THE INCIDENCE AND INTENSITY OF OFF-THE-JOB TRAINING

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Abstract

This paper examines the provision of training by employers and the receipt of training by employees, conditional on training provision. Together these two dimensions of training determine its overall distribution in the workforce. The factors which affect training provision and training receipt are considered simultaneously within an empirical model using data drawn primarily from the 2001 Employers Skill Survey. The results suggest high fixed costs but constant marginal costs of training provision, while also supporting many of the predictions regarding the relationship between training and workforce skills, skill-shortages, workplace and local labour market characteristics.

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1. Introduction and background

Britain's poor economic performance when compared with her major industrialised competitors is frequently attributed to poor skills - particularly low levels of intermediate and vocational skills - amongst the workforce. An important way in which this skills deficit can be addressed is through the provision of greater workplace education and training. This need for more training is exacerbated in the technologically-dynamic age at the beginning of the 21st Century which renders many of the skills learned during full-time education quickly obsolete. Consequently, the 'front-end' model of skills acquisition is becoming largely redundant and lifelong learning strategies are being recognised as increasingly important. Workforce training is also a crucial ingredient of labour market policies designed to increase individuals' employability and earnings.[1] Many commentators attribute one of the main causal influences of the sharp rise in inequality in the last two decades to an increased demand for skills. Thus, increasing the provision of training to enhance skills, particularly at the lower end of the skills spectrum, may also be an effective way of reducing wage inequality and other aspects of social disadvantage and exclusion. However, despite its evidently increasing importance, the provision of training has increased only very marginally in recent years.[2] These considerations indicate the importance of improving training provision, and a need for a greater understanding of what factors influence the distribution of training.

Workplace training provision in Britain is determined largely by employers, who also bear much of the costs of training (Felstead *et al*, 2002). The distribution of training is therefore essentially determined by employers' (derived) demand for the additional skills and attributes (that they perceive) it engenders in their employees. However, even where training is being provided by an employer, not all employees will be invited or able or willing to participate. Thus, an individual's receipt of training is conditional on a two-stage process. First, their employer has to provide some training. Second, the individual needs to be offered and to be able to participate in

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[1] Keep *et al* (2003?) provide a comprehensive review of the evidence on the return to employers of investment in training and suggest that the evidence base, at least for the UK, is rather thin. However, Dearden *et al* (2000) do provide some strong evidence of the importance of training for enhancing productivity in a panel of British industries. There is also the large literature which documents the impact of training on earnings, which can be interpreted as providing indirect evidence of its importance for individuals' productivity – see, *inter alia*, Blundell *et al* (1996) and Green *et al* (1996). See also Blundell *et al* (1999) and Machin and Vignoles (2001) for excellent reviews of the issues and evidence.

[2] The LFS reveals that the proportion of employees receiving training rose steadily through the 1980s but has been fairly constant since the mid-1990s. However, additional evidence suggests that while training participation may be constant, the duration of training spells is falling, so that the 'volume' of training may actually be in decline (Felstead *et al*, 1997). In fact, training provision in Britain is actually quite high by international standards, but much of it is of low level - for example, concerned with induction or health and safety - rather than directed towards productivity enhancing activities (Felstead *et al*, 1997).

the training that the employer is providing. Previous studies of the determinants of training have focussed on either employers' provision of training or on individuals' receipt of training, rather than recognising that the former is a necessary but not sufficient condition for the latter. The modelling framework utilised in this paper explicitly brings these two aspects together for the first time and investigates the distribution of training in the labour market which this two-stage process produces.

Employers' provision of training derives from the business and product market conditions facing the establishment, and the current skills of the workforce and those available in the labour market from which the firm recruits its new workers. Much of the extant research evidence confirms the predictions of human capital theory as a framework for understanding the determinants of training. Thus, for example, the amount of training that individuals receive is positively related to their qualifications such that the better qualified receive more training in general (see, for example, Green, 1993; Veum, 1995; National Skills Task Force, 2000; Booth, 1991, 1993).[3]

One rather neglected but extremely notable difference in both training provision by employers and training receipt by employees is that small firms provide significantly lower levels of training than larger businesses. This is a universal finding in all the studies cited above, and is apparent in other countries too. This divergence in access to training for workers in small businesses is of increasing concern given the pace of change and technological development. One potential explanation is that there are economies of scale in training provision that only larger firms can exploit. If there are indeed high fixed costs of training provision which are sufficient to deter the smaller enterprises from providing any training for their employees, then there would appear to be a role for policy makers to meet this need by the provision of appropriate training activities. One objective of this paper is to unravel the training-provision firm size relationship in order to throw light on this particular issue.

Of course, there are a number of factors other than the employment of more highly qualified personnel and workplace size that might be expected to influence the amount of training activity at any establishment. These include other establishment characteristics such as growth, ownership, product strategy, industrial sector as well as the extent of any current skill shortages and the ability of the firm to recruit new workers with the requisite skills. This may depend in particular on the local labour market. Thus, in order to explain the resulting distribution of training, a multivariate analysis is required which accounts for the various factors affecting employer training provision and employee training receipt.

The remainder of the paper is structured as follows. Section 2 briefly describes the ESS2001 data and the other sources used in the investigation. Section 3 documents the evidence on training provision and receipt in the ESS2001. Section 4 describes

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[3] There were a number of studies in the 1980s and early 1990s which highlighted gender discrimination in training access (eg Green, 1991; 1993), but attention has rather changed focus now that the raw gap in training receipt between men and women appears to have closed. Indeed, according to the LFS, women are nowadays more likely to receive both on-the-job and off-the-job training than men. More recently, greater attention has been paid to ethnic differences in training receipt (Shields and Wheatley Price, 1999a; 1999b).

the modelling strategy while Section 5 reports the empirical results. Finally section 6 concludes.

2. Data and definitions

The ESS2001 data set
The Employers Skill Survey 2001 (ESS2001) is a telephone survey of approximately 27,000 establishments in England which was conducted during the first quarter of 2001. Information on a wide range of establishment and firm characteristics was collected, including details of the extent of any training activity at the establishment - see Hogarth *et al* (2001) for further details. A major advantage of the ESS2001 survey for the analysis of training provision and receipt is that, unlike many other establishment-level surveys such as WIRS/WERS, the sample included the smallest establishments. Establishments employing fewer than 5 persons comprise more than 70% of all establishments (although only account for around 11% of employment), and these are typically omitted from surveys of this kind partly because of the difficulty of successfully deriving a representative sample of such establishments. At the other end of the scale, establishments employing 500 or more persons account for less than 0.2% of all establishments but for over 15% of employment. As is typical in establishment-based surveys, these larger establishments were over-sampled relative to their distribution in the population in order to more accurately capture the characteristics of the relatively large proportion of employment located in these establishments.

Definitions of training activity
Questions regarding training activity in ESS2001 were focussed on off-the-job training (hereafter OJT) activity only. This is defined as training away from the immediate work position, given at the employer's premises or elsewhere. ESS2001 identifies not only the incidence of OJT activity but also its intensity. Thus, employer provision of training and the number of employees in receipt of training are both recorded. Respondents were first asked if the establishment had funded any OJT for their employees over the last 12 months (or since starting operations):

> *Have you funded or arranged any off-the-job training for any of your employees over the past 12 months?*

For those who answered positively to the above query, respondents were subsequently asked about the intensity of training (in terms of the proportion of employees receiving OJT):[4]

> *For how many of your employees has this establishment funded or arranged training over the past 12 months?*

The focus on off-the-job training only is not necessarily a weakness of the analysis. Typically, such training will be more formalised than on-the-job training which can be

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[4] They were also asked about the types of training undertaken and if any of the training was provided by a third party supplier. However, the present analysis focuses solely upon the incidence and intensity of OJT activity.

extremely informal and range from simple learning-by-doing through to formal instruction by more senior colleagues which takes place at the immediate work position. While off-the-job training will also undoubtedly encompass a range of activities, that it takes place away from the usual work position implies that it has at least some real opportunity cost (in terms of the time taken for training). In addition, evidence from the Learning and Training at Work 2000 survey (LTW2000 – see Spilsbury, 2001, for details) reveals that more than 75% of employers who provided off-the-job training also provided some on-the-job training for their employees. In contrast, less than half of employers which provided on-the-job training also provided off-the-job training. Finally, the LFS reveals that more individuals receive off-the-job training than on-the-job training. Thus, the provision of off-the-job training is arguably more generic of training provision in general than is on-the-job training.[5]

The ESS2001 data are supplemented by a range of spatial indicators in order that the impact of the local labour market conditions on the provision and distribution of training can be assessed. Local labour markets are defined at the local Learning and Skills Council (LLSC) level.[6] These additional local labour market indicators include information on employment structure, employment growth, pay and unemployment and are derived from data taken from Annual Business Inquiry (ABI), New Earnings Survey (NES) and the LFS for the appropriate period. Details of these variables are provided in section 4.

3. Training incidence and training intensity: descriptive statistics

The first task is to document the evidence from ESS2001 on both the incidence and intensity of OJT activity. To investigate the conditions under which OJT activity takes place (i.e. training incidence), then an establishment-based approach is relevant since this is the location where workplace training is typically decided upon. However, in order to investigate how many individuals are actually engaged in training (i.e. training intensity), then the appropriate aggregation is by employment. Given that we are interested in both the incidence and intensity of training provision, and their joint impact on the resulting distribution of training, both establishment and employment weighted statistics are presented below.[7]

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[5] LTW2000 (Spilsbury, 2001) reveals the following distribution of on-the-job and off-the-job training:

% of employers offering:		OFF-the-job training		
	%	Yes	No	
ON-the-job	Yes	31	35	66
training	No	10	24	34
		41	59	100

[6] The 47 LLSCs are the local arms of the Learning and Skills Council (LSC) which was established in April 2001 to oversee the provision of all post-16 education and training in England with the exception of the higher education sector.

[7] Variable sampling fractions across regions, industrial sector and establishment size were used in the ESS2001 sampling frame and weights were subsequently constructed so that the achieved sample can be grossed-up to be representative of the population of just over 2 million establishments employing just over 20 million

OJT Incidence

The first column of Table 1 reports the proportion of establishments which provided any OJT in the previous 12 months, disaggregated by establishment size (Panel A) and broad sector (Panel B). Panel A reveals that nearly four in ten of all establishments provided some OJT in the last year. However, the incidence of OJT increases sharply with establishment size, such that only around one quarter of the smallest (1-4 employees) establishments provided any training as compared to over 95% of the largest (500+ employees) establishments. The second column of Table 1 presents the size distribution of establishments – most establishments are very small as noted above with over 80% employing fewer than 10 workers. Panel B presents the same information disaggregated by broad sector. Private sector establishments are rather less likely to offer OJT than those in the public and voluntary sectors, partly because of their (average) smaller size.

OJT Intensity

Table 1 also reports OJT intensity as measured by the proportion of employees undertaking some training in the previous 12 months, and also OJT intensity in those establishments where some OJT took place (conditional intensity).[8] Panel A shows that almost 40% of all employees received some OJT in the last year. The distribution by establishment size again reflects the tendency for larger establishments to be engaged in more training, since only around one in five of all workers in the smallest (1-4 employees) establishments received training as compared to almost three in five within the largest (500+ employees) establishments. Amongst those establishments offering some training, only just over half (51.8%) of workers in these establishments received some training. That is, even in the establishments where some OJT training took place in the previous 12 months, nearly half of all workers received no training in the period.

While the unconditional training intensity increases monotonically with size, in contrast, the conditional training intensity in the largest establishments is actually lower than in the smallest establishments[9], and is much less variable around the mean. It would appear that once some OJT provision has been made at the establishment, approximately half of all employees receive some of this training irrespective of establishment size. One interpretation of these findings is that, at least in the raw data, there are fixed costs in training provision, but no evidence of decreasing marginal costs in training additional employees, conditional on some training provision.

As shown in Panel B, some 35% of private sector employees received some training in the last year while, in contrast, over half of public sector workers received some OJT. Undoubtedly, this difference is partly a consequence of a greater tendency for public sector establishments to be engaged in some training, but is also a reflection

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workers. The weights ensure that the resulting estimates will be representative of the population – of employment or of establishments – in England as a whole.

[8] While OJT intensity was recorded as a series of banded measures in the ESS2001 survey (1-9%, 10-19%, etc), the data have been converted to a continuous measure using the mid-points for each band.

[9] This may be partly explained by the obvious indivisibilities in small establishments.

of the fact that, even when training is available, training in private sector establishments is undertaken by a lower proportion of employees (48%) than in public sector establishments (60%).

While we have demonstrated that factors such as establishment size and broad sector may influence the incidence and intensity of OJT, clearly other factors are important for the provision and receipt of training too. For example, establishments in areas dominated by rapidly expanding industries may face particular problems in obtaining sufficient numbers of appropriately skilled staff, and thus may need to engage in further training activities. Similarly, in geographically concentrated industries, there may be a ready supply of suitably skilled and experienced labour, but the firm may be more vulnerable to poaching of its staff by other similar employers in the same local area. All of these factors, and others, may impact upon the probability of establishments undertaking any training and, if they do so, how extensive this training is amongst the workforce. The following section therefore outlines a reduced-form empirical modelling strategy for examining the determinants of both the incidence and intensity of training, and thus the resulting distribution of training in the labour force.[10]

4.   Modelling strategy

As shown above, many establishments indicate that they did not do any OJT. In addition, OJT intensity can only be non-negative. Thus, the estimation procedure cannot be simple linear regression. An appropriate specification which takes account of the clustering of a large proportion of observations at zero, together with only positive values at the non-zero observations is the Tobit model.[11] However, the findings reported above indicate that the probability of an establishment having any OJT (OJT incidence) increases strongly with size, while the conditional intensity of OJT is fairly constant across all size categories, and in fact is lower for the largest size category than for the smallest. This pattern cannot be accommodated by the simple Tobit specification, which restricts the influence of any variable on both the probability of a non-zero observation, and on its magnitude if non-zero, to be the *same* sign. There may be other variables which also potentially have differential influences on the incidence and conditional intensity of OJT. Two sets of coefficients are therefore needed.

An appropriate specification which does allow for the kinds of differential effects is the modification of the Tobit model first suggested by Cragg (1971).[12] This is a two equation model, defined as:

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[10] It is reduced form in the sense that it reflects both the demand and supply of training.

[11] For a discussion and some examples, see, for example, Amemiya (1986) and Greene (2000). Green *et al* (1999) use a Tobit specification to model the intensity of training in the establishment-level Employers' Manpower and Skills Practices Survey (EMSPS) and also for individual data on training hours in LFS data.

[12] The classical example in the literature, due to Lin and Schmidt (1984), is the 'loss due to fire' as a function of the 'age of the building'. Newer buildings typically have a lower probability of having fires, but have a greater average loss when a fire does occur. Such a modelling structure is similar to the hurdle model specification

$$P(OJT_i > 0) = \Phi(X_i\beta_1) \qquad (1)$$

$$E(OJT_i \mid OJT_i > 0) = X_i\beta_2 \qquad (2)$$

The first equation represents the probability of establishment i undertaking any OJT. Given the nature of the dependent variable (either 1 or 0), this is estimated using a probit model which takes into account the dichotomous nature of the dependent variable (Φ is the CDF (cumulative density function, or distribution function) of the standard normal distribution). The second equation specifies a model for the conditional intensity of OJT (conditional on undertaking some OJT). This is estimated using a truncated regression model given that only positive observations on OJT are observed.[13] The dependence between the two equations is captured via the covariates, although could also be allowed to act through the stochastic components within a bivariate process (Morissette and Zhang, 2001). If $\beta_1 = \beta_2$ then the model becomes the simple Tobit model. As noted above, given the differential impact of establishment size on training incidence and on conditional training intensity, this restriction is not expected to hold (but can in any event be explicitly tested).[14]

The primary interest is in the relative importance of the various determinants of the incidence and intensity of OJT. The marginal or partial effects for the regressors for both the probit and truncated regression results are therefore reported. For the probit specification, these are the magnitude of the impact of the regressor on the probability of an establishment reporting any OJT. For dummy variables, since there cannot be marginal change in, say, being in the private sector, the change in the probability for a discrete change in the dummy variable from 0 to 1 is reported. In the truncated regression, the marginal effects record the proportionate impact on the conditional intensity of OJT activity.

Finally, in order to measure the overall impact of any particular variable X on the intensity of OJT, it is necessary to combine its impact on whether there is any OJT activity, together with its impact on the intensity conditional on there being some OJT. Differentiation yields:

$$\frac{\partial OJT}{\partial X} = \frac{\partial(P(OJT > 0) \times E(OJT \mid OJT > 0))}{\partial X} \qquad (3)$$

$$= \beta_1\phi(X_i\beta_1) \times E(OJT \mid OJT > 0) + \beta_2(1 - \lambda^2 + \alpha\lambda) \times P(OJT > 0)$$

(Mullahy, 1986) as utilised by Arulampalam and Booth (1997, 2001) in their examination of individuals' receipt of multiple training events using the NCDS data.

[13] In fact, we model training intensity as log(1+number of trainees) – this transformation reduces the considerable skewness in training intensity while also preserving the continuity of the intensity measure so that the Tobit specification is nested in equations (1) and (2).

[14] Note that this approach differs from the standard selectivity model or Tobit II model in the Amemiya (1984) classification in that here we are concerned with explicitly modelling the zero training outcomes, rather than the issue of selectivity. The concept of a positive potential training intensity in establishments which do not provide any training is not sensible. Melenberg and van Soest (1996) make the same point in their modelling of vacation expenditures.

where ϕ is the standard normal density function, $\lambda = \phi/\Phi$ is the familiar inverse Mills ratio and $\alpha = -\beta_2 X_2/\sigma$ (Greene, 2000). These overall marginal effects are also reported in the results in the following section.

5.   The determinants of OJT

There are a large number of potential factors that may contribute to differences between establishments in the incidence and/or intensity of their OJT. No attempt is made to differentiate between those factors which may determine only the incidence from those that may determine the conditional intensity. Instead a common vector of variables is used for both the probit part and the truncated regression part of the empirical model described in section 4. A brief description and summary statistics for the variables used in the empirical specification is presented in Table A1.

Establishment and firm characteristics: Specification (A) includes a number of controls for establishment and firm characteristics. Establishment size is included in logarithmic form (*log establishment size*) which facilitates the interpretation of the coefficient as well as ameliorating some of the extreme skewness in this variable.[15] Given the statistics presented in Table 1, the incidence of OJT is expected to increase with size. Similarly, given that training intensity is measured as the (log) number of trainees, conditional intensity is also expected to increase with size. A unit coefficient on log size in the conditional intensity equation would thus indicate proportionate increases in training intensity with increasing establishment size, which would be consistent with constant marginal (and average) training costs.

A number of other characteristics of the establishment which may influence the propensity of the employer to provide training are also incorporated. These include the private/public status of the establishment (*private sector*). The descriptive statistics presented in Table 1 suggest that the public (and voluntary) sector do more training than the private sector. The expected sign on this coefficient is therefore negative. A dummy variable is also included for whether the firm is wholly or party foreign owned (*foreign owned*). While this is relatively small proportion of establishments in the population, it seems possible that training strategies may well differ for such firms. A dummy variable is also included to indicate whether or not the establishment is a single- or multiple-establishment organisation (*single*). In multi-establishment organisations, there may be a greater probability of having formal HRM arrangements which may be associated with greater OJT activity. Such organisations also have the potential to share the fixed costs of any training provision across the establishments. A control for whether the establishment is the head office of the organisation is also included (*head office*) to reflect any differences in the nature of employment in such establishments.

Indicators are also included for whether total sales (for private sector enterprises) or budgets (for non-private sector establishments) have increased or decreased 'a great

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[15] However, the size and significance of the other estimated coefficients are not sensitive to this choice of functional form for the training-size relationship, and we also experimented with using a semi-parametric specification based on grouped/banded measures of establishment size (results available from the authors on request).

deal' in the past 12 months, in order to capture any expansionary or contractionary effects on training activity (*increase in sales* and *decrease in sales*). Related to this are controls for the establishments' underlying hiring and quit rates. The hiring rate and quit rate (*hire rate* and *quit rate*) are measured as the proportions of the current workforce at the establishment who have been taken on or left in the preceding 12 months respectively. Whether or not the establishment has particular recruitment problems or any notable skill-shortages is indicated by these hiring and quit rates and also the *vacancy rate* measured as the proportion of jobs at the establishment which remain unfilled at the survey date.

ESS2001 respondents were also asked about the most common level of qualification amongst each of the nine SOC2000 major occupational groups. By combining this information with data on the numbers employed in each occupational group, an overall indicator of the qualifications of the workforce at the establishment can be constructed. The establishment *qualification score* is based on assigning a value of 4 if the most typical qualification was NVQ level 4+ (or equivalent), 3 for NVQ level 3 (or equivalent), etc. for each occupational group, and then weighting the scores according to the occupational composition of the establishment. Higher values of the qualification score index thus denote a more qualified workforce which, based on previous research, are more likely to receive OJT.

Local labour market characteristics: Specification (B) additionally includes a number of local labour market characteristics that are likely to impinge on the propensity of employers to provide OJT. These local area characteristics are all defined at the LLSC level. A measure of industrial structure captures the supply of labour to the establishment in the locality. This is defined as the proportion of the local labour force which is currently employed in the (1-digit) industry in which the establishment is engaged (*industry employment*; source: ABI). The greater is the local supply of labour with the appropriate sector-specific skills, the less necessary it may be to provide training. However, high sectoral concentration also implies greater demand for these workers. The net balance of these two opposing effects is thus an empirical manner.

The sectoral concentration of employment in the locality is obviously only one of a number of industry characteristics that may affect the incidence and intensity of training. In addition, the proportionate rate of growth of the locally employed labour force over the last two years is included (*employment growth*; source: ABI). High rates of growth in employment may mean a relative shortage of (skilled) labour to fill any vacancies and a greater need for training incumbents. However, it may also signal to workers currently outside the locality that the area has good employment prospects, and hence they may be more tempted to migrate/commute to the area for work. Again, the net balance of these two effects is uncertain.

A further variable introduced to capture the characteristics of the local labour force and their likely impact on training is a measure of local relative wages. The occupational relative wages in the area (for SOC2000 major group categories, relative to the average for England) are computed, and then averaged, with weights given by the shares of each of the occupations in the local labour force (sources: NES for wages and LFS for occupation shares). Thus, rather than simply taking the average wage for all workers in the local area, this derivation captures the extent to

which the area has high or low wages relative to the occupational composition of its local labour force. This will be important if the occupational distribution of employment is not spatially uniform.[16] We also include a measure of overall labour market tightness. This is the (ILO-definition) unemployment rate for all those aged 16 or over for the local area (*log unemployment rate*; source: LFS). Where unemployment is higher, this may indicate a readily available supply of labour to the firm, but it could also equally indicate greater numbers of poorly skilled individuals amongst the local labour force. Finally, specification (B) also includes indicators of the skills of the local labour force. In particular, the proportion which has no qualifications (*low skills*) and the proportion with qualifications at NVQ level 4 (or equivalent) or above (*high skills*) are used to capture the skills profile of the local labour force (source: LFS).

Specification (C) extends the empirical model to include a set of 14 industry dummy variables to capture any remaining industry-specific effects, including the identification of industries in long term growth or decline.

5.1 Results

The main econometric results are presented in Table 2. For the three empirical specifications, first the estimates of the probit equation (1) for the incidence of any OJT are presented, followed by the truncated regression results for OJT intensity, conditional on there being some OJT at the establishment as in equation (2). For both probit and truncated regression results, the marginal effects are reported in the table. The net/joint marginal effects for changes in the independent variables on overall OJT intensity as defined in equation (3) are reported in Table 3. Given that training intensity is measured as log trainee numbers, these marginal effects are in log points or, equivalently, proportionate changes.

Establishment and firm characteristics: The impact of increasing establishment size on the incidence of training is positive and significant as expected. Moreover, the impact of size on conditional training intensity has an elasticity close to one. This suggests a proportionate relationship between the number of trainees and establishment employment, conditional on some training provision. This confirms the pattern in Table 1 which showed approximately constant conditional intensity across the range of establishment size.

If the establishment is in the private sector, this has a significant negative impact on both the incidence and intensity of OJT as shown in Table 2. The overall marginal effect is therefore negative as shown in Table 3. Foreign or joint foreign/UK owned establishments are 5 to 6% more likely to engage in some training activity, and are also more likely to train more of their employees than UK owned establishments if they have training programme in place, *ceteris paribus*. Being a head office does not impact in the likelihood of any training being available, but if it is, around 18 to 20% fewer employees receive training than in other types of establishment. The same

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[16] For example, London has high average wages partly because of its occupational composition. However, the important question is whether wages are high *given* its occupational distribution.

finding applies if the establishment is a single site establishment, although such firms are also 7 to 9% less likely to offer any training at all.

As would perhaps be anticipated, establishments which have increased their scale of operation in the last 12 months and/or have high hiring rates are significantly more likely to have some training. However, they do not appear to significantly increase the overall intensity of training that is taking place. Similarly, in establishments which have vacancies, employers tend to engage in more training, and significantly increase the intensity of training. This may reflect changing responsibilities of the incumbents to cover the jobs unfilled. As expected, and confirming all previous studies, more qualified workforces are more likely to receive OJT – and where training is provided, the intensity is significantly greater amongst the more qualified workforces.

Local labour market characteristics: Specifications (B) and (C) reveal that the impact of local labour market conditions on training incidence and training intensity is weak in general. The coefficients on the establishment and firm variables are robust to the inclusion of these additional variables and, once account is taken of the sectoral differences in training, local labour market characteristics do not appear to significantly influence either training incidence or training intensity. There are some significant differences in training incidence and intensity by industry. Manufacturing and transport and communication industries are significantly less likely to have engaged in any OJT over the past 12 months. They also train fewer employees where training does occur. In contrast, industries in the non-marketed service sector, such as public administration and education, are significantly more likely to undertake some training and, when they do so, to undertake it more intensively. These patterns are consistent with the broad sectoral analysis of the raw data in Table 1.

6   Conclusions

In England as a whole, 37% of establishments provided some OJT for at least some of their employees in the 12 months prior to the ESS2001 survey in Spring 2001. In aggregate, these establishments employed 77% of all employees, and thus tended to be the larger establishments in general. However, many of these employees received no training. In aggregate, it is estimated that 39% of employees received some OJT in the 12 months prior to the survey date, representing just over one half of all employees in the subset of establishments where some training was taking place. Thus training provision is far from being universal, and even where employers provide training, it is not evenly distributed to all employees.

The multivariate analysis reveals that larger establishments are more likely to have some training provision, but that conditional training intensity, as a proportion of the workforce, is fairly constant across different sized establishments. This is consistent with high fixed costs but constant marginal costs of employer training provision. Private sector, single-establishment enterprises with few vacancies and a poorly qualified workforce are least likely to engage in any training, and even if training is taking place, fewer individuals will be asked to participate in such establishments.

Finally, the impact of local labour market conditions on training activity is fairly limited.[17]

The key issues that this paper has addressed are the provision of training by employers and the receipt of training by employees, conditional on its provision. Together, these two dimensions of training produce its distribution in the workforce as a whole. It is important to consider these two aspects together because the individual receipt of workplace training is conditional on employer provision of training. Previous studies typically fail to account for this important conditioning factor when investigating the determinants of individual training receipt (or rather it is subsumed in their modelling strategy). One important consequence of separately identifying these two aspects of training is that we have shown that, conditional on some training provision, smaller enterprises are just as intensive in training as larger ones. Thus the lower training activity witnessed in small businesses is a consequence entirely of low training incidence rather than low (conditional) training intensity. Meeting the fixed costs of training provision for small businesses (for example, by providing local learning and training centres) may therefore be a cost-effective way of significantly increasing training across the workforce.

Improving workplace training provision is important for individuals' skills, for corporate success and also for the wider economy. The analysis in this paper reveals the characteristics and factors which can lead to low levels of training provision and receipt. These can be used as signalling possible areas for focussing future training policy initiatives.

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[17] This may be a cyclical phenomenon given that the survey took place at in a period of tight (and tightening) labour markets, or it may be due to greater labour market flexibility than pre-supposed, or to employers adjusting their production strategies to accommodate the nature of the local labour market. It is not possible to distinguish between competing explanations such as these with establishment-level cross-section data like the ESS2001.

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Table 1

Incidence and intensity of OJT by establishment size and sector

percentage:	of establishments[1]		of employment[1]		
Panel A: by Size	Incidence[2]	Pop. %[3]	Intensity[4]	Conditional intensity[5]	Pop. %[6]
1-4	26.2	72.0	19.1	67.3	10.8
5-9	52.5	11.1	27.0	51.1	7.2
10-24	66.5	9.9	31.4	46.4	15.1
25-49	79.0	3.7	36.9	46.5	12.5
50-99	85.9	2.0	39.2	45.7	13.2
100-199	89.7	0.8	45.2	50.5	10.0
200-499	90.7	0.5	48.8	54.1	15.7
500+	95.8	0.1	57.5	60.2	15.5
Total	37.1	100.0	39.2	51.8	100.0
Panel B: by Sector	Incidence	Pop. %	Intensity	Conditional intensity	Pop. %
Private sector	34.0	85.7	35.0	48.5	71.8
Public sector	58.4	8.8	51.4	59.5	24.5
Voluntary sector	54.9	4.7	47.7	58.0	3.0
Total	37.1	100.0	39.2	51.8	100.0

Source: ESS2001

Notes:
1. Establishment and employment weighted respectively.
2. Percentage of establishments which funded any OJT during the previous 12 months.
3. Percentage of all establishments in the size/sector category.
4. Percentage of employees receiving any OJT during the previous 12 months.
5. Percentage of employees receiving any OJT during the previous 12 months in establishments with some OJT.
6. Percentage of all employment in the size/sector category.

Table 2

Determinants of OJT incidence and intensity

	OJT incidence			OJT intensity		
Specification:	(A)	(B)	(C)	(A)	(B)	(C)
establishment and firm characteristics:						
log establishment size	0.128***	0.130***	0.128***	0.961***	0.968***	0.972***
	(0.002)	(0.002)	(0.003)	(0.006)	(0.006)	(0.006)
private sector$	-0.067***	-0.065***	-0.018**	-0.278***	-0.251***	-0.083***
	(0.007)	(0.008)	(0.009)	(0.017)	(0.018)	(0.021)
foreign owned$	0.046***	0.053***	0.057***	0.065**	0.075***	0.121***
	(0.012)	(0.012)	(0.012)	(0.025)	(0.025)	(0.026)
single$	-0.073***	-0.073***	-0.091***	-0.175***	-0.174***	-0.186***
	(0.007)	(0.007)	(0.008)	(0.017)	(0.017)	(0.017)
increase in sales$	0.048***	0.049***	0.051***	0.032	0.036*	0.041**
	(0.008)	(0.008)	(0.008)	(0.021)	(0.021)	(0.021)
decrease in sales$	-0.019	-0.019	-0.016	-0.125**	-0.113**	-0.065
	(0.017)	(0.017)	(0.017)	(0.050)	(0.050)	(0.049)
hire rate	0.019**	0.018*	0.023**	0.025	0.023	0.012
	(0.009)	(0.009)	(0.009)	(0.027)	(0.027)	(0.027)
quit rate	-0.019*	-0.019*	-0.015	-0.019	-0.027	-0.009
	(0.010)	(0.010)	(0.010)	(0.029)	(0.029)	(0.028)
head office$	-0.001	0.001	-0.012	-0.193***	-0.189***	-0.187***
	(0.010)	(0.010)	(0.011)	(0.021)	(0.021)	(0.021)
vacancy rate	0.103**	0.103**	0.099**	0.576***	0.511***	0.441***
	(0.041)	(0.041)	(0.041)	(0.124)	(0.125)	(0.125)
qualification score	0.077***	0.079***	0.067***	0.120***	0.118***	0.068***
	(0.003)	(0.003)	(0.003)	(0.008)	(0.008)	(0.008)
local labour market characteristics:						
industry employment		-0.122**	0.094		-0.954***	-0.001
		(0.048)	(0.086)		(0.120)	(0.202)
employment growth		-0.139*	-0.124		-0.131	-0.060
		(0.078)	(0.078)		(0.192)	(0.189)
weighted relative wage		-0.085**	-0.069*		0.120	0.089
		(0.040)	(0.040)		(0.097)	(0.096)
log unemployment rate		-0.029**	-0.028**		0.022	0.008
		(0.013)	(0.013)		(0.030)	(0.030)
low skill share		-0.146	-0.148		-0.803*	-0.572
		(0.169)	(0.169)		(0.413)	(0.407)
high skill share		-0.086	-0.111		-0.213	-0.177
		(0.124)	(0.125)		(0.301)	(0.296)
14 industry dummies$	NO	NO	YES	NO	NO	YES
Observations	25282	25282	25282	17374	17374	17374
Pseudo R-squared	0.1763	0.1785	0.1897			
Log likelihood	-12938	-12905	-12728	-21116	-21078	-20811

Notes:

1. OJT incidence is estimated using a probit model; OJT intensity is measured as (log) trainee numbers and is modelled using a truncated regression model for the subsample of establishments with some OJT training.
2. $ denotes dummy variables.
3. Heteroskedastic consistent standard errors in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%.
4. The reported coefficients are the marginal effects on training incidence and training intensity amongst employees in the subset of establishments with some training provision. For dummy variables, the discrete change in the probability of OJT incidence is reported – see text for details.
5. All three specifications strongly reject the restrictions implied by the Tobit model – see text for details.

Table 3

Net marginal effects

	Net marginal effects		
Specification:	(A)	(B)	(C)
establishment and firm characteristics:			
log establishment size	1.015	1.026	1.028
private sector$	-0.373	-0.348	-0.106
foreign owned$	0.167	0.191	0.237
single$	-0.315	-0.313	-0.370
increase in sales$	0.148	0.152	0.162
decrease in sales$	-0.139	-0.128	-0.087
hire rate	0.066	0.064	0.068
quit rate	-0.063	-0.068	-0.045
head office$	-0.139	-0.130	-0.166
vacancy rate	0.675	0.630	0.574
qualification score	0.285	0.290	0.223
local labour market characteristics:			
industry employment		-0.993	0.244
employment growth		-0.456	-0.367
weighted relative wage		-0.138	-0.118
log unemployment rate		-0.060	-0.066
low skill share		-0.951	-0.796
high skill share		-0.376	-0.417
14 industry dummies$	NO	NO	YES

Note: Net marginal effects derived from equation (3) – see text for details.

APPENDIX

Table A1: Variable descriptions and (weighted) summary statistics

Variable	Description	Mean	SD
dependent variables:			
training incidence$	any OJT at the establishment in previous 12 months	0.371	0.483
training intensity	proportion of employees receiving any OJT in previous 12 months	0.392	0.383
conditional intensity	proportion of employees receiving any OJT in previous 12 months conditional on some training provision	0.518	0.359
establishment and firm characteristics:			
log establishment size$	log establishment size	0.961	1.229
private sector$	private sector	0.858	0.349
foreign owned$	foreign or joint UK/foreign owned	0.032	0.176
single$	single establishment organisation	0.735	0.441
increase in sales$	total sales/budget increased a great deal in last year	0.125	0.330
decrease in sales$	total sales/budget decreased a great deal in last year	0.052	0.221
hire rate	number hired in last year as fraction of workforce	0.320	0.694
quit rate	number left in last year as fraction of workforce	0.294	0.718
head office$	establishment is head office of multi-establishment firm	0.069	0.253
vacancy rate	establishment vacancy rate	0.042	0.134
qualification score	Establishment occupation-weighted qualification score	2.298	1.260
local labour market characteristics:			
industry employment	share of industry employment: source ABI	0.124	0.071
employment growth	employment growth in last 2 years: source ABI	0.029	0.049
weighted relative wage	occupationally weighted relative wage: source NES/LFS	1.014	0.149
log unemployment rate	log of the ILO unemployment rate: source LFS	1.551	0.371
low skill share	proportion of working age with no qualifications	0.154	0.038
high skill share	proportion of working age with NVQ4+	0.237	0.056
industry dummies:	*Industrial sector:*		
industry1$	agriculture (base)	0.031	0.172
industry2$	mining and quarrying	0.002	0.040
industry3$	manufacturing	0.089	0.285
industry4$	electricity and water supply	0.001	0.030
industry5$	construction	0.092	0.290
industry6$	wholesale, retail	0.235	0.424
industry7$	hotels and restaurants	0.067	0.251
industry8$	transport and communication	0.043	0.202
industry9$	finance	0.021	0.144
industry10$	business services	0.252	0.434
industry11$	public administration	0.010	0.098
industry12$	education	0.023	0.149
industry13$	health and social work	0.043	0.203
industry14$	other community	0.092	0.289

Note: All statistics are establishment-weighted except training intensity and conditional intensity which are employment weighted.