



## **Working Paper 23**

# **Training Incidence and Training Intensity: An Analysis of the 2008 Scottish Employers' Skills Survey**

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# **Training Incidence and Training Intensity: An Analysis of the 2008 Scottish Employers' Skills Survey**

## **ABSTRACT**

This paper examines the incidence of training and the intensity of off-the-job training at establishments in Scotland, making use of the 2008 Scottish Employers' Skills Survey. Two measures of training incidence are used: one, a dichotomous dependent dummy variable associated with whether or not training of any sort was undertaken at the establishment, and the other a multinomial dependent variable associated with nominal outcomes about the nature of training which took place, relative to no training taking place. Two measures of training intensity are used, both applicable only to those establishments which had offered off-the-job training: one is based on ordered outcomes of the number of off-the-job training days received by the average worker at the establishment, the other is the percentage of workers at the establishment who received off-the-job training.

Capitalising upon the nature of the variables within the data set, in addition to containing variables reflecting the structural characteristics of the establishment, such as size and sector, the models estimated also contained variables commonly associated with the 'drivers of training' literature, for example reflecting change at the establishment and the human resource management policies and practices in operation there. Generally, the variables reflecting structural characteristics, notably size and sector, were more successful in explaining all four dependent variables. Variables associated with the 'drivers of training' literature were not wholly unsuccessful. Variables depicting the extensive use of highly skilled labour at the establishment and the existence of a training plan at the establishment, for example, often were positively correlated to the dependent variables and statistically significant. However, in contrast to the variables associated with size and structure, the variables associated with the 'drivers of training' literature lacked both consistency and internal coherence.

The paper concludes by advocating a re-examination of the data set, but focusing exclusively on establishments in the private or commercial sector of the economy and incorporating into the estimated models more of the variables available within the data set which reflect the 'drivers of training' literature and are more applicable to establishments in this sector of the economy.

# **Training Incidence and Training Intensity: An Analysis of the 2008 Scottish Employers' Skills Survey <sup>1</sup>**

## **1. CONTEXT AND MOTIVATION**

This paper investigates the incidence of training and the intensity of off-the-job training of establishments in Scotland, making use of the 2008 Scottish Employers' Skills Survey. Two measures of training incidence are produced and examined. One makes use of a dichotomous dummy variable and seeks to differentiate between whether or not training is undertaken at the establishment. The other makes use of nominal outcomes to a question about training, and seeks to contrast the nature of training undertaken at the establishment, relative to no training taking place. Two measures of training intensity are produced and examined for those establishments which undertook off-the-job training. One measure is based on ordered outcomes of the number of days of off-the-job training the average worker received. The other is the percentage of workers at the establishment who received off-the-job training.

The first novelty of the paper, therefore, is the diversity of measurements used to examine the training decision. One consequence of this diversity is the scope afforded to identify the determinants of training in a more comprehensive manner than hitherto and, more especially, to examine the extent to which, if at all, the determinants of training incidence differ from the determinants of training intensity.

Although there are other studies which identify the determinants of training, often by default these studies focus upon the structural characteristics of the establishment/firm. One feature of the data set used in this study is the potential to incorporate into the analysis some of the variables associated with the 'drivers of

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training' literature, notably variables which reflect the nature of the product/service provided, work organisation at the establishment and the human resource management policies and practices in operation there.

Conventionally when examining the training decision – for example, as with the Leitch Review of Skills (Leitch, 2006) - an implicit, supply-side focussed, simple input-output type model is assumed, whereby increases in inputs – increases in the relevant factors of production and/or enhancements in their qualities, via for example 'training' in the context of labour – increase outputs. Given this production function type construct, firms are viewed from a technological perspective and portrayed as units which transform a series of what are assumed to be homogeneous inputs into a series of outputs. One consequence is that training is assumed to be always and everywhere beneficial, to the economy, the organisation and the worker. The principal policy implication which emanates from the application of this model is that the determinants of training be identified, thereby providing the necessary information to facilitate the design and implementation of policy aimed at providing (or improving existing) incentives to train to those firms which do not train, for example firms which see training as additional and unnecessary costs rather than enlightened investment expenditures (Keep and Mayhew, 2004; Ashton, 2007).

An alternative model, however, much influenced by the resource based theory of the firm, provides an alternative perspective of the role of training and skills formation within firms. In turn, this alternative model also generates an alternative policy agenda.

The resource-based theory of the firm assumes that resources are the ultimate source of a firm's sustained competitive advantage and, hence the means by which its efficiency and effectiveness are enhanced and whereby super normal profits are generated through time, although not necessarily in perpetuity. Its origin is Penrose (1959) who conceives the firm to be a collection of productive, inherently dynamic, potentially malleable, resources and the services – or, alternatively 'competences' or 'capabilities' - which these resources may provide. A central assumption of the resource based theory – and one which contrasts with the assumptions of the traditional neo-classical theory of the firm – is that these resources and services are

distributed heterogeneously across firms, even within the same industry (Walker, 2010).

In the context of skills strategy, Sung et al (2009) encapsulate this alternative perspective of the firm in a “business strategy and skills utilisation model” (p 9). Although there is an inevitable element of path dependency, given its distinctive capabilities the firm is assumed to construct a comprehensive business strategy. The elements within this are inextricably interlinked, nonetheless the starting point is the firm’s product market strategy, its choice with respect to the nature of its product – often stereotypically presented as ‘one-off’ or ‘high volume’: ‘simple’ or ‘complex’: ‘price dependent’ or ‘dependent upon quality rather than price’ – and how and where it chooses to place this product on the market (for example, locally, regionally, nationally or internationally). Next, the firm chooses its production process, principally the nature of capital and labour to be utilised, again stereotypically choosing between not automated/highly automated processes, using high/low technology and employing high/low skilled labour, and how work is to be organised combining labour with capital. Finally, it chooses how to manage its human resources, its human resource management (HRM) strategy.

There is no deterministic relationship between product, process, work organisation and HRM strategy, as Sung et al (2009) emphasise. Nonetheless, these factors determine the nature of labour to be recruited, in terms of both the existing skills profiles of individuals in the external labour market and the ease with which these skills profiles may be further developed in the future via appropriate training as organisational and personal circumstances necessitate.<sup>2 3</sup> Skill requirements and training needs, therefore, are the consequences of prior decisions which determine the firm’s demand for training. One possible consequence is that such are the prior choices made with respect to product and process by the firm, skills requirements on the part of the labour input may be negligible and training needs minimal. The decision not to train from the private perspective of the firm, therefore, is rational

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<sup>2</sup> Following Thurow (1975) labour is selected according to an individual’s likely costs of training discounted over time, with those with the perceived lowest training costs being hired first.

<sup>3</sup> To the extent that it is ‘specific’ rather than ‘general’ skills which are being generated (Becker, 1964) to ‘buy’ (i.e. from the external labour market) rather than to ‘make’ (i.e. to train), the choices associated with the transaction economics model, is usually not an option (Coase, 1937; Lazear and Oyer, 2004).

In this alternative scenario, skills policy becomes not only about producing more highly qualified labour both in and entering into the labour market, but also about getting firms to change their business strategies, to increase the demand for skilled labour, and facilitating the training processes within firms. It is associated most with the advocacy of policies which seek to encourage firms to move up their value chain (Ashton, 2007; Sung et al, 2009). Equally, however, it is also about the use of legislation, for example to institute minimum standards with respect to health and safety, hygiene and service provision, and exhortation, for example to encourage low technology/low skills firms to re-design their human resource management policies and practices to reduce non-wage labour costs by increasing labour retention.

Although the ‘business strategy and skills utilisation policy’ outlined above may be more appropriate to firms in the private or commercial sector, nonetheless there are elements within it which are common to all organisations, for example in how training needs may arise as a consequence of product/service changes and changes in the manner in which these products/services are delivered. A second novelty of the paper, therefore, is the manner in which it examines the correlations between the diverse measures of the outcome of the training decision and some variables associated with the ‘drivers of training’ literature, particularly variables reflecting work organisation at the establishment and the human resource management policies and practices in operation there.

The paper is structured as follows. The next section describes the data set used, the 2008 Scottish Employers’ Skills Survey. How training incidence and training intensity are defined, measured and estimated is outlined in Section 3. The empirical work is reported in Sections 4 through to 7. A final section concludes, and makes some comment about other work which could be undertaken using this data set.

## 2. THE 2008 SCOTTISH EMPLOYERS' SKILLS SURVEY

The Scottish Employers' Skills Survey of 2008 is the fifth in a series of large scale surveys undertaken to obtain employers' perspectives on a diverse range of skills related issues e.g. vacancies, including 'hard to fill' vacancies, skill shortages, skill gaps and training.<sup>4</sup> It is establishment based.

The population from which the sample of establishments is taken is obtained from the ONS' Inter-Departmental Business Register. The survey population is defined as all establishments in Scotland. Quota sampling methods are used. The survey is multi-stage in its design. There are three elements to the sampling frame viz. 'geography' (the 11 Scottish Further Education Funding Council Areas); 'sector' (six Sector Skills Council industry groupings); and 'size' (six employer size categories). The resulting quota matrix consists of 164 cells in total. Accordingly, the statistical analysis in the paper makes use of Stata's 'survey' routines (StataCorp, 2005).<sup>5 6</sup>

14,052 establishments were contacted and positive responses were obtained from 6,274, a response rate of 45 percent. Where positive responses were obtained, telephone interviews were conducted with the senior person responsible for human resource and personnel matters.<sup>7</sup>

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<sup>4</sup> The others took place in 2002, 2003, 2004 and 2006.

<sup>5</sup> Complex survey data lead to a sample which may be weighted, clustered and stratified. Failure to accommodate these features, where appropriate, may result in conservative overestimates of standard errors, although not necessarily different values of the coefficients (Cameron and Trivedi, 2005 and 2009).

<sup>6</sup> Single PSUs were re-allocated to a geographically contiguous SFEFC area.

<sup>7</sup> The telephone interviews were undertaken by IFF Research.

The original report focussed upon four issues (FutureSkillsScotland, 2009):

1. The relative importance of skills-related issues, as compared with other challenges facing employers, such as their cash flow problems, the imminent economic downturn etc.:<sup>8</sup>
2. The types of jobs in which skills shortages and skills gaps were most/least prevalent:<sup>9</sup>
3. The causes of skills shortages and skills gaps, their consequences and the nature of employers' responses to both: and
4. The nature and extent of training paid for by employers, examined in two ways viz. 'training incidence' and 'training intensity'.<sup>10 11</sup>

In the original report, the analysis proceeded by means of cross tabulation, where the issues in question were examined by variables denoting establishment size and sector. Both training incidence and training intensity were reported as being associated with establishment size and sector.<sup>12</sup>

In contrast, the single focus of this working paper is 'training'. Further, the definition, interpretation, measurement and estimation of the central concepts of 'training incidence' and 'training intensity' are different from those used in the original report.

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<sup>8</sup> 'Attracting appropriate skilled staff' was seen as a 'second order challenge', cited by a small minority of respondents.

<sup>9</sup> For purposes of the report, 'skills shortages' are defined as 'a specific type of hard-to-fill vacancy that occurs when an employer can't find applicants with the skills, qualifications or experience to do the job', where other possible reasons for the existence of hard-to-fill vacancies are acknowledged. 'Skills gaps' are defined as instances 'when an employer thinks a worker doesn't have enough skills to perform their job with full proficiency.'

<sup>10</sup> 'Training incidence' is seen as an "establishment based measure which permits examination of the circumstances under which training takes place" (FutureSkillsScotland, 2009, p 43). In the original report, training incidence is examined both when training of any sort is undertaken and when the training in question relates only to off-the-job training. In contrast, 'training intensity' is seen as a "employee based measure which can help to answer questions about how much training takes place and who receives it" (FutureSkillsScotland, 2009, p 43). In this instance, however, training intensity refers only to off-the-job training undertaken.

<sup>11</sup> At this juncture, it is important to note that most of the emphasis in the report on the subject matter of training is upon off-the-job training, described as "conducted away from the employee's immediate workstation either on the premises or elsewhere" (FutureSkillsScotland, 2009, p. 43). This is done for reasons of expediency, off-the-job training being seen as easier to measure within establishments and compare across establishments (p. 46). The intention is not to depreciate the potential quality, effectiveness and importance of informal on-the-job training frequently undertaken in smaller size establishments (Ashton, 2007).

<sup>12</sup> Whether these associations were statistically significant or not – established, for example, by making use of a Pearson Chi-square test – is not reported.



Finally, the analysis makes use of multivariate methods, whereby possible correlations between training incidence and training intensity, however defined and measured, and variables such as establishment size and sector are explored, controlling for other observable differences.

A particular feature of the 2008 Scottish Employer's Skills Survey (and ignored in the original report) is the inclusion of sets of questions relating to:

- the nature of the products or services provided by the establishment (e.g. 'one off' or 'high volume'; 'simple' or 'complex'; 'price dependent' or not);
- recent change at the establishment (e.g. whether new products or processes had been introduced; whether working methods or workforce organisation had changed); and
- the human resource management policies and practices in operation at the establishment (e.g. was there a staff training plan; to what extent was the training of staff integrated with business strategy; was use made of part time and temporary labour).

Although not necessarily equally appropriate across all sectors of the economy, nonetheless these questions do facilitate an initial exploration of the role of the putative 'drivers of training' (Ashton, 2007; Sung et al, 2009).<sup>13</sup>

35.23 percent of establishments surveyed did not train their employees in the past 12 months (Table 1). Of those which did, most made use of a combination of on-the-job and off-the-job training.<sup>14</sup> Diverse reasons were forwarded to explain why establishments did not train their employees. The reasons cited most frequently included the following: staff were already fully proficient, hence no training was required; training was unnecessary, given the nature of the business; and a lack of the necessary funds.

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<sup>13</sup> An attempt was made to select, inevitably somewhat arbitrarily, variables deemed to be appropriate across the private/commercial, public and voluntary sectors. Consequently, the full potential of these variables, most of which are more appropriate to the private/commercial sector remains to be explored.

<sup>14</sup> In cross tabulations which are not reported here, there were statistically significant associations between an establishment's training status as reported in Table 1 and key sector group, sector and size (i.e. Pearson chi-square design based corrected statistics where  $p < 0.001$ ).

### 3. DEFINING, MEASURING AND ESTIMATING ‘TRAINING INCIDENCE’ AND ‘TRAINING INTENSITY’

From the initial questions asked about ‘Training and Staff Development’ it is possible to identify the ‘training status’ of the establishment i.e. whether or not training had been funded or arranged for employees in the past 12 months, and, if so, the nature of the training undertaken, only on-the-job, only off-the-job, or both.<sup>15</sup> The percentage distribution of these responses is reported in Table 1.

The ‘training status’ of the establishment makes possible the construction of two different measures of training incidence: one as to whether or not training of any sort was undertaken in the past 12 months; the other denoting the nature of the training undertaken, relative to no training being undertaken. The former produces a dichotomous dummy dependent variable (*trainincidence*). The latter produces a multinomial dependent variable (*trainstat*), which has four outcomes (cf. Table 1) viz.:

Outcome 1: training both on- and off-the-job

Outcome 2: training on-the-job only

Outcome 3: training off-the-job only

Outcome 4: not training

The binomial logit model used to identify the determinants of whether training took place at the establishment is of the standard form viz.

$$y^*_i = X_i\beta + \varepsilon_i$$

where  $y^*_i$  is a latent variable depicting the training outcome at the establishment; and  $X_i$ ,  $\beta$  and  $\varepsilon_i$  are respectively, a vector of observable independent variables, a set of coefficients to be estimated, and an error term (Cameron and Trivedi, 2005 and 2009; Long and Freese, 2006).<sup>16</sup> In the estimation,  $y_i = 1$  if training of any sort is undertaken (and = 0 otherwise)

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<sup>15</sup> Identified as the variable ‘TR\_STAT’ in the codebook.

<sup>16</sup> Logits are used in the analysis, because STATA’s survey routines only support logit models.

The multinomial logit model used to identify the determinants of the types of training undertaken at the establishment is also of the standard form:

$$\ln \Omega_{m|b}(\mathbf{y}^*_i) = \mathbf{X}_i \boldsymbol{\beta}_{m|b} + \boldsymbol{\varepsilon}_i$$

where  $\mathbf{y}^*_i$  is a latent variable denoting the training outcome at the establishment;  $m$  is the number of possible training outcomes, in this instance 4;  $b$  is the base response category, in this instance those establishments where no training is undertaken (i.e. outcome 4);  $\mathbf{X}_i$  is a vector of observable independent variables;  $\boldsymbol{\beta}$  a set of coefficients to be estimated; and  $\boldsymbol{\varepsilon}_i$  is an error term.

It is also possible to generate two very different measures of training intensity.<sup>17</sup>

The first measure makes use of categorical data (*traintime*). For those establishments who reported having undertaken off-the-job training in the past 12 months, question Q64A asked: ‘.. on average, how many days of off-the-job training and development have you arranged for each member of staff receiving training off-the-job?’ Re-coded, the percentage distribution of responses is reported in Table 2.

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<sup>17</sup> These measures of training intensity are examined ‘unconditionally’ i.e. the estimations are made for those establishments within the sub population identified with undertaking off-the-job training. No attempt is made to examine the determinants of training intensity conditional on undertaking off-the-job training, for example making use of Heckman like routines.

The determinants of *traintime* are examined by means of an ordered logit model. The model used is of the following generic type:

$$\mathbf{y}^*_{ij} = \mathbf{X}_i\boldsymbol{\beta} + \boldsymbol{\varepsilon}_i$$

such that

$$\begin{array}{ll} y_j = 1 \text{ (i.e. '1 day or less')} & \text{if } \tau_0 = -\infty \leq y^*_i < \tau_1 \\ y_j = 2 \text{ (i.e. '2 days')} & \text{if } \tau_1 \leq y^*_i < \tau_2 \\ y_j = 3 \text{ (i.e. 'between 3 and 5 days')} & \text{if } \tau_2 \leq y^*_i < \tau_3 \\ y_j = 4 \text{ (i.e. 'between 6 and 20 days')} & \text{if } \tau_3 \leq y^*_i < \tau_4 \\ y_j = 5 \text{ (i.e. 'more than 20 days')} & \text{if } \tau_4 \leq y^*_i < \tau_5 = \infty \end{array}$$

where  $\tau$  is some threshold point where, when crossed by the latent variable  $\mathbf{y}^*$ , the observed category changes;  $j$  denotes these categories; and  $\mathbf{X}_i$ ,  $\boldsymbol{\beta}$  and  $\boldsymbol{\varepsilon}_i$  are as described above (Cameron and Trivedi, 2005 and 2009; Long and Freese, 2006).

In contrast, the second measure of training intensity makes use of integers. Respondents were asked (Question 67): ‘..how many staff in each.. occupational categor(y) have received off-the-job training away from their immediate work station over the last 12 months?’<sup>18</sup> Subsequently, these numbers were added together and a variable denoting the total number at each establishment who received off-the-job training produced.<sup>19</sup> Accordingly, the dependent variable *trainingintensity* was derived by taking this number as a percentage of the total number employed at the establishment at the time of the interview.

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<sup>18</sup> Reported as variables Q67\_1 through to Q67\_9.

<sup>19</sup> Reported as variable Q67\_SUM.

An OLS regression is used to identify the determinants of this measure of training intensity, the model being as follows:

$$y_i = X_i\beta + \varepsilon_i$$

where  $y_i$  is training intensity, as defined and measured above; and  $X_i$ ,  $\beta$  and  $\varepsilon_i$  are, as before, a vector of independent variables, a set of coefficients to be estimated, and an error term (Cameron and Trivedi, 2009).

The names, descriptors and a note about the origin of the variables used in the four estimations are reported in Table 3.

The independent variables are common to each estimation. The initial hypothesis is that the signs of the coefficients will be similar across the four estimations: i.e. the variables which are positively/negatively signed as determinants of whether training is undertaken in the binomial logit model will be similarly signed in the multinomial logit model relative to the base outcome category of no training taking place at the establishment. Further, the variables which determine the incidence of training will also determine the intensity of off-the-job training as estimated in both the ordered logit model and the OLS regression.

The independent variables are subdivided by category, and Wald tests are undertaken to establish the joint significance of the variables associated with each category. There are nine categories in all, although two contain only one variable viz.

**A. Sector Skills Council Key Groups:** which formed one element within the sampling frame, with five dummy variables, exclusive of the reference category, *publicservices*. ‘Sector’ is deemed important within the literature on training, given the nature of the products/services in question and the particular nature of the labour force hired and employed derived from this. The relevant hypothesis is that whereas the coefficients of *ksfood* and *kshosp* will be negatively signed, the coefficient of *kshi\_tec* will be positively signed, relative to the reference category. The signs of the coefficients *ksmanu* and *kstrans* are more problematical.

**B. Size of the Establishment, in terms of numbers employed:** which formed another element within the sampling frame, with five dummy variables, exclusive of the reference category *sizecat4*. From the literature (and the presumption that most training in relatively smaller establishments tends to be informal, on the job, often conducted by means of a process of osmosis), the relevant hypothesis is that the coefficients *sizecat1*, *sizecat2* and *sizecat3* will be negatively signed whereas the coefficients *sizecat4* and *sizecat5* will be positively signed, relative to the reference category.

**C. The Corporate Governance Status of the Establishment:** with two dummy variables, exclusive of the reference category *public*. Given the literature about the prevalence of formal training within most of the public sector, often because of the nature of the frequently professional activities undertaken in some of its parts, the relevant hypothesis is that the coefficients *private* and *voluntary* will be negatively signed, relative to the reference category.

**D. The Single/Multi-Plant Nature of the Organisation:** which contains one dummy variable (i.e. *single* =1, and 0 otherwise). The relevant hypothesis is that training, especially formal training and training conducted off-the-job, will be more likely in multi-plant organisations, hence the sign of this coefficient will be negative.

**E. Where Training is Associated with Statutory Requirements:** which has one dummy variable (i.e. *trainlaw* = 1, and 0 otherwise). The relevant hypothesis is that the coefficient of *trainlaw* will be positively signed.

**F. Characteristics of the Establishment:** which contains seven distinct (and assumed to be exogenous) dummy variables, each reflecting important characteristics of the establishment which may influence training decisions, given previous literature. This literature would suggest positively signed coefficients for the following variables: *highskill*; *temps*; and *itgood*: and negatively signed coefficients for the following variables: *unionrec*; and *parttime*. The signs of the coefficients *hardtofill* and *skillsgaps* are more problematical. Given the presence of hard to fill vacancies, one policy response would be to train/re-train existing employees. Given that skills gaps are indicative of training needs within the establishment, one policy response would

be to train the workers deemed skills deficient. These assumptions would hypothesise positively signed coefficients. On the other hand, the presence of hard to fill vacancies and/or skills gaps may be indicative of a poorly performing establishment, less likely to see value in training expenditures. Consequently, given this alternative assumption, the coefficients will be negatively signed instead.

***G. Human Resource Management Policies and Practices in Operation at the Establishment:*** which contains three distinct (and again assumed to be exogenous) dummy variables. Again following the literature – and the textbook claims made for the role of this management function – the relevant hypothesis is that each of the three coefficients will be positively signed.

***I. Change in Work Methods and/or Work Organisation:*** which contains three distinct (and once again assumed to be exogenous) dummy variables, illustrative of the ‘drivers of training’. Hence the relevant hypothesis is that each coefficient will be positively signed.

***J. Labour Indicators of Establishment ‘Performance’:*** which contains two distinct (and on this occasion the assumptions of endogeneity are somewhat heroic) variables. Both are indicative of ‘poor’ performance. The relevant hypothesis is that the coefficients of both, therefore, will be negatively signed.

The logit and multinomial logit results identifying the determinants of training incidence are reported in Tables 4 and 5, respectively. The ologit and OLS regression results identifying the determinants of training intensity are reported in Tables 6 and 7, respectively.

#### 4. TRAINING INCIDENCE: THE LOGIT RESULTS

In accordance with expectations, the coefficient of *kshi\_tec* is positively signed whereas the coefficients of *ksfood* and *kshosp* are negatively signed, relative to the reference category of *publicservices*. Additionally, *ksmanu* and *kstrans* are negatively signed. Although the result of the Wald test indicates that the five variables within the Sector Skills Council Key Sector Group set of variables are jointly significant, only the coefficient of *ksfood* is statistically significant.<sup>20</sup> An establishment in this sector is 18 percent less likely to provide training, relative to an establishment in the reference category (cf. Table 4).

In the context of the five size category dummy variables in the Size of Establishment set of variables, only the coefficient of *sizecat3* does not accord with expectations, being positive rather than negative, relative to the reference category of *sizecat4*. The result of the Wald test indicates the joint significance of this set of variables. Perhaps most noteworthy is the magnitude of the likelihood that training is not undertaken in the two smallest sized establishments. In results which are statistically significant, relative to the reference category, establishments classified as *sizecat1* and *sizecat2* are 22 and 11 percent, respectively, less likely to provide training.

In contrast to expectations, the sign of *voluntary* is positive, relative to the reference category *public*. More noteworthy in the Corporate Governance Status set of variables is the statistically significant result indicating that establishments in the private sector of the economy are 17 percent less likely to provide training than establishments which are in the public sector. The result of the Wald test identifies the joint significance of the variables in this particular set of variables.

The coefficient *single* is negatively signed, as expected. Moreover, it is statistically significant, and the value of the marginal effect indicates that single plant establishments are 11 percent less likely to provide training than establishments which are part of a larger organisation, the reference category.

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<sup>20</sup> Statistically significant at ( $P > |t| < 0.05$ ), that is, the criterion level used throughout the empirical analysis.



The coefficient *trainlaw* is positively signed, again in accordance with expectations. Moreover, it too is statistically significant. The value of the marginal effect indicates that training is 41 percent more likely at establishments at which an element of the training undertaken is done to comply with statutory requirements.

In the context of the seven variables within the Characteristics of the Establishment set of variables, which are jointly significant given the result of the Wald test, the signs on the variables *highskill*, *parttime*, *temps*, *itgood* and *hardtofill* are in accord with expectations. The exception is *unionrec*, which is positively rather than negatively signed. *Skillsgap* proves to be positively signed, and is statistically significant. Establishments which report the presence of skills gaps are 11 percent more likely to undertake training than establishments which do not report skills gaps.

Each of the three variables associated with Human Resource Management Policies and Practices at the establishment is positively signed, as hypothesised, and the result of the Wald test establishes their joint significance. Moreover, *trainplan* is statistically significant. Where training is planned at the establishment, training is 12 percent more likely.

Although each of the three variables associated with Change in Work Methods and/or Organisation is positively signed in accordance with expectations, none is statistically significant. Moreover, their joint significance is not established, given the result of the Wald test.

Finally, neither *labturn* nor *vacrate* is economically or statistically significant.

In summary, most of the variables are signed in accordance with expectations. 10 of the 29 variables identified in the table are statistically significant. That said, little appears to be added to our understanding of the determinants of training by the variables associated with the ‘drivers of training’, with the exceptions of *trainlaw* and *trainplan*.

## 5. TRAINING INCIDENCE: THE MULTINOMIAL LOGIT RESULTS

In multinomial models it is not possible to identify separate coefficients for each of the possible outcomes. Conventionally, the coefficients for a selected outcome are set at zero, and, following this normalisation process, relative probabilities are produced with respect to this base outcome. Outcome 4 – that no training is undertaken at the establishment - is selected as the base outcome.

Given the selection of ‘do not train’ as the base outcome, there is a not unexpected similarity between the results of the binomial logit reported in the previous section and the results of the multinomial logit in terms of the other outcomes, reflecting the three training types viz. ‘train both on- and off-the-job’, ‘train on-the-job only’ and ‘train off-the-job only’. This is manifest in terms of: the signs of the coefficients, the nature – if not the number – of statistically significant coefficients, and the results of the Wald tests (cf. Table 5).

In the context of the outcome ‘train both on- and off-the-job’, relative to the results of the binomial logit, 6 additional variables are statistically significant: the positively signed *sizecat6*, *unionrec*, *equality* and *equipment*, and the negatively signed *ksmanu* and *sizecat3*. There are three notable features about these results. The first is that they reinforce the roles of sector and size in determining the incidence of training. The second is that they increase the role of the variables associated with the ‘drivers of training’, if only marginally but, nonetheless, in a positive manner. The third is the (general) magnitude of the values of their marginal effects – for example, 37 percent in the context of *sizecat6* – results which complement the often similarly sizeable magnitudes of the other statistically significant coefficients.

Relatively fewer variables are statistically significant in the context of the two other outcomes, 8 for the outcome of ‘train on-the-job only’ and 7 for the outcome of ‘train off-the-job only’. Again, there are three notable features associated with these results. The first is that the roles of size and sector become less important when measured in terms of the number of variables which are statistically significant; the second is that (some of) the variables associated with the ‘drivers of training’ do appear to continue to have some statistical consequence; and the third is that the values of the marginal

effects are, generally, relatively small, indicative of the corresponding variables being of little economic consequence.

## 6. TRAINING INTENSITY: THE ORDERED LOGIT RESULTS

The ordered logit is designed to model discrete dependent variables which take ordered multinomial outcomes, measured on an ordinal scale in ascending order. Coefficients on the explanatory variables have a qualitative interpretation, relative to the reference category and quantitative predictions are made on the basis of the marginal effects.

In the ologit estimation, 10 variables are statistically significant, five of which are common to the three previous estimations (viz. *ksfood*, *sizecat1*, *sizecat2*, *highskill* and *trainplan*) (cf. Table 6). The commonality between the ologit results and the results of other estimations is further evident in the context of the outcome of the Wald tests, where the variables associated with the Sector Skills Council Key Groups, the Establishment Size Categories, the Characteristics of the Establishment and the Human Resource Management Policies and Practices in operation at the establishment are all jointly significant. However, in the context of the ologit results, additionally – and notably – the variables associated with the Change in Work Methods/Organisation of Work are also jointly significant.

The signs on each of the variables associated with the Sector Skills Council Key Groups are negative, relative to the reference category *publicservices*. Moreover, when training is undertaken at these establishments it is for smaller (i.e. for 1 or 2 days) rather than larger quantities of days. By contrast, the signs on each of the coefficients associated with the Establishment Size Categories are positive, relative to the reference category of *sizecat4*. A particular feature of the values of the marginal effects for the relatively smaller sized establishments is that they indicate that when these establishments train, the off-the-job training they provide tends to be for relatively larger quantities of days. For example, the marginal effects for *sizecat1* for outcomes 4 (6 – 20 days) and 5 (more than 20 days) are 9 percent and 5 percent, respectively, relative to the reference category.

Differences in the relative quantities of off-the-job training provided are also apparent in the context of the other statistically significant variables. For *highskill*, *trainplan*, *involve*, and *equipment*, off-the-job training, when provided, tends to be for relatively larger quantities of days. For example, the values of the marginal effects for *trainplan*, *involve* and *equipment* for outcomes 4 and 5 each approximate 5 percent and 3 percent, respectively, relative to the appropriate reference categories. In contrast, for *parttime*, it tends to be for relatively smaller quantities of days. Whereas the marginal effects for outcomes 1, 2 and 3 are positively signed, outcomes 4 and 5 are negatively signed.

In contrast to the logit and multinomial logit two estimations, in the ordered logit estimation, the coefficients *single* and *trainlaw* are not statistically significant, suggestive that although both may explain training incidence, neither explains the intensity of off-the-job training provided using this particular measure of intensity.

## **7. TRAINING INTENSITY: THE OLS REGRESSION RESULTS**

The salience of sector is further manifest in the context of the second measure of training intensity, the percentage of staff employed at the establishment who receive off-the-job training (cf. Table 7). Of the five variables associated with the Sector Skills Council Key Group set of variables, four are statistically significant – the exception being *kshi\_tec*. Moreover, all are negatively signed, relative to the reference category *publicservices*. The percentage of staff who receive off-the-job training in establishments which are in the manufacturing sector key group, for example, is 12 percent less than it is in the reference category.

The extent of training intensity within the public sector, relative to elsewhere, is again apparent in the context of the variables associated with the Corporate Governance Status of the Establishment. Relative to the reference category of *public*, both *private* and *voluntary* are negatively signed, although only the former is statistically significant. The intensity of training, as defined and measured, in establishments which are in the private sector is 8 percentage less than it is in comparable establishments in the public sector.

Again, establishment size is of consequence and once again the positive training performance of relatively smaller establishments is apparent. *Sizecat1*, *sizecat2* and *sizecat3* are each positively signed, relative to the reference category *sizecat4*. Moreover, each coefficient is statistically significant. The percentage of staff who received off-the-job training in the smallest sized establishments, for example, is 29 percent higher than in comparable establishments in the reference category.

The results of the Wald tests confirm the joint significance of the variables associated with the Sector Skills Council Key Groups, the Corporate Governance Status of the Establishment and the Size of the Establishment.

The results of the Wald tests also establish the joint significance of variables associated with the Characteristics of the Establishment and the Human Resource Management Policies and Practices in operation at the establishment – but not the variables associated with the Change in Work Methods/Organisation of Work there. In the context of the specific variables associated with the Characteristics of the Establishment set of variables, however, only one is statistically significant *highskill*. Training intensity at establishments which employ staff who are highly skilled is five percent higher than that in comparable establishments which do not employ highly skilled personnel. Again, only one single variable is statistically significant in the context of the six associated with human resource management policy *trainplan*. Training intensity is almost seven percent higher at establishments which have a training plan, relative to comparable establishments which do not.

Finally, in contrast to the ordered logit estimation, whereas the coefficient *trainlaw* is statistically significant again the coefficient *single* is not.

## **8. CONCLUSIONS AND IMPLICATIONS**

This, essentially exploratory, paper has examined the incidence of training and the intensity of off-the-job training in Scotland, making use of the 2008 Scottish Employers' Skills Survey. There were two novelties associated with the paper.

The first novelty was the diversity of measurements used to examine the training decision. One measure made use of a dichotomous dummy variable to determine whether or not training of any sort took place at the establishment: a second measure made use of nominal outcomes about the nature of training which took place at the establishment, relative to a base outcome of no training taking place: a third measure related only to those establishments which undertook off-the-job training and was based on ordered outcomes of the number of days of off-the-job training the average worker received: and the fourth measure related to the percentage of workers at the establishment who received off-the-job-training, although again only for those establishments which did train workers off-the-job.

The second novelty was made possible by the nature of the data set. Traditionally, the training decision has been examined making use of models which emphasise the structural characteristics of the establishment, featuring in particular variables relating to sector and size. The questionnaire associated with the 2008 Scottish Employers' Skills Survey also asked questions about product/service and process at the establishment, recent change, for example in terms of the introduction of new products, technology and senior management, and the human resource management policies and practices in operation there. As a consequence, it was possible to examine the potential effect of the 'drivers of training', an alternative perspective of what makes establishments choose to train or not, making use of what is described as a 'business strategy and skills utilisation' model, implicitly influenced by the resource-based theory of the firm.

Both sector and size were seen to be major determinants of training incidence, however measured, very much in accordance with expectations. Generally, relative to the reference category of Public Services, in the set of variables associated with the Sector Skills Council Key Groups, whereas establishments in the High Technology/Business Services sector were more likely to train, establishments in the

Food, Clothing, Wholesale and Retail and Hospitality and Recreation sectors were less likely to train. The salience of sector was further evident in the context of the set of variables associated with the Corporate Governance Status of the establishment. Establishments in the private or commercial sector were less likely to train, relative to the reference category of establishments in the public sector. Whereas the relatively smaller sized establishments, such as those employing between 1 – 4, 5 – 9 and 10 – 24 workers, were less likely to train, the relatively larger sized establishments, such as those employing between 50 – 249 and more than 250 workers, were more likely to train.

Further in the same context of training incidence, again however measured, there was a story to be told by the variables associated with the ‘drivers of training’ literature, but it was neither complete nor consistent. Establishments which made extensive use of highly skilled labour and establishments which had a training plan were more likely to train, no matter the measure used. In the multinomial estimation only, these two variables were joined by establishments which had an explicit policy on equality/diversity and establishments which had introduced new equipment. Establishments with these characteristics were more likely to train. Further, although in the context of the logit model only, training was more likely in those establishments where training was implemented to meet legal requirements. Otherwise, the variables of relevance to this perspective, although not necessarily negatively signed were not statistically significant.

Many of the variables identified above were also of consequence in the context of explaining training intensity, although the examination of training intensity applied only to off-the-job training. Again, the variables associated with the structural characteristics of the establishment were of more consequence than the variables associated with the ‘drivers of training’ perspective. However, in this instance training intensity was relatively greater for the smaller sized establishments (and relatively less for the larger sized establishments). They trained proportionately more of their workforces. Furthermore, the results of the ordered logit estimation demonstrated how quantities of days of training varied across establishments. When off-the-job training was provided, generally it was for larger quantities of days for: the relatively smaller sized establishments; establishments which made extensive use of highly skilled

labour; establishments which had a training plan; and establishments which had introduce new equipment. By contrast, when off-the-job training was provided in establishments which made use of part time employment, the off-the-job training given was for smaller quantities of days.

Skills development, principally by means of training, is central to a policy agenda which seeks to enhance the competitiveness of firms. Therefore, establishing explanations of why firms choose to train or not is crucial for purposes of policy. The ‘business strategy and skills utilisation’ model is now seen to offer some potential in this respect, although perhaps more so in Scotland than elsewhere in Great Britain. Already, it has some empirical credibility, achieved as a consequence of the application of case study methodology (Sung et al, 2009). However, this attempt to apply the methodology of microeconometrics to the 2008 Scottish Employers’ Skills Survey data set has not generated the same positive outcome. Although several variables associated with the model were correlated positively and statistically significantly with both training incidence and training intensity, their impact has tended to be random rather than internally consistent and coherent.

This negative outcome may be attributable to the ‘business strategy and skills utilisation’ model being applicable more to establishments operating within the private or commercial sector of the economy, not all establishments, the focus of this study. Alternatively, the outcome may be attributable to the particular arbitrary selection of variables of relevance to the model deemed to be appropriate across all establishments. Whatever, what is now required is a study which focuses exclusively upon establishments in the private and commercial sector and the incorporation into the estimated models a fuller set of variables compatible with the ‘drivers of training’ literature, readily available within the data set.



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**Table 1. Training Status of the Establishments (Percentage Distribution)**

Training Status	Percent
Train both on- and off-the-job	35.61
Train on-the-job only	18.83
Train off-the-job only	10.34
Do not train	35.23
Total number of observations	6,274

Footnote to Table 1.:

The number of observations quoted in this table differs from that which appears in subsequent regressions, because, for the latter, observations which did not have complete information on all the variables required for the analyses were dropped.

**Table 2. The Average Number of Days of Off-The-Job Training Received by Each Member of Staff Who Received Training in the Past 12 Months**

Average Number of Days of Off-the-Job Training Received	Percentage
One day (or less)	14.66
2 days	15.50
Between 3 and 5 days	35.91
Between 6 and 20 days	24.15
More than 20 days	9.77
Number of observations	3,401

Footnote to Table 2:

The number of observations equate to the number of observations in the two estimations of training intensity, reported in Tables 6 and 7.

**Table 3. The Dependent and Independent Variables in the Estimations: Names, Descriptors and Origins, by Category**

<b>Name</b>	<b>Descriptor</b>	<b>Origin</b>
<b>The Dependent Variables</b>		
trainincidence	Whether training of any sort is undertaken (where trainincidence = 1)	A recoding of the variable TR_STAT, in the codebook
Trainstat	Training status at the establishment i.e. whether or not training is done and, if the former, its nature in terms of on-the-job, off-the-job or both	TR_STAT in the codebook
Traintime	On average, the number of days of off-the-job training received, by category	Q64A in the codebook, re-coded
trainintensity	The percentage of staff who received off-the-job training	Q67_SUM, in the data set as a percentage of Q5, also in the data set
<b>Independent Variables, Identifying the Sector Skills Council Key Group (SSCKG)</b>		
Ksmanu	SSCKG: Manufacturing (=1)	From SSCGRP in the codebook
Ksfood	SSCKG: Food/Clothing/Wholesale/Retail (=1)	From SSCGRP in the codebook
Kshi_tec	SSCKG: Hi-technology/Business Services (=1)	From SSCGRP in the codebook
publicservices	SSCKG: Public Services – the reference category (=1)	From SSCGRP in the codebook
Kshosp	SSCKG: Hospitality/Recreation (=1)	From SSCGRP in the codebook
Kstrans	SSCKG: Transport/Construction/Utilities (=1)	From SSCGRP in the codebook

**Table 3. (cont)**

<b>Name</b>	<b>Descriptor</b>	<b>Origin</b>
<b>Independent Variables, Reflecting the Size of the Establishment</b>		
Sizecat1	Employing between 1 – 4 (=1)	From Q5SIZE in the codebook
Sizecat2	Employing between 5 -9 (=1)	From Q5SIZE in the codebook
Sizecat3	Employing between 10 – 24 (=1)	From Q5SIZE in the codebook
Sizecat4	Employing between 25 – 49, the reference category (=1)	From Q5SIZE in the codebook
Sizecat5	Employing between 50 – 249 (=1)	From Q5SIZE in the codebook
Sizecat6	Employing 250 or over (=1)	From Q5SIZE in the codebook
<b>Independent Variables, Reflecting the Corporate Governance Status of the Establishment</b>		
Private	The establishment is in the private or commercial sector (=1)	From Q9 in the codebook
Public	The establishment is in the public sector, the reference category (=1)	From Q9 in the codebook
Voluntary	The establishment is in the voluntary sector (=1)	From Q9 in the codebook
<b>An Independent Variable, Reflecting the Single/Multi Plant Nature of the Establishment/Organisation</b>		
Single	The establishment is a single plant organisation (=1)	From Q11 in the codebook
<b>An Independent Variable, Reflecting Training Meeting Statutory Requirements</b>		
Trainlaw	Some element of the training provided is required by law (=1)	From Q73 in the codebook, where the original responses 1/2/3/ are recoded = 1
<b>Independent Variables, Reflecting Characteristics of the Establishment</b>		
Unionrec	The “organisation” (sic) recognises trade unions for bargaining purposes (=1)	From Q77 in the codebook
Highskill	The workforce at the establishment is considered to be ‘highly skilled’, relative to others in the industry (=1)	From Q81G in the codebook, where the original responses 4/5 are recoded = 1
Parttime	The establishment makes use of part time staff (=1)	From Q87D in the data set
Temps	The establishment makes use of temporary staff (=1)	From Q87E in the data set
Itgood	The establishment would claim that its IT systems are “state of the art”, relative to others in the industry (=1)	From Q81D in the codebook, where the original responses 4/5 are recoded = 1
Skillsgap	There are ‘skills gaps’ prevalent in the establishment (=1)	From GAP_ANY in the codebook
hardtofill	Some vacancies at the establishment are considered ‘hard to fill’ (=1)	From H2F_ANY in the codebook

**Table 3. (cont.)**

<b>Name</b>	<b>Descriptor</b>	<b>Origin</b>
<b>Independent Variables, Reflecting Human Resource Management Policies and Practices at the Establishment</b>		
Trainplan	The establishment has a staff training plan (=1)	From Q85B in the codebook
Involve	The establishment has arrangements for the direct involvement of employees in decision-making and problem solving (=1)	From Q87A in the codebook
Equality	The establishment has an explicit policy on equality/diversity at the workplace (=1)	From Q87F in the codebook
<b>Independent Variables Reflecting Change in Work Methods and/or Work Organisation</b>		
Equipment	The establishment has introduced major equipment over the past 12 months (=1)	From Q83C in the codebook
Methods	The establishment has introduced major changes in working methods/workforce organisation over the past 12 months (=1)	From Q83D in the codebook
Senior	The establishment has had a change in senior management over the past 12 months (=1)	From Q83E in the codebook
<b>Independent Variables, Reflecting the Labour Indicators of Establishment 'Performance'</b>		
Labturn	Labour turnover at the establishment over the last 12 months	In the data set, Q21_INT as a percentage of Q19_INT
Vacrate	The vacancy rate at the establishment at the time of the interview	In the data set, vactot as a percentage of Q5

Footnote to Table 3:

1. Additionally, each estimation contains 10 dummy variables (plus a reference category) identifying the 11 Scottish Further Education Funding Council areas. These results are not reported in the tables which follow.

**Table 4. Logit Results: Dependent Variable: trainincidence**

Variable	Coefficient	Linearised Standard Error	P>  t	Marginal Effect
Ksmanu	-.3440	.2350	.143	-.083
Ksfood	-.7967	.2260	.000	-.185
Kshi tec	.2069	.2276	.363	.051
Kshosp	-.2454	.2323	.291	-.059
Kstrans	-.0995	.2309	.666	-.024
Sizecat1	-.9330	.1806	.000	-.228
Sizecat2	-.4701	.1562	.003	-.113
Sizecat3	.0224	.1496	.881	.005
Sizecat5	.3296	.2003	.100	.082
Sizecat6	.9495	.7584	.211	.229
Private	-.6938	.2388	.004	-.171
Voluntary	.3733	.3126	.232	.093
Single	-.4694	.1258	.000	-.116
Trainlaw	1.7568	.1248	.000	.412
Unionrec	.1434	.1552	.356	.035
Highskill	.3219	.1210	.008	.078
Parttime	-.1898	.1273	.136	-.047
Temps	.2708	.1148	.018	.067
Itgood	.1067	.1203	.375	.026
Skillsgap	.4635	.1404	.001	.115
hardtocfill	-.2533	.1664	.128	-.061
Trainplan	.4892	.1289	.000	.120
Involve	.1804	.1328	.174	.044
Equality	.2229	.1231	.070	.055
equipment	.1937	.1214	.111	.048
Methods	.1183	.1292	.360	.029
Senior	.1496	.1280	.243	.037
Labturn	-.0003	.0009	.726	-.000
Vacrate	.0010	.0032	.748	.000
Constant	-.5155	.3369	.126	
Number of strata				364
Number of PSUs				5635
Number of observations				5635
Population size				139769.17
Design df				5271
F (39, 5233)				22.42
Prob > F				0.0000

Footnotes to Table 4

1. Marginal effects are calculated at mean values, and for dummy variables they are for discrete changes from 0 to 1. This footnote refers also to all marginal effects results which are reported subsequent tables.

2. Results of the adjusted Wald Tests <sup>21</sup>:

SFEFC geographical areas:  $F(10, 5262) = 0.89$ : Prob > F = 0.5438

Sector Skills Council Key Groups:  $F(5, 5276) = 7.28$ : Prob > F = 0.0000

Establishment Size Categories:  $F(5, 5267) = 11.68$ : Prob > F = 0.0000

Corporate Governance Status (sector):  $F(2, 5270) = 11.23$ : Prob > F = 0.0000

Single/Multi Plant Nature of the Establishment:  $F(1, 5271) = 13.90$  : Prob > F = 0.0000

Training Conforming to Statutory Requirements:  $F(1, 5271) = 197.91$ : Prob > F = 0.0000

Characteristics of the Establishment:  $F(7, 5265) = 3.55$  : Prob > F = 0.0008

Human Resource Management Policies and Practices:  $F(3, 5269) = 7.18$  : Prob > F = 0.0001

Change in Work Methods/Organisation of Work:  $F(3, 5269) = 1.77$ : Prob > F = 0.1506

Labour Market Indicators:  $F(2, 5270) = 0.10$  : Prob > F = 0.9081

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<sup>21</sup> One implication of these results is that it is preferable to re-allocate single PSUs by geography rather than, for example, size or sector groups.

**Table 5. Multinomial Logit Results: Dependent Variable: trainstat**

Variable	Coefficient	Linearised Standard Error	P >  t	Marginal Effect
<i>Train both on and Off the job</i>				
Ksmanu	-.7197	.3208	.025	-.109
Ksfood	-.9676	.3211	.003	-.147
Kshi_tec	.2495	.3335	.454	.055
Kshosp	-.5882	.3260	.071	-.090
Kstrans	-.4445	.3227	.169	-.055
Sizecat1	-2.3912	.2522	.000	-.362
Sizecat2	-1.3908	.2378	.000	-.201
Sizecat3	-.5873	.2452	.017	-.081
Sizecat5	.1212	.3965	.760	.063
Sizecat6	2.3994	.8589	.005	.372
Private	-.6675	.3403	.050	-.116
Voluntary	.3345	.4252	.431	.062
Single	-.9133	.1541	.000	-.147
Unionrec	.4011	.1818	.027	.061
Highskill	.2987	.1420	.036	.068
Parttime	-.0255	.1611	.874	-.015
Temps	.0377	.1453	.795	.022
Itgood	.1988	.1536	.196	.041
Skillsgap	1.1017	.1785	.000	.155
Hardtofill	-.2825	.2315	.222	-.020
Trainplan	1.6153	.1609	.000	.231
Involve	.3080	.1574	.050	.048
Equality	.4902	.1594	.002	.055
Equipment	.5625	.1657	.001	.083
Methods	.3250	.1849	.079	.051
Senior	.1414	.1964	.472	.056
Labturn	-.0056	.0009	.562	-.000
Vacrate	-.0041	.0038	.284	-.001
Constant	.7020	.4989	.159	



**Table 5. (cont.)**

Variable	Coefficient	Linearised Standard Error	P >  t	Marginal Effect
<b><i>Train on the job only</i></b>				
Ksmanu	-.3327	.3745	.374	.004
Ksfood	-.2499	.3526	.479	.051
kshi tec	.1121	.3688	.761	.004
Kshosp	-.3776	.3601	.294	-.020
Kstrans	-.4109	.3660	.262	-.033
Sizecat1	-1.3239	.2596	.000	.003
Sizecat2	-.7649	.2464	.002	-.029
Sizecat3	-.5275	.2566	.040	-.047
Sizecat5	-.3519	.3959	.374	-.065
Sizecat6	1.5246	1.0495	.146	-.030
Private	.0500	.3774	.894	.087
Voluntary	-.0349	.4698	.941	-.045
Single	-.4192	.1630	.010	.017
Unionrec	.2315	.2052	.259	.001
Highskill	-.1119	.1676	.504	-.051
Parttime	.2557	.1748	.144	.056
Temps	-.2633	.1618	.104	-.056
Itgood	.1048	.1647	.525	.006
Skillsgap	.7916	.1835	.000	.024
Hardtofill	-.2549	.2483	.305	-.008
Trainplan	1.1411	.1714	.000	.059
Involve	.1416	.1779	.426	-.004
Equality	.4211	.1679	.012	.023
Equipment	.3902	.1862	.036	.015
Methods	.1379	.2166	.524	-.009
Senior	-.2588	.1988	.193	-.055
Labturn	-.0004	.0008	.625	-.000
Vacrate	-.0007	.0033	.844	.000
Constant	-.2433	.5167	.638	

**Table 5. (cont.)**

Variable	Coefficient	Linearised Standard Error	P >  t	Marginal Effect
<b><i>Train off the job Only</i></b>				
Ksmanu	-.4265	.4055	.293	-.009
Ksfood	-.9709	.3933	.014	-.053
kshi tec	-.2117	.4033	.600	-.034
Kshosp	-.1526	.3936	.698	.017
Kstrans	-.2346	.3840	.541	.004
Sizecat1	-1.1767	.3181	.000	.017
Sizecat2	-.5790	.2982	.052	.007
Sizecat3	-.1395	.2995	.641	.024
Sizecat5	-.1559	.4306	.717	-.012
Sizecat6	-.3178	1.3170	.809	-.106
Private	-.7946	.4041	.049	-.062
Voluntary	.3658	.4603	.427	.027
Single	-.5365	.2021	.008	-.005
Unionrec	.2183	.2298	.342	-.001
Highskill	.1626	.1918	.397	.008
Parttime	-.2490	.1962	.205	-.034
Temps	.1801	.1936	.352	.026
Itgood	-.1346	.1961	.492	-.025
Skillsgap	.5483	.2598	.035	-.016
Hardtofill	-.6017	.3205	.061	-.040
Trainplan	.6461	.1836	.000	-.028
Involve	.2010	.2346	.392	.004
Equality	.4639	.1913	.015	.016
Equipment	.2297	.2019	.255	-.011
Methods	.2410	.2273	.289	.007
Senior	-.0631	.2375	.790	-.005
Labturn	.0000	.0019	.977	.000
Vacrate	.0050	.0039	.198	.000
Constant	.1569	.5571	.778	
Number of strata				364
Number of PSUs				5635
Number of observations				5635
Population size				139769.17
Design df				5271
F (114, 5158)				9.58
Prob > F				0.0000

Footnotes to Table 5.:

1. trainlaw is excluded from the multinomial estimation because of the nature of this dummy variable relative to the categories within the dependent variable.

2. Results of the adjusted Wald Tests:

SFEFC geographical areas:  $F(30, 5242) = 0.94$  : Prob > F = 0.5609

Sector Skills Council Key Groups:  $F(15, 5257) = 3.65$  : Prob > F = 0.0000

Establishment Size Categories:  $F(15, 5257) = 13.90$  : Prob > F = 0.0000

Corporate Governance Status (sector):  $F(6, 5266) = 4.83$  : Prob > F = 0.0001

Single/Multi Plant Nature of the Establishment:  $F(3, 5269) = 12.55$  : Prob > F = 0.0000

Characteristics of the Establishment:  $F(21, 5251) = 3.31$  : Prob > F = 0.0000

Human Resource Management Policies and Practices:  $F(9, 5263) = 15.97$  : Prob > F = 0.0000

Change in Work Methods/Organisation of Work:  $F(9, 5263) = 3.05$  : Prob > F = 0.0012

Labour Market Indicators:  $F(6, 5266) = 0.96$  : Prob > F = 0.4513

**Table 6. ologit Results: Dependent Variable: traintime**

Variable	Coef	Linear'd Std Error	P >  t	Marg' Effect Outcome 1 (1 day)	Marg' Effect Outcome 2 (2 days)	Marg' Effect Outcome 3 (3 – 5 days)	Marg' Effect Outcome 4 (6 – 20 days)	Marg' Effect Outcome 5 (more than 20 days)
Ksmanu	-.3066	.1849	.097	.038	.027	-.001	-.042	-.021
Ksfood	-.4791	.1863	.010	.063	.042	-.007	-.065	-.032
kshi_tec	-.1118	.1650	.498	.013	.010	-.001	-.015	-.008
Kshosp	-.6394	.1675	.000	.087	.055	-.015	-.085	-.041
Kstrans	-.1460	.1934	.450	.017	.013	.001	-.020	-.011
Sizecat1	.6563	.1623	.000	-.071	-.058	-.017	.091	.055
Sizecat2	.2371	.1200	.048	-.026	-.021	-.005	.033	.019
Sizecat3	.1429	.1072	.183	-.016	-.012	-.002	.020	.011
Sizecat5	.0388	.1631	.812	-.004	-.003	-.000	.005	.003
Sizecat6	.0835	.4068	.837	-.009	-.007	-.001	.011	.006
Private	.1874	.1645	.255	-.022	-.016	-.001	.026	.014
Voluntary	.2922	.2139	.172	-.031	-.026	-.009	.041	.025
Single	-.0876	.1382	.526	.010	.007	.001	-.012	-.006
Trainlaw	.2221	.1462	.129	-.026	-.020	-.001	.031	.016
Unionrec	.0319	.1299	.806	-.003	-.002	-.000	.004	.002
Highskill	.2841	.1106	.010	-.034	-.025	-.001	.039	.021
Parttime	-.2984	.1505	.048	.033	.026	.007	-.042	-.024
Temps	.1396	.1173	.234	-.016	-.012	-.002	.019	.011
Itgood	-.1103	.1214	.364	.012	.009	.001	-.015	-.008
Skillsgap	.1729	.0943	.067	-.019	-.015	-.003	.024	.014
Hardtofill	.0534	.1279	.676	-.006	-.004	-.000	.007	.004
Trainplan	.4330	.1695	.011	-.053	-.038	.001	.059	.031
Involve	.4204	.1425	.003	-.053	-.037	.003	.057	.029
Equality	.0859	.1687	.611	-.010	-.007	-.000	.012	.006
Equipment	.3583	.1233	.004	-.039	-.032	-.008	.050	.029
Methods	.1813	.1218	.137	-.020	-.016	-.003	.025	.014
Senior	.0299	.1056	.777	-.003	-.002	-.000	.004	.002
Labturn	.0009	.0005	.049	-.000	-.000	-.000	.000	.000
Vacrate	-.0057	.0033	.089	.000	.000	.000	-.000	-.000
/cut 1	-.3921	.3424	.252					
/cut 2	.5834	.3406	.087					
/cut 3	2.2080	.3380	.000					
/cut 4	3.8410	.3529	.000					
Number of observations							3401	
Population size							62428	
Design df							3044	
F (39, 3006)							3.90	
Prob > F							0.0000	

Footnote to Table 6.:

1. Results of the adjusted Wald Tests:

SFEFC geographical areas:  $F(10, 3035) = 1.14$  : Prob > F = 0.3299

Sector Skills Council Key Groups:  $F(5, 3040) = 3.75$  : Prob > F = 0.0022

Establishment Size Categories:  $F(5, 3040) = 3.47$  : Prob > F = 0.0040

Corporate Governance Status (sector):  $F(2, 3043) = 1.14$  : Prob > F = 0.3197

Single/Multi Plant Nature of the Establishment:  $F(1, 3044) = 0.40$  : Prob > F =  
0.5264

Training Conforming to Statutory Requirements:  $F(1, 3044) = 2.31$  : Prob > F =  
0.1290

Characteristics of the Establishment:  $F(7, 3038) = 2.45$  : Prob > F = 0.0166

Human Resource Management Policies and Practices:  $F(3, 3042) = 6.53$  : Prob > F =  
0.0002

Change in Work Methods/Organisation of Work:  $F(3, 3042) = 4.47$  : Prob > F =  
0.0039

Labour Market Indicators:  $F(2, 3043) = 3.12$  : Prob > F = 0.0445

**Table 7. OLS Regression Results; Dependent Variable: trainintensity**

Variable	Coefficient	Linearised Standard Error	P>  t
Ksmanu	-12.2511	2.7959	.000
Ksfood	-7.4079	2.5425	.004
kshi tec	-4.2644	2.3013	.064
Kshosp	-11.6541	2.7553	.000
Kstrans	-7.6237	2.6719	.004
Sizecat1	29.6585	2.5851	.000
Sizecat2	11.7441	1.9805	.000
Sizecat3	5.2727	1.8364	.004
Sizecat5	-3.9221	2.3613	.097
Sizecat6	-13.4582	4.9560	.007
Private	-8.1174	2.2744	.000
Voluntary	-5.3716	2.9225	.066
Single	-2.0575	1.8110	.256
Trainlaw	7.0715	1.8991	.000
Unionrec	3.1176	1.8901	.099
Highskill	5.0510	1.7175	.003
Parttime	-3.6708	2.0107	.068
Temps	-1.4047	1.5935	.378
Itgood	1.6235	1.6247	.318
Skillsgap	-.1524	1.5410	.921
hardtocfill	2.4212	1.9520	.215
Trainplan	6.9663	2.1554	.001
Involve	3.5821	2.1053	.089
Equality	-2.8905	2.1764	.184
Equipment	3.9809	1.7257	.021
Methods	-2.1547	1.6994	.205
Senior	2.1282	2.0131	.291
Labturn	.0179	.0094	.057
Vacrate	.0041	.0481	.932
Constant	57.9988	4.8326	.000
Number of strata			357
Number of PSUs			3401
Number of observations			3401
Population size			62428.009
Design df			3044
F (39, 3006)			13.42
Prob > F			0.0000
R-squared			0.1987

Footnote to Table 7.:

1. Results of the adjusted Wald Tests:

SFEFC geographical areas:  $F(10, 3035) = 1.11$  : Prob > F = 0.3474

Sector Skills Council Key Groups:  $F(5, 3040) = 5.79$  : Prob > F = 0.0000

Establishment Size Categories:  $F(5, 3040) = 34.51$  : Prob > F = 0.0000

Corporate Governance Status (sector):  $F(2, 3043) = 6.42$  : Prob > F = 0.0016

Single/Multi Plant Nature of the Establishment:  $F(1, 3044) = 1.29$  : Prob > F = 0.2560

Training Conforming to Statutory Requirements:  $F(1, 3044) = 13.86$  : Prob > F = 0.0002

Characteristics of the Establishment:  $F(7, 3038) = 2.59$  : Prob > F = 0.0116

Human Resource Management Policies and Practices:  $F(3, 3042) = 4.66$  : Prob > F = 0.0030

Change in Work Methods/Organisation of Work:  $F(3, 3042) = 2.26$  : Prob > F = 0.0795

Labour Market Indicators:  $F(2, 3043) = 1.84$  : Prob > F = 0.1591