spent on this course or training in total?
Hours.....1
Days.....2
Weeks.....3
Months.....4
Other **(SPECIFY)**..5

Which statement or statements on this card describe how any fees were paid, either for the course or for examinations?
No fees.....01
Self/family.....02
Employer/future emp...03
New Deal scheme.....05
Training for work,
Youth/Emp training/
TEC.....06
Other arrangement **(SPECIFY)**

Was there a course or qualification designed to lead directly to a qualification, part of a qualification, or no qualification at al?

Did you actually get any qualification from this course or training since September 1st last year?
Please look at this card and tell me whether you obtained any of these qualifications from this course or training since September 1st last year. (LIST)

How many subjects did you get?

Table A.1
Combinations of reported training categories

Type of training					
Induction	Current skills	Future skills	Frequency	Proportion	Standard error
0	0	0	245	0.057	0.004
0	0	1	278	0.064	0.004
0	1	0	1405	0.325	0.007
0	1	1	1856	0.430	0.008
1	0	0	33	0.008	0.001
1	0	1	29	0.007	0.001
1	1	0	91	0.021	0.002
1	1	1	380	0.088	0.004
			4317		

Table A.2
Location of training by type

Type	Frequency	Workplace	Employer training centre	Private training centre	College	Home	Other
Induction	533	0.386	0.191	0.195	0.167	0.019	0.041
Current skills	3732	0.383	0.181	0.204	0.144	0.025	0.063
Future skills	2543	0.336	0.166	0.194	0.208	0.036	0.060

Table A.3
Financing of training by location

Location	Frequency	No fees	Employer paid	Self/family paid	Other payment
Workplace	1567	0.432	0.555	0.005	0.013
Employer training centre	745	0.348	0.643	0.005	0.005
Private training centre	856	0.091	0.818	0.056	0.042
College	745	0.094	0.486	0.340	0.103
Home	130	0.092	0.531	0.369	0.023
Other place	274	0.212	0.664	0.066	0.073

Table A.3 presents evidence that finance category ‘no fees’ tends to be reported for training locations where it is likely that training expenditure is not visible to employees. Thus, training reported in the first two rows takes place directly within the sphere of the employing organisation (either in the firm or at an employer training centre), whilst the remainder occurs in external locations. Abstracting from other factors which may be associated with how training at different locations is financed, the drop in the proportion of no fees reports (more than 25 percentage points) between the top two rows and the rest of the table is notable, as is the difference of 8 percentage points between workplace training

and that occurring at the employer's training centre. These raw data suggest that for most training events where no fees are reported the employer in fact pays. Also noteworthy in the table is that self financing of college and home-based training is very prevalent, characterising about 35% of events.

Table A.4
Financing of training by type

Type	Frequency	No fees	Employer paid	Self/family paid	Other payment
Induction	533	0.276	0.623	0.058	0.054
Current skills	3732	0.276	0.647	0.053	0.033
Future skills	2543	0.247	0.607	0.109	0.047

Restricting the analysis to college training events shows that of those which are self-financed, again in only 5% of cases is there a direct contribution by the employer (and some other contribution in 2% of cases). 7% of self-financed home training events were subsidised by the employer.

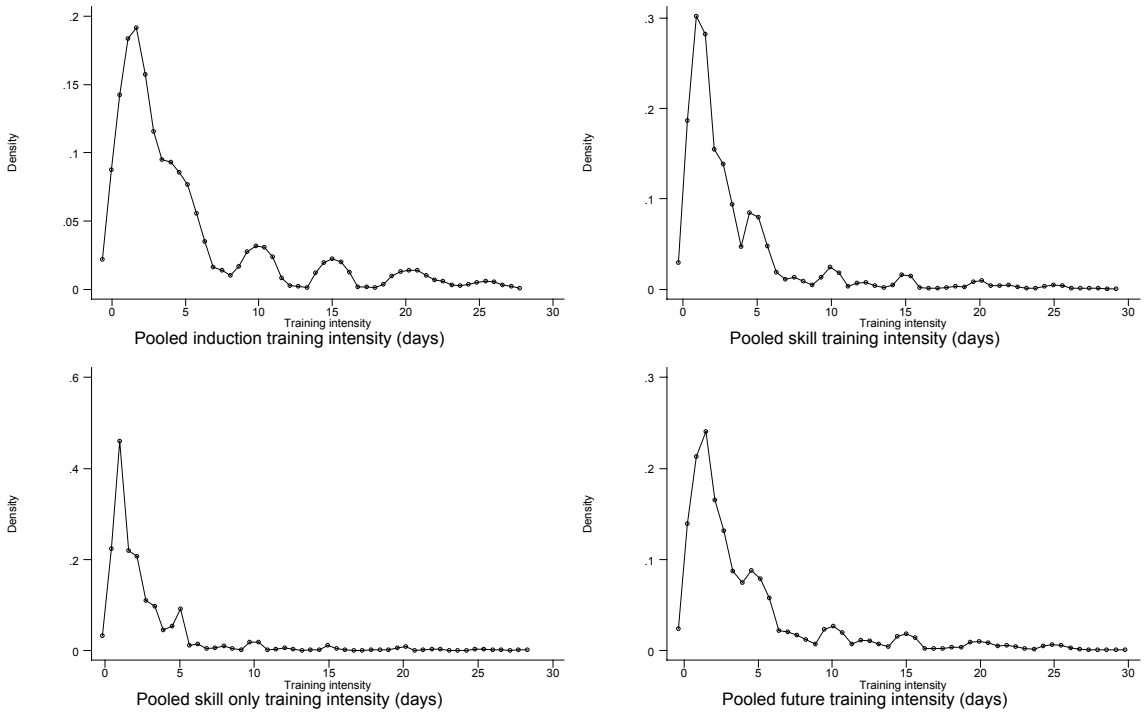
Table A.5
Combinations of finance methods

		Proportion of events also financed by:			
Finance method	Frequency	No fees	Employer paid	Self/family paid	Other payment
No fees	1154	1	0.0095	0	0
Employer paid	2662	0.0041	1	0.0049	0.0026
Self/family paid	379	0	0.0343	1	0.0211
Other payment	159	0	0.0440	0.0503	1

Table A.6
Finance methods by accreditation

Variable	Accredited training	Non-accredited training
No fees	0.158	0.346
Employer paid	0.618	0.616
Self/family paid	0.171	0.028
Other payment	0.025	0.012
Frequency	1811	2506

Figure 1
Distribution of training intensity



Although the distributions have similar shapes their means differ substantially, in particular the mean intensity is 16.1 days for induction training but only 9.4 days for skills training The percentiles reinforce the contrast: the respective medians are 4.0, 2.0 and 2.0 days and a quarter of all induction events last 15 days or longer compared to 5 days or longer for skills training (and only 3 days or longer for current skills only training). Furthermore 10% of induction events last more than 45 days. These results indicate that whilst induction training is a relatively infrequent event, it often involves a substantial investment on the part of firms and workers.

Appendix B
Definition of variables

Variable	Definition
Demographics:	
Married	Legally married or living in a couple as partners at interview date
Region of residence	Eleven regional dummy variables: East Midlands (base), Greater London, South East , South West, East Anglia, West Midlands, North West (incl. Manchester), Yorkshire and Humberside, North, Wales and Scotland
Education:	
No qualification (base)	Respondent does not report any academic qualification
O level/GCSE	Highest educational qualification is one or more "Ordinary"-level qualifications (later replaced by General Certificate of Secondary Education), taken at end of compulsory schooling at age 16
A level	Highest educational qualification is one or more "Advanced"-level qualifications, representing university entrance-level qualification, taken typically at age 18
Vocational qualification	Higher vocational qualifications (e.g., HNC, HND, teaching and nursing)
First degree	First (bachelors-level) university degree
Postgraduate degree	Higher university degree
Labour market history:	
Experience	Total experience since labour market entry (years)
Tenure	Time in current job (years)
Workplace size:	
Size1-24 (base)	Firm size: fewer than 25 employees at the establishment (base)
Size25-49	Firm size: 25-49 employees at the establishment
Size50-99	Firm size: 50-99 employees at the establishment
Size100-199	Firm size: 100-199 employees at the establishment
Size200-499	Firm size: 200-499 employees at the establishment
Size500-999	Firm size: 500-999 employees at the establishment
Size 1000 plus	Firm size: 1000 or more employees at the establishment
Occupation:	
Professional	Professional occupation (from the Standard Occupational Classification)
Managerial	Managerial occupation
Non-manual	Associate professional and technical occupations, clerical and sales occupations
Skilled manual	Craft and related, personal and protective service occupations, and plant and machine operatives.
Unskilled (base)	Other semi-skilled and unskilled occupations
Industry	Ten one-digit Standard Industrial Classification dummy variables: agriculture, forestry and fishing , energy, extraction, metal goods, other manufacturing, construction, distribution, hotels and catering, transports, banking and finance, other services. Base is other services.
Charity	Works in a non-profit organisation
Fixed-term contract	Job covered by a fixed-term contract
Temporary contract	Job is seasonal, agency, casual or other non-pemanent job
Trade union covered	Recognised trade union/staff association at workplace covering type of job
log (hourly wage)	= (usual gross pay per month) / [(usual standard weekly hours) + 1.5*(usual paid overtime weekly hours)] *(12/52)
Unemployment rate	Local unemployment rate. The geographic unit is 306 matched job centres and travel-to-work areas (source is National On-line Manpower Information Service)

Appendix C

Table C.1
Fixed-effect wage equation – coefficient estimates not reported in Table 5, column (3)

Variable	Mean	Coefficient	*t*-stat	Variable	Mean	Coefficient	*t*-stat
Experience (years)	16.86	0.1008***	3.86	Fixed-term contract	0.02	-0.0508*	1.66
Experience squared		-0.0009***	6.69	Temporary contract	0.01	-0.0698**	2.22
Tenure (years)	4.35	0.0002	0.10	Unemployment rate	0.04	-0.0606	0.18
Tenure squared		0.0001	0.78	Agric, forests, fishing	0.01	-0.1050**	2.13
O-level/GCSE	0.23	0.0718	1.62	Energy and water	0.02	-0.0531	1.30
A-level	0.16	0.0760*	1.73	Extraction, chemicals	0.05	0.0550*	1.93
Vocational qual	0.28	0.0864**	2.21	Metal goods	0.14	0.0051	0.23
First degree	0.11	0.2489***	4.05	Other manufacturing	0.13	-0.0127	0.56
Postgraduate degree	0.03	0.3034**	2.39	Construction	0.04	0.0288	0.95
Married/cohabiting	0.73	0.0021	0.13	Dist, hotels, catering	0.21	-0.0495**	2.55
Manager	0.19	0.1353***	5.50	Transports	0.08	-0.0738***	2.88
Professional	0.07	0.1074***	3.91	Banking & finance	0.20	0.0514***	2.61
Non-manual	0.35	0.1038***	4.47	London	0.09	0.0750	0.61
Skilled manual	0.34	0.0548**	2.52	South-East	0.21	-0.0051	0.05
Charity sector	0.04	-0.0133	0.43	South-West	0.09	-0.0734	0.65
Wave 9 dummy	0.33	-0.0223	0.82	East Anglia	0.05	-0.1332	0.81
Wave 10 dummy	0.34	-0.0625	1.21	West Midlands	0.09	-0.0914	0.73
Estab size 25-49	0.13	-0.0439***	3.55	North-West	0.11	-0.1750	1.41
Estab size 50-99	0.12	0.0134	0.93	Yorkshire	0.09	-0.1151	1.01
Estab size 100-199	0.12	0.0470***	3.23	North	0.06	-0.3682*	1.90
Estab size 200-499	0.15	0.0197	1.36	Wales	0.05	0.1782	1.21
Estab size 500-999	0.08	0.0335*	1.94	Scotland	0.07	0.1176	0.62
Estab size ≥1000	0.08	0.0649***	3.34	Constant		0.2974	0.71

Notes: * Significant at 10%; ** significant at 5%; *** significant at 1%.

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